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Contents

Initiation Ceremony in the light of Aitareya Brāhmaṇa

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In the *Brāhmana* Literature, it is observed that in this tenure of life on earth, a man is born thrice. His first birth occurs when he is delivered from the mother's womb. This is said to be his physical birth. His second birth takes place at the time of his initiation ceremony *(Diksaniyesti)* or investiture with the holy thread which is his spiritual birth.

In the spiritual birth Preceptor or *Ācārya* is his father and, the *Sāvitri* verse is his mother. After his second birth one is called *'Dvija'* (reborn). A man is born for the third time when he is initiated for performing any *Yajna* or sacrifice.

In this context Manu writes in his *Manusamhitā* that according to the injunction of the revealed texts the first birth of the twice born is from his natural mother, the second birth happens on the tying of the girdle of *Muñja* grass and the third on the initiation to the performance of a *Srauta* Sacrifice.[1] It is said that an uninitiated person is not entitled to perform any sacrifice or any religious work. Since kindling of the fire is the foremost of all sacrifices, some regard it as sacrificial initiation or *Yajñadiksā.*

In the Aitareya *Brāhmana* a full parallelism is constituted between the initiated sacrificer and the human foetus. The body of the sacrificer is besmeared with butter since the body or the foetus remains clammy 'नवनीतेनाऽभ्यञ्जन्ति, इति'.

Thereafter, the priests smear the black collyrium for clearing the two eyes of the initiate. Then the whole body of the initiate is rubbed with a bundle of twenty one kusha-grasses.[2]

That is, the priests purify the body of the initiate by rubbing with a bundle of twenty one *kusha*-grasses. The foetus resides within the womb; hence like womb the priests wrap the body of the initiated sacrificer with a cover वाससा प्रोर्णुवन्ति. The upper garment of the initiated sacrificer is constituted with a skin of black antelope कृष्णाजिनमुत्तरं भवति.

The Sacrificer is directed to observe silence and close his fists because new born baby cannot speak and keeps its fists closed. A baby lies in its mother's womb by closing its fits and also takes birth in the same position.[3] Sayana comments – 'जायमानस्य मुष्टिद्वयं लोके प्रसिद्धम्' The foetus stays within the womb. For this reason the initiated sacrifice is also placed in a room called *prācinavamsa* which is considered to be the womb.

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However, it is just as an embryo undergoes the toil of labour during delivery, so the sacrifice undergoes trouble in the process of the initiation ceremony called *Diksaniyesti* to obtain his new birth for sacrificial rites. Thus the initiation ceremony confers a new birth, a transfigured life upon the sacrificer. By means of this symbolical birth the sacrificer shakes off the mundane limitations and this transfigured life received by holy rites enables him to get union with the gods of the sacrifice in order to achieve the life divine thereby.

The *yajamāna* or the sacrificer achieves union with gods and the same from and the same world of the gods eulogized in the sacrifice. Thus, the sacrifice not only confers rewards here and hereafter but also confers a new birth, a transfigured life upon the sacrificer.[4]

Sacrifice of initiation or *Diksaniyesti* is the *Vikrti yāga* of its *Prakrti yāga*, viz. *Somayāga*. *Somayāga* being the most important sacrifice. *Diksaniyesti* also is of emence importance. As a matter of fact *Diksaniyesti* is included in the *Isti* variety of sacrifice. For the performance of almost all the Vedic sacrifices, the performance of almost *Diksaniyesti* gets priority. Because without being initiated a person can not attain the right of the performance of all most sacrifice.

As *Diksaniyesti*, it is performed in a place very high the sacrificer is of higher rank. As it is higher it should be attained in any way. *Diksaniyesti* is performed towards the east, since the east is the quarter of the gods; or else it should incline towards the north, since the north is the quarter of men. It should rise somewhat towards the south, that being the quarter or the Fathers. Were it to incline towards the south, the sacrificer would quickly go to yonder world, but in this way the sacrificer lives long, therefore, rise somewhat towards the south.

The Sacrificial ground should not exceed on the east side, since such an excess would be in favor of his spiteful enemy. It may be in the south, and also in the north; but that place of worship alone is thoroughly efficient where the measure of the sacrificial ground is exceeded in the west, for to him (who possesses such a one) the higher worship of the gods readily inclines so much as to the place of worship.

It is, however, the officiating priests that constitute the place (or medium) of worship: wheresoever wise and learned *Brāhmanas*, versed in sacred lord, perform the sacrifice, there failure doesnot take place: that (place of worship) we consider the nearest (to the gods).

On this (ground) they erect either a hall or a shed, with the top-beams running from west to east, for the east is the quarter of the gods, and from the east westwards the gods approach men that is why one offers to them while standing with his face towards the east.

For this reason one must not sleep with his head towards the west, nor he should sleep stretching (his legs) towards the gods. The southern quarter belongs to the Fathers, and the western one to the snakes, and that faultless one is the one where the gods ascended (to heaven), and the northern quarter belongs to men. Hence in human (practice)

a hall or shed is constructed with the top-beams running from south to north, because the north is the quarter of men. It is only for a consecrated, not for an unconsecrated person that it is (constructed) with the top-beams running from west to east.

They enclose it on every side, lest it should rain upon the sacrificer, while being consecrated. This, at least, is (the reason for doing so in) the rainy season. He, who is consecrated, truly draws nigh to the gods, and becomes one of the deities. Now the gods are secreted from men, and secret also is what is enclosed on every side; this is why they enclose it on every side.

Not everyone enter it, only a *Brāhmana,* or a *Rājanya,* or *Vaisya,* for those are able to sacrifice.

Let him not commune with everyone, for he who is consecrated draws nigh to the gods, and becomes one of the deities. Now the gods do not commune with everyone, but only with a *Brāhmana,* or a *Rājanya,* or *Vaisya;* for these are able to sacrifice. Should there be occasion for him to converse with a Sudra, let him say to one of them. This is the rule of conduct for the consecrated in such a case.

In the first place, having taken the two churning-sticks in his hand, he approves of the hall taking hold of the chief post of the front (east) side, he pronounces this sacrificial formula *(Vāj.S, IV.I),* "we have come to this place of worship on earth, wherein all the gods delighted." Thereby that (place of worship) of his becomes acceptable to all the gods, as well as to the learned *Brāhmanas* versed in sacred lore; and that (place of worship) of his, which those *Brāhmanas* versed in sacred lore see with their eyes, becomes acceptable to them.

The above mentioned account about the selection of the place ranks *Diksaniyesti* in a high place as it appears that as the sacrifice is performed in a higher place the person who is initiated gets a close association with the gods.

The Aitareya *Brāhmana* (1.6) assigns some compultion to the initiated person. It is stated there that the initiation is for ṛta. Ṛta is satya[5] i.e. truth. It is stated also as initiation is truth, truth is to be spoken.[6]

But there are some dispute regarding this as truth is for the gods and anrta is for the human beings.[7] Now in refute to this argument the Aitareya *Brāhmana* as assigns is that the initiated persen is to speak 'विचक्षणवतीम् वाचम्'. The Āpastamba s'rauta sutra states that चनसिता is for the *Brāhmanas,* विचक्षण is for the *Rājanya,* or Vais'ya.[8]

The Sacrifice of initiation places 'truth' to be of supreme importance. It is a sacrifice of truth.

Notes :

1. मातुरग्रेऽधिजननं द्वितीयं मौञ्जिबन्धने।
तृतीयं यज्ञदीक्षायां द्विजस्य श्रुतिचोदनात्।।
Manusamhitā-2/169

2. एकविंशत्या दर्भपिञ्जूलैः पावयन्ति-
Aitareya Brāhmana

3. मुष्टी वै कृत्वा गर्भोऽन्तः शेते मुष्टी कृत्वा कुमारो जायते-
Aitareya Brāhmana

4. स्वर्गं वा एतेन लोकमुपप्रथन्ति यत् प्रापणीयस्तत् प्रायणीयस्य प्रायणीयत्वम्-
Aitareya Brāhmana

5. ऋतं वाव दीक्षा।
सत्यं दीक्षा।
Aitareya Brāhmana-1.6.
तस्माद् दीक्षितेन सत्यमेव वदितव्यम्।

'मानसमर्थतथात्वम् ऋतम्। वाचिकमर्थतथात्वं सत्यम्। तदुभयहेतुका दीक्षा भवति। तद्धेतुत्वात् ताच्छब्द्यम्। तस्माद् दीक्षितेन सत्यमेव वदितब्यम् इति। मनः पूर्वरूपं वागुत्तररूपम् इति मनोऽप्यतथ्यं मनुष्याणां किं पुनर्वागिति प्रतिपादनार्थम् ऋतत्वमन्तरेण वाचः सत्यत्वाभावात् सत्यग्रहणमेवं कृतं न त्वनृतं ज्ञातब्यम्' इति भट्टभास्करः 'यथार्थवादित्वम् ऋतम्। यथादृष्टार्थवादित्वं सत्यम्। अनयोर्दीक्षास्थित्यर्थत्वाद् दीक्षासामानाधिकरण्यम्। तत्र यथार्थवादित्यस्यानुष्ठातुमशक्यत्वाद् यथादृष्टार्थवादित्वमेवविदधाति-तस्माद् दीक्षितेनेति' इति गोविन्दस्वामी।

Aitareya Brāhmana-1.6.

6. विचक्षणवतीं वाचं वदेत्।
'चनसितं विचक्षणमिति नामधेयान्तेषु निदधाति।
चनसितेति ब्राह्मण्। विचक्षणेति राजन्यवैश्यौ' इति।
Aitareya Brāhmana-1.6.

7. चक्षुर्वै विचक्षणम्।
एतद्ध वै मनुष्येषु सत्यं निहितं यच्चक्षुः।
Aitareya Brāhmana-1.6.

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Soma: An Important Vedic Plant and God

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Soma represents a multifaceted state in the whole extent of the Vedic literature. Soma is the name of a plant from which Soma juice is extracted and offered to the Gods. As the ritual plays a very important role in *Ṛgveda* it is only natural that Soma, the plant, the juice of which is so much used in the ritual is deified as one of the most important of Vedic God Soma. In the *Ṛgveda* the Soma hold the third position following Indra and Agni from the point of view of the total number of hymns dedicated to them. In the post Vedic mythology, Soma is identified with the Moon. Soma is the lord of all the plants.

The word Soma comes from the root √*su* which means to extract or to make ready, prepare. Soma is the name of one of the most sacred plants of the ancient world. Being the most important of herbs Soma is said to have born as the lord of plants[1] or as their king. He receives the epithet *Vanaspati*, 'lord of the wood'[2] and is said to have generated all plants. He with the plants is invoked to remove sin and confers bliss[3].

The Soma plant is once in the *Ṛgveda* described as *maujavata*[4], which according to later statements would mean produced on Mount Mujavat. Soma is also several times

described as dwelling in the mountains (*giristha*) or growing in the mountains (*parvatāvṛdh*) [5]. Mountains are also called 'Soma backed'[6], a term which, perhaps by ritual symbolism, is applied to the pressing stones (*adrayaḥ*) in the *Ṛgveda*. All these terms point to the abode of the Soma plant being on terrestrial mountains[7].

Though Soma is a terrestrial plant, it is also celestial[8], in fact its true origin and abode are regarded as in heaven. Thus it is said that the birth of the plant is on high; being in heaven it has been received by earth[9]. The intoxication juice is the 'child of heaven'[10], an epithet frequently applied to Soma.

A Soma plant is furnished with fifteen leaves which wane and wax with the waxing and the waning of the Moon. Thus one leaf grows every day in the lighted fortnight attaining the greatest number (fifteen) in the night of the full moon and then the leaves begin to decrease in number dropping one by one every day till the bare stem of the creeper is lift on the night of the new moon. The growth of the plant depends upon the luner phases of the Moon. The leaf develops one by one during *Śuklapakṣa* and become fifteen leaves on fullmoon and subsequently lose leaves one by one during *Kṛṣnapakṣa* and it remains leafless stump at *Amāvaśyā* that is no moon day.

The branches of the Soma plant were used for the extraction of the juice but not the fruits[11]. The part of the Soma plant which is pressed is called *aṁśu*, shoot or stalk[12].

The Ninth *Maṇḍala* of the *Ṛgveda* contains a number of references to the colour of Soma. The colour of the plant and juice as well as of the God is narrated as brown (*babhru*) or ruddy (*aruna*) or most often tawny (*harī*) and in accord with this, it is the rule that the cow, with which in the rite the Soma is purchased, must be brown or ruddy and that any

substitutes used for Soma must be similar to it in colour. The plant is made to yield its juice by being pounded with a stone or pressed with stones, which lie on a skin and seem in contravention to the ritual usage to be placed on the altar. It is quite possible that these variations in colour may have been due to the specific variety of the Soma plant available and the process of extraction and stage of storage. The *Ṛgveda* describes it as bright and shining[13]. Soma is narrated as purified with the hands[14], by the ten fingers[15] or figuratively by the ten maidens who are sisters[16]. Soma is the lord of the wine of delight, the beverage of immortality. Like Agni he is found in the plants, the growths of the earth and in the waters.

Soma is pressed out by the pressing-stone which has a close symbolic connection with the thunderbolt, the formed electric force of Indra who called Adri. The pressing of Soma with the help of stones was the usual method in the period of the *Ṛgveda* the pressed drops are poured upon and pass over the strainer of sheep's wool[17]. For it purifies Soma, so that he proceeds cleansed to the feast of the Gods[18]. Soma is simply described as flowing in a river of delight to the Seat of the Gods, to the abode of immortality. The purified (unmixed) Soma juice is often called *Suddha* (pure), but much oftener *sukra* or *suci*, 'bright'. This unmixed Soma is offered almost exclusively to *Vāyu* and Indra, the epithet *sucipa* 'drinking clear (Soma)' being distinctive of *Vāyu*, but is admixed with milk for *Mitra-varuṇa* and with honey for the *Aśvins*.

Based on the mixture of water with the juice, the connection of Soma with the waters is expressed in the most varied ways. Streams flow for him[19]. The waters flow his ordinance[20]. He flows at the head of streams. He is lord and king of streams[20], lord of spouses[22], an oceanic (*samudriya*) King and God[23]. The waters are his sisters. As leader of waters, Soma rules over rain[24]. He produces waters and causes heaven and earth to rain. He streams rain from

heaven[25]. The Soma drops themselves are several times compared with rain[26] and Soma is said to flow clearly with a stream of honey like the rain charged cloud[27]. So too the *Pavamāna* drops are said to have streamed from heaven, from air, on the ridge of earth[28].

Soma bestows not only long life but also immortality. Hence it is mythologically called *amṛta*, the draught of immortality. It is an immortal stimulant[29], which the Gods love[30] and of which, when pressed by men and mixed with milk, all the Gods drink[31], for they hasten to exhilaration and become exhilarated. Soma is immortal and the Gods drank him for immortality[32]. The Gods were originally mortal. They obtained it by drinking Soma, which is called the principle of immortality[33]. He confers immortality on the Gods and on men[34]. He places his worshippers in the everlasting and imperishable world where there is eternal light and glory and makes him immortal where king *Vaivasvata* lives[35]. In the heavenly world Soma is united with the Fathers (The blessed dead) as the ground of their immortality[36].

The Soma drink was considered the most effective of all medicinal preparations. Both weakness and disease disappear in the physical body immediately after one drinks Soma, a unique and divine medicine[37]. It is medicine for a sick man. Hence the God Soma heals whatever is sick, making the blind to see and the lame to walk[38]. He is the guardian of men's bodies and occupies their every limb[39], bestowing length of life in this world. The juice of the Soma plant and the Soma mixtures were thought to have more magical potency than any other. The Soma draught is even said to dispel sin from the heart to destroy falsehood and to promote truth.

When imbibed Soma stimulates the voice[40], which he impels as the rower his boat[41]. This is doubtless the reason

why Soma is called lord of Speech (*Vācaspati*) or leader of Speech[42]. He is also said to raise his voice from heaven[43]. Soma has all wisdom and knowledge. He surveys all things with his thousand eyes. Soma also awakens eager thought[44]. He is also spoken of as a lord of thought and as a father, leader or generator of hymns. He is a leader of poets, a seer among priests[45]. He has the mind of seers, is a maker of seers[46] and a protector of prayer[47]. As the treasure house of all wisdom, he is the source of all thoughts and songs.

Soma is the 'soul of Sacrifice'[48], a priest (*Brahmā*) among the Gods[49] and apportions to them their share of sacrifice[50]. Soma's wisdom thus comes to be predominantly dwelt upon. He is a wise seer. He knows the races of the Gods[51]. He is a wise man seeing wave[52]. Soma with intelligence surveys creatures[53]. Hence he is many eyed and thousand eyed[54]. Soma is participated in the ritual. The Soma drinkers are always respected, but if the ritual is not well performed and if there are errors in its performances, the Soma drinkers become unworthy of sacrificial gifts[55]. The power of Soma is at the basis of many uses of Soma in the magical rites.

Soma is a great fighter. He is a victor, unconquered in fight, born for battle[56]. He is the most heroic of heroes, the fiercest of the terrible, ever victorious[57]. He conquers for his worshippers' cows, chariots, horses, gold, heaven, water, a thousand boons and everything. Without reference to his war like character, he is constantly said to bestow all the wealth of heaven and earth, food, cattle, horses, and so forth[58]. Soma himself is occasionally called a treasure or the wealth of the Gods[59]. Soma is a fighter against darkness. He can also afford protection from foes[60]. He drives away goblins and like some other deities but more frequently, receives the epithet of goblin slayer (*rakṣoham*). Soma is the only God who is called a slayer of the wicked. In the later Vedic literature the

statement occurs that *Brāhmaṇs* who drink Soma are able to slay at a glance[61].

Being a warrior, Soma is said to have weapons. Which like a hero he graps in his hand and which are terrible and sharp[62]. He is said to have obtained his weapons by robbing his malignant father of them[63]. He is described as armed with a thousand pointed shaft[64] and his bow is swift.

The conception of Soma comes to be extended to that of a being of universal dominion[65], who is 'lord of the quarters'[66], who performs the great cosmic actions of generating the two worlds of creating or establishing heaven and earth, of supporting heaven and of placing light in the Sun[67].

Soma has a romantic aspect also. He is not only lovable but also a lover and sometimes even a beloved. The daughters of the priest have adorned him as if he were a beautiful youth[68]. There are of course, the fingers. Again ten ladies have sung to him as a maiden welcomes her love[69]. Soma, the red one, blends himself with the cows that yield their fair breasts. Hence the cows themselves stand for milk[70]. Everyone does his best to beautify him. He settles down among men like a hawk moving as a lover to his beloved[71]. The fingers are the glittering maids and sisters owing Soma as their lord[72]. He flows on the skin of the sheep like one longing a bride. *Apsarās* that live in the waters of the sea have seated themselves within the vat and flow to Soma [73], who is their lover probably. He gives pleasure as a wife pleases her husband[74] and moves onward like a youth to the youthful maids[75]. He is sung by poets as a lover to his love.

God Soma blesses the woman, who is in search of her husband; so that she obtains proper husband. A king who has lost the support of his people is banished out of his territory. He resorts to mountains. When again the times are favorable

he is installed. Soma calls him back from the mountains, where he might be resting.

In a few of the latest hymns of the *Ṛgveda*, Soma begins to be mystically identified with the Moon. In the AV, Soma several times means the Moon and in the *Brāhmaṇas* this identification has already become a common place. In the post Vedic literature, Soma is a regular name of the Moon, which is regarded as being drunk up by the Gods and so waning, till it is filled up again by the Sun. In the *Chāndagya Upaniṣad*, the statement is found that the Moon is king Soma, the food of the Gods and is drunk up by them[76]. Even in the *Brāhmaṇas* the identification of Soma with the Moon is already a common place. Thus the *Ait. Br.* remarks that the Moon is the Soma of the Gods[77]. The *Śat.Br*, that king Soma, the food of the Gods, is the Moon[78]; and in the *Kau. Br*, the sacrificial plant or juice is symbolical of the Moon God[79]. In the AV, Soma several times means the Moon[80]. Soma is possessed of rays[81]. Thus we get the identifications of Soma with the Moon. Soma is directly called to be *Candramās*[82]. The stem of Soma is the lord of fighters. By name it is never deficient in anything. Therefore, he (*darṣa*, the slender crescent of the new moon) should never make the worshipper deficient in progeny and riches. The *darṣa* or the young Soma plant (Moon) is complete at the point and at the end. He is charming to look at. The stems of Soma are unexhausted and the Gods feed on the unexhausted.

It will thus be noticed that Soma plant is used by the Atharvavedic singer not only for ritual but also for magical and medicinal purposes. Great emphasis is laid on the power of Soma and somehow it is made to connect itself with the various amulets and charms. The identification of the plant with the Moon is complete in the A.V. and this naturally leads to the connection that the moon is the lord of plants and herbs[83]. Soma, the Moon whose soothing light is praised by

poets the world over, is the outer symbol of *ānanda*, the delight of existence which upholds the universe.

Soma is the lord of the north[84]. There is a charm for securing safety from tigers, robbers, etc. The charm to crush the tigers belongs to *Atharvan* and is born of Soma. The strength of Soma is at the basis of such power of the charm[85]. Soma is described to be always victorious in the battles. The plants with king Soma are praised to relieve one of his sins. Soma is invoked to purify a person from the offence that he might have committed with his eye, mind, speech, during wakeful or sleeping state. The rite of shaving or (*godana*) is performed under the instructions from Soma. Soma increases both power and knowledge[86].

Foot Notes:

1. *Rgveda* 9.114.2
2. *Rgveda* 9.12.7
3. AV. 2.10.2
4. *Rgveda* 10.34.1
5. *Rgveda* 9.46.1
6. AV. 3.21.10
7. *Rgveda* 9.82.3
8. *Rgveda* 10.116.3
9. *Rgveda* 9.61.10
10. *Rgveda* 9.38.5
11. *Rgveda* 10.85.3
12. *Rgveda* 9.67.28
13. *Rgveda* 9.42.1
14. पवमान महार्णो वि धावसि सूरो न चित्रो अव्ययानि पव्यया।
    गभस्तिपूतो नृभिरद्रिभिः सुतो महे वाजाय धन्याय धन्वसि ॥–*Rgveda* 9.86.34
15. मृजन्ति त्वा दश क्षिपो हिन्वन्ति सप्त धीतयः। अनु विप्रा अमादिषुः ॥–*Rgveda* 9.8.4;
16. तमीमण्वीः समर्य आ गृभ्णन्ति योषणो दश। स्वसारः पार्ये दिवि ॥–*Rgveda* 9.1.7
17. परीतो वायवे सुतं गिर दून्द्राय मत्सरम्। अव्यो वारेषु सिञ्चत ॥–*Rgveda* 9.63.10
18. प्र राजा वाचं जनयन्नसिष्यददपो वसानो अभि गा इयक्षति।
    गृभ्णाति रिप्रमविरस्य तान्वा शुद्धो देवानामुप याति निष्कृतम् ॥–*Rgveda* 9.78.1
19. *Rgveda* 9.31.3
20. *Rgveda* 9.82.5
21. *Rgveda* 9.15.5
22. *Rgveda* 9.86.32
23. *Rgveda* 9.107.16
24. *Rgveda* 9.74.3
25. *Rgveda* 9.49.1
26. *Rgveda* 9.41.3
27. *Rgveda* 9.2.9
28. *Rgveda* 9.63.27
29. *Rgveda* 1.84.4
30. *Rgveda* 9.85.2
31. *Rgveda* 9.109.15
32. *Rgveda* 9.106.8
33. *Śat Br.* 9.5.18
34. *Rgveda* 8.48.3
35. *Rgveda* 113.7-8
36. त्वं सोम पितृभिः सम्विदानोऽनु द्यावपृथिवी आ ततन्थ।
    तस्मै त इन्द्रो हविषा विधेम वयं स्याम पतयो रयीनाम् ॥–*Rgveda* 8.48.13
37. *Rgveda* 8.48.11;
38. *Rgveda* 10.25.11
39. *Rgveda* 8.48.9
40. *Rgveda* 6.47.3
41. *Rgveda* 9.95.2
42. *Rgveda* 9.26.4

43. *Rgveda* 9.68.8
44. *Rgveda* 6.47.3
45. *Rgveda* 9.96.6
46. *Rgveda* 9.96.18
47. *Rgveda* 6.52.3
48. *Rgveda* 9.2.10
49. *Rgveda* 9.96.6
50. *Rgveda* 10.85.19
51. *Rgveda* 9.97.7
52. *Rgveda* 9.78.2
53. *Rgveda* 9.71.9
54. *Rgveda* 9.60.1
55. AV. 2.35.3
56. *Rgveda* 1.91.21
57. *Rgveda* 9.66.16
58. *Rgveda* 9.52.1
59. *Śat Br.* 1.6.4.5
60. *Rgveda* 10.25.7
61. *Rgveda* 9.61.30
62. *Rgveda* 9.61.30
63. *Rgveda* 6.44.22
64. *Rgveda* 9.86.40
65. *Rgveda* 9.86.28-29
66. *Rgveda* 9.113.2
67. *Rgveda* 6.47. 4
68. *Rgveda* 9.14.5
69. *Rgveda* 9.56.3
70. *Rgveda* 9.61.21
71. *Rgveda* 9.38.4
72. *Rgveda* 9.65.1
73. *Rgveda* 9.78.3
74. *Rgveda* 9.82.4
75. *Rgveda* 9.86.16
76. *Ch.Up.* 5.10.1
77. तदाहुर्यद्दर्शपूर्णमासयोरुपवसति न ह वा अव्रतस्य देवा हविरश्नन्ति तस्मादुपवसत्युत मे देवा हविरश्नीयुरिति पूर्वाम्पौर्णमासीमुपवसेदिति पैङ्गयमुत्तरामिति कौषीतकं या पूर्वा पौर्णमासी सानुमतिर्योत्तरा सा राका या पूर्वामावास्या सा सिनीवाली योत्तरा सा कुहूर्याम्पर्यस्तमियादभ्युदियादिति सा तिथिः पूर्वाम्पौर्णमासीमुपवसेदनिर्ज्ञाय पुरस्तादमावास्यायां चन्द्रमसं यदुपैतियद्यजते तेन सोमं क्रीणन्ति तेनेत्तमुत्तरामुपवसेदुत्तराणि ह वै सोमो यजते सोममनु दैवतमेतद्वे देवसोमं यच्चन्द्रमस्मादुत्तरामुपवसेत् । –Ait.Br. 7.11
78. Śat. Br. 1.6.45
79. Kau.Br. 7.10; 4, 4
80. मुञ्चन्तु मा शपथ्या दहोरात्रे अर्थो उषाः । सोमो मा देवो मुञ्चतु यमाहुश्चन्द्रमा इति ॥–AV. 11.6.7
81. उदेनं भगो अग्रभीदुदेनं सोमो अंशुमान् । उदेनं मरुतो देवा उदिन्द्राग्नी स्वस्तये ॥–AV. 8.1.2
82. मुञ्चन्तु मा शपथ्या दहोरात्रे अर्थो उषाः । सोमो मा देवो मुञ्चतु यमाहुश्चन्द्रमा इति ॥ –AV. 11.6.7
83. AV. 11.6.7
84. उदीची दिक्सोमोऽधिपतिः स्वजो रक्षिताशनिरिषवः ।
तेभ्यो नमोऽधिपतिभो नमो रक्षितृभ्यो नम इषुभ्योनम एभ्यो अस्तु ।
योऽस्मान्द्वेष्टि य वयं द्विष्मस्तं वो जम्भे दध्मः ॥ –AV. 3.27.4
85. यत्संयमो न वि यमो वि यमो यन्न संयमः । इन्द्रजाः सोमजा आथर्वणमसि व्याघ्रजम्भनम् ॥ –AV. 4.3.7
86. त्वं सुतस्य पीतये सद्यो वृद्धो अजायथाः । इन्द्र जैष्ठ्याय सुक्रतो ॥
आ त्वाः विशन्त्वाशवः सोमास इन्द्र गिर्वणः । शन्ते सन्तु प्रचेतसे ॥–*Rgveda* 1.5.6-7

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HOME AS 'IDENTITY': A CRITICAL ANALYSIS OF NISSIM EZEKIEL'S POETRY

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ABSTRACT
Ezekiel tends to investigate the relation between home and identity and how home contributes in forming one's identity through his poetic corpus. His interrogation of home and identity in the backdrop of postcolonial theories throws enough light on his problem of alienation. Needless to say that an individual is attributed with a primary identity in relation to own native place. The home, parents and other inhabitants of home, are the agents that provide a child the actual identity. Therefore, home leaves an eternal memory in the life of an individual without which one cannot live. During the long journey of life, the memory of home and the identity attributed by home are borne by an individual. The journey of making identity continues beyond home also, but the living identity conferred by home haunts an individual throughout his/her living tenure. However, identity formation is dynamic, not static as it can be established in relation to society, position. socio-political situation and cultural condition. The present paper interrogates Ezekiel's notion of home and identity reflected in his poetry in the backdrop of postcolonial theory propagated by Several postcolonial thinkers and critics like Homi Bhabha, Gayatri Spivak, Jhumpa Lahiri, Frantz Fanon, Stuart Hall have conceptualized identity contesting the colonial notion of identity.
Keywords: home, identity, alienation.

"Home and Identity' tends to investigate Ezekiel's demonstration of the relation between home and identity and how home contributes in forming one's identity. His interrogation of home and identity in the backdrop of postcolonial theories throws enough light on his problem of alienation Whereas the essentialists view identity as a 'fixed construct', the postcolonial concept of identity becomes at once political, cultural or social. Stuart Hall relates culture to identity and contradicts traditionalists view that identity is root or given from the past.

John McLeod in his book *Beginning Postcolonialism* (2000), argues that home can act as a valuable means of orientation by giving us a sense of our place in the world with emphasis on 'belongingness' and 'original root (210)'. Certainly, this traditional idea implies that people define their identity to their roots. But a paradoxical notion is propagated by the postcolonial thinkers while contextualizing the immigrants and their home and identity. Many people are compelled to leave their homelands in the course of colonialization, continuing up to present time. Though they adopt other's land as home, they somehow feel committed to their old country in spite of the assimilation. In this context postcolonial writers like McLeod, Rushdie, Jhumpa Lahiri, Brah conceptualize home as 'Mythic Place' or an 'Imaginary Homeland'. Consequently, facing discrimination in new country, a sense of

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alienation evokes resulting a sense of identity crisis as they cannot identify their real home. Their home of origin and home of settlement juxtapose and shape a sense of unhomliness. In the seminal essay of Stuart Hall '*Cultural Identity and Diaspora*', he maintains that identity is not a static or stagnant construct but a dynamic process. Cultural identity is a matter of 'becoming' as well as 'being'. It belongs to the future as much as to the past (225).

In the light of the above discussion on home and identity, Nissim Ezekiel's poems can be scrutinised from the said postcolonial perspectives. The encounter, confrontation or tension between his desire to assimilate and his need for ethnic identity tore Nissim Ezekiel from inside. Many of his poems deal with the postcolonial concept of home and identity. Among various issues raised in his poetry, identity issue shapes many poems which are milestones in Indian English poetry. The poem *Speech and Silence* (cp-53) portraits a man as alienated individual, rootless and helpless uttering 'Man is alone from his inner world'. M.K.Naik in his book *A History of Indian English Literature* (1995), maintains while talking about Ezekiel's alienation, "A refugee of the spirit' in search of his 'dim identity' which in different mood appears to him to be either a 'one man lunatic asylum' or 'a small deserted holy place' (164).

Ezekiel was a victim of different discriminations and some his poems surface the struggle of the poet for identity in a country where he as well as his community is castigated as alien. The concept of 'hybrid' migrant as problematized by Bhabha and Rushdie is reflected by Ezekiel's conceptualization of home and identity in his poetry. The fact that Ezekiel suffered from a sense of loneliness or not belonging is demonstrated by the critic A.K. Raghu also. He, in his book *The Poetry of Nissim Ezekiel* comments aptly, "Whether or not this generalization is correct, the author of the statement has always been alone. (148)". Ezekiel vehemently substantiates his identity crisis in his essay '*Naipaul's India and Mine*', "I am not a Hindu and my background makes me a natural outsider. Circumstances and decisions relate me to India. In other countries I am a foreigner. In India I am an Indian. (99)"

Ezekiel's conceptualization of home and identity finds best expression in his poem '*Background Casually*' where he encompasses various experiences of his life lived in Bombay. Being a descendant of Bene Israel Jewish community, he lacks Indian root and adheres a marginal position in the society. He describes the predicaments of living in the hostile environment throughout the poem and reflects his sense of alienation. A brief trajectory into the poem reveals how the issue of home and identity occupies his poetry. In the poem, his sense of alienation and his consequent identity crisis find vivid expression. Not that he felt alienated from Indian ethos, but also from his own Jewish ethos. He appears a helpless victim of religious and racial discrimination and he found it difficult to feel at home. Being nostalgic, he recalls childhood experience and the humiliation met by him at school for being a Jew. He expresses his spiritual differences with the main stream culture which made it humanly impossible to feel at home in the land of his birth. He further focuses on his alienation from his Jewish ethos expressing that his morals declined during Friday night prayer out home. He longs for his home which he adopts through reconciliation and naturally he cannot identify himself as an Indian. Here, he acknowledges his crisis of identity. He writes in a tone of terror in the 1st segment of the poem:

I went to Roman Catholic school,
A mugging Jew among the wolves.
They told me I had killed the Christ,
That year I won the scripture prize.
A Muslim sportsman boxed my ears.
I grew in terror of the strong
But undernourished Hindu lad, (cp-179)

Here, the poet expresses his marginalisation and highlights his terror-stricken school days so vividly that the readers find enough reason to realise his identity crisis. He depicts how he was like a helpless prey among the wolves in his school. By the metaphor of wolves, he refers to the majority of students belonging to Hindu, Muslim and Christian community. The Christian students accused him of killing Christ and the strange thing is that he won the

scripture prize that year. Despite his devotion to scriptures, he was blamed that Jews were responsible for killing Christ. Again, the Muslims bullied him and he had to live in terror among the strong Hindu students. The total unfriendly atmosphere of the school left a scar in his heart and he had to live in a panic. He hardly could belong to such a place and it fuels to make him suffer from identity crisis and unhomliness.

The poet's exasperation and distrusts find expression in the 2nd segment of the poem also. He reveals how he endeavours to negotiate with his native space but meets with heart break. His inner conflict finds a telling expression in the following lines:

How to feel at home, was the point.

Some reading had been done, but what

Had I observed, except my own

Exasperation? All Hindus are

Like that, my father used to say, (cp-180)

Ezekiel transparently reveals his problem of belonging here when he says that to feel at home in his native city is his main issue. He recalls his father's comment about Hindus. His father also held negative impression about the Hindus as their community had to suffer at the hand of them and told the poet that all Hindus were annoying. Despite his keen awareness of the fact that his native city bears negative dimensions, he has to adapt himself to the city and to identify himself as an Indian. He reveals how he becomes the part of his native city with the passage of time. He writes:

The Indian landscape sears my eyes

I have become a part of it"

To be observed by foreigners

They say that I am singular

Their letters overstate the case. (cp-181)

The poet very vehemently expresses that Indian landscape burns or pains his eyes as he finds it uncongenial. But yet he becomes an unavoidable part of his native city to draw the impression of the foreigners. They hold the opinion that the poet is lonely looking at his secluded existence. It is noticed here that he fails to assimilate with the landscape and hence fails to feel homely in India. At the same time, he suffers from identity crisis as he misses his home in Bombay. The traditional notion that 'home' provides a man with primary identity seems to be applicable here. Prior to this realisation, the poet expresses how his surrounding environ leads him to feel unhomely. He recounts the hostile environ in which he grows up and how he feels rootless. He writes in the 2nd segment of the poem. "How to feel at home, was the point", and it establishes his dilemma of adopting his native city as home. This ultimately gives him a sense of identity crises owing to the inner turmoil he experiences relating to his home.

In the final stanza of the poem, Ezekiel acknowledges that he has negotiated with his native space and tries to identify himself as an Indian accepting his backward place as his place of belonging. Notwithstanding the adverse situation of living, he considers his native place to be his home as he has to stay there. It can be interpreted that he realizes that one should acquire an identity from one's home and so he tends to negotiate. He avers:

I have made my commitments now

This is one; to stay where I am

As others choose to give themselves

In some remote and backward place.

My backward place is where I am. (cp-181)

The said lines focus on Ezekiel's sense of belonging to India, specially to Bombay. Despite bearing a label of being a Bene Israel, he expresses that he is deeply rooted in India and committed to his native land. It is observed that he has to negotiate his home and identity as he realizes that he has to stay in his native space though it is backward. Though he digs at the 'barbaric city' and finds it unsuitable to accept as home, he tends to submit his acceptance. Notwithstanding his disgust for the city with its futilities, he makes his commitment to stay in Bombay. He asserts his sense of belonging in an interview with John Beston ,"I have a strong sense of belonging ,not only to India but to this city.(85)" His

ambivalence regarding his native land and city find telling expression here.

'*Island*' is another topical poem which unveils Ezekiel's close attachment to his native city and his attempts to negotiate his home with the city despite its unfriendly and barbaric environ. His effort to seek his identity as a native of the city finds expression in the poem. The opening lines reveal Ezekiel's attitude towards the city that provides him his way of living and hence an identity. He candidly expresses 'I am here to find my way in it" (L-5, cp-182). He further throws light on the negative dimensions of the city referring human voice to be 'dragon's like'. However, with all its negativity, Ezekiel clings to the city as his home space that identifies him as a native of city of Bombay. His sense of negotiation with urban landscape that offers him home and consequent identity, finds a telling expression in the following stanza-

How delight the soul with absolute

Sense of salvation, how

Hold to single willed direction?

I cannot leave the island

I was born and belong. (cp-182)

It can be understood here that Ezekiel admits his incapability to leave his place of birth which implies that his birth place provides him an identity for which he wants to stay there. Despite the uncongenial environ of his native city full of slum, his soul attains a sense of delight here as he can dream of salvation in this native city, and leaves behind the negative aspects of the city. Consequently, he develops a sense of belonging to the island i.e., his native city. He further expresses that he cannot scrap the bonds of attachment with the city where miracles take place that leads him to his daily work. He behaves like a good native and assimilates to the ways of itself accepting both weal and woes rendered by the city.

Ezekiel makes a great revelation in segment V of the poem '*Poster poems*' that he has been a refugee of spirit searching for his 'dim identity'. He is quite candid here and showcases his submissive mood to belong to his native place. Here, he calls his native country 'a loved and troubled country' which he regards as both home and enemy. The barbaric environment of the city and his marginalization as a member of small Jew community convert him to a state individual lacking any spirit to live in the country but his desire for identity compels him to consider his hostile country as his native country. It is quite pristine here that he negotiates home and identity as a homeless cannot identify oneself as a native of that space. M.K.Naik (1995), maintains while talking about Ezekiel's alienation, "A refugee of the spirit' in search of his 'dim identity' which in different mood appears to him to be either a 'one man lunatic asylum' or 'a small deserted holy place" (164) He reveals his submissive mood and ambivalence as he writes:

I have never been a refuge

Except of the spirit,

A loved and troubled country

Which is my home and enemy. (cp-209)

The lines evoke the solitude of a modern man who is in quest of home and identity, despite his immense dislikes, he has to consider his native city as home. Dr, Shalia Mohan (1977) relates in this context,"The modern city has its humanizing effect. The place is not necessarily Bombay, but any place where man loses identity…The city emerges as an image of inferno where the modern city dweller is placed to suffer and crave his way out. (55)"

The poem '*The Egoist's Prayers*' demonstrates how Ezekiel is spiritually damned and feels unworthy to receive God's command. He expresses how he is 'cut off' from his land and from God's mercy owing to his vices. But in spite of his sense of alienation, he does not want to leave his native place and wants to reconcile with his place of belonging. His Bene Israeli background hardly seals his sense of belonging to India, rather he desires to make his living place his home. He searches for his self, vis-à-vis India and prays God to seal his way to go abroad. His efforts to negotiate home and identity, is marked in the following lines depicted in the concluding stanza:

Confiscate my passport, Lord,

I don't want to go abroad.

Let me find my song

Where I belong. (cp-213)

It is crystal clear here that he accepts his place of belonging as his home which identifies him as an Indian. His close attachment to his native city Bombay leads him cling to the city despite all oddities of the city space. His desire to identify himself as an Indian is reflected here. His identity and for that he does not want to leave his place of belonging through foreign country is more allusive. Shrish Chindhale's remark about Ezekiel authenticates his said idea and commitments towards his native land. He maintains "He has made his commitments, chosen his islands, found his people and identified five elements of sky, earth, air water and fire. It is quite gratifying that God has granted him the human metaphor also to make his song good. This is not a mood of submission, or resignation, or of alienation. It is rather the epiphanic moment of reconciliation, identification, discovery and achievement. (50)"

It is quite interesting to notice that Bombay becomes an indispensable part of Ezekiel life notwithstanding his odd experiences associated with the city. Even when he visits Edinburgh, the memory of Bombay haunts him and his knot with the city stay everlasting, such attachment is possible if a person is too occupied with certain things both mentally and emotionally. Such is the situation with Ezekiel as Bombay creeped into his soul. He carries Bombay in his heart in a foreign strand even that finds expression in segment XXI of *'from Edinburgh Interlude'* titled '*Mangoes*'. He avers:

I have not come

To Edinburgh

To remember

Bombay mangoes

But I remember them (cp-293)

His statement here reveals how he carries the memory of his native land while busy in foreign land. Even the tiny thing like mango also peeps through his memory lane. This shows his affinity towards his native city to which he affiliates. He maintains in an interview, "A writer needs a national or cultural identity, without that you become a series of imitation, echoes, responses, but you do not develop because there is nothing at the core to develop. (Ezekiel, 89)" This is obviously Ezekiel's postcolonial notion that establishes how identity is necessary and how a rootless fellow turns a hollow man having nothing to capitalize on in order to develop. Therefore, he, time and again, attempts to establish his national identity despite being disillusioned by his native city and home. Postcolonialism partakes landscape, history, national identity which is well reflected in the poetry of Ezekiel. The poem *Mangoes* quoted above authenticates the notion. Despite bearing a Bene Israel heredity, Ezekiel is deeply rooted in India and his attachment to the city finds best expression here.

Colonization essentially marginalizes people culturally making it hard for the colonized people to adapt in the new world after independence. Thus, people in postcolonial era feel rootless and the issue of loss of identity evoked. Ezekiel captures this issue of quest for identity in postcolonial period very meticulously in many of his poems as discussed above. A sort of dilemma of Ezekiel is realised through his poems that leads him to negotiate home and identity.

His poem '*Transparently*' demonstrates the same dilemma which he desires to resolve. He expresses how he feels at a loss and rushes in every direction in search of his identity and home but fails to achieve. It leads him to a state of rootlessness. Finally, he perceives that it is meaningless to undergo a mental strain by wandering. There is a clear tone of submission in the poem as he makes an attempt to recognize his dilemma relating to his home and identity feeling utter lonely and to resolve the issue. This makes it transparent that he wants to accept his native city as home and his identity pushing his sense of rootlessness behind. He writes:

All I want now

is the recognition of dilemma

and the quickest means

of resolving it

within my limits. (cp-150)

His poem *'Enterprise'* is a master piece, a gem of poetry which demonstrates poet's postcolonial attitude through the focus on modern man's search for identity. By the metaphoric journey in search of peace and spirituality, the poet highlights postcolonial quest for self and identity. The poem displays how the enthusiastic spiritual journey to achieve peace and identity ends with disillusionment as the members of the group attain nothing but a spiritual bankruptcy. Closing lines of the poem steals the show as these lines reveal deep thoughts of the poet. He writes:

"When finally, we reached the place

We hardly knew why were there

The trip had darkened every face

Our deeds were neither great nor rare

Home is where we have to earn our grace. (cp-118)

The poem is an allegory of the condition of modern human beings. The group of pilgrims continue their journey with a hope of exploring something different from their hectic lives and to find peace and spiritual contentment overcoming all hurdles. So many distractions, diversions and obstacles are witnessed by the members but still they continue their enterprise. But all end in a heartbreak as they fail to find any significance of the tiresome journey and their disillusionment is total. They end their journey with the realisation that 'Home is where we have to earn our grace.' They learn it that home is the best place to attain peace and grace and home can identify an individual the last line reveals that the effort to escape from reality of life is futile. We have to accept 'home' as the ultimate reality which can provide us peace, security and identity. Ezekiel's stance here is in the line of Uma Parameswaran's (2003) notion that 'home is there where our feet are. (118)' It means where we put our feet, that place becomes our home. Home can render identity to us and we need not wander to seek it outside.

While concluding, it may be conceded that home could not provide Ezekiel with an identity though it is believed that a primary identity is attributed to an individual by home. He maintains a love-hate relationship with native city and hence his acceptance of it as home and his identity as an Indian are often put into question. Again, it is observed that Ezekiel's existence in India was like the condition of the immigrants who face unhomliness in his land of settlement. He has to negotiate his home and identity. His Jewish ancestry made him to stand alone amidst Hindus and Muslims. Ezekiel succinctly pinpoints at the agency and anguish of loneliness and consequent identity crisis and unhomliness. It is unfurled here that Ezekiel felt like an exile at home and Ramanujan, another great Indian modern poet, felt at home in exile. Ezekiel had the inevitable choice to stay in India, which unsettled him. Not that his choice or reconciliation or negotiation to settle in India provided him an anchor for his dreams and hopes, but it launches the poet into an unending search for home, identity and repose instead. The paper explores how the poet digs at the mechanical and artificial life of modern man and how he suffers from home and identity crisis.

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Cultivation of Medicinal and Aromatic Plants as Source of Profit Generation and Employment Opportunities: A Look into India with special reference to Northeastern Region

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Abstract

Cultivation of Medicinal and Aromatic Plants is an excellent source of employment and profit generation. A large section of rural population in Northeast India depends on biodiversity for their better health and life. But certain anthropogenic activities are identified as the main causes of losing the medicinal plants diversity. Here, appropriate measures are in need of time to save the ecosystem.

Introduction:

With ever growing demand for natural products in food, pharmaceutical, perfumery, flavor and cosmetic industries, cultivation of medicinal and aromatic plants has now become popular and economically viable (Khanuja, 2004). Medicinal and aromatic plants, natural source of raw material for industrial products offer a great scope to receive net higher return and scoe for larger employment opportunities in recent times. The cultivation of such plants now form an important place in global international agricultural business with an estimated growth rate of about 6 to 12 percent (Economic Review, 2006). The Menthol mint (menthe arvensis) in Indo- gangetic plants damask rose in the plains and hilly areas of north India, lemongrass (cymbopogon flexuosus) in southern Indian plants, geranium (pelargonium, graveleons) in southern and northern part of India, citronella (cymbopogon winteriams), neem, pudina, tulsi acodo, kani pata in north eastern regions are some of the valuable industrial raw material aromatic plants are collected from forests, their systematic cultivation has now started in different parts of the country.

Sarpagandha (rauvolfia serpentine), periwinkle (catharanthus roseus), safed musli, isabgol (plantago ovate), senna (cassta senna) and aloe vera are some of the important medicinal plants that are being cultivated on a large scale the regular supply of raw materials for upcoming pharmaceutical industries (Botanical Survey of India).

However, there has always been problem of obtaining equitable genus raw materials in good quantities from the natural sources. Indiscriminate environmentally unfriendly assemblage has resulted in limited supply of some important herbs resulting in adulteration or substitution. Furthermore, the compatible quality of herbal raw materials collected from indigenous sources cannot be ensured due to cross reaction resulting in variability. Thus systematic cultivation of medicinal and aromatic plants involving High Yielding verities (HYVs) producing quality product maintaining the regular supply of raw materials at desired good qualities has therefore become essential for the growing user industries.

Role of Central Institute of Medicinal and Aromatic Plants:

Taking into consideration the upcoming and rising demand for medicinal and aromatic plants' products in both domestic and global market the Central Institute of Medicinal and Aromatic Plants (CIMAP) has taken initiatives to develop technology packages in cultivation and for the potential growth of medicinal and aromatic plants in different parts of India. Genotype yielding products such as, ayurvedic medicines, natural food products, natural health care perfume, and chemicals are recently popularized developed in different environmental viable region, particularly in forest zone. The raw materials of them are highly demanded and acceptable both for domestic and international markets. Systematic and scientific interventions put together the product like menthol mint becomes most popular crop of marginal and small farmers across the country. The cultivation of menthol is now increasingly replacing opium. For the farmers, the production of menthol oil has become a cottage industry. Because of higher return the quality product of High Yielding Verities of Himalayan products are released by CIMAP got wide acceptability among the farmers and demand of raw materials in industries are increasing day by day due to the quality. In fact, geranium bio-village programme in Uttaranchal and Uttar Pradesh sensitized growers for cultivation of excessive priced crops for still higher returns (Singh, 2004). The research are initiated by the CIMAP for new anti- cancer, anti- ageing, anti-virus, malaria, dyrihia, anti-obesity, anti-hypertension, diabetic medicine and hepatic-protective molecules from various plants is on.

Employment Opportunities:

Medicinal and aromatic plants, once brought under cultivation would be required both skilled and unskilled labour since the very beginning cultivation to processing, improved processing and delivery of an active ingredient in convenient and useable form. All these activities involved labour intensive come up with huge range for employment opportunities and generate it and helps in eradicate poverty of rural mass people. Cultivation, processing and trade through value addition of harvested products from medical and aromatic plants give higher profit to the cultivators and a good approach for self employment of farmers and master plan of sustainable agro-economic growth. With medicinal and aromatic plants , the potentiality for self employment is also enormous e.g. the total chain from seed or propagate to the product requires manpower for cultivation, generating planting materials and processing or distillation, technical manpower for value addition and product formulation and personnel involvement in marketing. There is ample scope for employment in each and every stage from beginning to last.

However, among basic needs of human being, food is the first choice and hence cultivation of medicinal and aromatic plants does guide us to replace the food crops production. Therefore, it is obvious that medicinal and aromatic plants cultivation to be integrated with food from horticulture crops. Higher extent of net yielding can be expected by integrating the cultivation of medicinal and aromatic plants with rice cultivation .For example, mints to be integrated with rice –wheat, rice-potato rotation. Similarly, co-cultivation of onion with mint, garlic with geranium and mints with sugarcane may increase the amount of profit from a small unit of area under cultivation. Most of these crops can also be homogenized with plantation crops or orchards, e.g, patchouli can be cultivated in orchards of coconut and coffee plantations similarly, a pineapple can be grown in banana plantation. This provides an additional yield /profit without affecting the profitability of main crops'. Thus the mission statement of CIMAP towards "green technologies for better health and life" is to be reflected towards societal improvement through medicinal and aromatic plants integrated with food crops and will generate more employment.

The raw materials and value added produce from cultivation of medicinal and aromatic plants are increasingly demand in day by day and safety and efficacy of plants based drugs and importance of natural aroma chemicals in perfumery, cosmetics and flavours. There is a sufficient scope to export these products to USA, Europe and other global markets. The production of quality raw materials therefore is bound to fetch higher prices

and thus higher profits (Swaminathan, 2001). However, some kind of traditional plants, menthol mint among one which did not gain much popularity initially mainly because of lack of HIVs producing good quality, now completely replaced that prevalent cultivated poor genotype after using HIVs seeds. Plant transplanted technology and early maturing varities enabled farmers to obtain good quality can earn more profits and now many small to marginal farmers are adopting this crop. At present this crop covers more than 1.5 lakh hectares (Chada, 2002).This has improved the socio-economic status of the poor farmers. Similarly, cultivation of menthe arvensis on large scale has also generated enormous employment and strengthened the business of related industries and promoting entrepreneurships in backward region. It is estimated that in each employment benefits from mint business of about Rs 420 cr. accrued to about 3 lakh persons. Now, menthe arvensis is considered a major cash crop in North India plains contributing 75-80 percent global menthol mint oil production and exports to other countries earning valuable foreign exchange (GOI, 2006).

A Look into North-Eastern Region of India:

The Northeastern region of India, earlier called seven sister states of Northeast India endowed with vast natural resources. The whole Northeast Region is located within the IUCN, recognized by Himalaya Hotspot and considered to be very good birth place of some valuable medicinal and aromatic. The zone, for instance, plants possessed plenty in distinct variety of herb, distillation, creeping plants which are important prospective therapeutic utility of local health giving physician along with medical practitioner. More than 900 varities of medicinal plants with different species are existed in wide hilly areas of Northeastern region. Among them most popular and widely practiced of some commercially valued products such as; Sarpagandha, Nayantera sarpagandha,Dhatura,Chalgoch, Java citronella, Agnisikha,Haldhi, Dalchira, Tulsi, Tejpata Pudina Omita, Rauvolflia, Mekuri Kendu, Tankuni patha, patorkuchi neen ,etc, are some of the important industrial medicinal and aromatic plants are still collected from forest (Baishya, Begum, 2013). Although, the scientific and systematic cultivation of them are started now they are being cultivated on a large scale on traditionally for continuing the regular supply of raw-materials for pharmaceutical industries.

However, with a huge wealth of biological diversity of plants and agro-climatic zone possessed by North-East are capable of supporting the cultivation of medicinal and aromatic plants. With vast manpower resources and varied agro-ecosystem, NE region of India has a scope to play a major

role in production of medicinal and aromatic plants. MAPs related business opportunities are enormous and are visibly on rise due to the diversified uses that plants derived molecules and compounds are finding in perfumery, pharmaceutical, cosmeceutical and agro- chemical industries. The valuable molecules from the plant sources that may have utility in wide ranging applications such as antibacterial, antifungal ant protozoan, anti cancer, anti insect, ant depressants cardiovascular and nerving stimulants, growth promoters, post harvest potentiating or bio enhancer (Kameshwara Rao,2004). With an excellent natural resource base, large gene pool, undoubtedly and both skilled and unskilled manpower, the NR region may look for achieving higher quality produce and product from medicinal and aromatic plants and may an ideal method for achieving economical security besides increasing employment potential especially in rural sector and income generation.

Conclusion and Suggestions:

Summarizing the above issues it is observed that indiscriminating destruction of forests, together with unscientific extraction of the plants and over exploitation for export purposes etc, have led to the extinction of many valuable medicinal and aromatic plants. Formation of Self-help Groups (SHGs) at different levels, though exist, involving representatives of ayurvedic medicine manufactures, farmers, NGOs, agronomists, professional raw-drug collectors etc. will facilitate demand based cultivation with a buy-back arrangement. The SHGs should take care of imparting technical know- how to the cultivators, supplying genuine planting materials, establishing medicinal plants nurseries and seed banks for propagation collecting requirements from various Pharmaceutical companies and marketing the produce at reasonable price. Moreover, areas rich in medicinal plants can be developed in to herbal sanctuaries, so that this unique biological wealth can be safeguarded and conserved well for posterity.

Secondly, there is need to expand facilities for a continuous updating of skills and information in relation to all aspects of medicinal production, processing and marketing among producer. For this, it will be useful to establish in every district the Institute of Medicinal and Aromatic Plants with merge of Krishi Udgyon Kendra. It is also desirable to develop region as herbal bio-region. The infrastructure that are necessary for seed multiplication including tissue culture facilities, establishment of nurseries of elite materials, validation and certification and producer-oriented marketing and other centralized facilities efficient decentralized production will have to be provided in the herbal bio-region.

Thirdly, the Government of India should review the current policy regulation of medicinal and aromatic plants and adopt intensive programmes and policies for promotion of MAPs cultivation. The Department of Horticulture, Government of India should provide incentives to the farmers for taking up of MAPs by demonstrations to the grower, assistance for the establishment of herbal garden, oil extractions including processing, drying and storage unit. The training and workshop involving professional local ayurvedic kabiraj and like that is also required.

Lastly, a massive awareness and education programme should be launched on medicinal and aromatic plants involving not only the public, but also the media and more importantly the Governmental agencies responsible for formulation and implementation of massive plan.

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Contractual Arrangements and Rural Credit Market in Assam.

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ABSTACT

The paper addresses the question of existence of land mortgage under usufructuary system in agriculture of Assam. It is well known that when a small farmer needs loan they can easily receive it by mortgage their land to the landlords. This system, however has been on the increase during the current decades. A number of explanatory factors have been considered to explain this phenomenon. There is a considerable scope here for they to catch up with the empirical findings. Our findings, primarily based on the field survey data, suggest that among the factor considered intensity of informal credit transactions are the most important ones to explain the forms, nature and extent of informal credit transactios in agriculture of Barak valley during the current decades.

Key words: Hunger Leasing; Pyakas; Kat Banddhak: Transaction cost; Banddhak.

ITRODUCTION

Besides, land is a basic factor of production, the subject of land closely related to that of rural credit market. It is well known that a bulk of the institutional or formal credit goes to the larger farmer. This comes out very clearly from our earlier study of villages in Barak valley of Assam. We find, for instance, the bureaucratic delay that a borrower has to face in getting a formal loan comparatively to big farmers. The transaction cost for a small is greater than that for a larger loan. When small farmers have need of credit, they can easily receive it from their landlord, relatives, shopkeepers or village traders. However, when quantum of loan is required, they have only choice to mortgage their inheritance small piece of landed property to the landlord. When debt is assemble by a huge amount and exceeds the paying capacity of the farmer, the land is lost by the small farmer. Moreover, attention was also drawn to the fact of interest rates which are high in backward areas but vary a lot.

EXISTING LITERATURE ON INTERLINKING CREDIT TRANSACTIONS

In a backward agricultural economy, on the question of inter linkage between tenancy and rural credit system, there is a philosophy which opines informal credit transactions allow the landlords to extort outmost surplus which leads to the tenant indebtedness[Badhuri, 1974 and 1977: Gathak,1977:Scandizo,1979: Prassad,1973: Chandra, 1994].In reality, liability of tenants to the landlord think about to be the mark of backwardness (Bhaduri,1984: Prasad 1979). There is first hand relation between informal credit in underdeveloped agriculture and landownership model. "The sizeable landowners have, to the greater extent capable of take over the institutional credit, sadness and small peasant carried with turn on non formal sources show there's below far involvement in the process of agricultural growth (Kuri,2004)". Loans for consumption and production needs of the farmer necessities to credit contract between landlord and tenants.

duction loan so called project financing loans as rule limit to purchase fertilizer, seeds ughing tools and other mode of capital. Tenants in non identical pay different borrowing rates heir mortgage | Singh,2003;Braverman and Stiglitz,1985. Bardhan and Rudra,1978|.

Under consideration of whether the consequence of interlinked credit is stimulant in take up ricultural development, Bhaduri (1973) initiated his work in this regard. According to him, the uation of interlinking credit and tenancy arrangement, should be an impediment to the chnological innovations. In his model, the land owners obtain rental income from the leased ot land and be of interest to loans that the amounts provided to tenants. Land owner did not refer technological innovations. If the landlords encourage the tenants to adopt technology, roduction will increase and therefore the tenants will be disincentives to borrow cash from andlord. Technological innovation, therefore makes tenants better off, bring down their order for consumption loan and here landlords worse off.

A number of studies have challenged the Bhaduri's theory. Using Bhaduri.s model Srinivsan (1979) has putted argument in favour of innovations lead to lower demand or credit. Barverman and Stiglitz (1986),have exhibited on the point that innovation effect at a time reduction and growing in tenant's need for informal credit sources. The studies of Gosh and Smith, (1976); Mitra, (1983); Pant (1980); Gangopadhya and Sengupta,(1987); Griffen,(1974);and Newbery (1975) accepted credit arrangements between landlord and tenants are essentially interlinked and renter behave as a face to face and incidental cause or effect of credit truncations. Rudra (1978), on the basis of his empirical study on agrarian relations in several districts of west Bengal, challenged the Semi feudal models of Bhaduri. Rudra has received support from a series undertaken by different writers [Braverman and Srinivasan,(1981). Guasch,(1984); Chakraborty,(1981)].Moreover, through the work of agricultural credit multitudinous informational effort has been built in the empirical field, particularly, the micro –emperical studies, for instance, the study of Nagraj (1985), Sarp (1991), Swaminathan (1991).

In Assam ,many academician mentioned their studies on the subject of tenancy spell their study on the agrarian reforms in the state. Though the study was not purely economic analysis, but they have shown tenancy situation and the problem related with it. Considerable studies have been made by Goswami, (1985); Guha, (1991); Chakravarty, (1995); Choudhury ,(2000);Gautam, (1995); Pukan, (1991); Khatun,(1984) ; Roy and Bezbaruah 2002). Though there have been theoretical attempts to model of interlinking credit arrangement under sharecropping, but no such work carries yet in the Barak vally of Assam to match up experiential among prevailing hypothetical propositions. What we need to do is to model the relationship between rural seasonality and credit market institutions.

OBJECTIVES OF THE STUDY

In Assam, tenancy is characterised by a high incidence of sharecropping, in which the tenant yields to the landlord on agreed upon share crop. Despite of the existence of share cropping over the years, their unusual terms and conditions and verbal or non-formal credit linkages to usufruct ray mortgage or bond land are remain still further untouched or understudied. The present paper strives to survey the typical terms and condition of informal credit market in rural areas of Brak valley in Assam.

DATA AND METHODOLOGY

The study is taken up in the Barak valley of Assam. The study is based on collection of primary data. Data of only 24 major villages of six Agricultural sub-division of three districts in Barak valley are used. The villages have been chosen purposively considering the dominant practice of the institution of tenancy. Household is the basic unit of our sample and is chosen from those whose agriculture is the primary source of livelihood. The listing farming household have been done consultation with the official of the agricultural department in each Agricultural sub-division. Two considerations have kept in the mind while selection process has done. First, the chosen sample villages have indicative of the entire sub division. Second, the sample village have to not either developed or backward village. The certain banking infrastructure and new agricultural practices have to be accessible in some villages of the adopted circle. A total of 206 sample households have been collected for the purpose of the study.

RESULTS AND DISCUSSION

Small tenants need credit for various purposes. They can easily get small amounts of loan required for consumption purposes from their landlord, relatives, shopkeepers or village traders. However, when require amount is needed for multi- purposes, the only way to receive cash through mortgaging their land. In non appearance of advanced and unambiguous credit market, land and credit connected with land mortgage is general practices in the sample villages. Simple mortgage and usufructuary mortgage that are two forms of mortgages found in our study villages. In the former type, the ownership of land remains to the debtor. In case of default to repay the borrowed amount the ownership will be transferred to the creditor. While, in case of usufructuary mortgage, the ownership of land be passed to the creditors and he will be the owner of that mortgaged land and will cultivate it instead of interest on loan, so long borrower repays the borrowed money.

Divergent type of usufructuary mortgages observed in our sample area. Commonly, three categories of usufructuary mortgages that are plasticised; (i) Partial mortgage or *Banddhak* . (ii) Total mortgage or *Pykas* and (iii) *Kat Banddhak* or mortgage on limited sale. In all instances, some kind of written agreement made between the contracting parties taken one or two as witness. However, the written agreement is done in form of hand note on ten rupees India non judicial stamp. The system is popularly in locally called *Smaranlipi*. In case of the *Kat Banddhak* where deed writer, so called *Munir* mediated in arranging the agreement in forefront the concerned Govt official. Although land mortgaged for certain sum of money, no interest charge levied for this loan. The money lender either cultivate the land itself or lease out to the mortgagetor or part of others. The *pykas* system or total mortgage is alike to that of partial banddhak or mortgage, but in case of former agreement is done for time bound and production of land to be pertain until clearance of the debts. The system of total mortgage is considered to be equivalent to fixed rent tenancy where the lease in on the condition that tenants will pay a fixed rent per acre either in advance or after the harvest in kind or in cash. In *kat banddhak* or mortgage on limited sale, mode of repayment is much rigid from the other two types of contract. In case of default of repayment by the borrower on that place a warning come from the lender with regard to detachment from land. The contract is made on condition that borrower after make full payment of borrowed

money on specified time the lender will return the land. Failure of which piece of land will be forfeited by lender. Thus,in case of *kat banddhak* lender will be the owner of land provided that the failure of borrower in repayment of loan in time. In Table-1 has presented different types credit contract under usufructuary mortgage mostly plasticised in our sample farm households

TABLE - 1
CREDIT CONTRACTS UNDER USUFRUCTUARY MORTGAGE

CIRCLES	PARTIAL BANDHAK	PIKAS	KHAT-BANDHAK	TOTAL	AMOUN OF LAND UNDER MORTGAGE (IN HA)	AVERAGE LOAN PER BIGHA (RS.)
1	2	3	4	5	6	7
Fakira Bazar	4	0	0	4	2.88	6295.00
R.K. Nagar	9	0	0	9	5.31	7200.00
Narshi-ngpur	2	4	0	6	3.12	8100.00
Salch-apra	3	1	0	4	2.65	5500.00
Bans-kandi	2	5	1	8	4.30	4550.00
Haila-kandi	1	6	0	7	4.18	5660.00
Total	**21**	**16**	**1**	**38**	**22.44**	**5250.00**

Source: Field Survey, 20015.

The partial usufructuary mortgage is common practiced in our sample villages (refer Table-1). Here, the land owner can anticipate ambiguous rate for bond his land. The variation has found in circle to circle and pact to pact. The highest amount of loan depends on the nature of the land to be bond. Also, maximum possible amount may fixed by the negotiating between debtor and creditor. We have also observed a uncommon character of tenancy under usufructuary mortgage in our sample villages, where owner becomes tenant in their own land. This condition comes when pity farmers mortgage their land to the lenders who then again lease it out to owner under share cropping. It is very winsome to the salaried and business men who have not any farmable land but can receive land by means of credit to the lender and can draw out lease income in forms of sharecropping.Table-2 illustrate the non identical partners of mortgage land.

Jamaluddin

Table-2

Usufractuary Mortgage and Operators of Mortaged of land

Circle	No. of victims of usufructuary Mortgage	Lender operator	Sharecropper	
			Owner of land	Other sharecropper
Fakira Bazar	13	8	4	4
R.K.Nagar	18	12	9	2
Narshingpur	3	3	1	1
Salchapra	16	8	5	3
Banskandi	14	9	8	1
Hailakandi	20	7	8	2
Total	84	47	35	13

Source: Field Survey,2015.

It is evident from the Table-2 that in some cases owners of land becomes lease in their own land. In some cases, we have also noticed that the professional money lenders have entered into the land lease market. They come up with interlinked land and credit market giving credit against the mortgage of land and later lease it out to the owner under sharecropping. This type of leasing in the Marxist literature is as 'hunger leasing.' In many cases, we have found that pity landowners are unable to repay the debt amount in long duration; they go on as tenant in their own land or put on sale it with low price to the creditor.

CONCLUSION

The sharecropping is a familiar practice in agriculture of Barak valley in Assam. Lease agreements go along with non-formal credit arrangement with the tenant. The sharecrop farmer accepts certain troubles either in getting institutional credit or non availability of sufficient institution credit. The farmer's need of loan arises mainly for consumption ,production and other multi purposes. The nature of informal credit agreements are of different. Land interlinked to bond or mortgage under three different types that is the common picture of the sample village. All in forms, small farmers when they have need sum of big amount of loan either for aforesaid purpose, they have only option to mortgage their inheritance property to the money lender or village *mahajan* to get loan. The money lender or mahajan encourage the poor farmers to borrow more and mortgage their land as security. As the debt is accumulated by a huge amount and exceeds the paying capacity of the farmer, the land is lost to the money lender.

Thus, the measures are necessary to control the exploitation by the money lenders. Though the state has brought under statutory regulation the function of lending in the form of licensing obligation of the money lenders and the chargeable rates of interest, the poor borrowers have not been much benefited because the greedy lenders know the lacuna of legislative provision and many ways of escaping due to helplessness of the debtor. The loss of land to the village mahajans and money lenders has to be stopped by ending their land mortgage type of exploitation. However, this is only possible by making institutional credit facilities available to the needy farmers. This will bring down inability to act independently on informal credit market.

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Existing Land Tenure System is an Obstacle for Diversification of Agriculture in Barak Valley of Assam: An Analysis

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Abstract

Agriculture has been and will continue to be the lifeline of the economy of Barak Valley The Barak Valley of Assam constitutes 8.9% of the geographical area of the states but it contains 11.22% of the population as per 2011 census. The economy of the region is predominantly agricultural with 70%of the work force being engaged in agriculture and other primay activities as per 2011 census. Though the region is not devoid of manufacturing units, its relative geographical isolation handicaps it for a programme of large scale industrialization. The prospect of economic development of the region therefore depends critically on the growth of agriculture and alied activities. Agriculture in Barak Valley as it stands today, is predominated by small farmers growing mainly rice and vegetables the market supply of which is far below in respect to their demand. In view of the mounting demands for food, linking of enhance food production with nutritional security, conservation of natural resources, enhancing farmers income, employment generation etc, diversification of agriculture is necessary in the backward agriculture in Barak Valley of Assam. Diversification interms of fruits, vegetables, livestock, poultry fisheries and agro-forestry may contribute to holistic development in the region. However, the existing land tenure system where share cropping is found practice largely informally and insufficiency of tenant farming may have an obstacle to the diversification of agriculture in the Barak Valley of Assam. Besides, lack of agricultural infrastructure, such as, improved cold storage facilities, short period storage during transit of commodities on farm processing and cool chain facilities are critical for insulating the farmer against risks and for the success of diversification. Proper identification of all these factor goes a long way in sustaining agricultural development in the region.

Keywords; Sharecropping, Agricultural infrastructure, Small farmer, Tenant farm, Cropping pattern.

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Introduction

Diversification of agriculture has been acknowledge to make more profit, generate additional employment for rural masses and to conserve natural resources. Diversification to traditional/non-traditional crops has been found to be the best option as these crops not only meet the above requirements but areas also adapted to a wide range of climate and are more remunerative for replacing subsistence farming and thus alleviate poverty in rainfed, dry land, hilly and arid ecosystem. These crops also have potential for improving wasteland and need comparatively less water than conventional crops. However, this practices mainly depend on the availability of agricultural infrastructure such as new technologies in agriculture, irrigation infrastructure, practice of HYV seed, cold storage facilities etc. As tenancy dominated land ownership pattern in the region and this may retards the diversification of agriculture in the economy of Barak Valley region of Assam.

Study Area

Agriculture has been and will continue to be the lifeline of the economy of Barak Valley. The Barak Valley of Assam constitutes 8.9% of the geographical area of the states but it contains 11.22% of the population as per 2011 census. The economy of the region is predominantly agricultural with 70%of the work force being engaged in agriculture and other primay activities as per 2011 census. Though the region is not devoid of manufacturing units, its relative geographical isolation handicaps it for a programme of large scale industrialization. The prospect of economic development of the region therefore depends critically on the growth of agriculture and alied activities. Agriculture in Barak Valley as it stands today, is predominated by small farmers growing mainly rice and vegetables the market supply of which is far below in respect to their demand.

The agriculture is almost entirely weather depended, the irrigation over being limited to only 2.43% of the Gross Cropped area. Not surprisingly therefore, the region today stands far behind the all India standards in terms of use of improved agricultural practices and also in agricultural productivity (Roy and Bezbaruah, 2002). On the other hand, share cropping is in practiced largely informally in Barak Valley. The insecurity of tenant cultivators is acting as an obstacle for effective use of the available technology package in the region. The levels of inputs used for owners and tenants cultivators are not uniform and the resulted output also differs. The owner has an edge over tenant cultivators (kuri, 2003). The tenants have insufficient incentive to the optimum use of resources on the land he cultivates. Owing to these factors, the practices of modern agricultural technologies are not willing by farmer and therefore the economy of Barak Valley is facing chronic food shortage.

Necessity of the study

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In view of the mounting demands for food, linking of enhance food production with nutritional security, conservation of natural resources, enhancing farmers income, employment generation etc. diversification of agriculture is necessary in the backward agriculture in Barak Valley of Assam. In this direction, technological improvements may have an important role to play in several traditional and non traditional crops/regions/seasons. Hybrid breeding approach may extend to rise and increases yield and stability may achieve through enhance biotic and abiotic stress resistance/tolerance in plants and increase area under rabi season production. Diversification in terms of fruits, vegetables, livestock, poultry fisheries and agro-forestry may contribute to holistic development in the region. However, the existing land tenure system where share cropping is found practice largely informally and insufficiency of tenant farming may have an obstacle to the diversification of agriculture in the Barak Valley of Assam. Besides, lack of agricultural infrastructure, such as, improved cold storage facilities, short period storage during transit of commodities on farm processing and cool chain facilities are critical for insulating the farmer against risks and for the success of diversification. Proper identification of all these factors goes a long way in sustaining agricultural development in the region.

Existing Empirical works on tenancy and diversification of agriculture in Assam

With a few exceptions, neither any systematic theoretical exercise nor any empirical investigation has yet been carried out on the issue of land tenancy contract and diversification of agriculture in Assam in general and Barak Valley in particular. Many scholars only touch upon the issue of land tenancy contract while analyzing the agrarian reforms in the state. Some studies though not based on pure economic analysis have been conducted to highlight the tenancy situation and the problem of agriculture and diversification associated with it. In this respect the studies by Goswami (1985); Guha (1991); Chakraborty (1995) and Gautum (2005) have found to be outstanding. These studies explore the nature and pattern of tenancy and diversification problems in the state of Assam. In similar studies Nag (1991), Phukan (1993) have also reached the conclusion that tenancy reforms in Assam have not favourable impact upon the tenant farmers and thus retards the diversification of agriculture before the economy of Assam. Sengupta (1991), in his study impact of land reforms in Karimganj district of Assam has shown that tenants are still being exploited by the land owners and for which diversification of agriculture in this region is insignificant. Roy and Uddin (2010), in their study Factor Market Imperfections and Agricultural efficiency in Barak Valley has shown that the effects of intensive agricultural practices, increasing population pressure, climate changes, environmental pollution, loss of bio-diversity, soil erosion, salinisation and water depletion are all threatening the sustainability of agriculture in the region. Therefore, to protect and conserve the natural resources not only for the present but also for the posterity is out most important. This may possible by generating new technologies that conserve resources and

economise the resource use. If security of tenure is provided to the tenant it will motivate to tenant to adopt new technology. In the absence of the security the tenant will not be ready to take risk associated with the technology and for there is no possible to success of diversification (Rai, 2008).

Methodology

The study is based on primary data. The primary data is selected through a process of multi-stage sampling. To retain the representatives of the entire region it has been decided to select the sites of sample survey from all the agricultural sub-division in the region. There are six agricultural sub division in the three districts of Barak Valley, namely, Cachar, Hailakandi, and Karimganj, District. From each of the six sub-division one Agricultural Development Officer (ADO) circle has been selected for field study. The Selection of ADO circle has been done in consultation with the officials of the Agricultural department. From each ADO circle four villages have been chosen at random. 281 households selected in this manner consists the sample size for the present study. The sample households have been classified in three farm size as small, medium and large farms. Suitable test statistics have been used to test the significance.

Cultivated Area and Cropping Pattern

The cropping is an important indicator of agricultural development. The decision will reflect *inter-alia* the resources under the control of the household, the quality of the land, extent of low land and upland, the amount of family labour allocated to agriculture and the willingness of the household to undertake risk, farming assets particularly bullock labour and irrigination infrastructure. Therefore the analysis of the cropping pattern is necessary for an identification of major crops that the grown in the region by its farmers. Data related to cultivated area in the six circles are presented in Table I

Table 1: Area under Cultivation in the Six Circles in The Year 2011-12

CIRCLES	NET CULTIVATED AREA (in hectare)	GROSS CROPPED AREA (in hectare)	CROPPING INTENSITY (in percentage)
Fakira Bazar	4250	5146	121.08
R.K. Nagar	6350	8408	132.40
Narshingpur	5808	6962.5	119.87
Salchapra	4526	6174	136.41
Banskandi	6638	6795	102.36
Hailakandi	5513	6932.5	126.04
Total	33085	40,418	122.16

Source: ADO of the Six circles

So far as cultivated area is concerned, Baskandi is the largest of the six circles followed by R.K. Nagar, Narshingpur, Hailakandi, Salchapra and Fakira Bazar, while cropping intensity is lowest of about 102.36

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percent in the Banskandi circle and highest of about 136.41 percent in the Salchapra circle. The higher cropping intensity in the Salchapra circle indicates greater prevalence of the practice of multiple cropping than other five circles. The R.K. Nagar circles also shows cropping intensity of about 132.40 percent, while the Fakira Bazar, Narshinpur and Hailakandi shows cropping intensity is 119.87 percent, and 126.04 percent respectively.The cropping patterns in the six circles can be inferred for the data given in Table.II

Table 2: Area under Different Crops and Their Percentage in the Total Cropped Area in the Six Circles during 2011-12

CIRCLE	FAKIRA BAZAR		R.K. NAGAR		NARSHIN-GPUR		SALCH-APRA		BANSK-ANDI		HAILA-KANDI	
CROPS	Area (in ha)	Percentage	Area (in ha)	Percentage	Area (in ha)	Percentage	Area (in ha)	Percentage	Area (in ha)	Percentage	Area (in ha)	Percentage
1	2	3	4	5	6	7	8	9	10	11	12	13
Sali Rice (HYV)	1750	34.69	3120	37.23	1947	28.56	1362	22.06	1255	18.74	1060	16.12
Sali Rice (T)	1325	26.25	1980	23.62	3199	46.92	2914	47.19	4475	66.84	3190	48.52
Total Sali Rice	3075	60.94	5100	60.86	5146	75.48	4276	69.25	5730	85.58	4250	64.64
Ahu Rice (HYV)	1012	20.06	1275	15.21	976	14.32	1115	18.06	420	6.27	655	9.96
Ahu Rice (T)	158	3.13	345	4.11	155	2.27	330	5.34	119	1.78	95	1.44
Total Ahu Rice	1170	23.19	1620	19.33	1131	16.59	1445	23.40	539	8.05	750	11.40
Boro Rice (HYV)	14	0.28	245	2.92	-	-	75	1.21	-	-	448	6.81
Boro Rice (T)	4	0.08	980	11.70	-	-	35	0.57	-	-	427	6.49
Total Boro Rice	18	0.36	1225	14.62	-	-	110	1.78	-	-	875	13.30
Total Rice	42.63	84.49	7945	94.81	6277	92.07	5831	94.44	6269	93.63	5875	89.34
Others	131	2.60	175	2.09	171	2.50	82.5	1.33	191	2.86	332.5	5.06
Vegetables (Kharif + Rabi & others)	652	12.92	260	3.10	370	5.43	261	4.23	235	3.51	368	5.60
Total	**5046**	**100.0**	**8380**	**100.0**	**6818**	**100.0**	**6174.5**	**100**	**6695**	**100.0**	**6575.5**	**100**

Source: ADO of the six Circle

Agriculture has been found to be the dominant economic activity among the sample farms in all the villages of the six ADO circle. Of all the ADO circles, Salchapra and Baskandi have be found better economic base with diversified occupations of the household members. The dominant practice of agriculture in the sample villages in characterized by the institution of tenancy. Although paddy, pulses, rape and mustard, vegetables (both karif & rabi) etc. are grown in the sample villages, the tenancy have been observed mainly in paddy cultivation. *Ahu, Sali* and *Boro* are the three important varities of paddy. It is grown almost through out the year, in the three seasons. *Ahu* harvested in Autum Season, *Sali* in Winter and *Boro* in summer seasons. Most of the sample farm follows single cropping pattern.

Though insignificant, the figures in the table - II show prevalence of double cropping in all the six circles under study. A wide variety of food and non-food crops are grown through out the all selected circles. Rice occupies a predominant place by comprising 84 percent to 94 percent of the total cropped area in each of these circles during 2011-12. Vegetables (both summer and winter), the second most important in order, comprised about 5 percent to 12 percent of the total cropped are. However, some variations in the cropping pattern in the circles become on a closer look at the figures. For instance, Banskandi and Narslingpur circles do not have any boro-cultivated areas. Of our four circles cultivating boro paddy, R.K. Nagar and Hailakandi circles seems to be very important comprising about 14 percentage of total cropped area.

So far as HYV paddy is concerned, it is not widely adopted in Salchapra, Banskandi and Hailakandi circles. The HYV Sali paddy area for the respective circles are only 22.06 percent, 18.74 percent, and 16.12 percent. A closer look of the HYV paddy area to total cropped area in all the six circles in Table -II clearly indicates that the low incidence of HYV. This is due to fact that agricultural practices depends mainly upon rainfall and there is neither irrigation facilities nor flood control arrangements. The degree of mechanization is almost insignificant. Further number of farmer using fertilizer to revive the fertility of soil is also negligible. Probably these are the main reasons for diverse cropping pattern in all the circles as shown from the table -IIAs such *ahu* paddy not have any important place in the cultivation of paddy in the circle. The farmers, therefore, depends greatly on pre-kharif crops mainly vegetables even with the help of traditional method of irrigation the area under vegetables.

Since, the tenurial status of land is found in agricultural practices in the entire Barak Valley practices (Roy, Bezbaruah, 2002), the share cropper followed wholly a mono cropping pattern. The reason for practicing momo cropping attributed to the following: Firstly, land taken on lease by the tenants was mostly the low land suitable for rice cultivation only. Secondly lack of irrigation facilities would not allow them to go for second crop with ahu paddy easily, which is water exhaustive crop.

Conclusion and suggestions

The Development of agriculture is directly related to the resource use efficiency. However resource use and productivity in agricultural production is largely influenced by a number of factors. Tenancy is identified as one of the factor influencing the resource use efficiency. The poor state of agricultural infrastructure, especially of irrigation, extension services and institutional credit system, non suitability of available technology package to good part of cultivated are the major constraint in the diversification of agriculture in the region. The share croppers in valley, faces the problem in applying modern inputs, as they do not have any security and access to institutional credit facilities. Unless the credit facilities are extended to them or it is mandatory by enforcing legislation, the share croppers will remain handicapped in diversification of agriculture in the region. Moreover, in Barak Valley, as in the state of Assam as whole, low lying plots prone to frequent flooding and prolonged water logging is fairly common. If the flood control measures are effective the majority of the farmers particularly to poor farmer who desire to cultivate more land and desire for cultivation in varieties of crops but unable to do it because low-laying areas prone flooding cause enormous loss of crops. There may be greater adjustment in the owned land and the desired cultivable land through tenancy operation and this brings the distribution of operational holding. The availability of irrigation infrastructure lead to a significant positive impact on the rate of consumption of fertilizer in farms and also farmer's decision regarding adoption of mechanized plough practice of HYVs. Thus technologies lead to a saving of irrigation water, fertilizer and seed may significantly improve soil health. Moreover, developing technologies for waste management and utilization assumes considerable significance. Similarly there is much scope to convert by- products into main products. Technologies and infrastructure, which promote primary processing value addition and product diversification in and around the villages need to be promoted.

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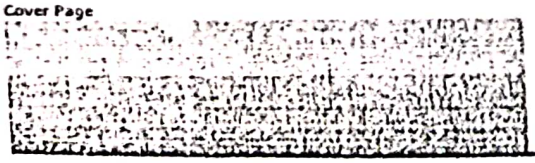

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An Empirical Study on Productivity Efficiency and Share Tenancy in Agriculture of Barak Valley in the State of Assam

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Abstract

Agriculture in Barak valley region of Assam, as it stands today, is predominated by small farms growing mainly rice. The region today stands far behind the all India standard in terms of use of improved agricultural productivity. The prospect of economic development of the region therefore depends critically on the growth of agriculture and allied activities. On the other hand, share tenancy has been fairly extensive in the region. In fact, as substantial debate has taken place on the question of share cropping efficiency, if the share cropping proves to be inefficient institution how could be it have continued over the wide areas of rural India in explain by some empirical studied. In view of this, an attempt has been made in this paper to provide explanation of empirical findings.

Keywords: Share Cropping, Efficiency, Rice, Monocropping, Barak Vally.

Introduction: - The economy of Barak Vally is predominantly agricultural with 70 percent of the work force being engaged in agriculture and other primary activities as per 2010-11 census. Though the region is not devoid of manufacturing units, its relative geographical isolation handicaps it for a programme of large-scale industrialization. The prospect of economic development of the region therefore depends critically on the growth of agriculture and allied activities. Agriculture in Barak Valley, as it stands today, is predominated by small farms growing mainly rice. As per 2010-2011 Agricultural Census, 53.09% of agricultural holdings in the Barak Valley, of which was in the size class of below one hectare. The average size of operational holding works out to be 1.62 hectors, which contains some amount of upward bias due to the large holdings of the tea estates. In 1998-99 rice crops constituted 92.5 percent of the gross cropped area (excluding the area under plantation and tree crops) of the region. The agriculture is almost entirely weather dependent, the irrigation cover being limited to only 2.43 percent of the gross cropped area till 1996-97. Not surprisingly therefore, the region today stands far behind the all India standard in terms of use of improved agricultural practices -and also in agricultural productivity (Roy and Bezbaruah, 2000). Despite the provision of different tenancy reforms in the state share cropping is practiced largely informally in Barak Valley. Though numerous studies have been carried out both at theoretical and empirical level on the issue

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of sharecropping efficiency, no such empirical study has yet been under taken in the State of Assam as n whole and Barak Valley in particular.

Review Of Literature :

On the issue of land tenancy contract, there has always been controversies on a number of theoretical and empirical issues since the day of Adam Smith (1776). The major debates in this regard have been concentrated on share cropping efficiency, factor market interlinkages, modes of production, rationale for the persistence of share cropping along with other forms of tenancy, its implication for technological development and so on. The economist belonging to classical, neo-classical and Marxian tradition have contributed profoundly in these debates.

The decision made so far classical and neo-classical and Marxist tradition analysis, almost all economists have condemned share cropping as inefficient. If the share cropping proves to be inefficient institution how could it's continued over the wide areas of rural India be explained by some empirical studies. The empirical investigation on the issue of share cropping efficiency also gives puzzle picture. The available empirical evidence on the efficiency of alternative land tenure contract is mixed. Some studies do not find significant inefficiency of share tenancy and the distribution of case study results shows no significant evidence of Marshallian inefficiency of share cropping (Otsuka and Hayami, 1988). The studies that support Marshallian inefficient hypotheses are Bharadwaj (1974) in Maharastra, Chattopadhyay (1979) in West Bengal; Bell (1976) in Bihar and Shaban (1987) in Bangladesh. On the other hand, several studies document the fact that share cropping has not adverse effects on efficiency. These includes studies in Gujrat by Vyas (1970); in Andhra Pradesh by Rao (1971); in West Bengal by Dwivedi and Rudra (1973); Parthasarathy and Prasad (1974) in Andhra Pradesh; Bliss and Stern (1982) in Uttar Pradesh, Jabbar (1977), Hossain (1977) and Zaman (1973) in Bangladesh; Ahmed (1974) in West Pubjab in Pakistan; Kauri (2003) in Assam. However, no conclusive evidence has been provided by empirical research to prove inefficiency or efficiency of tenant farming and findings are mixed (Appu, 1975; Rudra, 1982; Bhalla 1977; Murty 1987; Srivastava, 1983). Difference in factor endowments, adoption levels of new technology, geographical location and many more factors have lead to believe that it is not necessary to believe in Marshallian inefficiency of share cropping as a proper result.

Thus, in order to test the significance of the Marshallian logic of 'inefficiency', a large number of case studies have been conducted in India. They compare the average output and inputs per unit of land between share tenancy and owner cultivation or fixed rent tenancy, mostly in the production of rice and wheat. In order to control the quality differences in land and the factor market imperfections, some efforts have been made to classify observations according to irrigation status and the size of cultivation. However, most of these works not only differ at the level of their methodologies that they adopt in selecting criterion variables, but also arrive at mixed and conflicting results regarding the efficiency theory of share cropping. While the majority of studies did not find the inefficiency hypothesis of share

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cropping to be significant, there are some studies reporting inefficiency, hypothesis to be significant. In view of these conflicting findings it has been of interest to analyse in the context of industrially backward and agriculturally depended Barak Valley region of Assam.

Sampling & Data: In the field survey conducted in the six Agricultural Development Officer's (ADO) circles, namely, Fakira Bazar, R.K. Nagar, Narshingpur, Salchapra, Banskandi and Hailakandi, in the three districts of Barak Valley. A total number of 281 farm households have been selected at random from 24 villages were interviewed. From each circle, four villages were chosen at random subject to condition that at least in one village some amount of irrigation facilities must be available. The sample of 281 farm households comprised 39 from Fakira Bazar, 50 from R.K. Nagar, 47 from Narshingpur, 53 from Banskandi, 46 each from Salchapra and Hailakandi. It may be noted that, to draw the sample of farm households, the households in the selected village had to be first classified between farm household and others. The classification was done as per information provided by VLEWs concerned.

Results and Discussion:

Agrarian Characteristics of the Sample Locations: Agriculture is the dominant economic activity in all the villages of the ADO's circle. Of all the ADO's circles, Salchapra and Banskandi have better economic base with diversified occupations of the household members. Compared to agriculture, permanent job outside the villagers are generally considered as quite attractive in the sample survey area.

The dominant practice of agriculture in the sample villages is characterized by the institution of tenancy. Although paddy, pulse, rape and mustard, vegetables (both Kharif and Rabi) etc. are grown in the sample survey area, the tenancy contracts have been observed mainly in paddy cultivation. 'Ahu', 'Sali' and 'Boro' are the three important varieties of paddy. It is grown almost through out the year in three seasons, 'Ahu's harvested in autumn season (August/September), 'Sali' is harvested in the winter (December/January) and 'Boro' is harvested in summer season (April/May). The sample farms in all villages have been cultivating of all these crops. The types of seasonable variety of paddy to be planted depends manly upon the condition of the soil. Sali crop is suitable for soil where sufficient water is available. But Ahu is planted on the soil where there is scarcity of water. The cultivation period for Sali variety is slightly longer than that of the Ahu paddy.

Another important feature of the agriculture in the sample survey area is that most of the farmers follow single cropping pattern. Though insignificant, the incidence of double cropping is observed both in Salchapra and R.K. Nagar circles. The low incidence of double cropping is due to the fact that agricultural practices in the sample survey area are traditional in nature. It depends mainly upon rainfall and there is neither irrigation facilities nor flood control arrangements. The degree of mechanization is almost insignificant.

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Area Cultivated and Cropping Pattern: The cultivated area and cropping pattern of the sample farm households in the six circles are shown in Table-I

TABLE – I

AREA UNDER DIFFERENT CROPS, THEIR PERCENTAGE SHARE IN GCA IN TENANT AND OWNER CULTIVATED FARM

		AREA (IN HECTARE) TOTAL							
		PADDY				VEGETABLES			
1	2	3	4	5	6	7	8	9	10
Circles	Tenurial status	Autumn Paddy	Winter Paddy	Summer Paddy	Total	Winter	Summer	Total	Combined gross cropped area
Fakira Bazar	Tenant	6.30 (23.4)	8.25 (30.7)	3.30 (9.2)	17.85 (64.8)	5.50 (20.2)	3.50 (13.0)	9.0 (33.2)	26.85 (100.0)
	Owner	1.64 (23.6)	1.29 (18.5)	-	2.93 (42.1)	2.56 (36.8)	1.44 (20.6)	4.0 (57.4)	6.96 (100.0)
R.K. Nagar	Tenant	13.25 (24.7)	19.70 (36.7)	6.63 (12.3)	39.88 (73.7)	8.64 (16.2)	5.40 (10.1)	14.04 (26.3)	53.65 (100.0)
	Owner	5.34 (17.8)	6.40 (20.0)	3.67 (12.2)	15.05 (50.0)	13.66 (45.5)	2.34 (4.5)	16.0 (50.0)	30.05 (100.0)
Narshi-ngpur	Tenant	12.36 (34.6)	17.11 (48.0)	-	29.57 (82.6)	5.27 (14.5)	1.49 (2.90)	6.76 (17.40)	36.33 (100.0)
	Owner	2.07 (18.7)	3.09 (27.9)	-	5.16 (46.6)	3.97 (35.9)	1.95 (17.5)	5.92 (53.4)	11.08 (100.0)
Salch-apra	Tenant	13.34 (30.4)	17.66 (40.3)	4.52 (10.3)	35.22 (81.0)	6.50 (16.0)	1.79 (4.0)	8.29 (20.0)	43.81 (100.0)
	Owner	.80 (13.5)	1.43 (24.1)	.50 (8.4)	2.73 (46.0)	2.0 (33.8)	1.19 (20.2)	3.19 (54.0)	5.92 (100.0)
Bans-kandi	Tenant	9.54 (26.5)	15.44 (42.9)	-	24.98 (69.4)	9.12 (25.3)	1.90 (5.2)	11.02 (30.5)	36.0 (100.0)
	Owner	1.39 (6.6)	7.67 (36.3)	-	9.06 (43.1)	9.19 (43.7)	2.74 (13.2)	11.93 (56.0)	20.99 (100.0)

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Hail a-kandi	Tenant	7.46 (25.7)	12.73 (43.8)	5.68 (19.6)	25.87 (89.1)	2.10 (7.2)	1.08 (3.7)	3.18 (10.9)	29.05 (100.0)
	Owner	1.27 (8.0)	1.64 (23.0)	1.49 (15.8)	4.40 (46.8)	5.25 (33.2)	3.13 (19.8)	8.38 (53.2)	12.78 (100.0)
TOTAL	Tenant	62.35 (26.7)	90.89 (43.7)	20.13 (8.2)	173.37 (78.6)	37.13 (15.2)	15.16 (6.2)	52.29 (21.4)	225.66 (100.0)
	Owner	12.51 (15.5)	21.16 (24.7)	5.66 (7.1)	39.33 (47.3)	36.63 (39.0)	12.79 (13.7)	49.42 (52.7)	88.75 (100.0)

Source: Field Survey

Note: Figures in the parentheses represent percentage of respective crop to gross cropped area.

The figures in the Table-I shows that of 78.6 percent of the combined area under rice cultivation in case of the tenant farms, only 47.3 percent of the combined are under rice cultivation in case of owner farms. Further area under vegetables (both winter and summer) cultivation, 21.4 percent of the combined area is in case of tenants farm and 52.7 percent of the combined area is under owner farms.

This empirical findings suggests that tenants are more attractive in the rice cultivation and less incentive in vegetables cultivation whereas, the owner farm's have more interested in vegetables cultivation.

The agriculture for commercial purpose is, of course, based on the profit maximizing principles of the cultivators. The higher area under vegetables cultivation by owner farm, as has been found in our sample farm, is partly due to the commercial interest of the rich land owners. The market price of the vegetables has been found to be invariably higher than that of the rice cultivation. The rice land owners with their able financial strength cultivate the vegetables more intensively in order to obtain the maximum profit.

Decision Making, Incentive and Efficiency: Tenants in our sample farms enjoy considerable autonomy in making decision about cultivation. In many cases, we observed landlords involved in making decision in the use of inputs (specially where HYV crops are introduced). When landlords consider that tenants have adequate skills and assets for the technologies they use, the tendency is to leave them alone. In either case, the system seems to be flexible and capable of promoting efficiency. Table-2 has shown the adoption of HYVs paddy by tenant farms and owner farms.

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TABLE – 2

COMBINED AREA (IN PERCENTAGE) OF SAMPLE FARMS UNDER HYVS IN TENANT AND OWNER CULTIVATORS

CIRCLES	TENANTS / OWNER	'SALI' (HYV) AREA IN TOTAL PADDY AREA (IN PERCENTAGE)	'AHU' (HYV) AREA IN TOTAL PADDY AREA (IN PERCENTAGE)	PERCNETAGE OF HYV AREA TO TOTAL PADDY AREA
1	2	3	4	5
Fakira Bazar	Tenant	26.86	34.13	61.04
	Owner	24.69	31.52	56.21
R.K. Nagar	Tenant	24.19	17.05	41.24
	Owner	22.56	19.78	42.34
Narshingpur	Tenant	20.24	30.22	50.46
	Owner	18.23	27.47	45.70
Salchapra	Tenant	16.20	10.34	26.54
	Owner	14.12	12.86	26.98
Banskandi	Tenant	19.67	22.92	42.59
	Owner	18.02	21.40	39.42
Hailakandi	Tenant	16.73	23.08	39.81
	Owner	14.23	22.79	37.02
Total	Tenant	23.89	18.21	42.10
	Owner	22.97	18.96	41.93

Source: Field Survey

The figures in the Table-2 shows in our sample farms, 42.1 percent of the tenant farms of their combined are under HYV paddy and 41.93 percent of the owner farms of their combined are under paddy. But there is a considerable variation among the six circles. The highest percentage of both the tenants farm and owner farms of 61.04 percent and 56.21 percent respectively was recorded in Fakira Bazar circle. In Salchapra circle where the percentage was the lowest, the same was low as 26.54 percent and 26.98 percent respectively the tenants farms and owner farms. The farmers in Fakira Bazar might have been helped in using HYVs more extensively by their relative locational advantage. The Fakira Bazar circles is situated just 5 km away from the district headquarter town of Karimganj. The farmers in this circle therefore being benefited by better contract with the district agriculture authority and easy access to various agricultural tenants.

From the above discussion, it indicates that there is no significant difference in the adoption of HYVs by the tenants farms and the owner farms in our sample villages. The only the differences that can exist among the inter-circle variations may due to other constraints.

Cropping Intensity and Productive Efficiency: Higher cropping intensity implies larger cultivated area under the crops. Cropping intensity is sometimes used to explain the relative

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efficiency of owner cultivation and share cropping. However, in our sample villages, almost all the farmers follow single cropping system and there is little differences in cropping intensity of owner operated and share cropped farm. The cropping intensity of the sample farms in the six circles is shown in Table-3

TABLE – 3
PERCENTAGE OF IRRIGATED AREA, LOWLAND AND CROPPING INTENSITY OF SAMPLE FARMS

CIRCLES	STATUS OF FARMER	PERCENTAGE OF LOWLAND OF GCA	PERCENTAGE OF IRRIGATED AREA OF GCA	CROPPING INTENSITY
1	2	3	4	5
Fakira Bazar	Tenant	37.9	42.5	120.7
	Owner	19.1	24.1	116.0
R.K. Nagar	Tenant	50.2	40.5	159.5
	Owner	47.8	45.8	160.0
Narshingpur	Tenant	32.0	45.0	108.9
	Owner	19.7	39.3	105.2
Salchapra	Tenant	54.5	61.9	132.0
	Owner	29.1	36.9	133.6
Banskandi	Tenant	24.9	59.8	112.3
	Owner	29.2	37.5	105.6
Hailakandi	Tenant	34.9	27.2	101.4
	Owner	27.4	29.0	103.4
Overall	Tenant	39.1	46.2	122.6
	Owner	28.7	35.4	123.0

Source: Field Survey

The figures in Table-3 shows that in case of the tenant farm cropping intensity is 122.6 percent and in case of the owner farm it is 123.0 percent. Thus there is little differences in cropping intensity of owner operated and share cropped farm. But any given cropped area can yield more output per bigha with greater effort. This effort is translated into agricultural activities such as deeper ploughing, careful weeding and hoeing, etc. Our empirical result of equal productivity in owner cultivation and share cropping indicates that landowners were able to get their share croppers to cultivate as intensively as owner cultivations.

Productivity Comparison In Tenant's Farm And Owner's Farm

The average productivity measured in terms of yield per hectare in the case of tenants and owner cultivators are presented in Table-4

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TABLE – 4

Circle Wise Comparison of Yield of Rice (Kg/Hectare) Of Tenant And Owner Cultivators

CIRCLES	STATUS OF FARM	AUTUM RICE	WINTER RICE	SUMMER RICE	OVERALL YIELD
1	2	3	4	5	6
Fakira Bazar	Tenant	1730.55	2976.63	1539.13	2094.55
	Owner	2175.30	3253.48	-	2683.71
R.K. Nagar	Tenant	2650.54	2397.76	1898.54	2321.84
	Owner	2205.79	2513.25	2126.86	2694.87
Narshingpur	Tenant	3016.14	3854.82	-	3417.76
	Owner	2872.74	4235.98	-	3886.14
Salchapra	Tenant	2624.53	1759.04	2142.40	2158.40
	Owner	2481.13	2805.74	2423.70	2987.75
Banskandi	Tenant	2723.45	3998.52	-	3376.92
	Owner	3496.48	4012.52	-	3853.65
Hailakandi	Tenant	3875.82	3412.32	2584.56	3304.82
	Owner	2854.95	3592.06	3385.64	2984.56
Overall	Tenant	2667.52	2265.96	2705.89	2518.17
	Owner	2670.52	2268.74	2701.92	2507.92

Source: Field Survey

The figures in Table-4 shows that the average productivity of land of Autumn Rice (Ahu) is 2667.52 kg and 2670.52 kg per hectares respectively in tenant's farm and owner's farm. The corresponding figures for winter rice (Sali) is 2265.96 and 2268.74 kg per hectare for in tenant farm and owner farm respectively. For summer rice (Boro), the corresponding figures are 2705.83 and 2701.92 kgs per hectare respectively the tenant and owner operators. The overall yield rate of 2,518.17 and 2,507.92 kg per hectare in tenant farms and owner farms.

The main point to emerge from the Table-4 is that there is no significant differences in the productivity between the tenants operated farms and self operated farms. Of course, there is little inter-village deviations to these results and thus, it would not be wise to treat the whole, community of share croppers as efficient or inefficient in the use of land under cultivation.

Thus, the empirical results, in general, suggests that there is no significant difference of productivity levels between the tenant operated farms and the owner operated farms. It has been found that share croppers use more labour and bullock power per hectares operated land compared to owner cultivations. This clearly contradicts Marshallian hypothesis of distinctive effect and smaller work efforts under share cropping. Thus the empirical evidence and economic reasoning suggests that Marshallian and related disincentive effects of share cropping are of limited importance in our sample villages. Since the share cropping *per se* has not hurt the productivity in our sample farms, it cannot be interpreted as detrimental to development.

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Our data also support partly the findings of Vyas (1970) and clearly indicate that tenants cultivators cultivate the land more intensively than the owner cultivators but the results of our survey do not provide any conclusive proof of significant yield differences in the owner operated and share cropped land. According to our data, sharecropping does not indicate significant inefficiency in the use of land. This result is again consistent with the findings of Rao (1971) and Rudra and Dwivedi (1973).

CONCLUSION : The dominant practice of agricultural in the Barak Vally of Assam is characterized by the institution of tenancy. A very high percentage of equal share cropping in mostly done on the principle of equal share (may be equal cost sharing or with cost sharing). Although in the some cases, the land owners made arbitrary deduction even before the produce is shared. Also the share cropping contracts led to some kind dependency relationship between the share cropper and the landlord under the circumstances, the landless poor small and marginal farmers are in capable of taking any risk of agricultural modernization. More over, in the absence of security, the tenants have no incentives for higher productivity. As a result, the agricultural scenario in the region is still highly under developed. On other hand, the tenurial conditions by no means is universally perfect in the background of agriculture. The uneasy feudal relationship and unequal economic power in some cases have resulted in 'oppressive' tenurial conditions in the region. In order to pave for a healthy and vigorous development of agriculture as well as protection of tenants in Barak Valley of Assam, the following policy measures have been suggested,

(i) Institutional credit facilities are to be extended to the tenant cultivator and small farmers. This will reduce their dependence on informal source of credit with orbitant rate of interest.

(ii) It should however, be feasible to eliminate the interlocking of the process of social networks and infrastructure of agriculture. The economic status of the tenants cultivators can be improved by providing them adequate irrigation or flood control facilities with regulated tenancy operation.

(iii) Provision of input cost need to be shared by the lessor on the basis of cost of production in proportion of the area rented in by the tenant. This will encourage the modernization of agricultural practice.

(iv) The lessor should not impose any additional responsibilities to the tenant other than works and operations in the tenant operated land. The tenancy legislation must be made effective in rural Assam.

(v) The oppressive tenancy contracts must be made under control by introducing a new reform package including a massive drive of the recording of rights to the tenants.

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Understating Economic Backwardness of the North Eastern Region In The Light Of the Theory of Under Development

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Abstract:

Despite being an advantageous position with rich natural resources, economic backwardness of the North East India is glaring instances of uneven regional development of India since independence. It not only suffer from monetary resources, other economic and non economic factors are also responsible for it backwardness. Generally, the backwardness of the region has sought to explain in terms of what Meier (1970) called 'missing component' and constraints amenable government policy of 'welfarish approach'. A special conceptual framework is needed to correctly identify the maladies that plague the region. In this contest this paper makes an attempt to examine the roots of its backwardness with the light of some importance theories of under development.

Keywords: *Missing components, welfarish approach, left out, Jhumias generous recourses transfer spread effects.*

Introduction: North East India, literally call seven sister is endowed with vast natural resources and is acknowledged as the eastern gateway of India look east policy. Not with standing economic backwardness of the region is a glaring instance of the uneven regional development of India since independence in spite of decades of planning in India. Moreover, the region remains isolated from the rest of India and has not been able to attract investors or produced skilled labour entrepreneurial resource. An economy with abundant natural resources but with out the necessary technology or capital to developed them, is almost as poor as one without these resources (Kurihara,1965). Insurgency problems and autonomy movements have added, political dimension to this scenario of relative backwardness as the social scientists have sought to explain political turmoil and social unrest in terms of economic problem and as the protagonists of various violent and non violent movements have been harping on concept like regional ethnic exploitation and privation, the central government apathy etc. Generally the backwardness of the region has been sought to be explained in terms of what M.G. Mirer (1970), has called 'missing components'. It is pointed out that geographical factor like topography, political factors like long international border and isolation from rest of India, sociological reality like presence of large section of disadvantaged people like the tribals in the population, human

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-ficiencies like primitive technology in agriculture, lack of skill entrepreneur, and over all handicap posed by weak infrastructure retard the economic progress of region. Some of these can be regarded as obstacles limiting the possibility and rate of progress (e.g. hilly, topography, geographical isolation etc.) while some others (weak infrastructure, lack of skill enterprise etc.) may be taken as the constrains amenable to policy measures (Bhattacharjee. 2003). But as Meier opines, the 'missing component' approach is a mechanistic approach that over looks the inter relations among the elements and evolution of the forces of development in an organic process.

The roots of under development have to be searched much deeper. A special conceptual framework is needed to correctly identify the maladies that plague the region. In this context an attempt is made to examine the roots of backwardness with the light of some importance theories of under development.

Dependency Theories: There are still points of serious disagreements among the various strains of dependency theories but there are some core propositions which seen to underline the analysis of dependency theories.

As is well known, dependency theories were originally developed to explain international differences in development Paul Baran, the father of dependency theories attempts to show that economic development in under developed countries is profoundly inimical to the dominant interest in the advanced countries. To avoid such development, the advanced nation will form alliances with pre-capitalist domestic elites and have easy access to domestic resources and thus be able to maintain traditional modes of surplus extraction. With this context the possibilities of economic growth in dependent (underdeveloped) countries would be extremely limited (Baran, 1989). However, frank (1969) has shown that metropolis-satellite chain ensure that surplus generated at each stage is successfully drawn towards centre. It is satellite status which generates underdevelopment as development of the centre necessarily requires the underdevelopment of the periphery (Frank, 1969).

Some centre-periphery models stress the balanced of payments implication of the particular pattern of production and trade between rich and poor countries whish arise from the fact that industrial goods produced traded by rich countries have a higher income elasticity of demand than goods produced by poor countries. In this category lies the model of Prebisch (1950), who arrives at the conclusion that the relative growth rates of periphery and centre will be equal to the ratio of the income elasticity of demand for two countries commodities: $\frac{g_p}{g_c} = \frac{e_p}{e_m}$. Here, g_p and g_c are growth rates of the periphery and the centre respectively and e_p and e_m are income elasticities of demand for primary goods and manufactures respectively. Since $e_p < e_m$. We have $g_p < g_c$ and this explains the widening relatives income gap between the centre and periphery.

The Theory of Circular and Cumulative Causation: Gunar Myrdal (1956) has put forward the hypothesis of circular and cumulative causation as an explanation of the

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backwardness of developing nations. Basically, it is a hypothesis of geographical dualism, applicable to nations and regions within nations and it is intended to account for the persistence of spatial difference in a wide variety of development indices like capita income, rates of growth of industrialization and trade, employment growth rates etc.

Accordingly to Myrdral, once development differences appear, there is set in nation a chain of cumulative expansion in the favoured region which has what Myrdral calls "backwash" effect on other regions. Factors flows from one region to another accentuate income differences instead mitigating them. In a free market, capital as well as labour will tend to move where the prospective return is highest and this will be to the region where demand is buoyant capital, labour entrepreneurship will migrate together. The benefits of trade will also accrue prosperous regions. If production is subject to increasing returns, the region experiencing rapid growth of factor supplies will be able to increase its competitive advantage over the relatively lagging regions containing small-scale industries. In the same way, the general freeing and winding in the international markets and the expansion of world trade will tend to favour the more rapidly growing regions within nations states. In, Myrdral's terms the "spread" effect are always weaker than the "backwash" effects and without state intervention spatial difference in development will tend to widen.

The Theory of Dualism: The feature of dualism has also been considered by many economists to be a casual factor underdevelopment (Singer,2007). There are number are possible definition and interpretation of the term dualism, but in the main, it refers to economic and social divisions in an economy such as differences in the level of the technology between sector or regions, differences in the degree of geographic development and differences in social customs and attitudes between the indigenous and imported social system.

Dualism creates a member of problems. For example, different development strategies will be required to cope with dissimilar conditions in different societies and this may involve real resources costs encountered in developed unified economies. Similarly technological dualism may imbeds progress when the 'modern sector' possess capital impansive method of production with relativity fixed technical co-efficients and the traditional sector is characterized by labour-intensive techniques and variable technical co-efficient. Because in that case absorption of labour from the traditional section in the modern sector will be highly restricted.

Export-Growth Model of Regional Growth-Rate Differences: A.P. Thirwall (1987) shows that it is possible to combines the ideas of Myrdal with the insights of Prebisch and other dependency theorists in a single model called by him "Export Growth Model of Growth-Rate Differences". The hypothesis Thirwall's model is that once a region obtains a growth advantage. It will tend to sustain it at the 'expense' of other regions because faster growths lead to faster productivity growth (Verdroon's Law) which keeps the region competitive in the export in the export of goods which gave the region its growth advantage

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at the first place. Exactly the opposite is true of the region which obtains an export-growth disadvantage.

Relevance the Theories on the North Eastern Region: Now to examine how far the dependency theories are suitable for explaining the underdevelopment of the NER.

Firstly, during the British rule the North Eastern Region was never strongly integrated with British India politically, socially and economically. Even today, the problem of NER is mainly one of weak link and imperfect Socio-economic integration with the rest of India. Therefore, A.G Frank's theory of dependency where periphery is incorporated in to the world economy(in the NERs case via the national economy) to serve the capitalist interest of the metropolis is not applicable to the NER in an unmodified form. However , the careless exploitation of the mineral resources like petroleum, Coal, Wanton destruction of forests to meet the commercial demand of the people in the rest of India, link of the plantation industry with the foreign Capital consequent poor multiplier effect on income and employment, support the dependency theory propounded by Paul Baran who hypothesized that underdevelopment of the backward area is caused by the development of advanced areas.

The model of Prebisch has also some relevance to the North Eastern Region with low income elasticity of demand for its products and high income elasticity of the products it imports from the rest of India. But explanation of regions backwardness derived from such a theory does not touch the root cause as it says nothing about the structural deficiencies of NE economy. The alleged apathy of the Central Government towards the development of the region can not be construed as assign of dependency relation, in the face of high per capita assistance both in plan and non-plan accounts. However, as the Central Government holds control over the infrastructural network like railways, communicational channels, financial institutions etc. the apathy or negligence hypothesis has some kernels of truth in new of the proverbial deficiency in this respect that in the region. Even infrastructure creation is not unrelated to demand and one reason of the underdeveloped infrastructure may be the inadequate demand emanating from defective economic structure of the region.

Secondly, as compared to the dependency theory, Gunar Myrdral's hypothesis of circular and cumulative causations seems to be better suited to explain the relatives backwardness of the North Eastern Region and its inability to participants vigorously in the process of planned development. Following the prediction of Myrdal's theory, both social and economic forces have produced tendencies disequilibrium (regional divergence) in the Indian economic scenario. The growth of the regions like Punjab, Maharastra, Haryana and Gujrat has much greater "backwash" effect than "spread" effect on the economy of the North East in spite of the center's policy of generous resource transfer in this regions on plan and non-plan accounts. The green revolution having greatly bypass the NE states, they are helplessly dependent on import of essential primary products likes rice, fish etc. along with the manufactured items from the rest of India. Capital, entrepreneurship and even skilled labour have been concentrated in the advanced regions. Assam and other North

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Eastern states have not been ale to strength their economics as their base mostly consist of traditionnal agriculture (along with semi-primitive shifting cultivation), small and cottage industries and only few modern enterprises connected with natural oil and gas extraction., oil refinery, power generation, paper mills etc. and the crisis-ridden plantation sector unable to generate dynamism.

Thirdly, the theory of dualism is also relevant to the NER. The North Eastern Region is characterized by dualism of all types described reinforcing each other. The rural-urban dualism is reinforced by tribal-non-tribal dualism and hills-plains divide. Consequently, even the traditional agriculture is technologically divided between settled and shifting type contributing to social dualism between the present farmers jhumias. This grates complicates the problem of development. The problem of the dualism in the North East manifests itself in twofold dilemma in policy adoption. First, in the NER one most distinguish between economic development of an area and economic of its backward section of population especially the tribals. In spite of the policy of the reservation and other measures of protection meant for the tribals and disadvantages groups the spillover of benefits is so large that any meaningful attempt of development inevitably generates inequality not only between the tribals and non-tribals or between the hills and the plains but also between advanced and backward groups of tribals themselves. The geographic dualism in the region is also intimately related to the problem of striking a balanced between the requirements of economic development and those of protecting the fragile ecology of the region. Although the region is very rich in respect of hydel –power potential, forests, minerals etc. these resources can not be exploited to the optimum limit with out keeping in mind the constraint imposed by ecological consideration.

It is observed that dualism as a theory of under-development can explain much of the difficulties faced by the North Eastern Region and it has only theoretical significance but also important policy of implications.

Fourthly, Thirwall's theory has grate relevance for explaining the backwardness of the North Eastern states as they have been unable to participate vigorously in meeting increasing national demand for good through regional exports. The North Eastern sates face great imbalance between their exports and imports and this gap is being met through high rate of resources transfer from the Central Government to the states and generation of disproportionately large services sector. But central resource transfer has failed to have the desired multiplier effect and thus generate dynamics in the North Eastern economy as income leaks out of the region through various channels of imports of both consumptions and capital goods.

Conclusion: The foregoing review of the theories of underdevelopment and examination of their applicability to the North Eastern situation go to the show that although these modes are useful in many ways, they can not answer all questions. The level of economic development of the North Eastern could suggest that there is a wide gap between the potential and actual development. The region is not only more backward than India as

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whole, but its backwardness stands in the great contrast to its resource endowments. In particular theories are unable to explain Government failure in achieving rapid growth of the regional economy. The Government in the political units of region have not been too much concerned with the welfarish approach rather the commodity producing sector and the task of long term, growth. The fact lies at the root of non-fulfillment of the aspirations of people of the region giving birth to strong descent against the national policy. Firstly, it was expected that during the plan period, the rate of economic growth of the NER would be high enough so that a substantial reduction in regional inequality would be achieved. But the in equality seems to be on the increased. Secondly, the natural, resources, particularly forests, minerals and hydral resources expected to utilized for industrialization of the region so that what Bhattacharjee (2003), called 'regional colonialism' would come to on end. Thirdly, in the process of economic development, the indigenous population of the region would have their genuine share of participation in the process of development. Fourthly, it was expected the pattern of economic development would be in conformity with maintenance of the socio cultural identify of tribal groups and their environment and protection of their interests from the attack on the market economy. Finally, the successive Indian Governments supported the Indian 'Look East Policy, built on it. It is this process that a new vision to serve as the gateway to South East and East Asia, Jairam Ramesh, (2005), forcefully argued, "political integration with the rest of India and economic integration with east and South East Asia particularly to certainly one direction that this region must be looking to as a new way of development".

It is alleged that none of these aspirations have been fulfilled during the plan period. The Government in the political units of the region have not much concerned with the welfarish approach and thus, most of these aspiration remained unfulfilled.

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A combined experimental and theoretical approach to study SmC → N_{cybC} phase transition in a four-ring bent-core liquid crystal†

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A newly synthesized four-ring bent-core liquid crystal (BCLC) has been studied using experimental and quantum chemical approach. Differential scanning calorimetry (DSC), polarised optical microscopy (POM), and X-ray investigations were carried out to identify the phase transitions and associated phases. DSC along with POM revealed four phase transitions *i.e.* Cr → SmX → SmC → N_{cybC} → Iso in the temperature range from 30 °C to 180 °C. The existence of smectic C like fluctuations also known as cybotactic groups in the broad temperature range of the nematic phase was confirmed by small angle X-ray diffraction. Conformational and vibrational analyses have been performed using density functional theory (DFT), to identify the most stable conformer having a bent shape. Analysis of the potential energy surface (PES) for different torsional angles revealed the most probable conformational states for the BCLC. Temperature dependent Fourier transform infrared (TD-FTIR) spectroscopy is used to study phase transitions and revealed marked changes in the spectral line shape especially the vibrations of OH, CH_2, CH_3, C═O, and HC═N groups during the SmC → N_{cybC} phase transition above ~95 °C. A good agreement between the calculated and observed infrared spectra validates the structure of this conformer that has been used for further studies.

1. Introduction

The discovery of novel mesomorphic phases in achiral bent- or banana-shaped molecules with unusual properties unknown for other materials *viz.* supramolecular chirality, biaxiality, ferroelectric, antiferroelectric and nonlinear optical properties,[1,2] orthogonal polar smectic phases, *etc.* created interest among scientists working in the area of liquid crystals (LCs) due to their promising applications such as the memory effect, the formation of stable fibres, bent-core organic semiconductors, molecular switching and strong photoluminescence.[3–6] The majority of bent- or banana-shaped compounds exhibiting so-called smectic phases[7] are realised in five- or more-aromatic-phenyl-ring systems with different linking groups in particular azo, ester and imine linkages. Very few of them exhibit rare biaxial nematic phases[8] (with arguments in favour and against their existence) and cybotactic nematic phases.[9,10] The formation of the nematic phase by these bent-core compounds is restricted by the constraints imposed by the bent-shape of the molecules, *i.e.*, steric hindrance for free rotation and core-core interactions promoting layer formation due to the segregation of extended aromatic moieties and end alkyl chains, as well as the incompatibility between the bent aromatic cores and aliphatic moieties. Hence, the design and synthesis of a bent-core (BC) compound with three[11] or four-ring[12] bent-core molecules exhibiting nematic phases with smectic-C (SmC) fluctuations (cybotactic groups) is a challenging task. The molecules of BCLCs consist of three parts, *i.e.* central bent-core units, terminal chains and linking groups. One of the important aspects is the nature and size of the substituent in the central core, which largely influences the mesophase behaviour.[13,14] The variation in the length of the alkoxy terminal chains not only affects the formation of liquid crystalline phases exhibited by the BC compounds, but also physical properties such as the dielectric anisotropy, birefringence,[15] and elastic constants.

Very few reports appeared in the literature to study the molecular structure, conformation and phase transitions in liquid crystals[16–19] using density functional theory (DFT) and

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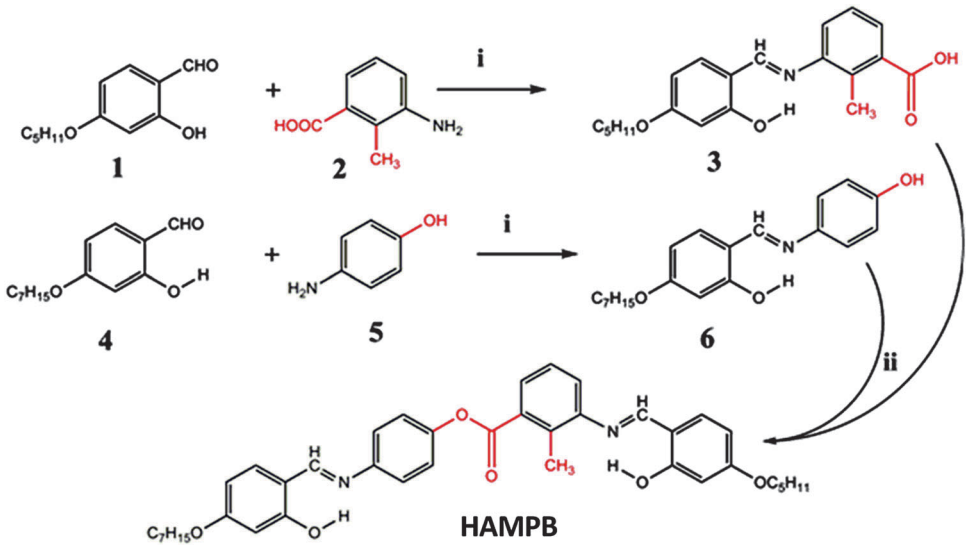

Scheme 1 *Reagents and conditions* (i) ethanol, drops of glacial acetic acid, reflux, 4 h; (ii) DCC, DMAP, DCM, 24 h.

vibrational spectroscopy. Temperature dependent Fourier transform infrared (TD-FTIR) spectroscopy is a precise and sensitive tool for monitoring the structural, rotational or conformational (torsional) changes in molecules during phase transitions.[19,20] The crystal → mesophase → isotropic transitions and *vice versa* result in the change in molecular assemblies and their conformations (that causes a change in inter/intramolecular interactions) and thereby changes in the dipole moment of the molecule. Therefore, FTIR became a sensitive detection technique for the investigation of phase transitions. The fingerprint region is very informative regarding the structural changes and provides specific information about the core (phenyl rings) and linking or functional groups (ester and Schiff base) of the molecules exhibiting liquid crystalline phases. The peak position, peak height and peak width are temperature sensitive, and therefore, very useful (especially for the liquid crystals) to investigate the dynamics of the molecule during the phase transition.

Here we report the synthesis of a newly designed four-ring BCLC system possessing an ester moiety between two phenyl rings as the central core connected through imine linkages on both sides to a phenyl ring on either side substituted with an unequal distribution of the 4-*n*-alkoxy groups (different aliphatic alkoxy end-chain lengths). Phase transition temperatures with associated enthalpies were detected by differential scanning calorimetry (DSC), and the mesophases were identified using a polarised optical microscope (POM) and confirmed by X-ray investigations. The analysis of the potential energy surface (PES) for different torsional angles revealed the most probable conformational states for the BCLC reported here, as well as provided a basic idea to understand the dynamics of the molecules during the phase transitions. Temperature dependent Fourier transform infrared spectroscopy (TD-FTIR) along with DFT is used for understanding the mechanism of phase transitions and the concomitant changes at the molecular level. TD-FTIR studies revealed prominent changes in the bands to give a sharp signature during SmC → N_{cybC} phase transition. The correlation between the infrared spectral and structural changes accompanying the phase transitions in liquid crystals at the molecular level to depict the intra- and intermolecular interactions is also presented.

2. Experimental and theoretical methodology

2.1 Synthesis

The schematic representation of the synthesis of newly designed four-ring bent-core compound [4-(*N*-4′-*n*-heptyloxysalicylidene)-aminophenyl]-[2-methyl-3-(*N*-4′-*n*-pentyloxysalicylideneamino)]-benzoate (hereafter abbreviated as HAMPB) is presented in Scheme 1. The details of the synthetic procedures of intermediate compounds **3** and **6** are presented in the ESI.† The synthesis of HAMPB is described as follows. To a solution of 2-methyl-3-*N*-(4-*n*-pentyloxysalicylideneamino)benzoic acid **3** (0.65 g, 0.002 mol) and 4-*N*-(4-*n*-heptyloxysalicylideneamino)-phenol **6** (0.68 g, 0.002 mol) in dichloromethane (DCM, 80 ml) were added dicyclohexylcarbodiimide (DCC, 0.49 g, 0.0024 mol) and 4-dimethylaminopyridine (DMAP, 20 mg).

The resulting reaction mixture was stirred at room temperature for 48 h. The urea which formed during the reaction was removed by filtration and the DCM was evaporated *in vacuo*. The solid residue of the compound was purified by column chromatography on silica gel using petroleum ether/ethyl acetate (97 : 3 v/v) as an eluent and then recrystallized from absolute ethanol and again from ethanol providing 0.58 g (yield 45%) of the target liquid crystal HAMPB as a pale-yellow solid. IR ν_{max} in cm^{-1}: 1618 ($\nu_{CH=N}$, imine); 1746 ($\nu_{C=O}$, ester), 3435 (ν_{O-H}, H-bonded); ^1H NMR ($CDCl_3$, 400 MHz): δ = 13.65 and 13.54 (s, 2H, –OH); 8.55 and 8.46 (s, 2H, –CH=N–); 8.00 (d, 1H, J = 7.2 Hz, ArH); 7.39 (t, 1H, J = 7.2 Hz, ArH); 7.37 (d, 2H, J = 8.0 Hz, ArH); 7.10–7.07 (m, 3H, ArH); 7.25 (d, 2H, J = 8.0 Hz, ArH);

6.54 (dd, 4H, J = 2.4 Hz, 7.2 Hz, ArH); 4.01 (t, 4H, J = 6.0 Hz, –O–CH_2–); 2.69 (s, 3H, Ar–CH_3); 1.82–1.78 (pen, 4H, J = 6.2 Hz, –CH_2–CH_2–); 1.46 (q, 4H, –CH_2–CH_2–); 1.34–1.24 (m, 8H, –$(CH_2)_2$–); 0.90 (t, 6H, J = 6.9 Hz, –CH_3). Elemental analysis calculated for $C_{40}H_{46}N_2O_6$: C = 73.82%; H = 7.12%; N = 4.30%. Found C = 73.71%; H = 7.01%; N = 4.21%.

2.2 Instrumentation details

The thermal behaviour of the compound was investigated by differential scanning calorimetry (DSC). Phase transition temperatures and associated enthalpies were determined using a DSC 821e (Mettler Toledo, Switzerland) operating with version 5.1 of stare software. Accurately weighted samples (2.22 mg) were encapsulated in aluminium pans having pierced lids to allow escape of volatiles. The sample was heated from 30–180 °C followed by cooling with the scanning rate of 5 °C min^{-1} employing nitrogen purging at the rate of 80 ml min^{-1}. The temperature axis and the cell constant were calibrated using indium.

The transition temperatures along with the phase identification of the sample HAMPB were determined using a polarising optical microscope (POM) (Nikon Optiphot-2-pol) attached with a hot and cold stage, HCS302, and with an STC200 temperature controller, from INSTEC Inc. USA. The small angle X-ray diffraction (SAXRD) patterns were obtained using a Bruker Nanostar system. The cybotactic groups in the nematic phase were investigated for samples aligned in a magnetic field, by X-ray diffraction. The CuKα (1.54 Å) radiation and the Goebel mirror type monochromator were used and the patterns were registered using an area detector VANTEC2000. The broad range diffraction was obtained using a Bruker GADDS system working with CuKα (1.54 Å) radiation.

Temperature dependent infrared spectra of the sample HAMPB were recorded on a Vertex 70 Fourier transform infrared spectrometer (Bruker, Ettlingen, Germany) within the 4000–400 cm^{-1} spectral region in both heating and cooling cycles. KBr pellets of solid samples were prepared from mixtures of KBr and the sample in a 200 : 1 ratio using a hydraulic press. Attenuated total reflectance and diffuse reflectance sampling techniques provided similar spectra. A liquid-nitrogen cryostat (Janis Research, Wilmington, USA) was employed to record FTIR spectra as a function of temperature.

2.3 Computational methodology

The initial geometry optimization of HAMPB was done by employing DFT calculations using GAUSSIAN 09 software[21] following the 6-31G(d) basis set and the Becke3-Lee–Yang–Parr (B3LYP) hybrid functional[22–24] that take account into electron correlations. The basis set 6-31G(d) augmented by '*d*' diffuse functions on heavy atoms was used.[25,26] The conformational analysis of the HAMPB molecule has been performed at the same level of theory. In order to find the most stable structure as well as the possible conformers, assuming ordered side chains (all *trans*) and relaxing the geometry, the one dimensional PES of torsional angles has been performed along all the dihedral angles ϕ1–ϕ14. A complete set of 276 internal coordinates were defined using Pulay's recommendations.[27,28] The molecule HAMPB belongs to the C1 point group, as it does not exhibit any unique symmetry. To compare the calculated spectrum with the observed spectrum at room temperature, they were scaled down using only one scaling factor (0.9614).[29] The vibrational assignments of the normal modes were done using potential energy distribution (PED) of each mode in terms of the internal coordinates using localized symmetry and utilizing GAR2PED[30] software. The calculated infrared spectrum was simulated by adopting a pure Lorentzian band profile (FWHM = 8 cm^{-1}). CHEMCRAFT[31] and GAUSSVIEW 5.0[32] software were used to visualize the calculated molecular vibrations and confirmations. PeakFitv4.1 software was used for the analysis of the peak position, intensity and width (FWHM) of the observed temperature-dependent FTIR spectra.

3. Results and discussion

3.1 Mesomorphic properties: molecular design, thermal analysis and phase characterization

A newly designed four-ring bent-core compound HAMPB exhibiting liquid crystalline phases was successfully synthesized and characterized. These molecules are well designed to possess two hydroxyl groups in the *ortho* position to imine linkage in both the wings, to participate in intramolecular H-bonding. The imine linkages are stabilized by H-bonding due to the presence of the *o*-hydroxyl group of the phenyl ring in both the wings. The presence of the *ortho* hydroxyl group in benzylidene moieties enhances the stability of imines through intramolecular H-bonding to overcome the hydrolytic instability of the molecules towards atmospheric hydrolysis as well as promotes extended conjugation in the core and also enhances the transverse dipole-moment. Hence the resorcylidene core is more stable towards atmospheric hydrolysis. The ester group also plays an important role and is involved in the conformational changes during the phase transition. The transition temperatures and associated enthalpies are determined from the DSC studies both in second heating and cooling cycles. The identification of mesophases was carried out using POM studies and the identified phases are confirmed by the complementary technique of X-ray diffraction studies.

The compound HAMPB exhibits three enantiotropic liquid crystalline phases in the temperature range of 30–180 °C. The phase transition temperatures, entropy and enthalpy changes were measured in both heating and cooling scans at a scan rate of 5 °C min^{-1} and are presented in Table 1. Upon heating the sample four endothermic peaks appeared (Fig. 1) that correspond to the four phase transitions Cr → SmX → SmC → N_{cybC} → Iso (confirmation of phases is described below). The large value of the enthalpy (17.3 kJ mol^{-1}) at 89.66 °C confirmed a first order transition of the sample from a crystalline phase to a liquid crystal phase. The large enthalpy and entropy values suggested order to disorder transition reflecting the changes in the packing of molecular structure. However the small values of both enthalpy and entropy associated with the three other transitions are considered to be the changes in the molecular structural arrangement of layer order and orientational order reflecting the

Table 1 Phase transition temperatures (°C) of the compounds HAMPB recorded for second heating (first row) and second cooling (second row) cycles at 5 °C min^{-1} from DSC. The enthalpies (ΔH in kJ mol^{-1}) and entropies (ΔS in J mol^{-1} K^{-1}) are presented in parentheses

Cr	SmX	SmC	N_{cybC}	I	ΔT
• 89.66 (24.1, 66.6)	• 93.98 (0.47, 1.29)	• 98.14 (0.78, 2.10)	• 171.65 (0.50, 1.12)	•	81.99
• 64.23 (17.3, 51.5)	• 77.52 (1.15, 3.27)	• 93.61 (0.51, 1.39)	• 171.87 (0.38, 0.86)	•	107.64

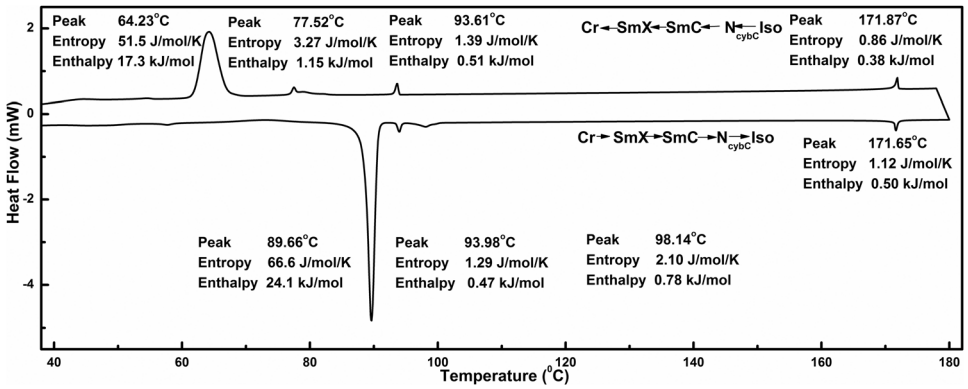

Fig. 1 DSC thermograph of the compound HAMPB for heating (downward curve) and cooling (upward curve) cycles at 5 °C min^{-1}. The enthalpies (ΔH in kJ mol^{-1}) and entropies (ΔS in J mol^{-1} K^{-1}) are also presented.

intermolecular interactions and conformational changes. In the cooling cycle also all the four exothermic peaks are observed corresponding to the transitions from Iso → N_{cybC} → SmC → SmX → Cr. Except the peak at isotropic to nematic phase transition all the three other transitions have shown supercooling by ~5 °C at N → SmC phase transition, ~16 °C at SmC → SmX phase transition and ~25 °C at SmX → Cr phase transitions. Similar changes are observed in the heating as well as cooling cycles that suggested the enantiotropic nature of the liquid crystal phase transitions. The identification of the mesophase is done by utilizing POM. These mesophases are further confirmed by the small angle X-ray technique that will be discussed in the next section.

POM studies revealed three liquid-crystalline phases (N_{cybC}, SmC and SmX) both in cooling and heating cycles between the crystalline phase and the isotropic phase. The sample sandwiched between an untreated glass plate and a coverslip, upon cooling from the isotropic phase, exhibited typical threaded (Fig. 2a) and Schlieren (Fig. 2b) textures with characteristic two brush defects (s = 1/2) and four brush defects (s = 1). The presence of a large number of s = 1/2 defects is typically exhibited by the nematic phase and is quite unique and characteristic of

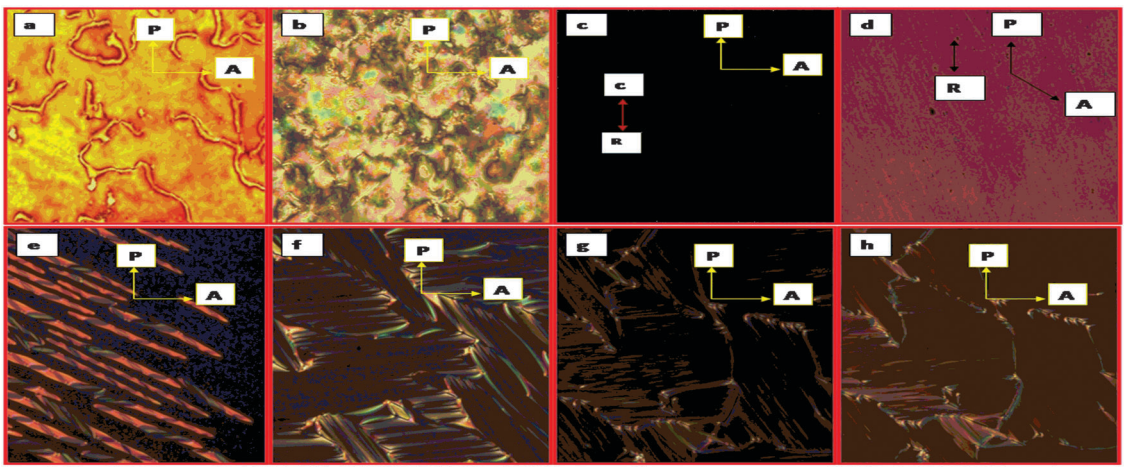

Fig. 2 POM investigations between crossed polarizers upon cooling with an untreated glass plate and a cover slip (a) Marble texture in the N_{cybC} phase at 171.5 °C. (b) Schlieren texture with growth of dark region characteristics of N_{cybC} at 164.1 °C. Optical texture in thin cells of 5 m (c and d) by PI treatment for homogeneous alignment (c) Optical texture extinction at 94 °C. (d) With the analyser rotated 45° from the optic axis direction at 94 °C. (e) Rope-like texture during transition at 93.6 °C from the nematic phase to the SmC phase. (f) SmC phase broken fan-like texture at 93.2 °C. (g) SmX phase focal conic fan texture at 77.5 °C with characteristic boundaries between two different domains of molecular alignment. (h) Upon further cooling a texture with increased birefringence at 74.9 °C.

bent-core materials exhibiting the nematic phase. However, they are rarely observed in the nematic phase exhibited by rod-like compounds as they escape into three dimensions.[33,34] Upon further cooling, they exhibit a slow transition to a homeotropic alignment of molecules initially over small areas which subsequently spread to the entire area under observation and such anchoring transition at which molecules aligned perpendicular to the surface indicating the cybotactic cluster formation is commonly observed in nematic phases exhibited by bent-core compounds.[9,10,33,34]

Upon slow cooling from the isotropic phase in thin cells of 5 μm with polyimide treated glass substrates, the sample appeared black (Fig. 2c), a defect-free planar texture, with the director (optic axis) of the nematic phase was aligned with one of the polarizer directions in POM studies, such that the high-temperature phase resembled a birefringent plate of a crystal with the optic axis in the plane of the substrate. With the variation of the sample in the azimuthal angle, the transmitted light intensity between crossed polarizers continuously increased to a maximum (Fig. 2d), when the optic axis was oriented at 45°. Characteristic flickering was observed upon tapping the sample caused by the Brownian motion of the director that is characteristic of the nematic phase with strong, long living director fluctuations. Upon further cooling a low-temperature mesophase (designated as SmC) with rope-like texture (Fig. 2e) which grows slowly to form broken focal conic fan texture with stripe patterns (Fig. 2f) appeared at 93.4 ± 0.2 °C with a transitional entropy ($\Delta S_{N_{cybC}-SmC}/R = 0.16$). The small transitional entropies at both the transitions (N_{cybC} → SmC and SmC → SmX) and the two-phase coexistence of ~0.1 °C at these transitions observed in POM investigations can be attributed to weakly first-order phase transitions. Upon further cooling the broken fan-like texture transformed to larger domains with boundaries (Fig. 2g). Within each of these domains, birefringence increased upon further cooling (Fig. 2h). The phase exhibited clear dark and bright domains. The brightness of the domains interchanges when one of the polarizers is uncrossed in the opposite direction, indicating the birefringent nature of this phase. The nematic phase in these unsymmetrical achiral bent-core compounds resembled the nematic cybotactic phase.[9,10,33,34]

The sample was further studied by small and wide angle X-ray diffraction. In the nematic phase the X-ray signal, related to the molecular length, is significantly broader than in the smectic or crystal phase (that appeared below the nematic phase) that is the signature of the short range positional order of molecules in this phase (Fig. 3a and b). The sample aligned by the magnetic field in the nematic phase showed azimuthal splitting of the low angle signal as shown in Fig. 3b. The corresponding X-ray intensity profile in a nematic phase at 100 °C was aligned by the magnetic field showing the azimuthal splitting of the signals in the low angle region as depicted in Fig. 3c, related to the molecular length that is characteristic of the local SmC type order, Fig. 3b. The schematic description of the aligned molecules with their long axes along the magnetic field is shown in Fig. 3d while the local layer normal is tilted from the magnetic field and such smectic fluctuations are called 'cybotactic groups'.[34] The X-ray experiment confirmed that the transition at around ~93 °C is related to the developing lamellar structures. The X-ray diffraction signal in the wide angle region confirmed that the nematic and smectic phases had a liquid-like in-plane order, as the signal corresponding to 4.5 Å (the transverse distance between molecules) remains diffused. Hence, the X-ray investigations complimented the POM studies to confirm LC phases as the cybotactic nematic (N_{cybC}) and SmC phases. Even though the SmC → SmX phase transition was detected by DSC, the same could not be detected by X-ray studies due to the fast recrystallization of the sample (~77 °C). The observed POM texture in the thin film (~74 °C) is a super-cooled phase texture of the SmC phase.

3.2 Density functional theory: molecular geometry optimization and conformational analysis

The combined temperature dependent FTIR spectroscopy and DFT calculations have been used for the investigation of hydrogen bonding as well as the dynamics of the molecules during the phase transitions. The vibrational assignments are made for the correct peak identification of the observed IR spectra, on the basis of the calculated potential energy distribution, the peak intensity value and the presence/absence of peaks in molecules having similar groups.

DFT calculations of HAMPB were performed to obtain the optimized molecular structure. In order to find the most stable conformer the conformational analysis has been performed by employing the DFT/B3LYP/6-31G(d) level of theory followed by initial geometry optimization and shown in Fig. 4. The one-dimensional potential energy surface scan (PES) of the torsional angles, relaxing the geometry on the energy minimised conformation, has been performed along all the dihedral angles $\phi1$–$\phi14$ (as labelled in Fig. 4), assuming ordered side chains (all *trans*), and the PES as a function of dihedral angle is presented in Fig. 5. Total 45 conformers were obtained and out of them, 28 conformers are the same in energy and having a similar structure. Now remaining 18 (Fig. S1, ESI†) conformers are under investigation and on account of their energy, the lowest energy (−2112.84681 Hartree) conformer is named conformer I, the second lowest is named conformer II and so on (Fig. 6). Conformer I is the most stable conformer and exhibits a banana shape that validates our conformational analysis (Fig. S2, ESI†). Upon analyzing all the 18 conformers, it is found that conformers I to VIII have a relatively low energy ranging from 0.00 to 0.88 kcal mol^{-1} while conformers IX–XVII have a much higher relative energy and cannot exist even in the isotropic phase.

Thus, further computations are done for conformer I. The geometrical parameters such as the bond length, the bond angle and the dihedral angle of the conformers I have been tabulated and presented in Table S1 (ESI†). In this conformer, the H atom of the hydroxyl group (H55 and H2) participates in the strong intramolecular hydrogen bonding O–H···N with the N atom of Schiff base (N56 and N1) that results in a planar six-membered ring. The hydroxyl group (OH) and Schiff base (HC═N) are substituted on the phenyl rings R1 and R4 while the methyl group (CH_3) is attached to ring R3 (can be seen clearly from Fig. S2, ESI†). All the four rigid phenyl rings are non-planar in conformer I, the torsion angles between the

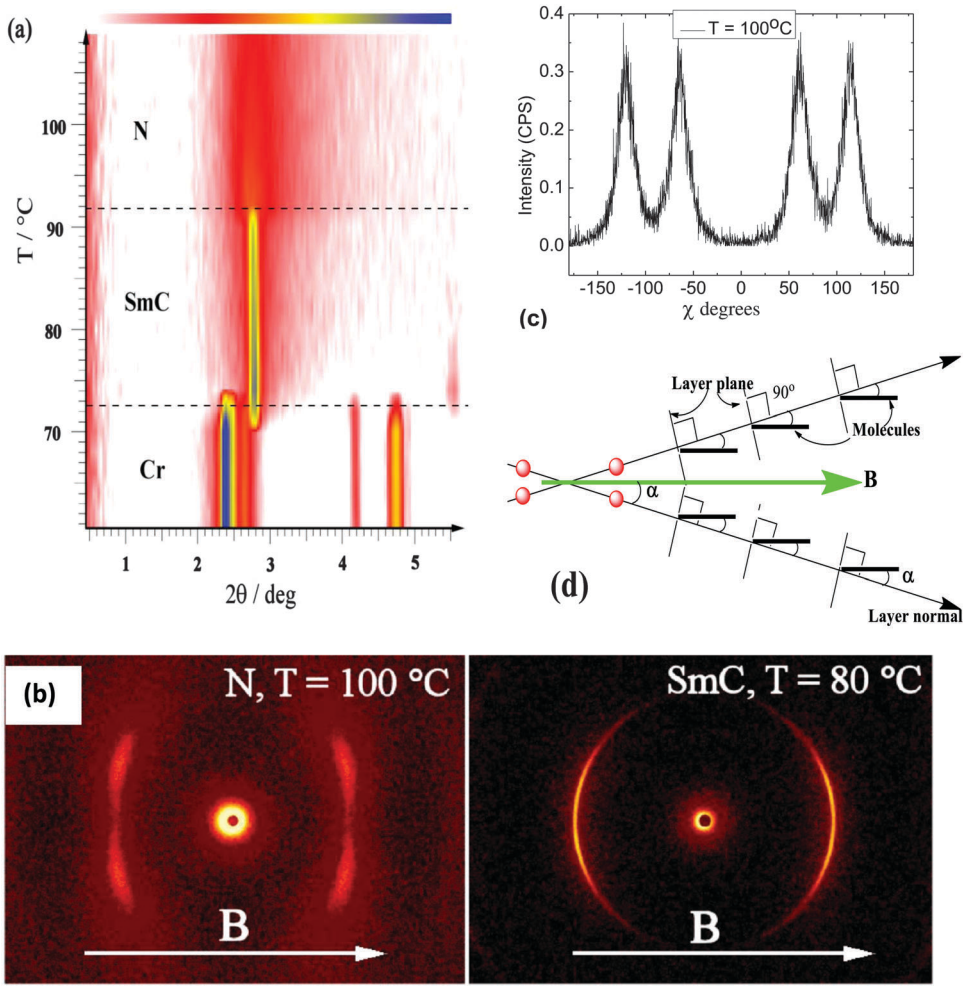

Fig. 3 (a) Temperature dependence of the signal position on 2q *vs.* temperature, obtained by small-angle X-ray diffraction, upon slow cooling the sample in cybotactic nematic, SmC and crystal phases, and (b) the 2D X-ray pattern obtained for the sample aligned by the magnetic field in nematic and smectic phases (the arrow indicates the direction of the field). (c) Corresponding X-ray intensity profile in the nematic phase at 100 °C aligned by the magnetic field showing the azimuthal splitting of the signals in the low angle region. (d) Schematic picture showing the geometry of layers, molecules and X-ray signals in the nematic phase. Note that the recrystallization of the sample (74 °C) did not allow the observation of SmC → SmX phase transition detected by DSC.

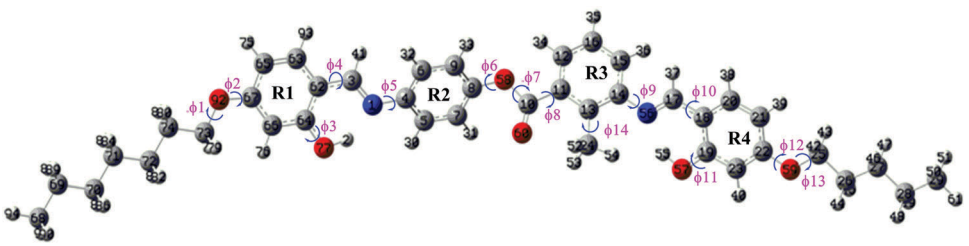

Fig. 4 Initial optimized structure.

R1 and R2, R2 and R3 and R3 and R4 are ~31°, 40° and 39°, respectively and a π-electron conjugated system can be inferred. The carbon atoms of the alkoxy chains are nearly in the same plane, which is almost coplanar with the neighbouring phenyl rings (R1 and R4). The molecular length and the bent angle of conformer I are measured to be ~3.48 nm and ~134°, respectively, using GAUSSVIEW 5.0 software. Our calculated results are in good agreement with the reported structural studies of the BCLC.[35,36]

3.3 Spectroscopic investigation

3.3.1 Vibrational assignments. In the present work the phase transitions in the HAMPB were monitored by temperature dependent infrared spectroscopy. However, it is important

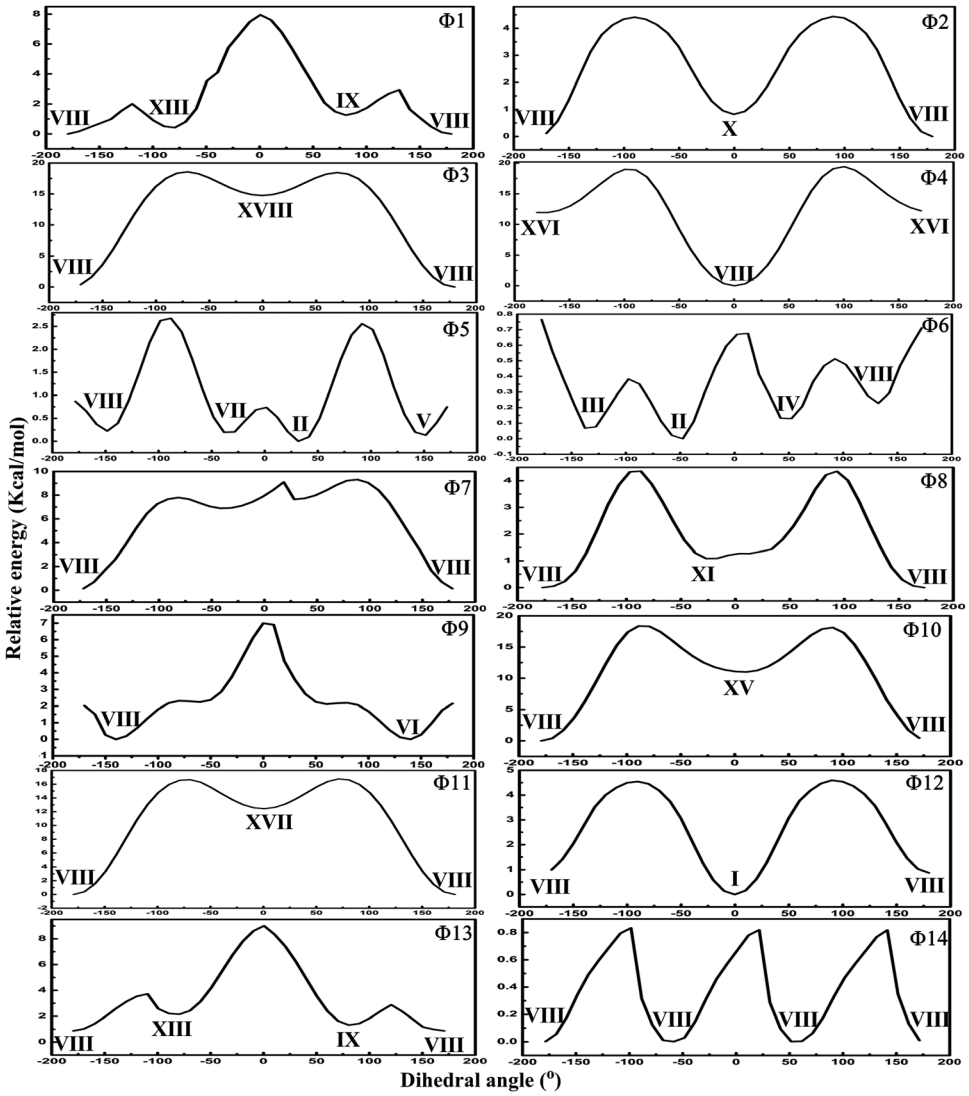

Fig. 5 The potential energy graph plotted between the relative energy (kcal mol^{-1}) and the dihedral angle (degree) presenting the possible conformers I–XVIII.

to know the precise assignment of modes before using them as marker bands. Vibrational assignments are also very useful for understanding the mechanism of transition, as they provide information about the functional groups that are affected during the transition, as associated modes will show changes upon heating and cooling.

The optimized structure of most stable conformer I is used for the calculation of vibrational spectra of the HAMPB. A comparison of the calculated and experimental room temperature infrared spectra (Fig. 7) shows a good agreement that validates the structural model used (conformer I) for calculations. All observed peaks are accurately assigned to specific vibrational modes on the basis of potential energy distribution (PED), utilizing previous reports of the vibrational mode assignments for substituted phenyl rings and alkyl chains in similar molecules[16–18] (Table S2, ESI†). The value of the correlation coefficient (R^2 = 0.99761) and the graph between the observed and calculated wavenumbers show a good agreement between them (illustrated in Fig. S3, ESI†).

It is observed that the overlapping of several CH_2 bands resulted in the broadening of the peaks in the higher region. Hence, in this region, the accurate assignment (2700–3200 cm^{-1}) is a challenging job. Therefore, the spectroscopic analysis of these stretching bands for liquid crystalline systems has not been done in many cases. The lucid signatures of the crystal modification are observed in this region.[37] There are four distinct peaks of methyl and methylene asymmetric and symmetric stretching. The higher frequency region, 2800–3500 cm^{-1}, reveals the presence of CH_3/CH_2 stretching vibrational modes along with ring CH and OH stretching modes. The CH_3 asymmetric stretching (hereafter abbreviated as r^-) and symmetric stretching (hereafter abbreviated as r^+) modes were assigned to the shoulder peaks at 2951 and 2870 cm^{-1}, respectively. The CH_2 asymmetric stretching (hereafter abbreviated as d^-) and symmetric stretching (hereafter abbreviated as d^+) modes were observed as intense peaks at 2930 and 2857 cm^{-1}, respectively. It is well known that d^+ and d^- are strong indicators of the chain conformation. The *ortho*-substituted hydroxyl group stretching vibrations showed

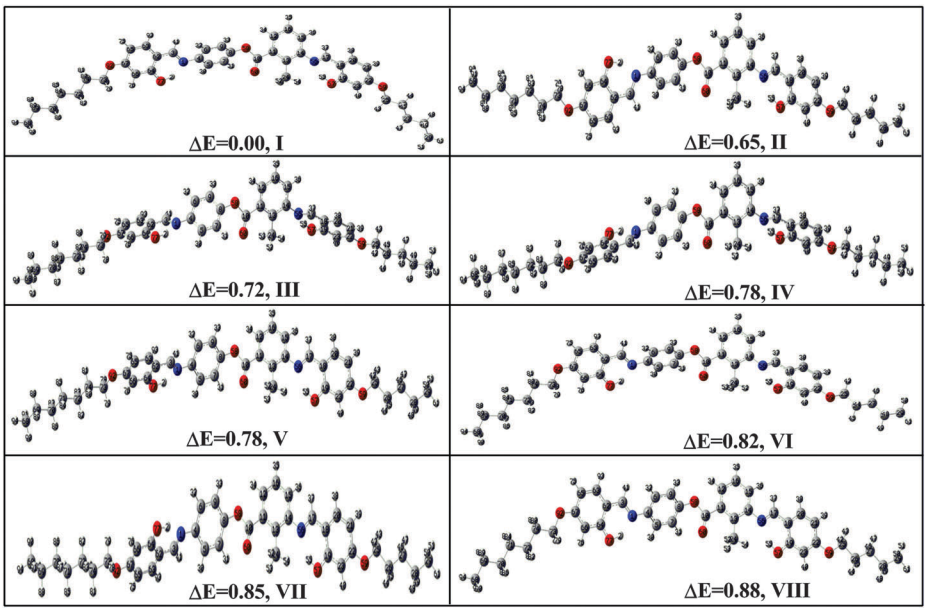

Fig. 6 The first 8 conformers with their relative energy (kcal mol^{-1}).

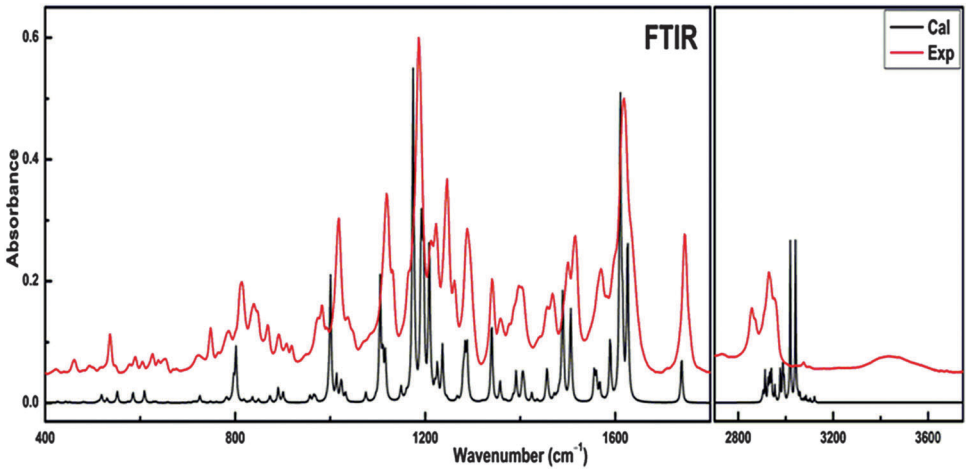

Fig. 7 Observed and calculated (scaled) infrared spectrum of HAMPB, at room temperature in the higher region (3700–2800 cm^{-1}) and the lower region (1800–400 cm^{-1}).

the involvement in intramolecular hydrogen bonding with imine linkage that lies in the region 3400–3450 cm^{-1}.[35,38] A broad peak at 3435 cm^{-1} was assigned to the OH stretching. Three small peaks at 3098, 3074 and 3042 cm^{-1} correspond to the ring CH stretching vibrations.

The lower region shown in Fig. 7 revealed rich spectral signatures composed of a large number of well-defined vibrational mode absorptions. The carbonyl stretching vibrations in saturated esters are expected in the region 1750–1735 cm^{-1}. A distinct sharp intense C=O stretching peak observed at 1746 cm^{-1} suggests the nonparticipation of the C=O moiety in hydrogen bonding. Free C=N stretching vibrations lie within the range 1690–1640 cm^{-1}. However, the C=N stretching mode observed as an intense peak at 1618 cm^{-1} clearly confirmed the participation of the N atom of the imine group in intramolecular hydrogen bonding (Fig. S2, ESI†). Peaks at 1570 and 1516 cm^{-1} are associated with ring CC stretching. Peaks at 1456 and 1377 cm^{-1} are assigned to the CH_2 scissoring and CH_3 bending or umbrella mode, respectively. CH rocking and CH out-of-plane bending of Schiff base are observed at 1358 and 984 cm^{-1}, respectively. Generally the CH_2 wagging mode is observed in the region 1150–1400 cm^{-1} which corresponds to the all-*trans* structure of the alkyl chain.[39–42] Hence, the observed CH_2 wagging mode at 1396 cm^{-1} supported the all *trans* conformation of hydrocarbon chains in HAMPB. The strongest peak in this region at 1186 cm^{-1} reflects the coupled mode of ring C4–N1 stretching with ring C8–O58 stretching and trigonal deformation of the ring. The ring CH in-plane bending modes are observed at 1223, 1165, 1132, 1130 and 1119 cm^{-1} in the region 1230–1100 cm^{-1}. The CH in-plane-bending is known to

be a sensitive indicator of the phase transition[16–18] in liquid crystals. The exact shape of this band including the peak position, width, and the number of components reflects the packing arrangement of the alkyl chain assemblies. The peak at 1047 cm^{-1} corresponds to the skeletal mode of the hydrocarbon chains or C–C–C backbone stretching mode. The band at 982 cm^{-1} is assigned to the methylene CH_2 twisting mode. The band at 764 and 723 cm^{-1} corresponds to the CH_2 rocking mode. The CH out-of-plane bending modes that are observed in the region 940–780 cm^{-1} appeared at 918, 908, 868, 846, 839, 814 and 787 cm^{-1} in the observed FTIR spectrum. The difference between the calculated and observed results is due to the fact that calculations have been done on single molecule neglecting intermolecular interactions.

3.3.2 Dynamics of molecules and hydrogen bonding at phase transitions. Temperature dependent FTIR spectra have been recorded when heating the sample over the temperature range of 25–185 °C followed by cooling up to 30 °C. Changes in the spectra are observed in both heating and cooling cycles that support DSC and POM results. However, the phase transition analysis has been performed only during the heating cycle. The phase transitions Cr → SmX → SmC → N_{cybC} → Iso occurred at ~89.66 °C, 93.98 °C, 98.14 °C and 171.65 °C (from DSC) and the associated thermal activation energies are ~0.721, ~0.729, ~0.737 and ~0.884 kcal mol^{-1}, respectively. The FTIR spectra are recorded just before and after the transition temperature to identify the clear signatures of the phase transition in the spectral peaks. The phase transitions result in the change in the peak position, relative intensity and peak width (FWHM). To obtain the precise position, width and intensity of peaks, peak fitting was done using the Voigt (Lorentz + Gauss) profile. The observed peaks from the FTIR spectrum (~25 °C) are critically examined and assigned to best fit with the calculated spectrum. Upon heating the sample, distinct changes have been observed in the spectra mainly during SmC → N_{cybC} phase transition above ~95 °C as shown in Fig. 8. Further FTIR bands associated with the core showed prominent changes in spectral features (in particular line width) during the other three phase transitions (Cr → SmX, SmX → SmC and N_{cybC} → Iso) indicating that the core no longer remains rigid during these transitions. The interlinked groups and soft alkoxy chains provide flexibility to the molecule and are responsible for the rotation of the molecule that results in the conformational changes during the SmC → N_{cybC} phase transition which are clearly reflected in the spectral features. As it is evident from the structure, the title molecule may be considered to consist of two distinct parts: (a) the ''core'' region comprised of four phenyl rings connected by ester-imine linkages (imine-ester-imine) and (b) ''aliphatic'' region comprised of the terminal alkoxy chains (OC_7H_{15} and OC_5H_{11}) attached at both ends of the core. To understand the dynamics of the molecule during phase transition, especially during SmC → N_{cybC} (skewed cybotactic clusters with the fragmented SmC phase), the crystalline phase is assumed as a closely packed structure while SmX and SmC phases have pseudo-layer ordering and layered structure, respectively.

The analysis of the TD-FTIR spectra reveals that some specific modes (marker bands) respond strongly and undergo pronounced spectral changes during the phase transitions. However, the entire spectral region showed slight variation. Among them, C═O stretching showed maximum variation in the peak position (~8 cm^{-1}) during the SmC → N_{cybC} phase transition (Fig. 8). Similarly the C═N stretching mode also showed abrupt spectral changes during phase transition. The CH_2 scissoring mode at 1501 cm^{-1} is transformed into a shoulder peak upon heating. The CH_2 wagging mode at 1396 cm^{-1} changes upon heating that resulted in the weakening and broadening of the peak. The peaks at 1261, 1246, 1223 and 1213 cm^{-1} correspond to CH_2 wagging, CH_2 twisting, ring CH in-plane bending and C17C stretching, respectively and disappeared after the onset of the nematic phase with the appearance of two broad peaks at 1242 and 1225 cm^{-1}. The CH_2 twisting mode is observed at 982 cm^{-1} and diminished after heating. Peaks at 918, 908, 891,

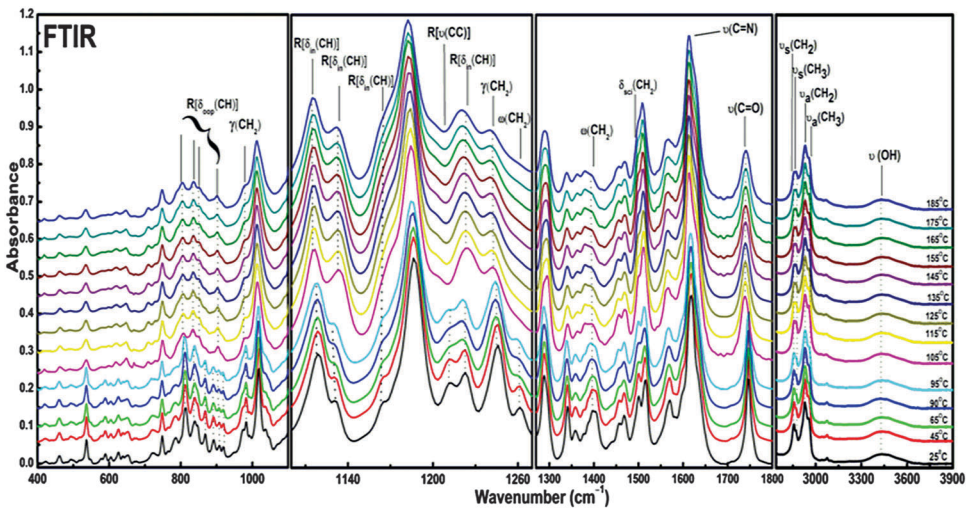

Fig. 8 Temperature dependent FTIR spectra of HAMPB recorded upon heating from the room temperature crystal phase (25 °C) to the isotropic phase (185 °C) in the region 4000–400 cm^{-1}.

868, 847, 839, 814 and 787 cm^{-1} correspond to the ring CH out-of-plane bending, start diminishing in the nematic phase and remain with only four peaks of low intensity as marked in Fig. 8. Although most of the observed peaks showed variation with the temperature, we confined our discussion to the hydroxyl group, the soft alkoxy chain and polar promesogenic linking units (C═O and C═N).

3.3.2.1 OH vibrational mode. The hydroxyl group stretching mode when involved in inter- or intramolecular hydrogen bonding appeared in the lower wave number region (3550–3200 cm^{-1}), while the free hydroxyl group peak appeared in the region 3600–3550 cm^{-1}. The observed peak position of the OH stretching mode at 3435 cm^{-1} is in good agreement with the reported results on bent-core molecules.[35,38] Further DFT optimised structures also supported a strong intramolecular hydrogen bonding between the hydroxyl groups and nitrogen of the imine moiety. Upon heating to the nematic phase, the peak is clearly visible and becomes broader (Fig. 8) without any shift in the peak position up to the isotropic phase reflecting insufficient thermal activation energy to break these hydrogen bonds. The analysis of the one-dimensional PES around $\phi 3$ and $\phi 11$ (Fig. 5) which involve the rotation of hydroxyl groups (Fig. 4) revealed that the energy barrier in both the cases is much larger and hence justified the experimental results since higher energy is required to break these strong intramolecular hydrogen bonds (see the conformers XVII and XVIII in the ESI,† Fig. S1). Hence, it can be inferred that crystal modification or conformational changes during phase transitions do not affect the environment of the hydroxyl group up to an isotropic phase.

3.3.2.2 CH_2 and CH_3 vibrational modes. The CH_2 vibrational mode and the terminal CH_3 vibrational mode of soft alkoxy chains are highly sensitive towards the phase transition due to the conformational change as well as reorganisation of end alkyl chain assemblies in the molecule. The structural disordering also results in the *trans* and *gauche* rotational isomers. The changes in the peak position of methylene and terminal methyl moieties as a function of temperature are shown in Fig. 9. Four distinct peaks are observed for methyl and methylene asymmetric and symmetric stretching modes. The shoulder peaks at 2957 and 2863 cm^{-1} correspond to the asymmetric (r^-) and symmetric (r^+) stretching of the terminal methyl moiety, respectively. Two sharp peaks at 2930 and 2855 cm^{-1} correspond to the asymmetric (d^-) and symmetric (d^+) stretching of methylene moieties, respectively. Hence, these CH_2 and the terminal CH_3 vibrational modes indicated an all-*trans* conformation of alkoxy chains with small or no significant *gauche* population.[43] Initially upon heating (25–95 °C), these modes did not exhibit any marked changes (suggesting a higher structural order that offered strong packing and intact intermolecular interactions in Cr and SmX phases) but a steady and slight change is observed in spectra at ~95 °C (SmC phase) that reflects the onset of disordering in methylene chains. All the four peaks undergo sudden changes typically at SmC → N_{cybC} phase transition to indicate changes in intermolecular interactions and relaxation in molecular packing. Small changes in methylene stretching may also be attributed either to the change in the co-planarity of the alkoxy chain and the phenyl ring and hence contribute to changes in intermolecular interaction or due to the stacking effect. As illustrated in Fig. 9 the marked changes in the peak position at above ~95 °C confirmed the SmC → N_{cybC} phase transition. As the wavenumbers of these bands are 'conformation-sensitive' and respond to changes in the *trans*/*gauche* ratio in the alkyl chains[44] the marked changes can be attributed to *trans*/*gauche* isomerism of the long alkoxy chains.

The ratio of normalized integrated intensities of d^- and d^+ is also a sensitive indicator of the structural changes during the phase transition.[44] The variation of the ratio of normalized integrated intensities of asymmetric and symmetric CH_2 stretching (I_d^-/I_d^+) as a function of temperature shown in Fig. 10 also confirmed the SmC → N_{cybC} phase transition. Initially, with an increase in temperature, this ratio constantly increases up to ~95 °C that corresponds the slight structural disordering and above this temperature, it suddenly decreases, reflecting major structural/conformational changes during the SmC → N_{cybC}

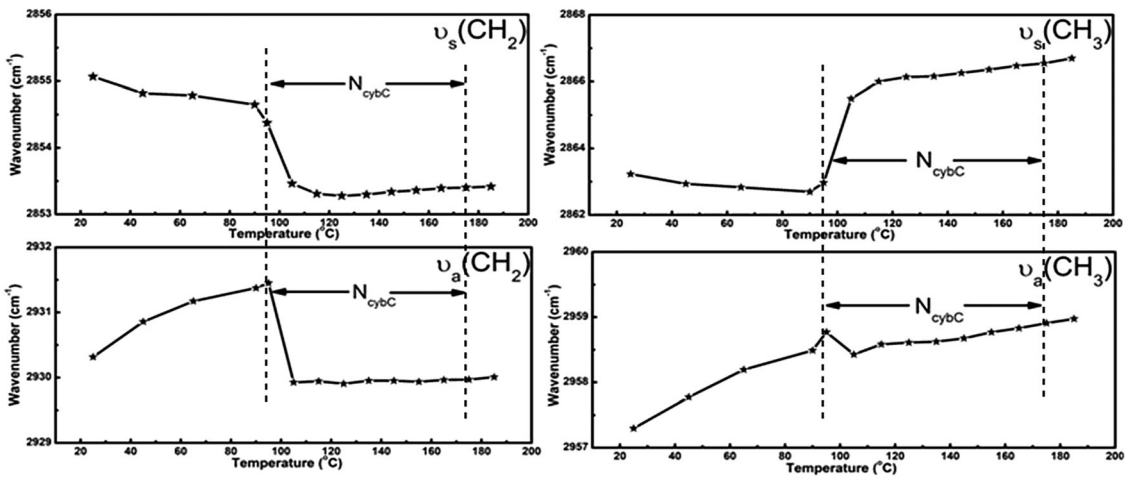

Fig. 9 Temperature dependence of the peak positions (cm^{-1}) due to asymmetric and symmetric CH_3/CH_2 stretching vibrations (3000–2800 cm^{-1}).

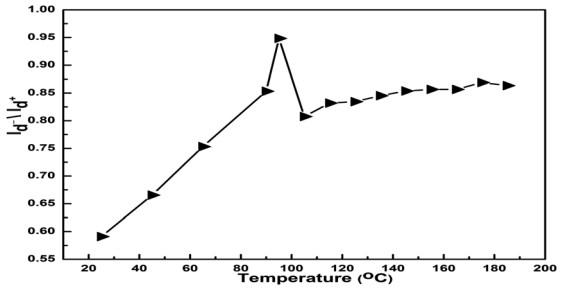

Fig. 10 Temperature dependence of the normalized integrated intensities of asymmetric and symmetric methylene (CH_2) vibrations (3000–2800 cm^{-1}).

phase transition. Upon further heating in the nematic phase the ratio is almost constant.

3.3.2.3 C═O vibrational mode. The distinct stretching mode of the carbonyl group (C═O) at ~1746 cm^{-1} (Fig. 11) undergoes a subtle change with the increasing temperature in SmX and SmC phases, in all the three parameters like the peak position, the peak width and the peak intensity and is illustrated in Fig. 12. The marked changes in peak intensity as well as ~8 cm^{-1} red shift in the peak position (~1739 cm^{-1}), which could be clearly seen from the fitted spectra (Fig. 11), clearly reflect the phase transition from the SmC → N_{cybC} phase. This red shift and broadening can be attributed to the conformational (E/Z rotational isomerism) changes due to the relative motion of the phenyl rings (R2 and R3) that further facilitates charge conjugation between the rings and carbonyl group.

Upon further heating very small but noticeable changes (Fig. 12) in the peak position (upward shift), peak intensity (downward shift in FWHM ~2 cm^{-1}) and downward trend in peak width are observed at N_{cybC} to isotropic phase transition. These upward/downward shifts are associated with the charge conjugation, conformational changes, structural changes or other inter/intramolecular interactions, *etc.*[16–18] These changes recorded in FTIR spectra can also be explained from the analysis of the PES scan of $\phi 6$ (Fig. 5). The conformers obtained along this scan (conformers II, III, IV and VIII) possess relatively low energies and exhibit smaller barrier height (Fig. 6), such that it would be possible to cross these barriers which resulted in a distinct peak shift in the C═O stretching band (~8 cm^{-1}) attributed to the molecular conformational changes around the C8–O58 bond.

3.3.2.4 C═N vibrational mode. The C═N stretching mode plays an important role in the investigation of the phase transitions as it undergoes a marked shift with the variation in temperature due to the changes in molecular dipole moment. The intensity of a peak in the infrared spectra mainly depends upon the number of components that take part in the related mode. It can be seen from Fig. 11 that only a slight variation is observed in the peak position and intensity in the low-temperature

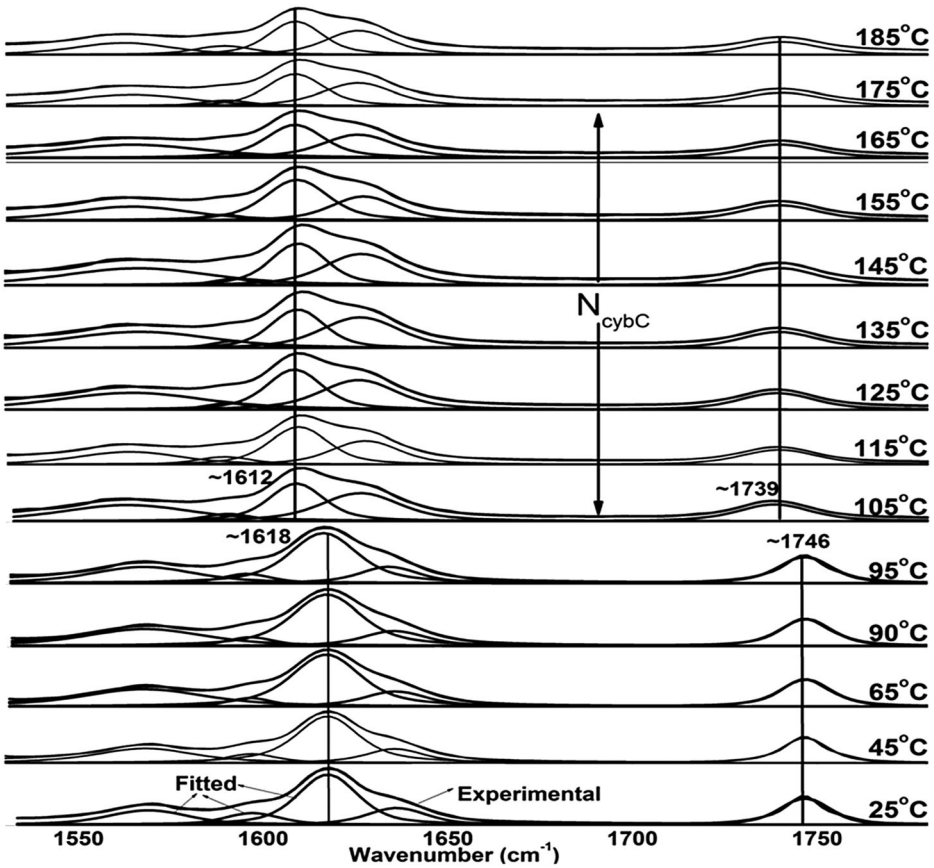

Fig. 11 Fitted infrared spectra of HAMPB, over the temperature range of 25–185 °C, for the lower region (1800–1500 cm^{-1}).

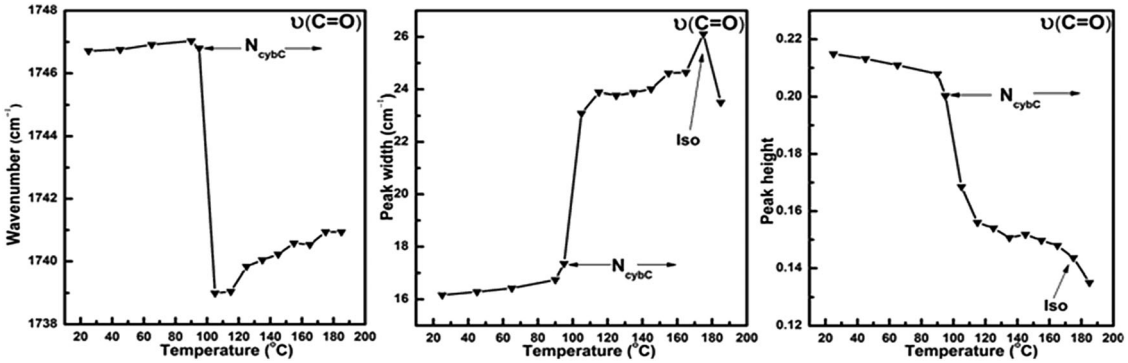

Fig. 12 Temperature dependence of carbonyl group (C═O) stretching vibration over the temperature range of 25–185 °C.

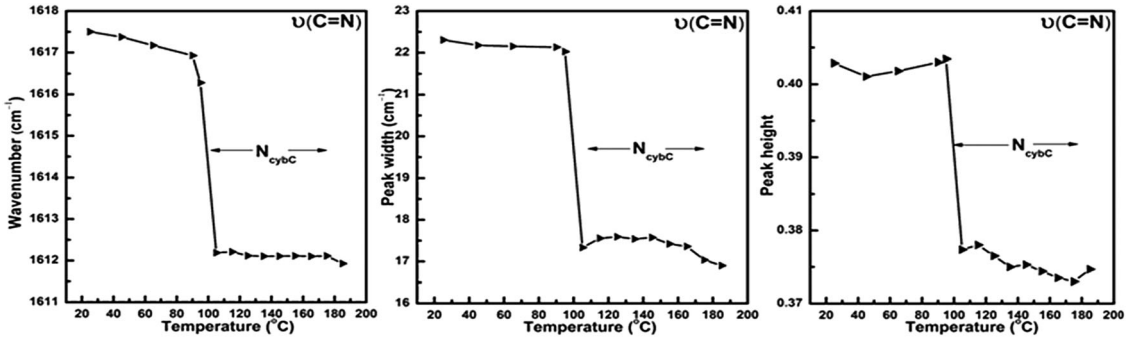

Fig. 13 Temperature dependence of C═N stretching vibration, over a temperature range of 25–185 °C.

region (25–95 °C). However, above ~95 °C, there is a red shift (~4 cm^{-1}) in wavenumber (Fig. 13) and a decrease in intensity (Fig. 13) with a decrease in FWHM (~5 cm^{-1}). Such noticeable variations suggest that the structural transformation or *E/Z* isomerism might be possible around the bond N–C during the phase transition.[45] Upon further heating, the peak position, as well as intensity, showed slight variations.

3.4 Reversible nature of the LC phases exhibited by the bent-core liquid crystal

The thermal reversibility of the sample was confirmed by comparing the FTIR absorptions of the title molecule at room temperature after repeated heating/cooling cycles. Comparison of the recorded spectra (Fig. 14) at ~25 °C (room temperature), ~185 °C (isotropic phase) and ~30 °C (after annealing) revealed the thermal reversibility of the sample, and prominently reflected in sensitive spectral peaks, *i.e.*, conformationally sensitive CH stretching peaks of d^+, d^-, r^+ and r^- that appeared to be distinct and intense and the C═O stretching peak with high intensity, and the reappearance of the CH out-of-plane bending mode of progression series (wagging and twisting modes). The integrated intensities are conserved in both the regions, at $(I_{30}/I_{25})_{400-1800cm^{-1}} \sim 1.01$ in the lower region as well as at $(I_{30}/I_{25})_{2600-3700cm^{-1}} \sim 0.92$ in the higher region.

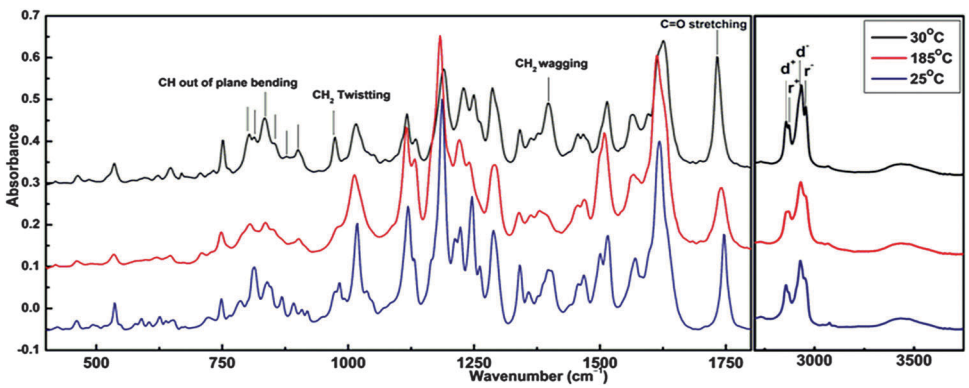

Fig. 14 Infrared spectra of HAMPB recorded at room temperature, at 25 °C (navy blue color), after annealing the sample at 185 °C (red color) and after cooling the sample at 30 °C (black color).

Temperature-induced minor but non-vanishing changes are still present in the sample that results in some shifting and broadening in the FTIR peaks due to the minor changes in the molecular conformations after annealing the sample. However, most of the FTIR peaks, POM as well as DSC data support the reversibility of the LC phases. Thus, it can be concluded that the title molecule exhibited reversible characteristics with good thermal stability.

4. Conclusion

A four-ring bent-core compound [4-(*N*-4′-*n*-heptyloxysalicylidene)-aminophenyl]-[2-methyl-3-(*N*-4′-*n*-pentyloxysalicylidene-amino)]-benzoate (HAMPB) was successfully designed, synthesized and characterized. The four-ring bent-core liquid crystal HAMPB exhibits the cybotactic nematic phase (N_{cybC}) with strong SmC like fluctuations in the wide temperature range. The long alkoxy chains are mainly responsible for these cybotactic clusters with a fragmented SmC phase structure in the nematic phase. Small angle X-ray investigations of the aligned sample in the magnetic field complemented the polarised optical microscopy and differential scanning calorimetry studies to confirm the nematic phase with SmC type fluctuations as N_{cybC} and the phase variant as SmX → SmC → N_{cybC}. A detailed conformational analysis has been carried out to find the most stable conformer followed by vibrational assignment to make correct peak identification. The calculated potential energy scan predicted 18 conformers along with the most stable conformer (conformer I) that might be expected to be closer to the real system as the molecular length and the bent angle of this conformer are nearer to the values observed in other similar systems. The theoretically calculated spectrum of conformer I showed a good agreement with experimental Fourier transform infrared spectra that validates the structure of conformer I. In addition, an accurate assignment of the peaks of the infrared spectrum (recorded at room temperature) was done to understand the changes in spectral features during the phase transitions. Differential scanning calorimetry along with polarised optical microscopy studies revealed four phase transitions *i.e.* Cr → SmX → SmC → N_{cybC} → Iso in the temperature range from 30 °C to 180 °C. During the first two transitions, temperature dependent infrared spectra show only slight changes, which indicate that slight conformational changes (due to the bulkiness of the molecule) occurred in the molecules and the entire thermal activation energy is utilized in the crystal modification or disordering in the system. However, spectral peaks show remarkable changes during the SmC → N_{cybC} transition due to the loss of the structural order, thereby resulting in conformational changes in the molecule. The convincing signatures are observed in the vibrational modes of CH_2/CH_3 stretching vibrations, C═O and C═N that strongly support conformational changes driven by the rotation of the linking groups (relative motion of phenyl rings) facilitating the charge conjugation and responsible for the changes in the infrared spectra during SmC → N_{cybC} phase transition. One of the salient features noticed is the non-involvement of the C═O moiety in inter/intramolecular hydrogen bonding. However the N atom of Schiff base (–HC═N–) as well as the hydroxyl group (–OH) is involved in hydrogen bonding up to the isotropic phase as the large shift is not observed in both the peaks. The present study demonstrated the importance of combined techniques of FTIR and DFT along with the standard techniques to identify the most stable conformer as well as conformational changes during the phase transitions. Furthermore, these experimental techniques complemented by the theoretical results are useful to understand the dynamics of the large molecules during the phase transitions.

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A hybrid carbon policy inventory model with emission source-based green investments

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THEORETICAL ARTICLE

A hybrid carbon policy inventory model with emission source-based green investments

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Abstract
The present study analyzes a production-inventory system with hybrid carbon regulation policy. This hybrid carbon policy is a combination of carbon tax and cap-and-trade policies. It considers a single item that can be produced in different qualities. Production cost, setup cost, amount of emissions and the demand rate depend on the quality. The demand rate for each quality is price sensitive. Emissions occur from three sources—setup, production process and stock holding. The firm can invest on green technologies in each emission source separately to reduce emissions. This model considers profit maximization policy. The managerial problem is to select the profit-maximizing quality for production, and to find the optimum values of the production run time, green investments and the selling price. An algorithm is provided to solve the model. The model is illustrated by a numerical example. Sensitivity analysis is also performed.

Keywords Cap-and-trade · Carbon tax · Emission · Green investment · Inventory · Production

1 Introduction

Catastrophic effects of global warming are well-known to us. In a special report published in 2018, the Intergovernmental Panel on Climate Change (IPCC) mentioned that a number of climate change impacts that could be avoided by limiting global warming to 1.5 °C, compared to 2 °C or more. For instance, by 2100, the rise of global sea level for 1.5 °C global warming would be 10 cm lower compared to 2 °C global warming (https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report (Accessed on 05 June 2019)). Tollefson [31] mentioned,

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"Two degrees of warming could destroy ecosystems on around 13% of the world's land area, increasing the risk of extinction for many insects, plants and animals. Holding warming to 1.5 °C would reduce that risk by half". Human activities, like industrialization, urbanization etc. are main causes for global warming. It has been observed by the scientists that the carbon emissions play major role in global warming because of its heat trapping property. Industry sector is one of the major carbon emitters. In a report, published in 2014, the US Environmental Protection Agency (EPA) noted that industry was the third major contributor to GHG emissions contributing 21% of the total GHG emissions in US. A country's economic growth largely depends on its industrial growth. So, no country will shut down its industries to reduce emissions. Instead, the government of a country should adopt strong emission regulation policies. Many countries are implementing carbon emission regulation policies to compel the emitters taking serious actions to reduce emissions. Carbon tax and cap-and-trade are two well-known polices adopted by many countries. Under these carbon policies, a firm needs to reset the optimal values of the decision variables [8]. To reduce the burden of carbon tax, an industrial firm can considerably reduce emissions by investing on green technology in production process, warehouse, transportation [4, 23].

In recent times, there is a growing interest among the researchers to investigate sustainable inventory models and supply chain under various realistic situations. Hovelaque and Bironneau [19] discussed a carbon-constrained EOQ model with price and emission sensitive demand. Aliabadi et al. [1] analyzed an inventory system of deteriorating items with carbon emission and credit period sensitive demand. Many research publications are available in inventory and supply chain literatures which consider sustainability as one of the prime factors (e.g. [2, 3, 6, 7, 9, 12, 14, 15, 17, 18, 20–22, 27, 28, 33]. None of these studies considers green investment as a decision parameter. There are three main sources of emissions in a production-inventory system. These sources are—setup, production process and stock holding [3, 12, 27]. Emissions can be reduced considerably in each of these sources by investing on green technologies and green systems. Toptal et al. [32] incorporated green investment as a decision parameter in a retailer's decision model under different emission regulations. Lou et al. [24] considered green technology investment as one of the model parameters in a supply chain model with emission trading policy. In a study, Bi et al. [5] discussed on governmental subsidy policy to motivate firms' adoption of green investment for environmentally discerning consumers. A system with defective product under carbon tax and green investment was investigated by Datta [12]. None of these articles considers emission source-based green investment. Further, all the studies mentioned above discuss different carbon policies separately. Both policies, carbon tax and cap-and-trade, have advantages and disadvantages. In the existing literature, many research articles are available which compare these two policies (e.g. [13, 16]). To overcome the disadvantages of these policies, some authors proposed a hybrid mechanism by mixing these two policies. Mandell [26] investigated a situation where one part of the economy is controlled by cap-and-trade mechanism and the rest by carbon tax. Snyder [29] proposed a hybrid system where emission companies pay tax at a fixed rate and the government uses the carbon tax to buy the companies' emissions credits in the carbon market. Sun

and Kuang [30] simulated the effects of a hybrid policy on the economy in a CGE (Computable General Equilibrium) model. Zhang et al. [34] proposed a hybrid carbon policy consisting of a combination of progressive carbon tax and carbon trading policy. They discussed about how it could be implemented in small and large enterprises. None of these papers shows the effects of this proposed hybrid carbon policy

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One critical observation is that none of the studies available in inventory literature focuses on emission source-based green investment. Emission source-based green investment is more practical because fund allocations in these sources are important decision variables, particularly when green budget is fixed. Another observation is that none of the researchers incorporates hybrid emission regulation policy in a production-inventory model. These observations provide the motivation of the current work, in which we investigate a firm's production-inventory system with hybrid carbon policy and emission source-based green investment. This is the first attempt to use source-based green investment in a model. The demand rate is considered as price sensitive. The firm has to select only one quality for production from a multiple quality options that maximizes its average annual profit. The contributions of this study with respect to the studies available in existing literature are threefold. First, it incorporates hybrid carbon policy in a production inventory system. Second, the green technology investments are emission source-based and independent. Third, the selection of profit-maximizing quality for production from multiple-quality options is a decision parameter. To the best of the authors' knowledge, the current study is the first study which considers hybrid carbon policy, multiple-quality and source-based green investments in a system for analysis.

The rest of this paper is organized as follows. Section 2 describes the assumptions and notations used in the model. The model development is presented in Sect. 3. Solution of the model and the solution algorithm are presented in Sect. 4. Numerical example and sensitivity analysis are provided in Sects. 5 and 6 respectively. Section 7 derives the condition for simultaneously optimizing average profit and average emission. Section 8 provides some concluding remarks.

2 Assumptions and notations

Following are the assumptions and notations used to develop the proposed model.

Assumptions:

(a) Time horizon is infinite.
(b) The firm can produce the item in n different qualities. However, the firm decides to produce only one of these qualities that maximizes its average annual profit.

Model parameters are different for n different qualities. All qualities are marketable, but demand rates are different.
(c) Demand rate is price sensitive.
(d) Production rate is constant.
(e) Three sources of carbon emission are—set up (source 1), production process (source 2) and holding the produced items (source 3) (as in Arslan and Turkay [3], Marti et al. [27] and Datta [12]).
(f) The firm has the opportunity to invest on green technology in each source of emissions separately to reduce emissions.
(g) We use a hybrid carbon policy in this model. This policy is a combination of carbon tax and cap and trade policies. In this policy, the firm receives free annual

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Types of Doping and Its Side Effects on Athletes: An Overview

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Abstract:

Doping is a serious problem in sport physiology nowadays on an international scale. The moral and ethical principles of mankind that affect the fair competition of sports are also taken into consideration. Worldwide sporting events are being directly impacted by this. Blood doping is the use of particular substances improperly to raise red blood cell mass, which enables the body to carry more oxygen to muscles and boosts performance and stamina of a player or individual. Blood doping has been linked to a long range of harmful harmful effects, including blood viscosity increases, myocardial infarctions, emboli, strokes, infections, allergic reactions, and an increased risk of blood-borne illnesses like HIV and hepatitis, among others. Local legislation may contradict with anti-doping policies implemented by various athletic governing bodies. These authority & government legislation don't correlate in this way. Nowadays, players use a variety of methods and medicines, making it difficult for professionals to identify them and win the battle against doping. However, it is our duty to combat them, using the most recent information and developments.

Keywords: Doping, Erythropoietin, Sport Physiology, Anti-doping policies

Introduction:

Doping is currently a serious problem in sport physiology on a worldwide scale. In addition to physical issues, this also has moral and ethical implications for the integrity of teamwork in athletic competition. This has a direct impact on international sporting events. The term "doping" was formerly primarily used to refer to blood doping. But as doping becomes more prevalent nowadays, the present tests are rendered useless for detecting it. However, it is the responsibility of professionals to stay informed in this area in order to avoid doping. Any type of behaviour that encourages the use of particular medicines for the purpose of enhancing athletic performance or endurance is referred to as doping. According to the organisations concerned, this is unethical because it frequently happens at both the national and international levels. The International Olympic Committee deems this situation to be illegal and immoral. These committees frequently accuse such events of regular, significant offences. occasionally took place. This organisation makes constant, unrelenting efforts to promote doping-free sports. Sportspeople frequently utilise doping in an effort to enhance their performance without concern for or ignorance of its repercussions or negative effects. These actions not only degrade sportsmanship, but they may also be viewed as a component of sports corruption, which weakens the competitive spirit.

Purpose of the article:

To make coaches, trainers, players and parent to aware of anti-doping and side effect of doping.

Objectives:

1. To know about different types of doping
2. To create awareness amongst people about anti-doping.
3. Good health and success in sports and physical activities through nutrition and anti-doping.
4. To make athletes aware of the side effects of doping

Research Methodology:

This research paper is based on secondary content. For data collection, the researcher has relied on various research materials, reference books, books, research papers, magazines, newspapers, YouTube, media, TV, Internet and through conference and seminars for promoting health and anti-doping to spread awareness.

Definition of Doping:

The word doping is probably derived from the Dutch word dop, the name of an alcoholic beverage made of grape skins used by Zulu warriors in order to enhance their prowess in battle.

The use of a substance (such as an anabolic steroid or erythropoietin) or technique (such as blood doping) to illegally improve athletic performance.

Reasons for Athletes Taking Drugs

1. There are a large number of reasons why an athlete may decide to take Drugs, the reasons are listed here:
2. Feeling under pressure to perform, whether it comes from their instructors or families; • Believing that their rivals are using drugs
3. Lack of access to, or funding for, training facilities and additional support (nutrition, psychological support), pressure from governments and national authorities (as was the case in the eastern bloc countries in the 1960s and 1970s);
4. Financial rewards for exceptional performance;

Types of Doping:

(A) Performance enhancing substance:

1. **Stimulants:**
   Drugs that directly influence the central nervous system are known as stimulants. They function by accelerating certain bodily and mental processes, raising the user's heart rate, blood pressure, metabolism, and body temperature. They help athletes perform better by reducing weariness and drowsiness and boosting alertness, aggressiveness, and competitiveness. 'Performance-enhancing drugs' or 'performance and image-enhancing substances' are prohibited in sports because they could provide a competitor an unfair edge.
2. **Anabolic Steroids:**
   By mimicking the effects of the body's natural male hormone, testosterone, anabolic steroids aid in the development of muscular tissue and increase in body mass. Steroids, however, cannot increase an athlete's agility or talent. Genetics, body size, age, sex, food, and how hard an athlete trains are just a few of the many variables that affect athletic performance.
3. **Peptide hormones:**
   Peptide hormones are hormones whose molecules are peptide. Peptide hormones have shorter amino acid chain lengths than protein hormones. These hormones have an effect on the endocrine system of animals, including humans. Most hormones can be classified as either amino acid–based hormones (amine, peptide, or protein) or steroid hormones.
4. **Beta - 2 Agonist:**
   These medications, also known as sympathomimetic amines, are made to replicate the body's normal response to the hormones adrenaline and norepinephrine, but with a focus on B2 receptors in an effort to minimise side effects. They are mostly employed to treat respiratory conditions like asthma and chronic obstructive pulmonary disease (COPD).
5. **Narcotics:**
   Drugs of the narcotics class are used as doping in sports. They are injected into a person's muscles, bloodstream, or subcutaneously. Drugs can also be ingested. Unless prescribed by a licenced professional, unlawful.
6. **Diuretics:**
   Diuretics are medications that alter the body's fluid and salt balance. They may result in water loss from the body, lowering an athlete's weight. Diuretics may also assist athletes in passing urine drug tests that look for indicators of drug use. They thin the urine and could mask drug residue.
7. **Cannabinoids:**
   Tetrahydrocannabinol (THC) is the principal active ingredient. The soothing and slightly euphoric effects of cannabinoids are felt. Although marijuana is rarely used to improve performance, its usage outside of sports results in several positive doping samples. In all sports, marijuana use during competition is illegal.

(B) Physical methods: Blood doping and Gene doping these are two types of physical method.

Blood doping:

Meaning of Blood Doping:

Blood doping is also referred to as blood packing, blood boosting, or even artificial erythrocythemia. It is "the misuse of specific methods or/and substances to increase one's red blood cells, enabling the body to deliver more oxygen to muscles to enhance stamina and performance," according to WADA. High oxygen transport to the working skeletal muscles and its usage are the primary determinants of performance in aerobic sports disciplines including long-distance running, cycling, and cross-country skiing.

Methods and Techniques of Blood Doping:

There are two basic techniques of blood doping; heterologous and autologous blood doping:

Heterologous Blood Doping:

Heterologous blood doping involves transfusing a donor's blood into the body of an athlete. Even though this technique is frequently employed for therapeutic purposes, if the blood is contaminated, it may be harmful to the athlete's health.

Autologous Blood Doping:

Two units of the athlete's blood are taken, stored, and then reinfused around seven days before the sports competition. This is known as autologous blood doping. Venesection must be carried out at least three weeks before to reinfusion to give the subject time to return to normal haemoglobin levels. Doping with autologous blood is challenging to identify

ii) Gene Doping:

Meaning of Gene Doping:

The non-remedial use of genes and genetic materials that have the potential to improve athletic performance is referred to as gene doping. The fake gene is introduced by a virus, genetically modified cells, or by injecting DNA directly into the muscles. Some of the drugs utilised by athletes to improve their athletic performance include erythropoietin, insulin-like growth factor

(IGF), and vascular endothelia growth factor (VEGF). The World Anti-Doping Code's "The 2017 Prohibited List" lists gene doping as Prohibited Method M3, or gene doping.

The following things are not allowed using this method:

1. The exchange of nucleic acid or nucleic acid analogue polymers; 2. The application of unaltered or genetically modified cells. There is no solid proof that gene therapy has ever been used as a means of athletic enhancement, despite the fact that gene doping was first addressed in 2001 by the International Olympic Committee and later outlawed in 2003 by the World Anti-Doping Agency (WADA).

Methods of Gene Doping:

The most effective way to transfer genes is through a viral infection; but, to achieve the highest levels of safety, a significant financial investment is needed. Ex vivo introduction is a different technique that entails extracting a collection of disease-related cells from the patient.The separation and characterisation of the human DNA region that codes for endogenous EPO, as well as the production of a complementary mould copy of the same region (c-DNA), were the actions that made it possible and heralded a new era in the production of synthetic EPO. Because they derive from diverse sources of synthesis, every RhEPO manufactured by different manufacturers has a different analogy. The dangers of gene doping Athletes wouldn't have to work hard or give up things to have good results if there were genetics in sports, which would kill the practise spirit and the attractiveness of the sport. The introduction of viral vectors into the host DNA raises the possibility of transhumanism or posthumanism due to insertional mutagenesis. In addition to harming the athlete's health, gene doping also affects others, i.e., future individuals. Gene therapy has the potential to cause leukaemia and flu-like symptoms.

General Side Effects:

Many athletes use excessive amounts of anabolic steroids. These dosages are significantly higher than those prescribed by medical professionals. Serious adverse effects can also be caused by anabolic steroids.

Male specific effect:

1. See their breasts expand.
2. Note any testicular atrophy.
3. Being unable to impregnate their partner.
4. Discover that their prostate gland has grown in size from a medical professional.

women specific effect:

1. Use a louder voice. Treatment might not be able to reverse the alteration.
2. Take note of the clitoris, a portion of their genitalia, which has become larger.
3. Increase body hair.
4. The head's hair will fall out. It's possible that treatment won't be able to regrow hair.
5. Stop having periods or have them considerably less frequently than before.

General side Effect on Human bodies:

1. Severe acne;
2. An increased risk of tendons—cords that connect muscle to bone—becoming enlarged or ruptured;
3. Liver tumours or other changes to the liver.
4. Higher concentrations of low-density lipoprotein (LDL), or "bad" cholesterol.
5. Lower levels of high-density lipoprotein (HDL) cholesterol, the "good" cholesterol. Blood pressure problems.
6. Heart and blood flow conditions.
7. Problems with aggression or violence.
8. Mental health issues including depression.
9. An uncontrollable urge for anabolic steroids.
10. Diseases, such as HIV or hepatitis, if injecting the narcotics with needles.

Conclusion:

Nowadays, players use a variety of methods and medicines, making it difficult for professionals to identify them and win the battle against doping. However, it is our duty to combat them, using the most recent information and developments. Doping medicines have awful negative consequences on the body. Steroids prevent your body's hormones from developing normally. Your body goes through alterations that can be reversed when this occurs. changes such sperm production, baldness, male breast development, female breast shrinkage, and a woman's voice becoming deeper. High blood pressure is more likely. Additionally, there is a greater risk of heart attacks. Blood doping, a doping substance, puts the heart under a lot of strain. This is because as your red blood cell count rises, your blood becomes thicker in your bloodstream. The heart of a human is not accustomed to pumping blood this thick. It causes many forms of cardiac disease. The risk of AIDS exists because this type of doping involves the use of needles, typically shared needles. Narcotic overdose can result in death. Limited vision, decreased sex drive, menstruation, persistent constipation, mood swings, and muscle twitching

are a few withdrawal symptoms. Cramping is one of creatine's known side effects. Dehydration, increased urination, and diarrhoea. The effects of consuming a lot of creatine are similar to those of drinking sea water.

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Research Paper
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A Comprehensive Study of Educational and Demographic Status of the Rural- Urban Fringe Area of Kolhapur City

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Abstract

Rural-urban fringe is transition zone between rural and urban area, and it shows both characteristics. Any statistical parameter that impacts population growth or decline can be included in demographics; however, certain criteria are essential: size, density, sex ratio, and population of the fringe area. The rural-urban fringe of the city is a significant area because it shows both urban and rural characteristics. The fringe area consists of 20 villages around Kolhapur city. The Socio-economic development of the fringe area is examined in terms of population, population density, and sex ratio of the fringe villages from 1981 to 2011. And the educational development of fringe areas includes the literacy rate and educational institutes in this area. The current research paper examines the demographic and educational development of fringe areas over a 30-year population period. From 1981 to 2011, the population increased steadily over a 30-year period because the fringe area is near Kolhapur city and the fringe area provides basic services like supplying milk and vegetables, etc., and plays an important role in the city. As a result, an effort has been conducted here to evaluate the demographic and educational growth of the periphery area.

Keywords

Rural-Urban fringe, Social, Growth rate, Density, Sex Ratio, Demography.

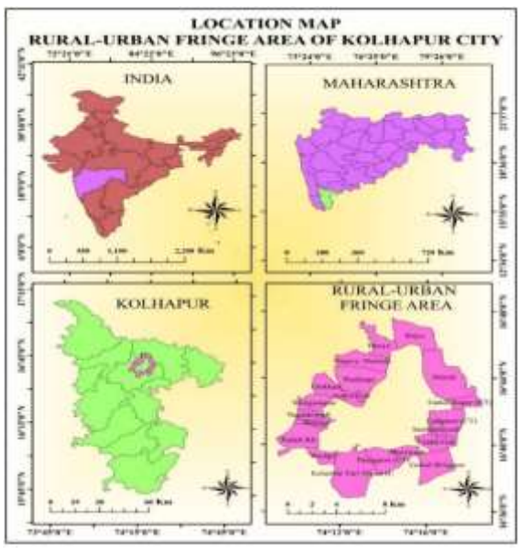
Introduction

The dynamic nature of the fringe can be detected by observing the changes in the city and vice versa. The changes in the rural-urban fringe depend upon the function and size of the city. Over the last 30 years, The Rural-Urban Fringe area of Kolhapur city population increased. In 1981-2011 Period population increased by 83,147 to 2,01,328. In India rural area is engaged in agriculture-based activities but metropolitan cities are engaged in tertiary and large-scale secondary activities. But small cities like Kolhapur are the cities that show both cultures like the rural areas as based on some Agro-based industrial sector and culture of urban areas as developing small-scale industries. In this combination fringe of any city plays an important role. Because it connects the city with the rural areas, and it combines both rural as well as urban activities. It provides agricultural products to the city easily as well as human resources. It provides low-rent accommodation as compared to the city and people can use facilities from the city. Therefore, this area plays important role in the city's development. Therefore, here an attempt has been made to analyse the economic status of this fringe of Kolhapur.

Objective

To study social and educational aspect of the rural-urban fringe area of Kolhapur city.

Study Area



Kolhapur is an inland city located in south-west Maharashtra state. The geographical area of fringe area is about 122.13 Sq.km and the population of fringe area is 2,01,328 as per the census 2011. Kolhapur is headquartered of the district. It located between 16° 42' North latitude and 74° 14' East longitudes at an altitude 650 meters above mean sea level. The city of Kolhapur located on the right bank of river Panchganga. The fringe area comprises about 20 villages. These are located on the boundary of the city. Following table shows population of villages located on fringe area.

Databa se

The current study is based on secondary data and data collected in the Kolhapur district census handbook from 1981 to 2011.

Methodology

Various effective statistical methods for gathering, tabulating, classifying, calculating, and interpreting data have been applied in the current study. The research has been supported using quantitative and cartographic methods. The quantitative and cartographic methods, maps

diagrams are used as necessary, with their meaning specified in the current research of rural-urban fringe development.

1. Population Growth Rate

The population growth rate calculated by formula,

$$Gr = (P_2 - P_1)/P_1 * 100$$

Where, Gr represents Population Growth Rate
P_2 represents Final Population Size
P_1 represents Initial Population Size

2. Population Density

Population density calculated number of persons living per sq. km area.

Population Density = Number of People/ Total Land Area

3. Sex Ratio

The sex ratio is defined as the number of females per thousand males.

Sex ratio = No. of Females/ No. of males *1000

4. Literacy Rate

The literacy is defined as the ability of reading and writing of person (Census of India, 2011).

Literacy Rate = Literate Population Age 7 and above/Total Population Age 7 and above *100

Result and Discussion

Demographic Aspect

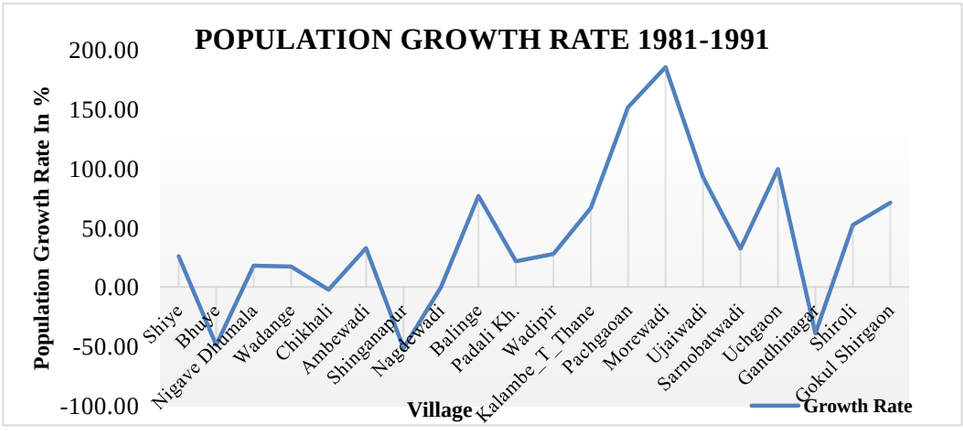
The word demography comes from two old Greek words, demos, meaning "the people," and graph, meaning "writing about or recording something." Van de Walle (1982) Defined "demography as the scientific study of the human population, primarily with respect to their size, structure, and development." The study of demographic development of a rural-urban fringe area of Kolhapur city, to analyse different characteristics of the population, density, and sex ratio of the fringe area over 30 years period. The demographic indicators are discussed below.

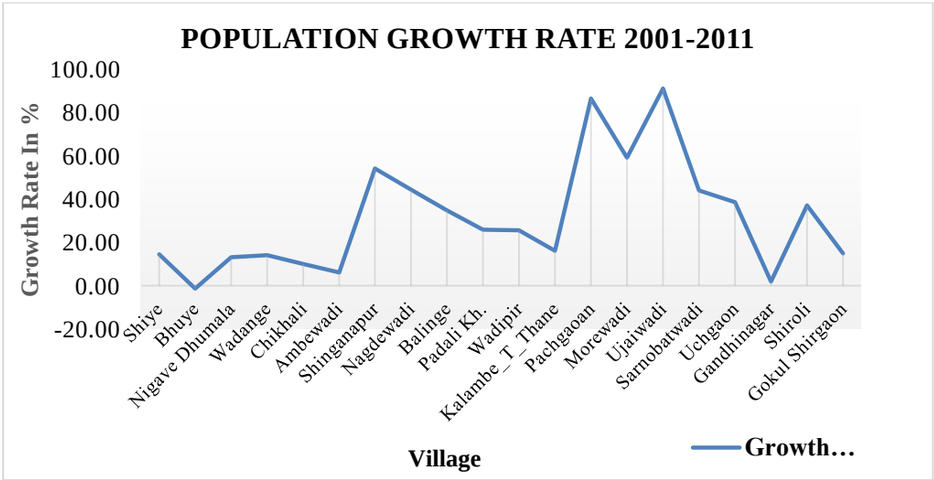
Population Growth Rate

Sr. No.	Village	1981	1991	Decadal variation	Growth Rate	2001	2011	Decadal variation	Growth Rate
1	Shiye	4421	5566	1145	25.90	8307	9503	1196	14.40
2	Bhuye	5018	2566	-2452	-48.86	2781	2744	-37	-1.33
3	Nigave Dhumala	4630	5464	834	18.01	6101	6898	797	13.06
4	Wadange	9148	10740	1592	17.40	11846	13507	1661	14.02
5	Chikhali	4606	4501	-105	-2.28	5728	6301	573	10.00
6	Ambewadi	1507	2002	495	32.85	2077	2203	126	6.07
7	Shinganapur	7686	3722	-3964	-51.57	4911	7570	2659	54.14
8	Nagdewadi	0	2010	2010	0.00	3449	4981	1532	44.42
9	Balinge	1709	3023	1314	76.89	3828	5158	1330	34.74
10	Padali Kh.	2929	3569	640	21.85	4297	5408	1111	25.86
11	Wadipir	1214	1553	339	27.92	1893	2376	483	25.52
12	Kalambe_T_Thane	3939	6561	2622	66.57	8734	10138	1404	16.08
13	Pachgaoan	2016	5069	3053	151.44	11991	22353	10362	86.41
14	Morewadi	885	2525	1640	185.31	4539	7222	2683	59.11
15	Ujlaiwadi	1098	2113	1015	92.44	4750	9075	4325	91.05
16	Sarnobatw	1244	1648	404	32.48	2586	3722	1136	43.93

	adi								
17	Uchgaon	7417	14790	7373	99.41	22548	31238	8690	38.54
18	Gandhinagar	10767	6561	-4206	-39.06	12374	12601	227	1.83
19	Shiroli	11069	16854	5785	52.26	21671	29707	8036	37.08
20	Gokul Shirgaon	1844	3154	1310	71.04	7505	8623	1118	14.90

Source: Computed by Researcher based on District Census Handbook Kolhapur (1981-2011)





The population growth rate calculated by 1981-1991 and 2001-2011 decadal period. The 1981 to 1991 decadal period population growth of fringe area fluctuated due different reasons. Morewadi and Pachgaon villages the population growth increased in 185.31 and 151.44 because 1981-to-1991-decade population growth is doubled and this villages comes under city area, most of the population migrated and their settled down. This villages constructed big bungalows and cities like construction but rural facility. The Ujlaiwadi, Gokul Shirgaon and Uchgaon village represents highest growth rate because this villages near to city and available of various services and facility like rural areas. Population growth of fringe area fluctuated from the year 2001-to-2011. The Ujlaiwadi and Pachgaon village recorded highest growth rate because developing Airport and rural area convert into urban. The Bhuye village population growth is negative this village 14 km away from the city most of the area under agriculture land and it comes under rural area.

Population Density

The population density is an important characteristic of demographic development. The density of population represents number peoples living per unit area Sq. Km. and it show man and land proportion. Population density calculated by ratio between total population of fringe area to total area formula of population density.

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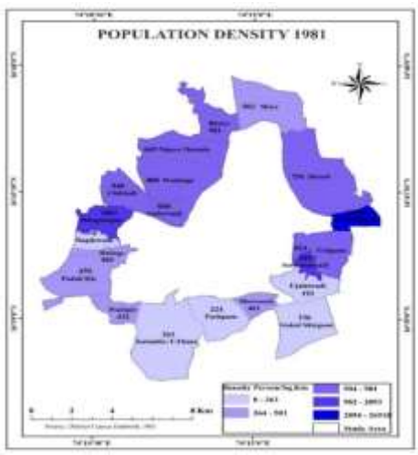
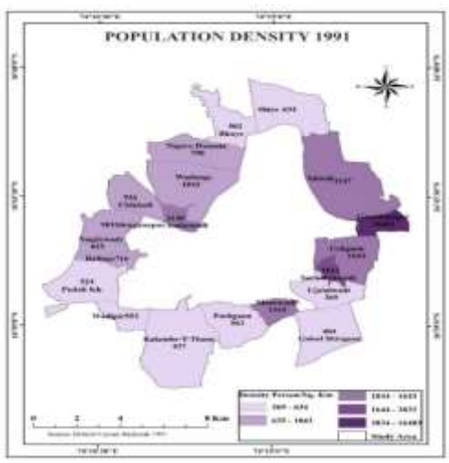
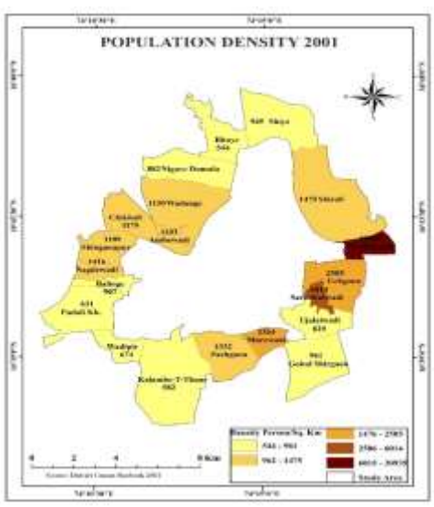
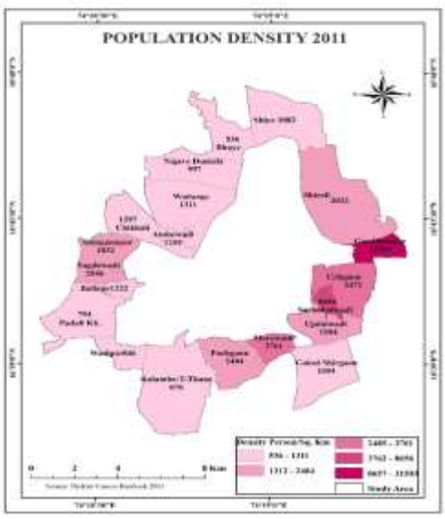
		Population Density Person/Sq. Km.			
Sr. No.	**Village**	**1981**	**1991**	**2001**	**2011**
1	Shiye	503	634	945	1082
2	Bhuye	981	502	544	536
3	Nigave Dumala	669	790	882	997
4	Wadange	888	1043	1150	1311
5	Chikhali	948	926	1179	1297
6	Ambewadi	858	1140	1183	1255
7	Shinganapur	1861	901	1189	1832
8	Nagdewadi	0	825	1416	2046
9	Balinge	405	716	907	1222
10	Padali Kh.	430	524	631	794
11	Wadipir	432	553	674	846
12	Kalambe-T-Thane	263	437	582	676
13	Pachgaon	224	563	1332	2484
14	Morewadi	461	1315	2364	3761
15	Ujalaiwadi	192	369	829	1584
16	Sarnobatwadi	2893	3833	6014	8656
17	Uchgaon	824	1643	2505	3471
18	Gandhinagar	26918	16403	30935	31503
19	Shiroli	754	1147	1475	2022
20	Gokul Shirgaon	236	404	961	1104

Source: Computed by Researcher based on District Census Handbook Kolhapur (1981-2011)









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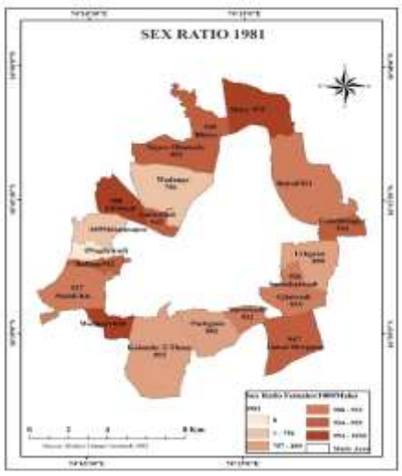
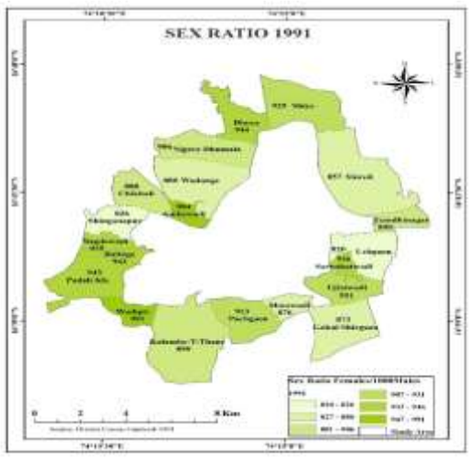
Sex Ratio

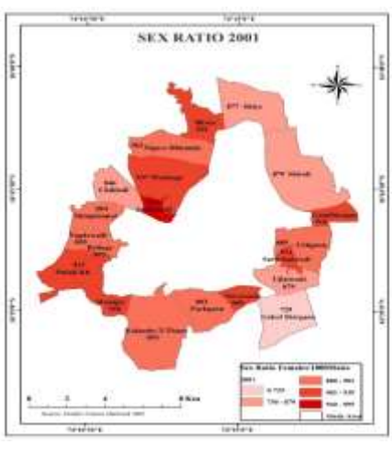
Sex ratio is an important indicator of demographic development of rural-urban fringe area of Kolhapur city. The comparison study of male and female population of social and economic development of fringe area. The sex ratio is defined as the number of females per thousand males. The calculation of sex ratio formula,

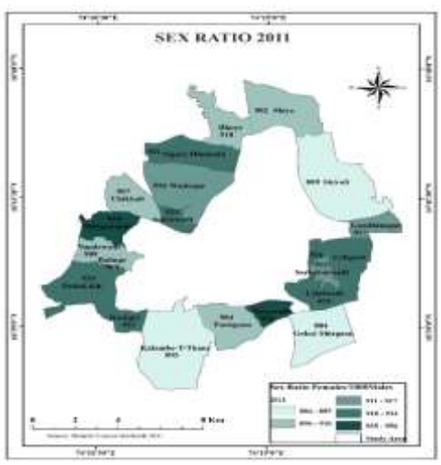
Sex ratio = No. of Females/ No. of males *1000

					Sex Ratio 1981-2011			
Sr. No.	**Village**				**1981**	**1991**	**2001**	**2011**
1	Shiye				975	929	877	902
2	Bhuye				939	944	939	910
3	Nigave Dhumala				953	906	902	921
4	Wadange				756	880	937	916
5	Chikhali				988	888	846	907
6	Ambewadi				942	984	995	924
7	Shinganapur				669	826	894	944
8	Nagdewadi				0	935	895	909
9	Balinge				942	942	895	908
10	Padali Kh.				927	943	913	934
11	Wadipir				1030	991	928	922
12	Kalambe-T-Thane				892	890	893	895
13	Pachgaon				882	913	893	904
14	Morewadi				932	876	909	956
15	Ujaiwadi				933	931	879	925
16	Sarnobatwadi				926	946	914	912
17	Uchgaon				899	820	885	921
18	Gandhinagar				943	890	910	917
19	Shiroli				921	857	879	889
20	Gokul Shirgaon	947	873	729	884			









Source: Computed by Researcher based on District Census Handbook Kolhapur (1981-2011)

Educational status

Education is very important indicator of social development of rural-urban fringe area of Kolhapur city. Educational status decides the social as well as economic status of the region. Education is one of the key factors for overall growth and development of region.

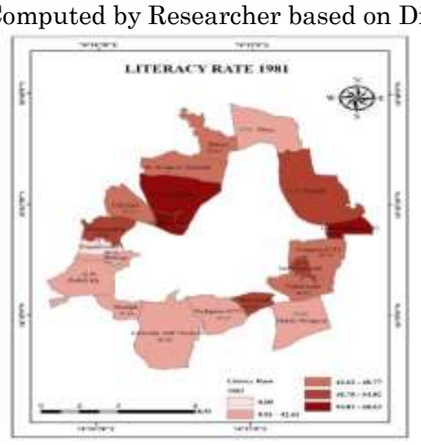
Literacy

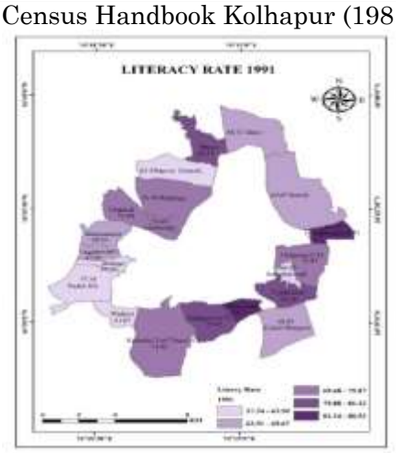
Literacy is important indicator of fringe area development. Literacy in India is a key for social-economic progress. The literacy is defined as the ability of reading and writing of person (Census of India, 2011).

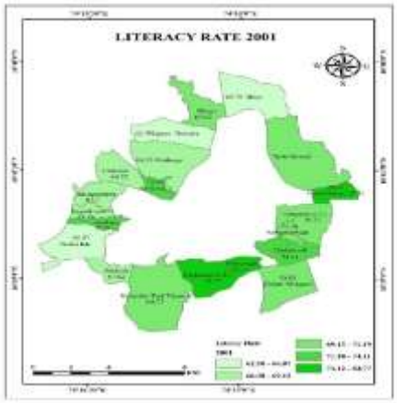
Literacy Rate = Literate Population Age 7 and above/Total Population Age 7 and above *100

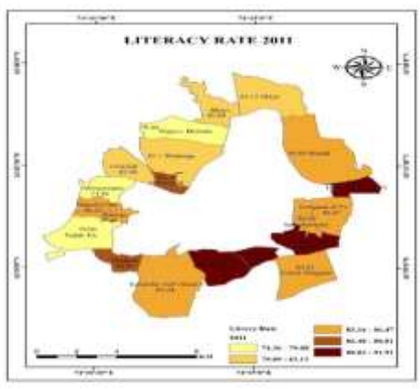
Literacy Rate					
Sr. No.	**Village**	**1981**	**1991**	**2001**	**2011**
1	Shiye	42.61	68.33	65.76	83.13
2	Bhuye	45.83	81.33	69.62	80.89
3	Nigave Dhumala	46.74	63.5	62.5	78.46
4	Wadange	56.52	74.79	68.55	81.1
5	Chikhali	47.52	72.44	69.12	82.08
6	Ambewadi	57.33	73.65	72.08	88.18
7	Shinganapur	52.82	69.22	67.3	74.36
8	Nagdewadi	0	67.93	68.86	86.25
9	Balinge	40.26	61.98	72.99	85.41
10	Padali Kh.	41.89	57.34	66.07	79.08
11	Wadipir	38.39	61.64	67.62	88.81
12	Kalambe-T-Thane	42.42	74.52	69.77	85.24
13	Pachgaon	37.45	77.61	76.79	90.75
14	Morewadi	54.01	84.31	82.77	91.65
15	Ujaiwadi	44.81	76.74	74.11	90.01
16	Sarnobatwadi	54.02	60.22	71.19	85.97
17	Uchgaon	48.77	75.07	70.77	86.47
18	Gandhinagar	60.63	88.53	78.71	91.91
19	Shiroli	52.11	69.67	70.86	85.65
20	Gokul Shirgaon	35.09	68.43	70.83	84.93

Source: Computed by Researcher based on District Census Handbook Kolhapur (1981-2011)









Educational Status

		1981				1991			
Sr. No.	**Village**	**P**	**M**	**H**	**AC**	**P**	**M**	**H**	**AC**
1	Shiye	1	1	0	0	3	1	1	0
2	Bhuye	1	1	0	0	1	1	1	0
3	Nigave Dhumala	1	1	1	0	1	1	1	1
4	Wadange	1	0	0	0	3	1	1	0
5	Chikhali	1	1	0	0	1	1	1	0
6	Ambewadi	1	1	0	0	1	1	0	0
7	Shinganapur	1	1	1	0	1	1	1	1
8	Nagdewadi	0	0	0	0	1	1	1	1
9	Balinge	1	1	0	0	1	1	1	0
10	Padali Kh.	1	1	0	0	1	1	0	0
11	Wadipir	1	0	0	0	1	0	0	1
12	Kalambe_T_Thane	1	1	0	0	1	1	0	0
13	Pachgaon	1	1	0	0	1	1	0	0
14	Morewadi	1	0	0	0	1	1	0	0
15	Ujaiwadi	1	1	0	0	1	1	0	1
16	Sarnobatwadi	1	1	0	0	1	1	0	0
17	Uchgaon	1	1	0	0	1	1	1	1
18	Gandhinagar	1	1	0	0	1	1	0	0
19	Shiroli	1	1	1	0	5	1	1	0
20	Gokul Shirgaon	1	1	0	0	1	1	0	1

Educational Institute

		2001								
Sr. No.	**Village**	**P**	**M**	**S**	**PUC**	**C**	**I**	**Tr**	**AC**	**O**
1	Shiye	3	1	1	1	1	0	0	0	0
2	Bhuye	1	1	1	0	1	0	0	0	0
3	Nigave Dhumala	2	2	1	0	0	1	1	1	0
4	Wadange	3	3	2	1	1	0	0	0	0
5	Chikhali	1	1	1	0	1	0	0	9	0
6	Ambewadi	1	1	0	0	1	0	0	0	0
7	Shinganapur	1	1	1	0	1	0	0	1	0
8	Nagdewadi	1	1	1	0	1	0	0	1	0
9	Balinge	1	1	1	0	1	0	0	1	0
10	Padali Kh.	1	1	1	0	1	0	0	0	0
11	Wadipir	1	1	0	0	1	0	0	1	0
12	Kalambe_T_Thane	1	1	1	1	5	0	0	0	1
13	Pachgaon	1	1	1	0	4	0	0	0	0
14	Morewadi	2	1	1	0	1	0	0	1	0
15	Ujalaiwadi	2	2	1	0	1	0	0	1	0
16	Sarnobatwadi	1	1	0	0	1	0	0	0	0
17	Uchgaon	2	2	2	0	4	0	0	0	0
18	Gandhinagar	1	1	1	1	5	0	0	0	0
19	Shiroli	4	3	3	2	2	0	0	0	0
20	Gokul Shirgaon	2	1	1	0	1	1	0	1	0

Sr. No.	Village	PP	P	M	S	SS	ASC	EC	MC	MI	Pt	ITI	NFTC	SSD	Others
1	Shiye	10	5	5	1	1	1	1	1	1	1	1	1	1	0
2	Bhuye	3	2	1	1	1	1	1	1	1	1	1	1	1	0
3	Nigave Dhumala	7	4	2	1	1	1	1	1	1	1	1	1	1	0
4	Wadange	15	7	5	1	4	1	1	1	1	1	1	1	1	1
5	Chikhali	7	4	3	1	1	1	1	1	1	1	1	1	1	0
6	Ambewadi	3	2	1	1	1	1	1	1	1	1	1	1	1	0
7	Shinganapur	8	5	2	1	1	1	1	1	1	1	1	1	1	0
8	Nagdewadi	5	2	2	1	1	1	1	1	1	1	1	1	1	0
9	Balinge	6	5	2	1	1	1	1	1	1	1	1	1	1	0
10	Padali Kh.	6	5	3	1	1	1	1	1	1	1	1	1	1	0
11	Wadipir	3	2	2	1	1	1	1	1	1	1	1	1	1	1
12	Kalambe_T_Thane	0	4	3	3	1	1	1	1	1	1	1	1	1	0
13	Pachgaon	0	4	3	3	1	1	1	1	1	1	2	1	1	0
14	Morewadi	0	5	1	1	1	1	1	1	1	1	1	1	1	0
15	Ujalaiwadi	0	2	2	1	1	1	1	1	1	1	1	1	1	2
16	Sarnobatwadi	5	3	1	1	1	0	1	1	1	1	1	1	1	0
17	Uchgaon	0	12	8	4	1	1	1	1	1	1	2	1	1	0
18	Gandhinagar	0	6	6	3	1	1	1	1	1	1	1	1	1	0
19	Shiroli	18	14	8	5	1	2	1	1	1	1	1	1	1	1
20	Gokul Shirgaon	0	4	3	2	1	1	1	1	0	0	0	0	0	0

Source: District census handbook of Kolhapur 1981-2011
P- Primary/Secondary School
H- Matriculation/Secondary School
M- Junior Secondary/ Middle School
AC- Adult Literacy Class/Canter
P- Primary School
C- College
M- Middle School
I- Industrial School
S- Secondary School
Tr- Training School
PUC- Senior Secondary
O- Other (Specify)
PP- Pre-primary School
MC- Medical College
P-Primary School
MI- Management Institute
ACS- Degree College Arts,Commerce and Science
M- Middle School
Pt- Polytechnic
SSD- Special School for Disabled
S- Secondary School
ITI- Vocational Training School
Others- Specify
SS- Senior Secondary School
NFTC- Non-formal Training Centre EC- Engineering College

Conclusions

- The population of Gandhinagar, Shiroli, Gokul Shirgaon, Pachgaon, and Ujlaiwadi villages has rapidly increased because these villages are close to city i.e., only 8 to 10 kms away from Kolhapur city and mostly Gandhinagar, Shiroli and Gokul Shirgaon are commercial areas. Therefore, here job opportunities are more. Pachgaon, Uchgaon, Kalmabe – T – Thane, Morewadi and Ujalaiwadi are the villages they almost look like city area and most of the high-class people who wants to construct bungalows and settled down in very calm and cool areas they have constructed their houses at these villages therefore here population is increasing.
- Even these villages are also well connected with city with city transportation. Here number of educational institutes are also located in Pachgaon, Uchgaon and Morewadi. These villages are also near to Pune Banglore highway therefore population of these places is increasing day by day. But villages like Shiye, Bhuye, Wadange, Ambewadi and Wadipir are located on the Konkan highway they are little away from city, and they are separated from city by river

therefore they are less developed. Even in these villages most of the population is having agricultural land few of their family members doing farming and male are working in industrial sector, construction business and transportation services.

- Even kids from Pachgaon, Uchgaon, Kalmabe – T – Thane, Morewadi, and Ujlaiwadi are coming to city for schooling and students from cream area of city are going to school in these villages because most of the CBSC schools are in these areas. Because of proximity to city the literacy rate of Pachgaon, Uchgaon, Kalmabe – T – Thane, Morewadi, and Ujlaiwadi villages is also high. But in Shiye, Bhuye, Wadange, Ambewadi and wadipir as compared to above places literacy rate is low and they are coming to city for higher education.
- Above analysis shows that Pachgaon, Uchgaon, Kalmabe – T – Thane, Morewadi, and Ujlaiwadi these are the villages developed because of city and proximity to city. But Shiye, Bhuye, Wadange, Ambewadi and wadipir these villages are not much developed because they have separated because of the river and here dominant activity is agriculture. Gandhinagar, Shiroli and Gokul Shirgaon are the commercial area who gives economic opportunities to city population therefore they are important areas in the fringe.
- It shows that these fringe areas serve city population like Shiye, Bhuye, Wadange, Ambewadi and wadipir giving agriculture products. Gandhinagar, Shiroli and Gokul Shirgaon provides income and Pachgaon, Uchgaon, Kalmabe – T – Thane, Morewadi, and Ujlaiwadi provides residential area and educational facilities to city population.

Problems

1. Because of growing population density rate of land is increasing in Gandhinagar, Shiroli, Gokul Shirgaon, Pachgaon, Uchgaon, Kalmabe-T-Thane, Morewadi, and Ujlaiwadi.
2. It creates stress on public utility services and services like police station, sewage disposal etc.
3. Here population is increasing but health facilities, banking facilities are less therefore they must come to city for these facilities.
4. Even entertainment facilities are also not here in the fringe areas.
5. These are also facing problems regarding security, quality of road, and scarcity of water.
6. Therefore, we are suggesting that most of the places like Pachgaon, Uchgaon, Kalmabe-T-Thane, Morewadi should include into the city otherwise taxes to the residents should impose based on their economic activities, these areas should have separate police stations, bank facilities etc. transportation connectivity should be more. Roads must be well constructed.

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Research Paper
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Geographical Analysis of Demographical Characteristics of Karad City

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Population factors play a significant role in geographical research since they serve as the basis for many other geographical considerations. An essential factor that obstructs regional management and development planning is demographic features. This study is considered in relation to several facets of the population in Karad City, which is well-known to be the centre of religious, social, and intellectual movements as also the centre of political and economic development in the country from ancient times. And also famous for the meeting of the two holy rivers, the Krishna and Koyna. The city of Karad is located in the Satara district, which is part of Maharashtra, India's Pune division. It is located on the eastern edge of Maharashtra's Konkan region. Only the most recent two decades have seen a decrease in the population of Karad, which has expanded over the evaluation period of 100 years. At the time of the investigation, different castings have been seen in this group. In terms of percentage, literacy is also doing well at 87.67%. Additionally, the societal complexity is demonstrated by the occupational system.

***Keywords**: Demographic Properties, Development Planning, Occupational Structure, Literacy*

Introduction

Geography has traditionally focused on the interaction between people and the environment. A demographic factor that had a direct impact on development was population. The best resource for advancing development is the population. Planning professionals can use the shifting trend and pattern of population characteristics as a useful tool to help them decide, establish, and formulate plans and policies for the balanced development of the region in general and for the development of community, institutions, and services for the development, utilisation, and supply of human resources, etc. in particular. Population density or distribution affects population characteristics, hence a change in either of these factors also affects the latter. Again, demographic characteristics can be considered to alter population density or distribution. As a result, there are regional variances in the amount of population pressure being applied due to the large geographical variation in the patterns of fertility, death, and mobility. This study is considered in relation to several facets of Karad city's population, which is renowned for its market district. Karad is located in the Satara district, which is part of Maharashtra, India's Pune division. It is located on the eastern edge of Maharashtra's Konkan area. Due to the impact of important road connections that run through all four directions, from Bijapur in the east, Belgaum in the south, Pune in the north, and through the Kumbharli ghat towards the Arabian Sea in the west, Karad has developed into a commercial hub. These connections have given the city genuine importance since ancient times.

Database

Primary and secondary data are the foundation of the investigation. At the city level, primary data are gathered through visits, observations, numerous interviews, and also through questioners that have been developed. Primary Census Abstract, Directorate of Census operation, Census of India, District Census Handbook, Draft Development Plan of Karad, and different data and reports gathered from local governing authorities for the years 1911 to 2011 were used to gather secondary data.

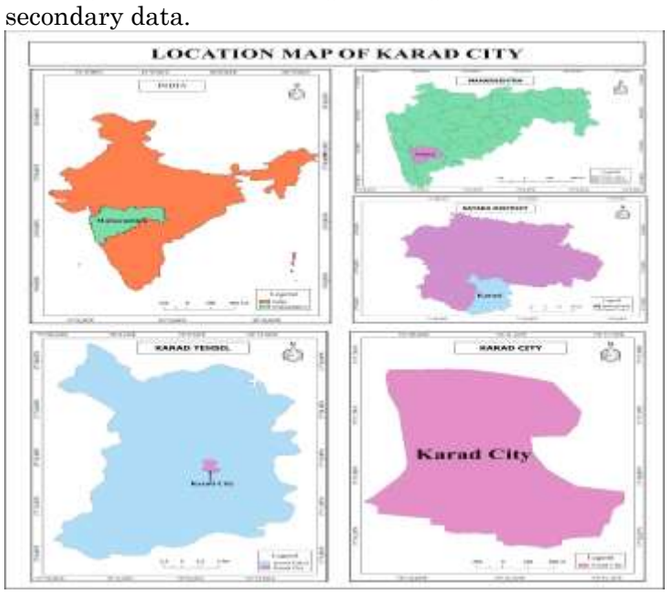

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Figure 1. Location Map of Study Area

Growth of Population

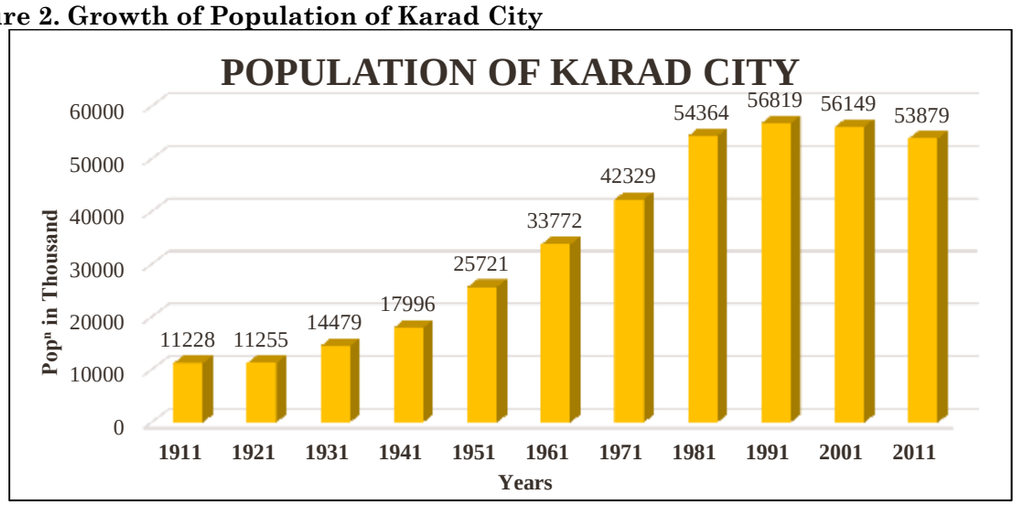
Population characteristics differ greatly between various countries/regions and also between various facets of a society. These variations are the outcome of a variety of factors at play. The following table shows the calculated decadal growth and percentage growth. The changes in Karad City's total population, growth rate, and population fluctuations from 1911 to 2011 are depicted in table 1.1 and figure 1.1, respectively.

Table 1. Growth of Population of Karad City

Sr. No.	Year	Population	Decadal Variation (Growth of Population)	Growth of Population in Percentage
1.	1911	11228	---	---
2.	1921	11255	+27	+0.24
3.	1931	14479	+3224	+28.72
4.	1941	17996	+3517	+24.29
5.	1951	25721	+7725	+15.30
6.	1961	33772	+8051	+31.30
7.	1971	42329	+8557	+25.33
8.	1981	54364	+12035	+28.43
9.	1991	56819	+2455	+4.51
10.	2001	56149	-670	-1.71
11.	2011	53879	-2270	-4.043

Source: Draft Development Plan of Karad

Figure 2. Growth of Population of Karad City



The population of the Karad increased gradually between 1911 and 1931 after that is growing quickly between 1931 and 1981. However, population growth in 1991 was remarkably extremely slow. Population growth is negative from 1991 to 2001, and it will continue to be so in the following decade. The population of Karad city as a whole is 53879, with a growth rate of -4.043 percent. The population's growth rate and fluctuation drastically decreased after 1991 since the city was physically surrounded by the rivers Krishna and Koyna, which prevented any further growth. The increased population growth rate of Karad Town was 28.72 in 1931 and climbed by 3224 in a similar manner. The following decade saw a similar growth rate in population incline up to 1991. And next decade is suddenly fall in growth rate noticed.

In the years between 2001 and 2011, Karad Town's growth rate reduced by 1.71 percent, and a -670 change in population was noted. The growth rate for the following decade is again declining, at -4.043 percent, and the population variation is noted as being negative 2270. Since people's knowledge and literacy levels are rising and population is both growing and falling, the rate of population expansion is slowing down every day. they choose to stay outside near cities.

According to the census, Karad tehsil had a total population of 498,535 people in 2011. Of that number, Karad town added 10,81 percent of people (53879) in 2011, and its total population was split 50.36 percent male and 46.64 percent female. 5444 people in the town (or 10.10%) are between the ages of 0 to 6.

Social Category-Wise Population

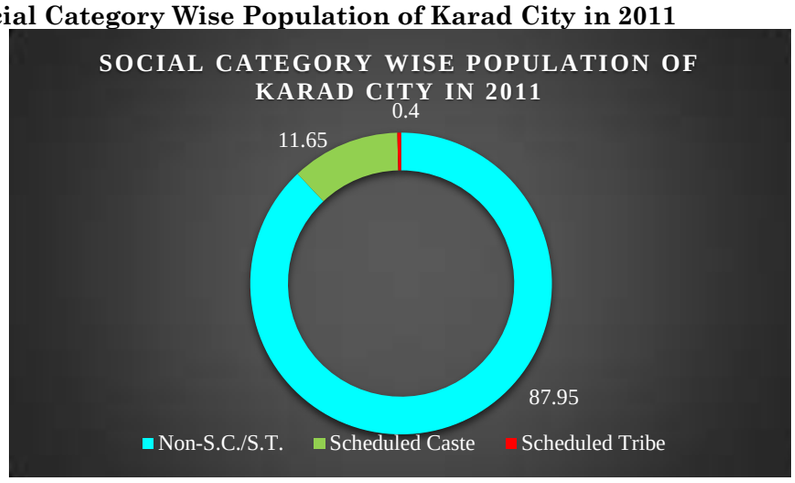
The overall number of Scheduled Castes in the Karad municipal area is 6279, or 11.66 percent of the total population. The number of Scheduled Tribes is 214, or 0.398 percent of the Karad town's total population. Out of the overall population, the town's non-S.C. and S.T. population makes up 87.95 percent.

Table 2. Social Category Wise Population of Karad City in 2011

Sr. No.	Category of Population	Population	Population in Percentage
1.	Non-S.C./S.T.	47386	87.95
2.	Scheduled Caste	6279	11.65
3.	Scheduled Tribe	214	0.40
	Total		100

Source: District Census Handbook, 2011

Figure 3. Social Category Wise Population of Karad City in 2011



One of the main issues of considerable concern to the policy makers for the development of the concerned region is illiteracy. Government has worked to promote literacy ever since independence and the implementation of planning. And as a result of that policy, the government spends a huge amount of money on education each year. Karad is well known for being a significant centre of education, and its economy. Therefore, it is crucial to draw attention to the literacy and illiteracy rates among the local population.

Table 1.3 shows Karad town's literacy and illiteracy rates by gender. It has been noted that the literacy rate as of 2011 is 80.05%. In Karad Municipal Area, 19.5% of the population has been found to be illiterate. Additionally, there are somewhat more literate men (41.94) than literate women (38.11).

Table 3. Gender Wise Composition of Literate and Illiterate Population in Karad City (2011)

Sr. No.	Demographic Aspect	Karad City
1.	Total Population	53879 (100)
2.	Literate Persons	43131 (80.05)
3.	Literate Male	22599 (41.94)
4.	Literate Female	20532 (38.11)
5.	Illiterate Persons	10748 (19.95)
6.	Illiterate Male	4535 (8.42)
7.	Illiterate Female	6213 (11.53)

Source: District Census Handbook of Satara 2011

Figure 4. Gender Wise Composition of Literate Population in Karad City

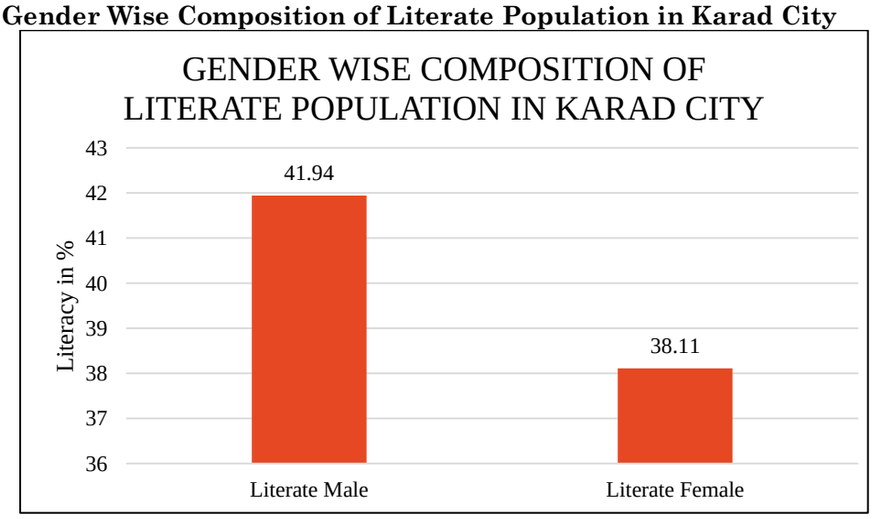
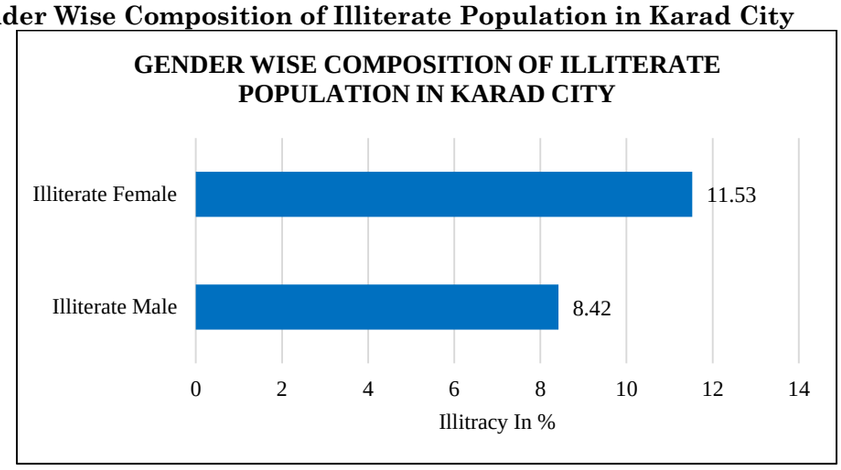


Figure 5. Gender Wise Composition of Illiterate Population in Karad City



Figures 1.3 and 1.4 depict the city of Karad's overall gender-based literacy and illiteracy rates. Only 38.11 percent of women are literate, which is a serious worry for the local government. Around 11.53 percent of females are illiterate. In Karad City, women have a respectable percentage of literacy, but it is lower than that of men.

Occupational Structure-

The definition of an occupation defines it as a specific type of engagement in any economically productive activity, whether it be mental or physical. Along with actual work, the occupational structure includes efficient work supervision and direction. The total population has been divided into three main groups, namely main workers, marginal workers, and non-workers, in accordance with this concept.

The term "primary workers" refers to all employees who, in essence, work the entire calendar year and are involved in economic activity for at least 183 days or more.

All employees who have worked at all during the year but not during the bulk of it are considered marginal workers. In other words, any employees who work fewer than 183 days in a given year are considered marginal workers.

The non-workers category shows the percentage of the population that is not productive. All employees who have not worked at all in the previous year are considered non-workers.

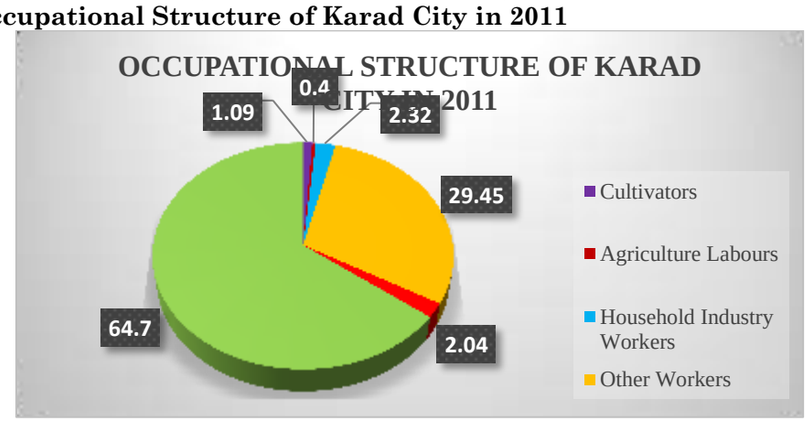
Table 4. Occupational Structure of Karad City in 2011

Sr. No.	Category of Main Workers	Persons	Percentage
1.	Cultivators	588	1.09
2.	Agriculture Labours	217	0.40
3.	Household Industry Workers	1250	2.32
4.	Other Workers	15866	29.45
5.	Marginal Workers	1098	2.04
6.	Non-Workers	34860	64.70
	Total Population	**53879**	**100.00**

Source: District Census Handbook of Satara 2011

Table 1.4 and picture 1.5 show the occupational breakdown of Karad Town. The population of Karad City is estimated to be 0.40 percent employed in agriculture, 29.45 percent employed in other occupations, 2.04% employed as marginal workers, etc.

Figure 6. Occupational Structure of Karad City in 2011



The results show that the non-working population of Karad makes up about 64.70 percent of the total population. It suggests that the majority of the population depends on the labour of the working population for economic support. The whole labour force in India was split into six broad divisions for the population census: principal workers, cultivators, agricultural labourers, home industry employees, marginal workers, and other workers.

Result and Discussion

Municipal council authority, which is under the Satara district, is in charge of running Karad town. The population of Karad grew gradually between 1911 and 1931, then rapidly between 1991 and the present since more people began to live in the city's environs. However, since 1991, the population of Karad has dropped. Additionally, Karad has excellent rail and road connections. It has been noted that a developed infrastructure is necessary for population growth.

The total Scheduled Castes population in the Karad municipal area is 6279 (11.65% of the total population), while the total Scheduled Tribe population is 214 (0.40%) of the Karad town's total population. It has been noted that the literacy rate as of 2011 is 80.05%. In Karad Municipal Area, 19.5% of the population has been found to be illiterate. Here, it is seen that there are more men than women, which can be attributed to traditional India's social, cultural, and economic factors. Additionally, a complicated type of habitation is shown in the town of Karad. The family business has resulted in a larger non-working population.

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Fruit Cultivation Problems of Villages in Satara District: A Geographical Study

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Abstract

The main objective of this research paper is to discuss the problems of fruit cultivation in villages of the Satara district. The researcher has selected 44 villages. It is 20 percent of the total villages. The stratified random sampling technique is used for a number of villages while purposive sampling is used for the selection of villages. A detailed and formal discussion with the village heads has been done through a detailed schedule of 9 points, which helps us to know the problems of fruit cultivation in the villages in the study area. This study concludes that various fruit cultivation problems are observed in the study area. All these fruit cultivation problems are obstacles to the sustainable development of the study area. **Key words:** Fruit cultivation, Problems.

Introduction

Pomegranate, Mango, Strawberry, Custard apple and Sapota are among the fruits that have been developed in the study area. This technique has the ability to extensive commercial farming to be identified. (**Phule, 2002**). The area under this crop has gradually increased. The rate of increase has been steadily growing for the last two decades.

A few concerns with fruit cultivation need to be addressed. As a result, the first half of this research paper focuses on the cultivation of the major fruits (Pomegranate, Mango, Custard apple, Strawberry and Sapota). This research mainly aims to discuss the Problems in the cultivation of major fruits of the villages in the Satara district.

Study Area

The study areas related to the subject Satara district north latitude 17°5 ' to 18° 11' and east line 73° 33' to 74° 54 '. East of Satara district is 144 km north-south 120 km. As per the district, the area of the district is 10, 400 sq. Km and it covers 34% of the area of Maharashtra by Satara district. There are 11 tahsils in the district and seven north of the

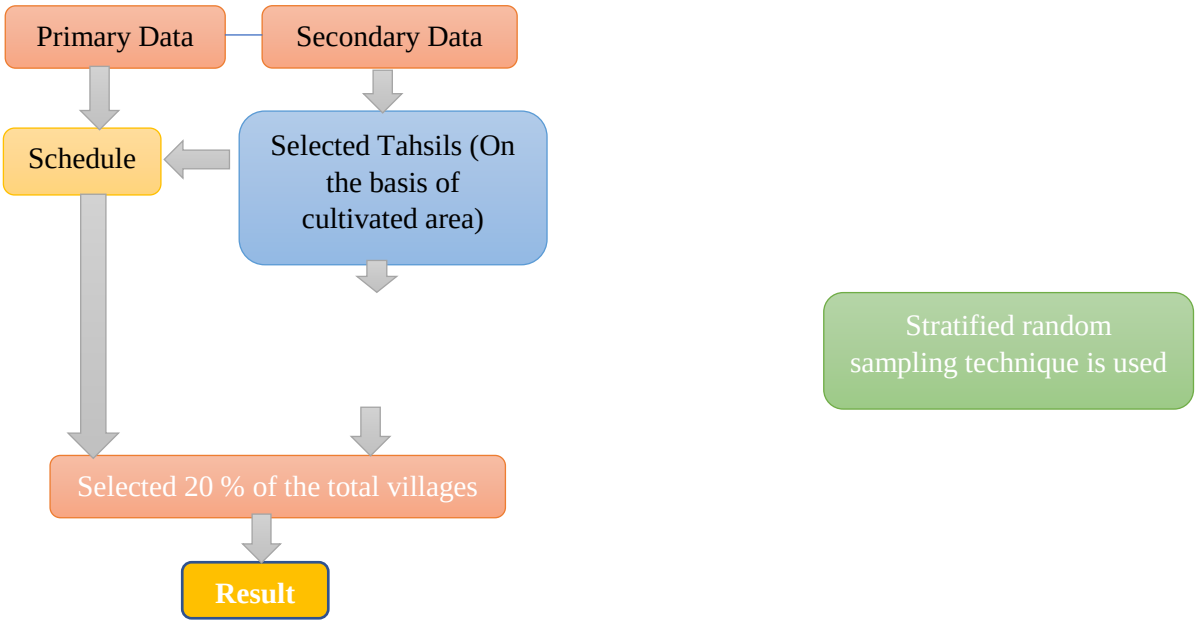
Pune District, West Raigad, Ratnagiri, Sangli south to East Solapur District**. (Fig. 1).**

Fig. 1

Objective

1. To assess the fruit cultivation problems of villages in the study area.

Methodology



Problems in The Cultivation of Major Fruits

Growers face various problems during fruit cultivation which cause the fruit production to be low and more negligible in quality. Many peoples believe that Pomegranate, Mango, Custard apple, Strawberry and Sapota growers are always happy and have few issues. Especially, in South Asia countries the world, due to a large amount of produce each year. However, that is not the farmers of the Pomegranate, Mango, Custard apple, Strawberry and Sapota have some issues with the largest producer of Pomegranate, Mango and Custard apple, Etc. i.e., Satara district, Maharashtra, India**. (Gholap, 2023).**

1. Natural Hazards

Growers of Pomegranate (90 percent), Mango (85.71 percent), Custard apple (58.18 percent), Strawberry (88.89 percent) and Sapota (61.82 percent sample) in the Satara district are also facing natural calamities. (**Table 1**). Producers are facing the problem of unpredictable rainfall. Its uncertain start and offset disrupt the out-of-treatment calendar, affecting production, quality and marketing processes.

Due to the dramatic rise in temperature in the Satara district, the fruits are exposed to sunlight, making Pusat and Aril black. This reduces the quality and yield of fruit peat, while cracking occurs due to a sudden drop in temperature. This type of problem is facing growers of Pomegranate (76.25 percent), Mango (51.42 percent), Custard apple (83.63 percent), Strawberry (90 percent) and Sapota (45.45 percent) **(Table 1).**

Occasionally heavy rains affect the flowering of trees, increasing the humidity in the climate. Such a humid climate increases the incidence of many pests, insects and diseases. Growers of Pomegranate (36.25 percent), Mango (57.14 percent), Custard apple (43.63 percent), Strawberry (95.55 percent) and Sapota (29.09 percent) had to face the problem of excess rainfall during outdoor treatment. Outcomes were lower compared to the high cost of treatment. **(Table 1).**

Cyclones in the Bay of Bengal and the Indian Ocean cause regular rainfall in the study area. Hurricane Rain in this area November, mid-December, sometimes only clouds

and fog. Cloudy and overly humid weather causes moisture in the study area. Although such foggy, humid weather only lasts one day, it severely affects fruit production and quality. During such a short time, many bacteria, diseases and fungi develop and, in some cases, crop production fails. Growers of Pomegranate (47.5 percent), Mango (38.57 percent), Custard apple (47.27 percent), Strawberry (56.67 percent) and Sapota (34.54 percent) are facing these problems. **(Table 1).**

2. Timely farm Operations

The study area found that where labor was involved in various operations, the common problem faced by producers was the unavailability of more labour on time and the availability of labour for even lower efficiency. Pomegranate (78.75 percent), Mango (98.57 percent), Custard apple (81.82 percent), Strawberry (78.89

Table 1
PROBLEMS OF MAJOR FRUIT CULTIVATION

Sr. No.	Problems of major fruit cultivation	Pomegranate		Mango		Custard Apple		Strawberry		Sapota	
	Natural Hazards	**No. of Respondents**	**%**	**No. of Respondents**	**%**	**No. of Respondents**	**%**	**No. of Respondents**	**%**	**No. of Respondents**	**%**
1.	i) Uncertain rainfall	72	90	60	85.71	32	58.18	80	88.89	34	61.82
	ii) Extreme rise and fall in temperature	61	76.25	36	51.42	46	83.63	81	90	25	45.45
	iii) Fogy weather	38	47.5	27	38.57	26	47.27	51	56.67	19	34.54
	iv) Heavy rainfall	29	36.25	40	57.14	24	43.63	86	95.55	16	29.09
2.	**Timely farm Operations**										
	i) Non-availability of labourers in time	63	78.75	69	98.57	45	81.82	71	78.89	53	96.36
	ii) High charges of lababoure with less efficiency	70	87.5	55	78.57	50	62.5	73	81.11	45	81.82
	iii) Shortage of water-supply	52	65	51	72.85	42	76.36	83	92.22	50	90.91
	iv) Irregular electricity supply	69	86.25	60	85.71	49	89.09	85	94.44	51	92.72
3.	**Miss Management**										
	i) Over irrigation	09	11.25	04	5.71	08	14.54	10	11.11	05	9.09
	ii) Lack of Tech knowledge	39	48.75	32	45.71	21	38.18	12	13.33	19	34.54
4.	**Use of Fertilizer**										
	Organic	4	5.00	2	2.86	4	7.27	2	2.22	1	1.81
	Inorganic	76	95.00	68	97.14	51	92.72	88	97.78	54	98.18
5.	**Plant Protection**										
	i) High, cost of pesticides	79	98.75	60	85.71	50	90.1	79	87.78	45	81.81
	ii) Inadequacy of finance	36	45	56	80	36	65.45	80	88.89	20	36.36
	iii) Inferior quality of pesticides	42	52.5	42	60	41	74.54	81	90	30	54.54

Source: Based on field work.

percent) and Sapota (96.36 percent) farmers have expressed the problem of unavailability of labour.

Pomegranate (87.5 percent), Mango (78.57 percent), Custard apple (62.5 percent), Strawberry (81. 11 percent) and Sapota (81.82 percent) farmers are facing high labour costs. (Table 1). Growers of Pomegranate (65 percent), Mango (72.85 percent), Custard apple (76.36 percent), Strawberry (92.22 percent) and Sapota (90.91 percent) face more water scarcity in summer!

Irregularity is another severe problem facing sample growers of seasonal Pomegranate (86.25 percent), Mango (85.71 percent), Custard apple (89.09 percent), Strawberry (94.44 percent) and Sapota (92.72 percent) power supply. Irregular electricity supply disrupts water suppling and adversely affects fruit production and quality. Some medium and large farmers use electricity for spraying
pesticides and insecticides. Its erratic supply makes it difficult to spread at the required time, affecting fruit production and quality. **(Table 1).**

3. Miss Management

Pomegranate (11.25 percent), Mango (5.71 percent), Custard apple (14.54 percent), Strawberry (11.11 percent) and Sapota (9.09 percent) farmers are facing the problem of over-irrigation. The study area that Pomegranate (48.75 percent), Mango (45.71 percent), Custard apple (38.18 percent), Strawberry (13.33 percent) and Sapota (34.54 percent) farmers did not have technical knowledge of fruit cultivation. (**Table 1**).

4. Fertilizer

A) Pomegranate - Out of 80 respondents, 76 (95.00 percent) respondent farmers use inorganic fertilizer in Pomegranate cultivation. It was observed that only 4 respondent farmers (5 percent) use organic fertilizer in Pomegranate cultivation. There was a minor use of organic fertilizers in the study area. The study area has a high use of inorganic fertilizer in Pomegranate cultivation. Excessive use of inorganic fertilizer will affect the plant and its soil and make the soil barren, which will affect the Pomegranate crop. **(Table 1).**

B) Mango - Out of 70 respondents, 68 respondents (97.14 percent) use inorganic fertilizers for Mango cultivation. It was found that only 02 responding farmers (2.86 percent) use organic fertilizers for Mango cultivation. In the field of study, the use of organic fertilizers is low, and inorganic fertilizers in Mango cultivation have been found in the field of study. This affects human health, the land and the crop yields **(Table 1).**

C) Custard apple - Out of 55 respondent farmers, 51 respondent farmers (92.23 percent) used inorganic fertilizer in Custard apple cultivation. Only 04 respondent farmers observe (7.27 percent) use organic fertilizer in Custard apple cultivation. In the study area, there is minor use of organic fertilizers and high use of inorganic fertilizer in Custard apple cultivation is observed in the study area. The use of fertilizers for high in order to yield Custard apple cultivation. This affects human health, the land and the crop yields. **(Table 1).**D) Strawberry - 90 samples were taken from Strawberry cultivation farmers., Out of 90 respondent farmers, 88 respondents (97.78 percent) use inorganic fertilizer in Strawberry cultivation. It is observed that only 02 respondent farmers (2.22 percent) use organic fertilizer in Strawberry cultivation. In Mahabaleshwar, because of heavy rainfall, fertilizers throws out of the bed. So, the number of fertilizers increased in beds to cover the loss. Some organic and chemical fertilizers assimilate by digging a 2.5 cm hole before covering. Soluble fertilizers are provided to crops by dripper irrigation. Plants are improved by some tonic and ripen the fruit by spray but this affects human health, the land and the crop yields. **(Table 1).**E) Sapota - 55 samples were taken from Sapota cultivation farmers. Out of 55 respondent farmers, 54 respondent farmers (98.18 percent) use inorganic fertilizer in Sapota cultivation. It is observed that only 01 respondent farmers (1.81 percent) use organic fertilizer in Sapota cultivation. In the study area, there is the minor use of organic fertilizers. The study area has a high use of inorganic fertilizer in Sapota cultivation. but this affects human health, the land and the crop yields. **(Table 1).**

5. Plant Protection

While protecting the seedlings, growers are facing high-cost pesticides from Pomegranate (98.75 percent), Mango (85.71 percent), Custard apple (90.1 percent),

Strawberry (87.78 percent) and Sapota (81.81 percent). Pomegranate (45 percent), Mango (80 percent), Custard apple (65.45 percent), Strawberry (88.89 percent) and Sapota (36.36 percent) sample farmers are facing a shortage of funds. Samples like Pomegranate (52.5 percent), Mango (60 percent), Custard apple (74.54 percent), Strawberry (90 percent) and Sapota (54.54 percent) are facing the problem of poor quality of pesticides. **(Table 1).**

According to many growers and agronomists, the nature of plant protection operations is almost indispensable for the protection of vines and other fruit trees. According to him, most fruit trees suffer from airborne bacteria and diseases. However, in many ways, Pomegranates, Mango, Custard apples, strawberries and Sapotas are adversely affected by airborne and soil pests and diseases. Therefore, proper and timely plant protection must be strictly treated. In addition, proper fertilizer, water and spray are required. Any mistake in this regard adversely affects plant growth, yield, fruit quality and plant life. Such mismanagement of orchards has created many problems in this practice. **(Table 1).**

6. The nutrition requirements of Pomegranate, Mango, Custard apple, Strawberry and Sapota trees in the study area vary by variety, orchard age and soil type. Improper fertilizer application leads to imbalanced nutrient management.

7. Pomegranate, Mango, Custard apple, Strawberry and Sapota grower's production issues regarding inadequate fertilizer application and plant protection instruction labour easts are high. Waiting a long time for a return is inconvenient, storage facilities are insufficient, and there is a tremendous high marketing cost. There is no insurance for Pomegranate, Mango, Custard apple, Strawberry and Sapota. These fruits have irregular market demand.

8. Strawberry harvests and field crops succumb to fungal infections, lowering the berry's shelf life, according to growers in and around Mahableshwar, Wai, Jaoli and Koregoan tahsils.

9. Pomegranate, Mango, Custard apple, Strawberry and Sapota cultivation in the study area face numerous challenges, including limited land holding, a lack of quality seeding or saplings, large post-harvest losses due to lack of infrastructure, the threat of middlemen, a lack of support from concerned nodal bodies and a lack of coordinated efforts, lack of profitability and so on.

Conclusion

Geographical and socio-economic fruit cultivation problems along with infrastructure are found in the study area. These fruit cultivation problems are obstacles to the development of rural areas. Providing the basic and necessary facilities to the fruit farmers in the villages can be of great help in transforming them into smart agriculture. The backwardness of fruit-growing villages is not only due to physical problems but also ignorance and ignorance. If proper schemes and campaigns are implemented with enthusiasm by the public and the government, the above problems of fruit cultivation can definitely be overcome.

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Research Paper
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Synergistic Effect of Cypermethrin and Sodium Fluoride on Liver Histo Pathology of Albino Mice

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Abstract

The present study was aimed to investigate the hepatotoxicity induced by cypermethrin and sodium fluoride (NaF) separately and combined in albino mice. Albino mice were treated at 48-hr intervals with cypermethrin and sodium fluoride (NaF), separately and in combination, for 15 and 30 days with 1/10th of the LD_{50} dosage of cypermethrin and NaF for individual administration by oral gavage (i.e., 8.5 mg/kg bw and 5.6 mg/kg bw, respectively) and 1/20th of the LD_{50} dose of cypermethrin and NaF for combined administration (i.e., 4.25 mg/kg bw and 2.8 mg/kg bw, respectively). Separate or combined treatment resulted in histopathological changes in the liver tissue such as cytoplasmic degeneration, cellular disarray, binucleated condition, vacuolar and nuclear degeneration in the hepatocytes were observed. The changes were greater in combination than individual treatment, this may be because of a synergistic effect of cypermethrin and NaF.

Key Words: Synergism, Cypermethrin, Sodium fluoride, Liver, Albino mice

Introduction

Water is the most precious natural resource that exists on our planet. It is a key component in determining the quality of our lives. Today, people are concerned about the quality of the water they drink. Water dissolves numerous substances in large amounts, pure water rarely occurs in nature. Pesticides are one of the most common causes of water pollution. Pesticides from farms and individual home owners run off into streams and rivers. Among minerals, fluoride is one of the contaminants of water. Fluoride is an essential trace element for human beings and animals. In small amounts fluoride is beneficial as it is believed to impart stability to bone and enamel, thereby preventing dental carries and osteoporosis to some extent but its higher concentration is highly toxic to humans and animals alike. Chronic exposure to fluoride above the permissible limits, it causes a disease called "Fluorosis". Fluorosis is an important clinical and public health problem in several parts of the world. Exposure higher than permissible levels of fluoride (>1.5 mg/L) may lead to serious health problems (WHO, 2017). Vital organs such as liver, kidney, reproductive organs and endocrine glands are reported to be adversely affected by high fluoride intake (Chinoy, 1991; ATSDR 2001). Some metabolic activities are also disturbed due to alteration in regulatory enzymes and biomolecules after exposure to fluoride (Kumar et al., 2007). Tripathi et al. (2009) has describe of severity of fluorosis.

The study of abnormal cells and tissues is histopathology (Aughey and Frye, 2001). It is a structural science and serves to compliment the knowledge gained from the anatomy, physiology and pathology and it gives insight into the functioning of tissues and organs. Histopathology helps in diagnosing the damages of the tissues of an animal subjected to toxic stress. The knowledge of the histology is useful to distinguish normal cells from abnormal or diseased ones, which helps in diagnosis of many diseases (Majumdar, 1980). Even though biochemical studies may give an idea of the pathological state of the animal, a clear picture of cytoarchitectural changes produced during the chemical intoxication can be produced during the chemical intoxication can be traced by histopathological studies.

Several workers reported on the pesticides and fluoride toxicity separately, the present study was designed to investigate the synergistic effects of cypermethrin and sodium fluoride (NaF) on hepatic histological architecture in albino mice.

Materials And Methods

Test chemicals: Cypermethrin technical (92% purity; cis:trans isomers ratio 40:60) was obtained from Tagros Chemicals India Limited, Chennai. Sodium fluoride (NaF) (99%) was supplied by BDH Chemical Division, Bombay.

Animal model: Healthy adult male albino mice of the same 75±5-day age group and weight (35 g) were taken from parental stock obtained from the Veterinary College, Bangalore and maintained as a colony. They were kept in well-cleaned and sterilized cages and were maintained at 26±2ºC with a 12-hr light/dark photoperiod throughout the study. The mice were fed on commercial rodent feed supplied by Hindustan Lever Limited, Bombay, and tap water was supplied ad libitum.

Experimental design: The albino mice were divided into seven groups with ten animals in each group. The toxicity of cypermethrin and NaF in mice was evaluated by the static bioassay method of Finney (1971), and the single-dosage of LD_{50} of cypermethrin and NaF to albino mice was found to be 85 mg/kg bw/24 hr and 56 mg/kg bw/24 hr, respectively. A 1/10th single-dosage LD50 level of cypermethrin and NaF (i.e., 8.5 mg/kg bw and 5.6 mg/kg bw, respectively) for individual administration and 1/20th the single-dosage LD50 level for combined administration

were selected. The treatments were by oral gavage and the first group of mice was treated as controls, as shown below in the experimental protocol in Table 1.

Table 1. Experimental protocol

Group	Treatment	Duration (days)	Day of sacrifice
I	Controls	-	-
II	Treated with cypermethrin (8.5 mg/kg bw)	15	16
III	Treated with cypermethrin (8.5 mg/kg bw)	30	31
IV	Treated with NaF (5.6 mg/kg bw)	15	16
V	Treated with NaF (5.6 mg/kg bw)	30	31
VI	Treated with cypermethrin + NaF (4.25 mg/kg bw + 2.8 mg/kg bw)	15	16
VII	Treated with cypermethrin + NaF (4.25 mg/kg bw + 2.8 mg/kg bw)	30	31

The second and third groups were treated for 15 and 30 days with cypermethrin, respectively, at 48-hr intervals. The fourth and fifth groups were treated with NaF for 15 and 30 days at 48-hr intervals. The sixth and seventh groups were treated with combined dose of cypermethrin and NaF for 15 and 30 days at 48-hr intervals.

Histopathological examination: Following the method of Humason histological examination of the tissues was conducted after removal from the mice. The liver tissues were gently rinsed with a physiological saline solution (0.9% NaCl) to remove blood and adhering debris. They were then fixed in 5% formalin for 24 hr, and the fixative was removed by washing overnight with running tap water. After dehydration through a graded series of alcohols, the tissues were cleared in methyl benzoate and embedded in paraffin. Sections were cut by a microtome to a thickness of 6 µm and stained with hematoxylin as described by Harris et al (2006). and counter-stained with eosin dissolved in 95% ethanol (H&E). After dehydration and clearing, sections were mounted with DPX (digital picture exchange) and observed under a microscope.

Results

Normal histology of mice liver

The liver of normal mice comprises of continuous mass of hepatic cells with cord like formation. The cells are large in size with more or less centrally placed nucleus and homogenous cytoplasm. There is no clear division of the hepatic cells into lobules. The hepatic cells are hexagonal in their nature. The bulk of the hepatic lobule comprised of polyhedral epithelial parenchyma cells containing round nuclei and a prominent nucleolus. A fine network of vascular capillaries, sinusoids running in between the parenchyma cells, the nucleus in hepatocytes consists one or more nucleoli were noticed. (Figs. A-C).

Experimental mice liver

The mice exposed to cypermethrin, sodium fluoride separately and their combination for 15 days and 30 days have shown remarkable changes when compared to control (Figs. D - I). These changes include – cytoplasmic degenerative changes in hepatocytes, cellular degeneration, vacuoles, congestion, cellular disarray, nuclear fragmentation, nuclear degenerative changes, binucleated condition, pushing of nucleus to periphery of hepatocytes, severe necrosis in hepatocytes, haemorrhage in central vein and pycnotic nucleus (Figs. D -I). In 15 days cypermethrin showed more changes compared to sodium fluoride. The mice which received cypermethin and sodium fluoride in combination have exhibited more changes compared to the mice received the chemicals separately. In the case of 30 days the sodium fluoride intoxicated animals showed more changes than cypermethrin. With the combination of these two chemicals more severe changes were observed than sodium fluoride and cypermethrin intoxicated mice.

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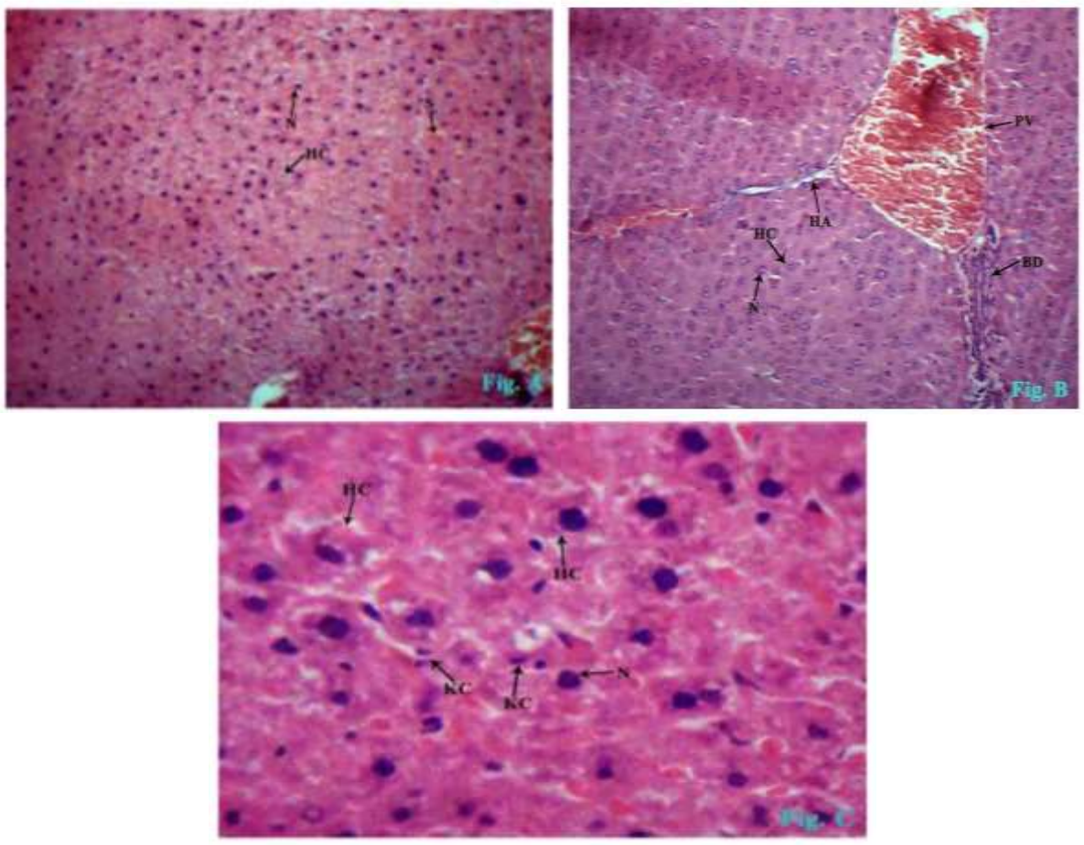

Figs. A &B : Microphotograhs of control liver of mouse showing hepatocytes (HC) with centrally placed nucleus (N) besides portal vein (PV) with bile duct (BD) and hepatic artery (HA) – H & E. 100 X.

Fig. C : Microphotograph of control mouse liver at higher magnification showing hepatocytes (HC), Nucleus (N) and Kuffer cells (KC) - H&E. 400 X.

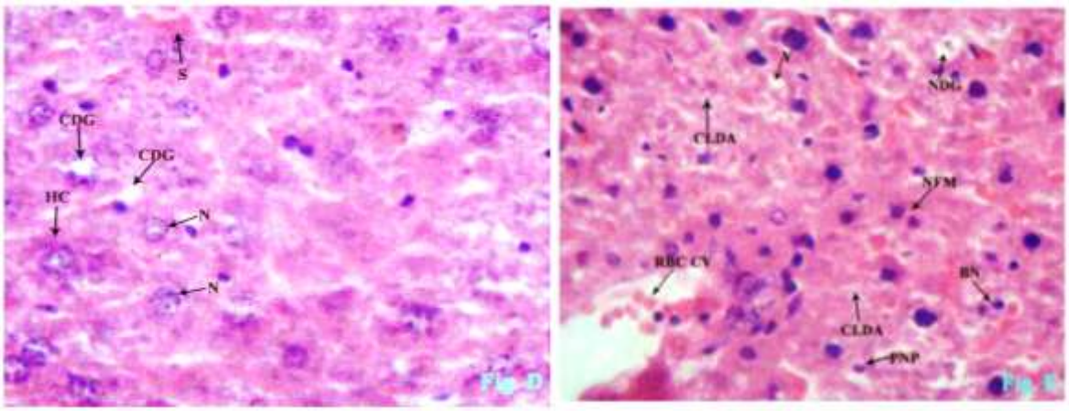

Fig. D: Microphotograph of mouse liver under 15 days of cypermethrin showing cytoplasmic degeneration (CDG) - H&E. 400 X.

Fig. E: Micrograph of mouse liver under 30 days of cypermethrin showing nuclear fragmentation (NFM), cellular disarray (CLDA), vacuoles (V), binucleated condition, scattered RBC in central vein (RBCCV) and pushing of nucleus to periphery of hepatocytes - H&E. 400X

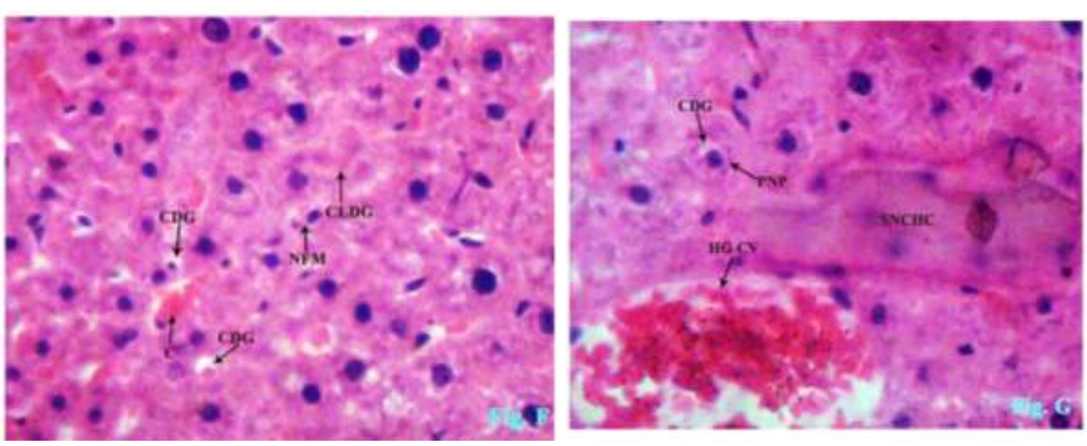

Fig. F : Microphotograph of mouse liver under 15 days of sodium fluoride showing cytoplasmic degeneration (CDG), congestion(C), Cellular degeneration (CLDG) – H & E.400 X.
Fig. G : Photomicrograph of mouse liver under 30 days of sodium fluoride showing severe necrosis in hepatocytes (SNC HC), pushing of nucleus to periphery of hepatocytes and haemorrhage (HGCV) in central vein - H&E. 400X.

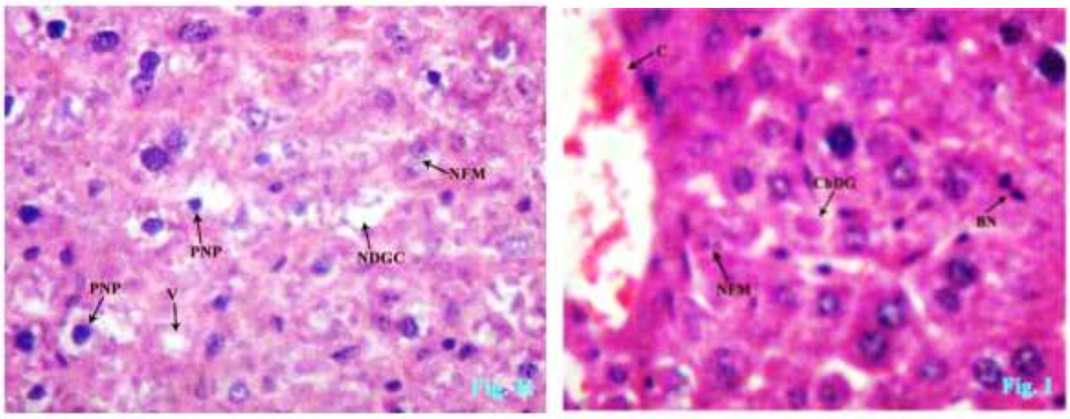

Fig. H : Microphotograph of mouse liver under 15 days of cypermethrin and sodium fluoride showing with vacuoles (V), pushing of nucleus to periphery (PNP), nuclear fragmentation (NFM) and nuclear degenerative changes (NDGC) in hepatocytes – H&E. 400 X.
Fig. I : Microphotograph of mouse liver under 30 days of cypermethrin and sodium fluoride showing binucleated condition (BN), nuclear fragmentation (NFM) and congestion (C) – H&E. 400 X

Discussion

Liver is the largest organ of the body comprising 2-3% of the total adult body weight, is primarily concerned with the metabolic activity of organisms (Sheila and Dooley, 1993). It is also the central site for the biotransformation of xenobiotic chemicals and therefore is involved in the detoxification mechanism. Pesticides causes for the architectural damage to liver in various animals (Shukla et al., 2001 and Jacobdoss et al., 2007). Fluoride is a toxic agent that can permeate cell membrane and disturb the cell homeostasis. High amount of fluoride may disturb liver function and homeostasis (Wang et al., 2000) and produced abnormalities such as degenerative and inflammatory changes (Djouadi and Derouiche, 2017).

Several authors reported histopathological changes in liver in different animal models under pesticidal toxicity. Luty *et al.* (2000) observed infiltrations of individual mononuclear cells and parenchyma degeneration of hepatocytes in liver of mice exposed to α-cypermethrin. Slight inflammatory infiltrations around single necrotic hepatocytes, composed of the hyper plastic kupffer cells and single lymphocytes in the liver of mice exposed to deltamethrin (Tos-Luty *et al.,* 2001). Wade *et al.* (2002) observed hypertrophied hepatocytes with many highly vacuolated cells in liver tissues of rats exposed to complex mixture of persistent contaminants.

Choudhary *et al.* (2003) reported congestion, vacuolar degeneration and accumulation of fat in centrilobular area, focal to extensive necrosis, hyperplasia of kupffer cells, dilation of sinusoids, nuclear aberrations, cytoplasmic degranulation and pycnotic nuclei in the liver tissues of rats exposed to endosulfan. Tos-Luty *et al.* (2003) observed parenchymatous degeneration of hepatocytes with slight infiltration in the liver of rats dermal exposed to malathion. Hypertrophy of hepatocytes with pyknotic nuclei, vacuoles and hyalinization, hepatocytes with dilation of central vein in albino mice treated with carbosulfan (Ksheerasagar and Kaliwal, 2006). Congestion and fatty changes in liver of rats exposed to deltamethrin (Manna *et al.,* 2005). Sarkar *et al.* (2005) found significant changes as hyperplasia, disintegration of hepatic mass, focal coagulative necrosis in *Labeo rohita* exposed to cypermethrin. Hepatic lesion in the liver tissues of *Cirrhinus mrigala* exposed to fenvalerate were characterized by congestion, cloudy swelling of hepatocytes and focal necrosis (Velmurugan *et al.,* 2007). Liver showing blood streakes fibrosis and vacuolated hepatocytes with pyknosis nucleus in H. fossilis treated with cypermethrin (Pratap Sing and Vandana Sing, 2008).

Hepatocellular necrosis, degenerative changes, hepatic hyperplasia, extensive vacuolization in hepatocytes, degenerative and necrotic changes in liver and kidney of rabbits have been reported with high concentration of NaF (Shashi and Thapar, 2000; Shashi et al., 2002). Chinoy *et al.* (1993) observed hyalinized hepatic tubules with loss of cells and the vacuolized cytoplasm and zonal necrosis in the liver of sodium fluoride treated rats. High dose of NaF elicited hepatic abnormalities such as ballooning, hypertrophy, hepatocellular necrosis, infiltration of mononuclear cells, deformed central vein, sinusoidal dilation, and binucleated cells in albino mice (Prakash et al., 2018). Necrosis, and mononuclear cells infiltration in the liver of mice that were treated with NaF (Bouaziz et al., 2006). Chinoy *et al.1991* observed

pyknosis of nuclei, zonal necrosis, and disintegration of the organization of hepatic cords in fluoride administer. Degenerated blood sinus in Gill and liver of fishes exposed to acute and chronic concentration of sodium fluoride showed several drastic histopathological changes (Kale, 2021).

Conclusion:

Several independent studies on pesticide and fluoride toxicity have been conducted in different researchers. However, few attempts have been reported to determine the combined toxic effects of pesticides and fluoride. The present study was designed to investigate the combined toxicity of cypermethrin and sodium fluoride in mice. Combined toxicity by cypermethrin and fluoride through drinking water appears to be an exceptional condition and is able to cause more severe toxic effects than either one alone. Moreover, in Combination the effects were more severe than from separate exposure, thus indicating that these chemicals exhibited synergistic effect.

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Land Transformation Analysis of Siliguri City using Remote Sensing and GIS techniques

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Abstract

During past four decades, Siliguri city has attracted a large number of population due to economic hub of the entire north Bengal, which led to the rapid transformation of its LULC pattern. Therefore, this study is aimed to analyse the LULC changes during 1991 to 2021 by giving special emphasize on built up transformation. The Landsat TM, ETM and LISS IV data has been used for the LULC classification of the Siliguri city. Modified Maximum Likelihood Classifier approach has been adopted to generate the classified image. From the analysis it is found that there is a drastic change in built-up 1254.54 percent in respect to 1991. While teagarden, agriculture land and waterbody declined by -90.06, -97.17 and -88.76 percent, respectively. These changes are harmful for the ecological balance of the city surrounding. It can further impact on the city's sustainable development.

Keywords: Land Use Land Cover (LULC), Built-up, Maximum Likelihood Classifier, Urban expansion.

Introduction

As per the World Bank report 2009, Secondary cities have tremendous potential for upgrading the regional and national Development (World Bank., 2009). In this report significance of medium sized class 1 cities has been given more importance for the betterment of world economy. Historically South and South East Asia has the highest population concentration. In the last few decades, mainly second half of the last century rapid growth of urban population has led to the speculation of urban explosion in this region . On the other hand, the population growth of the developed countries almost stagnant because they already passed the phage. It is worth mentioning that their rate of urban growth also stagnant. Among the Asian countries India and China alone will account for more than 64% of the overall growth of urban populations in Asia and a 42% share of global urban population growth from 2005 to 2025(Sankhe et al., 2011). India with a total urban population of 377 million as per 2011 census, the second largest in the world after China and expected to increase up to 590 million by 2031. According to 2011 census between 2001 and 2011, 92 million people were added to the urban population, the largest decadal increase in the last one hundred years, and for the first time, the net addition to urban population exceeded that of the rural population (Shaw, 2018). Urbanization is a process whereby productive agricultural lands, forests, surface water bodies and groundwater prospects are being irretrievably lost((Pathan et al., 1991). In India, unprecedented population growth coupled with unplanned developmental activities has resulted in urbanization, which lacks infrastructure facilities(Sudhira, Ramachandra, & Jagadish, 2004). Development of new urban areas and expansion of existing cities is inevitable as it is an essential part of sustainable economy but uncontrolled and haphazard urban growth may raise serious problems related to environmental pollution, changes in urban micro climate, loss of biodiversity and ecological balance, human and traffic congestion and moreover quality of urban life (Dutta & Rahman, 2017). Physical expansion of the city, population growth induce land cover change and land transformation are natural process we can't stopped the transformation. It can be regulated trough proper planning and management. The urbanization in India is resulting tremendous changes at ground level which are not given due attention in the discourse of planning, development, administration and policy making. One such area that did not receive much attention is the development, planning and governance is 'urban fringe', (Nallathiga, Taneja, Gupta, & Gangal, 2018) as the city grows to the periphery, many geographical changes at the urban periphery are associated with the transfer of land from rural to urban purpose. The current trend of spatial urban growth in almost all Indian cities has a haphazard pattern, particularly along the urban-rural fringe(Farooq & Ahmad, 2008)

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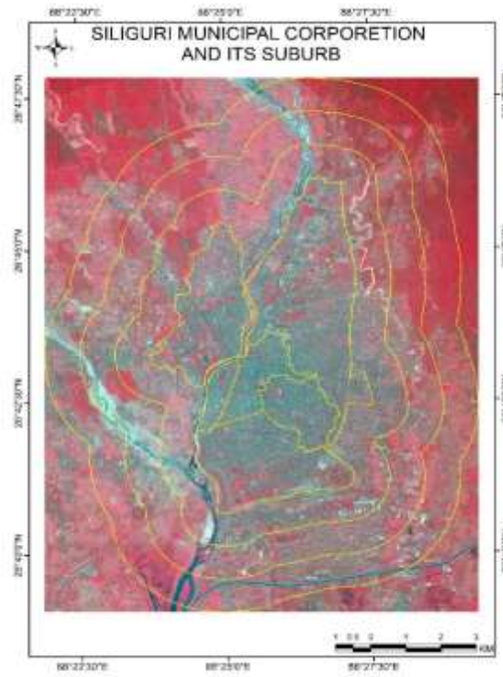


The conventional surveying and mapping techniques are expensive, and time consuming for the estimation of urban growth, by the time information became available to the planner it is outdated because the damage have already been done. Remote Sensing has become well accepted tool for monitoring land dynamics. Statistical techniques along with remote sensing and GIS have been used in many urban growth studies(Mahesh Kumar Jat et al., 2008; Punia & Singh, 2012; Sudhira et al., 2004b) for a proper development of city, it is necessary to monitor and plan the growth of a city. Geographers, planners and people from other discipline also took a keen interest in the study of this type of phenomena. Considering all the facts one attempt has been made for calculating and monitoring the urban growth in reference to Land Use Land Cover of Siliguri city.

Study area:

The Siliguri city, is located in the northern part of west Bengal above the 396 feet from the sea level on the bank of river Mahananda. The latitudinal and longitudinal extent of the city is 26^0 72' N and 88^0 41' E. Siliguri is the fastest growing city in the entire northern part of west Bengal. It is third largest city after Kolkata and Asansol as per 2011 census. Geographically it is located a strategic position in the Siliguri Corridor, a narrow strip of land linking mainland India to its north-eastern states. The city is popularly known as the gateway of North-East India because its corridor establishes a connection between the rest of India and the North-Eastern states. It not only connects the North-Eastern states with the Indian main land it also has the connection with three international boundaries (Bangladesh, Nepal and Bhutan). It also connects hill stations such as Gangtok, Darjeeling, Kalimpong, Kurseong and Mirik and the northeast states to the rest of India. Siliguri famous for four 'T' Tea, Timber, Transport and Tourism. Hundred km radius around the city is the birthplace of the World-famous Darjeeling Tea. Siliguri get recognition and started expanding after getting the municipality tag by the govt. in 1949. Till 1994 the Siliguri municipality has 34 wards under its jurisdiction. After declaration of the Siliguri Municipal Corporation in 1994, 17 new wards are added to its jurisdiction. Siliguri is a unique city as 15 out of 47 wards of the Siliguri Municipal Corporation fall in the neighboring Jalpaiguri district remaining are fall under the Darjeeling district.

Material and method

The following remote sensing imageries were used to compute the land use and land cover of the Siliguri city.

- Landsat Thematic Mapper (TM) image (path 139, Row 41) of 11-05-1991
- Landsat Enhanced Thematic Mapper Plus (ETM+) image (path 139, Row 41) of 26-12-2001.
- Linear Imaging Self-Scanning Sensor-4 (LISS 4) image (Path 107, Row 53) of 17-11-2011 and 16-01-221.

Spectral details of the aforementioned imageries are given in table 1. It is worth mentioning that the thermal bands of Landsat TM and ETM were not considered for the analysis.

Table: 1 Spectral details of the Sensor

Sensor	Spectral Bands (in µm)	Spatial Resolution (in m.)	Spectral Region	Year of acquisition
Landsat TM, ETM	Band 1 0.45–0.52	30	Blue	1991, 2001
	Band 2: 0.52–0.60		Green	
	Band 3: 0.63–0.69		Red	
	Band 4: 0.76–0.90		Near IR	
	Band 5: 1.55–1.75		SWIR	
	Band 7: 2.08–2.35		SWIR	
LISS IV	Band 2: 0.52–0.59	5	Green	2011, 2021
	Band 3: 0.62–0.68		Fed	
	Band 4: 0.77–0.86		Near IR	

The images were acquired as a standard product i.e., radio-metrically and geometrically corrected. As the images are free from cloud no atmospheric correction carried out. Since the urban growth analysis entirely depends on multi-temporal satellite images image to image registration has been done to remove the spatial miss match of the data sets taken from the different agencies and different time period.

Image from different sensor have differences in their spatial resolution. Despite different spatial resolution, images are kept as it is without changing the pixel size or value as not to compromise spatial detail and pixel values (Bhatta, 2009).

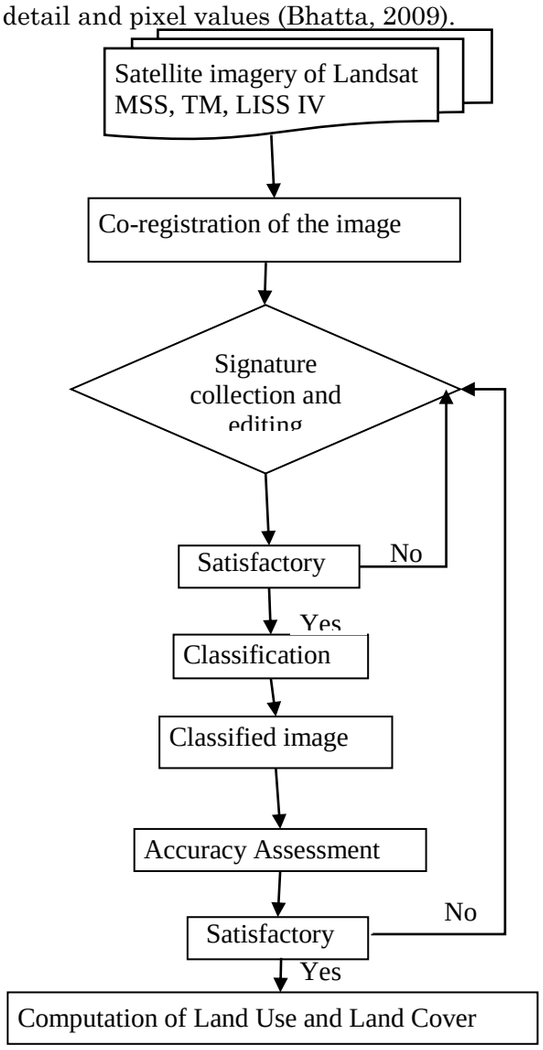


Fig: 1 Flow chart of methodology

The administrative map of Siliguri (SMC area) registered in UTM (Zone 45) and WGS 84 based on the GCP in the first-degree polynomial. The vector map of Siliguri (SMC area) which is generated after vectorization from the above map was used for sub setting the satellite images. In the next stapes co-registered images ware subset with the vector map of the SMC area. The subset raster images were considered as the input for extracting the built up along with other impervious area with the help of well-known Maximum Likelihood Classifier(M. K. Jat et al., 2008b; Mahesh Kumar Jat et al., 2008; Rahman et al., 2011, 2012; Sudhira, Ramachandra, &

Jagadish, 2003; Sudhira, Ramachandra, Raj, et al., 2003). Considering the heterogeneity of the built-up area MLC is used in modified approach. Instead of merging the signatures and then applying the classification, in this research, signatures were kept without merging and they were merged once the classification was over. This could handle the urban heterogeneity well (Mithun et al., 2016). After the classification a total of Six LULC classes i.e., Agricultural Land, Built-up, Vegetation, Tea Garden, Vacant/Fallow Land and Water body were identified based on NRSC level I classification scheme. Identified LULC classes were further authenticated by ground validation, details of authentication have been mentioned in the accuracy assessment. Classified images are converted into vector for further analysis of change detection. Finally, LULC change was estimated by generating multi temporal vector layers for 1991, 2001, 2011 and 2021 and computing their corresponding statistics.

Accuracy assessment

Accuracy assessments determine the correctness of the classified image, it is an important part of the LULC classification and mapping. The classification accuracy quantifies the quality of maps produces and helps to evaluate the applicability of a map for a particular use (Naikoo et al., 2020). Accuracy assessment for remote sensing classification is commonly based on using an error matrix, or confusion table, which needs reference map or high-resolution image, or 'ground truthing' data to support (Bhatta 2008). The techniques like Kappa coefficient, error matrix and indices-based techniques have already been used in several studies for the accuracy assessment of LULC maps produced(Bhatta, 2009; Mondal et al., 2017; Rahman et al., 2011, 2012).

In this study Kappa coefficient technique is used to evaluate the classification accuracy by selecting 380 random points throughout the study area. These points are selected such a way so that it can distribute entire area proportionately. As this is a multi-temporal change detection it is often difficult to verify with traditional method of ground verification. Due to this reason ground verification for the year 1990, 2001, 2011 were taken from the Google Earth pro, for the ground verification of the image 2021 both the field data as well as the Google Earth Pro were also considered for the inaccessible area. The results of accuracy assessment show an overall accuracy level of 84.79 percent, 94.29 percent, 91.46 percent and 88.89 percent for 1990, 2001, 2011, 2021 respectively and the corresponding Kappa statistics was 0.973, 0.9314, 0.8975, and 0.8667 respectively. It is well accepted that for level one classification of land use land cover accuracy should not be less than 80 percent (Anderson et al., 1976).

Dynamics of land use land cover change

Change dynamics of area under each LULC classes during 1981 - 1991

A total of 4190 hectares of land came under Siliguri municipality, this land has been categorized into six broad land use classes namely agricultural land, built-up areas, forest land, Teagarden, vacant land, and water bodies. During the year 1981 Siliguri is not a famous place most of the area was undeveloped.

Siliguri is located in the foothill of the Himalaya, if we check the land transformation between 1981 to 1991 most dominated land cover group was barren land, agricultural land and forest area. In 1991 there is a predominance of vacant and agricultural land throughout the city (table 2) while built up is concentrated mainly at the central part of the city (fig lulc 1991). Forest is mainly concentrated at the north and north east part of the city though we can find forest patches throughout the city. Tea garden is significant part of the land cover there in Siliguri, it is dominated in the north and western part of the city.

Table no. 2

Land Use Land Cover Change Matrix 1981 - 1991

LULC Class/ Year		Land Use and Land Cover at 1991						
		Agriculture	Built-up	Forest	Teagarden	vacant land	waterbody	1981 Total
Land Use and Land Cover at 1981	Agriculture	501.91	152.68	53.65	3.50	103.26	24.18	839.18
	Built up		107.26	1.15		97.33		205.74
	Forest	3.23	0.53	3.48		52.57	1.33	61.13
	Teagarden	3.52	0.34	8.76	8.08	15.04	0.16	35.90
	Vacant land	104.47	121.87	53.11	21.82	2574.63	44.01	2919.90
	Waterbody	3.25	3.39	3.20		67.76	50.55	128.15
1991 total	Grand Total	616.38	386.06	123.36	33.39	2910.59	120.22	4190.00

Source: Computed by author from remote sensing data

In the table 2 a minute details have been given of the interchange of different land use. This way each pair has been calculated and summarised there in table 3.

Change dynamics of land use 1981 to 2021

The eye-catching insight regarding the 1981 to 2021 land transformation was the increase in built-up land and choking agricultural land. At the initial stage of the decade, the total available land under agricultural practices was 839.18 hectares and it continued to reduce 23.74 hectares of land available for agricultural practices. This region is famous for the tea cultivation it is noticed that 35.90 hectares which is 0.86 percent of the total area of the city was under this category in 2021 it reduced to only 3.57 hectares (table 3) and they are located mainly the outskirt of the city fig 3 and fig 4.

Table 3 Trends of land use land cover change (1981 – 2021)

LULC Class/ Year	1981		1991		2001		2011		2021	
	Area in Hec	%	Area in Hec	%	Area in Hec	%	Area in Hec	%	Area in Hec	%
Agriculture	839.18	20.03	616.38	14.71	415.49	9.92	148.49	3.54	23.74	0.57
Built up	205.74	4.91	386.93	9.23	1072.96	25.61	1628.58	38.87	2786.84	66.51
Forest	61.13	1.46	123.36	2.94	242.75	5.79	50.18	1.20	135.77	3.24
Teagarden	35.90	0.86	33.39	0.80	180.72	4.31	1.69	0.04	3.57	0.09
Vacant land	2919.90	69.69	2910.59	69.47	2201.41	52.54	2350.68	56.10	1225.68	29.25
Waterbody	128.15	3.06	120.22	2.87	76.67	1.83	10.38	0.25	14.40	0.34
Grand Total	4190.00	100.00	4190.00	100	4190	100	4190	100	4190.00	100

Source: Computed by author from remote sensing data

Usually in city area due to the infill growth vegetation area synchronized. Siliguri is located in the foothill of Himalaya. It has the legacy of good vegetation cover. That is reflecting the land use land cover. In 1981 61.13 hectare was under forest cover for the next two decades more area has been added in the forest category. But in 2011 it was there in worst condition. In the recent year due to the civic awareness and restoring the park inner city protection over existing forest cover enhances the forest cover and it reached to the 135.77 hectare in 2021 (table 3).

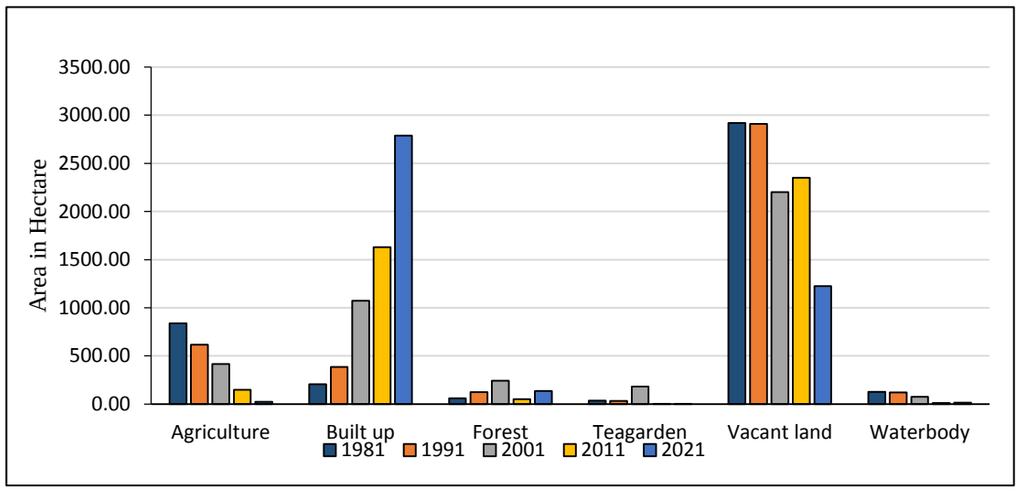
Table no 4 Land Use Land Cover Change Percentage (1981 – 2021)

LULC class	1981	Percentage	2021	Percentage	Change Percentage
Agriculture	839.18	20.03	23.74	0.57	-97.171
Built up	205.74	4.91	2786.84	66.51	1254.544
Forest	61.13	1.46	135.77	3.24	122.0842
Teagarden	35.90	0.86	3.57	0.09	-90.0559
Vacant land	2919.90	69.69	1225.68	29.25	-58.0232
Waterbody	128.15	3.06	14.40	0.34	-88.7629

Source: computed by the author form remote sensing data

The Present study advocates transformation and modification of land (LULC) from one category to another over 40 years (1991-2021). In the 1981s, the total identified built-up area in SMC was 205.74 hectares, it had increased to 386.93 hectares between 1981 and 1991. It further increased to 1072.96 hectares, 1628.58, and 2786.84 hectares in the year 2001, 2011, and 2021 respectively.

Fig. 2: Trends in Land Use Land Cover Change (1981 - 2021)



Percentage change in entire city built-up area in the last four decade (1981 to 2021) is 4.91 percent to 66.51 percent, of the total city area with a massive 1254.54 percent overall change (Table 4). The above study also figures out the continuous concentration of population in SMC which leads to rapid encroachment on physical land and transformed into different kinds of land use practices (Mukherjee and Debnath, 2016).

Discussion

In India, the urbanization has taken place at an unprecedented rate during past few decades, the momentum of growth are noticeable for the small and medium class town rather megacities (Chadchan & Shankar, 2012). Siliguri is one such city which rate of transformation in all classes are quite high (Basu Roy & Saha, 2011; Bhattacharyya & Mitra, 2013; Bose & Chowdhury, 2020; Roy & Kasemi, 2022; Sarkar & Chouhan, 2019). In the initial phase of development during 1991 city is concentrate at the core area of the city (fig 3). Change in land use can found only near the city core. By the year 2011 city mainly expand towards North, North East and southern part of the city (fig 4). The scenario of urban area increasing over the year (fig 4, 5 and 6). Land use maps, built-up area, cropland and open land, forest, and plantations and water bodies are associated with the study area. It has been found that over the period built-up areas have increased consequently at a rapid pace and this rapid increase of built- up areas is associated with the decline of the cropland and open land fig 4, 5 and 6.

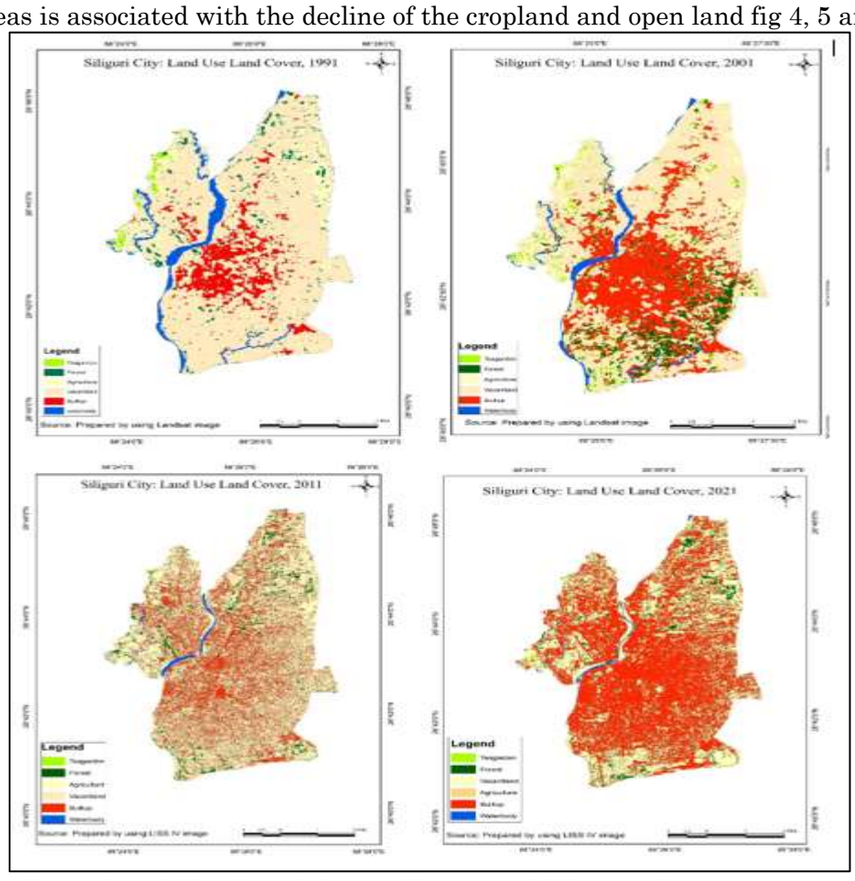


Fig: 3 Land Use Land Cover Change of Siliguri City 1991-2021

Conclusion:

This study is done to examine the spatio-temporal change in land use land cover of Siliguri Municipal Corporation. Rapid change in built up has been noticed, which has increased to about 1254.54 percent from 1991 to 2021. At the same time teagarden, agriculture land and waterbody declined by -90.06, -97.17 and -88.76 percent, respectively (table 4). while the changes in vacant land quite low -58.02 due to lots of addition of vacant land from different land cover class. Most of the cases it is found that vegetation covers of the city affect harshly but in the present study there is an addition of vegetation. The result also shows that the agricultural land and teagarden are the major contributors in the growth of built-up area, it also observed that this urban area mostly expanded over this two land use classes. While the water body also has a significant contribution in built up expansion. The discussion in the previous sections has directed attention to the magnitude and pattern of change in land use land cover of Siliguri city for the last four decades, which should be helpful in terms of guiding future planning and policy making for the city.

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Analysing the Necessity of Cognitive Enhancement Systems for Humans

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Abstract

Different medications are used to treat cognitive deficiency in humans. It is also termed cognitive neuro enhancement. the most psychoactive substance in the world consumed by people is caffeine, others are L- Thiamine, creatine, nicotine, etc. its works by increasing blood flow in the brain due to which blood can use more oxygen. in this way, the individual can stay conscious for long hours. It acts as an energy booster and memory enhancer and also enhances the mood. Previous data about cognitive enhancers show that people who use drugs can work tirelessly for long hours rather than people who are not using them. However, it has several side effects which are described in this article. in this article, all the formations are summarized for a better understanding of this drug.

Keywords

Cognitive enhancer, Memory enhancer, human augmentation, wearable-computing, multi-modal interaction, cross-modal connection, augmented cognition, interaction-paradigms

Introduction

People to enhance their mood and increase memory consume different drugs. People spend lots of money on these drugs in the name of work better and to improve mental health. Those drugs are termed cognitive enhancers. These drugs can be natural as well as artificially made in laboratories by using chemicals. In this article, all types of cognitive enhancers will be explained. There will be a discussion on whether using the enhancer is good for health or not. Everything should be used in a moderate amount as the excess of anything is bad for both physical as well as mental health. The accurate amount and the time of using these drugs will be discussed.

Objectives

The objectives of the study are

1. To explain what is cognitive enhancement
2. To reveal that how to enhance cognition
3. To know about how the enhancer works.
4. To identify the types of enhancers
5. To explain the benefits of using this drug
6. To understand the side effects of this drug

Methodology

At present time due to several mental pressures, due to workload, medical issues, and personal problems, people use various drugs (CE) to reduce their stress levels. All the data about the CE are collected from an internet source and by surveying 40 people from different professional backgrounds. This research followed the primary quantitative method to gather the personal experiences of individuals after using different drugs.

Significance of Cognitive Enhancement

The major problem facing people nowadays need to be treated therefore CE is important. The mental action or the processing of the mind to gain knowledge and recognize anything through experiences is termed cognition [1]. There are many causes of mental decline like- mental stress, deficiency in nutrition, aging, genes, and history of the family. Dementia is the state of mind, where the brain fails to work properly. The specific brain disease ‘Alzheimer’s disease' is the most common type of dementia. [2] Loss of memory, difficulties in concentration, difficulties in doing daily tasks, getting confused doping common activities, cannot interpret the correct time and date, changes in mood, etc.

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Caffeine: As a source of CE

Figure1: Caffeine-rich food

(Source: 2)

Caffeine is a type of nootropic. It is a natural substance for cognitive improvement [3]. While using any medication or drugs, it is necessary to keep in mind that our body is not harmed by it in anyways. Caffeine is present in many foods, beverages, and medicines that we consume daily like- coffee, chocolates, energy drinks, green tea, etc. caffeine has several benefits which people consume it, like-

1. longer life span possible
2. more sugar will be processed by the body
3. risks of heart failure will reduce

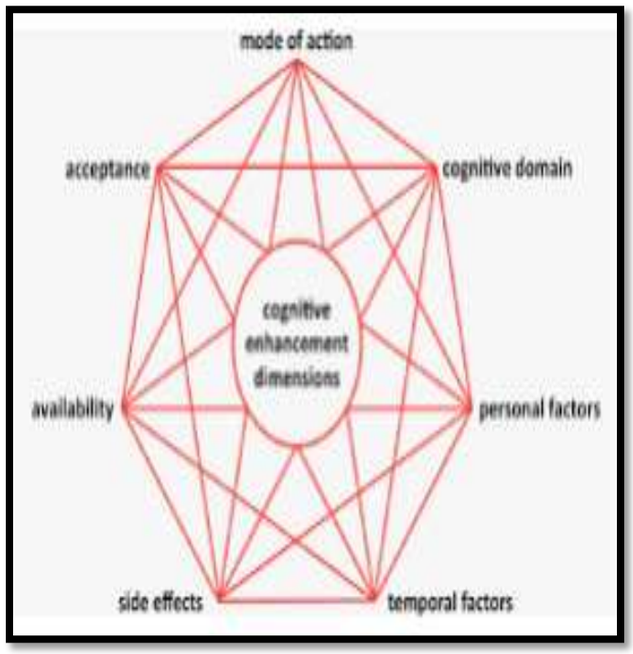

Figure 2: Importance of CE in human

(Source: 4)

A huge potential unit of more than 550,000 individuals has been observed for 10-12 years showing that there is a connection between consuming higher amounts of caffeine and a reduction in the death rate from all causes.

However, overconsumption of it may cause insomnia. Nervousness and restlessness can be caused by it. The point is why anybody should use an excess amount of caffeine when moderate consumption is connected with many benefits [4]. Aside from its benefits, caffeine is not the right choice for children [8]. People should avoid caffeine intake if they have any medical issues like- high blood pressure, or insomnia. A study has been conducted in 2019 suggested that caffeine intake of more than 400mg per day increases health issues like- agitation, anxiety, and

tremors, another potential study of 2021 shows that consuming more than 300mg of caffeine per day during pregnancy may affect the birth weight of the baby [5].

S.No	Type of factors	Methods & Tools for evaluation	Suggestions
1	Cognitive	Experiments and observation during laboratory test, observation using online & offline Questionnaire, Interview	Changing of interface superficial features, Changing the user system communication level
2	Social	Ethnographic methodology, survey methods based on observation, Interview comparison with multimedia system evaluation	Improvement of interface functionalities for communication and data sharing between users

Figure 3: Different cognitive factors affect human

(Source: 14)

In the above table, some examples of social and cognitive factors are impacting human lives and the evaluation of learning systems. Cognitive factors indicate several characteristics of a person that greatly affects their learning and performance. It has been observed that cognitive factors help in modulating and improving human performance [14]. However, these factors encourage different cognitive functions such as attention, memory, as well as reasoning. On the other hand, cognitive factors are addressed as the internal factors of each person and it helps to modify human behavior and behavioral responses to reduce any kind of external stimuli like stress and negative thinking. Hence, these factors affect human performance in different activities of daily life.

Nicotine: As a source of CE

It is a drug that occurs naturally in tobacco and it has benefits as well as side effects. The studies by human and preclinical models have illustrated that nicotine plays some role in enhancing mental health conditions. Learning capacity and memory are increased by nicotine, it reduces stress and depression of people therefore it is used by people in a huge amounts [15].

Comparison between Caffeine and Nicotine

S.No	Particulars	Caffeine	Nicotine
1	Chemical	It is a chemical mainly present in high amounts in coffee, and tea plants.	It is a chemical mainly present in a high amount in the tobacco plant.
2	Addictive	It is less addictive	It is highly addictive
3	side effects	It has less number of side effects	It has a huge number of side effects

It is one of the most life-threatening and compulsive chemicals. Blood pressure and heart rate can be increased by it. The arteries can become narrow by consuming it. As it is addictive, therefore it is very necessary to avoid using it. Doctors to reduce the addiction to nicotine also prescribe medicines [6]. Data from 2019 shows that tobacco was responsible for the death of 8.71 million people globally. A nicotine-addicted people are prone to covid-19 disease. The number of benefits is higher than its benefits therefore, nicotine consumption should be reduced. Nicotine has more in common with caffeine than other chemicals found in tobacco cigarettes. For example, nicotine and caffeine are both alkaloids derived from plants that naturally stimulate dopamine production in the brain. Bothe chemicals are stimulants that act on the central nervous system, and they have positive effects when taken in small doses. The biggest difference between them is how they are consumed. No one disputes that nicotine and caffeine can by addictive. People who regularly use either substance may experience withdrawal symptoms such as headaches and fatigue if they suddenly quit cold turkey. Young people may be more prone to nicotine and caffeine since their brains are still developing, so minors shouldn`t have access to either substance.

Merits and Demerits of Cognitive Enhancement

In the above discussion, it is clear what is cognitive enhancement and why it should be done. All the benefits and side effects are mentioned above. Based on these data some advantages and disadvantages of cognitive enhancement are listed below;

S.No	Advantages of CE	Limitations of CE
1	enhances mood	overconsumption leads to restlessness and other health issue
2	boost energy level	treatment might be costly
3	treating diseases like dementia	sometimes it can be addictive

Cognitive Enhancement Therapy

Cognition is a mental process of the brain by which knowledge is developed, such as learning, thinking, memory, recognizing, and perception. Cognitive enhancement is an extension or improving the brain's core capacities through the use of drug therapy or other brain treatments. Human development is as old as human civilization. People are trying to raise their physical strength as well as mental efficiency over thousands of years. Sometimes they are successful or sometimes come with tragic results. As a result, "Cognitive Enhancement Therapy" developed. Therapy is characterized by treatment i.e. achieved by correcting the defect of a cognitive subsystem. The enhancement is the intervention of the cognitive subsystem by using another way rather than refitting or cure of dysfunction [11]. In practice, the difference between therapy and enhancement is often difficult to access and it could be argued that it has no practical significance. A cognitively developed person is not necessarily with good brain capacities. Cognitive development includes not only medical treatments but also psychological treatments. It also brings improvement of external technological structures that supports cognition.

Here in Table 1, discussed the effects of drugs which are known as cognitive enhancers.

Table 1

Cognitive Enhancers	Effects on Cognition Enhancement
Caffeine	It enhances cognitive and psychomotor functioning. It cans effects on thinking and increases concentration level.
Nicotine	It can affects on cognitive development such as improving fine motor functioning, thinking, attention, etc.
Amphetamine	It is highly addictive drugs and it mainly use in Schizophrenia. D-amphetamine improved language production.
Donepezil	It mainly used in traumatic brain injury, epilepsy, Parkinson's disease.

Deep learning model

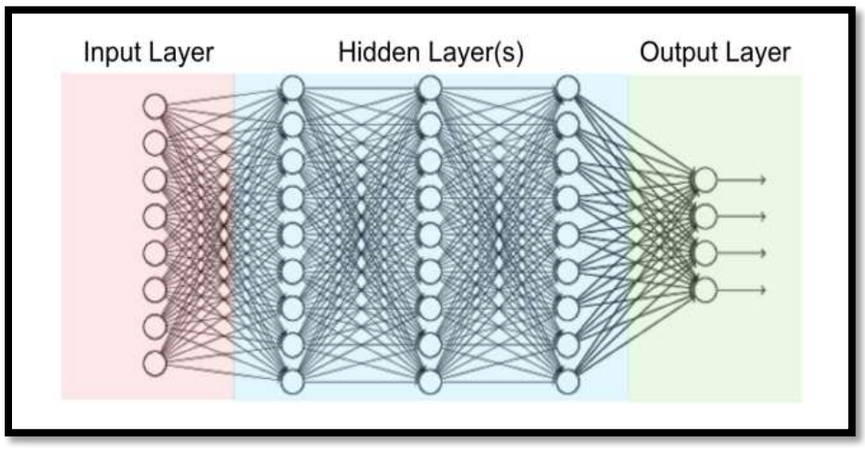

Figure 4: Model of deep learning

(Source: 15)

The theory or model of deep learning model mainly used for artificial networks. This model provides a computation system through which humans can perform on large amounts of data [15]. According to the deep learning model, machine learning and cognitive system help people to be more innovative and increase the capability of putting more creative things together in a completely new and different way. Moreover, it supports the concept of a machine learning system because it works based on the operation as well as the function of the human barons [16]. Thus, the deep learning model boosts up the cognitive enhancement systems in different industries, health care organizations, e-Commerce, and advertising.

Cognitive Enhancement System for Humans

Recently advancement of neuroscience technologies has laid the way to innovative applications that cognitively increased and developed humans. Human enhancement is the approaches and

techniques that are aimed at cognitive functions through drugs, or by computer or other brain therapy for improvement of brain capabilities. There are many techniques that are helping to increase cognitive enhancement. Education is one of the best ways to develop cognition. It reduces crime risks, abuse, and many illnesses. Mental training, visualization techniques, and rehabilitation have a good effect on cognition. Stimulant drugs like nicotine, caffeine, and amphetamine have been used to improvement of cognition. Diet and dietary supplements can also affect cognition development. Human-computer interaction and brain-computer interfaces are helped to enhance cognition. Cognition helps humans to understand all things which are around us and interact with other people and the environment. Cognition has a physical body in the brain with over one hundred billion nerve cells in the human brain. Each of these ten thousand connections with other nerve cells is known as neurons. So, cognition is the most complicated organ. Cognition basically controls our thoughts and behaviours. These are regulated by neurotransmitters in the brain. There are a number of chemicals which has a major impact on regulating cognitive process. This chemical includes dopamine, serotonin, glutamate, GABA, etc.

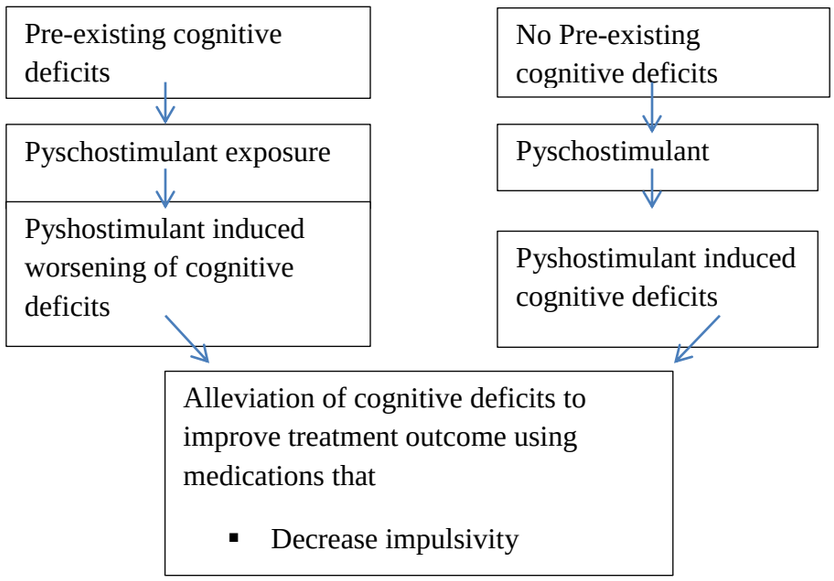

Figure 5: Relationship between Medicines and Cognition

(Source: 16)

Internet and Cognitive Enhancement System

Cognition development is the increase of the mental capacities of human beings. More precisely, In order to make the approach of new cognitive capacities or improvement is relevant of changing the existing capacities. The internet is considered a cognitive enhancement because it is the most easily and biggest information source. It influences human brain structure and function. It helps humans to increase their existing mental capacities like collecting and processing information. Computers and the internet are the best technologies for cognitive development for getting information instantly.

But on the internet, all information sources are online which burdens human cognition development. Anyone can change information and upload new and wrong information easily. This may lead to a psychological "levelling effect".

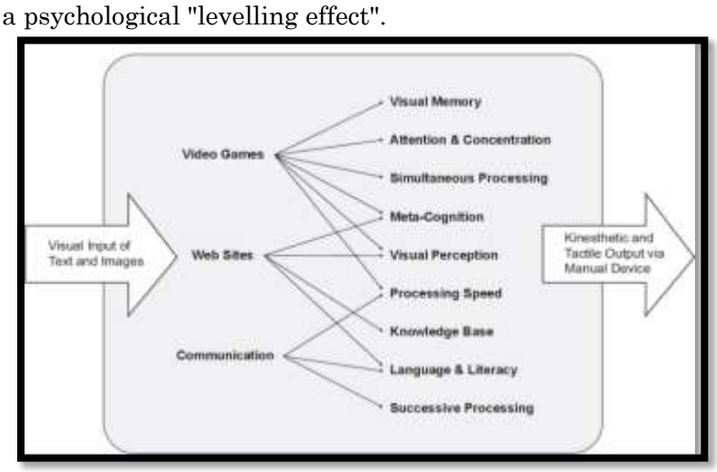

Figure 6: Internet effects on Cognitive Development

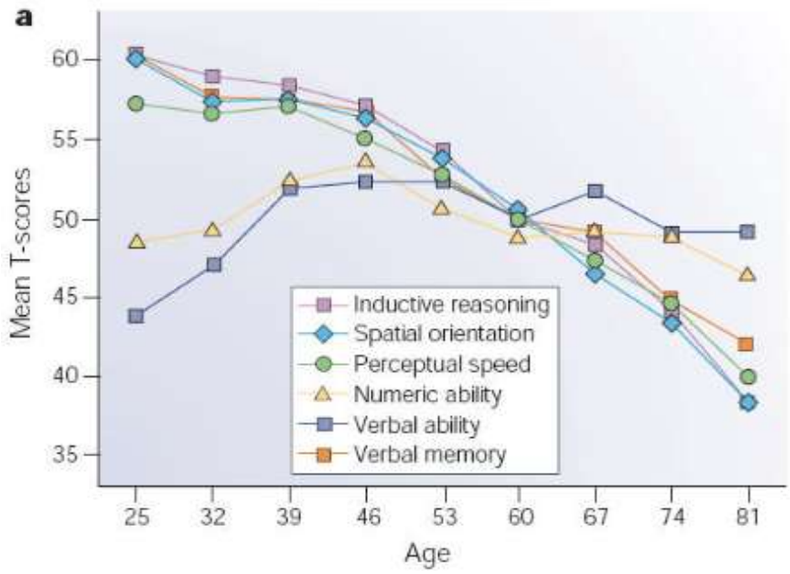

Figure 7: Individual Variability in Cognitive Function

(Source: 17)

The above graph is demonstrating how cognitive functions get lowered with age. It has been noted that there are almost no changes are found in human verbal ability [17]. On the other hand, the graph is showing completely opposite in some cases that their brain and its functions has improved with age. There are many symptoms that shows a decline of cognitive functions are interconnected with aging like, declines in perceptual speed, people losses their verbal ability, losses in numeric ability.

Discussion

As already stated that cognitive enhancement has a major impact on human beings, but there are some risk factors for cognitive development, such as nutrition, environment, maternal-child interactions, etc. Major nutritional risk factors for poor brain child growth include iron deficiency anaemia, iodine deficiency goitre, and stunted growth. Balanced diet and supplementation are given to underweight women for increasing birth weight, reducing the risk of a low birth weight baby, and developing child cognition. Most of the studies say breastfeeding is one of the most protective factors for child development as well as cognition enhancement. The environment is another major risk factor for the development of poor children. Malaria and HIV can lead to decreased mental capacities. Poor maternal mental health is also associated with cognition development.

If depressed mothers interact with their children a result in bad cognition outcome. Recent research says that excessive internet use over a long time negatively hampers cognitive functions such as loss of attention and short-term memory loss.

Conclusion

A cognitive Enhancement System is necessary for human development because it enhances thinking ability and mental capacity. In this section, we examined and summarized the most recent articles about the necessity of a cognition development system for human and conduct a survey about the importance of cognition enhancement but also explore the negative impact and risk factors the enhancement of cognition.

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Impact of Yogic Pratices on Flexibility and Balance of College Athletes

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Abstract
The aim of this study was to find out the impact of yogic practices on flexibility and balance of college athletics. The research population included sixty (60) male subjects between the age group of 18 to 28 years were selected as subject from Dept. of Physical Education, Rajarshi Shahu College of Arts, Commerce & Science Pathri, Dist. Aurangabad, Maharashtra, India. The subjects were purposively assigned into two groups: Group-A : Experimental Group (N=30) and Group-B : Control Group (N=30). All the subjects were informed about the objective and protocol of the present study. The subject from Group-A were subjected to 6 weeks yogic practices. The training consisted of variety of yogic asanas like Parsottanasana, Adho-Mukh-Svanasana, Utthita Parsva Konasana, Dhanurasana, Bhujangasana, Paschimottanasana, Sarvangasana, Halasana, Vrksasana, Utkatasana, Virbhadrasana. Sit and Reach (SR) test for flexibility and Stork Stand (SR) test for balance was used for measurement of independent variables. Descriptive analysis and independent 't' test were applied at 0.05 level of significant. The result revealed that the 6 weeks yogic practices brought about significant improvement in flexibility (t=8.06,) and balance (t=5.92) in Group-A as a compared with the Group-B. Findings concluded that regular practices may improve the college athlete's flexibility and balance.
Keywords: Yoga, flexibility, balance, athletes.

Introduction:

Today yoga is most popular in the world. It is recognized a one of the most important heritage of India. Traditionally it was said that lord shiva is beloved to be the inventor of yoga. Our ancestors spend a lot of time in practicing yoga for their good health and happiness. Yoga as a 5000 years old system of technologies and methodologies that provides a complete philosophy of living defines by Taylor M.J., (2000). It incorporates learning about the nature of life, reality, and the self. Yoga is an open-ended practice that assists in quieting the body, mind, and emotions. First developed in India, yoga is an ancient discipline that increases mental and physical control of the body to achieve a state of well-being (Singh V. et. al., 1990; Telles S. et. al., 1993; & Anand B. K., 1991). The word yoga is derived from the Sanskrit root "yug" that means, "to join together" (Murie C. A., 1998).

Yoga is all over world practiced for its benefits to body and mind. Yoga rectifiers is an decreasingly appreciated discipline, particularly in India where it's overseen by the Ministry of Health and Family Welfare's Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (Raphaelhager, 2009). Not figures studies have assessed the influence of integral yoga practices on cerebral and health variables, establishing multitudinous possible benefits. Regular practice of yoga has multitudinous health benefits (Wolff et. al., 2013; Pal et. al., 2011; McDermott et. al., 2014; Parikh et. al., 2014). Yoga also brings positive changes in physical performance and well-being if rehearsed regularly (Akhtar et al., 2013; Ross and Thomas, 2010) by improving to flexibility and balance (Boehde et al., 2005) as well as functions of cardiovascular also (Bera T.K. et. al., 1993). Yoga may have direct link to ameliorate the common rudiments of athletic performance (Harrelson G.L. & Swann E., 2003). Regular yoga practice rapidly enhanced flexibility as this process involves gentle muscle stretching, tissues connectivity around bones and joints (Woodyard C., 2011). Yoga also has profound effect on balance, muscular strength, abidance and collaboration because of its largely structural exertion and involvement (Carrico M., 1997).

Yoga is different from other typical forms of exercise training as it requires multi-structural involvement that gives a difficult task to the body in various different ways (Gulati R. & Sharma A., 2011; Kaminoff L. et. al., 2007). Proper positioning trough yoga enhances movement abilities and reduces movement limitation, thus improves body performing among college athletes. It also helps to maintain continuous and stable breathing throughout a series of asanas involving groups of muscle required under tension. Interacting the strained musculoskeletal system brings comprehensive changes to the whole body while performing those asanas (Coulter H., 2010).

Traditional exercise emphasizes on perfecting specific fitness for a given sports achievement (Bryant C.X. & Green D.J., 2006). On the other hand, regular yoga practice improves many specific fitness components (e.g. increase alignment, range of motion, and enhance muscle fibers recruitment) by increasing flexibility and reducing tension of muscle thus allows new movements to take place and help to move freely joints (Clark B. & Powers S., 2012). Therefore sport skill improves.

Flexibility is the one of factors of health related physical fitness. Flexibility can be defined as a property of the musculoskeletal system, which determines the range of stir that's attainable without joints injury. Flexibility implies 'freedom to move' and it is the ability to engage a part of the body in a wide range of purposeful movements at the speed required (Alter M.J., 2004). The term flexibility in this context means the elasticity of soft tissues that cross or surround joints (muscles, tendons, fascia, articular capsule, ligaments, nerves, blood vessels, skin) and is absolutely necessary for painless movement of the body (Kinser C. et. al., 2007). Flexibility exercises should be performed by every age groups like children, adolescents, adults and the elderly also. World Health Organization recommends taking part in muscle-strengthening activities that involve the major muscle groups on two or more days a week (WHO, 2010).

Balance is one of the important fitness components which not only play a vital role for the sports person but also for sedentary people. It is ability to sustain the body center of gravity over its base of support. Static and dynamic balance these are two types of balance. Static balance is the capability to maintain the neuromuscular system in a static condition for an effective response or to control it in a specific effective position while dynamic balance is the capability to maintain the stir in neuromuscular system. Both the types of balance are equally important according to the nature of activity. The main role plays dynamic balance more important role for the sedentary people then static balance. Static balance was to perform a task while maintaining a stable position (Ricotti L., 2011).

Therefore, the main intention of this paper was to investigate the impact of yogic practices on flexibility and balance of college athletics. Thus, through an improvement of flexibility and balance performance should increase by yogic practices.

Review Of Literature:

Literature related to the present study has been presented as follows-

Jay Polsgrove M. et. al., (2016) conducted a study on impact of 10 weeks of yoga practice on flexibility and balance of college athletes. They're reported that the findings for independent variables like flexibility and balance measures as well as whole body measures illustrate the significant positive changes due to the participation in daily yoga practices in the yoga group as well as the significant differences between yoga and non-yoga groups.

Shah Noman Md. Iftekher et. al., (2017) studied on effects of yoga on flexibility and balance of athletes. Total 20 athletes participated in present study. In each group 10 participants (10 in yoga group and 10 in non-yoga group). They are also reported that significant improvement was observed in the yoga group for flexibility and balance then the non-yoga group. They were concluded that the daily yoga practices may improve the flexibility and balance of athletics also. Dr. Suresh C. & Pravin Raj R., (2021) conducted study on impact of yogic practices on flexibility in college students. Total 60 students participated in the present study. They were significantly found that the yogic practices enhanced physical fitness variables such as flexibility in college students also. Similar result also found by Mr. Selvakumar K. et. al., (2019) on influence of yogic practice on flexibility among college students. Another study done by Dr. Amandeep Singh, (2019) on the effect of selected yogic practices on flexibility and agility of soccer players of Punjabi University, Patiala. The researcher has taken 50 soccer players belonging to Punjabi University Patiyala and divided in two equal groups. Findings of this study suggested that the practice of eight week yoga programmed showed significant improvement in flexibility level. Dr. Rajkumar P. Malipatil, (2018) studied the effect of asana on physical fitness variables among government residential school students. He was concluded that regular yogasana practices have improvement to flexibility.

Petric M. et. al., (2014) conducted a study on the impact of hatha yoga practice on flexibility. They were concluded that the enhancement of flexibility is one of the most egregious and snappily achieved impacts of regular hatha yoga practice. The results of this study indicated that the daily yoga practice has a significantly effect on flexibility in young women. Similar result also found by Gurpreet Makker, (2013) on effect of selected asanas on the flexibility of Ranji level wicket keepers in cricket.

Materials And Methods:

Subject -

Sample of the study consisted of *sixty* (60) male subjects between the age group of 18 to 28 years were selected as subject from Dept. of Physical Education, Rajarshi Shahu College of Arts, Commerce &science Pathri, Dist. Aurangabad, Maharashtra, India. The subjects were purposively assigned into two groups: Group-A : Experimental Group (N=30) and Group-B : Control Group (N=30). All the subjects were informed about the objective and protocol of the present study. The subject from Group-A were subjected to 6 weeks yogic practices.

Procedure -

The Group-A (experimental group) and Group-B (control group) were comprised of college athletes. During the period of yoga sessions for 6 weeks, only members of experimental group have participated the regularly yoga practices. The yoga practice sessions was scheduled at 6:30 a.m. to 7:30 a.m. on Monday to Saturday weekly working days. The experimental group was assigned to asanas such as Pyramid Pose (Parsottanasana), Downward Facing Dog Pose (Adho-

Mukh-Svanasana), Extended Side Angle Pose (Utthita Parsva Konasana), Bow Posture (Dhanurasana), Cobra (Bhujangasana), Intense Dorsal Stretch Posture (Paschimottanasana), Supported Shoulder Stand (Sarvangasana),Plow Pose (Halasana),Tree Pose (Vrksasana), Chair Pose (Utkatasana),Warrior Poses (Virbhadrasana). Measures of flexibility and balance were taken immediately before and shortly after the six week yoga sessions.

Measuring Tools -

Assessments for each group were completed separately. One day before the initiation of first yoga session, the measurements were taken with the same testing protocol from both experimental and control groups. Similarly, at the end of 6 weeks yoga practices one day after, the testing protocol was repeated with the experimental and control group of college athletes. The measurements of flexibility were determined by Sit and Reach (SR) Test developed by Baechle T., (2008), while a test of balance was conducted with a Stroke Stand (SS) Test was developed by Coulson M. & Archer D., (2011).

Data Analysis -

The collected data in present study were analyzed by statistic program version 25.0 of the Statistical Package for Social Science (SPSS) software. Descriptive Statistic (Mean and Standard Deviation) and Independent 't' test was applied to comparison between experimental and control groups. The significance level of was set as 0.05 levels ($p<0.05$).

Results:

The findings with regards to the present study have been presented in Table No. 1. Further in Fig. No. 1 the graphical representation is presented.

Table No. 1. Analytic statistics between control and experimental group on Flexibility.

Variables	**Group**	**N**	**Mean**		**SD**		**DF**	**'t'-value**
			Pre-test	Post-test	Pre-test	Post-test		
Flexibility	Control	30	16.43	17.50	1.04	1.23	29	0.67
	Experimental	30	16.20	18.66	1.27	1.02		**8.06**

*Significant on 0.05 level of confidence

Table No. 1.indicates the results of control group and experimental group with regards the variable flexibility. The descriptive statistics shows the Mean and SD value of flexibility of pre-test and post-test of control group was 16.43±1.04 and 17.50±1.23 respectively, whereas the Mean and SD value of flexibility of pre-test and post-test of experimental group was 16.20±1.27 and 18.66±1.02. The 't' value of control group was 2.67 and for experimental group it was 8.06. The 't' value is 8.06 which is more than tabulated value. It means there was significant difference between control and experimental group with regards to their flexibility.

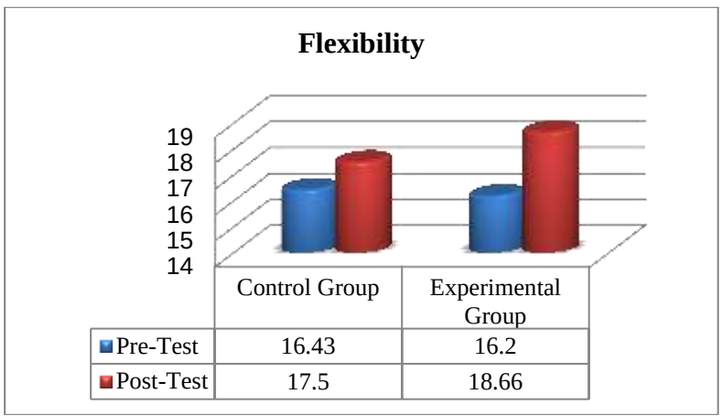

Fig. No.1 – Graphical representation in flexibility between control and experimental group for flexibility.

The findings with regards to the present study have been presented in Table No. 2. Further in Fig. No. 2 the graphical representation is presented.

Table No. 2. Analytic statistics between experimental and control groups for balance.

Variables	**Group**	**N**	**Mean**		**SD**		**DF**	**'t'-value**
			Pre-test	Post-test	Pre-test	Post-test		
Balance	Control	30	32.90	33.16	3.55	3.73	29	0.31
	Experimental	30	33.93	38.76	3.09	3.28		**5.92**

*Significant on 0.05 level of confidence

Table No. 2.indicates the results of control group and experimental group with regards the variable balance. The descriptive statistics shows the Mean and SD value of balance of pre-test and post-test of control group was 32.90±3.55 and 33.16±3.73 respectively, whereas the Mean and SD value of balance of pre-test and post-test of experimental group was 33.93±3.09 and 38.76±3.28. The 't' value of control group was 0.31 and for experimental group it was 5.92. The 't' value is 5.92 which is more than tabulated value. It means there was significant difference between control and experimental group with regards to their balance.

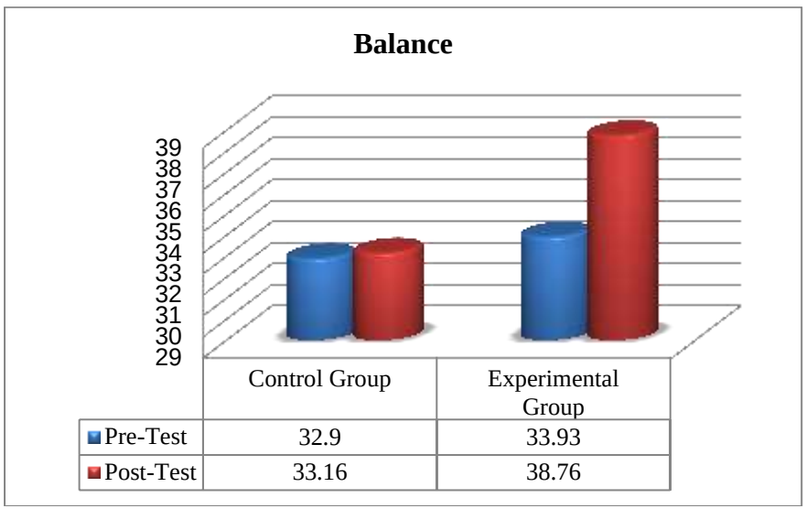

Fig. No.2 – Graphical representation in flexibility between control and experimental group for balance.

Discussions:

Flexibility and balance are important factors of fitness of any sportsmen which plays an important part on their performance. In this particular study, our main focus was to determine if yoga has any additional effect on the flexibility and balance of college athletes. Only experimental (yoga) group was given yoga practices. Evidence have shown that flexibility training and yoga increases the range of stir of joints (McHugh M.P. & Cosgrave C.H., 2010; Amin D.J. Goodman M., 2014) compared to those who are untrained. In these findings, it shows that the regular yoga training significantly increases the measures of flexibility. On the contrary, the control (non-yoga) group did not show any improvement in flexibility measures. Moreover, yoga group participants also had higher flexibility than the non-yoga group also. Thus, the 6 weeks of yoga practicing did help to improve flexibility. Regular yoga practice supposed to increase the balance (Zech et. al., 2010; Boehde et. al., 2005). This study finds similarity with other studies too. In a study conducted among college athletes for about 6 weeks of yoga session in similar setting. Significant enhancement were seen in both flexibility and balance among those participant who were belong to yoga group, but non-yoga group didn't show any changes in their performance after the tests performed for dimension (Polsgrove et. al., 2015). This substantiation also supports to these finding. Yoga can enhance the independent variables like flexibility and balance of college athletes also.

The result of the study also supported by the previous study conducted by Jay Polsgrove M. et. al., (2023) on impact of 10-weeks of yoga practice on flexibility and balance of college athletes. They were reported that regular yoga practice may increase the flexibility and balance on college athletics. The finding of Mr. Selvakumar K. et. al., (2019) also reported that there was found significant difference on the criterion variable. There were found difference between experimental (yoga) groups on flexibility when compared to control (non-yoga) group due to yogic practice. Similar results were found in previous work carried out by Petric et. al., (2014) to determine the impact of hatha yoga practices on flexibility. He was reported that a regular practice of yoga has a significant effect on body flexibility, which is particularly obvious in measurement of the increase of the flexibility of skeletal muscles.

Another study conducted among shooting trainee athletes revealed that regular yoga training may improve the flexibility and balance of shooting athletes even within short period of time, can also improve the athletic performances that demands high flexibility and balance (Shah Noman et. al., 2017).

Based on the above related literatures and consultations with numerous others the researcher definitely arrived at the conclusion that the trainee athletes who took the part in the yoga practices session had enhanced flexibility and balance than the other group also. Yoga also has psychological benefits which have not been studied in our study but this is also an important aspect to be added in future research.

Conclusions:

Based on the findings, we can conclude that taking part in yoga session has helped to improve flexibility and balance among college athletes. Thus, yoga may support to enhance to performance of athletes by increasing specific fitness components. Further studies to evaluate the impact of yoga including large sample size with different age groups, others sport departments, other components of fitness and measurement tools, psychological aspects and more time may help to create more strong evidence. Hence, we can recommend that yoga professional could be included with the team to conduct yoga session on a regular basis to enhance performance of athletes and players also. Trainers and coaches could also be trained on yoga poses so that they can conduct yoga session with their trainee athletes along with the other regular training.

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Vyasa's Ecological Standpoint in the *Mahabharata*: A Recherche Research

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ABSTRACT

From time immemorial, pristine environment has been one of the major sources of inspiration to the poets, dramatists and writers and our scriptures that give divinity to Nature and ask us to conserve it proclaim that God sleeps in the rocks, dreams in the plants, stirs toward wakefulness in the animals, and spreads in mankind the message of *Vasudhaiva Kutumbakam* – 'The Whole Universe is one Family'. The *Mahabharata* written by the great sage Veda Vyasa gives a very detailed view on environment of the then time. Like other Holy Indian scriptures the *Mahabharata* also contains the earliest messages for preservation of environment and ecological balance with the ethical treatment of the human beings with the natural world. The epic gives utmost importance to the relationship between human and nature. Like the *Ramayana*, the *Mahabharata* covers rough and mild both the aspects of Nature. The importance of forests in Indian epics can be understood from the fact that the epic devotes a book to the forests called the Aranyaka Parva. Several passages of the *BhagavadGita* remind us of universal panentheism and advise us not to try to change the environment but to improve it or wrestle with it and if it seems hostile at times tolerate it. Ayurveda was present and practised in the days of *Mahabharata.* Thus, the *Mahabharata* inspires us even today as it inquires into human nature, human relationships, man's links with Nature, Universe and God and an individual's place within the defined society and indefinable self.

Key words: *Mahabharata*, *BhagavadGita*, environmental conservation, human, nature.

Objectives

The objectives of the present study are

1. to take a minute look on the environment as described in the *Mahabharata*,
2. to elicit information about ways of conservation of environment in those days,
3. to find ways of preserving healthy environment going to past being in the present.
4. To make our global village fit for us by making all aware about the conservation of environment.

Methodology

Love for literature is an evergreen technology to conserve environment. To build an understanding of various dimensions of environment in the era of *Mahabharata* attempts has been made to collect available data both primary and secondary from various sources both living and non-living, online and offline like texts on ecology, various editions on *Mahabharata*, research papers and journal articles published by the learned scholars on the topic of presentation and various websites. Paper has been prepared after careful analysis of those data accordingly.

Full Paper

Environmental conservation is a very strong and powerful message of all literature from the whole of the world. Reverence for Nature and its creations is the unifying ethical principle in almost all religions of India. They have all kept Nature above man. Our natural environment – comprising mountains and hills, rivers and dales, trees and plants – is considered auspicious enough to provide space for meditation. Harmony with the natural world receives strong emphasis as a pervasive element in Indian spiritual beliefs and rituals. Evergreen trees were regarded as symbols of eternal life and to cut them down was to invite the wrath of the Gods. Groves in forests were looked upon as habitations of the Gods. It was under a banyan tree that the Hindu sages sat in a trance seeking enlightenment and it was here that they held discourses and conducted holy rituals. From time immemorial, pristine environment has been one of the major sources of inspiration to the poets, dramatists and writers and our scriptures give divinity to Nature and ask us to conserve it. Since the then time the Hindu scriptures proclaim that God sleeps in the rocks, dreams in the plants, stirs toward wakefulness in the animals, and spreads in mankind the message of *Vasudhaiva Kutumbakam* – 'The Whole Universe is one Family'.

We are subconsciously integrated to our past which is always on its journey. From centuries to centuries we have been constantly travelling and changing ourselves and causing change to our surroundings without knowing it. In course of our eternal journey we carry our environment with us --- we cross through rivers, mountains, face extreme weathers, enchanting beauty of Nature, destructions sent from the sky and the earth, facing and fighting battles and wars and what not. We are the products of it and we produce it. Our existence is

interdependent. It is a fact that writings are the record of our journey. Being conceived by an adivasi fisherman on a riverbank in sylvan surroundings a tale expanded to an epic that is the *Mahabharata*, one of the greatest literary works belonging to India since ancient times. Poets, versifiers, chroniclers, intellectuals, pedants, scholars, dogmatists, liberals, frauds, rural as well as urban bards went on adding to it. This was already anticipated by the dark adivasi poet dwelling on an island with an accommodating sprit and fondly named Veda Vyasa. In the *Mahabharata* that calls itself *itihasam-puratanam* we find the reflection of vast history of Indian culture and life-style of the then time. This epic written by the great sage Maharshi Krishna Dwaipaayana Vyasa gives a very detailed view on environment of the then time too --- variety of memories it passed through in its time; environment they carried, created and passed over to us. Like the *Ramayana*, the *Mahabharata* covers rough and mild both the aspects of Nature.

Nature or Environment has never been considered a hostile element to be conquered or dominated. In fact, man is forbidden from exploiting Nature. He is taught to live in harmony with Nature and recognize that divinity prevails in all elements, including plants and animals. The rishis (seers) of the past have always had a great respect for Nature. Theirs was not a superstitious primitive theology. They perceived that all material manifestations are a shadow of the spiritual. The *BhagavadGita* advises us not to try to change the environment but to improve it, or wrestle with it and if it seems hostile at times tolerate it. Ecology, the scientific study of interactions of organisms among themselves is an inherent part of a spiritual world view in Hinduism. Indeed from the ecological stand point the *Mahabharata* is a story of how Dharma came to be established as a result of a conflict over social policies in response to on-going environmental/ecological crises. The crises and the social policies implicitly advocated by the two contestants in the Great war of the *Mahabharata*, Pandavas (the miraculously born sons of Pandu) and Kauravas (the natural sons of Dhritarashtra, Pandu's brother named after their common ancestor Kuru) have been identified in some of the episodes of the *Mahabharata*. The Great war of the *Mahabharata* which is traditionally considered as a war to establish the rule of law, a *dharma-yuddha* in which Krishna, revered by modern Hindus as the God Vishnu, befriends and helps the Pandavas; goes through the motions of negotiating a peace deal; ultimately, acts to defeat the Kauravas and both the victors, the Pandavas and the villains, the Kauravas are shown acting in their own self-interest. Pandava's proposals helped their culture survive the crises and became the Dharma for the new age that followed the war and operate to the present day.

Like the *Ramayana* the world of the *Mahabharata* is also blessed with the richness of greenery of Nature. Its sky is clean, weathers perform their journey with their all qualities and remain uninterrupted. Its rivers are full of neat and clean water, the breeze is pure and nourishing and the flow of life around is healthy. In a kingdom where someone dies immature, is criticized. Growing trees, making ponds are considered pious. There is no scarcity of natural fountains, but rich people have artificial fountains near their houses. People love Nature and worship it like God. Elements of Nature have also been attached with the festivals.

But it is not easy to understand the concept of environment in the *Mahabharata* exactly from our today's point of view. In this great epic the Nature is viewed as the extension of the same consciousness. As per Hindu view of life, they all pass through eighty four lac yonis in their different births. Like another great epic of the then time, the *Ramayana*, the *Mahabharata* also maintains the concept of the birth from one *yoni* to the other. River Ganga was the wife of Shantanu and mother of Bhishma. All the sons of Pandu were the products of the main elements of Nature. Karna was the son of Surya (the Sun) Yudhisthir of Dharma (Truth) Bhima of Vaayu (Air) Arjun of Indra and from Maadri the second wife of Pandu, conceived her two sons Nakul and Sahdeva from Ashinikumars. Draupadi as well as her brother Dhrishtadyumna were born from the sacrificial fire. There are many such examples where the distinction between the human beings and others looks to be abolished. Not only human beings, but almost all the metals are the products of the discharged semen of Lord Shankar. They are his sons and daughters. Lord Shankar was so much charged by the charming vision of Agni that he could not control his semen and discharged it in the sacrificial alter resulting into birth of Skanda.

Our ancestors learnt to live with five elements of Nature, the earth, water, air, light and cosmos and actually worshipped them in reality and symbolically. We get lots of information about the relationships between man and Nature and the human behaviours and indebtedness towards Nature from the writing in the ancient Indian treaties and literatures like the *Vedas* and the *Upanishads*. The messages of environmental conservation contained in these literatures are all based on Hindu religious philosophy, the core of which is Non-violence that is, non-injury to both the living as well as non-living creations of Nature such as plants, animals, air, water, land (earth), hill and forest. Undoubtedly, Hinduism has always been an environmentally sensitive philosophy. No religion, perhaps, lays as much emphasis on environmental ethics as Hinduism. It is a universally acknowledged fact that protection and development of environment is very important for the human race. Like other holy Indian

scriptures the *Mahabharata also* contains the earliest messages for preservation of environment and ecological balance with the ethical treatment of the human beings with the natural world as it gives utmost importance for the relationship between the human and nature. If we draw our attention to the *Mahabharata* from the point of view of environmental consciousness with regard to the physical five five physical elements (Prthvi, Ap, Teja, Vayu and Akasa), there can be found a lot of material regarding it. The epic has given paramount importance to the five great elements and almost reached to the point of conclusion that these elements create environmental consciousness *i.e.* a kind of "Be Aware Of" situation.

The *Mahabharata* can be described as "spiritual Scientist". Eco-spirituality expresses the spiritual connection that binds human beings with the environment. Environmental consciousness led to purification of mind. The *Mahabharata* has shown that ecology through literature is a strong catalyst for survival of human race and sustenance of dharmic practices. Various trees, fruits and plants have special significance in Hindu ritual. The coconut tree and the fruits are sacred and are offered to God during worship. Mango leaves are used as festoons during pujas and auspicious events. All flowers and leaves of plants are used during worship for pushpa puja and patra puja. The lotus is a sacred flower and plant for Hindus. The banana plant and leaves are used for ornamentation and worship. Hindu religious scripts, stories, and rituals have attempted to drive home the importance of preserving nature through the centuries. Lord Krishna says in the *BhagavadGita* :

patraṁ puṣhpaṁ phalaṁ toyaṁ yo me bhaktyā prayachchhati tadahaṁ bhaktyupahṛitam
aśhnāmi prayatātmanaḥ ||(9/26)

"I accept a leaf, flower, fruit or water or whatever is offered with devotion."

As a depository of Indian ethos the *Mahabharata* embodies the Indian values and code of conduct. The epic is an enormous drama that populates the story drama, pathos and thrills abound. The text teaches important lessons on environment and ethics. Anthropological evidences show that the cow is a long term requirement for a farmer and at best it should not be consumed. Cow is sacred to Humanism due to many reasons chief of which is teachings of Lord Krishna who was raised as a cow-harder. In the *Mahabharata* it is seen that in spite of being born to a royal family he chose himself to be raised in a low-caste cow-herder family. Lord Krishna is also called as Balagopala, the child who protects the cows and Govinda, one who brings satisfaction to the cows. Like Krishna Balarama too stands as counsellor, planner, initiator and finisher with his role developing the plans of cow protection and ploughing. Several passages of the *BhagavadGita* remind us of universal panentheism. The overlord identifies himself with elements of nature like the sun, moon, ocean, mountain, wind and river. In the *BhagavadGita* Lord Krishna says, "I am the Self seated in the heart of all creatures. I am the beginning, the middle and the very end of all beings. All beings have, therefore to be treated alike."(10/20) The importance of forests in Indian epics can be understood from the fact that the epic devotes a book to the forests called the Aranyaka Parva (also Vana Parva, Aranya Parva) (The Book of the Forest) which mentions the period of twelve years spent by Pandavas in exile in the forest (aranya).

Last but not the least, the *Mahabharata* is a religious 'big epic' of Indian soil and Ayurveda is the 'mother of all medical science and pride of our soil'. Subject materials related to Ayurveda and various types of medicinal and surgical methods explained in Ayurveda can be seen referred to in the *Mahabharata*. In fact, Ayurveda was present and practised in the *Mahabharata* days. All plants and flowers have medicinal value in the Hindu system of medicine (Ayurveda) brought by the divine medicine man Dhanvantari during Samudramantha Dhanvantari during Samudramanthna (churning of oceans). While describing gandhamadhana Vyasa has mentioned multitudes of trees which crated a healthy environment.

Thus, it is needless to say that though advancement in Science and Technology has given man power fit for "God", he can't be "God" unless he has understanding of environment which consists of the social, historical, political, religious and physical surroundings and conditions. The *Mahabharata*, a melodrama of human event reflects the changing times of socio-politico-cultural-moral upheavals. We may unhesitatingly say that the influences of the *Mahabharata* upon the Indians are tremendous and this great epic of India has been molding the sentiments of the Indian people from time immemorial. Undeniably, the *Mahabharata* inspires us even today as it inquires into human nature, human relationships, man's links with Nature, Universe and God and an individual's place within the defined society and indefinable self.

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Ealdtl: Early Alzheimer Disease Diagnosis Using Transfer Learning

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Abstract

Early detection of moderate cognitive impairment using magnetic resonance imaging (MRI) is critical for dementia therapy. Deep learning architecture produces good results in such studies. Algorithms need a huge number of annotated datasets to train a model. We avoid this obstacle in our study by employing layer-wise transfer learning and tissue segmentation of brain images to detect Alzheimer's disease in its early stages (AD). For layer-wise transfer learning, the VGG architecture family with pre-trained weights was employed. The proposed model distinguishes between normal control (NC), early mild cognitive impairment (EMCI), late mild cognitive impairment (LMCI), and Alzheimer's disease (AD). The Alzheimer's Disease Neuroimaging Initiative (ADNI) database was accessible by 85 patients with NC, 70 patients with EMCI, 70 patients with LMCI, and 75 patients with AD in this research. Each patient's grey matter (GM) tissue was removed utilising tissue segmentation. Preprocessing data are utilised to assess the proposed technique, which obtains the highest rates of classification accuracy on AD vs. NC (98.73%) and EMCI vs. LMCI patients (83.72%), while remaining classes accuracy is more than 80%. A comparison with earlier studies revealed that the proposed model beat the state-of-the-art models in terms of testing precision.

Keywords: Transfer learning, Alzheimer’s disease, Image classification, early diagnosis.

I Introduction

Alzheimer's disease (AD) is a kind of dementia that mostly affects the elderly. It is thought to start 15 to 20 years before symptoms appear. Syndromes are caused by the removal of neurons involved in memory, cognition, and learning. Symptoms tend to grow over time and interfere with daily chores such as family event planning, walking, and skill loss [1]. Cognitive impairment is now related to Alzheimer's disease and is referred to as dementia. The brain changes that go from normal cognitive function (NC) to moderate cognitive impairment (MCI) and, finally, the last stage of Alzheimer's disease (AD). With 121,404 deaths documented in 2017, Alzheimer's disease is the sixth leading cause of death in the United States [2]. Alzheimer's disease is expected to affect 60 million people over the next 20 years. According to the World Alzheimer's Report, the number of people suffering from the disease will rise to 152 million by 2050. Long-term care for dementia patients is expected to cost roughly $290 billion in total. Researchers are attempting to detect Alzheimer's disease early in order to reduce the abnormal loss of brain neurons [3]. It also provided emotional and monetary advantages to the patient's relatives. Alzheimer's disease is diagnosed by functional magnetic resonance imaging (fMRI), magnetic resonance imaging (MRI), single-photon emission computed tomography (SPECT), positron emission tomography (PET), and computed tomography (CT) [4].

These modes are contrasted. MRI images are often available in a standard format for clinical usage. The researcher developed functional connectivity modelling for Alzheimer's disease diagnosis using sparse representation methods, graphical techniques, and partial correlation-based methodology [5]. Cortical thickness, grey matter density, ventricular enlargements, and brain atrophy are all used by researchers. White matter (WM), grey matter (GM), and cerebrospinal fluid (CSF) in brain images, on the other hand, are critical. In contrast, researchers identified a stronger link between GM atrophy and cognitive decline in MCI [6].

Mild cognitive impairment (MCI) is a stage in the evolution of Alzheimer's disease dementia (AD). The six-year MCI to AD conversion rate investigated is 80%. Identifying MCI patients who may be further classified into two stages, such as early mild cognitive impairment (EMCI) and late mild cognitive impairment (LMCI), is a continuing problem for AD-related research (LMCI). The early detection of NC and MCI provides clinicians with crucial information for treatment and decision making. It was also beneficial to save costs while providing long-term care [7]. The support vector machine has shown early success in AD classification (SVM). Deep learning-based technologies such as sparse autoencoder and convolutional neural network (CNN) have recently provided optimal classification solutions in a range of fields such as computer vision, voice identification, and natural language processing [8]. Deep learning algorithms, on the other hand, have limitations when training a model on scratch data since the model needs a significant number of medical photographs with annotations [9]. The availability of a large amount of labelled data complicates a solution to this

issue, which may be avoided by classifying medical scans utilising transfer learning techniques [10].

In this study, we look at a transfer learning framework based on the most sophisticated CNN architecture for categorising Alzheimer's disease images into four categories: NC, EMCI, LMCI, and AD. The fundamental goal of transfer learning is to transfer features from nature photography to Alzheimer's images and suggest a novel strategy for categorising AD that may help novice physicians establish objective judgements and make correct diagnoses. Our main goal is to get cutting-edge results with a smaller dataset while avoiding overfitting [11]. To achieve this aim, we applied the data augmentation strategy, which enables us to avoid overfitting and get the desired results [12]. We rebuild the final fully connected and classifier layers using layer-wise transfer learning on a deep CNN architecture. The proposed model is divided into two groups, with some layers being gradually trained while the others are frozen. Using transfer learning in this way, we estimate the best results for binary categories such as NC, EMCI, LMCI, and AD Overcoming the problem of inadequate training data, measuring the robustness of transfer learning, and avoiding overfitting were key challenges in previous studies [13-15].

Ii Background Study

Acharya, H. et al. [1] This study looked at possible learning techniques for predicting the stage of Alzheimer's disease. Proposed model work for data testing at the Kaggle warehouse, in which the MRI image was classified as demented (VMD), demented (MD), moderate AD (MAD), and demented (ND) to pick the model's highest accuracy as 95.70%. The analysis looked at how lowering congestion and changing the model affected the performance of these author application. To do this, the researchers employed familiarity and then compared recommended strategies to the three existing advanced networks CNN, VGG16, and RESNET50; the new model outperformed the others significantly.

Cilia, N. et al. [2] As a preliminary observation, the author observe that the nonhandcrafted characteristics seem to be more promising than the handmade ones, with the Random Forest classifier obtaining the best accuracy. The results obtained with handmade features were, on average, poorer to those obtained with non-handcrafted features, according to the comparison table (see V). Indeed, for every task and classification scheme, there was a CNN model whose properties allow us to get better results than with handcrafted models.

Ebrahimi, A. et al. [7] The author successfully moved data from the ImageNet dataset to the ADNI dataset. ADNI has hundreds of MRI scans from Alzheimer's disease patients, whereas ImageNet includes millions of nature photographs. The framework of 2D ResNet-18 was extended to properly accomplish this transition. ResNet was a well-known and capable CNN that performed well on the ImageNet dataset. 3D filters were applied to 2D filters to turn the basic 2D ResNet-18 model into a 3D model. Any extra layers received the updated filters. The learnable parameters were transferred from a 2D ResNet-18 model pre-trained on ImageNet to a 3D ResNet-18 model by replicating (copying twice) the 2D filters across the third dimension.

Gonzalez, H. et al. [8] This study's proposed subject semi-independent training for EEG-based emotion recognition involves rating selection, subject selection, and two rounds of unsupervised learning. Unsupervised learning was used first to cluster stimuli for data selection, followed by clustering of similar EEG responses.

Zaabi, M., et al. [15] The author identified AD using two separate techniques: CNN and Transfer Learning. The proposed method was divided into two stages (extraction of region of interest and classification). The first step divides the image into blocks to identify the region of the brain containing the hippocampus. CNN and Transfer Learning algorithms were examined in the second stage. The results show that image classification using Transfer Learning produces better accurate results than CNN. High classification rates have been attained utilising the two relevant techniques, outperforming state-of-the-art algorithms employing the same methodology.

Iii Material And Methods

3.1 Dataset preprocessing operations

In this study, a thorough preparation strategy was used to the T1-weighted images from the ADNI database. All data was prepared using the neuroimaging informatics technology initiative (NIFTI) format and statistical parameter mapping. Since grey matter (GM) segmentation in the brain has the potential to be useful in revealing early abnormalities in sporadic Alzheimer's disease, this is where our study is primarily focused. Data from the brain's white matter (WM), grey matter (GM), and cerebrospinal fluid (CSF) are segmented during preprocessing. We apply the ICBM space template to all datasets for a fine regularisation, with the bias regularisation set to extremely light (0.0001), the bias full width at half maximum (FWHM) set to 60mm cuto_. We used the MNI reference space to achieve the desired normalisation. The voxel size in this study image is (2 2 2), and a Gaussian kernel smooths the pictures. The segmentation results in a 256-by-240-pixel sample size. The proposed model

requires all images to be reduced in size to 224 by 224 before being used for training and testing.

3.2 Convolutional neural networks and transfer learning

The architecture of convolutional neural networks (CNNs) is hierarchical and clustered. A convolution layer, a pooling layer, many sequential completely connected layers, and a softmax layer round out these multilayer architectures. CNNs typically use convolution layers to extract neighbourhood information from data at the input. These basic features are extracted and then used in pattern recognition tasks by way of intermediate layers to build more complex features. Over-weighted connections connect each artificial neuron to the layer above it. CNN's method might help widen and deepen photos with complex compositions. The pooling layer is an important CNN parameter for minimising computation time, and it is often implemented using nonlinear functions in the form of max and min pooling. By lowering the need for computation and parameters, the pooling layer provides an additional benefit in the fight against model overfitting. Max-pooling layers that include an activation function are used in a variety of studies. We used the RELU activation function, which converts negative feature values to zero and speeds up CNN convergence, in this study.

The current CNN-based model, consisting of many different layers and optimization algorithms, was developed by hand by researchers. Throughout the ImageNet dataset, we experimented with different training parameters for our models, including as learning rate, batch size, and weight decay. CNN's lower layers may give broad feature extraction capabilities, while the higher levels can provide more specific information vital to the classification task. Using transfer learning to classify precancerous diseases, cardiac imaging, and lung diseases has shown promising results. Using convolutional neural networks and transfer learning, the scientist developed a system to categorise medical images. These results demonstrate that transfer learning produced good accuracy for classification in medical domains and achieved maximum results on AD classification with a lower quantity of information.

3.3 Proposed transfer learning model

As a result of CNN's encouraging results, several well-established models have been developed by academics to tackle binary and multi-class classification problems. Improvements in object identification have been made thanks in large part to the ImageNet Large Scale Visual Recognition Challenge (ILSVRC). The biggest challenge is figuring out how to organise the many different items. For this task, we analyse the winning object classification schemes from the competition. In this study, we extended the VGG family architecture to create a transfer learning model. VGG-19 was used because it provided better results from computer-aided diagnostics. Specifically, the VGG-19 network consists of 16 convolutional layers, 5 max-pooling layers with stride 2, 3 fully-connected layers, and a softmax layer as its final layer. We make changes to the last two categorization levels and the final fully connected layer to address our problem. These 1000 and 512 layers are linked and use binary categorization. Second, we "freeze" the convolutional layers by using transfer learning. It is common practise to employ just the fully connected layer that was learnt from the training data for the whole transfer learning process, leaving the convolutional layers unchanged. Our suggested strategy, on the other hand, splits the model in half and progressively freezes the layer blocks while training on augmented and unaugmented datasets.

IV RESULTS AND DISCUSSION

The suggested model was built using Python programming using version 3.8. The experimental results are shown in this chapter.

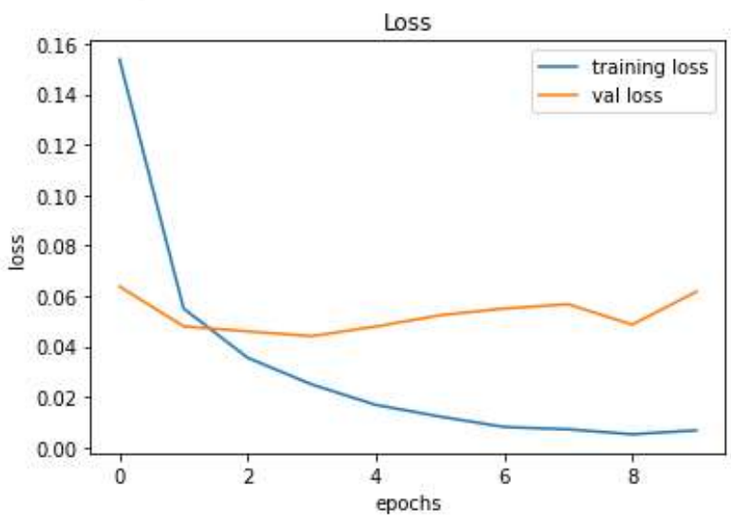

Figure 1: Training and testing loss

As illustrated in Figure 1, the suggested model is trained using loss values. The X-axis represents the Epoch, and the Y-axis represents the lost value.

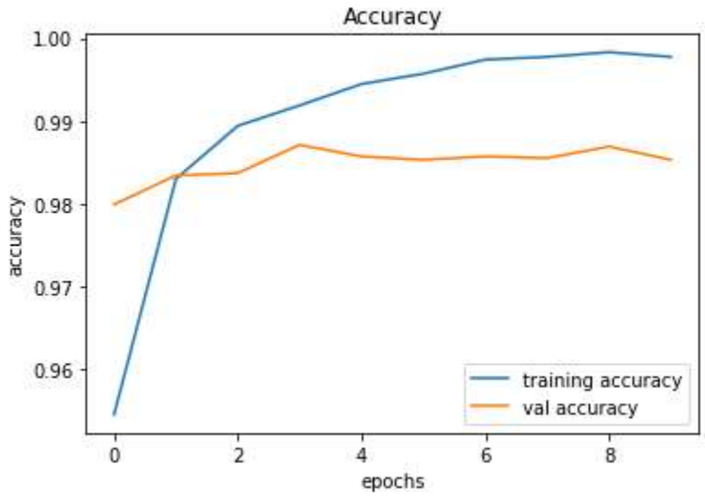

Fig 2: Training and testing Accuracy.

The CNN-ResNet has been trained using 2 Training Epochs, and Figure 7 displays the testing accuracy. The Y-axis reflects the accuracy, while the X-axis represents the Epoch number.

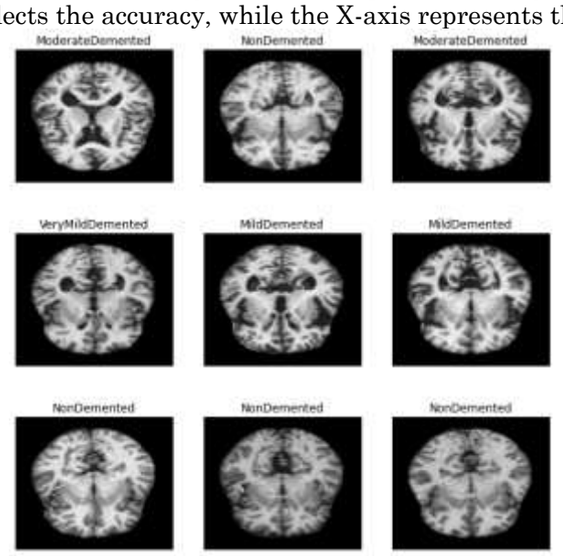

Figure 3: CNN Image Classification

The proposed model achieves 98% accuracy. And the CNN has classified the MRI image as multi-class classification, as shown in figure 3.

V Conclusion

This study reported the identification of Alzheimer's disease (AD) using a transfer learning model that assists clinicians in the diagnosing process. This paper presents an EALDTL framework for the early identification of Alzheimer's disease. Vascular dilatation and shrinking of the brain Image segmentation is used in the detection of bigger vascular/tumor masses. The degree of enlargement reflects whether a patient is healthy, in the initial stage of Alzheimer's disease, in the second stage, or has considerable cognitive impairment. Another important element in determining Alzheimer's disease is brain shrinkage. This research offered a methodology for detecting Alzheimer's disease early. CNN was used to remove noise from the MRI image, and the image was segmented using watershed segmentation. Resnet50 with Alexnet architecture was used for training. Transfer learning was used to categorise the data. According to the findings, utilising improves classification precision. This approach solves the issue of early detection without causing brain injury, and it has a 99% success rate. This will aid in the advancement of medical imaging research; the long-term goal of this effort is to merge mobile applications into authentic MRI images.

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Research Paper
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Hunter-Gatherers and Early Food Producing Societies in Kerala

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Hunter-gatherers and early food producing societies represent two different stages of human cultural and technological development. Hunter-gatherer societies are characterized by their reliance on hunting wild animals and gathering wild plants for sustenance. These societies typically live in small, nomadic groups and their way of life is closely tied to the natural environment. Hunter-gatherers have a deep understanding of the plants and animals in their environment, and their survival depends on their ability to adapt to changes in their surroundings. Early food producing societies, on the other hand, are characterized by the development of agriculture and the domestication of plants and animals. This allowed these societies to settle in one place and rely on farming as their primary source of food. The development of agriculture brought about significant changes in human society, including the growth of larger, more complex communities, the development of specialized roles and professions, and the rise of civilization.
Keywords: Pre-historic societies, Hunters, food gathers, Palaeolithic, Mesolithic & Neolithic

In the absence of written records, scholars have drawn inferences about pre historic culture and society from other kinds of evidence. Archaeologists have excavated many sites that open windows on pre-historic life, and anthropologists have carefully studied hunting and gathering societies in the contemporary world. The transition from hunter-gatherer societies to early food producing societies occurred gradually over thousands of years, and was driven by a combination of factors including climate change, population growth, and technological innovation. This transition also had significant impacts on the environment and on human health and wellbeing. While early food producing societies were able to support larger populations and develop more complex cultures and technologies, they also faced new challenges such as increased disease transmission, resource depletion, and social inequality.

One of the earliest food producing societies in India was the Mehrgarh culture, which flourished in what is now western Pakistan between approximately 7000 BC and 2500 BCE. The people of this culture were among the first in the world to cultivate domesticated wheat, barley, and other crops, and they also raised cattle, sheep, and goats. They lived in small villages and developed sophisticated pottery, jewellery, and other crafts. Another important prehistoric food producing society in India was the Neolithic culture of South India, which emerged around 2500 BCE. This culture is characterized by the development of rice cultivation and the domestication of animals such as cattle, goats, and pigs. The people of this culture also developed sophisticated irrigation systems to support their agricultural practices, and they created elaborate burial practices and pottery. In addition to these cultures, there were also several other prehistoric food producing societies in India, including the Jorwe culture of Maharashtra, the Chalcolithic cultures of central India, and the Megalithic cultures of southern India. These cultures all developed unique practices and technologies, and contributed to the rich cultural heritage of India.

Previous Studies

The credit for the rediscovery of Indian pre-history goes to Primrose, an Englishman, who was the first person to discover pre-historic implement in 1842 at a place called Lingsugur in the Raichur district early of Karnataka. However, John Evans was first to publish an account of worked flints stone discovered on the bed of the Narmada River near Jabalpur in 1853. In the second half of the nineteenth century Colonel Meadows Taylor published many excavation reports of megalithic burials in South India. Another person who enriched our knowledge about Indian pre-history was Robert Bruce Foote who discovered a large number of pre- historic sites in South India and collected stone artefacts (Foote, 1916). In 1930, M.C. Burkitt published an account of the collection from the Krishna basin in 1935. H. de Terra and T.T. Paterson studied the glacial sequence of Kashmir and Punjab and related their findings to the pre-historic stone industries of Punjab, the Narmada valley and Tamil Nadu. Subsequent discoveries show that Indian Prehistory goes beyond 1.4 million years. Mortimer Wheelers works also resulted the entire pre-historic culture sequence of India. The efforts of the 1940s resulted in the publication of Stuart Piggott's *Prehistoric India* in 1950. Since then, the explorations and excavations done have resulted in the identification and establishment of culture sequences more firmly.

Kerala was a region where exploration was neglected till 1974, certain findings Megalith burials in Chirakkal (Babington, 1823), Neolithic tool from Kannyakod Hill (Lake 1891), quartz flakes, a fragment of Neolithic celt and carvings at Edakkal cave (Fawcett,1901), Mesolithic implements from Chevayur (Allchin, 1968), had been reported. Megalithic were reported from Thozheeppadam and Tint from Thrissur district. Odanur and Peringottukurssi in Palakkad district (IAR 1971-72) Aiyappan (1933) conducted excavations at Feroke, (Thapar,

1952) at Porkalam and (Poduval, 1934-45) at Panjapalliparamba. Directorate of Archaeology, Government of Kerala and Archaeological Survey of India did some work reported in *Indian Archaeology A Review*. Foote had hypothesized that Kerala was inhospitable for prehistoric human habitations because of heavy rainfall, impenetrable forests, dissected terrain, absence of quartzite, etc. This led to neglect of serious explorations until 1974. It was P. Rajendran whose efforts resulted in our highly knowledge of the entire pre-historic culture sequence of Kerala, putting Kerala firmly on the map of pre-history.

Classification

Based on the tool-making traditions, the entire Stone Age culture has been divided into three main stages viz. Palaeolithic, Mesolithic & Neolithic. Palaeolithic and Mesolithic period people exclusively used stone tools, it ends with the Megalithic or Iron Age when there was profuse use of iron implements. The intermediate stages, Neolithic and Chalcolithic, witnessed traditions from the hunter-gatherer types to agriculture, domestication, seasonal settlement and the beginning and development of ceramic and metallurgical technology. These culminated in the Megalithic when metals like iron, copper and gold were efficiently worked out. Relics of this culture still survive amazing some tribal communities living in the deep forests

Palaeolithic Culture

The Palaeolithic period or the old stone age constitutes the longest phase of pre-history. In this period, the early humans, who shared the landscape with various wild and giant animals or megafaunas. The Palaeolithic Age is divided into three cultural phases viz. Early or Lower Palaeolithic, Middle Palaeolithic and Late or Upper Palaeolithic. This division is based on progressive improvement in tool-types which gradually came to acquire better efficiency in their cutting edge and operating ease (Jain, 2006). The tools of lower palaeolithic age include mainly hand-axes, cleavers, choppers and chopping tools. The middle Palaeolithic tools are based mainly upon flake industries and the upper Palaeolithic is characterised by burins and scrapers.

Earliest evidence of human habituation in Kerala dates to the upper palaeolithic age. Palaeolithic tools and implements have been reported from Valluvasseri, Karimpulakkal and Kunnathubhalu in Beypore Basin, Tenkara and Kanhirampuzha in Nila Basin, Kunnoni in Meenachil Basin, Abhayagiri in Kallada Basin consisted mostly of Chopper-Scraper-Flake implements of quart, showing morphological, typological and technological affinities with some lower palaeolithic industries of various parts of India (Rajendran 1981, 1998). The Palaeolithic tools at Abhayagiri and Valuvasseri were obtained from the lateritic surface whereas similar implements from Kanhirapuzha, Tenkara, Kunnathubalu, Karalikkot, Karimpulakkal, Mukkali, Pandikkad and Kunnoni were collected from the gravel beds. But the recent discovery of a few hand-axes from Tenkara in Palakkad shows that Kerala Palaeolithic industries have an Acheulian element rarely seen elsewhere in the West Coast. The Palaeolithic implements of Kerala are mostly made of locally available river worn quartz pebbles with the stray utilization of gneiss pebbles. They consisted of both the core tools and the flake tools worked unifacially or bifacially. (Rajendran, 2003).

Mesolithic Culture

The Mesolithic or the Middle Stone Age Cultures represent a phase of transition from the preceding hunting and food-gathering stage of the Palaeolithic period to that of farming and herding in the succeeding Neolithic period. The Mesolithic period coincides with the beginning of the Holocene age, around 8000 BC (Jain, 2006). This period witnessed a change in climate from cold and arid to warm and wet on account of the gradual recession of the glaciers. This change led to the melting snow and the formation of rivers resulting in the growth of forests and vegetation

The evidence from Mesolithic industries in Kerala was first discovered by Capt. K.R.U Todd from Chevayur, Kozhikkode (Allchin & Allchin, 1965), After 1975 more than two dozen archaeological sites were discovered by P. Rajendran. Most yielded implements made exclusively of quartz, except at two places where a few of them were made of chert (Rajendran, 1981). The use of the locally available quartz is evident, it continues since the Lower Palaeolithic (Rajendran,1981). From the typology, technology and morphology, it is clear that the Mesolithic people of Kerala had mastered quartz as raw material for flaking though elsewhere it was probably considered a poor rock type. Different forms of quartz are seen in Kerala boulders, cobbles, pebbles, gravels and veins. The implements are mostly made on flakes, and include bifacial points, blades, lunates, borers, burins, backed knives scrapers, discoids and small choppers made on medium pebbles. (Rajendran, 2003). The apex of the Mesolithic culture in Kerala was in the early Holocene, and continued till 3000 BC (Rajendran, 1983). Stone tools are the prime indicators of the technical skill. They could lubricate the most beautiful and effective implements from quartz. This reflects the dependence on locally available raw material and capacity to innovate suitable techniques in its utilization.

Mesolithic sites were discovered at Niramalagiri and Madayippara in Kannur district; Walayar, Malampuzha, Podippara, Mankara, Kulappalli, Cherakkalppadi, Ayannur,

Agali, Narasimokkai and Sirakadavu in Palghat district; Chellur and Pandikkad in Malappuram district; Chempara and Kuppakotti in Wayanad district; Tenmala and Odanavattom in Kollam district, and Ankode and Neyyar in Thiruvananthapuram district. The Mesolithic rock shelter sites were discovered at Tenmala in Kollam district and at Ankode in Perumkadavila in Thiruvananthapuram district. (Rajendran, 2018). The increase in the number of sites from this culture indicates the significant growth in population and the change in demographic profile.

It is suggested that greater availability of food and better health of the people were probably the main factors which led to decrease in mortality rate and the increase in population. While better rainfall in Holocene age contributed to greater plant growth as well as increase in fish and animal population, the use of microliths as arrows or spear-heads greatly improved the hunting efficiency of the Mesolithic man. Hunting-gathering remained the main survival strategy, but there was a change from big- game hunting to smaller animals and birds, they had also started fishing. More shelters and caves were occupied, there was rapid growth in the execution of artistic forms such as petrographs and petroglyphs (Rajendran, 1998).

Neolithic Culture

The Neolithic Cultures constitute the concluding phase of the stone age. The term Neolithic was first used the Danish prehistorian Thomsen, in the nineteenth century to denote the stage of technological progress achieved by early man. The term neolithic era means "new stone age," as opposed to the old stone age of palaeolithic times. Archaeologists first used the term neolithic because of refinements in tool-making techniques, they found polished stone tools in neolithic sites, rather than the chipped implements characteristic of palaeolithic sites. Gradually, however, archaeologists became aware that something more fundamental than tool production distinguished the neolithic from the palaeolithic era. Polished stone tools occurred in sites where peoples relied on cultivation, rather than foraging, for their subsistence. Today the term neolithic era refers to the early stages of agricultural society, from about twelve thousand to six thousand years ago. The Neolithic Cultures are largely defined in terms of transition from hunting and food-gathering to herding and food producing subsistence economy with a sedentary way of life. It could become possible because of better tool-types and more conducive environment with the commencement of Holocene Age. The domestication of animals and cultivation of cereals by the Neolithic folks is evident from the discovery of charred pieces of grain animal bones. This period also marks the beginning of the use of handmade potteries.

In Kerala the first Neolithic evidence was discovered from Kannyakod Hill in 1891 by Philip Lake and later Fawcett had discovered similar evidence from Wayanad in 1901 (Philip 1891& Fawcett 1901). Only after several decades Polished stone axes and beads, typical of the Neolithic, were reported from Kalpetta and Pulpalli in Wayanad and the Periyar river bed at Aluva. Later similar evidences were discovered by P. Rajendran in 1989 from Mantrothuruth in Kallada river basin of Kollam District and in 1995 from Kunnoni in Kottayam District (Rajendran, 1990 & 1995). Axes were made on locally available gneiss or granite rock and other implements were flakes, blades and beads. Axes were well made through flaking, pecking, grinding and polishing. A Neolithic axe was also discovered from the Palai in the Meenachil river basin in 2006. In 2006, a stone axe of the Neolithic culture has been discovered from Vembayam in Trivandrum District in south Kerala. (Rajendran & Divya, 2006). The tool was half buried in the hard matrix and it is, for the first time, that a Neolithic axe has been found from the district. The occurrence of Neolithic cultural evidence and other early Stone Age finds from all the three physiographical zones in Kerala indicates the fact that the region had conducive environmental situation for the prehistoric habitation from the coast to the ghats on the south-west coast of India.

Prehistoric human communities span a vast timeframe, from the emergence of early humans millions of years ago to the development of writing systems in different regions of the world. During prehistoric times, humans lived as hunter-gatherers, relying on hunting animals and gathering wild plants for survival. These societies were nomadic, moving from one location to another in search of food and resources. Over time, prehistoric societies began to develop more advanced technologies and social structures. The most significant development was the transition from hunting and gathering to settled farming communities, which occurred during the Neolithic period. This transition marked a major turning point in human history, leading to the establishment of permanent settlements, the domestication of plants and animals, and the emergence of agriculture as the primary means of subsistence. In addition to technological advancements, prehistoric societies developed their own cultural practices, art forms, and religious beliefs. Archaeological evidence, such as cave paintings, rock art, and burial sites, provides insights into the social, cultural, and spiritual aspects of these early human communities. It is important to note that our understanding of prehistoric societies is largely based on archaeological findings, scientific studies, and anthropological research. While these sources allow us to reconstruct and interpret the lives of prehistoric humans to some extent, there are still many gaps and uncertainties due to the lack of written records from that time.

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Role of Mudra Yojan in Entreprenuership Development In India

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Abstract

Small business play an important role not only in contributing to the nation's GDP, but also providing employment to large number of people. Pradhan Mantri MUDRA (Micro Unit Development and Refinance Agency) Yojana is a flagship scheme launched by Government of India in 2015 in order to provide financial assistance to the micro and small scale entrepreneurs. The main objective of this paper is to know the products offered under this scheme, to analyze the performance of Mudra yojana and to evaluate the role of MUDRA yojana in entrepreneurship development in India. The study is based on secondary data which has been collected from the annual reports of MUDRA yojana, journals, and research articles.

Introduction

Entrepreneurship acts as pivotal role in transforming economy into a progressive one. In India, most of the business units are engaged in manufacturing, processing, trading and services sector. The micro enterprises represent a major portion of Indian economy and provide sizable employment opportunities after agriculture. MUDRA yojana has been launched by our Hon. Prime Minister, Shri Narendra Modi on 8th April 2015, with a corpus of Rs.20,000 crore and a credit guarantee corpus of Rs3,000 crore.. The main objective of this scheme to encourage the entrepreneurship and small business units to expand their business operations, small business play an important role in contributing to GDP and provide employment to large number of people. But due to various reasons small businesses are not playing their role effectively and the main reason behind is, most of the individuals of our country living in rural area. They have been lagging behind to access various facilities like credit, loan, insurance, and other financial instruments which are helpful them to establish and grow their small businesses. Mudra Yojana is great initiative of our Prime Minister to bank the unbanked population and fund the unfunded.

Products Under Mudra Scheme

MUDRA bank provides refinance and credit support to financial institutions that promote small and micro units. The products of MUDRA are

1. Micro credit scheme (MCS)
2. Refinance for micro units
3. Mahila Uddyami scheme
4. Business Loan for Traders &Shopkeepers
5. Missing Middle Credit Scheme
6. Equipment Finance scheme

Refinance is given to commercial banks, regional rural banks, co-operative banks, micro finance institutions and non banking finance corporations. There are three types of loans offered under Refinance scheme. They are as follows.

Table 1 Types of loans offered under MUDRA scheme

Shishu	Starting stage	Upto Rs. 50,000	12%
Kishor	Mid stage	Rs. 50,000 to Rs. 5 Lakhs	14 to 17%
Tarun	Growth and development stage	Rs. 5 Lakhs to Rs.10 Lakhs	16%

Review Of Literature

Vijai (2018) in his paper entitled "A Study on the Performance of Mudra Yojana in Tamilnadu" assessed the objective and role of PMMY in India, The study is based on the secondary data, and study resuled that schemes of MUDRA BANK and contribution of PMMY in promotion of financial Inclusion in Tamil Nadu and states that this scheme has been taken to focus exclusively on entrepreneurs. This type of scheme will add to the well-being of the individuals engaged in small-scale industries which will positively effect the progress of the economy and it is very effective in its early stage.

Nikita Kabra (2018) in her paper entitled "MUDRA Performance in Karnataka" analysed the the working efficiency of Micro Units Development & Refinance Agency and the study resulted that the performance of Micro Units Development & Refinance Agency loan schemes in Karnataka, working of Micro Units Development & Refinance Agency in Association of Small-Scale Industries. India needs to fill up the gaps like skill development, knowledge, business literacy, microfinance and MUDRA is the answer to that.

Poornima (2019) in her paper entitled "A Study on Pradhan Manthri Mudra Yojana -Mudra Scheme" examine the performance of the products offered under Refinance scheme. The study is based on secondary data and resulted that MUDRA scheme brings new ray of hope for both

existing and aspiring micro enterprises and women entrepreneurs. This scheme is helpful in Supporting and promoting the small and micro industries and contributing in boosting the country's economy, by employment generation, exports and GDP.

Dr. Yogesh D (2019) in his paper entitled "A STUDY AND REVIEW OF PRADHAN MANTRI MUDRA YOJANA (PMMY) IN THE STATE OF MAHARASHTRA" Analyzed the extent of impact on various categories like SC, ST, OBC, Women micro enterprises in terms of loan sanctioned and the resulted that MUDRA continues to be a major initiative of the Government is providing financial assistance to millions of micro and small scale units in India. It has provided assistance to women, SC/ST, OBC category entrepreneurs in India. Due to this scheme financial inclusion has been increased.

Deepthi Laiju (2020) in her paper entitled "MUDRA YOJANA A BOON TO YOUNG ENTREPRENEURS: A CRITICAL APPRAISAL" analysed how Mudra has offered a helping hand to the entrepreneurs, the study has used secondary data and resulted that the Micro units Development and Refinance Agency Ltd. undoubtedly stand as the best micro enterprise sector in the country. It has given a refinance support to the banks, NBFCs and MFCs for lending loans to small units. Since micro enterprises form a major economic segment in our country equipping them with the needed financial resources not only provides employment opportunities to many but it also contributes towards the welfare of the nation.

Objectives Of The Study

1. To understand Pradhan Manthri Mudra Yojana and the products offered under this yojana.
2. To study the performance of Mudra Yojana.
3.To evaluate the role of MUDRA yojana in entrepreneurship development in India.

Hypothesis Of The Study

This research paper is based on the following hypothesis, which are going to be used in tune with objectives and tested for its approval.

H1- MUDRA yojana plays an important the role in entrepreneurship development in India.
H0- MUDRA yojana does not play an important the role in entrepreneurship development in India.
H1- Government takes measures to develop MUDRA Yojana.
H0 - Government may not take measures to develop MUDRA Yojana.

Research Methodology

The study is based on secondary data collected from research articles, journals, reports from websites and annual reports of MUDRA Yojana.

Rationale Of The Study

The study reveals the features and products of Mudra Yojana along with its benefits. The study also highlights the support offered by the yojana to Banks, MFIs, NBFCs, small enterprises and individuals. The purpose of this paper is to examine performance and the extent to which Mudra yojana is helping in entrepreneurship development, how it is solving unemployment problem of the people and contributes to the economic welfare of the nation as a whole. As the rate of interest is less and no collateral security is required for the borrower to take loan in this scheme, so it is inspiring the rural and urban youth to have more confident to take risk in business and it is suitable to small business organizations. This paper is also intended to contribute to knowledge in the area of youth entrepreneurship to be able to know and survive in business.

Table 2: Category wise analysis of Mudra Yojana

Category	**2019-20**		**2020-21**	
	No. of loan accounts	Amt Sanctioned .in crores	No. of loan accounts	Amt Sanctioned in crores
Shishu	5,44,90,617	1,63,528	4,01,80,115	1,09,953
Kishor	64,71,873	95,578	94,86,160	1,09,953
Tarun	12,85,116	78,358	10,68,771	79,290
Total	6,22,47,606	3,37,495	5,07,35,046	3,21,759

The above table reveals that there is a huge growth in the number of Loan accounts and amount sanctioned under each category, During the year 2019-20 and 2020-21 Shishu category is having more number of accounts which is followed by Kishore and Tarun scheme with respect to amount sanctioned also.

The following tables depict the progress and performance of Mudra Yojana for the FYs 2015-16 to 2020-21

Table 3 **(Amt. in ` lakh crore)**

year	Target	Sanctioned Amount
2015-16	1.22	1.37
2016-17	1.80	1,80
2017-18	2.44	2.53
2018-19	3.00	3.21
2019-20	3.25	3.37
2020-21	3.50	3.21

Sources: Annual reports of MUDRA scheme

The above table shows that from 2015-16 to 2020-21 MUDRA scheme as, has played a dual role by extending refinance support to various lending institutions. Every year Target amount and Sanctioned amount has been increased, it shows the efficiency of Mudra yojana.

Table 4: State wise Performance of top 10 States

Name of the State	Sanction Amt 2020-21 (Rs. in Crores)	Sanction Amt. 2019-20 (Rs. in Crores)
Karnataka	30,199.18	30,188
West Bengal	29,335.98	26,790
Uttar Pradesh	29,231.35	30,949
Tamil Nadu	28,967.97	35,017
Bhihar	25,589.31	27,442
Maharastra	25,208.63	27,903
Rajastan	18,571.38	19,662
Madya Pradesh	18,474.24	19,060
odisha	15,328.63	15,419
Andra Pradesh	12,028.33	10,439.93
Total	2,32,935	2,42,869.93

Sources: Annual reports of MUDRA Yojana

The above table shows the amount sanctioned by 10 States. The Karnataka topped with Rs. 30199.18 crores during the year 2020-21 and Rs.30,188 Crores in 2019-20, followed by West Bengal with 29,335.98 crores during the year 2020-21 and Rs.26790 crores in 2019-20, and Utthar Pradesh stood at third with 29,231.35 crores and 30949 crores in 2019 and amount sanctioned by the other states also shown in the table.

Table showing the amount sanctioned and dispersed by MUDRA under Shishu, Tarun and Kishore scheme from 2016-17 to 2019-20.

Table No.5

	Amount in crores		
Year	Amount Sanctioned	Amount Dispersed	Percentage of Amount Dispersed
2016-17	366470.97	354241,92	96.66
2017-18	488590.01	472725.87	96.75
2018-19	604415.31	583034.87	96,46
2019-20	295388.78	286375,81	96,94

Sources: Annual reports of MUDRA Yojan

Analysis

The above table reveals that the amount sanctioned and dispersed by MUDRA Yojana under Shishu, Tarun and Kishore scheme from 2016-17 to 2019-20. The table highlights that more than 96 percent of the amount sanctioned is dispersed every year, it shows efficiency in the performance of MUDRA yojana, concluded that it has given boost to entrepreneurial culture. For the FY 2019-20 the target set was " 3.25 lakh crore" and the amount sanctioned was 3.37 lakh crores and this yojana has achieved 103.67% of the target set. The table shows

that more than 100 percent amount was sanctioned to target set, which means Government has sanctioned more than one lakh crore every year under this scheme, it implies that MUDRA yojana plays an important the role in entrepreneurship development in India. Government is taking number of measures to develop MUDRA It (PMMY) is the key initiative of Government of India to develop and improve entrepreneurial culture in the country by providing collateral free and cheap credit to "millions of people. This Yojna has filled the gap of "unfunding or shortage of the funds". It also boosts the morale of "first generation entrepreneurs" by providing financial assistance for setting up their micro enterprises expanding it further.

Conclusion

MUDRA Yojana is the recently introduced scheme to encourage entrepreneurship especially in micro and small business units in India. This scheme will improve the well-being of the people engaged in small-scale industries which will positively shape the progress of the economy. MUDRA as a financial tool, will definitely make a change and will help in making a developed India. MUDRA has an impact on the economy, entrepreneurship development, employment generation and standards of living of the people. Many state Governments also making efforts to implement this scheme effectively and showing positive results. MUDRA scheme brings new hope for both existing as well as aspirants for micro enterprises and women entrepreneurs.

Findings Of The Study

1. The study resulted that , MUDRA Yojana has been playing a very important role in India and this role in getting more and more prominent.
2. Keeping the importance and role of Mudra in mind, Government of India is working very hard towards creating entrepreneurial culture and skill development, it builds confidence in the mind of young generation.
3. The study is based on certain objectives, after going through the entire study it can be said that all objective are fulfilled successfully.
4. Similarly, the hypotheses of the paper are also tested based on observation. alternative hypotheses have been accepted and the null hypotheses are rejected.
5. In conclusion it can be said that, in India MUDRA YOJANA is playing an important role in entrepreneurship development, export promotion and contribution to GDP and Government is taking number of measures to develop MUDRA Yojana.

Suggestions

1. There should be more encouragement among the rural and poor people to help them to grow economically with this type of schemes .
2. Some times the sanctioned amount for Shishu and Tarun categories is more than the disbursed amount. It clearly shows that the people are not aware about this scheme and how it is helping towards growth and wellbeing, therefore there is a need to create awareness about MUDRA in different ways and through effective media.
3. Some people fails to repay the loan amount in this respect Government should impliment strict policy.
4. The Government has to improve this scheme by appointing "independent agency" to evaluate performance of this scheme and bring innovation by adopting product design by considering local needs.

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Unveiling the Teachings of Saint Bhima Bhoi: A Case Study on Peace Education

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Abstract

Saint Bhima Bhoi's poetry is marked by its deep empathy and concern for the suffering of all beings, reflecting his philosophy of nonviolence and compassion. His poems convey a message of peace, justice, and harmony, urging people to embrace a philosophy of selfless deeds for the betterment of the whole world. One of his most notable poems which is inscribed on the wall of the United Nations Organisation: **"Endless are the agonies and sorrows of the living. Who can bear to be a witness? Condemn my life to hell, but let the world be uplifted."** expresses his philosophy of peace and nonviolence to the world. He believed that the true path to peace and harmony lies in recognizing the interconnectedness of all beings and embracing a philosophy of selfless action.

Bhima Bhoi's teachings provide an insight of a more compassionate and inclusive society in a world where discrimination, social disputes, and injustice are pervasive. His ideology has the ability to make the world more peaceful and egalitarian by encouraging empathy and understanding among people and communities. Hence, this article aims to elucidate those poetic concepts by Bhima Bhoi that are crucial for fostering world peace.
Keywords: Bhima Bhoi, philosophy, peace, education, social justice, harmony

Introduction

Saint Bhima Bhoi was a notable figure in the 19th-century, known for his work as a poet, philosopher, and social reformer from the Indian state of Odisha. Despite facing discrimination and oppression as a result of his low-caste background, Bhima Bhoi dedicated his life to advocating for social justice and peace.

Saint Bhima Bhoi's enormous collection of works displays his devotion to spirituality and his pursuit of the truth. He filled his writings with intense emotion and a sense of purpose, including ***Stutichintamani (The Gem of Hymns), Bhajanamala (Garland of Devotional Songs), Brahma Nirupana Gita, Chautisa-Madhuchakra, Padma Chalak, Adi-Anata Gita, Manu Mandala, Bangala Atha Bhajana, Mahima Vinoda, Astak Bihari Gita, Sruti Nishedha Gita, Brahma Chalak, Nirveda Sadhana*** etc. Bhima Bhoi's literary contributions have great value for peace education as they express the importance of introspection and self-realization as a means of promoting peace within society. His writings also stress the need of nonviolence, empathy, and compassion in promoting social justice, peace and harmony.

Peace Education

Peace education is a dynamic and multi-faceted field that seeks to cultivate knowledge, skills, attitudes, and values that promote a culture of peace and non-violence. It is a field that draws from many other academic fields, such as philosophy, psychology, sociology, anthropology etc. The fundamental goal of peace education is to develop the capacities of individuals to think critically, empathize with others, and engage in constructive dialogue and action to promote peace and justice.

To combat the causes of violence and create more equitable and peaceful communities, peace educators employ a wide range of formal and informal teaching strategies. Peace education encompasses various thematic areas, including social justice education, human rights education, conflict resolution, environmental education, global citizenship education etc. These subject areas emphasize the interconnection of social,

economic, and environmental systems, are related to one another, and work well together as a whole to provide a comprehensive approach to peace education.

Peace education aims to minimize conflict and violence by highlighting concerns like poverty, injustice, discrimination, and environmental damage. It promotes an understanding of the complexities of conflict and the value of peaceful resolution techniques. It emphasizes the need for communication, empathy, and understanding in promoting social cohesiveness and creating links between various groups and communities.

Saint Bhima Bhoi and Peace education

The teachings of Saint Bhima Bhoi place a strong focus on the value of inner peace and self-realization as strategies for fostering world peace. His emphasis on love, nonviolence, and compassion as a means of societal reform is particularly pertinent to modern peace education. His teachings also stress the significance of correcting societal and structural injustices in order to advance sustainable peace and social harmony.

Social justice

Saint Bhima Bhoi used his poetry to discuss social justice concerns, notably those pertaining to the caste system and the treatment of Dalits. He strongly challenged the conventional Hindu caste hierarchy and fought for the equality of all people, regardless of caste or social standing. In his poetry, he stressed on the significance of individual freedom and personal responsibility. He strongly objected to the idea that social position should be determined by one's birth. He proposed the elimination of prejudice and the creation of a better society.

His work serves as a poignant reminder of the necessity to fight for a more equitable and just world and to speak out against the injustice. His message of social justice and equality continues to inspire individuals from all walks of life. To quote him:

In the thirty-six royal lineages, the caste of boatmen cannot be named
It is wise to consider water as the only caste within.
In this universe, I only hope for one person and one caste;
It is the Creator who has made everyone from the same earth.
(Stutichintamani, 70. 12, 13)

Non-violence

Saint Bhima Bhoi, a revered spiritual figure, fervently preached the virtue of non-violence as a means to enlightenment. His teachings exemplified kindness, tolerance, and regard for all living things. He promoted peace through his writings and speeches, stressing the efficacy of nonviolence in creating a more equal and just society.

His dedication to nonviolence is not limited to the absence of physical violence. He urged his disciples to develop attitudes of compassion, tolerance, and forgiving. He thought that we might help spread love and peace throughout the world by changing our own minds and emotions. In his words,

In the Mahabharata war, five to ten heads
fall as one, from a single stroke of a sword.
As for me, if you kick my leg,
It is my other limb which suffers
(Bhima Bhoi, Verses from the Void, p.171)

Peace

Saint Bhima Bhoi, an influential spiritual luminary, spent his life preaching peace through his profound teachings and writings. His insights continue to move people of different backgrounds toward greater harmony. He made it clear through his remarks that real peace comes from inside and is attained through self-realization and detachment from worldly desires.

According to Bhima Bhoi, peace is a transformational power that springs from inside each of us, allowing us to feel and express love, forgiveness, and unity with one another. His words serve as a reminder that we can all become powerful agents of change in the world just by working to find calm within ourselves. Bhima Bhoi's legacy is a constant call to

remember that peace is not something to be attained from the outside, but rather something to be attained from within, by bringing our thoughts, words, and deeds into harmony with one another through love and tolerance.

His statements call for a worldwide culture of peace and mutual respect to be fostered by tearing down the walls that separate us and embracing the natural unity that ties us all. Saint Bhima Bhoi's teachings continue to have an impact today, encouraging people all over the world to find harmony within themselves and work toward making the world a more peaceful place. His advice encourages us to go on an introspective journey that will help us overcome our own personal obstacles and find true inner peace. He expressed it as,

Non-violence, the guiding light,
peace and love, shining bright.
In words of sages, wisdom's sound,
compassion's echo, all around.
(Bhajanamala , dwiteeya shataka,169.1)

Equality

Saint Bhima Bhoi, an eminent saint and social reformer, dedicated his life to advocating for equality in all aspects of society. He firmly believed in the inherent values and dignity of every individual, regardless of their caste, creed, or social standing. He challenged prevailing social norms, tirelessly working towards uplifting the marginalized and oppressed. His teachings emphasized that true equality can only be achieved when society breaks free from discrimination and embraces the principle of universal brotherhood.

Bhima Bhoi's philosophy extended beyond external factors, urging individuals to recognize the divine spark within every soul. He believed that true equality goes beyond surface-level differences and lies in treating every person with respect, dignity, and fairness. His teachings continue to inspire generations, encouraging them to champion equality and strive for a just and inclusive society. His life and actions serve as a timeless reminder that equality is not merely an abstract concept but a collective responsibility that requires unwavering commitment and compassion.

To Bhima Bhoi, everyone should be treated with respect and dignity no matter where they come from. The transforming power of equality is on full display in his teachings, which encourage us to unite and cherish our differences. His life and work inspire us to strive for a future in which social justice and equality for all are the norm. Bhima Bhoi's life and teachings continue to inspire individuals to stand up against discrimination and establish a more just and equitable society. To quote him:

Be they wicked or saintly, servant or master
Insect or bird, you pervade all
I see you equally in all beings
Nowhere less than in another
(Bhima Bhoi, Verses from the void, p.167)

Conclusion

The profound teachings and poetry of Saint Bhima Bhoi are priceless tools for advancing peace and equality. His teachings align closely with those of peace education, which stress nonviolence, inner calm, empathy, and fair treatment of all people. Bhima Bhoi's legacy serves as a timeless reminder of the need to address prejudice, cultivate inner peace, and building a more accepting and equitable society for all people. By embracing his teachings, individuals can contribute to the creation of a peaceful world where peace, compassion, justice, and equality prevail. In his words,

Dharma pachhe nindaa heu, Dharani mandala rahu
Sunya dharati aakaasha, Aakaasha bhaasi na jaau
(Chautishaa-Madhuchakra, 18.19)

(Let the religion be defamed but the earth should remain)

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Research Paper
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Challenges in front of Indian Democracy

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India is recognized as the largest democracy in the world. It first became a democratic country post-independence, in 1947. After this, every citizen of India was given the mere right for electing and voting their leaders. India gives every citizen the right to vote, irrespective of their colour, caste, religion, creed, and even gender. It consists of five democratic principles. These include- socialist, secular, sovereign, democratic, and even republic. Thus, in Indian, democracy is all about offering every citizen the right to vote for running the country.

Although evidence of democracy is found in the Vedic period of ancient India by the presence of organizations like Sabha, Samiti and some republics. But the role of four revolutions, England's Bloodless Revolution of 1688, the American Revolution of 1776, the French Revolution of 1789, and the Industrial Revolution of the 19th century prevailed in stabilizing the present form of democracy. The glorious revolution of England ensured that Parliament should be approved against the backdrop of administrative policy and state laws. After years of colonial rule, India has also accepted parliamentary democracy.

Meaning of Democracy

The word democracy is originated from the Greek root word 'Demos' and Crescia Demos means 'common people' and Cressey means 'rule', thus democracy means the rule of people .About the meaning of Democracy a Thinkers Opinion :

1) Herodotus**:** "Democracy is a type of government in which the whole power is with people".
2) Abraham Linkan: "Democracy is government of the people, by the people and for the people."

What is Indian Democracy?

"India is parliamentary Secular democratic republic in which the president of India is the need of the state and first citizens of India and the prime minister of India is the head of government, although the word is not used in the constitution itself."

The journey of democracy in India:

According to Dr. Bhimrao Ambedkar, one of the founders of the Indian Constitution, 'Democracy means a way of life which consists of the basic principles of freedom, equality, and fraternity.' To achieve the principles mentioned above on 26 January 1950 Democracy was duly established in India. It is one of the oldest civilizations in the world with unity in diversity and rich cultural heritage. Indian culture is different from other cultures in that it still cherishes its oldest traditions and brings newness to it. After attaining independence, India has made multifaceted social and economic progress. India is the only nation in the world to establish political justice by giving every adult citizen the right to vote from the very first day after independence. Many democracies like America, Britain, which have taken years to establish political justice. Fair and transparent Mechanism of election is the key to the establishment of a good democracy because elections are the process by which the public transfers their sovereignty. India can certainly be proud of its election system. The efficiency of the Fair Election Commission led to the timely and uninterrupted transfer of power to India, while dictatorship and military rule also came into force in many independent countries along with India.

Till date, only one emergency was used in India, in which people felt that democracy was being weakened by the government, then this people of India responded to the emergency and the ruling party sat in opposition for the first time. The Court of India has several times kept parliamentary laws and executive orders invalid to protect the rights of the people and protect the individual liberty in the country, keeping the democratic element alive.

Challenges in front of Indian democracy:

There are many challenges facing democracy in India as follows.

1. For political democracy to succeed, its alliance with economic democracy and social democracy is necessary. Economic democracy means that every member of society should get equal physical facilities for his development. There should not be much economic disparity between people and one person cannot exploit another person. It is not possible to build a democratic nation on the one hand in an environment of extreme poverty and on the other hand, social democracy means that there is a lack of privileges at the social level. But both of these have still not been established in India. Our nation's 1% of the rich have more than 85% of the country's wealth, the total wealth of the country's 63 billionaires is equal to the national budget. Along with this inequality, gender, ethnic, religious discrimination prevents the country from establishing genuine democracy.
2. Criminalization of politics and use of money power in elections has been a major problem of Indian elections. There are more than 200 MPs in the current Lok Sabha who have criminal cases against them. Along with this, poverty, corruption tricks in the country have affected the election system, spreading despair in the daily life of the people. The

increasing importance of muscle power, money power, the effects of casteism, communalism, and corruption in political life have made the political scenario toxic!

3. India's difficult, far-reaching and lengthy judicial process has brought a state of justice in the country. At times, due to misrule, the fairness of justice itself has come into the dock. Delay in justice is often equated with injustice. Many more cases pending in our judiciary.
4. Civil service and police service from colonial heritage consider themselves as masters while in democracy both of them are considered service providers.
5. Perhaps the greatest challenge democracy faces in India is that is has failed to deliver the kind of sustained economic development enjoyed by neighbors like China over the last four decades. It has also failed to eliminate extreme poverty.

Future of democracy in India:

The trajectory of Indian democracy is more uncertain after two terms of BJP rule, as key democratic institutions have proven themselves to be brittle. Opponents and critical journalists have been harassed, prosecuted, investigated for tax irregularities or put under surveillance, restricting critical voices.

Election campaign finance laws have become more opaque, making it easier for individuals to make unlimited anonymous donations, undermining the integrity of elections. Worst of all, religious division and resentment has intensified, challenging the constitutional right to religious freedom and undermining the rule of law.

Conclusion:

It is true that India has achieved great democratic achievements, but after independence, the high ideals that we should have established in this country and society, we are going in exactly the opposite direction today and corruption, dowry, human hatred, Problems such as violence, obscenity, and rape are now becoming a part of life. But our country is advancing many problems since ancient times, present India is the most populous country, in such a way, youth will have to democratize the country, society, and family by increasing g their participation.

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Research Paper
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Effects of social media trends on adolescent behavior patterns

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Abstract

The research was designed to explore the impact of social media trends on the behaviour of young people in Lagos State. The study used an old factorial design. Simple and purposeful random sampling is used to select the sample. Both in-school and out-of-school youth were used for the study with a total population of 1,660 and a sample of 310 young people selected and used for the study. Three research hypotheses were put forward and tested. Pearson r, t-test, chi-square and ANOVA tools were used for statistical analysis. The results show that there is a positive correlation between social media trends and behavioral patterns. Feedback from these friends will be better to enhance their self-image and improve group behavior.

Keywords- *Social Media, Youths, Social Media, Trends.*

Introduction.

Social media is the integration of digital media, including a combination of electronic text, graphics, video, and sound, in a structured and computerized environment that allows users to manipulate data for appropriate purposes. Digital environments include the Internet, telecommunications, and interactive digital television. The Web is now part of the entire business of communications, sales, and services. It changes business practices. Its technical limitations affect the amount of material and the speed of access to the material. Networks rely primarily on telephone line connectivity, so better locations mean more reliable service. The limitations inherent in transmitting large amounts of digital information over telephone lines have affected the types and quality of media that can be effectively used, and the kinds of interactions that are possible through the Web. There are ways to improve performance by improving the technical constraints that depend on the available infrastructure, known as broadband, that can deliver more data faster and more reliably. The link between social networks and their impact on behavior change in young people is clear. This allows your message to reach audiences and target groups in real time, creating change and trends. Younger generations today are growing up well connected to different types of social networks. Easy access to digital culture we live in a digital world where only adults are naturalized citizens. Tapscott (1998) talks about growing up in a digital environment, calling young people the 'Network Generation'. Children meet in hybrid virtual spaces, learn in innovative ways, create new languages, and apply multicultural values (Tappscott, 1998). The main characteristics of the N-Gen culture are independence, emotional and intellectual openness, inclusivity, freedom of expression and strong points of view, innovation and maturity, joy in research, immediacy and sensitivity to people's interests, business , credibility and trust. (Tapscott, 1998, S. 62-69).

Problem of Statement

Livingstone (2008) believes that online domains will be met with enthusiasm because online domains represent their space. It's a place where you can see your peer group, not your adult guard, and the opportunity to get the job done in an exciting but relatively safe manner. Psychosocial adolescence constructs, experiments, and presents projects of introspection within social contexts, bypassing, for some, communication norms and other risky behaviors. Technology Social networks generated by are valuable tools, but today's youth abuse them. His two main means that young people use to access social networks are mobile phones and the Internet, which has greatly changed the way young people live given the current visibility

The accessibility young people can gain through these media; this study determines the influence young people have on the media. Issues that should emerge from this research include exposure to questionable materials, prejudice of young people online, exposure to unnecessary marketing and online advertising, exposure to risky online behavior, and identity theft problems, the emerging digital gap, and the parent generation gap. and young people. According to Ritchel, Matt wrote an article in his The New York Times titled "Wire More and More Digital Interfering Wires." Nov 21, 2010 Rather than alleviate depression, loneliness, social isolation, user withdrawal, etc., it wastes time, builds superficial and toxic relationships, and possibly causes them.

The purpose of the study

The purpose of this study is to examine the impact of social media trends on adolescent behavioural patterns using Lagos State as a case study. Specifically, this study seeks to:

1. Determine how Lagos youth use social media trends in their daily lives.
2. To determine whether young people in Lagos state prefer social media as a means of communication over traditional methods.
3. Investigate the impact of social media on behavioural change among young people.

Importance of the study

It is hoped that the results of this study will fill in the gaps in the lack of sufficient information on the impact of social networking on youth and behavioral change. The results of this study may also help decision makers in different areas of government. For example, education program developers are notified when they develop programs for the education sector. Ministry of Health helps doctors. Especially those responsible for providing advice Young people need to know which tools to use to communicate effectively with young people. The results of these studies may influence the academic work of other researchers interested in knowledge in this area and initiate appropriate mitigation measures.

Definition of Basic terminologies

Social media:

Websites and applications that enable users to create and share content or to participate in social networking.

Behavioural change:

Behavior change (public health), a broad range of activities and approaches which focus on the individual, community, and environmental influences on behavior.

social media influencer:

A Social Media Influencer is a user on social media who has established credibility in a specific industry

1. Overview of the study.

This study aimed to determine the impact of social media trends on the behavioural patterns of young people in Lagos State. To achieve this, the study was divided into chapters. Chapter dealt with the background of the study and presented the arguments that justified this study. Goals, research questions and hypotheses were put forward. Research-based assumptions, and ranges and boundaries were presented. Next up was a review of relevant studies, and I had access to a lot of material. independent variable. Social media and other dependent variables. Self-image, collective behavior and school performance, adolescence and adolescent developmental tasks were precisely defined and reviewed. Social identity theory, Bandura's social learning theory, and signaling theory were used to provide a theoretical foundation for the study. Several empirical studies were also reviewed. The next chapter presents the methodology used to conduct this research. Using a post hoc design and a simple targeted random sample, 310 samples were drawn for the study. The table of Krejcie and Morgan was used to determine the sample size. Four schools were specifically selected for the study. Data were collected on two different instruments. Social media use, social media self-image and group behavior surveys, English and math test. The reaming chapter presents results and discussion. Collected data is statistically analyzed and results are presented in tabular form. Descriptive frequency statistics were used to analyze respondent demographics, such as age, gender, and time per day to respond to social media items, using chi-square, t-test, Pearson's r, and ANOVA. We analyzed the six null hypotheses indicated. in this study. A summary and discussion of the results were presented.

2. Recommendations

The following recommendations were made in relation to the results obtained in this study.

1. Students should be aware of the time spent on social media sites to spend more time on class activities and homework. Teachers should encourage students to spend meaningful time on social media sites and make friends that will boost their self-image. These friend comments are good for boosting self-image and adjusting to social activities.
2. School authorities should encourage students to make judicious use of the computer labs available at school for educational purposes. Parents should encourage and monitor student use of educational social media sites that help students maximize educational outcomes and protect against harmful influences.
3. Policies regarding students' access to social media are such as to encourage educational and useful information rather than uncontrolled access to the Internet that may harm students' social and intellectual development must.

3. Conclusion

This study showed that social media use affects self-image. It was observed that the more students who participated in social media, the stronger their self-image. Also, the use of social media has increased student group activities, and the more time students spend on them, the more they participate in them. However, social media use did not affect academic performance in less passive users. In addition, positive self-image feedback influenced students to participate more in group activities on social media. There are also age differences in social media usage. Also, male social media users used social media more than female students.

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Impact of Industrialization on Immigration Patterns of Population Migrationin Sangli District of Maharashtra

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Abstract:

Migration is an important factor of population change in any area besides fertility and mortality. It is different from fertility & mortality in nature as it is not a biological phenomenon, rather than it is governed by social, cultural, economic and political factors. Actually, migration is purely voluntary (sometimes forced)action of an individual for his livelihood or betterment of life. Migration does not mean a short trip for pleasure or business neither it is merely change in residence of a person or family. It is such an event when people move from one geographical area to another permanently or for considerable time. Sangli district is one of the industrially and economically developed district in western Maharashtra. It has many textile, co-operative sugar industries and an allied agricultural industry which needs workers in large amount therefore it has become a hotspot for migrants not only from Maharashtra but also all over the India. So, in this research paper attempt has made to study the impact of industrial development on immigration patternin Sanglidistrictregardingorganizedandunorganizedlabors andworkers etc.

Introduction

Migration is an important approach of human beings to cope up with the disparities in terms of economic, social, physical or political suffering. Humans are migrating in different parts of the world since their evolution on earth for better and secure life. Migration is not merely shift of people from one place to another, as it is most fundamental to the understanding of continuously changing space content and space relationship of an area (GosalG.S.1961). Migration is an aspect of population change which affects both the source and destination region in different manner; it facilitates the redistribution of population in any region. Migration changes social, economic, demographical and political condition of any region. Population of any region can change because off our factors: birthrate, death rate, life expectancy and migration, population either increases or decreases because of it. Out of these first three are biological factors of population change but migration is a factors stimulated by man and his social, economic or political needs and aspirations.

Migration of person can be temporary or permanent in nature, but movement of person for very short time is not considered permanent change of residence with no restriction on the distance, creates some confusion. On other hand Bouge D. I. (1959) limited migration to only those, who change residence permanently. Ghosh B. N. (1985), discussed variety of international migration in modern period based on brain migration as brain drain, brain overflow, brain exchange and brain export. Based on place of birth, an individual living elsewhere besides its own birth place is considered as migrant. The migration movements in the world generally are of three types:

I) Migration within the state itself with its components
a) Migration within the district (Intra-district)
b) Migration from one district of state to another (Inter-district)
II) Migration from one state to another state of country (Inter-state)
III) Migration from one country to another (Inter-national).

Migration is a process triggered by Pull or Push factors in any area. The adverse factors in any area like unemployment, poverty, prolonged drought, lack of health facilities and lack of education facilities etc. compels the people to move out of their areas are called as Push Factors. While employment, education, health, social security, standard life etc. in any area attracts people are called as Pull Factors. Areas from where people move out are called as Emigration Area, while areas where people go are known as Immigration Area. The people who move from one area to another are called as Migrant and whole process is known as Migration. The term emigrant & immigrant used in inter-national migration, while in internal migration same people are called as out-migrants and in-migrants. The other reasons for migrations are social discrimination, religious persecution, natural disasters, marriages (Ladies), family movement and other reasons.

Objectives:

1. To study the industrial development in Sangli district.
2. To study the immigration patterns of population migration in Sangli district.

Database & Methodology:

This research work is based on the secondary data collected from different sources such as district census handbook of Sangli district and district industrial report of 2011. The collected data is tabulated and processed. The data is presented by using different techniques like maps and diagrams. The interpretation of data is done with geographical point of view.

Industrialization In Sangli District:

As per the history of industrial development in the study region, industrialization started in 1910 with Kirloskar Brothers factory and after the independence of India, Indian government five year plans and co-operative movements helps in the growth of industries in the Sangli district. Here for the analysis of the trends in industrialization secondary data is used and last five decades are considered to calculate temporal development.

A) Trends in Industrialization:

Table No.1: Trends in Industrialization in Sangli District (1971 - 2011)

Year	Industry	Change
1971	148	---
1981	269	121
1991	492	223
2001	566	74
2011	783	217

Source: Socio-economic Abstract of Sangli District 1971 to 2011

Table No.1 shows trends in industrialization in Sangli district during 1971 to 2011. As per the table in 1971 total 148 industries was present in the district which increased by 121 industries in 1981 and total 269 industries was operating. In 1991, 492 industries were in functioning and this was nearly dabbled than previous decade i.e. 1981. There are total 566 industries are observed in 2001 and the lowest change is observed in the study period that is only 74 new industries are newly established during 1991 to 2001. In the last decade of the study period total 786 industries are located and during 2001 to 2011, 217 new industries are established in the study region.

Overall in the Sangli district there was continuous development in the industrialization is observed. In the study period highest new industrial establishment is observed during 1981 to 1991 whereas during 1991 to 2001 lowest new industrial establishment is observed.

Table No.2: Industrial Areas in Sangli district

Sr. No.	NameofArea	Area (inHect.)	No. of Plots Developed
1	Sangli-Miraj	166.48	541
2	Sangli-Miraj - Kupwad	222.63	789
3	Islampur	165.01	202
4	Jath – Mini	10.00	69
5	Palus – Small	10.00	21
6	Add. Palus Wine Park	53.70	104
7	KavteMahankal	13.17	52
8	Kadegaon – Mini	18.15	126
9	Add. Kadegaon, Weavers Park	96.71	363
10	Shirala	162.8	242
11	Vita	55.27	148
12	Information & Technology Park	1.80	51

Table No. 2 Shows the major industrial areas in the Sangli district. Mainly large industrial area is located near the urban centers due to availability of basic infrastructure such as transportation, electricity and local market. Sangli- Miraj- Kupwad and Sangli- Miraj industrial areas have 222.63 and 166.48 Hect. area with 789 and 541 plots respectively which has highest industrial area as well as number of plots in the study region.

Islampur is third largest industrial area in terms of area with 202 plots are developed. Shirala tehsil has M.I.D.C. area which has 162.8 hect. area and 242 industrial plots. Kadegaon tahsil has Kadegaon mini and newly developed M.I.D.C. area specially for textile industry therefore it is called as weavers park and totally this industrial area has 114.86 hectors with 489 plots. Wine park is located in Palus tahsil with 53.70 hector area with 104 plots as well as another small industrial area with 10 hector area is also located in the Palus tahsil. Kavte Mahankal and Jath tahsils has small industrial area with 13.17 and 10 hector area respectively. Vita city is famous for a gold ornament which is also has industrial area with 55.27 hector area with 148 plots. Vita city has small textile units as well as agro based industries.

In the Sangli district area for Information and Technology park is allowed with 1.80 hector area and 51 industrial plots. This Information and Technology park given new window for the upcoming IT hub in the district.

Patternsofpopulationmigrationinsangli District

Sangli district is one of the favorite destinations in western Maharashtra for migrants from all over the state and country. Sangli district is blessed with favorable climate,

soil and drainage that helped it to develop in various fields like agriculture, industries, transport and trade. Sangli district has developed rapidly after independence. Industrial development in Sangli district was started with co-operative movement. Many sugar and dairy industries in the study region was established by co-operative sector. State government have setup many industrial complexes (MIDC) in different parts of the district like Sangli-Miraj-Kupwad, Tasgaon, Kadegaon, Islampur, Palus etc. which promote large scale migration of workers from all over the India.

Inter-State Migration Pattern in Sangli District:

Sangli district has emerged as an economic growth center in Maharashtra state**,** which attracts migrants from other states in large number. TableNo.3 shows the inter-state immigration patterns of workers.

Table No.3: Inter-state immigrationpatterns of workers in Sangli district

State	**Total**	**%**	**Male**	**%**	**Female**	**%**
Jammu & Kashmir	48	0.15	30	0.13	18	0.19
Himachal Pradesh	6	0.02	2	0.01	4	0.04
Punjab	115	0.35	65	0.28	50	0.53
Chandigarh	6	0.02	5	0.02	1	0.01
Uttarakhand	20	0.06	10	0.04	10	0.11
Haryana	65	0.20	41	0.18	24	0.25
NCT of Delhi	99	0.30	51	0.22	48	0.51
Rajasthan	939	2.89	562	2.44	377	3.98
Uttar Pradesh	1,571	4.83	941	4.09	630	6.65
Bihar	615	1.89	443	1.92	172	1.82
Sikkim	1	0	1	0	0	0
Arunachal Pradesh	6	0.02	3	0.01	3	0.03
Nagaland	2	0.01	1	0	1	0.01
Manipur	2	0.01	1	0	1	0.01
Mizoram	0	0	0	0	0	0
Tripura	1	0	0	0	1	0.01
Meghalaya	1	0	0	0	1	0.01
Assam	37	0.11	24	0.10	13	0.14
West Bengal	499	1.54	329	1.43	170	1.79
Jharkhand	90	0.28	60	0.26	30	0.32
Odisha	181	0.56	143	0.62	38	0.40
Chhattisgarh	105	0.32	40	0.17	65	0.69
Madhya Pradesh	419	1.29	252	1.09	167	1.76
Gujarat	798	2.46	305	1.33	493	5.20
Daman & Diu	1	0	1	0	0	0
Dadra & Nagar Haveli	2	0.01	2	0.01	0	0
Andhra Pradesh	674	2.07	356	1.55	318	3.36
Karnataka	25,462	78.36	19,001	82.55	6461	68.19
Goa	178	0.55	69	0.30	109	1.15
Lakshadweep	0	0	0	0	0	0
Kerala	289	0.89	157	0.68	132	1.39
Tamil Nadu	257	0.79	122	0.53	135	1.42
Puducherry	1	0	0	0	1	0.01
Andaman & Nicobar Islands	3	0.01	1	0	2	0.02
Total	**32493**	100	**23018**	100	**9475**	100

Source: Census of India, 2011

Table no.3 shows that the, there were total 32493 persons recorded as migrants in Sangli district in 2011 in that 23018 male and 9475 females population is observed. Persons from every State and union territory are migrated towards Sangli district for economic purpose excluding Lakshadweep. In this migration pattern male population was highly migrated as compare to female population because for work sex specific migration is observed and where always male dominances is seen. As workers have tendency to travel for short distance, we can see labors from neighboring states like Karnataka have migrated to the district in more number.

According to 2011 census, Migrants form Karnataka ranks first with 25,462 persons (78.36%), followed by Uttar Pradesh with 1,571 (4.83%) persons, Rajasthan with 939 (2.89%) persons, Gujarat with 798 (2.46%) persons, Andhra Pradesh with 674 (2.07) persons, Bihar with 615 (1.89%), West Bengal with 499 (1.54%) persons, Madhya Pradesh with 419 (1.29%) persons, Kerala with 289 (0.89%), Tamil Nadu 257(0.79%) persons and Goa with 178 (0.55%). Persons from North-eastern states like Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, etc. are very lass. There are only 50 migrants recorded out of 30 male and 30 females.

Migrants from Karnataka, Uttar Pradesh and Rajasthan are mainly engaged in construction works like brickwork, centering, coloring, flooring etc. Workers from Bihar as well

as West Bengal provide cheap labors for industries. Many Gujarati population is engaged in textile industry of the district.

Mainly male migrates to far distance for jobs, services, business and education. Women have social restrictions and responsibility therefore the share of women migrants was less comparing to men in every state in-migrants.

Inter-District Migration Pattern in Sangli District:

Inter-district migration is the outcome of regional imbalance in economic development. The Maharashtra state is economically progressed in India, but that development is not equally distributed in all districts of the state. The districts of western Maharashtra are highly developed whereas Konkan region along with Vidarbha are moderately progressed, but district of Marathwada, Khandesh are economically backward.

Table No.4: Inter-district immigration patterns of workers in Sangli district

District	Total	%	Male	%	Female	%
Nandurbar	148	0.06	77	0.05	71	0.09
Dhule	429	0.18	226	0.15	203	0.25
Jalgaon	646	0.27	342	0.22	304	0.37
Buldana	207	0.09	109	0.07	98	0.12
Akola	254	0.11	133	0.09	121	0.15
Washim	74	0.03	41	0.03	33	0.04
Amravati	229	0.10	121	0.08	108	0.13
Wardha	95	0.04	49	0.03	46	0.06
Nagpur	460	0.19	235	0.15	225	0.27
Bhandara	54	0.02	29	0.02	25	0.03
Gondiya	36	0.02	20	0.01	16	0.02
Gadchiroli	11	0.00	5	0.00	6	0.01
Chandrapur	63	0.03	28	0.02	35	0.04
Yavatmal	236	0.10	138	0.09	98	0.12
Nanded	401	0.17	214	0.14	187	0.23
Hingoli	73	0.03	37	0.02	36	0.04
Parbhani	1,963	0.82	1,018	0.65	945	1.14
Jalna	910	0.38	477	0.31	433	0.52
Aurangabad	432	0.18	236	0.15	196	0.24
Nashik	926	0.39	524	0.34	402	0.49
Thane	1,798	0.75	1,027	0.66	771	0.93
Mumbai (Suburban)	3	0.00	3	0.00	0	0.00
Mumbai	10,906	4.58	6,049	3.88	4,857	5.88
Raigarh	470	0.20	265	0.17	205	0.25
Pune	9,928	4.17	6,013	3.86	3,915	4.74
Ahmadnagar	2,622	1.10	1,330	0.85	1,292	1.56
Bid	11,911	5.00	6,270	4.03	5,641	6.83
Latur	1,155	0.48	623	0.40	532	0.64
Osmanabad	2,071	0.87	1,008	0.65	1,063	1.29
Solapur	50,365	21.13	33,431	21.47	16,934	20.50
Satara	58,391	24.50	40,740	26.16	17,651	21.37
Ratnagiri	2,796	1.17	1,518	0.97	1,278	1.55
Sindhudurg	862	0.36	473	0.30	389	0.47
Kolhapur	77,411	32.48	52,919	33.98	24,492	29.65
Total	238,336	100	155,728	100	82,608	100

Source: Census of India, 2011

The scenario of inter-district in-migration in Sangli district (2011) is shown in table 4. Table no.4 indicates that people from all districts of Maharashtra state had migrated towards Sangli district in more or less number. The highest inter-district in-migrant in Sangli district

was observed from Kolhapur district with 77411 total persons accounts 32.48 % of all migrant which was followed by Satara district with 24.50 % and Solapur district with 21.13%. It is observed that 78.11 % inter-district migration is produced from surrounding district i.e. Kolhapur, Satara and Solapur district.

Total 11,911 (5%) person are migrated from Bid district which are basically working in the agricultural sector. It is also observed that people from Mumbai with 10,906 persons (4.58%), Pune with 9,928 persons (4.17%), Ratnagiri with 2,796 persons (1.17) and Ahmadnagar with 2,622 persons (1.10%) has moderate migration.

People from remote districts such as Nandurbar, Dhule,Jalgaon, Buldana, Akola , Washim, Amravati, Wardha, Nagpur , Bhandara, Gondiya, Gadchiroli, Chandrapur, Yavatmal, Nanded, Hingoli, Jalna and Aurangabad district has very less.

Inter-district emigration data clearly indicates that migrants have a tendency to migrate for short distance. Sangli district is an important district in western Maharashtra, which is developed in agriculture, industry, trade, transport and services. Many migrants from neighboring district come to Sangli district in search of jobs, services, business, education, etc.

Conclusion:

The study of migration is very important to understand the demographic character of an area. It the most important aspect of population change after, fertility & mortality. Sangli district has fertile soil & adequate supply of water for the development of agriculture. So, there is development of sugar industry and agro based industry, which attracts large amount of seasonal migrants in the district. In last 20 years, Sangli and Miraj city and surrounding areas like Islampur, Tasgaon, Vita and Kadegaon etc. has developed as industrial regions, which attracted large number of migrants not only within Maharashtra but also from all over India. In recent years the Information & Technology (IT) industry in Sangli city adds more migrants from all over India. Well-developed sugar industry in Sangli district attracts thousands of sugarcane cutters as seasonal migrants from rain shadow districts of Maharashtra. So different patterns of migration like inter-state, inter- district has developed in Sangli district. Emigration data of Sangli district clearly indicates that migrants have a tendency to migrate for short distance.

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Study of Participation of Women In Life Insurance

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Abstract:

Women occupied around 49 per cent of the total population in India. Their contribution to the economic activity of the country is slightly increasing every year and it is important. Under the situation, there is a need for life insurers to accept the growing importance of women population in the economy, identify their special needs or requirements, if any, and develop suitable product solution to provide adequate life insurance coverage. In this context, a short study is made on the share of female lives covered in life insurance business. Only discrete new business data- number of policies and first year premium for the year 2021-22 has been considered for the purpose.

Key Words:
Insurance Company, Life insurance, policies, premiums

1. Introduction :-

Women occupied around 49 per cent of the total population in India. Their contribution to the economic activity of the country is slightly increasing every year and it is important. Under the situation, there is a need for life insurers to accept the growing importance of women population in the economy, identify their special needs or requirements, if any, and develop suitable product solution to provide adequate life insurance coverage. In this context, there is need to study the share of female lives covered in life insurance business.

Definition of 'insurance' by investopedia

"A contract (policy) in which an individual or entity receives financials protection or reimbursement against losses from an insurance company". The company pools client's risks to make payments more affordable for the insured.

1. Insurance is a device of sharing risk that occurs on happening or uncertain event.
2. In insurance the risk is minimized by re-insuring or grouping the insurance.
3. Premium is charge as consideration for insurance.
4. In insurance contract payment will be made if contingency (insurance) occurs. In some insurance is certain in some it is not.
5. The amount of payment depends upon the value of loss.
6. In order to minimize risk large numbers of persons to be involved in insurance contract.
7. Insurance is not gambling nor it is a charity one. Has to pay a premium to protect (insure) one's risk.

Types of Insurance:

Insurance in India is mainly of two types:

1) Life Insurance:

has made its way in India over 100 years ago. It has been defined as a term of insurance where the insured pay a certain amount called premiums of specified time and in return the insurance companies agrees to compensate or pay back a certain sum of money to the insured on specific terms and conditions related to the duration of human life. Life insurance guarantees full protection against the risk of death of the insured. On the death of the insured person, Life insurance pays the full sum assured with bonuses as applicable while in other saving schemes only the saved amount with interest is payable. In a sense, Life insurance is superior to other forms of savings.

2) General Insurance:

means insurance against health, fire, marine and various insurance which include insurance against property, burglary or theft, reliability guarantee, employers' liability, and insurance of motor vehicles etc.

Every asset has a value of its own and the main aim of general insurance is to protect the economic value of assets. Assets can be prevented from the losses of accidents and calamities through insurance.

a. Property Insurance Policy: This particular policy is specially intended to cover all the risks of a house and other property of insured.

b. Health Insurance: It covers all medical expenses following hospitalization from sudden illness or expenses from any kind of accident.

c. Personal Accident Insurance: This insurance policy allows full compensation for injury and even loss of life caused by an accident. It also includes compensation of cost of treatment and the use of hospital facilities in the process of treatment.

d. Travel Insurance: These policies caress the insured against various events and misfortunes while travelling abroad. Travel insurance covers the insured against any kind personal accidents medical expenses and even loss of checked luggage, passport etc.

e. Liability Insurance: This policy identifies the offices or other professional employees against loss of their jobs arising from claims made against them by reason of any wrongful Act in their terms of service.

f. Motor Insurance: Motor Insurance is compulsory for every vehicle running on the road as per Motor Vehicle Act. Generally, there are two types of Motor Insurance Policy; one covers the act of liability while the other covers all liability and damages caused to the vehicles.

2. Profile of the study area.

In India, insurance has a deep-rooted history. It finds mention in the writing of **manu** (manus –mrithi), **yagnavalkya** (dharmashastra) and **kautilya** (Arthasastra). The writing talks in terms of pooling of resources that could be re-distributed in times of calamities such as fire, floods, epidemics, and famine. Ancient India history has preserved the earliest trace of insurance in the form of marine trade loans and carries contract. Insurance in India has evolved over time heavily drawing from other countries, particularly England.

1818 saw the advent of life insurance business in India with the establishment of the oriental life insurance company in Calcutta. This company failed in 1834, in 1829, the Madras equitable had begun transacting life insurance business in the Madras presidency. 1870 saw the enactment of the British Insurance Act and in the last three decades of the nineteenth century the Bombay Mutual (1871), Oriental (1874) and Empire of India (1897) were started in the Bombay Residency.

The Indian Life Assurance Companies Act, 1912 was the first statutory measure to regulate life business. The insurance Amendment Act of 1950 Abolished Principal Agencies. An ordinance was issued 19th Jan'1956 nationalizing the life insurance Sector and Life Insurance Corporation came into existence in the same year.

The history of general insurance dates back to the industrial Revolution in the West in 17th Century. Triton Insurance Company Ltd., rooted in the year 1850 in Calcutta. General Insurance business was nationalized with effect from 1/1/1973. The IRDA opened up the market in August'2000 with the invitation for application for registration. Foreign Companies were allowed ownership of upto 26%. In December'2000, the subsidiaries of the General Insurance Corporation of India were restructured as independent Companies and at the same time GIC was converted into a national re-insurer. Parliament passed a bill de-linking the four subsidiaries from GIC in July'2002. Today there are 28 general insurance companies including the ECGC and Agriculture Insurance Corporation of India and 24 Life Insurance Companies operating in the country.

The Insurance Sector is a colossal one and is growing at a speedy rate of **15 – 20%.** Together with baking services, insurance services add about **7%** to the country, **GDP**. A well developed and evolved insurance sector is a boon for economic development as it provides long-term funds for infrastructure development at the same time strengthening the risk taking ability of the country. Under the situation, there is a need for life insurers to accept the growing importance of women population in the economy.

In the light of the above, the present research is an attempt to "Study of participation of women in life insurance business in India".

3. Objectives of the Study:

1. To Study the participation of women in life insurance business
2. To study the type of insurance.
3. To study the share in number of policies bought by women in 16 States/UTs,

4. **Limitation of the Study**:

The present study will be restricted to the The proportion of policies on women amongst private Life Insurance and LIC of 16 States/UTs. The references period of the study will be two years (2020 – 2022) and it will be based on secondary data which will be collected through various sources.

5. **Review of Literature:**

1. Singh H. and Loll M (December 2011), states that life insurance is one of the rapid growing and evolving markets in India. Insurance dispersal in rural area – the insurance industry has an acceptation grant in socio-economic development. Researcher has studied the opportunities for insurers in the rural market and new action to be taken to tap the highly underinsured rural area.

2. Rashmita Sahoo, (2012) studied Indian Life insurance market. More than 80% of the population in India does not have any life insurance cover. There was monopoly of LIC. But after privatization and opening up of life insurance sector, this sector is developing very fast. The growth rate of life insurance industry in India is @ 15 to 20% per annum.

3. Harmanpreet Singh, (2012) evaluated satisfaction level of female employees working in insurance industry in India is critically analyzed. For this present scenario of insurance sector and causes which produce stress on female employees has been studied.

4. Babu P. R. (February 2013) in his study by, on the private sector life insurance companies have been making smartly bunch in terms of increasing their extension and market share since year 2000. The Indian life insurance system is having strong base on mixed economic system

where in the public sector engaged a monopolistic position in life insurance business. Private players play an wide aspect in life insurance business more active and customer friendly.

5. Padhi B. (August 2013), study reflects that Indian insurance market was nationalized in 1956 and LIC of India was setup. LIC of India admired monopoly on Indian Insurance market for more than 4 decades. The study by will reveal the performance of particular private insurance companies in the sections like number of policies floated number of money collected through premium and the annual expansion in the specific areas from 2001 to 2012.

6. Data-base and Research Methodology:

- **Secondary Data**

Data required for the study primarily will come from online. The secondary Data also will be collected from annual reports and financial statements of the sample insurance companies. These will obtain from Hand book of insurance companies and their annual reports Newspaper, Magazines, Journals and periodically and search engine will be used.

- **Data Interpretations :**

Processed data and analysis will be further interpreted and presented in the form of elaboration, general finding and conclusions to the effectiveness.

7. Analysis:

Women occupied around 49 per cent of the total population in India. Their contribution to the economic activity of the country is slightly increasing every year and it is important. Under the situation, there is a need for life insurers to accept the growing importance of women population in the economy, identify their special needs or requirements, if any, and develop suitable product solution to provide adequate life insurance coverage.

In this context, a short study is made on the share of female lives covered in life insurance business. Only discrete new business data- number of policies and first year premium for the year 2021-22 has been considered for the purpose.

- The number of policies issued to women in the year 2021-22 is approx. 1.01 crore which is 34.7 % of 2.91 crore total policies as against a share of 33% in 2020-21.

No. of policies	Crore (100%)	34.7%	2021-22 year
No. of policies	2.91 Crore (100%)	33%	2020-21 year

- The proportion of policies on women amongst private Life Insurance and LIC
- In 16 States/UTs, the share in number of policies bought by women to the total policies sold is higher than the all-India average of 34.7%.

Top 5 States/UT		**Bottom 5 States/UT**	
State	**Share to total Policies (%)**	**State**	**Share to total Policies (%)**
Karnataka	45	Jammu & Kashmir	26
Kerala	44	Ladhak	26
Sikkim	42	Haryana	27
Goa	42	Rajasthan	30
Arunachal Pradesh	41	Uttar Pradesh	30

Participation of Women in Life Insurance Marketing

1. 6,99,429 women are working as agents in the life insurance industry, making it 29% of the total individual agency force as at March 31, 2022. Out of the total number of women agents, the share of private life insurers is 52% and LIC is 48%.
2. Among the private life insurers, Max Life Insurance Company Ltd. has the highest percentage of women agents at 42.5 per cent followed by Ageas Federal Life Insurance Co. Ltd. at 42.4 % and SUD Life Insurance Co. Ltd. at 41.7 %.

Conclusion:

Life insurance is available to women on the same term as relates to men, subject to however their income earning capacity. In fact, there is a positive practice of according privileged treatment to the female lives by most of the life insurers while charging the premium as their life expectancy is higher. Insurance of women type also depends on literacy levels, financial independence and financial decision making. Possible more peril.

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Research Paper
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Job Satisfaction of Secondary School Teachers in the Hybrid Teaching Scenario

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Introduction

The post covid world has disrupted the world of education in many ways, with schools and educational institutions around the globe facing unprecedented challenges. The entire learning -teaching scenario has undergone a major shift and that shift is going to stay. As the world begins to accept the changed normal, there are several trends and changes that are likely to shape the future of education in the post-COVID world. The pandemic has accelerated the adoption of hybrid learning models that combine in-person and remote instruction. In the post-COVID world, hybrid learning is likely to become more prevalent, with schools and institutions offering students greater flexibility in how they learn.

Hybrid learning, also known as blended learning, is an educational model that combines both in-person and online instruction. In a hybrid learning environment, students attend classes on campus for some portions of the week and engage in online learning activities for others. Hybrid learning is often used as a way to provide more flexibility in the learning process. For example, it allows students to complete assignments online, review lectures or other materials at their own pace, and engage in online discussions with classmates and instructors.
Though the concept of Hybrid learning existed for a long time and there was adaptations of the same in higher education and advanced learning areas, the COVID-19 pandemic accelerated the adoption of hybrid learning in many educational institutions around the world starting from the primary to advanced degrees. With the need for social distancing and remote learning, hybrid learning became a necessary tool to ensure that students can continue their education in a safe and effective manner.

Though the new learning -teaching method did have its share of benefits, it also led to changes in the workload, teaching style, and communication methods for school teachers. Job satisfaction is a critical factor in teacher retention and student success. The new model suddenly created a lot of stress among teachers and that further lead to other related issues which affected the quality of teaching and learning.
This paper aims to explore the job satisfaction of secondary school teachers in the hybrid teaching scenario.

The Good, Bad & Ugly of Hybrid Education.

The physical classroom as we know it is changing and evolving in new ways. Hybrid education, also known as blended learning, is a mode of education that combines traditional face-to-face classroom teaching with online learning. As a result, students have more access and get better results overall with hybrid learning models that blend the real and virtual worlds.
Initially remote learning had become increasingly popular as a component of hybrid education due to various factors, such as surges in COVID cases, and the need to reach students residing in remote areas & limited transportation options. The recent increase in the demand in Hybrid education is due to the flexibility which this form of education offers to the students.
Here are some advantages of hybrid education:

1. **Flexibility**: Hybrid education provides flexibility in terms of learning schedule, location, and pace. Students can access course materials and complete assignments online at their convenience, while still having the opportunity to interact with teachers and peers in person.
2. **Personalization**: Hybrid education allows for a more personalized learning experience. Students can work at their own pace and receive individualized attention from their teachers. They can also choose to focus more on the areas where they need more help.
3. **Cost-effective**: Hybrid education can be cost-effective for both students and educational institutions. It can reduce the need for classroom space and resources, as well as transportation costs for students.
4. **Increased engagement**: Hybrid education can increase student engagement using interactive online materials, multimedia resources, and collaborative learning activities. It can also provide immediate feedback to students, which can improve their learning outcomes.
5. **Improved accessibility**: Hybrid education can improve accessibility for students who live in remote areas, have disabilities, or have other constraints that prevent them from attending traditional face-to-face classes.

   Hybrid education provides a flexible, personalized, cost-effective, engaging, and accessible learning experience for students, while also providing the benefits of face-to-face interaction with teachers and peers.

But while these positives are definitely there, there is also a flip side to this new medium of teaching. And these points affect both the teachers and the students. Few of the overbearing challenges faced by both Students and Teachers are,

Technological Challenges:

One of the most significant challenges of hybrid education is the reliance on technology. Students need reliable access to the internet and the necessary devices to participate in online learning, which can be a challenge for students who come from low-income families or live in rural areas. Moreover, technological difficulties such as connectivity issues, software malfunctions, and other tech-related problems can interrupt the learning process and can negatively impact the student's motivation and engagement.

Lack of Personal Interaction:

While hybrid education provides some opportunities for face-to-face interaction with teachers and peers, it may not be enough for some students who thrive on personal interaction. Socialization and interaction with peers are essential for the student's growth and development, and not having enough of it can make students feel isolated or disconnected from the learning community, which can further affect their motivation and engagement.

Time Management:

Hybrid education requires students to manage their time effectively and be self-disciplined, which can be challenging for some students who need more structure and guidance. Balancing online and in-person activities can be difficult, especially if students have other responsibilities such as work or family obligations. Moreover, some students may struggle with self-motivation and may not be able to keep up with the course's pace, which can lead to a decline in their academic performance.

Reduced Accountability:

Hybrid education can provide some flexibility, but it can also reduce accountability. Students may be tempted to procrastinate or skip online activities, which can affect their learning outcomes. Additionally, teachers may have difficulty tracking student progress and ensuring that they are meeting learning objectives. Therefore, it is essential to have systems in place that can monitor student progress and ensure that they are meeting the course's objectives.

Unequal Access to Resources:

Hybrid education may widen the gap between students who have access to resources such as technology, quiet study spaces, and supportive home environments, and those who do not. Students who come from low-income families or have limited access to technology may struggle to participate in online learning, leading to inequities in educational outcomes and opportunities. Moreover, the lack of access to quiet study spaces and supportive home environments can further impact the student's motivation and engagement.

Thus, while hybrid education can offer many benefits, it is essential to address the potential challenges and negative points to ensure that all students have equal opportunities to learn and succeed. To overcome these challenges, it is essential to provide students with the necessary resources and support to participate in online learning and to have systems in place that can monitor student progress and ensure that they are meeting the course's objectives.

These challenges also put a lot of pressure on teachers. A efficient teacher always wants to ensure equal development of all their students, but in the above mentioned circumstances this is not possible. In turn this develops additional stress on the teachers leading to lack in satisfaction, unnecessary mental stress and overall disinterest in teaching.

Factors affecting Job satisfaction among teachers

Attracting and retaining high-quality teachers is a significant challenge faced by educational institutions. A positive approach is an essential quality that every teacher must possess. It is crucial for teachers to have the potential and a clear intention to perform their duties with utmost dedication and derive satisfaction from their work. Job satisfaction is a combination of emotional and psychological experiences related to work. It is the relationship between one's expectations and achievements in the workplace. Job satisfaction is essential for effective work performance, and it is especially crucial for school teachers, who play a crucial role in building the nation and shaping the future citizens. Satisfied teachers are more likely to be interested in teaching their students effectively, which is critical for improving the quality of education in the country and meeting the demands of globalization. The productivity and performance of schools depend on the job satisfaction of their teachers. Therefore, job satisfaction is a crucial phenomenon that must be addressed in every sector, particularly in the teaching profession.

Due to Covid-19 and the unexpected changes that it brought into our lives, specially in the education sector put in a lot of stress on the teachers. This was even more for the secondary school teachers who had to prepare the students for their students for first board exam, which was also uncertain. Every week there were new directives from the government about how the exam would happen. They had pressure of the curriculum completion, practical labs and projects, which are all important components of the 10th standard board exam. Suddenly the entire education went into the Hybrid Mode which was a absolutely new concept to many of

them. Some of the factors which influence the job satisfaction of secondary school teachers in the hybrid teaching scenario are,

Workload: Teachers may feel overwhelmed with the increased workload of hybrid teaching, which involves planning and delivering lessons for both in-person and remote students, as well as managing online platforms and providing additional support to students who are struggling.

For every lesson, they have to make material for both Online and offline platforms. This is basically doubling the work.

Technology: The use of technology can be both a boon and a bane for teachers. While it provides greater flexibility in teaching and allows teachers to reach more students, it can also be a source of frustration when technology malfunctions or students struggle with access to devices and internet connectivity. While taking a class in a flow, such technical interruptions are very frustrating as that breaks the continuity of the class. Many times the classes are incomplete and the entire process needs to be redone.

Many teachers, had to make themselves fluent with using computers, internet and mobile apps to make themselves apt for online teaching. This was and still is a major issue with many teachers.

Student Engagement: Teachers may find it challenging to keep students engaged and motivated in the hybrid teaching scenario, as remote students may feel disconnected from the classroom and struggle with online learning. It is also very difficult for any teacher to keep track of the students online. Many of them switch of their camera and certain apps would not show all the students at the same. And even if they do, it is not possible to keep an eye on all the screens at the same time.

Work-Life Balance: The hybrid teaching scenario may blur the boundaries between work and personal life, as teachers may feel pressured to be available for both in-person and remote students outside of traditional work hours.

Due to hybrid classes, schools are extending their class hours and working hours. This has majorly affected the morale of the teachers.

Communication: Effective communication is essential in the hybrid teaching scenario, as teachers need to communicate with students, parents, and colleagues through a variety of channels, such as email, online forums, and video conferencing. Poor communication can lead to misunderstandings and frustration for all parties involved.

Compensation: Finally compensation is another major issue which has affected the job satisfaction of many teachers. Many educational institutes were forced to bring down their fees of the students as the classes went online. That directly affected the teachers as their salaries were reduced with the logic that they don't need to travel to schools anymore, not take physical classes etc. While the work increased two folds, in many cases the salaries were halved. Even after the new normal has set in now, many institutes have not brought back the salaries to the pre-covid levels.

With online classes and hybrid teaching, as there is no limitation to the number of students which can be in a class, many institutes have also reduced the number of teachers. This job insecurity has further lead to frustration among teachers.

Conclusion

The job satisfaction of secondary school teachers in the hybrid teaching scenario will depend on how well they are able to adapt to the new teaching environment, manage their workload, and maintain effective communication with students, parents, and colleagues. While that is true, schools and institutes need support teachers by providing training on hybrid teaching strategies, technology tools, and communication skills, as well as by promoting work-life balance and recognizing the challenges that teachers face. They should ensure that proper compensation and benefits are provided to the teachers by recognizing the extra effort which needs to be put to make this new mode of teaching successful. Also while the number of students can be limitless in an online class, the institutes need to acknowledge the fact that teaching is not just mere taking classes. Thus the effective student to teacher ratios needs to be maintained. Reducing the number of teachers is basically creating a bigger problem in the longer run. More and more youngsters would be demoralized to take up the teaching profession which would lead to crisis of teachers.

The government also needs to have polices which are just towards teachers and they should ensure that the rules of examination, syllabus and methodologies should be structured around the new ways of teaching. They should help develop free and easily accessible website which have relevant content and can help teachers in preparing for lessons, creating online content and reference material for their students.

In short, to ensure that the job satisfaction among schools teachers is not diminished over time, the entire educational ecosystem needs to work and structure based on the new normal of Hybrid teaching-learning.

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Research Paper
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Use of per and Polyfluoroalkyl Substances (PFAS) in Cosmetics and their effects on human health

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Abstract:

Per- and polyfluoroalkyl substances (PFAS) are a diverse group of synthesized chemicals used in a wide range of consumer and industrial products. It consists of a group of more than 4700 chemical compounds for which the characteristic perfluorinated carbon moiety confers hydrophobic chemical properties and environmental persistence. Certain PFAS are also intentionally added as ingredients in some cosmetic products, including lotions, cleansers, nail polish, shaving cream, foundation, lipstick, eyeliner, eyeshadow, and mascara. These PFAS are used in cosmetics to conditioning and smooth the skin, making it appear shiny, or to affect product consistency and texture. Some common PFAS used as ingredients in cosmetics include PTFE (polytetrafluoroethylene), perfluorooctyl triethoxysilane, perfluorononyl dimethicone, perfluorodecalin, and perfluorohexane. These highly persistent and potentially toxic class of chemicals, are added to cosmetics to increase their durability and water resistance.

Key words: PFA, cosmetic, environment, chemicals.

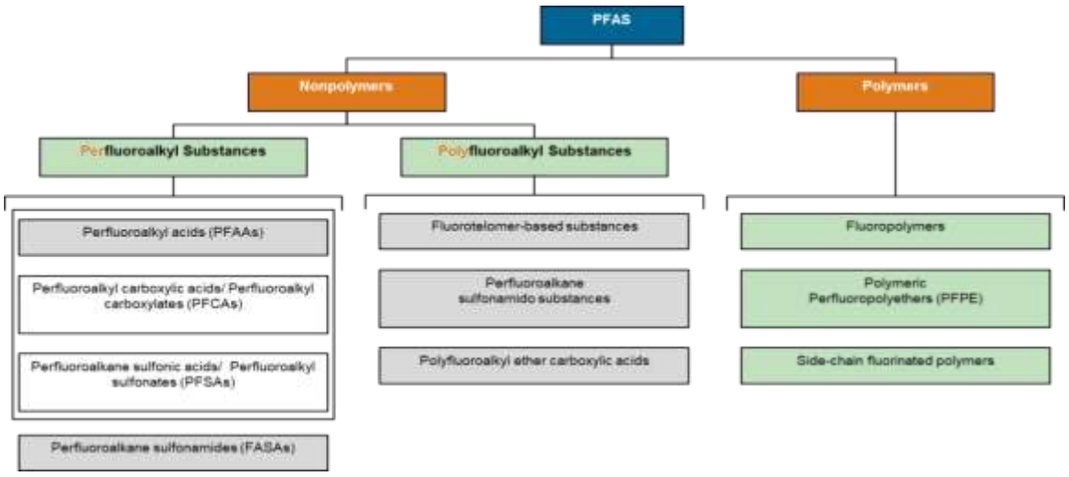
Introduction:

Since the 1950s, PFA compounds have been widely used in industrial products such as fire-fighting foams and consumer goods such as coated fabrics, carpets, utensils and other food packaging and many others. Some studies have reported the use of PFAS in cosmetics in Europe and Asia. The PFAS in cosmetics can pose a risk to human health through direct and indirect exposure, as well as pose a risk to ecosystem health throughout the life cycle of these products. PFAS are used in various cosmetics products including lotions, cleansers, nail polish, shaving cream, foundation, lipstick, eyeliner, eyeshadow, and mascara for their properties such as hydrophobicity and film-forming ability, and are thought to improve product wear, durability, and spreadability. Additional claimed benefits are increased skin absorption of the product and improvements in the appearance or texture of skin. Some common PFAS used as ingredients in cosmetics include PTFE (polytetrafluoroethylene), perfluorooctyl triethoxysilane, perfluorononyl dimethicone, perfluorodecalin, and perfluorohexane. But these chemical are highly persistent and potentially toxic in nature These synthetic chemicals consist perfluorinated carbon moiety with hydrophobic chemical properties and environmental persistence.. In this paper we will be discuss about the structure and adverse effects of PFA compounds.

Chemical Structure and Classification:

Carbon can form up to four bonds with other atoms. In PFA compounds, Carbon (C) attached with fluorine (F). This C-F bond is highly durable and a key factor behind the problems posed by PFAS and is also the cause of its desirable technical properties. Polymers that are made by repeating subunits called monomer are often used as starting materials for the production of other PFA chemicals. The best known fluoropolymer is polytetrafluoroethylene (PTFE), was discovered by Roy Plunkett on April 6, 1938. PFA is a semi-crystalline material with a maximum achievable crystallinity of 60%. PFA chemicals can also exist in multiple states such as acids, anions, cations, and salts that have important effects on their physical and chemical properties. The anionic form is the most prevalent form in the environment.

Non-polymeric PFASs include perfluorinated and polyfluorinated materials. If carbon is bonded only to fluorine excluding functional groups, it is said to be perfluorinated. While in polyflorinated, some carbon bonds are bonded to functional groups or to something other than fluorine and is also considered unsaturated with respect to F. Hydrogen is the most common other bond. “PFAS” stands as a default plural acronym of PFA means "per- and polyfluoroalkyl substances" and a single compound cannot be simultaneously unsaturated and saturated with respect to fluorine. Both perfluoroalkyls and polyfluoroalkyls fall into classes with relatively similar functional group behaviour. Two broad classes are fluoroalkyl acids and fluoroalkanesulfonamides are related to perfloroalkyl family. These large classes are then subdivided again based on functional groups/moieties. Interstate technology regulatory council gave a broad classification for PFAS. There are over than 425 acknowledged nonpolymer moiety classification groups.



Picture courtesy of The Interstate Technology Regulatory Council

In 2017, Wang et al published an iconic chart covering the number of papers published on various PFAS groups.

Literature reviewed for PFAS used in Cosmetics:

Various types of fluoroalkyl substances including perfluoroalkyl and polyfluoroalkyl and their compounds or mixtures are used in cosmetic products. These fluorinated substances and compounds contain residues of the basic perfluoroalkyl acids or perfluorocarboxylic acids (PFCA). The most important PFCA is perfluorooctanoic acid (PFOA) with a perfluoroalkyl chain of seven carbon atoms. Fluoroalkyl substances with longer perfluoroalkyl chains than PFOA are considered to be very persistent, highly bio-accumulative and toxic. Fujii et al. (2013) conducted a study on PFCA concentrations in different types of cosmetic products. They selected 24 different cosmetic products for face and nails, including nine different sunscreens, for which the ingredient list indicated that the product contained either polyfluoroalkyl phosphate esters (PAP) or other fluorinated substances. The study was conducted on cosmetic products purchased in Japan. The results disclosed that 87% (13 out of 15) of cosmetic products (excluding sunscreen), contains PAP or other types of fluorinated substances having concentrations of PFCA. For sunscreens alone, this result was 89% (8 out of 9). The highest concentrations of PFCA were found in sunscreens followed by foundation.

The GSP Institute (2014) has prepared an overview of fluoroalkyl substances and other fluorinated compounds in cosmetic products, based on data from the Skin Deep database.

In Sweden, Naturskyddsföreningen (2017) (Nature Conservation Association) analysed 22 cosmetic products from nine different brands for PFAS content. Out of the selected products PFAS was found in 20 of the products, with variation. One product in particular contained large amounts of different PFAS. 17 products contained PFOA, 12 contained PFNA and 10 contained PFDA. Based on information from the above-mentioned studies, a Lund University thesis (Henricsson, 2017) examined the presence of PFAS in cosmetic products on the Swedish market. In the survey, 30 brands were selected for examination, where ingredients lists for a total of 1,354 products in the categories sunscreen, foundation, powder, moisturizer, eyeliner and eye shadow were reviewed. Out of the 1,354 products, 59 (4.4%) of the products had declared contents of PFA.

Hazardous effects of PFAS on human:

Studies on the prevalence of PFAS in cosmetics are scarce. According to published studies, the content of certain PFAS—either as ingredients or impurities—in cosmetics ranges from a few parts per billion to hundreds of parts per million. It may be difficult to detect and quantify all PFAS that may be present in cosmetics since the chemical compound's unique "fingerprint" or analytical standard may not be accessible.

There is also limited research on whether PFAS in cosmetics are absorbed through the skin at levels that could be harmful to human health. . In a 2018 study the sole risk assessment that has assessed the presence of PFAS in cosmetics was done by Denmark's Environmental Protection Agency and focused on a few PFAS that were unintentionally present in cosmetics. The study concentrated on five distinct PFAS contaminants that were found in the most variety of cosmetic items and at reasonably significant levels. The scientists came to the conclusion that the amounts of PFAS in each of the examined goods are not likely to endanger customers' health. The low amount of information from this and other published studies prevents from drawing firm conclusions about the potential health dangers of PFAS in cosmetics. A large number of epidemiological studies have evaluated possible associations between perfluoroalkyl exposure and a wide range of adverse health outcomes. However, most of the studies have focused on PFOA and/or PFOS; fewer studies have evaluated a smaller number of potential health outcomes for the remaining 10 perfluoroalkyls included in this toxicological profile. In 2017, the International Agency for Research on Cancer (IARC) classified perfluorooctanoic acid

(PFOA), as a possible human carcinogen based in part on weak epidemiologic evidence of associations with kidney and testis cancers in people who had been exposed to the substance frequently. Perfluoroalkanoic acids (PFCA) and their salts with different chain lengths can inter alia activate "peroxisome proliferator-activated receptor α" (PPARα) in liver cells, and therefore they may cause peroxisome proliferation, enlarged liver and increased fatty acid oxidation, etc. (Ikeda et al., 1985).

A toxicological profile developed by the Agency for Toxic Substances and Disease Registry (ATSDR) and the Environmental Protection Agency (EPA) reported that based on a number of factors the available epidemiological studies suggest associations between perfluoroalkyl exposure and several health outcomes; however, cause-and-effect relationships have not been established for these outcomes:

1. Pregnancy-induced hypertension/pre-eclampsia (PFOA, PFOS)
2. Increases in serum hepatic enzymes, particularly alanine aminotransferase (ALT), and decreases in serum bilirubin levels (PFOA, PFOS, PFHxS)
3. Increases in serum lipids, particularly total cholesterol and low-density lipoprotein (LDL) cholesterol (PFOA, PFOS, PFNA, PFDA)
4. Decreased antibody response to vaccines (PFOA, PFOS, PFHxS, PFDA)

These health outcomes include osteoarthritis in women less than 50 years of age (PFOA, PFOS). Additionally, associations between serum PFOA and PFOS and decreases in glomerular filtration rate and increases in serum uric acid levels and between serum PFOA, PFOS, PFHxS, and PFNA and increased risk of early menopause have been observed; these effects may be due to reverse causation, where the effect (disease) causes the change in serum perfluoroalkyl levels (exposure).

Conclusion: Long time exposure with chemicals creates hazardous effects on health despite use of chemicals increases day by day. Now- a-days cosmetics are also essential part of life in females therefore avoiding use of chemicals is not possible but we need to prepare better alternatives of these products and also avoid using those cosmetics that contains such hazardous chemicals.

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Identifying the Potential of Agri-Tourism in India: Overriding Challenges and Recommend Strategies

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Abstract:

Agri-tourism is the latest concept in the Indian tourism industry, which normally occurs on farms. Agri-tourism is a form of agricultural multi-functionality it gives you the opportunity to experience the real alluring and authentic contact with the village life, taste the local veritable food and get familiar with the many farming tasks during the visit. It provides you the welcome break free from the daily busy and hectic life in the peaceful village environment. It gives you the chance to relax and reinvigorate in the pure natural environment, surrounded by splendid setting. It gives you the chance to see the real India and have the experience on the farm stay holidays. Many Indian farmers especially from Pune and Maharashtra currently involved in or are considering the use of agri-tourism as a mode of diversifying their farm operations. How they will achieve this is the challenge. The overall potential for agri-tourism can only be achieved if strategies to address and overcome their challenges are developed and implemented. This paper is an attempt to identifying the potential of agri-tourism in India by highlights major challenges in this issue with some useful recommendations.

Keywords : Agri-tourism, Employment, Rural development.

Introduction :

Indian population has increased five times than that existed at the time of independence, but the land area is not change even the agricultural land got decease, currently only one fourth of the land is available for per person as compared to the time of independence. Agriculture business is becoming more and more costly and many farmers cannot afford it. In addition to this the gradual decrease in fertility of land that is giving marginally diminishing yields. So to overcome this continuously increasing gap farmers must think of an alternative business of any type to support their overall income from land, or else they shall be forced to live out a life of below poverty line with lots of scarcity of resources. In order to work in this direction some farmers must be encouraged to start small and viable business like Agri-Tourism units on the farm in their villages.

1. Around 70 to 80% of Indian Population lives in rural area.
2. By realizing their problems and needs we felt that, there is still many things that can be done for these people.
3. ATDC has been contributing its efforts for the overall upliftment of the farmers in rural areas.
4. The youth population in rural especially the school dropouts, educational backward and rural women constitute more than 50% of our rural population. Until and unless we do some welfare activities for this section of the community overall social upliftment of the nation remains uncompleted. The women in village can be good host as well as provide help in preparing taste rural rustic food for the Agri Tourism guests.

2. Research Objectives :

1. To explore the status of Agri-tourism in India.
2. To identify factors are necessary for Agri-tourism development
3. To study the Challenges and Recommended strategies of Agri-tourism industry.

3. Secondary Literature :

Agri tourism is no knew in the field of research many researches has well stated the term as Barbieri and Mshenga (2008) define Agritourism as "any practice developed on a working farm with the purpose of attracting visitors."McGehee, Kim, and Jennings (2007) explain Agritourism as “rural enterprises which incorporate both a working farm environment and a commercial tourism component." Marques (2006): "a specific type of rural tourism in which the hosting house must be integrated into an agricultural estate, inhabited by the proprietor, allowing visitors to take part in agricultural or complementary activities on the property." Sonnino (2004) "activities of hospitality performed by agricultural entrepreneurs and their family members that must remain connected and complementary to farming activities." Sharpley and Sharpley (1997) "tourism products which are directly connected with the agrarian environment, agrarian products or agrarian stays." World Tourism Organization (1998) involves accommodation being offered in the farmhouse or in a separate guesthouse, providing meals and organizing guests' activities in the observation and participation in the farming operations. Azimi Hamzah and others (2012)in the article 'Socio-economic impact potential of agro tourism activities on Desa Wawasan Nelayan community living in Peninsular Malaysia' discuss about the potential socio-economic benefits that can be offered by the agro-tourism activities to progressive fishing communities in Malaysia. It enhances the understanding the probable potentialities to bring socio economic changes due to agro tourism.

4. Research Methodology:

The Paper is invades the conceptualization of the development of Agri-tourism in India. Role of Government Institutions likes Agri-Tourisin Development Corporation (ATDC), and others in the development of the concept of agri-tourism, Exploratory research design is used as a tool to study the concept, to get an in-depth knowledge of challenges and scope of the Agri-tourism. Secondary data has been used from variety of sources as, government official Sites, books, journal, publications and internet.

4.1What Is Agri-Tourism and Why Agri-Tourism?

Agri-tourism is a business conducted by a farmer for the enjoyinent and knowledge of the people, to promote the products of the land and generate additional income from farms. It provides rural experiences to urban population and economic alternatives to farmers. Agri-tourism includes activities such as roadside stands, farm tours, bed-breakfast, and cattle drives. It can provide cconomically feasiblc ways to care for natural resources, natural habitats, natural scenic areas and special places.

4.2Development of Agri-tourism is Desirable

1. It is a sustainable form of tourism.
2. Where there is limited scope of extra earnings for family depending on agriculture, agro-tourism could serves as additional source of income for the farmers.
3. It gives prestige to rural life, creates jobs at local levels.
4. • It gives opportunity to urban tourist to escape from his busy and hectic routine and allows him to go back to his roots.
5. It can enhance the quality of life for local residence.
6. It gives the tourists glimpse of village ambience, local cuisine, culture and art.
7. It expects the active involvement from the tourist, rather than a passive spectator, so a bond between guest-host is strengthened. ATDC has always been putting its efforts as per the changing needs of the section of the social fabric; and shall continue to do the same. Some facts which provide the outcome of the effort are as follows: We saw in last 4 years more than 500 farmers trained under ATDC Agri Tourism training program and 52 farmers from near by villages of Maharashtra have started their own agri-tourism activity on their farms to enhance the agriculture income to quote the examples: "Mr. Sunil Bhosale from village called Jogawadi, which is 40 kms from Baramati in Pune district have 13 acres of agriculture farm. His annual income from the same is Rs 60 thousand. However ever since he started Agri Tourism activities at his own farm, his income from agri-tourism has been Rs.45,000 in only six months." Means there is a 50% hike in the annual income.

5. Scope Of Agritourism :

Agri-tourism has vast scope in the present context for the following reasons:

Less expensive gateway - The cost of accommodation, food, travel and recreation is very less in Agri-Tourism compare to any other type of tourism. Present concept tourism is limited to urban and rich class which constitutes very small proportion of the population. However, the concept of agri tourism takes travel and tourism to the larger population, this widens the tourist base by widening the scope of tourism due to its cost effectiveness.

Have strong demand for wholesome family oriented activities - Villages provide amusement opportunities to all age groups i.e. children, young, middle and old age, female, male, in total to the entire family at a cheaper cost. Rural games, traditional dresses, festivals, food and the nature provides variety of entertainment to the whole family.

Curiosity about the farming and farmer lifestyle - Almost all urban population having roots in villages, so they always have had the curiosity to learn or at least see about sources of plants, plants, animals, raw materials like handicrafts, woods. Rural lifestyle and their languages, culture, tradition, Agri-Tourism which generally revolves around farmers, villages and agriculture has the potential to satisfy the curiosity of this segment of population.

Finding solace with nature friendly means - Present urban lifestyle has made life stressful and brings average life span comedown. Hence, people are in continuous search of pro-nature means to make life more peaceful. Indigenous mcdical knowledge of villagers are must be respected. Ayurveda which is a pro-nature medical approach have its roots in villages.. Organic foods are in higher demand in urban areas and foreign countries. In totality, our health conscious urban population can look towards pro nature villages for solutions.

Desire for peace and Interest in natural environment - Busy and hectic urban life is an outcome of diversified activities and diversified thinking. Today every individual attempts to work more and hard, in different directions to earn more money and enjoy lavish life comforts. Hence, peace is always out of his system. They can look towards agri-tourism is a means for searching peaceful location. Peace and tranquility are inbuilt in Agri-Tourism as it is away from urban areas and close to nature. Crops, birds, animals, mountains, water bodies, villages provide totally different atmosphere to urban population in which they can forget their busy and hectic urban life.

Disillusionment with resorts and illusionment with farm - In the late 90's people use to visit resorts to get an peaceful and green environment but now the crowded peace seekers

disturb each other's peace. Hence, peace is beyond cities and resorts. Hence, visit to villages satisfies their desire. This is also expressed through the hatred of urbanites to flat culture and love for farmhouses located in the outskirts of cities. Any opportunity to visit villages and spend time with family is dream of any urbanite. But, minimum decent facilities are always problem. Agri-Tourism attempts to overcome this problem.

Educational value of Agri-Tourism - As we all know Indian economy is an agricultural driven economy. Agri-Tourism creates awareness about rural life and knowledge about agriculture science among urban children. It would be effectively used as educational and training tool to train agriculture and line department officers. It is a means for providing training to future farmers. This provides unique opportunity for education where learning is fun cffective and casy. “Seeing is believing, doing is learning". This experience based concept is the USP of Agri- Tourisın.

Recreation of Villages - Villages provide variety of recreation to urbanites through festivals and handicrafts. Villagers lifestyle, dress, languages, culture / traditions which always add value to the entertainment, Agricultural environment around farmers and the entire production process could create curiosity among urban taught. Agricultural products like farm gate fresh market, processed foods, organic food could lure the urban tourists. As result of this agri – atmosphere in the villages, there is scope to develop Agri - Tourism products like culinary tourism, agri-shopping, pick and own your tree or plot, bed and breakfast, pick and pay, camel riding, bullock cart riding, boating, fishing, herbal walk, rural games and health (ayurvedic) tourism.

Table: Agri-Tourism Benefits

1	An inexpensive gateway
2	Curiosity about the farming industry and lifestyle
3	Strong demand for wholesome family oriented recreational activities
4	Finding solace with nature friendly means
5	Desire for place
6	Interest in natural environment
7	Disillusionment with overcrowded resorts and cities
8	Health Consciousness of urban population
9	Rural recreation
10	Educational Value of Agri-Tourism

6. Challenges To The Agri-Tourism Industry

Agri-tourism is although a boom for the development of our rural society but if it can positively handle the following challenges in its path as stated below.

1. Quality of the service
2. Complexity in the delivery of the servicc
3. Infrastructural deficiency
4. Multilevel channel involved this tourism development at local and regional level.
5. Literacy rate of the farmers and farm owners
6. Government Support and Identification:

7. Agri-Tourism Recommended Strategies To Overcome Challenges

Indian farmer need to cater the concept of this agri tourism as diversifying their operation. Explaining the determinant of Agri tourism is a creative strategy for their betterment, however it will not be an easy road map to follow by the farmers or farm owners. A well defined strategy has to be implemented for the developinent of agri- tourism at national and state level. The following sections identify these overriding challenges and recommend strategies to address them.

8. Suggested Strategies To The Indian Agri Tourism Industry.

1. Proper Recognition of Agri-tourism Industry. Government supported policy structure of Agri-tourism
2. Education of the farmer and farm owner for the development of the Entrepreneurial skill in their work operations.
3. Proper Financing Solution for its Enhancement.
4. Liability and Risk Management Programs.
5. Product and Service Quality Improvement: In terms of the Product quality enhancement as well as the delivery of the service bias to be elevated up to the standards.
6. A Public Private Strategic Partnership Development Model has to be created.
7. Proper Marketing and Promotional Assistance has to be provided

9. Conclusion :

Agri-tourisin is a supportive system to the agricultural activities in India. It is an Innovative practices which can be utilized by the famer and farm owners to harvest this opportunity, through a diversified approach.

1. It will be beneficial Model for both farmer and the tourist, as farmers have and extra edge for earning and employments whereas the tourist gets an privilege to relive a smooth, clam and rejuvenating atmosphere and culture of our agricultural heritage.
2. Although is a long way on go as the development and acknowledgement of the Agri-tourisms is potential seen and cultivated by only Maharashtra government and its supporting agencies.
3. Rest on the nation is yet to understand its worth and move ahead on it.
4. Is it the best platform for the socio economic development of the rural areas? Thus the government has to provide a full fledge policy support system for the rooting and strengthen of the Agri-tourism in India.

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The Role of Nutritious Diet in Boosting Athletic Performance

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Abstract:

Athletes and sportspeople should be aware of the importance of nutrition. The performance of a sportsperson during competition can be impacted by numerous elements, each of which may be related to a different domain. Sportspeople who do not take enough dietary energy as a whole frequently experience nutritional-related issues. It is no secret that in the contemporary era of top sports, nutrition has become a critical aspect that can impact an athlete's performance. It's not by chance that we hear a lot about athletes' tight diet regimens; the optimum diet programme will vary depending on the sport, the athlete's goals, and their unique tastes Each of them has a particular purpose in supplying the body with nutrition. Recognizing what each does to his body under the physical, mental, and emotional pressures of competition is crucial for the sportsman. The primary source of energy utilized to meet the work demands of a given sport will depend on the length and intensity of the exercise performed in that sport. The right diet and nutritional strategies can improve athletic performance, and nutrition is crucial to an athlete's success. The diet of the athlete should contain plenty of carbs, moderate amounts of proteins, and little or no fat. Teenagers who participate in sports have higher nutrient requirements due to the additional demands of increased physical activity in addition to needs for growth, development, and wellness. Due to a lack of appropriate nutritional counselling, the health and nutritional status of this population may be impaired. Additionally, false information about wholesome foods spread by the media to school-age children can be highly dangerous. This review paper's objectives are to illustrate the dietary requirements of young people and athletes taking part in various sports, as well as to educate young people and athletes on the value of proper nutrition when engaging in physical activity.

Keywords: Physical activity; Nutrition counseling; Food and health, Sports nutrition

Introduction:

High levels of carbs, moderate levels of proteins, and little to no fat should make up the athlete's diet. Teenagers who participate in sports have higher nutritional needs than non-participants because to the increased physical activity requirements beyond growth, development, and wellbeing. Due to inadequate nutritional counselling, the population's health and nutritional status may be impaired. Additionally, false information about wholesome foods spread by the media to young readers who are attending school might be quite dangerous. This review paper's objectives are to illustrate the dietary requirements of teenagers and athletes taking part in various activities, as well as to inform and educate teenagers and athletes about the value of nutrition during involvement in games and sports. Sports nutrition can be summed up as the application of nutrition science to a realistic daily eating programme designed to maximize athletic performance in competitive events, facilitate the repair and rebuilding process after strenuous physical work, and provide the fuel for physical activity. It also aims to support general health and wellness. Sports nutrition is sometimes perceived as being exclusive to "athletes," which implies that only those people who are competing at the highest level are included. Any person who engages in regular physical activity, from fitness enthusiasts to competitive amateurs or professionals, is referred to as an athlete in this literature. Along this defined spectrum of athletes, there may be variations in specific nutrient requirements, posing the fun issue of individualized sports nutrition programmes. Professionals advising athletes on proper eating methods first need to have a command of general nutrition as well as exercise science. This will enable them to completely comprehend and then apply sports nutrition concepts. The second stage is to learn how nutrition and exercise science are connected, realizing that healthy eating and exercise depend on one another to generate the best results. The third step—the practical application of sports nutrition knowledge to individual athletes participating in a sport or physical activity—can be regarded as one of the most crucial. Professionals in sports nutrition must be able to instruct athletes by applying "book" information to real food choices and meal planning, while taking into account the difficulties posed by hectic training, competition, work, school, and other commitment schedules. After completing an undergraduate or graduate programme in sports nutrition, dietetics, exercise science, or athletic training, many professionals are missing this third step.

Objectives of the Research:

1. To define Concepts of nutrients
2. To study good eating habits of athletes
3. To study the impact of all-round nutrition for athletes
4. To study the nutritional information required to enhance sports performance of the athlete

Research Methodology:

Secondary sources provide the basis of this research paper. For the purpose of gathering information, the researchers have used a variety of research tools, including reference books, books, research papers, periodicals, newspapers, and YouTube etc.

Concepts of nutrients:

Six nutrients found in food and beverages are essential to human health because they help the body produce energy, support tissue growth and development, control bodily functions, and fend off deficiency and degenerative diseases. They are categorized as important nutrients—the six nutrients. They consist of water, vitamins, minerals, proteins, lipids, and carbohydrates. The body needs certain nutrients to function effectively, but it is unable to produce them on its own in the levels required on a daily basis.

Carbohydrate:

Carbohydrates serve as the primary energy source for any physical activity, making them arguably the most significant macronutrient in an athlete's diet. Typically, an athlete's energy source should consist of between 55% and 70% of carbohydrates. This is because the primary source of glucose is carbs. The body transforms glucose into glycogen, which is then stored in the muscles and liver. The energy from the stored glycogen is subsequently utilized by athletes to power their movements.

Protein:

Protein is a necessary component of a training diet since it helps muscles recover and repair after exercise. The recommended daily protein intake for strength and endurance athletes is 1.5 to 2 gram per kilograms of body weight, which is rather easy to meet. This is because protein needs are typically met by a diet rich in variety and carbs, many of which also contain a significant quantity of protein.

Fat:

Protein and carbs may be the two macronutrients that an athlete requires the most in their diet. However, what use do fats serve? Contrary to common misconceptions and out-of-date assumptions, fats are an essential component of a healthy diet. Cell membranes, joint structure, and hormone production all depend on fats. In addition, because many vitamins are fat-soluble, they must be consumed with fat in order for the body to fully absorb them. Usually, 10% to 15% of your daily caloric intake should be made up of fat. The key issue should be the type of fat that is ingested. Monounsaturated and polyunsaturated fats are regarded as healthy fats. Saturated fats also provide health benefits but should be ingested in moderation. While fats, especially artificial ones, should be avoided since they have been shown to increase dangerous cholesterols, diminish the quantity of beneficial cholesterol, and increase the risk of heart disease.

Common Eating Strategies:

Pre-Training / Competition:

Athletes usually eat a lot of carbs before a competition to optimize their glycogen reserves, especially in sports that call for endurance. According to the Journal of Sports Medicine, carbohydrate loading before a competition has benefits including a 20% delay in the onset of fatigue and a 3% boost in performance. Furthermore, several research suggest that the carbs taken before a sporting event should have a low GI. This makes it possible for an energy release to remain longer during exercise, which can improve endurance and reduce fatigue.

During Training / Competition:

It is not a coincidence that we commonly see athletes eating a tiny snack, an energy gel, or a mouthwash with carbohydrates while playing. This aids them in refueling their energy and replenishing their glycogen levels in addition to lowering their risk of hypoglycemia.

Post Training / Competition:

As was already noted, it is essential for athletes to eat in order to restore their glycogen levels and support recovery following a taxing workout or competition. The first one to two hours following exercise are ideal for taking carbs. In general, a moderate to high Glycaemic Index protein and carbohydrate mix is indicated.

Carbohydrates are essential for fuel and recovery:

Different carbohydrate recommendations are being provided based on the amount, frequency, and intensity of exercise. Wholegrain breads and cereals, which are high in unprocessed carbs, should form the basis of an athlete's diet. meals that contain more refined carbs Athletes are encouraged to adjust their carbohydrate intake to match their amount of exercise for both fuel and recuperation.

For example:

1. Light exercise (30 minutes per day): 3 to 5 g/kg per day
2. 5 to 7 g/kg/day of moderate intensity exercise (60 minutes/day).
3. 6 to 10 g/kg/day of endurance exercise (1-3 hrs/day)
4. 8 to 12 g/kg/day for extreme endurance activity (greater than 4 hours/day).

Training with low carbohydrate availability:

An athlete's training programme may occasionally require a period of carbohydrate restriction. As a more contemporary technique, some athletes now train with low body carbohydrate levels and intakes.

There is mounting evidence that strategically timed training sessions with limited glucose availability may increase certain of the muscle's responses to the training regimen. However, the benefits of this tactic for raising athletic performance are not yet obvious.

Sporting performance and glycemic index:

Foods and beverages are ranked on the glycemic index based on how "carbohydrate-rich" they are and how rapidly they raise or drop blood sugar levels. Athletes are getting more and more interested in the GI when it comes to sports nutrition.

Assuming an athlete consumes enough total energy and carbohydrates, the research generally does not show a major impact of GI modulation in the diet on exercise performance.

Although it has been proposed that eating low GI foods can help with a more prolonged energy release before exercise, the evidence is insufficient to demonstrate any performance effect.

It's possible that foods and beverages with a moderate to high GI are the best to eat or drink while exercising and in the early phases of recuperation. It's imperative to remember that the type and timing of food ingested should be tailored to individual tastes and to maximize performance in the particular sport that person is participating in.

Pre-event meal:

A vital part of the athlete's pre-workout routine is the pre-event meal. Eating a meal rich in carbs three to four hours prior to exercising is believed to enhance performance. Have a little snack an hour or two before your workout to improve performance. Drinking enough of water before an event is essential. Drinking 500 ml of liquid two to four hours prior to an event may be a good idea in general.

Some people may experience unfavorable effects from eating soon after exercise. You will probably feel worse after eating a meal that is high in fat, protein, or fiber.

Because they do not irritate the stomach, it is advisable to eat a lot of carbs shortly before doing out. A few examples of appropriate pre-workout meals and snacks include cereal and low-fat milk, toast, muffins and pancakes, fruit salad and yoghurt, pasta with tomato sauce, a low-fat breakfast bar or muesli bar and low-fat creamed rice. Liquid meal supplements may also be beneficial, particularly for athletes who experience pre-event jitters. For athletes competing in competitions lasting less than 60 minutes, a mouth rinse with a carbohydrate beverage may be adequate to improve their performance. The benefits of this strategy appear to be connected to how the brain and central nervous system are impacted.

Eating during exercise:

To keep blood glucose levels stable and avoid becoming fatigued after exercise lasting more than 60 minutes, carbohydrates must be consumed. Current guidelines state that 30 to 60 g of carbohydrate per day found in sports drinks, low-fat cereal, sports bars, or sandwiches made with white bread are adequate. It is essential to start taking in before working out and to keep up a consistent intake rate during the workout. In order to avoid dehydration during vigorous exercise, regular fluid intake is also essential. You can drink water, fruit juice that has been diluted, sports drinks, and other things.

Eating after Exercise:

After exercise, it's important to promptly replace glycogen. You should consume foods high in carbohydrates and drink fluids after working out, especially in the first one to two hours. After exercising, it's important to eat enough total carbohydrates, but the type of carbohydrates you eat also counts. This is particularly true if a subsequent training session or event is less than eight hours away. Athletes should choose high GI carbohydrate foods in this situation within the first half hour or so after exercise. Up to the reinstatement of the regular mealtime routine, this should be continued. A good place to start is with sports drinks, juices, cereal, low-fat milk, low-fat flavored milk, sandwiches, spaghetti, muffins/crumpets, fruit, and yoghurt. Since the majority of athletes incur a fluid deficit during activity, rehydrating after exercise is equally essential for attaining the optimal recovery. Athletes are advised to consume 1.25 to 1.5 L of fluid for every kilograms of body weight lost when exercising.

Protein and sporting performance:

Protein is necessary for post-workout recovery and repair and is an integral part of a training diet. Most athletes can typically meet their protein needs if they consume enough energy from their diet. Intake recommendations for protein for the general population are scarcely higher than those for athletes.

For example:

1. The general public and participants Protein intake of 0.8 to 1.0 g/kg of body weight per day is advised.
2. Athletes who compete in non-endurance sports The recommended daily intake for persons who exercise for 45 to 60 minutes each day is 1.0 to 1.2 g/kg of body weight.

3. Competitors in strength and endurance contests in sports Aim for 1.2 to 2.0 g of protein per kg of body weight per day if you exercise for extended periods of time (more than an hour) or engage in strength training like weightlifting.
4. Increasing protein intake up to 2.0 g/kg of body weight per day for athletes seeking to lose weight on a low-energy diet may help to prevent the loss of muscle mass. For athletes wanting to improve lean mass or muscle protein synthesis, consuming a high-quality protein source, such as whey protein or milk containing 20 to 25 g of protein, right before exercise may be beneficial. It is generally recommended to spread out protein consumption fairly equally throughout the day in order to obtain appropriate protein intakes; for instance, ingesting roughly 25 to 30 g of protein every 3 to 5 hours, including as part of regular meals. Because of this, it is unlikely that more protein supplements will improve players' athletic performance.
5. Potentially detrimental effects on renal and bone health.
6. An increase in body weight if protein options contain a lot of fat.

Water and sporting performance:

Athletic performance can be hampered by dehydration, which in extreme circumstances can even result in collapse and even death. It's important to hydrate properly before, during, and after exercise. Avoid delaying till you are thirsty. When participating in long, intensive, or warm-weather events that run more than 60 minutes, it's crucial to drink plenty of fluids. Sodium in sports drinks helps with absorption. For sports nutrition, a sodium concentration of 30 mmol/L (millimoles per litre) seems suitable. Although many athletes battle with insufficient hydration, overhydrating can also be detrimental. Rarely, athletes may consume excessive amounts of fluids, diluting the blood and lowering the blood's salt concentration. Hyponatraemia is a disorder that, if untreated, can lead to seizures, collapse, coma, or even death. Drinking 400 to 800 ml of fluid per hour of exercise may be a good place to start in preventing dehydration and hyponatremia, but the best fluid intake should be customized to each athlete, taking into account factors like environment, sweat rates, and tolerance.

Main purposes a nutrition plan has to fulfil in relation to sports performance:

Although a good diet offers many benefits for overall health, a nutrition plan for athletes must focus on three key goals:

1. **Provide energy for training & competition:**

Although it may seem simple, it is important for athletes to achieve their daily caloric needs while also being mindful of how those calories are ingested. When creating an ideal diet plan, macronutrients, micronutrients, ratios, meal timing and frequency, water, and supplements are all important considerations.

2. Facilitate recovery after training & competition:

After a demanding game or training session, the muscles' glycogen (or energy reserve) is depleted, and some of their proteins are broken down and destroyed. These glycogen stores are replaced by eating quickly after (or even during) exercise or competition, preventing muscle (protein) breakdown and hastening recovery.

3. Achieve & maintain optimal body weight & composition:

To maximise their performance, athletes should reach ideal body weight and body fat percentages. More importantly, a food plan needs to be created so that the athlete can follow it easily over time.

Conclusion:

Athletes need to arrange their diets in order to maximise their health and performance. They must ensure they have a diversified diet that has all the vitamins and minerals they need while also considering their calorie and macronutrient needs. Hydration and timing of meals are also crucial for all-day performance. Dietary supplements may be chosen by some athletes. An ideal diet plan, macronutrients, micronutrients, ratios, meal timing and frequency, water, and supplements are all important considerations. Glycogen stores are replaced by eating quickly after (or even during) exercise or competition, preventing muscle (protein) breakdown and hastening recovery and athletes should reach ideal body weight and body fat percentages. They should check to see whether their sporting association is okay with them and be mindful of safety and effectiveness issues. Both amateur and professional athletes can get advice from a sports nutritionist on the best diet to follow to meet their individual needs and goals.

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Neuroprotective Potential of Bacopa monnieri: A Comprehensive Study

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Abstract
This study synthesizes behavioural research with neuromolecular mechanisms putatively involved with the low toxicity cognitive enhancing action of Bacopa monnieri (Bm), a medicinal Ayurvedic herb. Bm is traditionally used for various ailments, but is best known as a neural tonic and memory enhancer. Numerous animal and in vitro studies have been conducted, with many evidencing potential medicinal properties. Several randomized, double-blind, placebo-controlled trials have substantiated Bm's nootropic utility in humans. There is also evidence for potential attenuation of dementia, Parkinson's disease, and epilepsy. Current evidence suggests Bm acts via the following mechanisms—anti-oxidant neuroprotection (via redox and enzyme induction), acetyl cholinesterase inhibition and / or choline acetyltransferase activation, b-amyloid reduction, increased cerebral blood flow, and neurotransmitter modulation (acetylcholine [ACh], 5-hydroxytryptamine [5-HT], dopamine [DA]). Bm appears to exhibit low toxicity in model organisms and humans; however, long-term studies of toxicity in humans have yet to be conducted. This review will integrate molecular neuroscience with behavioural research.
Keywords: Bacopa monnieri, Dementia, Parkinson's disease, acetylcholinesterase, b-amyloid.

Introduction:

An estimated 3.4 million people are affected by dementia in the United States (Plassman et al. 2007) most prevalently in the elderly. The elderly population (aged over 65) is expected to double by 2030. reaching 72 million, or 20% of the total U.S. population (Federal Interagency Forum on Aging-Related Statistics, 2012). Bacopa monnieri (Bm) shows great clinical potential in attenuating dementia via several mechanisms, most notably dose-dependent acetylcholine potentiation and free radical scavenging. Alzheimer's disease (AD) is a chronic neurodegenerative disease of undetermined etiology, seen in the elderly albeit rarely before 60 years except when its inheritance is autosomal dominant (Ballard et.al., 2011; Ryman et al., 2014). Combined presence of amyloid beta (Aß) and tau (τ) stands out as the hallmark of progressive AD and the basis of most disease-modifying therapy (Scheltens et al., 2016; Akiyama,2016). Initial stage of disease is characterized by the impairment of recent memory which is followed by impairment of cognitive abilities, vocabulary, and concepts (Markowitsch &S taniloiu, 2012). Early impairment of recent memory is due to involvement of median temporal lobe and hippocampus which controls recent memory (Scoville & Milner ,1957). Subsequently, involvement of other areas of brain may manifest as sleep disturbances, problems in judgment, psychological changes, pyramidal and extrapyramidal motor signs (Alzheimer's Association, 2010). According to World Alzheimer's Report 2015, global prevalence of dementia rose from 30 million (2010) to 46.8 million and global expenditure on dementia rose from US$ 604 million (2010) to US$ 818 million (2015). In India, the prevalence of dementia was 33.6 in every 1,000 people of which 54% were cases of AD (World Alzheimer Report 2015).

Currently, the effects of aging on cognitive function have become a prominent area of research. It is well established that aging is associated with a gradual impairment of cognitive function (Nandy, 1997). Age-related cognitive ability decline varies considerably across individuals and across cognitive domains. Various cognitive domains show different susceptible to aging. The basic cognitive functions most affected by age are speed of processing, memory, spatial ability, and reasoning (Hughes, 2010). Since the cognitive function is a key success factor in life, the strategy to sustain or prolong this function is one of the ultimate goals in care for the elderly. Therefore, the development of cognitive enhancers has been focused on in research.

Due to the lack of effective disease-modifying treatments, findings on pharmacological or nonpharmacological strategies to slow disease progression are of significant importance. In addition, the failure of potential pharmaceuticals in human clinical trials has highlighted the need for research into early diagnosis. The lack of effective treatments and pharmaceuticals has led to the assessment of alternative therapeutics, such as nutraceuticals. For example, many antioxidants may enhance cognitive ability (Calabrese et al., 2003; Emilien et al., 2000; Kontush & Schekatolina, 2004). Nutraceuticals have an effect on various neurodegenerative diseases as they modulate signaling pathways (Maity et al., 2019). Nutraceuticals are nutrients, herbals, and dietary supplements that can help in maintaining physical wellbeing, work against

various diseases, and ensure a better quality of life. Bacosides from Bacopa- monnieri (B monnieri) are examples of valuable therapeutic agent for neurological diseases (ND) due to their anti-inflammatory, antioxidant, and Aß This review presents current clinical studies and scientific evidences that document the therapeutic potential of B monnieri extracts (BME) such as bacosides in ND.

Bacopa monnieri (L.)

Bacopa monnieri (L.) (Bm) is an important medicinal plant in Indian traditional Ayurvedic medicines. It is a small perennial herbaceous plant commonly known as 'Brahmi', belonging to the family Scrophulariaceae. It is a renowned Indian medicinal plant that has been used as a memory booster in the Ayurvedic medicinal system for more than 3000 years (Gohil & Patel, 2010)

Traditional Aspects of Bm

Traditional Aspects of Bm According to World Health Organization, traditional medicine is defined as "the sum total of knowledge, skills and practices based on the theories, beliefs and experiences of different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses."(World Health Organization,2008) Many population in the developing countries have reverted to the use of traditional plants in maintaining their health and wellbeing (Robinson& Zhang, 2011). In this age where migration has taken a leap, immigrants tend to bring traditional plants from their country of origin to use as supplements. This has caused the promotion. These plants or plant compounds are known as complementary or alternative medicines in non-native countries. Notably, B monnieri, otherwise known as Brahmi and Aindri (Sanskrit) is classified into the Scrophulariaceae family and found throughout the Indian subcontinent in moist soil, humid, and muddy environments (Satyavati et al.., 1976) The genus Bacopa has 146 aquatic herbal species dispersed throughout the subtropical regions of the globe, including Nepal, India, Sri Lanka, Taiwan, China, and Vietnam, as well as Florida and other US southern regions. Although it can be seen in the United States, these plants are perceived as weeds in rice fields and abundantly grown in wetlands and marshes of warmer districts (Barrett& Strother, 1978). Brahmi is a succulent herb commonly grown in subtropical nations up to 1500m altitude. Brahmi, which is traditionally known as "medhyarasayana," which means brain tonic or nootropic, or in Sanskrit word, referring to intellectual, cognition, and rejuvenation because it enhances the brain's cognitive properties, is popular among Ayurveda practitioners, who use it to treat various ailments.

Bm Bioactive constituents

The main nootropic constituents of Bm are believed to be dammarane types of triterpenoids saponins known as bacosides, with jujubogenin or pseudo-jujubogenin moieties as aglycone units (Sivaramakrishna et al., 2005). Bacosides comprise a family of 12 known analogs (Garai et al., 2009). Novel saponins called bacopasides I–XII have been identified more recently (Chakravarty et al., 2001; Chakravarty et al., 2003). The alkaloids brahmine, nicotine, and herpestine have been catalogued, along with D-mannitol, apigenin, hersaponin, monniera sides I–III, cucurbitacins and plant ainoside B (Chatterji et al., 1965; Chakravarty et al., 2008; Kawai&Shibata, 1978; Bhandari et al., 2007; Phrompittayarat et al., 2007; Deepak et al., 2005, Kregel& Zhang 2007; Valko et al., 2007). The constituent most studied has been bacoside A, which was found to be a blend of bacoside A3, bacopacide II, bacopasaponin C, and a jujubogenin isomer of bacosaponin C (Deepak et al., 2005). These assays have been conducted using whole plant extract, and bacoside concentrations may vary depending upon the part from which they are extracted. In one BM sample, Rastogi et al. found this bacoside profile—bacopaside I (5.37%), bacoside A3 (5.59%), bacopaside II (6.9%), bacopasaponin C isomer (7.08%), and bacopasaponin C (4.18%).66 The complete assay of BM is an ongoing effort.

Bm pharmacological activities

It is used in traditional medicine to treat various nervous disorders, digestive aid, improve learning, memory, and concentration and to provide relief to patients with anxiety, and skin disorders; specific uses include the treatment of asthma, insanity and epilepsy (Jyoti & Sharma,2006; Calabrese et al., 2008; Kamkaew et al., 2013). The Bacopa herb, also called nootropic herb, helps in the repair of damaged neurons, neuronal synthesis, and the restoration of synaptic activity, and improves brain function. Bm contains alkaloid brahmine, nicotinine, herpestine, bacosides A and B, saponins A, B and C, triterpenoid saponins, stigmastanol, ß-sitosterol, betulinic acid, D-mannitol, stigmasterol, α-alanine, aspartic acid, glutamic acid, and serine and pseudo jujubogenin glycoside (Devishree et al., 2017). The plant possesses a wide variety of pharmacologically active principles including memory enhancing, tranquillizing, sedative, antidepressant, antioxidant, cognitive, anticancer, antianxiety, adaptogenic, antiepileptic, gastrointestinal effects, endocrine, gastrointestinal, smooth muscle relaxant effects, cardiovascular, analgesic, antipyretic, antidiabetic, antiarthritic, anticancer, antihypertensive, antimicrobial, antilipidemia, anti-inflammatory, neuroprotective, and hepatoprotective activities (Russo& Borrelli, 2005; Sinha &Saxena, 2006; Ramasamy et al., 2015).

In a 90-day oral administration trial in rats, Bm exhibited a no-observed adverse effect level (NOAEL) of 500 mg/kg and a median lethal dose (LD50) of 2400 mg/kg (Tripathi et al., 1996). The standard experimental human dose is between 150 and 3000 mg equivalent per day. The most common clinical side effect of Bm is mild gastrointestinal upset, but long-term clinical trials are lacking. Several research groups formulate bacoside standardized Bm extract for clinical use, and the herb is widely used in India, the United States, and Australia. Bm has been applied in rodents and cell culture for the following uses, which will not be detailed in this review: anti-convulsant (Mathew et al., 2011; Mathew et al., 2010) anti-depressant (Sairam et al., 2002) analgesic (Abbas et al., 2011; Afjalus et al., 2012) anti-ulcerogenic(Sairam et al., 2001)anti-H. pylori (Goel et al., 2003) anxiolytic (Bhattacharya& Ghosal, 1998),adaptogenic(Bhatia et al., 2003), anti-neoplastic (Deb et al., 2008) hepatoprotective (Ghosh et al., 2007) immunostimulatory (Yamada et al., 2011).

Neuropharmacological Activity

Bm has been studied extensively in animal models and in vitro. While Bm is implicated in the treatment of anxiety, epilepsy, and other neurodegenerative disorders, this review will concentrate on cognition, learning, and memory. The clinical studies cited focus on memory, omitting other facets of cognition like fluid intelligence or creativity. Past clinical studies were not longitudinal, typically lasting only 12 weeks. The long-term effect of Bm on humans is unknown, but animal models suggest considerable protection against age-related neurodegeneration rather than progressive toxicity or tolerance formation. Putative mechanisms of action.

Neuroprotection by Antioxidant activity:

Acetylcholinesterase inhibition, choline acetyltransferase activation, b-amyloid reduction, increased cerebral blood flow, and monoamine potentiation and modulation. Anti-oxidant/neuroprotection. Oxidative stress (OS) occurs when free radicals (chemical species with unpaired electrons, produced during normal metabolism) overcome the cell's homeostatic defense mechanisms (Kregel& Zhang, 2007) Protective, free radical–quenching enzymes include superoxide dismutase, catalase, glutathione peroxidase (GPx), glutathione reductase (GSR), and others. Anti-oxidant compounds also play a key protective role, including vitamins A, C, E, and myriad phytonutrients (particularly phenols) (Valko et al., 2007). OS plays a role in many diseases, even aging itself (De Grey,1999), by degrading ligands, peroxidizing lipids, disrupting metabolic pathways, denaturing proteins, and breaking DNA strands (Maxwell, 1995). The brain is especially susceptible to OS because it is metabolically active, possesses high levels of pro-oxidant iron, and is composed of unsaturated lipids (prone to lipid peroxidation) (Arivazhagan et al., 2002). Furthermore, the blood–brain barrier prevents many exogenous anti-oxidants from quenching reactive oxygen species (ROS) in the brain (Gilgun-Sherki et al., 2001), Anbarasi et al. (2006) assessed the neuroprotective role of bacoside A against OS in the brains of rats exposed to cigarette smoke by measuring concentrations of enzymatic and non-enzymatic anti-oxidants as well as trace elements. The researchers administered 10 mg/kg aqueous bacoside A gavage daily and found that BM significantly increased brain levels of glutathione, vitamin C, vitamin E, and vitamin A in rats exposed to cigarette smoke (perhaps an anti-oxidant conservation effect). Bacoside A administration increased the activities of superoxide dismutase (SOD), catalase, GPx, and GSR. As a result, the levels of glutathione (primary endogenous anti-oxidant conjugate) in the brain were significantly increased as well. The researchers found that cigarette smoke depletes zinc and selenium levels in the brain, which is especially problematic because zinc is a SOD co-factor and selenium is a GPx co-factor. Administration of bacoside A also restored zinc and selenium levels.

In a comprehensive study, Rastogi et al. (2012) investigated the neuroprotective mechanisms of purified bacosides (comprised of bacopaside I [5.37%], bacoside A3 [5.59%], bacopaside II [6.9%], bacopasaponin C isomer [7.08%], and bacopasaponin C [4.18%]) at dosages 50, 100, 200, 400, and 800 mg/kg per day orally for 3 months) on the aging biomarker lipofuscin , oxidative stress, acetylcholine (ACh), monoamine levels as well as behavioral deficits in the aged rat brain. Bm restored ACh and AChE concentrations to those seen in young rats. The authors supported the hypothesis (Ahirwar et al., 2012). that the primary ACh-boosting mechanism of Bm is not AChE inhibition but choline acetyltransferase activation (synthesis of ACh), and that up-regulated AChE expression is a response to heightened ACh tone. The authors assayed the integrity of CA3 hippocampal neurons, finding that Bm "profoundly" protected against age-related structural alterations. SOD and catalase (CAT) activity were not significantly improved, but GPx deficits in middle-aged rats were abolished. The increase in age-dependent protein carbonyl formation was not significantly attenuated by BM. Strong correlations between age-related biomarkers (lipid hydroperoxides and lipofuscin) and behavioral deficits were identified. Lipofuscin and 5-hydroxytryptamine (5-HT) levels were inversely correlated. Transfer latency and ambulation time in the passive avoidance test were inversely correlated with lipid hydroperoxide levels. Monoamine potentiation (5-HT and DA) was a remarkable finding, with concentrations in aged rats significantly restored to levels seen in the young. The behavioural effect was modelled using the tail-suspension depression test,

showing an antidepressant effect in accordance with past research (Sairam et al., 2002) This study demonstrated the efficacy of Bm in preventing lipofuscin accumulation and enhancing acetylcholine synthesis, monoamine modulation, and inhibition of lipid peroxidation.

Cerebral blood flow and vasodilation:

Adequate perfusion of blood to capillary beds within the brain is of highest importance. Otherwise, deficits of oxygen and nutrients will ensue alongside the build-up of cytotoxic waste. Diminished cerebral blood flow is implicated in various pathologies, including dementia (de la Torre, 2012). Kamkaew et al. (2013) compared the effect of daily oral Bm (40 mg/kg oral) and Gingko biloba (60 mg/kg oral) on cerebral blood flow (CBF) in rats. Rats treated with Bacopa monnieri saw a significant 25% increase in CBF, although Gingko biloba increased CBF by 29% (albeit at a 20-mg higher dosage) in their 8-week trial. Chronic oral Bm administration had no effect on blood pressure, whereas intravenous infusion decreased diastolic blood pressure 31 mmHg with 40 mg/kg of ether extract, correspondingly decreasing CBF by 15%. Bm appears to act as a vasodilator by releasing NO from the endothelium and inhibiting calcium fluctuations in and out of the sarcoplasmic reticulum (Kamkaew et al., 2011).

Neurotransmitter potentiation

Adaptogens enable the body to better cope with the deleterious mental and physical consequences of stress. Rhodiola rosea, and Panax ginseng are classic adaptogens. Others include Ocimum sanctum (Sweet Holy Basil or Tulsi), Withania somnifera (Ashwaghanda), Astragalus propinquus, Ganoderma lucidum (Reishi mushroom), and many others (Winston & Maimes, 2007) Bm also exhibits adaptogenic qualities. One putative action of the adaptogen is modulation of neurotransmitter production, release, and synaptic concentration. Sheikh et al. (2007) evaluated Bm's adaptogenic effect in acute stress and chronic unpredictable stress-induced fluctuations of plasma corticosterone and monoamines in the rat cortex and hippocampus. Panax quinquefolium (PQ) was used as a positive control. Immobilization stress resulted in significant elevation of plasma corticosterone levels, which was significantly reduced by Bm at oral doses of 40 and 80 mg/kg, comparable to oral PQ at 100 mg/kg. Treatment with Bm attenuated stress-induced changes in levels of 5-HT and DA in the cortex and hippocampus but was ineffective in normalizing noradrenaline (NA) levels in the acute stress model, whereas PQ treatment significantly attenuated all assayed neurochemical effects of acute stress. In the chronic stress model, pre-treatment with BM and PQ significantly elevated levels of NA, DA, and 5-HT in the cortex and NA and 5-HT in the hippocampus compared to controls. Prevention of NT depletion is the cornerstone of adaptogenic stamina enhancement, both physical and mental. Charles et al. (2011) found Bm extract up-regulated tryptophan hydroxylase (TPH2) and serotonin transporter (SERT) expression in rats.

Dementia and cognitive dysfunction:

Dementia is a global loss of cognitive ability. Aging is a major risk factor for dementia, which includes various types, such as vascular dementia, frontotemporal degenerative dementia, Lewy body dementia, and Alzheimer disease. Dementia results secondarily from many neurodegenerative disorders. The exact etiology of Alzheimer dementia is uncertain and controversial, but there is a general consensus about some of the factors that may be involved. Free radical-induced OS is one such.Factor (Munch, et al., 2002) It is unclear whether OS is primary to the disease process or a secondary by-product, but the presence of OS does appear to play a major role in illness severity (Reddy, 2007) Cell loss, impaired energy metabolism, dystrophic neurites, DNA damage, b-amyloid plaques, and neurofibrillary tangles are also thought to play key roles (Shankar et al., 2008) Researchers have also put forward the hypothesis that Alzheimer disease is at least partially mediated by insulin resistance, leading some to brand the condition "type 3 diabetes."(de la Monte& Wands,2008) Deficits in ACh are also often seen in dementia patients, and the dominant therapeutic agents are AChE inhibitors (Francis et al., 1999) Despite some controversy, cigarette smoking appears to increase dementia risk (Rusanen et al., 2011) Despite containing nicotine itself, Bm protects against nicotine-induced lipid peroxidation and mutagenicity in mice. Aqueous Bm extract (50 mg/kg i.p.) restored anti-oxidant enzymes SOD, CAT, and GPx in the liver. Bm treatment also significantly decreased the incidence of micro-nucleated polychromatic erythrocytes (micro-nucleation is a product of chromosome damage). Hepatic glutathione, alkaline phosphatase, and glutathione-S-transferase levels were brought to normal values, indicating hepatic protection (Vijayan &Helen 2007).

Scopolamine (SC) is a powerful muscarinic ACh antagonist that impairs long-term potentiation (LTP) and memory (Ovsepian, 2004) Saraf et al. (2001) found that Bm extract (120 mg/kg oral, 55.35% bacosides) effectively reversed SC-induced anterograde and retrograde amnesia (Morris water maze) in mice. Another group of researchers isolated specific triperpenoid saponins from Bm and evaluated their reversal of SC-induced amnesia in mice, finding potential in bacopaside I and XI and bacopasaponin C (Zhou, et al., 2009).

Learning and memory

Bm may have a potential application to enhancing cognition in healthy subjects. Singh and Dhawan (1987) administered rats an ethanolic whole plant Bm extract (40 mg/kg orally) for

3 or more days and evaluated cognitive performance using shock-motivated brightness discrimination reaction, active conditioned flight reaction, and continuous avoidance response tests. The Bm-treated group showed significantly better acquisition, improved retention, delayed extinction, and faster reaction times than controls. Vollalaet al.(2011) studied the effect of Bm on the dendritic morphology of neurons in the basolateral amygdala, a region implicated in learning and memory. In another study, Vollala et al. (2010) found highly significant improvement in learning and memory in rats administered. Rajan et al. (2011) investigated the effect of Bm on serotonergic receptor 5-HT3A expression as well as ACh and 5-HT levels during a hippocampal-dependent learning task.

The anticonvulsant phenytoin adversely affects cognitive function. Vohora et al. (2000) combined Bm with phenytoin on passive-avoidance, maximal electroshock seizures and locomotor activity in mice. Phenytoin (25 mg/kg p.o. for 14 days) adversely affected cognitive function in the passive avoidance task. Bm extract (40 mg/kg p.o. for 7 days) significantly reversed phenytoin-induced memory impairment. Both memory acquisition and retention showed improvement without affecting phenytoin's anti-convulsant activity, supporting Bm use as an adjuvant for epileptics and possibly a nootropic for non-epileptics. Prisila et al. (2012) found that 80 mg/kg p.o. Bm extract (55% – 5% bacosides) protects against D-galactose (D-gal)-induced brain aging in rats in a contextual-associative learning task. Bm-treated individuals showed highly significantly more correct responses and less latency than control and D-gal–treated rats.

Conclusion

Bm demonstrates immense potential in the amelioration of cognitive disorders, as well as prophylactic reduction of oxidative damage, NT modulation, and cognitive enhancement in healthy people. Biomedical research on Bm is still in its infancy, but preliminary results such as these have begun to open the research floodgates. It is critical that much longer-term studies be conducted Bm in combination with other substances, as is prescribed by the Ayurvedic system, may result in synergistic effects and should also be investigated. The social implications of cognition-enhancing drugs are promising but must be appropriately tempered with ethical consideration as researchers enter the brave new world of neural enhancement.

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Research Paper
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Production of value-added Shrikhand by using Lemongrass Juice - An Economic Study

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Abstract

This investigation highlights Lemongrass as the flavouring agent, value-added Shrikhand had prepared by the addition of Lemongrass juice with three levels of Flavouring agent i.e., 2.5%, 5%, and 7.5% Lemongrass juice used and the study was laid in Completely Randomized Block Design with three replications. The effect of all treated samples and their interaction was studied on the sensory quality of Shrikhand. The control and experimental samples of different treatments were analyzed for organoleptic qualities (colour and appearance, flavour, body and texture, and overall acceptability) by using a 9-point Hedonic scale. It was observed that the standardized Shrikhand containing 5 % Lemongrass juice (T_2) was at par with control and would be the best option for diabetic consumption` The cost of production for one kg of the product T_0, T_1, T_2, and T_3 was Rs. 217.4 ,219.3, 221.8, and 223.7 respectively.

Keywords: - Shrikhand, Lemongrass juice, Cost of production**.**

Introduction

Presently, people are highly health conscious & hence, market trends of many probiotics' products are rapidly increasing very fast to meet the growing demand of the consumer. (Pal et al., 2018). Shrikhand is a semi-soft sweetish sour whole milk product prepared from lactic fermented curd. The curd (Dahi) is partially strained through a cloth to remove the whey and thus produce a solid mass called chakka (the basic ingredient for Shrikhand). This chakka is mixed with the required amount of sugar, cardamom, nutmeg (jaiphal) etc. to yield Shrikhand. The Shelf Life is 30 days from manufacturing when stored below -18^{0}C.

Shrikhand is one of the important fermented milk products which derives its name from the Sanskrit word "Shrikharani" meaning, a curd prepared with added sugar, flavoring agents like Cardamom & Saffron, etc., and fruits & nuts. It is popular in the western part of the country, especially in Maharashtra, Gujarat & Karnataka. It is known for its high nutritive, characteristic flavour, taste, palatable nature & possible therapeutic value. It is very refreshing, particularly during summer. It can be recommended as a health food for specific patients suffering from obesity & cardiovascular disease due to its low fat and sugar content (Sameem et al.,2018). Lemongrass (Cymbopogon citratus) is a C4 tropical & sub-tropical grows. The lemongrass (Cymbopogon flexuous (Steud) Wats) is a perennial grass belonging to the family Graminaceae & grouped under the genus Cymbopogon. It is locally known by different names such as Gawati Chah: 'Nibugrass', Puthiganda, etc. in different languages. It is of indigenous origin and is a medicinal aromatic plant. (Therat et al., 2017.)

Efforts have been made to review the pertinent literature in respect of the cost of production of value-added Shrikhand Various researchers have been carried out production cost of Shrikhand efforts have been made to calculate and compare the production cost of Shrikhand after considering the significance of traditional knowledge, their combination with scientific know-how and health benefits.

Mane, et al., (2019). Studies on sugar-free Shrikhand prepared by using stevia (Stevia rebaudiana Bertoni) powder. The cost of production was increased with an increased in the rate of addition of stevia powder. Though the cost of production is increased with the addition of stevia powder, it can be compensated with the enjoyment of product taste for the diabetic patient who is prohibited from sugar. Tondare and Hembade (2019) studied the cost of production of dietetic Amrakhand using different levels of stevia leaf extract powder was higher than plain Amrakhand. They observed that the cost of production of dietetic Amrakhand per kg for treatment T_0, T_1, T_2, T_3, T_4, and T_5 were 156.38, 192.14, 195.05, 198.35, 201.60, and 204.93 rupees, respectively. Amrakhand prepared using stevia leaf extract powder proportionally increases the cost of production since it is available at a higher cost. The cost of production of the addition of stevia leaf extract powder in Amrakhand could be lower, further if the same was manufactured on a large scale.

Shrikhand is a highly refreshing and energy-dense dairy dessert due to its high fat, protein, and carbohydrate content. Hence, the current study aimed at evaluating the effect of Lemongrass juice on the sensory quality of Shrikhand to manage and control eating flavoring food. Keeping this in view, an experiment was conducted to develop value added Shrikhand. using Lemongrass juice. The present paper aims at an economic study i.e., cost of production. The present investigation was planned and executed to evaluate the suitability of Lemongrass

juice various levels with Chakka and evaluating the sensory attributes of the Shrikhand.

Ii. Materials And Methods

In this study Laboratory investigation during 2022-23 was conducted. The experiment was carried out in the Department of Dairy Science Research Centre, Yeshwant Mahavidyalaya Nanded, MS.

Control (T_0) and experimental Shrikhand:

Starter culture: Streptococcus thermophilus and Lactobacillus bulgaricus

Buffalo milk
↓
Filtration
↓
Standardization
(Fat 6% and 9% SNF)
↓
Heating (85°C for 30 minutes)
↓
Cooling (25-30°C)
↓
Inoculation (1% starter culture)
↓
Incubation (28-30°C for 10-12 hrs.)
↓
Curd (Dahi)
↓
Cutting/Breaking the Curd
↓
Drainage of Whey
↓
Chakka
↓
Addition of Lemongrass juice
(@2.5%, 5%, 7.5% weight of Chakka)
↓
Kneading
↓
Packaging
↓
Storage (5°C)
↓
Shrikhand
↓
Stored in HDPE Cups

Fig 1. Flow chart of development value added Shrikhand

(**Source**: Aneja et al., 2002)

Method: The present investigation was carried out in the Deptt. of Dairy Sci. Research Centre, Yeshwant College, Nanded in Maharashtra. An attempt was made to add value to the Shrikhand by adding Lemongrass juice three levels of white sugar i.e., 2.5, 5, and 7.5%. to evaluate suitability of Lemongrass juice with Chakka to prepare value-added Shrikhand. The materials used and method adopted are as hereunder:

Materials: Iron karahi was used for concentrating the milk and Food Processor (Make: Philips) was used. Fresh standardized buffalo milk (6% fat and 9% SNF) used for product preparation. It was drastically heat treated at 95°C for 15 min. Followed by its prompt cooling to 37°C and was inoculated with 2% active culture of Dahi. The milk thus inoculated was incubated at 37°C for 16 h, Chakka was prepared from the Dahi. Good quality Lemongrass obtained which was strained through a fine mesh sieve. Sugar used for adding sweetness to Shrikhand was brought from local supermarket. The product was prepared as detailed in the flow diagram (**Fig. 1**).

Statistical analysis: The Completely Randomized Design with three replications was used for the data analysis (Panse & Sukhatme,1985). The effect of all treated samples and their interaction were studied on the sensory quality of the product (Gupta, 1976).

Determination of cost of the product: The cost of the product was calculated at the prevalent prices of raw materials purchased from the local market of Nanded during the study period.

III. Results And Discussion

The data obtained on different aspects of costs that were tabulated have been analyzed critically within and between the treatment combinations. The cost of the ingredient is very important factor besides other factors in determining the cost of production. It is considered as a basis for price fixation and determining the profit. The price of a product is dependent on the cost of production. The Addition of Lemongrass juice is used as it is health-friendly (prepared without using any chemicals) and as a cheap source of minerals and some vitamins. The results obtained from the study with relevant discussion thereon have been presented.

The data obtained on its cost of production are tabulated and analyzed within and between the treatment combinations.

Table No.1. Economics of cost of production of Shrikhand prepared by using Lemongrass juice.

Ingredients	Per **lit./Kg rate in Rs.**	**Control**		**Experimental treatment combinations**					
		TO		**T1**		**T2**		**T3**	
		Qty.	**Cost.**	**Qty.**	**Cost.**	**Qty.**	**Cost.**	**Qty.**	**Cost.**
		(L./g.)	(Rs.)	(L./g.)	(Rs.)	(L./g.)	(Rs.)	(L./g.)	(Rs.)
Buffalo Milk(ml)	58/1lit	1000	58	1000	58	1000	58	1000	58
Culture	6	20	6	20	6	20	6	20	6
Sugar(kg)	40	69	15	350	15	350	15	350	15
Lemongrass	60/50 gm	-	-	2.5	1.5	5	3	7.5	4.5
LPG fuel charges/hr.	1200/ 14kg	15 min	5	15 min	5	15 min	5	15 min	5
Labour/hr.		120/8	6.25	120/8	6.25	120/8	6.25	120/8	6.25
Miscellaneous			3.25		3.25	-	3.25		3.25
Total product Yield obtained(g)		430	-	433	-	435	-	438	-
Cost Shrikhand obtained (Rs.)			93.5		95		96.5		98
Total Cost of Shrikhand obtained**/kg**. (Rs.)			217.4		219.3		221.8		223.7
Total Production Cost for 100g (Rs.)			21.74		21.93		22.18		22.37

The incorporation of different % levels of Lemongrass juice on the physic-chemical attributes, overall acceptability, and cost of manufacture of Shrikhand was studied.

The addition of Lemongrass juice in the production of Shrikhand prepared and the addition of 5% Lemongrass was found to be acceptable as far as the organoleptic score was concerned. Moreover, from the consumer point of view, Lemongrass had the healthier option.

The cost of the ingredient is a very important factor besides other factors in determining the cost of production. It is considered a basis for price fixation and determining the profit. The price of a product is dependent on the cost of production. The cost of experimental Shrikhand was calculated, which is shown in table No.1 from the above-presented data of cost (`/kg) of Shrikhand samples of selected treatment sample and control furnished in the table.

The production cost for one kg of Shrikhand of treatment T_0, T_1, T_2, and T_3 was Rs. 217.4 ,219.3, 221.8, and 223.7 respectively. The production cost for Shrikhand from treatment T_0 (i.e., control) was comparatively low in comparison with treatment T_1, T_2, and T_3. Hence the major ingredient affecting the cost is Lemongrass. The present investigation is supported by the findings of Mane, et al., (2019). Studied on sugar-free Shrikhand prepared by using stevia (Stevia rebaudiana Bertoni) powder. As regards the cost of production per kg, Shrikhand was lowest in T_1 (Rs. 138.12 per kg) and highest in T_5 (Rs. 215.68 per kg). This indicates that an increase in the level of stevia powder showed an increase in the cost of production of Shrikhand. This result is in agreement with Tondare et al., (2019) observed a

similar trend while calculating the cost of production of Amrakhand prepared using Stevia leaf extract powder proportionally increase the cost of production due to the cost of stevia leaf extract powder and reduction in the quantity of product. Present investigation is also in agreement with finding of Sonwane, et al., (2022) while calculating the economics of Shrikhand blended with Jaggary powder.

IV. Conclusion

From the present investigation, it is concluded that the Shrikhand prepared with 5% Lemongrass juice (T_2) is more acceptable. The cost of production of Shrikhand using different levels of Lemongrass juice is higher than the control. The cost of production of value-added Shrikhand and control (T_0) was 221.8 and Rs. 217.4 respectively.

Future Scope

The developed Shrikhand might be fruitful for health-conscious people due to its low-calorie value. There is scope for further research in standardized low-calorie Shrikhand dry instant mix for commercial production.

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Conflict of Interest: There is no conflict of interest.

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"Ultrasound" As An Application Of Physics And It's Uses In Modern Day Medicine".

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Abstract:

Ultrasound is the term used to describe all acoustic energy with a frequency higher than human hearing (20,000 hertz or 20 kilohertz). Standard operating frequencies for diagnostic sonographic scanners vary from 2 to 18 megahertz, which is significantly over the range of human hearing. Higher frequencies can be used to create sonograms with finer details because they have shorter wavelengths. Often referred to as Ultrasonography (USG), diagnostic sonography is an ultrasound-based imaging technique for spotting anomalies or lesions in subcutaneous body parts such as tendons, muscles, joints, arteries, and internal organs. Sonography is a helpful tool to observe what is happening in your body's soft tissues. Radiologists maneuver a hand-held probe called a transducer over and around the patient (sonographers).The ultrasound is coupled between the transducer and the patient using a water-based gelly. [1, 2].

USG was discovered 12 years before the X-ray (1883), but it was only used in medicine much later. Detecting submarines was the first practical application of ultrasonography during World War I. Ultrasound was first used in treatment in the 1950s. It was first used in obstetrics and then in all departments of medicine (general abdominal diagnostics, pelvic diagnostics, cardiology, ophthalmology, orthopedics, and so on) (3). Ultrasound has good vision properties and is a reasonably simple and operator-dependent study from a clinical standpoint [4,5].Since the introduction of gray-scale signal processing in 1974, B-mode sonography has become a generally accepted approach. Better spatial resolution and imaging of highly minute structures in the abdomen (0.5-1 cm) have resulted from advancements in transducer design [1].

Keywords: Ultrasound, Piezoelectric,Truma,Dynamic,Echocardiography

PHYSICS

Unlike X-rays, ultrasound requires a medium to travel through. Ultrasound waves with a frequency of 2-10 MHz are used in diagnostic ultrasound. (Audible sound frequency: 2-20,000 Hz) The pulse-echo principle underpins ultrasonography, which means that a pulse of high-frequency sound (ultrasound) is sent from the transducer and transmitted into the body. The ultrasonic vibration passes through the body until it reaches a reflecting surface, where it is reflected back to the transducer in the form of an echo. The transducer only generates pulses for less than 0.1 percent of the time, leaving it with >99.9% of the time to listen for returning echoes. The time it takes for the pulse to travel a certain distance is proportionate to that distance, allowing the position of the reflecting surface to be determined, which will be displayed as a dot on the ultrasound screen at the correct depth. The amount of the ultrasonic pulse that is reflected determines the brightness of the dot. As ultrasound travels through tissues, it grows weaker: this is called the attenuation.[2]

Interpretation: Artifacts And Other Difficulties:

Ultrasound is a technology that is known to be operator-dependent. It is a form of study that is constantly changing. Unlike radiography, where the images are an objective document, ultrasound images must be analysed as they are taken. Hard copies are typically generated to document an observation rather than to produce something that can be interpreted afterwards. In addition to having the essential knowledge of anatomy, the operator correctly prepares the patient, selects the appropriate scanning technique and machine settings, and recognises artefacts. Because ultrasound allows for imaging anatomy in any chosen tomographic plane, the capacity to think in 3D and perceive anatomical structures such as viscera is also required. The position, size, shape, echogenicity (echo intensity: hyper-, hypo-, an-, isoechoic, or mixed) and echotexture of the structures visible during the echographic exam are frequently examined (fine, coarse, uniform or nonuniform parenchymal texture, which depends on the size, spacing and regularity of the dots that form the image). For the various organs and tissues, all of these criteria are standardised. The liver, for example, is described as having a medium amount of echogenicity, a uniform and homogeneous parenchyma, and a texture coarser than the spleen. The operator's assessment of the sonographic appearance, the machine's settings and the presence of artefacts remain relatively subjective.[1,2,3]

Uses Of Ultrasound In Modern Day Medicine :

As it is rightly said by the radiologists that Air is the enemy of the ultrasound as the sound waves dissociate in the air but fluid is the friend,so taking this analogy into consideration here are few important uses of ultrasonography

Skull

USG is the most practical technique to diagnose Hydrocephalus in infants up to 18 months of age. As the age advances the ultrasound can't penetrate the bone ,therefore clinicians have to order other modalities of investigation like X Ray, CT-Scan or MRI.

Face

1. Eyes A-scan mode of ultrasound called as amplitude scan is used to measure the axial length of eyeball which is integral part of any cataract surgery while B Scan is useful in diagnosis of Retinal detachment ,Retinal Tumors, Vitreous hemorrhage
2. Using USG superficial lobe of parotid gland can be seen to diagnose any pathology relating to clinical symptoms

Neck

Ultrasound is an important investigation when it comes to thyroid gland, Benign and malignant masses can be diagnosed according to the echogenicity of the mass present in thyroid USG guided Fine needle aspiration cytology is then used to confirm the malignant Nodules of thyroid.

Chest

2D echocardiography is an important ultrasound based investigation to diagnose the abnormal dynamic changes in the heart and valve motion abnormalities.Endoscopic ultrasound is also considered useful in cardiovascular evaluation in particular cases.

Ultrasound stands in the core triple assessment of the evaluation of breast/breast examination USG is the first and foremost investigation along with mammogram to evaluate a breast lump, USG gives an idea about the nature or lump and further roadmap can be drawn by the clinician about how to approach a case of breast lump.

Abdomen

Ultrasound can be considered the most important investigation as far as the abdominal cavity is considered USG is considered as the Gastroenterologist's Stethoscope.It is used in the diagnosis of liver pathologies ,gallstones in gallbladder, distention of gall bladder .Endoscopic ultrasound a newer modality is used to visualize deep structures such as pancreas which are sometimes missed on CT scan Ultrasound is also very useful in the Obstetrics as it is Radiation less modality and easily accessible, Trans vaginal ultrasound as well as trans abdominal ultrasounds are performed Various Obstetric conditions like IUGR(intrauterine grown retardations),preterm baby ,routine AnteNatal care, Ectopic pregnancies etc. Hydrocele, varicocele testicular torsion, epididymis orchitis are other medical conditions where ultrasound is useful.

Lower Limbs

In the Lower Limbs ultrasound doppler is the investigation for deep vein thrombosis,varicose veins,peripheral vascular disease etc.

Advantages And Disadvantages Of Usg:

1. **Non Invasive Procedure**
   As we are moving towards the era of ultra modern medicine,patient compliance and patient care is the utmost priority where non invasive procedures are much more preferred than an invasive procedure for example: biopsy Ultra sound is one of the best non invasive diagnostic procedures.
2. **Non ionizing**
   As ultrasounds are not ionizing or non ionizing radiations,they are safe as far as risk of radiation is considered.
3. **Easily Available**
   Ultrasound machines are easily available at all hospitals in the cities as well as peripheral hospitals
4. **Cost effective**
   Ultrasounds can be performed at a minimal prices as compared to the MRI and they take less time.
5. **Portable**
   Ultrasound machines are portable and handy hence they are integral part of various lifesaving protocols where E-FAST(extended focused assessment with sonography for trauma) is used.
6. **Real time**
   Ultrasound Is a dynamic type of investigation where in you get the real time picture of the viscera eg:ultrasound of baby in the third trimester
7. **LImitation of ultrasound**
   It is Operator dependent The operator has to undergo training and has to have a spatiovisual orientation that is the three dimensional perspective of anatomical structures, Important landmarks in our body.

Conclusion:

Considering the developmental status of our healthcare system in India,Ultrasound, which is an application of Physics is found to be widely accepted and considered to be an integral part of

various diagnostic Protocols Taking into consideration the advantages of this application it better suits our healthcare system. Further Research and modifications in this will be a next step towards ease of diagnosis for the doctors.

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Impact on Libraries - knowledge and E Resources Management.

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Abstract

A brief discussion of the concepts of data, information, and knowledge is provided in this article, as well as an overview of knowledge and e-resources management practices in libraries. It also highlights how knowledge and e-resource management may be used to improve library services, records, and information, as well as the vital role that knowledge management plays in helping users to learn by providing them with an approach that is user-friendly in all activities(Com et al., n.d.).

The ideas of knowledge management and electronic resources are the primary emphasis of these studies.

Keyword -Knowledge management, E-Resource,Libraries,Electronic Resource.

Introduction -

One of the most significant changes in twenty-first century libraries has been the acquisition of the most effective resources for library facilitation of the aims of users. Organizational performance may be improved via the use of different management procedures that assist in the identification of knowledge sources as well as the capture of information, its storage and dissemination, as well as its renewal in an era of growth and growing global competitiveness (Abdelghaffar, n.d.).

In the context of knowledge management, this refers to the process of gathering, creating, sharing, and utilizing information efficiently. Knowledge is categorized and transformed via the use of a procedure(Shaba hat Husain, 2022).

What is management?

It is not that the art of administration was absent previously; rather, it was present at all times in various ways in a variety of organizations. The only difference is that this art system, practice, and experience were not generally recognized until relatively recently, as a result of numerous communication channels, when it transcended the borders of people organization..

Definition:

Management is a district process that includes the steps of planning, organizing, actuating, and controlling, all while using science and art to achieve a predetermined goal. Management is a district process that includes the steps of planning, organizing, actuating, and controlling.

- George R. Terry

Informally structured groups are used to accomplish tasks, and management is the skill of getting things done through and with them.

Harold Koontz.

Knowledge man't

A talk given at a European management conference in 1986 was the first time that the phrase "knowledge management" was mentioned (American productivity and quality center, 1996). Management of data acquired into information directed at a certain approach is what knowledge management is all about. This in turn assists in the continued development and distribution of knowledge. It helps to increase the value of intellectual property and the productivity of any firm (Baker &Badamshina, n.d.).

Knowledge management is the basic assumption is valuable knowledge exists and it is to be distributed in the organization to prevent invitation of wheel or to do the same mistake Knowledge management also focus on creation it production of New knowledge.

Definitions

The authors of Davenport and Prusak argue that knowledge is a fluid mixture of framed experience, contextual information, and expert insight that serves as a framework. New experience and knowledge must be evaluated and incorporated into the system(Professor Dr. Ali M. Al-Khouri, 2014).

Knowledge management can be defined as an evolving process specifically applied to a system of topics and viewpoints which can in turn, evolve major thoughts and trends.

Electronic Resources Management:(ERM)

Electronic resources are digital objects specifically made to be read with reading application operating on either a handheld device like a tablet, Smartphone, E-books, E-journals library management systems which enables the procurement storage, retrieval and a

dissemination of license terms, holdings information, entitlements and other information related the resources,

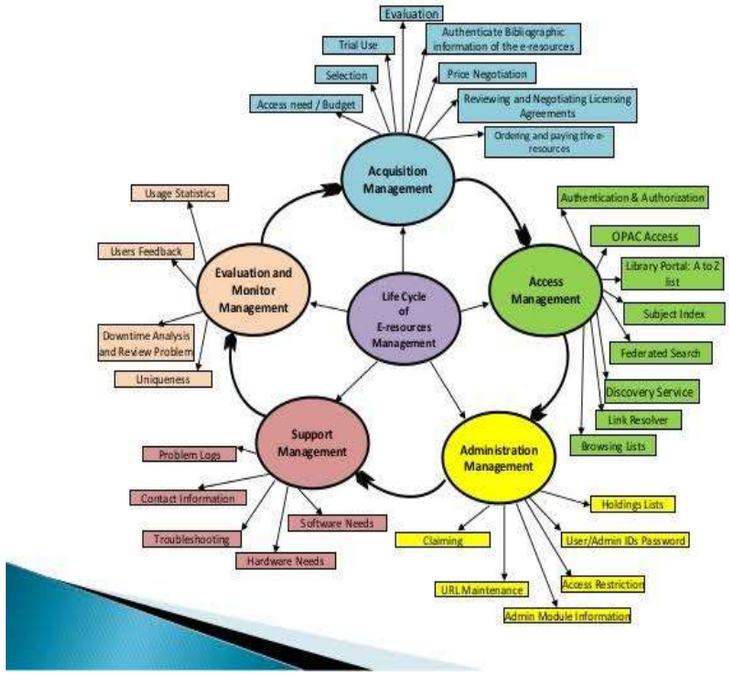

Figure 1 E-Resources (Kusturie Moodley, 2015).

When we talk about electronic resources management (ERM), we're talking about the practices and software systems that libraries employ to maintain track of vital information about digital information resources. E-books, e-journals, databases, and other internet-based resources are examples of internet-based resources. Early development of ERM began in the early 2000s, when it became evident that traditional library catalogues and integrated library systems were not built to handle metadata for resources that were constantly changing, such as numerous online items, among other things. Developing a strategy for development management (Daniel Forsman, 2010).

This collection development section is the continuing rights to electronic content, keeping in mind the value for a single penny invested in buying e-resources and with a enhance e-collection. Separate policies for different type's g e-resources like CDS, DVDs, online books, on-line journals, online databases, and at other materials.

Now a day librarians all over the world consider freely available web resources as components of collection.

Some technology skills are so common wages in management and management of e-resources are still at the users know about e-resources.

Electronic Resource Management systems have a number of characteristics.

1. Providing assistance with the procurement and administration of licensed e-resources.
2. A standalone system or one that may be combined with other library system modules are both possible.
3. It is possible to have a public interface that is independent from or incorporated within the OPAC.
4. The ability to provide resource descriptions at the package (database) level, as well as to link package contents (for example, e-journals) to the package record
5. Incorporating licensed rights such as e-reservations, course packs, and interlibrary borrowing into an encoding and maybe public display system
6. Keeping track of electronic materials from the time of purchase to licensing and ultimate access.
7. The provision of information about data suppliers, cooperative arrangements, and the access platform.
8. Providing contact information for all content creators and distributors
9. Problems with resources and service providers are being recorded.
10. Making configurable email alerting systems available (for example, sending messages to managers when actions are expected or necessary)
11. Creating a link between licensing documents and resource records (Saha, 2017).

Impact of ERMs Database on Library and Information Services

In addition to revolutionizing the library system, the abundance of Internet e-resources is also changing the way we think about information sources in general, including books. Because of this, the acquisition of information sources has been simplified and hastened, which is vital for librarians who require instant access to books, journals, and electronic publications. Access to the internet is the most convenient and efficient method for all libraries of obtaining and updating documentation, as well as the interface of their cataloguing systems and catalogues. When the materials have been scanned and digitized, the request for Inter Library Loan (ILL) may be filed through e-mail, and the photocopies can be sent either by post fax or by e-mail once the request has been approved. When it comes to information intake, the growth of information technology, as well as the broad availability of Web-based settings, have had a considerable influence on human behavior in recent years. The workflows of electronic resources, from purchases to user services and beyond, as well as the life cycle of electronic resources, differ significantly from those of print resources, owing to the fact that electronic resources are defined by access rather than by physical possession of the physical items themselves.

Finding efficient strategies to manage electronic resources in libraries is becoming an increasingly difficult topic as the number of electronic resources in libraries continues to expand. Most libraries have witnessed a large rise in the number of electronic journals, citation databases, and full-text aggregations that they contain in recent years. All of these components of managing electronic resources, including providing easy ways for library users to identify and utilize these electronic items as well as the tools essential for library staff to keep track of them, are crucial parts of managing electronic resources. Most Library items have been made available in electronic versions in recent years, such as e-journals, e-books, databases, and other comparable resources, making them more accessible to users. Because of the advantages that electronic resources offer over print resources, libraries are making the shift from print to electronic resources, either by subscribing individually or through consortiums. Recent study has found that individuals prefer electronic journals over paper ones. This is consistent with previous findings. Libraries have struggled to maintain control over the information contained in paper files, integrated library systems, independent databases maintained on local computers, and networked computers as the number of electronic resources available for licensing has increased dramatically in recent years(Saha, 2017).

Conclusion

Knowledge management is a new field that is attracting the attention of librarians. It has been established in corporate America and is now making its way into public service and educational institutions across the country. Higher education and librarians can utilize knowledge management to help their organizations accomplish their objectives.

As more as libraries are marching towards E-Library, Future success of the professionals depends heavily on how efficiently and successfully they manage electronic resources.

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Water Security in Punjab: Issues and Challenges

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Abstract

Water resources are epitome of Punjab. But, the mismanagement of water resources is making Punjab – a water deficit state. Increasing urbanisation, industralisation and agriculture is exerting pressure on water resources of Punjab. Punjab is an agrarian state, depends entirely on its land and water resources for the socio-economic development. Agriculture is the driving force of the economy of Punjab. However, due to extreme exploitation and misuse of resources to develop agriculture, through high yielding varieties of seeds, chemical fertilizers and a significant amount of water is bringing Punjab's economy at plateau stage. Punjab which was a model state for the country, entered into the disaster zone. Therefore, the present research focuses on essential factors like urbanisation, agriculture, irrigation, chemical fertilizers and political opportunism which has affected water resources of Punjab.

Keywords: Contamination, Electricity Subsidies, Irrigation, Minimum Support Price, Pesticides

Introduction

Water is the shaping force of our planet Earth, intrinsically woven into human race (Jagerskog et al., 2016). The presumption of freshwater resources being infinite, considering it covers 70 per cent of the planet, is absolutely false. Only 2.5 per cent of the total water on the earth is freshwater and can be consumed by humans. Out of this total freshwater, 68.7 per cent is frozen in ice caps, 30 per cent is stored as ground water and only 0.3 per cent is available on the surface of the earth. Out of the surface water, 87 per cent is stored in lakes, 11 per cent in swamps and 2 per cent in rivers (Pegram, 2010). With huge advances in technology, humans have tried to harness many of world's natural waterways by building dams and water irrigating systems, due to which ecosystems are being destroyed and sometimes damaged permanently. Consequently, water resources world-wide are determined by various natural processes and anthropogenic interferences (Van Oel, 2009). The freshwater scarcity can be described in terms of rising demands, depletion and pollution of water resources (UNEPFI and SIWI, 2005). Water shortages can be associated with declining groundwater levels, increasing contamination and problems in allocation, leading to serious drought conditions all over the world (United Nations, 2007). But, we cannot say that there is physical water scarcity on earth as there is enough freshwater on planet for 7 billion people. Conversely, it is not evenly distributed and much of it is polluted, wasted and is used inefficiently. Thus, water scarcity can be defined as lack of enough water, that is, physical scarcity or lack of access to water, which can be called as economic scarcity.

Statement of the Problem

The water security is the critical issue driven by population growth, unplanned urbanisation, industralisation and economic-political situations. In addition to rapid rate of urbanisation, change from dietary habits to varied diet like staple cereals, livestock and fish products, the consumption of water has increased manifolds (United Nations, 2007). It is projected that by 2035, 40 per cent of the world population will reside in water stressed regions (Planning Commission, 2011). Water demands are expected to increase by 400 per cent from manufacturing sector and 130 per cent from household use (Guppy and Anderson, 2017).

Although, India is not a water scarce country, but due to escalating growth in human population, vast irrigation systems, increasing industralisation and urbanisation, lack of planning and co-ordination in various government departments, and depletion of groundwater resources, India is becoming a water scarce nation. As per Government of India (2012), the per capita water availability in the country is reducing day after day due to increase in the population. With continuously declining per capita water availability, from about 5,177 cubic meters in 1951 to 1,816 cubic meters in 2001, which further reduced to 1545 cubic meters in 2011, India can be categorized as water scarce country. The average annual per capita water availability is estimated to drop down to 1,341 cubic meters by 2025 and 1,140 cubic meters by 2050 (Government of India, 2012). Punjab is facing multiform and diverse water crisis. The very name of Punjab stands for abundance of water (land of five rivers), but the present situation of water resources in this region is highly critical with surface water pollution, groundwater pollution and depletion.

Results and Discussions

Post-Independence, the Green Revolution ushered in late 1960s in Punjab with motive to achieve self-sufficiency in food and cereal crops. With debarkation of Green Revolution, the agrarian economy of Punjab advanced expeditiously. With change in cropping pattern from

rainfed to water intensive crops, Punjab has witnessed rapid fall in groundwater table. With overwhelming dependence of water for irrigation, groundwater was extracted indefinitely by sinking tubewells (Planning Commission, 2011). Historically, Punjab has never been a rice growing area. Table 1 shows the major agricultural growth drivers in Punjab, which have worked as catalyst in increasing the agricultural production.

Table 1

Agricultural Growth Drivers of Punjab (1970-71 to 2015-16)

Agricultural Year / Indicators	1970-71	1980-81	1990-91	2000-01	2010-11	2015-16
Gross Cropped Area (000'ha)	5,678	6,763	7,502	7,941	7,882	7872
% of Net Irrigated Area to Net Sown Area	71	81	93	93	97.9	99.9
Area Irrigated by Canals (000'ha)	1292	1430	1660	962	1113	1201
Area Irrigated by Tubewells (000'ha)	1591	1939	2233	3074	2954	2936
No. of Tube wells (Lakh)	1.92	6.00	8.00	10.73	13.82	14.7
No. of Tractors (Number)	5,281	1,18,845	2,89,064	4,34,032	5,04,310	5,36,429
Agricultural Consumption of Electricity (In Million KWH)	463.4	1849.7	5104	5534	10116	11513
Consumption of Chemical Fertilizers (000'nutrient tonne)	213	762	1220	1313	1911	1943
Cropping Intensity (%)	140	161	178	186	190	190

Source: Statistical Abstracts of Punjab 1971, 1981, 1991, 2001, 2011, and 2016

The data reveals that the gross cropped area has increased from 5678 thousand hectares in 1970-71 to 7872 thousand hectares in 2015-16. The percentage of net irrigated area to net sown area also witnessed increase from 71 per cent in 1970-71 to 99.9 per cent in 2015-16. The area irrigated by canals witnessed decline from 1292 thousand hectares in 1970-71 to 1201 thousand hectares in 2015-16. Whereas, sharp rise is observed in the area irrigated by tubewells from 1591 thousand hectares in 1970-71 to 2936 thousand hectares in 2015-16. The number of tubewells installed rose from 1.92 lakh in 1970-71 to 14.7 lakh in 2015-16. The increase in number of tubewells also lead to increase in the agricultural consumption of electricity from 463.4 million KWH in 1970-71 to 11,513 million KWH in 2015-16. The consumption of chemical fertilizers also rose from 213 thousand nutrient tonnes in 1970-71 to 1943 thousand nutrient tonnes in 2015-16. The number of tractors in Punjab also rose from mere 5,281 in 1970-71 to 5,36,429 in 2015-16. Due, to above all agricultural inputs, cropping intensity in Punjab rose from 140 per cent in 1970-71 to 190 per cent in 2015-16.

The area under maize and bajra was replaced by rice. Table 2 shows that Punjab had well-diversified agriculture in 1970-1971, whereas in 2015-2016, the agriculture of Punjab shows monoculture cropping pattern. The area under wheat was 2299 thousand hectares in 1970-1971 which rose to 3506 thousand hectares in 2015-2016. Similarly, the area under rice was merely 390 thousand hectares which rose to 2970 thousand hectares in 2015-2016. The maize crop which holds a noticeable position in the cropping system of Punjab has seen a significant decrease from 555 thousand hectares in 1970-71 to 127 thousand hectares in 2015-16. There has been a severe decline in the area of bajra, jowar, groundnut, barley, and gram crop. However, sugarcane, pulses, cotton, rapeseed and mustard, and potato show fluctuations in the area of crops. The production of wheat and rice has doubled in 30 years. Punjab agriculture has achieved progress with the adoption of modern agricultural technology. However, the Green Revolution in Punjab is just confined to the production of wheat and rice.

Paddy became the first preference of farmers due to better and assured returns which replaced other crops.

Due to which, the withdrawl of ground water surpassed the replenishable rates, which led the state to groundwater development stage of 145 per cent, against the national average of 58 per cent. (Narula and Lall, 2009). Groundwater declined at an alarming rate in Punjab, except low lying areas of water logging and salinization in canal command areas. Further, subsidized electricity and minimum support price encouraged rice crop, which resulted in increase in net cropped area of rice by 2.5 times in last two decades (Narula and Lall, 2009). Consequently, Punjab state seems to be doomed in water and energy nexus with skyrocketing fiscal deficits.

Table 2 The shift in Cropping Pattern of Punjab from 1970-71 to 2015-2016

(Area in Thousand Hectares)

Crops/ Year	**1970-71**	**1980-81**	**1990-91**	**2000-01**	**2010-11**	**2015-16**
Rice	390	1183	2015	2612	2830	2970
Wheat	2299	2812	3273	3408	3510	3506
Maize	555	382	188	165	138	127
Bajra and Jowar	207	69	12	6	3	-
Groundnut	174	83	11	4	2.2	1.7
Cotton	397	502	137	358	470	331
Sugarcane	128	71	101	121	70	92
Seasum	15	17	18	19	6.6	8.2
Barley	57	65	37	32	12	12
Gram	358	258	60	6	2.7	1.9
Rapeseed/Mustard	103	136	69	55	32	31.6
Potato	17	40	23	60	64.4	91.6

Source: Statistical Abstracts of Punjab 1971, 1981, 1991, 2001, 2011, and 2016.

With the mechanization of agriculture, there was a shift from centrifugal to submersible pumps which increased the agricultural consumption of electricity. Though the role of electricity subsidies cannot be ignored, and has been used as an electoral incentive by political parties of Punjab nowadays. With flat water tariff rates, electricity subsidies and minimum support prices for rice, tubewell irrigation flourished which exploited both water and power resources of Punjab. This increase in tubewell irrigation is due to high yielding varieties, liberal loans by the State Development Board and subsidies on electricity consumption by tubewells. The development of irrigational facilities with extensive mechanization has increased gross cropped area.

The extravagant use of fertilizers, insecticides and pesticides for ginormous agricultural production has unfolded into groundwater pollution and surface water pollution in Punjab. Freshwater resources are supplemented with chemicals and sewage discharge from industries and urban areas, with major contaminants like nitrate, iron, cadmium, aluminium, and magnesium, which can cause critical health diseases (Planning Commission, 2011). Sewage discharges, chemical run off from agricultural fields and untreated effluents from industries are directly discharged into rivers and streams, which are main culprits of surface water contamination. Large scale use of chemical fertilizers, insecticides and pesticides in agriculture has contaminated and added chronic toxicity in soil and water resources of Punjab leading to groundwater quality degradation. Consequently, high levels of arsenic, uranium, fluoride and selenium poisoning are traced in groundwater of Punjab, which has made groundwater resources unfit for drinking and agricultural purposes.

Conclusion

The forthcoming water crisis in Punjab can not only eclipse the agriculture and economy but, also ruined the ecology, health, life style and social fabric of the state. Introduction of HYV seeds, shift of cropping pattern to water gulping rice in cropping pattern of Punjab, groundwater extraction through tubewells and electricity subsidies are major reasons of depletion and exploitation of water resources. Further, Punjab's economy is been downtrodden by the weight of electricity subsidies which is pushing Punjab into the ocean of debts. Therefore, there is an urgent need for taking up research and studies based on adequate and reliable data. So, it can be concluded that man-made environment is playing a vital role in affecting the water resources of Punjab. The agriculture of Punjab needs a new version to redefine the cropping patterns. Immediate steps should be taken by policy makers to diversify cropping pattern and control electricity subsidies.

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Research Paper

Study of pesticides: Classification and Effects

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Abstract

Pesticides are a material capable of selectively killing a pest in a Biological Community. Mostly used groups of pesticides are insecticides, Herbicides, fungicides, rodenticides, Molluscicides.The main purposed of this paper is to critically look out major impact of pesticides towards the health and environment. The different literature of relevant topics is collected and reviewed on their adverse effect to environment and health. Those effects are very harmful to health as wellas for the environment therefore control of their used in a proper way is necessary. By properlytrained the farmers and other people regarding their effect and process of screening may lessenthis pesticide problem.

***Keywords*:** pesticides, mitigate, environmental impact, harmful pest, fumigant, rodenticides

Introduction:

The term pesticide covers a wide range of compounds including insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators and others. (Aktar *et al.*, 2009) Pesticides are toxic chemical substance or mixture of substance or biological agent that are deliberately released into the environment in order to kill, prevent, deters, control, destroy, repel or mitigate population of insect, weeds, rodents, fungi, or other harmful pest in agricultural, domestic and industrial setting. Pesticide serves as regulator or modifiers that work by destroying the pest. In agricultural field the insecticide is used to increase the production of quality through controlling pest and pest related disease. The main groups of commonly used pesticides are insecticide, fungicides, fumigants, and rodenticides. Insect are the major fountain of crop vandalism. The use of pesticide has become a common practice and it increased many folds over the past few decades. It estimated that about 5.2 billion pounds of pesticide are used worldwide annually (Alavanja, n.d.). Pesticides are toxic chemical substance or mixture of substance or biological agent that are deliberately released into the environment in order to kill, prevent, deters, control, destroy, repel or mitigate

population of insect, weeds, rodents, fungi, or other harmful pest in agricultural, domestic and industrial setting. Pesticide serves as regulator or modifiers that work by destroying the pest. In agricultural field the insecticide is used to increase the production of quality through controlling pest and pest related disease. The main groups of commonly used pesticides are insecticide, fungicides, fumigants, and rodenticides. As pesticides are responsible for several adverse effects on human health other than acute intoxications. Many studies have reported associations between exposure to agricultural chemicals and various health outcomes, including different kinds of cancer (Daniels *et al.*, 1997, Khuder and Mutgi, 1997; Zahm and Ward, 1998) and degenerative diseases (Engel *et al.*, 2001; Jenner, 2001). Effects in immune, hematological, nervous, endocrine and reproductive systems have been reported (Ojajarvi *et al.*, 2000; Ritz and Yu, 2000; Figa-Talamanca and Petrelli, 2001; Mourad, 2005) and these compounds have been also associated with DNA damage in human populations (Gomez-Arroyo *et al.,* 2000; Undeger and Basaran, 2002; Costa *et al.*, 2007; Ergene *et al.*, 2007; Muniz *et al.*, 2008). Exposure to low-level of pesticides is known to produce a variety of biochemical changes, some of which may be responsible for the adverse biological effects reported in human and experimental studies (Gupta *et al.*, 1998; Banerjee *et al.,*1999; Panemangalore *et al.*, 1999). Conversely, some biochemical alterations may not necessarily lead to clinically recognizable symptoms, although all the biochemical responses can be used as markers of exposure or effect (Panemangalore *et al.*, 1999).

1. **Aim And Objectives:**
   The main aim of present study is too look out the effects of pesticides on health and environment. The second objective is to systematic study of the work done by other author.
2. **Material And Method:**
   Though there was no specific method for reviewing articles. So, different literature of relevant topics was collected and studied thoroughly. Books and journals were collected and studied the article and papers about pesticides and toxicology. Besides library work different websites on internet was searched for necessary data.
3. **results:**
   Misuse of pesticide induced tremendous effect on health and environment. The various effects of pesticides on health and environment are as follows -

Effect of pesticide on environment:

Mostly farmers and field workers are illiterate or they less educated and they hence applied pesticides without screening and proper specific information, due to which various hazardous effect posed on environment. Myriad use of pesticide without screening on daily basis also affects the non-target organism. Due to irregular screening sometimes, they used pesticide abundantly after damaging the crop. Ultimately those are persisting for long time in the environment and causes environmental pollution specially soil pollution. The innumerous useof pesticides also kills the helpful microorganism as a result of which the self-fertility property of soil is reduced.

Regarding pesticides it is important to have practical understanding of their physical and chemical properties, since their solubility determine the transportation of surface runoff and absorbing capacity of soil. In environment the pesticides are tempo rated long distance and their deposition to water causes water pollution. In several cases pest are resistances to a particular pesticide as effect of natural selection, which cause hazards to non-target organism and cause sudden death of that organism. On the contrary, the pesticides which are demoted through photodecomposition, microorganisms, or through physical or chemical reaction. But the un-demoted pesticides are remaining on environment over long time which greatly causes environmental damage. The long-time persisting pesticide causes hazards to biodiversity of aquatic or terrestrial organism. Pesticides are entered to aquatic ecosystem that act as toxic agent and causes hazard to aquatic plant and animal.

Effect of pesticide on health:

Human beings are highly vulnerable to deleterious effect of pesticide due to nonspecific nature, haphazard application or misuse of pesticide. The pesticide enters human body through ingestion, inhalation, penetration (skin) but majority of people get affected via intakeby pesticide contaminated food. Pesticide shows acute as well as chronic effects which are-

A. Acute effects of pesticides:

Acute effects of pesticide include headache, skin irritation, itching, rash and blisters, diarrhea, abdominal pain, nausea, vomiting, blindness etc.

B. Chronic effect of pesticide:

Long term effect of pesticide damage body organ and diseases as follows-

1. **Neurological**- pesticide cause neurological health effects include memory or learning disability, vision, impairment, signaling disability etc.
2. **Immune**- immune effects include hypersensitivity, asthma, and allergic reaction.
3. **Carcinogenic**- pesticide associated with brain cancer, prostate cancer, ovarian cancer etc. It is estimated that worldwide chemical exposure is responsible for 4% of all death from cancer(Abdelbagi *et.al* 2005).
4. **Endocrine disruptors**- pesticide act as endocrine disruptors as it is interfered with endocrine system by blocking/mimicking, displaying, and the hormone in living organism. Mainly theyconfirmed estrogenic action as affect the reproductive system such as still birth, miscarriages, and abortion infertility etc. endocrine receptor also mimic insulin thereby block the insulin receptor site and cause diabetes mellitus.
5. **Other**- long term exposure of pesticide also damage liver, lung, kidney etc.

Table no 1- Different classes of pesticide and its health effect

	rganophosphor us Pesticides	**Carbamat es Pesticides**	**Organochlor in Pesticides**	**Pyrethrin and pyrethroids Pesticides**	**Tria zane s Pest icide s**	**Pheno xy Derivat ive Pestici des**	**Dipyridy l Derivati ves Pesticid es**
EXPOSITION	Skin, conjunctiva, gastrointestinal tract, and lungs	Lungs, gastrointes tina l tract, and skin	Lungs, gastrointest inal tract, and skin	Lungs, gastrointesti nal tract, and skin	Skin, eye, nose, and gastr ointe s tinal tract	Lungs, gastroin tes tinal tract	Skin, eye, nose, and gastrointe sti nal tract
SIGN AND SYMPTOM	Muscarinic syndrome and nicotine	Miosis, salivation, sweating, tearing, behavioral	Dizziness, headache, nausea, vomiting, diarrhea, muscle	In coordination prostration, drooling irregular movement of			

	syndrome, resulting of excess acetylcholine in the synaptic cleft	change	weakness, mental confusion, anxiety	limbs and hypersensitivity to stimuli			
TREATMENT	Maintenance of vital function and cholinesterase levels. Avoid the use of parasympathomimetic agents.	Maintance of vital function and cholinesterase levels. Avoide the use of parasympatho mimetic agents.	Maintance of vital function and administer diazepam and Phenobarbital to control seizures.	Decontamination of the skin and eyes, besides basic maintenance of vital functions.			

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Research Paper
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Nutritional quality in Millets and their health benefits.

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Abstract:

Now it is an established fact that the whole world is facing many health challenges because of fibreless food. Using daily intake of wheat, rice, refined food, processed meat, packed food, so many disorders are created in Human body. Cultivated grains in the words. Millets is a good source of protein, fibre, vitamins, and minerals. The potential health benefits of millets include protecting cardiovascular health, preventing the onset of diabetes, helping people achieve and maintain healthy weight and managing inflammation in the age.

Millets are impressive, hardy, cereal crops that are low maintenance and drought – resistance thriving in semiarid environments.

Key words: Millets, Antioxidant, Gluten free, high fibre, celiac disease.

Introduction:

The term village does not refer to a single type of grain, rather to a group of small seeded, annual grasses. Millet is an indigenous crop in Africa and Southeast Asia. Millets is one of the oldest cultivated grains in the words. Millets are impressive, Hardy, serial crops that are low maintenance and drought resistance semiarid environment. Millets also grow at an unprecedented rate, maturing in as little as 60 days. Millets in an indigenous crop to India that comes with an impressive nutrient profile. They are formed as "poor mains food grain".

Now it is an established fact that the whole world is facing many health challenges because of fiber less foods. The gallery content of millets is low, and they are a excellent food product for weight loss. Millets boots your immunity. Low glycaemic index in millets. Millets is a good source of protein, fibre, vitamins, and minerals. The potential health benefits of millets include protecting cardiovascular health, preventing the onset of diabetes, helping people achieve and maintain of healthy weight and managing inflammation in the age. Millets have multiplied their benefits in include this ancient, prized grains - like seed in our regular diet. Full feeling the nutritional need of global population as a nutritious food. Effectively and to reduce the problem of malnutrition and other health problems.

Objectives:

1. To introducing the millets.
2. To know the importance of millets
3. To know the nutrition of Millets
4. Explain the health effect of eating millets.

Hypothesis:

1. Millets is for health.
2. All economic group can eat millets.
3. Twice a day eating millets will result in weight loss.
4. Millets is rich source of fiber, minerals & antioxidant.
5. Millets is low calories & sugar.

Discussion:

Millets are divided two broad categories.

Naked grains and Husked grains

1. Naked grains – Naked Grains refer to millets devoid of the though, indigestible husk, namely Bajra, Jawar and Ragi. These millets don't require processing after harvesting. Can be consumed right after cleaning. These millets are there for significantly cultivated today.
2. Husked grains – Kodo, foxtail and little millets belong to this second type of millets consist of an indigestible seed code that has to be removed before consumption. The processing once done by hand or mechanical. These millets making them less popular.

Types of millets:

1. **Sorghum** – Sorghum or Jawar is a staple food item. It is a complex carbohydrate that digests slowly. Sorghum is known to be rich in phenolic compounds and antioxidants. Sorghum is high content of dietary fibre beneficial for Celiac's diseases. It helps in weight control, provides strong bones.
2. **Foxtail millet**– foxtail millets full loaded proteins and complex carbohydrates regulate blood sugar spikes, diminished bad cholesterol levels, and increase good cholesterol in the body. While being rich in Iron and Calcium in maintenance healthy blood levels and strengthen bones.
3. **Finger millets** – Ragi is a more common name for finger millets. It is used as help their cereal substitute for rice and wheat. Ragi is gluten free and reach in a protein and amino acids. Ragi is supposed the brain development is growing children.
4. **Pearl millet** – is called Bajra. Bajra is incredibly contains minerals such as calcium and magnesium, protein, fibre, and iron. Practice of regular consumption of pearl millet to fight

type II diabetes and support weight loss. But it is used after soaking because pearl millet has a large amount of phytic acid.

5. **Little millet** – Little millets or kutki is a great millets option for all those fitness enthusiasts as it serves as a healthy millet. You can eat is a rice replacement. It is high in fiber and filed with numerous Minerals and antioxidants.
6. **Buckwheat** -Buckwheat is used to lose weight. It makes for a healthy food option for diabetes, cures low blood pressure and improve cardiovascular health. Buckwheat also fights against diseases gallstones, childhood asthma and breast cancer.

Nutritional Content in 100 gm of dry grains.

Millets	Protein gm	Carbohydrates gm	Fat gm	Minerals gm	Fiber gm	Calcium Mg	Phosphorus mg	Iron mg	Energy K Cal.	Thiamine Ug	Niacin Ug
Foxtail	12.3	60.2	4.3	4.00	6.7	31	200	1.3	351	0.59	3.2
Little	7.7	67.00	4.7	1.7	7.6	17	220	1.7	329	0.15	2.0
Kodo	8.3	65.9	1.4	2.6	5.2	35	188	2.9	353	0.41	4.5
Sorghum	10.4	70.7	3.1	1.2	2.0	25	222	5.4	329	0.38	4.3
Pearl	11.8	67	4.8	2.3	2.3	42	240	11	363	0.38	2.8
Finger	7.3	72	1.3	2.7	2.6	34.4	283	3.9	336	0.41	1.1

Source: National Institute of Nutrition Hyderabad.

Health benefits of millets:

Calorie Contents of millets is low, and they are an excellent food product for weight loss. Not just those looking to lose weight it benefits people who are conscious of their energy too. It helps them to maintain their energy level throughout the day without having to eat to refuel themselves constantly. Millets also keep you settle for longer than other carbohydrates. When you consume them, you feel fuller for longer as they take time to get digest and absorbed into your body. That prevents making and overeating.

Millet is good source of rich fibre that benefits digestion by alleviating, bloating, gas and constipation. Good digestion keeps issues like gastric colon cancer and kidney, liver complications away. Millets are gluten free foods and beverages that can be suitable for celiac disease person (Taylor and other 2006) Lignans which is present in millets helps from breast cancer as it is converted into mammalian Lignan. Millets are rich in antioxidants such as Phenolic, tannins and phytates which help reducing which is effective for prevention of cancer intention progression (Chandrasekhar A. Et al. 2011)

Millets contain essential fat which provide our bodies with good fat which prevent excess fat effectively & lowers the risk of high cholesterol, strokes and other heart complications. The potassium contents in millets regulates your blood pressure and optimises your circulatory system. Millets are good source of magnesium which help in reducing heart attack, rich phytochemicals help in lowering cholesterol and prevent cardiovascular disease. Vit.B3,B6 can help lower cholesterol (Lee et al 2010) Millets have a low glycaemic index; therefore, consumption of millets regularly will lower your risk of developing diabetes. The whole grain foods consumption is effective for the prevention and management of diabetes millitus, and showed that millets intake population epidemiologically lower of diabetes (American diabetes Association 2005, kim and other) Millets provide a great source of protein and can help develop and strengthen and Boost Your immunity.

Millets help your body detox because of, their antioxidant properties, curcumin, ellagic acid and other valuable catechins flush out toxins from body and nutralise the enzymatic actions of your organs.

Conclusion:

The aim of the study is to help the people to recognise the importance of food and to introduce the millets as a nutritious food, full feeling the nutritional need of global population and to find way to consume the millets nutritionally, effective and to reduce the problem of malnutrition and other health problems. Significant benefits, with their rich content of nutrients like fibre which help in metabolic disorders like diabetes, obesity, cardiovascular diseases etc. They are good protein content with help in child growth and development with calcium content with help in the bone development with geriatric people. Good iron content help in ailing of anaemia and with gluten free characteristics helps the celiac this is a patient and help in gluten insensitivity phytosterols and policosanols are cardio – protective compounds present in the wax layers of the millets. If these millets are ground into flour without hulling, then one can have multiply benefits. Millets have antioxidant, which are substance that may protect your sales against the effect of free radicals. Thus, using millets twice a day in a regular diet promotes weight loss.

Suggestion:

Millets most be avoided by thyroid issues people. Millets contain goitrogens that may interfere with the absorption of iodine which could be reduced in the cooking process, yet not negated completely hence those with hypothyroidism mast steer clear of millets.

Phytic acid strong in pearl millets and phytic acid which is an anti nutrient that could reduced the observation of other nutrients but soaking, sprouting or fermenting the millets which will breakdown the anti nutrient and reduce its negative effects.

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The Study of Impact of Pilgrimage on Tourists Destination - A case study of Ozar Pilgrim Center in Pune District

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Abstract

The economy of the host region benefits greatly from tourism. It is extremely important in terms of economic growth and job creation. Tourism development has its own impact on the host region's economic, environmental, socio-cultural, and political development. It creates an opportunity for development of host country and communities. Tourism is a globally prominent socio-economic phenomenon that has grown to turn into one of the greatest sectors with cultural activities. For tourist destinations, it is very important and integral component of life. Every tourist place has its own unique characteristic such as scenic beauty, heritage monument, healthy climate, renowned architecture, biodiversity, religious importance, etc. Tourism has economic, physical and socio-culture impact on the host population of the destination.

Now a days tourism industry is one of the global, dynamic and largest developing economic sectors. It helps to initiate infrastructure development, foreign currency inflows, introduction of new educational and management experience, etc. This affects the economy positively and contributes to the social development too. Therefore, the present research paper highlights the major impacts of pilgrimage on physical, socio-cultural and economic aspects at Ozar Pilgrim center.

Introduction: - Tourism is one of the most important economic sectors in India. This sector contribution to national income and employment generation is a huge. It is the one of India's fastest growing industries. (Hajare and Hajare, 2013). It is very necessary to give attention towards the impacts of the pilgrimage to avoid and control the disadvantages and harmful impacts of pilgrimage and to promote the advantages and positive impacts of growth in tourism industry. The positive impact contributes to the welfare of the society, whereas negative impact contributes to harmful effect on society. The development of pilgrimage leaves there impact on environment, economic and socio-culture condition of tourist destination, this change is like a double-edged sword.

The relationship between environment and tourism is symbiotic. It will help to sustain tourism for tourist and host. For the future generation, it is essential to reduce harmful effect on environment along with host population. The responsibility of conserving the destination lies with the tourism planners. Tourism planners should ensure that tourism development would not destroy the attractive landscapes and delicate environment through over exploitation. Due to tourism growth two possible situations happens between environment and tourism. One is tourism sustained through harmony with nature, and second is overutilization of the natural landscape and environment by encouraging excessive number of visitors which will affect natural wealth adversely.

Objective: - Major objective of the study is to assess the Physical, Economic and Sociocultural impacts of Pilgrimage at Ozar Vigneshwar Ganpati Temple (One of the eight Ashtavinayak) in Junnar Tehsil of Pune district.

Study Region: - Ozar is situated in Junnar tehsil of Pune district resting on the banks of River Kukadi close to the backwater of Yedagaon dam. Ozar is 85 kilometres in North of Pune and about 9 kilometres north of Narayang Ozar are 85 kilometres north of Pune and about 9 kilometres North of Narayangaon. This place is on Pune-Nasik national highway.

Methodology :- The current research is based on primary along with secondary sources of information. Intensive field surveys were done to acquire primary data. Questionnaire and interview methods were used during field surveys. The Likert scale measures data regarding impacts of religious tourism and analysis is done. For the analysis of the attitude of community towards development of tourism, 151 residents were selected randomly from Ozar. For this measurement scale, total 27 variables are considered which reflects the effect of pilgrimage on locals. Among them 10 variables reflect physical facility impact, 9 variables reflects economic impact and 8 variables reflects socio-cultural impact of pilgrimage on resident. A set of questionnaire was design. Every response was graded on a seven-point "Likert Scale" ranging from - 3 to +3, with zero indicating no affect on the item as a result of the pilgrimage. For each attitude statement, there were seven possible responses. Strongly disagree, moderately disagree, disagree, uncertain, agree, moderately agree, and strongly agree are the options. The resulting seven-point scale (-3, -2, -1, 0 +1, +2, +3) might be used to determine an individual's overall attitude (-3, -2, -1, 0 +1, +2, +3).This technique gives us not only direction (agree - disagree) but also degree of promise to that response (Likert, 1932), (Ramotra, Potdar, 2009). In this research, the analysis of mean and standard deviation methods were used to find out the significant association between the residents attitude about the factor influencing the effect of tourism on selected pilgrims centers.

Discussion

1. Physical Impacts Indicators of Pilgrimage

Tourism development is dependent on the environment. The goal of tourism development is to conserve and improve the environment in a long-term manner. The natural and man-made environment's quality is used in the promotion and creation of the tourism destination's image. Tourism and the environment get along swimmingly. When the number of tourists and their level of consumption exceed the capacity of the environment, there is a negative influence on the environment. Protecting the environment by raising awareness among tourists, locals, and planners contributes to increased tourism.

Budowski (1976) identifies three different states of tourism's relationship with environmental conservation: "Conflict, co-existence and symbiosis". Middleton and Hawkins (1998) explained that, "on the one side, in terms of environment, the quality of natural resources such as landscape, air, sea, water, fresh water, and flora and fauna need to conserved, while on the other hand , the magnificence of cultural resources are judged to have intrinsic value and are worthy of conservation".

For the assessment of impact of pilgrimage development on physical environment of the selected case study, the following parameters are taken into account.

1. Tourism damages the natural scenery
2. Tourism causes congestion and over crowding
3. Tourism increases pollution
4. Tourism creates the problem of pure and adequate water supply
5. Tourism causes problem of garbage disposal
6. Tourism causes strain on public services
7. Tourism adversely affects road conditions
8. Tourism creates need of separate parking place
9. Tourism is responsible for increase in numbers of shops
10. Tourism is responsible for the basic infrastructure development

1.1 Perception of Residents Response to Physical Impact of Pilgrimage

According to table 01 the host population of Ozar strongly agreed with statements that tourism creates the problem of pure and sufficient water supply (+2.37) and tourism causes problem of garbage disposal (+2.15). The local people moderately agree with statements that tourism is accountable for increase in numbers of shops (+1.89), tourism is responsible for the basic infrastructure development (+1.82), need of separate parking place (+1.70), tourism damages the natural scenery (+1.29). The local peoples are moderately disagreeing with statements that tourism adversely affects road conditions (-1.94) and tourism increases pollution (-1.19). The local people are slightly agreed with statements that tourism causes congestion and overcrowding (+0.98) and tourism causes strain on public services (+0.86).

Table 01 Views of Local Residents on Physical Impact of Pilgrimage at Ozar

Sr. No	Indicators	-3	-2	-1	0	1	2	3	Mean	SD
1	Tourism damages the natural scenery	1	15	15	0	9	98	12	1.29	1.52
2	Tourism causes congestion and over crowding	2	20	18	5	14	76	15	0.98	1.68
3	Tourism increases pollution	16	51	49	25	0	7	2	-1.19	1.24
4	Tourism creates the problem of pure and adequate water supply	0	3	0	0	3	73	71	2.37	0.82
5	Tourism causes problem of garbage disposal	1	2	2	1	10	80	54	2.15	0.96
6	Tourism causes strain on public services	0	8	28	25	23	48	18	0.86	1.47
7	Tourism adversely affects road conditions	98	16	12	0	4	17	3	-1.94	1.81
8	Tourism creates need of separate parking place	4	5	7	0	16	86	32	1.7	1.36
9	Tourism is responsible for increase in numbers of shops	0	2	2	3	35	69	39	1.89	0.95
10	Tourism is responsible for the basic infrastructure development	0	2	1	2	33	91	21	1.82	0.81

The local people of Ozar have an opinion that increasing number of pilgrims at destination creates various problems like pure and enough water supply, garbage disposal, increase in numbers of shops, parking place, damage of natural scenery, congestion and overcrowding and strain on public services. The residential of Ozar says that the tourism is not

responsible for bad road conditions and pollution and it helps for basic infrastructural development.

2. Economic Impact of Pilgrimage

Tourism activity has a significant impact on a tourist destination's economic development. It changes the economic structure of the tourist destination. Tourists spend their money in tourist destinations to consume and purchase a wide range of commodity and services. In most cases, tourism development has had a positive economic influence on the host population. The tourist industry has a large capacity for both direct and indirect job creation. This activity generates both direct and indirect revenue for the government. It is the largest foreign exchange earning sources of the host country. Tourism development is accountable for increase in basic amenities and it enlarges in the standard of living of local people. Tourism promotes infrastructure development, which aids in the enhancement of the host population's quality of life. The price of land and the local people's gross domestic product may rise because of tourism. Tourism has a favorable impact on the economy and contributes to the overall economic growth of tourist destinations (Venkatesh and Raj, 2016), (Ramotra, Potdar, 2009), (Ashfaq and Parveen, 2014).

For the assessment of Economic impact of Pilgrimage development on residents of the selected case study, the following parameters were taken into account.

1. Tourism development leads to increase in income
2. Tourism development helps to increase shopping opportunity
3. Tourism development helps to increase jobs and business opportunity
4. Tourism development lead to increase in land and housing cost
5. Tourism development affects prices of goods and services
6. Tourism development increase the demand for female labor
7. Tourism development affects the scarcity of goods during festivals
8. Tourism development lead to reduce open land around the temple site
9. Tourism development develops commercial view in local residents

2.1 Perception of Residents Response to Economic Impact of Pilgrimage

The host people of Ozar moderately agree with the statement that tourism development increase the scarcity of goods during festivals (+1.73), tourism development leads to increase in income (+1.71), tourism development lead to increase prices of goods and services (+1.47) and tourism development lead to increase in land and housing cost (+1.39). They also moderately agree with the statement tourism development developed commercial view in local residents (+1.39). They also moderately agree with the sentence that tourism growth helps to increase shopping opportunity (+1.37), tourism development increases the demand of female labor (+1.08) and tourism development helps to increase jobs and business opportunity (+1.07). The host people slightly agree with the sentence that tourism development lead to reduce open land around the temple site (0.64).

Table 02 Views of Local Residents on Economic Impact of Pilgrimage

Sr. No	Indicators	-3	-2	-1	0	1	2	3	Mean	SD
1	**Tourism development leads to increase in income**	**3**	**4**	**2**	**4**	**22**	**92**	**23**	1.71	1.17
2	**Tourism development helps to increase shopping opportunity**	**0**	**10**	**1**	**7**	**47**	**76**	**9**	1.37	1.13
3	**Tourism development helps to increase jobs and business opportunity**	**7**	**12**	**10**	**4**	**45**	**46**	**26**	1.07	1.66
4	**Tourism development lead to increase in land and housing cost**	**4**	**6**	**14**	**7**	**30**	**50**	**39**	1.39	1.56
5	**Tourism development lead to increase prices of goods and services**	**1**	**6**	**8**	**9**	**36**	**62**	**28**	1.47	1.29
6	**Tourism development increase the demand of female labor**	**1**	**12**	**13**	**9**	**48**	**47**	**20**	1.08	1.44
7	**Tourism development increase the scarcity of goods during festivals**	**1**	**3**	**2**	**7**	**31**	**79**	**27**	1.73	1.05
8	**Tourism development lead to reduce open land around the temple site**	**3**	**17**	**27**	**9**	**36**	**44**	**14**	0.64	1.63
9	**Tourism development develops commercial view in local residents**	**1**	**2**	**16**	**13**	**16**	**91**	**11**	1.39	1.22

The host people of Ozar have opinions that the increasing number of pilgrims at Ozar has increased scarcity of goods during festivals, income, land and housing cost, prices of commodity and services, commercial view in local residents, shopping opportunity, demand of

female labor and jobs and business opportunity. They also think that tourism development leads to reduction of open land around the temple site.

3. Socio-Cultural Impact of Pilgrimage

Tourism's socio-cultural influence is interrelated and results from the interaction between two distinct groups of individuals that is the tourist and neighborhood. This interaction may bring about a change in the norms and value of a society. Socio-cultural interaction between tourist and the host people results in a cultural exchange because they are from different cultural background. Socio-cultural differences support the tourism development. Tourism development leads to social alteration between host population and tourists. The social effect of tourism development refers to changes in quality of life of host people of tourist destination.

The socio-cultural effects of tourism on society vary by destination and are dependent on the kind of tourism, the attitude of the hosts, the tourist's background, and the place's strengths and weaknesses.

For the assessment of socio-cultural impacts of pilgrimage development on residents of the selected case study, the following parameters were taken into account.

1. Tourism development leads to increase in Population
2. Tourism development leads to increase in the quality of police protection
3. Tourism development leads to increase in strain on police protection
4. Tourism development leads to increase in crime rate
5. Tourism development leads to increase in commercialization of traditions and customs
6. Tourism development helps to change the standard of living
7. Tourism development leads to change in occupational structure
8. Tourism development leads to increase in epidemics

3.1 Views of local Residents Response on Socio-cultural Impact of pilgrimage

Table 03 Views of Local Residents on Socio- Cultural Impact of Pilgrimage

Sr. No	Indicators	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	Mean	SD
1	Tourism development lead to increase in population	1	4	11	33	29	50	22	1.15	1.33
2	Tourism development lead to increase in quality of police protection	1	2	23	27	30	56	11	0.97	1.3
3	Tourism development lead to increase in Strain on police protection	4	11	12	74	21	18	10	0.27	1.33
4	Tourism development lead to increase in crime rate	11	21	32	79	5	2	0	-0.65	1.05
5	Tourism development lead to increase in commercialization of traditions and customs	3	4	8	57	15	46	17	0.89	1.38
6	Tourism development helps to increase the standard of living	0	0	0	6	38	83	23	1.82	0.73
7	Tourism development lead to change in occupational structure	0	0	9	12	47	58	24	1.51	1.04
8	Tourism development lead to increase in epidemics	2	20	7	121	0	0	0	-0.35	0.76

According to table 03 local people of Ozar are moderately agree with the statements that tourism growth assists to increase the standard of living (+1.82), tourism development brings changes in occupational structure (+1.51) and tourism development lead to increase in population (+1.15). Local people are slightly agree with the statements that tourism development increases quality of police protection (+0.97), tourism development helps to increase the commercialization of traditions and customs (+0.89) and tourism development lead to increases strain on police protection (+0.27). Local people are slightly disagree with the statements that tourism development increases the crime rate (-0.65) and tourism development increases the epidemics (-0.35).

The local people of Ozar express that the rising number of pilgrims at destination has increased their standard of living, population, quality of police protection, crime rate, commercialization of traditions and customs and strain on police protection. They also express that there is a change in occupational structure caused by tourism development. While they express tourism has very less impact on crime rate and epidemics.

Conclusion

Impact assessment is nothing more than a study of local people's views on the development of a tourist destination and the impact of tourism on their personal lives and on

the destination. Pilgrimage development has physical, economic, and socio-cultural consequences on the people who live in the area.

The impact of pilgrimage development on physical environment was assessed by choosing ten indicators. As per the study, the means of physical environment impact the residents of Ozar (+1.00) indicates that overall ten indicators have showed the moderate impact on physical environment at Ozar. The economic impacts are assessed with the help of nine indicators. As per the study there is a huge economic impact of Pilgrimage Development. As per the study, the means of economic impacts on the residents of Ozar (+1.31) indicate that overall nine indicators show the moderate economic impact. Socio-cultural impacts are assessed by using eight indicators. As per the study the means of socio-cultural impacts on the residents of Ozar (+0.70) indicate that overall eight indicators shows the slight impacts.

As per the impact of pilgrimage development on physical environment, the residents have stated that the increasing number of pilgrims causes the problems like congestion and overcrowding, pure and sufficient water supply, garbage disposal, strain on public services and pollution. As per the opinion of the residents, due to pilgrimage there are positive changes in the basic infrastructural development and numbers of shops at pilgrim destination.

In terms of the economic impact of pilgrimage on locals, it considered, the host population expressed that the increasing number of pilgrims increased their income, shopping opportunity, jobs and business opportunity, commercial view in local residents and scarcity of goods during festivals. As per the host population as a result of tourism cost of land and houses slightly increased. Overall indicator shows the positive impact because tourism boosts the economic expansion of the tourist destination.

In terms of socio-economic impact of religious tourism on host population of pilgrimage destinations if considered, they express their views that the increasing numbers of pilgrims have changes the standard of living, quality of police protection and population at the destination. According to the residents, occupational structure has been change due to tourism while tourism does not have impact on crime rate and epidemics.

Tourism has physical, economic and socio-cultural effect on the local environment of pilgrim destination, so the planners of tourist destination have to play a important role in minimizing the negative impacts.

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Mathematical Modelling Of Transport of Contaminants In Unsaturated Porous Media With Non-Uniform Flow

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Abstract

Over-pumping of groundwater for domestic, agricultural and industrial consumption will lower the water table and can accelerate the movement of pollutant-laden surface water into the groundwater. In unsaturated soil, the water content is less than the soil porosity, and the soil water pressure head (matric potential) is negative, being less than that of free water at the same location. The upper most region of the soil, the unsaturated zone, is the site of important process leading to pollutant attenuation.

In responding to the growing concern over deteriorating groundwater quality, groundwater flow models are rapidly coming to play a crucial role in the development of protection and rehabilitation strategies. These models provide forecasts of the future state of the groundwater aquifer systems.

The present study is concerned with the development of analytical models for transport of contaminants in unsaturated porous media with non-uniform flow

Introduction

The groundwater has been a major source of water supply throughout the ages. The groundwater is also an important source in the agriculture and industrial sector. In many parts of the world, groundwater resources are under increasing threat from growing demands, wasteful use and contamination. A good planning and management practices are needed to face this challenge. In order to understand the behaviour of contaminant transport through different types of media, several researchers are carrying out experimental investigations through laboratory and field studies. A porous medium is a material, which contains pores. Pores are filled with one or more different fluids, like air, water or oil. The porous medium is saturated if all the pores contain water and is unsaturated if some pores are filled with water and some with air. The saturation is defined as the fraction of the total volume of the fluid and pore volume. There exist many natural porous substances such as soil, rocks, wood, cork or bones.

The water flow and contaminant transport equations in the unsaturated zone are described by Bear [2], Pinder and Gray [6], and Freeze and Cherry [7]. Gray and Hassanizadeh [8] proposed a new set of equations to describe the unsaturated flow processes obtained from averaging theory coupled with an interface thermodynamic analysis. However, this set of equations contains many more unknowns than that of classical equations.

For simulating most field problems, exact analytical solutions are probably out weighted by errors introduced by simplifying approximations of the complex field environment that are required to apply the analytical approach (De Smedt and Wirenga, [5], Foussereau et al.,[9],Yates et al., [10]). Ebach and White [1] studied the longitudinal dispersion problem for an input concentration that varies periodically with time. Al-Niami and Rushton [3] studied the analysis of flow against dispersion in porous media. Hunt [4] applied the perturbation method to longitudinal and lateral dispersion in non-uniform seepage flow through heterogeneous aquifers. M Jalal Ahammad et al [11] studied dispersion and diffusion of solvent saturation with the help of a streamline-based Lagrangian methodology. Overall pressure drag on the diffusion and dispersion of solvent saturation was studied. Numerical results were in good agreement with the results obtained from asymptotic analysis.

In this paper, we have studied the mathematical modelling of transport of pollutants in unsaturated soil media with non-uniform flow. The basic approach is to reduce the advection-dispersion equation into a conduction equation by using moving coordinates which eliminates the convective term. We have used Laplace transform method to reduce the non-linear partial differential equation to ordinary differential equation. By introducing Duhamel's theorem, the general solution of ordinary differential equation is expressed in terms of error function.

Mathematical Formulation

The advection-dispersion equation of one-dimensional mathematical model for transport of pollutants through unsaturated porous media in non-uniform flow with initial and boundary conditions is of the form

$$\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial z^2} - w\frac{\partial C}{\partial z} - \frac{(1-n)}{n}\mathrm{K}_d C \qquad (1)$$

where C is the constituent concentration in the soil solution, t is the time, D is the hydrodynamic dispersion coefficient, z is the depth, w is the average pore-water velocity, K_d is the dissipaton coefficient.

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Let us consider a semi-infinte soil (porous) medium in an uni-directional flow field in which the input tracer concentration is $C_0 e^{-\gamma t}$, where C_0 is a reference concentration and γ is a constant. Initially, saturated flow of concentration, $C = 0$, in the porous media. At t = *0*, the concentration of the upper surface is instantaneously changed to $C = C_0 e^{-\gamma t}$

Thus, the appropriate boundary conditions for the given model are

$$\left.\begin{aligned} C(z,0) &= 0 \qquad z \geq 0 \\ C(0,t) &= C_o e^{-\gamma t} \quad t \geq 0 \\ C(\infty,t) &= 0 \qquad t \geq 0 \end{aligned}\right\} \tag{2}$$

The problem then is to characterize the concentration as $f(z,t)$, where the input condition is assumed at the origin and a second type boundary condition or flux type boundary condition is assumed. C_o is the initial concentration. Using

$$C(z,t) = \Gamma(z,t)\, Exp\left[\frac{wz}{2D} - \frac{w^2 t}{4D} - \frac{K_d (1-n) t}{n}\right] \tag{3}$$

equation (1) reduces to

$$\frac{\partial \Gamma}{\partial t} = D \frac{\partial^2 \Gamma}{\partial z^2} \tag{4}$$

The initial and boundary conditions (2) transform to

$$\left.\begin{aligned} \Gamma(0,t) &= C_o \, exp\left[\frac{w^2 t}{4D} + \frac{K_d (1-n) t}{n} - \gamma t\right] \quad : t \geq 0 \\ \Gamma(z,0) &= 0 \qquad : z \geq 0 \\ \Gamma(\infty,t) &= 0 \qquad : t \geq 0 \end{aligned}\right\} \tag{5}$$

Equation (4) is solved for a time dependent influx of the fluid at $z = 0$ and is obtained by Duhamel's theorem stated as " If $C = F(x, y, z, \tau)$ is the solution of semi-infinite conduction equation in which, the initial concentration is zero and the solute concentration at the surface is unity. The solution of the given problem at temperature $\phi(t)$ will be $C = \int_0^t \phi(\tau) \frac{\partial}{\partial t} F(x, y, z, t-\tau)\, d\tau$". Consider the problem in which the initial concentration is zero. The boundary conditions are

$$\left.\begin{aligned} \Gamma(0,t) &= 0 \quad t \geq 0 \\ \Gamma(z,0) &= 1 \quad z \geq 0 \\ \Gamma(\infty,t) &= 0 \quad t \geq 0 \end{aligned}\right\}$$

The Laplace transform of equation (4) is given by $L\left[\frac{\partial \Gamma}{\partial t}\right] = L\left[D \frac{\partial^2 \Gamma}{\partial z^2}\right]$ which reduces to

$$\frac{\partial^2 \bar{\Gamma}}{\partial z^2} = \frac{p}{D} \bar{\Gamma} \tag{6}$$

Its solution is $\bar{\Gamma} = Ae^{-qz} + Be^{qz}$ where $q = \pm\sqrt{\frac{p}{D}}$.

As $z \to \infty$, $B = 0$ and at $z = 0$, $A = \frac{1}{p}$, thus the general solution is of the form $\bar{\Gamma} = \frac{1}{p} e^{-qz}$. The inverse of the given function from the table of Laplace transforms is

$$\Gamma = 1 - erf\left(\frac{z}{2\sqrt{Dt}}\right) = \frac{2}{\sqrt{\pi}} \int_{\frac{z}{2\sqrt{Dt}}}^{\infty} e^{-\eta^2} d\eta \qquad \text{with} \qquad erf(z) = \frac{2}{\sqrt{\pi}} \int_0^z e^{-\eta^2} d\eta .$$

Using Duhamel's theorem, the solution of the problem with initial solute concentration is zero and the time dependent surface initial condition at z = 0 is

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$$\Gamma = \int_0^t \varphi(\tau)\frac{\partial}{\partial t}\left[\frac{2}{\sqrt{\pi}}\int_{\frac{z}{2\sqrt{D(t-\tau)}}}^{\infty} e^{-\eta^2}d\eta\right]d\tau$$

Since $e^{-\eta^2}$ is a continuous function, the differential under the integral reduces to

$$\frac{2}{\sqrt{\pi}}\frac{\partial}{\partial t}\int_{\frac{z}{2\sqrt{D(t-\tau)}}}^{\infty} e^{-\eta^2}d\eta = \frac{z}{2\sqrt{\pi D}(t-\tau)^{3/2}}\ exp\left[\frac{-z^2}{4D(t-\tau)}\right]$$

The solution to the problem is

$$\Gamma = \frac{z}{2\sqrt{\pi D}}\int_0^t \phi(\tau)\ exp\left[\frac{-z^2}{4D(t-\tau)}\right]\frac{d\tau}{(t-\tau)^{3/2}} \qquad (7)$$

Putting $\mu = \frac{z}{2\sqrt{D(t-\tau)}}$ then the equation (7) can be written as

$$\Gamma = \frac{2}{\sqrt{\pi}}\int_{\frac{z}{2\sqrt{Dt}}}^{\infty} \phi\left(t-\frac{z^2}{4D\mu^2}\right)e^{-\mu^2}d\mu \qquad (8)$$

Since, $\varphi(t) = C_0\ exp\left(\frac{w^2 t}{4D}+\frac{K_d(1-n)t}{n}-\gamma t\right)$ the particular solution of the problem is

$$\Gamma(z,t) = \frac{2C_0}{\sqrt{\pi}}exp\left(\frac{w^2 t}{4D}+\frac{K_d(1-n)t}{n}-\gamma t\right)\left\{\int_0^{\infty} exp\left(-\mu^2-\frac{\varepsilon^2}{\mu^2}\right)d\mu - \int_0^{\alpha} exp\left(-\mu^2-\frac{\varepsilon^2}{\mu^2}\right)d\mu\right\} \qquad (9)$$

z

Where $\alpha = \frac{z}{2\sqrt{Dt}}$ and $\varepsilon = \sqrt{\left(\frac{w^2 t}{4D}+\frac{K_d(1-n)t}{n}-\gamma\right)}\frac{z}{2\sqrt{D}}$.

The integral of the first term of equation (9) gives

$$\int_0^{\infty} exp\left(-\mu^2-\frac{\varepsilon^2}{\mu^2}\right)d\mu = \frac{\sqrt{\pi}}{2}e^{-2\varepsilon} \qquad (10)$$

For convenience, the second integral term is expressed in terms of error function.

Noting that $-\mu^2-\frac{\varepsilon^2}{\mu^2} = -\left(\mu+\frac{\varepsilon}{\mu}\right)^2+2\varepsilon = -\left(\mu-\frac{\varepsilon}{\mu}\right)^2-2\varepsilon$, the second term of the integral of equation (9) is

$$I = \int_0^{\alpha} exp\left(-\mu^2-\frac{\varepsilon^2}{\mu^2}\right)d\mu = \frac{1}{2}\left\{e^{2z}\int_0^{\alpha} exp\left(-\left(\mu+\frac{\varepsilon}{\mu}\right)^2\right)d\mu + e^{-2z}\int_0^{\alpha} exp\left(-\left(\mu-\frac{\varepsilon}{\mu}\right)^2\right)d\mu\right\}. \qquad (11)$$

With $a = \varepsilon/\mu$, the first integral on R H S of equation (11) can be written as

$$I_1 = e^{2\varepsilon}\int_0^{\alpha} exp\left[-\left(\mu+\frac{\varepsilon}{\mu}\right)^2\right]d\mu = -e^{2z}\int_{\frac{z}{\alpha}}^{\alpha}\left(1-\frac{\varepsilon}{a^2}\right)exp\left[-\left(\frac{\varepsilon}{a}+a\right)^2\right]da +$$

$$e^{2z}\int_{\frac{z}{\alpha}}^{\infty} exp\left[-\left(\frac{\varepsilon}{a}+a\right)^2\right]da \qquad (12)$$

Let $\beta = \left(\frac{\varepsilon}{a}+a\right)$, then the first integral term of the above equation becomes

$$I_1 = -e^{2z}\int_{\alpha+\frac{z}{\alpha}}^{\infty} e^{-\beta^2}d\beta + e^{2z}\int_{\frac{z}{\alpha}}^{\infty} exp\left[-\left(\frac{\varepsilon}{a}+a\right)^2 da\right] \qquad (13)$$

Similarly, the second integral on R H S of equation (11) gives

$$I_2 = e^{2z}\int_{\frac{z}{\alpha}}^{\infty} exp\left[-\left(\frac{\varepsilon}{a}-a\right)^2\right]da - e^{-2z}\int_{\frac{z}{\alpha}}^{\infty}\exp\left[-\left(\frac{\varepsilon}{a}-a\right)^2\right]da \quad (14)$$

Again substituting $-\beta = \frac{\varepsilon}{a} - a$ into the first integral term,

$$I_2 = e^{-2z}\int_{\frac{z}{\alpha}-\alpha}^{\infty} e^{-\beta^2}d\beta - e^{-2z}\int_{\frac{z}{\alpha}}^{\alpha} exp\left[-\left(\frac{\varepsilon}{a}-a\right)^2\right]da \quad (15)$$

But $\int_{\frac{z}{\alpha}}^{\infty} exp\left[-\left(\frac{\varepsilon}{a}+a\right)^2+2\varepsilon\right]da = \int_{\frac{z}{\alpha}}^{\infty} exp\left[-\left(\frac{\varepsilon}{a}-a\right)^2-2\varepsilon\right]da$

Substitution into equation (11) gives

$$I = \frac{1}{2}\left(e^{-2z}\int_{\frac{Z}{\alpha}-\alpha}^{\infty} e^{-\beta^2}d\beta - e^{2z}\int_{\frac{Z}{\alpha}+\alpha}^{\infty} e^{-\beta^2}d\beta\right) \quad (16)$$

Thus, equation (9) may be expressed as

$$\Gamma(z,t) = \frac{2C_0}{\sqrt{\pi}}exp\left(\frac{w_L{}^2 t}{4D_L}+\frac{K_d(1-n)t}{n}-\gamma t\right).$$

$$\left\{\frac{\sqrt{\pi}}{2}e^{-2z} - \frac{1}{2}\left[e^{-2z}\int_{\frac{Z}{\alpha}-\alpha}^{\infty} e^{-\beta^2}d\beta - e^{2z}\int_{\frac{Z}{\alpha}+\alpha}^{\infty} e^{-\beta^2}d\beta\right]\right\} \quad (17)$$

But $e^{2z}\int_{\alpha+\frac{Z}{\alpha}}^{\infty} e^{-\beta^2}d\beta = \frac{\sqrt{\pi}}{2}e^{2z}erfc\left(\alpha+\frac{\varepsilon}{\alpha}\right)$, $e^{-2z}\int_{\frac{z}{\alpha}-\alpha}^{\infty} e^{-\beta^2}d\beta = \frac{\sqrt{\pi}}{2}e^{-2z}erfc\left(\alpha-\frac{\varepsilon}{\alpha}\right)$ Re-writing equation (17) in terms of error function, we get

$$\Gamma(z,t) = \frac{C_0}{2}exp\left(\frac{w^2 t}{4D}+\frac{K_d(1-n)t}{n}-\gamma t\right)\left[e^{2z}erfc\left(\alpha+\frac{\varepsilon}{\alpha}\right)+e^{-2z}erfc\left(\alpha-\frac{\varepsilon}{\alpha}\right)\right] \quad (18)$$

Thus, substitution into equation (3) gives the solution as

$$\frac{C}{C_0} = \frac{1}{2}exp\left(\frac{wz}{2D}-\gamma t\right)\left[e^{-2z}erfc\left(\alpha-\frac{\varepsilon}{\alpha}\right)+e^{2z}erfc\left(\alpha+\frac{\varepsilon}{\alpha}\right)\right] \quad (19)$$

Re-substituting for ε and α gives

$$\frac{C}{C_0} = \frac{1}{2}exp\left(\frac{wz}{2D}-\gamma t\right).$$

$$\left[exp\left(\frac{\sqrt{w^2 n+4D(1-n)K_d-4Dn\gamma}}{2D\sqrt{n}}z\right)erfc\left(\frac{z+\sqrt{w^2 n+4D(1-n)K_d-4Dn\gamma}}{2\sqrt{Dnt}}t\right)\right]+$$

$$\left[exp\left(-\frac{\sqrt{w^2 n+4D(1-n)K_d-4Dn\gamma}}{2D\sqrt{n}}z\right)erfc\left(\frac{z-\sqrt{w^2 n+4D(1-n)K_d-4Dn\gamma}}{2\sqrt{Dnt}}t\right)\right] \quad (20)$$

When the boundaries are symmetrical the solution of the problem is given by the first integral term of the equation (20). The second integral term of equation (20) is due to the asymmetric boundary condition imposed in the general problem. However, if a point at a large distance away from the source is considered, then it is possible to approximate the boundary condition by $C(-\infty, t) = C_0$, which leads to a symmetrical solution.

1. Results and Discussion

Equation (20) gives the value of the ratio $\frac{C}{C_0}$ for unsaturated non – uniform fluid flow at any distance z and time t. Fig. 1 and. Fig. 2 represents the concentration profiles verses time in the porous media for depth z for different velocity w = 0.0111 m/hr, D = 11.24 cm²/yr, K_d =1, n

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= 0.5 and n = 1. Fig. 3 and. Fig. 4 represents the concentration profiles verses time in the porous media for depth z for different velocity w = 0.0111 m/hr, D = 11.24 cm²/yr, K_d =1, n = 0, $\gamma = 0$ and $\gamma = 1$.

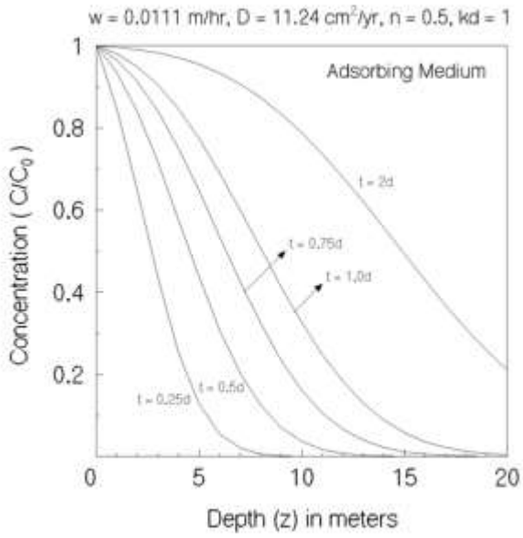

Fig.1 Break-through-curve for C/C_0 v/s depth Z for different time interval at porosity n = 0.5 and dissipation coefficient K_d = 1

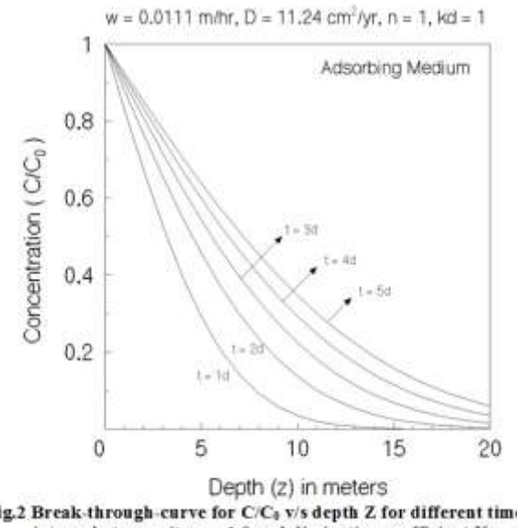

Fig.2 Break-through-curve for C/C_0 v/s depth Z for different time interval at porosity n = 1.0 and dissipation coefficient K_d = 1

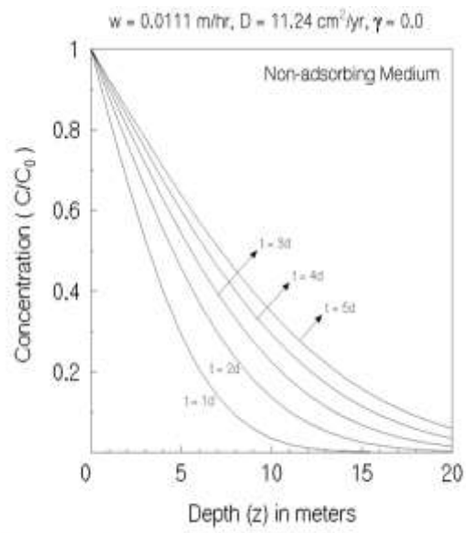

Fig.3 Break-through-curve for C/C_0 v/s Depth Z for different time interval at porosity n = 0.0, Dissipation Coefficient K_d = 1 and γ = 0.0

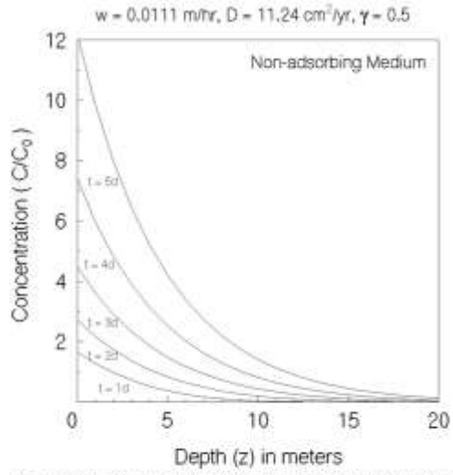

Fig.4 Break-through-curve for C/C_0 v/s depth Z for different time interval at porosity n = 0.0, dissipation coefficient K_d = 1 and γ = 0.5

From Fig. 1 and Fig.2, there is a decrease in $\frac{C}{C_0}$ with depth as porosity n decreases due to the distributive coefficient Kd . From Fig. 3 and Fig.4 there is a decrease in $\frac{C}{C_0}$ with depth as γ decreases and if time increases the concentration increases for different time.

Conclusions

The main limitations of the analytical methods are that the applicability is for relatively simple problems. The geometry of the problem should be regular. The properties of the soil in the region considered must be homogeneous in the sub region. The analytical method in somewhat more flexible than the standard form of the other methods for one-dimensional transport model. Accordingly, the analytical solutions derived for the finite domain will thus be particularly useful for analyzing the one-dimensional transport in unsaturated porous medium with a large dispersion coefficient whereas the analytical solution for semi-infinite domain is recommended to be applied for a medium system with a small dispersion coefficient. Moreover, the developed solution is especially useful for validating numerical model simulated solution because realistic problems generally have a finite domain.

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Geographical Study of Primary Schools In Vengurla Tahsil

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Abstract:

Primary education is an essential stage in educational system. Lots of efforts are being taken by governmental and NGO's for improvement of Primary education in our agro based Country. Geographical Positioning of the villages and primary schools also affect the qualitative and quantitative aspects of the primary education. The physical barriers may include the rivers, high rainfall, remoteness from the district place and urban areas etc. If we want to overcome all the geographical obstacles coming in the primary education we must study the position of primary schools.

India is having a geographical diversity. We can understand the possibly in path of educational depot through the study of physiographic and educational status. This research will be useful to improve the quality of educational standard at rural areas. Primary education in rural area is less developed. The predominant factors which determine the position of primary education are unproductive land, less availability of employment, rare income source, poor transportation facility, illiterate parents. Private resources for promoting Primary education are minimal to non-existent. Single teacher schools, most of them with just a single room, are unable to provide even the basic environment for learning. Lack of adequate classroom facilities means that, children from different age groups typically seat in the same classroom, leading to boredom and disinterest to learn.

We succeed to find the correlation between all these geographical factors and the teachers-students availability in the school; it will help the administration to take needful steps in case of primary education in near future. In present research and attempt has been made to indicate geography and education for betterment of primary education.

Rationale Of The Study:

Mapping of Schools using GPS tools for better school educational planning & management is important in educational development. Latitude, Longitudes, Altitude and other education information is useful for planning of Primary education. Though the present research work is related to geography, it is proposed to study with the interdisciplinary approach i.e. Education, Sociology, Geo-informatics, Economics, Disaster Management, Agriculture, Population Studies, Political Science, etc.

Objectives Of The Study:

1. To specify the latitudinal and longitudinal position of primary schools situated in Vengurla of Sindhudurg district using Global Positioning System.
2. To Classify the Positions of Primary School in the Vengurla based on mean sea level with the help of GPS.
3. To correlate the availability of teaching staff and geographical positions of primary school.
4. To find the possible effects of natural Calamities on the number of students studying in different Primary School.

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Study Area:

Vengurla is situated in Sindhudurg district in Maharashtra state. North by Malvan tehsil, on the south Goa state, East Kudal tehsil and on the west by the Arabian Sea. Its Geographical co-ordinate are 15 52'0" North latitude and longitude is 73 38'0"east. A narrow coastal plain is lies at Vengurla coast. Vengurla has a semi tropical climate and temperature lies between 34 c maximum in summer and 29 c in winter. So temperature is very humid and hot in most of the year. In monsoon there is heavy rainfall approx. 1500 to 2000 mm. The occupational structure of tehsil indicates that fishing and agriculture is the main occupation of

people. As per census2011 has a population of 12,392. The city is governed by a 'C' class municipality.

Methodology:

The title of the proposed research work is Geographical study of primary schools in Vengurla. For this study purpose primary as well as secondary data is collected through different sources. Through the actual visit to primary schools and by using GPS the survey was carried out. The data are collected through GPS about the schools related to the altitude, longitude and latitude, total students population, teacher total and distance from Vengurla city.

Besides the physical conditions of the schools were studied through questionnaires and interviews. The data about physical facilities, gardens, and types of trees and occupation of parents were collected. The categorization of schools was done on the basis of low, medium and high latitude and the geographical study was carried out.

To provide better school educational planning and management through using GPS as the main spatial data source, and the educational and village statistics as the main non-spatial data source. The spatial data of schools will capture GPS survey other non-spatial data will be collected through Grampanchyat, and offices from Panchayat Samitee, Tehsildar office, Zilla Parishad, Collector office, District Educational Department etc. The Government published record, Census reports, Books, Journals, and Internet and so on will use for data collection.

Conclusion:

1. While studying the primary schools from Vengurla through actual visits, the factual data have been collected related to latitude and longitude and altitude in feet. The attempt has been made to schools how geographical conditions affect the primary schools
2. The tehsil is under heavy rainfall region, so, it affects the health and presence of students at schools adversely.
3. Some schools have less number of schools due to migration of students.
4. Some schools are non-aided near their villages and parents have admitted their into them
5. Many schools do not have proper teaching staff as per rules and regulations.
6. The student's attendance at school is affected due to adverse physical conditions like Hilly area, heavy rain and winds, The school goers face problems in rainy seasons.
7. Though certain villages have large population. The student population is less in Z.P schools due to private primary school and parents incline to admit their ward there.
8. Some schools have the geographical effect. Bad road, schools a way from main roads flowing streams in monsoon, migration of families, economic condition at home, complaints about health, hills and valleys, etc., have affected the student's strength at school.

Recommendations:

1. Fill up the proper teaching staff in school
2. Medium of learning is semi-English in every Z.P. schools.
3. Divert students from English medium school to Marathi medium schools**.**

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Gender Sensitive Practices in Kerala- Educating Student Teachers

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Abstract

Kerala, God's country, has been in the limelight for various reasons. The country has achieved a lot in the education and health sectors. The country was declared fully literate in 1991. The country has been singled out as a model for development due to its strong social matrixes. The Government of Kerala allocates huge expenditures to nurture new and innovative learning experiences for every child. Educational institutions subject to higher education are mixed. The state's teacher education institutions are co-educational, and the curriculum is formulated to encourage gender-responsive education. Most teacher education institutions have 90 percent female students.

Recognizing the diverse roles, responsibilities, and obligations of both men and women in society as well as their interactions, it is important to understand and be sensitive to social and cultural norms and distinctions. This is what it means to be gender sensitive. Kerala society was matrilineal in the cases where we follow Marumakatayam. A summary report published by the Government of India's Ministry of Women and Child Development in 2009* indicated that in 2006, Kerala ranked third among Indian states in the Gender Development Index, GDI, with a score of 0.745. Kudumbashree is just one of the examples of gender sensitive projects in Kerala. The Kerala State Commission for Protection of Child Rights took the latest gender-sensitive decisions in the state when it mandated that all educational institutions in the state be converted into co-ed or co-ed schools and that boys-only and only schools may soon become a thing of the past. In order to make the campus more welcoming to women and attentive to their needs, the Kerala government has decided to grant menstrual leave and maternity leave to female students.

Consciousness is the state or quality of being aware of something. Teacher education plays a key role in sensitizing stakeholders to the timely need for gender-sensitive practices. Student teachers, the architects of the future society, should be aware Innovative gender-sensitive practices. The study is an honest effort to determine whether student teachers are aware of gender-sensitive practices in the state. An online survey was conducted among fifty student teachers of 40 female teachers and 10 male teachers. The questionnaire consists of yes/no questions. Percentage analysis was used to analyze the responses. The responses showed that about 95% were aware of recent gender-sensitive practices. The results led to a scope of gender awareness practices to be incorporated into teacher education curricula and also the establishment of incubation centers to create gender sensitive projects to provide solutions to existing issues in the state.

Keywords : Gender Sensitive Practices, Awareness, Students - Teachers , Kerala

1.Introduction

It is a known fact that women in society play two distinct roles: selfless caregiver and independent wage-earner. Unfortunately, the society in which the woman lives offers little or no support in her constant struggle to balance the two. Most of the time, they are not given the same basic economic, social and even legal rights as their male counterparts. Gender equality and the empowerment of women was the third of the eight Millennium Development Goals as a result of this observation. Kerala's success was the result of the

practice of matrilineal property inheritance among some upper-caste segments of the population. Surveys have revealed that Kerala has successfully resisted the centuries-old trends in India.

Definition of Gender Sensitivity

Recognizing the diverse rights, obligations and responsibilities of men and women in society and the relationships between them requires an understanding and consideration of social and cultural norms and discrimination.

Indicators of Gender Sensitive services :

Avoid discriminating against or profiling customers on the basis of their gender or gender, and treat every customer with respect,

Training all employees to respect gender differences,

Ensuring that women are represented fairly.

Gender awareness can start at home and be nurtured at school in these ways:

At home

Developing gender sensitivity is a concept that starts at home.

1. They treat their children as sons and daughters.
2. Encourage children to use toys that are suitable for both sexes.
3. Tell them the gender and show respect for the opposite sex.
4. Encourage children to play with people of both sexes.
5. Giving children the opportunity to speak and respond to their inquiries in order to encourage gender awareness.

At school

NCERT ("National Council for Educational Research and Training") worked with the "Ministry of Human Resource Development", "Ministry of Women and Child Development" and other ministries to ensure that schools are gender sensitive by ensuring that all textbooks followed gender neutral design. Teachers strongly support gender-sensitive classrooms. Here are some of the tried and true methods they use:

1. Encouraging male and female students to take the lead in the class.
2. Assemble "mixed" groups for activities regardless of gender.
3. Ensure that boys and girls perform all class duties equally, including cleaning, moving furniture, obtaining class supplies, etc.
4. Organizing activities and events that promote cooperation between the two sexes and respect their needs **.**

2.Need and Significance of the study

Today, most people around the world agree that gender equality and gender awareness are important for growth. Men and women still have a long way to go before they gain the same rights and opportunities, despite the fact that women have made progress and now have a voice in society, business, and politics. Globally, the average wage for women in the workforce is still 24% lower than for men. Women account for only 22% of all national legislators as of August 2015. In India, women hold only 14% of the 542 seats in the Lok Sabha. 35% of women worldwide have experienced violence in a relationship.

Discrimination still exists in India and is evident in every social class. Although the constitution stipulates women's equality, they lack legal protection.

One of the basic necessities for holistic development is gender awareness. An individual may fail to understand the requirements of the opposite sex, and in some extreme circumstances, even themselves if they are not sensitive to the demands of that gender. Since the dawn of time, people have recognized and felt the need for this sensitivity in almost all aspects of human existence. People become more aware of the intelligence of women through the process of gender awareness. In addition, women often believe that they are not inferior to men and can play an equal role in making decisions for the family, society, and organization. It is a way of thinking that promotes consideration for others as well as empathy.

3.Review of Related Literature

(Barnali Baruah), 2019, In order to ensure that all young Indians are aware of and respect human rights, this article will discuss how higher education institutions in India are working to educate students about gender issues. It will do this by referring to laws and programs established by governments and organizations to encourage gender equality and equality in the academic community. Secondary data obtained from journals, government directories, books, official reports, electronic media, and newspapers form the basis of the research.

We can learn more about the many gender disparities that led the 2016 Global Gender Gap Report to rank India 108th. The main reason for reducing disparities in educational attainment and occupational segregation was highlighted as the devaluation of women's work. For example, caregiving and nursing are mostly female-dominated professions that are sometimes undervalued and viewed as "normal" female characteristics. In Kerala, women have made use of their female capital by working in the economy, although primarily in the care and service industries. These areas of work show how women's career choices interact with social and gender norms.

Objectives of the study

1. To learn about gender sensitive programmes in India and Kerala.
2. To check awareness about sensitive practices among student teachers.
3. To propose measures that ensure gender-sensitive practices.

3. Methodology

The methodology follows a descriptive nature and uses quantitative methodology. Mostly online data and resources have been used to find out what gender sensitive programs are in Kerala and how to use gender sensitive practices as suggested by the ILO.

A questionnaire was used to collect student teachers' opinions with the aim of collecting information related to their awareness of the practices followed in the country. A Google form was used to collect responses from (N=100) student-teachers from different subjects of 2 different semesters doing B.Ed course under the University of Kerala which constitues a representative sample.

4.Analysis of secondary data about Gender Sensitive Programmes in India and Kerala

In India, the concept of gender has been embraced when creating policy frameworks and curricula. After independence, a number of committees promoted the requirement of gender parity at all educational levels.Promoting gender parity in education was strongly emphasized by the Kothari Commission, National Education Policy and Action Program of 1992.The National Education Policy placed a strong emphasis on using education as a catalyst for fundamental transformation of the status of women.For trainers at the university and college levels, the India XI plan proposes training sessions, talks, workshops and other events to increase their sensitivity to gender issues.

The government also conducts numerous research projects and routinely hosts lectures, workshops, seminars, conferences, community service projects, and programs to promote gender equality. Regularly offer instructors a refresher course for women's studies at UGC. The Indian government is integrating gender-sensitive OSH ("occupational safety and health") content into adult education programs and curricula of higher education institutions, as well as conducting awareness campaigns to disseminate information about workplace risks and hazards.

The Ministry of Human Resources and Development is updating the curriculum, including gender-sensitive materials and modules in the annual in-service teacher training and teaching young women self-defense in physical education courses. India's Ministry of Women, Child Development and Human Resource Development has launched an initiative to find gender champions among college students across the country. These individuals will

be responsible for educating girls and boys about gender issues and strengthening their ability to advocate for gender equality.

Educational institutions can set up gender advocacy clubs working on projects such as creating a blog or website about gender equality and publishing a regular column on gender issues, which might include telling stories about exceptional girls, boys, and transgender people who have changed girls' lives. and women or write about government laws and programmes. Students may be inspired to show their support for gender justice and equality through workshops, plays, films, college- or university-sponsored youth festivals, or other events with a similar theme. People's attitudes and behaviors can change as a result of students being exposed to visits to public service institutions at the block, village, city, and district levels, as well as public health clinics, post offices, hospitals, and police stations, to raise awareness of gender issues. Gender Champions should arrange for other students to receive basic life skills training and knowledge about public services already in place. An organization's annual activity schedule may include programs promoting gender equality on any two days each week. To assist the work of gender advocates, institutions will designate one or more teachers as nodal teachers.

Since the time of the Seventh Plan, the Women's Studies program in the country has been supported, strengthened, and directed by the University Grants Commission (UGC). In order to evaluate policies and strategies to enhance gender sensitivity, the UGC established a working group in January 2015. The UGC has helped universities establish equal opportunity cells to overcome the successful implementation of programs and policies for underrepresented groups and provide advice in financial, social and academic, as well as other domains. The Cell hosts programs to educate colleges and universities about issues experienced by the ST, SC, and OBC communities in higher education.

Gender sensitization in higher education was mentioned in the draft National Women's Policy – 2016, and it also became an important recommendation for "Saksham – measures to ensure the safety of women and gender sensitization programs on campuses," according to the UGC Principles report released in 2013. The guidelines call for Scotsham aims to integrate gender issues into existing curricula. Real and current cases of women's disenfranchisement should be included, as well as an examination of how these conditions impede their opportunities to advance professionally.A session on gender awareness and sexual harassment concerns should be included in the orientation training offered by higher education institutions for principals. For the safety and well-being of students, it is their duty to select medical and security staff who have undergone gender awareness training. Higher education institutions must provide advisory services through trained full-time advisors. Information on gender equality and sexual harassment should be included in the prospectus and posted widely in visible places, such as bulletin boards, to provide a safe and secure environment on campus. Case studies on the gender pay gap in management education can be included.While engineering courses can draw attention to the low percentage of female students and discuss how professions have been stereotyped on the basis of gender, students studying journalism, hotel management, and other related fields may be asked to investigate the effects of late-night shifts For women and girls. the safety risks they pose. Teachers should provide students with articles written by female academics that have been published in scientific publications to help bridge the gender gap in science and technology.

Gender Sensitive Practices in Kerala

1. BODHYAM (2019) - The aim of 'Bodhyam' is to train police officers to be gender sensitive and empathetic. Bodiam also aims to develop the relationship between the police force and the Mithra 181 helpline to promote a safer environment for women in the state.
2. Women Cell -KSWDC plans to set up a women's cell for the cause in 80 colleges across Kerala. The cell's mission is to educate women about their rights and responsibilities. It also provides a forum for women to express their experiences and perspectives on gender

inequality, their social status, and strategies for empowering themselves. The goal of the women's cell is intellectual enrichment and

3. Kudumbasri is a community established by the Government of Kerala to combat poverty and empower women. The facilities management centers in Kudumbassery have partnered with KMRL to provide trained women to work on the front lines.

4. The Kerala State Police has also implemented measures such as Vanitha Police, pink patrols, monitoring rooms, installation of CCTV cameras, all aimed at involving women and monitoring public spaces.

5. KSRTC and MVD are building the SURAKSHA-MITRA Command and Control Center, which will be equipped with real-time bus tracking and emergency buttons. KSRTC began hiring female leaders and drivers in 1992. Conductors make up 15% of all conductors. They also made gender awareness training and night shelters mandatory.

6. According to KSCPCR ("Kerala State Committee for the Protection of Child Rights"), the use of the term "teacher" is more gender neutral, can help in promoting equality among students, and improves children's attachment to their teachers.

7. In order to reduce representations that encourage gender stereotypes and categorization of roles in society, Kerala State is planning to conduct a gender assessment of existing textbooks.

8. GET-UP (Girl Empowerment Training)

It is a unique curriculum that focuses on the holistic development of girls in primary, secondary and tertiary education institutions. As part of this strategy, girls' clubs will be set up in every school. The entire program will be conducted with a research approach. Choose two students from each class and from the Girls Club. Girls in grades 6-8 can start a small club, while students in grades 9-12 can join a large club. The organizer of the school club is the teacher in charge of the help desk, and the coordinator is the leader of the institution. The secretary and the president represent the female students. An incoming member and the PTA/SMC Chair, as well as the mothers of two PTA members, are ex officio members. These clubs can organize focused events.

9. Earlier this month, the Kerala government stated that there was no regulation requiring teachers to wear sari, with Higher Education Minister R Bindu stating that such a practice of requiring teachers to wear sari is not conducive to the modern thinking of Kerala. The minister stressed that one's choice of clothing is entirely a personal matter, and no one has the right to judge or interfere in another's clothing choices.

10. According to a senior official in the Ministry of Education, the Government's policy is to encourage gender neutrality and will fully support any school that proposes to implement such gender-neutral uniforms.

11. The year 2023 began with a surprise from the Department of Higher Education, which issued a decision approving menstruation and maternity leave for students enrolled in universities affiliated with the department.

Google Form : Findings

Awareness among Student Teachers about Gender Sensitive Practices in Kerala

One of the objective was to identify the awareness of gender sensitive praactices in Kerala.The results of google form is represented in a table .The responses are of Yes/No type and then briefly interpreted descriptively with the help of percentage analysis.

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Table 1Awareness of 100 Student Teachers in Percentage

Awareness	RESPONSES
	Yes
1.Role of Kudumbashree	97 (97%)
2.GET scheme in high schools	25 (25%)
3.Dress code of teachers in educational institutions	72 (72%)
4.Gender stereotypes in textbooks	33 (33%)
5.Maternity leave for students	81 (81%)
6.Menstrual leave	94 (94%)
7.Reforms in KSRTC	86 (86%)
8.New policies by UGC	38 (38%)
9.Activities of Women's Cell	99 (99%)
10.Usage of gender neutral terms	73 (73%)

An analysis of responses to a Google questionnaire from 100 student teachers (Table 1)revealed that:
1.97% of student teachers were aware of the role of Kumbashree in ensuring gender sensitivity.
2. 25% revealed that they were aware of GET in schools.
3. 72% were aware that the dress code for teachers does not have to be a mandatory saree.
4. 33% do not know about gender stereotypes in textbooks.
5. 81% have been informed about maternity leave.
6.Menstrual leave information created news and so 94% have been informed.
7.86% are aware about the reforms in KSRTC that lead to support gender sensitivity.
8.38% are only aware about the new policies for gender sensitivity by UGC.
9.Majority of the student teachers are aware about activities of Women's Cell as most of them are females and directly involved in these activities in their institution.
10. The student teachers (73%) are familiar that the society should use of gender neutral terms.

Figure 1 Responses of 100 student teachers with regard to awareness of gender sensitive practices

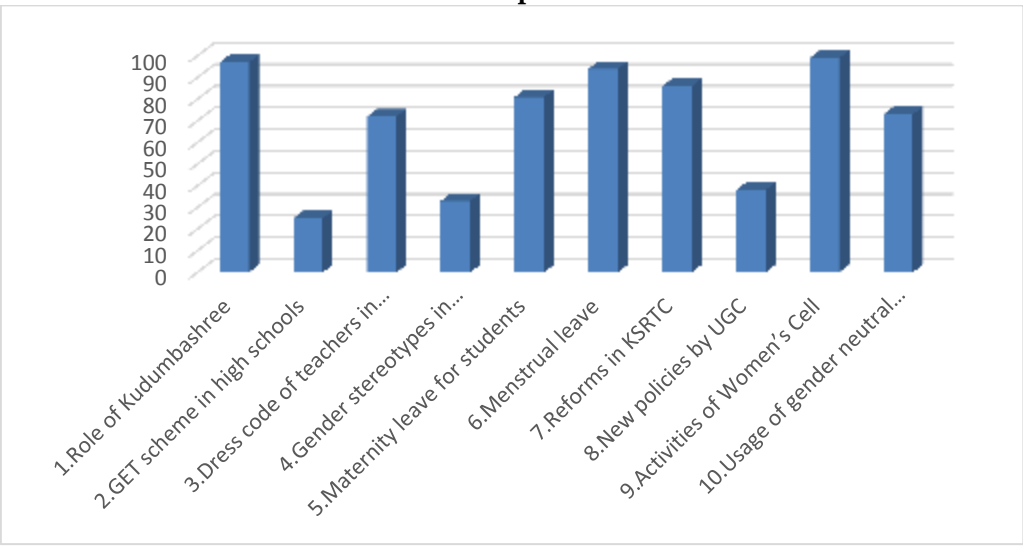

Figure 1 shows that majority of the student teachers are aware about the gender sensitive practices in the state which reveals that they are interested in collecting information which affects their morale ,emotional intelligence and thereby their integrity.

Gender Balance Strategy

The United Nations implements a gender balance policy, which includes special measures such as training courses for women, targeted recruitment and promotion, and numerical targets. All aim to eliminate past and contemporary prejudices against women while achieving gender balance in recruitment and promotion.

It is possible to increase the number of qualified applicants while at the same time eliminating bias from the recruitment process by using personnel selection criteria.

The Exiting Employees Survey provides information on organizational obstacles to hiring and retaining employees.

The United Nations has called for work-life balance and flexible working arrangements, such as staggered working hours. Work schedule pressure, scheduled break for extended learning activities, telecommuting, part-time work, adoption leave, parental leave as special leave without pay, breastfeeding policy, special leave in circumstances of death or emergency.

UN Women hosts expert group meetings to discuss the latest cutting-edge research and policy advances on equitable representation of women. The sessions provide key opportunities to discuss the many difficulties that exist, as well as to learn from the best practices of stakeholders and partners.

Measures of the ILO and the United Nations can be scaled back or adapted to local conditions to ensure gender equality.

Implications

1. Breach of Limitations

Higher education is an advanced stage of human learning. Once you finish school and join the university, you are placed in an environment made up of adults. Traditionally, women have been forced to limit their interaction with the outside world. Perhaps out of fear that women might use their mental faculties and challenge existing social institutions. However, when women are placed in heterogeneous settings such as universities, they are able to explore beyond the traditional constraints placed on them. Self-esteem issues that plague women when interacting with people and engaging in various activities are effectively addressed.

2. Educate others about gender

Gender education through higher education should not be limited to women. Many universities have introduced curricula that focus on narrow ideas that have taken root in the patriarchal society. It needs to be emphasized that we have come to terms with patriarchy and misogyny to such an extent that we often ignore the subtle manifestations of it. To create a world that is aware of the issues women face just because they are women, it is necessary to educate and train men on these issues. It must be sensitive to women's issues through comprehensive programs. Universities like Oakland University, DePaul University, and Arizona State University are known for their gender studies programs.

3. Better participation in the workforce

Orthodoxy asserts that women are mentally and physically inferior and cannot generate results as effective as those achieved by men. This notion is deeply rooted in misogyny and patriarchy and was sparked by paranoia that women could upset the long-established traditional framework. As a result, women were prevented from participating in the labor force. However, with the expansion of education and scholarships in higher education, women have become entrenched to participate and contribute. Women's access to higher education has increased women's financial independence and improved career and personal development opportunities.

4. Realization of rights

Women have long been denied the right to vote. Much of this deprivation stemmed from the fact that they were legally treated as "personal property" and reduced to mere property. In India, for example, the colonial adultery law, now decriminalized, treated adultery as trespassing on the husband's property when his wife was involved in adultery. Since the 19th century, the women's empowerment movement has gained momentum and universities have been at the forefront. Student movements around the world have fought and won many battles for the welfare of women. This could have happened only in the presence of the intellectual discourse encouraged by higher education institutions. Today, universities are involved in empowering women with tools to exercise their rights. Women are beginning to question the status quo and demand answers, and the right to know is one of many rights that women are actively exercising to fulfill others.

Conclusion

Kerala is one of the Indian states that has bucked national trends by offering a development model that is more open and inclusive to women. The Channar Lahala or Channar rebellion, also known as Maru Makkal Samaram, took place in Kerala and is referred to as the battle of the Nadar mountaineering women for the right to wear upper body clothing in the Travancore kingdom of India from 1813 to 1859. Need for legislation And measures that can determine the actual influence of women in the state and the amount of this power that can be translated. While the system cannot be completely ignored , there is a need to move forward with the institutional structure created by the matriarchy and ensure that gender sensitivity is being taken care.

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Biological Activity and Electrical Behavior of Newly Synthesized Nanoporous Terpolymer Resin Derived from Dithiooxamide with Formaldehyde

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Abstract:
The terpolymer (2, 2'-HBDF) synthesized in the presence of acid catalyst by the condensation of 2, 2'-Dihydroxybiphenyl (2, 2'-HB) and Dithiooxamide (D) with Formaldehyde (F) using 1:1:2 molar proportions of the reacting monomers. The copolymer possesses antimicrobial activity for certain bacteria such as Staphylococcus aureus, Escherichia coli, and fungi Aspergillus niger, Candida albicans. Linear graph are found by the plots of log σ vs $10^3/T$ over a wide range of temperature, which indicate that the Wilson's exponential law $\sigma = \sigma_0 \exp^{(-\Delta E/kT)}$ is obeyed. From the electrical conductivity of these copolymers, activation energies of electrical conduction have been evaluated and values lies in the range 7.1 x 10^{-20} to 4.5 x 10^{-20} J/K. On the basis of above studies, these copolymers can be ranked as semiconductors.
Keywords: Antimicrobial screening Terpolymer, synthesis, electrical conductivity

Introduction:

The use of terpolymers in all spheres of life has been abundantly increases in recent years because of novelty and versatility. They occupy the pivotal position in the field of polymer science. A copolymer involving 2, 4-dichlorophenylmethacrylate and vinyl acetate was reported as a significant inhibitor for the growth of microorganisms (Patel MM et.al 2003). The progress in this field has been extremely rapid, as they are generally useful in packing, adhesives and coating in electrical sensors, ion exchangers, organometallic semiconductors, activators, catalyst and thermally stable materials, high temperature flame resistant fibers (Niley SN. 2018). Terpolymer approach for controlling the crystalline behavior of naphthalene diimide based polymer acceptors and enhancing the performance of all polymer solar cells (Kim Y. et al.2016). Although carbon nano tubes are effective fillers to enhance the mechanical and electrical properties of polymers, they cannot be dispersed easily in a solvent or a polymer matrix due to the Vander Waals forces (Vedejo R. et. Al. 2011, Vaia RA et al. 2004). Pal TK reported electrical conductivity of Salicylic acid-Biuret/ Dithiooxamide/ Dithiobiuret- Trioxane terpolymer resins (Pal TK et al 1989). A variety of conjugated organic molecules are known as semiconductors, the carrier mobility in them is usually low. This is due to the difficulties in, which electrons jumps from one molecule to another and hence, the carrier mobility in the compound of this type increasing molecular size. Kanda S. reported the rubeanato-copper semi conductive polymers and studied their AC and DC conductivity (Kanda S. et al., 1961). The resin HBUE-II shows the semiconducting behavior (Kapse SK and coworkers 2013). Poly (3, 4-ethylene dioxythiophene)s are the conducting polymers (CP) with the biggest prospects in the field of bioelectronics due to their combination of characteristics (Mntione D et al 2017).

Synthesis of 2, 2'-Dihydroxybiphenyl (2, 2'-HB)-Dithiooxamide (D)-Formaldehyde (F) i.e. 2, 2'-HBDF Terpolymer Resins:-

Terpolymer resin (2, 2'-HBDF-I) was prepared by condensing 2, 2'-dihydroxybiphenyl (1.86 gm, 0.1 mol), dithiooxamide (1.20 gm, 0.1 mol.) and formaldehyde (7.5 ml of 37 %, 0.2 mol.) in the presence of 2M HCl (200 ml) as a catalyst at 122 $\pm$ 2^0C in an oil bath for 5 h (Sanjiokumar S. Rahangdale et.al 2019, 2020, 2021, Santosh P. Chakole, 2020). The solid product obtained was immediately removed from the flask as soon as the reaction period was over. It was washed with cold water, dried and powdered. The powder was repeatedly washed with hot water and methyl alcohol to remove unreacted monomers. The air-dried terpolymer resin was extracted with diethyl ether to remove copolymer. It was further purified by dissolving in 8 % NaOH and then was filtered. The terpolymer was then precipitated by drop wise addition of 1:1 (v/v) conc. HCl/water with constant stirring and filtered. The process was repeated twice. The resulting polymer sample was washed with boiling water and dried in a vacuum at room temperature. The purified terpolymer resin was finely ground to pass through a 300 mesh size sieve and kept in a vacuum over silica gel. The yield of the terpolymer resin was found to be 70%.

Similarly, the other terpolymer resins, 2, 2'-HBDF-II, 2, 2'-HBDF -III and 2, 2'-HBDF -IV were synthesized by varying the molar proportion of the starting monomers i.e. 2, 2'-dihydroxybiphenyl, biuret and formaldehyde in the ratios 2:1:3, 3:1:4 and 4:1:5 respectively. The samples yield and reaction details are tabulated in Table 1.

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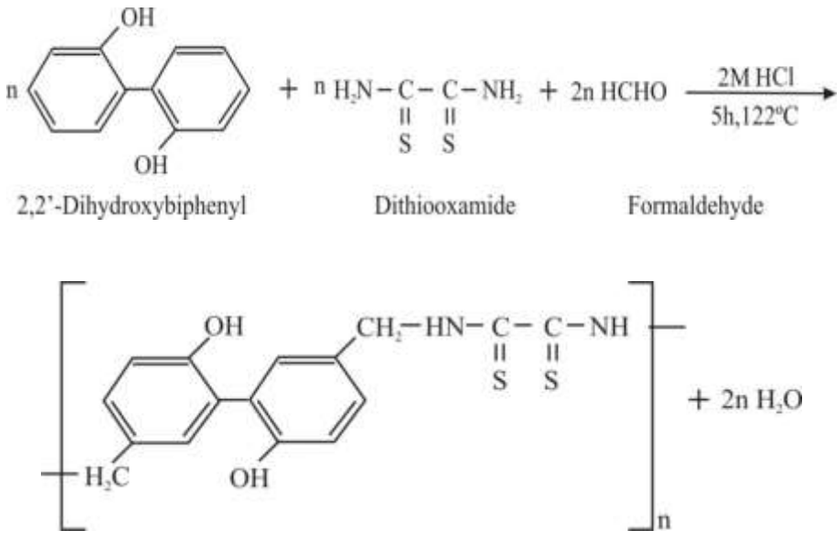

Fig. 1: Proposed reaction for 2, 2'-HBDF-I terpolymer resin

Table 1 Reaction Details of 2, 2'-HBDF Terpolymer Resins.

Resin abbreviation	Reactant			Molar ratio of reactant	Cata-lyst 2M HCl (ml)	Reflux temp. ±2 K	Yield (%)	Melting point of resin (K)
	2,2'-Dihy-droxybi-phenyl '2,2'-HB' (mole)	Dithio-oxamide 'D' (mole)	Formal-dehyde 'F' (mole)					
2,2'-HBDF-I	0.1	0.1	0.2	1:1:2	200	392	70	454
2,2'-HBDF-II	0.2	0.1	0.3	2:1:3	200	392	72	464
2,2'-HBDF-III	0.3	0.1	0.4	3:1:4	200	392	74	477
2,2'-HBDF-IV	0.4	0.1	0.5	4:1:5	200	392	78	488

Experimental

The electrical resistivity of the different terpolymer resins described in chapter II was measured over a wide range of temperatures (i.e. from 303 to 423 K). The measurements involved following steps.

(i)Preparation of Pellets for Resistance Measurements

To prepare the pellets, terpolymer resins was thoroughly ground in agate pestle and mortar. The well powdered terpolymer was pelletalized isostatically in a steel die at 10 tones / inch^2 with the help of hydraulic press. The pellet thus obtained was hard and crack free. A thin layer of colloidal graphite in acetone was applied on both sides of the pellets and dried at room temperature for 4-6 hr. The colloidal graphite on either side of pellet functioned as electrode. The surface continuity of the pellet was then tested by means of multimeter. The average diameter of this pellet and its thickness were measured using a Screw Gauze. Actual dimensions were measured as average of the three measurements taken at three places.

(ii)Sample Holder

A simple spring loaded sample holder was fabricated using brass electrodes. The prepared pellet was mounted between the two brass electrodes, one of which was spring loaded while other electrode rested on the brass platform.

(iii)Furnace for Heating the Samples

For resistivity measurements at different temperatures a small furnace was used. The current to the furnace was recorded by means of A. C. ammeter and controlled by a rheostat. To ensure a uniform temperature inside the furnace, a thin metal cylinder was inserted into it. The temperature of the furnace was recorded by means of chromel-alumel thermocouple connected with digital multimeter in which millivolts were measured. The connection wires of two electrodes which were insulated with porcelium beads were taken out for connections.

(iv)Measurement of Resistivity:-

The resistance of the pellet was measured on Auto Comput LCR-Q meter 4910. Connection wires from the furnace were connected to the terminals of the instrument. In this way corresponding resistance of the pellet was measured by keeping the pellet in sample holder. Resistivity (σ) was then calculated using the relation.

$\sigma = R \times A/l$

where, R = Resistance of the pellet

A = Surface area of the pellet

l = Thickness of the pellet

σ = Resistivity.

The conductivity measurements were made over a wide range of temperatures. The electrical conductivity (σ) varies exponentially with the absolute temperature according to well known relationship,

$\sigma = \sigma_0 \exp^{(-Ea/\ kT)}$

where, σ = Electrical conductivity at temperature T.

σ_0 = Electrical conductivity at temperature $T \rightarrow \infty$

Ea = Activation energy of electrical conduction.

K = Boltzmann Constant (0.8625×10^{-4} evdeg^{-1}or 1.3817×10^{-23} J molecule^{-1}K^{-1}).

T = Absolute temperature.

This relation has been modified as,

$\log \sigma = \log \sigma_0 + (-Ea/\ 2.303\ k\ T)$

According to this relation, a plot of log σ Vs 1/T would be linear with negative slope. Such plots were made on the basis of each set of data. From the slopes of the plots, the activation energy (Ea) of electrical conduction was calculated.

Antimicrobial Screening

Biological assay depends upon a comparison of the inhibition of growth of microorganism by measuring the concentration of the sample to be examined with the known concentration of standard antibiotic. For the antimicrobial analysis the in vitro disc diffusion method has been employed. In this study the ligand and their chelates were tested for their effect on certain human pathogenic bacteria such as Gram-positive (*Aspergillus niger and Candida albicans*).

The nutrient agar medium was boiled and sterilized by autoclaving at 7 kg pressure (120 ^{0}C) for 20 min for the study of antibacterial activity. 20 mL media was poured into the sterilized Petri plates and kept at room temperature for a few minutes, and allowed to solidify in plates. It was then incubated for 12 h and inoculated with microorganism using sterile swabs. All of these manipulations were carried out with utmost care under aseptic conditions. The test solution prepared by dissolving the compound in DMSO was filled with the media using a micropipette and incubated at 35 ^{0}C for 48 h. The same procedure was adopted for the antifungal studies in which potato dextrose agar was the medium.

During the course of time, the test solution diffuses and the growth of the inoculated microorganisms such as Staphylococcus aureus, Escherichia coli, Aspergillus niger, and Candida albicans were found to be affected. The activity developed on the plate was measured by measuring the diameter of the inhibited zone in millimetres. The drug ciprofloxacin was used as the standard for bacteria and nystatin for fungi.

Results and Discussion:

Electrical Conductivity of 2, 2'-HBDF Terpolymers:

The DC resistivity of the 2, 2'-HBDF terpolymers were measured in the temperature range of 303 to 423 K. The electrical conductivity of the terpolymer samples at room temperature vary from 1.4×10^{-13} to 2.3×10^{-12} Siemen(Gurnule WB, 2001). The temperature dependence of the electrical conductivity (Fig. 2) is found to be linear in the temperature range under study showing thereby that Wilson's exponential law is obeyed. Examination of the plots also revealed that the electrical conductivity of the terpolymers increases with the increase in temperature. Hence these terpolymers can be termed as semiconductors. The activation energy calculated from the slopes of the plots is found to be in the range of 7.1×10^{-20} to 4.5×10^{-20} J/K. The low magnitude of the activation energy may be due to the large number of π electrons. The activation energy was found to decrease in the order of 2, 2'-HBDF-I > 2, 2'-HBDF-II > 2, 2'-HBDF-III > 2, 2'-HBDF-IV. The above decreasing order of activation energy may be ascribed to the introduction of more and more aromatic skeleton in the repeat unit structure of the terpolymers.

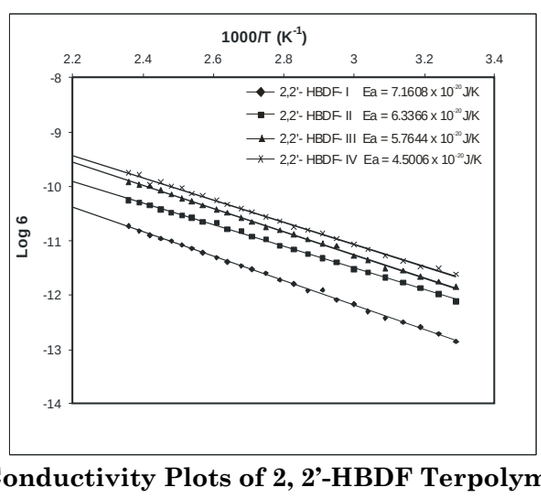

Fig. 2. Electrical Conductivity Plots of 2, 2'-HBDF Terpolymers. (Temperature dependence of log σ)

Table 2 Evaluation of Activation Energy of Conduction of 2, 2'-HBDF-I
Diameter of pellet (r) = 1.502cm.
Surface area of the pellet (A) = 1.771 $cm.^2$
Thickness of the pellet (l) = 0.192 cm. A/l = 9.228cm

Temp (K)	1000/T (K^{-1})	Resistance (Ohm) 'R'	Resistance ρ= R. A/l	Conductivity $\sigma = 1/\rho$	Log σ
303	3.30	$7.6929x10^{11}$	$7.0990x10^{12}$	$1.4086x10^{-13}$	-12.8512
308	3.24	$5.5871x10^{11}$	$5.1558 x10^{12}$	$1.9395x10^{-13}$	-12.7123
313	3.19	$4.2412x10^{11}$	$3.9138 x10^{12}$	$2.5550x10^{-13}$	-12.5926
318	3.14	$3.5147x10^{11}$	$3.2433 x10^{12}$	$3.0831x10^{-13}$	-12.5101
323	3.09	$2.8886x10^{11}$	$2.6656 x10^{12}$	$3.7514x10^{-13}$	-12.4258
328	3.04	$2.1998x10^{11}$	$2.0300 x10^{12}$	$4.9260x10^{-13}$	-12.3075
333	3.00	$1.5815x10^{11}$	$1.4594 x10^{12}$	$6.8517x10^{-13}$	-12.1642
338	2.95	$1.3526x10^{11}$	$1.2482 x10^{12}$	$8.0112x10^{-13}$	-12.0963
343	2.91	$8.7819x10^{10}$	$8.1040 x10^{11}$	$1.2339x10^{-12}$	-11.9087
348	2.87	$9.1199x10^{10}$	$8.4158 x10^{11}$	$1.1882x10^{-12}$	-11.9251
353	2.83	$6.8500x10^{10}$	$6.3212 x10^{11}$	$1.5819x10^{-12}$	-11.8008
358	2.79	$5.7081x10^{10}$	$5.2674 x10^{11}$	$1.8984x10^{-12}$	-11.7216
363	2.75	$4.3560x10^{10}$	$4.0197 x10^{11}$	$2.4877x10^{-12}$	-11.6042
368	2.71	$3.6795x10^{10}$	$3.3954 x10^{11}$	$2.9450x10^{-12}$	-11.5309
373	2.68	$3.2187x10^{10}$	$2.9702 x10^{11}$	$3.3666x10^{-12}$	-11.4728
378	2.64	$2.6871x10^{10}$	$2.4797 x10^{11}$	$4.0327x10^{-12}$	-11.3944
383	2.61	$2.2003x10^{10}$	$2.0304 x10^{11}$	$4.9249x10^{-12}$	-11.3076
388	2.57	$1.8339x10^{10}$	$1.6923 x10^{11}$	$5.9088x10^{-12}$	-11.2285
393	2.54	$1.5360x10^{10}$	$1.4174 x10^{11}$	$7.0550x10^{-12}$	-11.1515
398	2.51	$1.2953x10^{10}$	$1.1950 x10^{11}$	$8.3656x10^{-12}$	-11.0775
403	2.48	$1.0836x10^{10}$	$1.0000 x10^{11}$	$1.0000x10^{-11}$	-11.0000
408	2.45	$9.7632x10^{9}$	$9.0094 x10^{10}$	$1.1099x10^{-11}$	-10.9547
413	2.42	$8.5820x10^{9}$	$7.9195 x10^{10}$	$1.2626x10^{-11}$	-10.8987
418	2.39	$7.1993x10^{9}$	$6.6435 x10^{10}$	$1.5052x10^{-11}$	-10.8224
423	2.36	$5.9114x10^{9}$	$5.4550 x10^{10}$	$1.8331x10^{-11}$	-10.7368

Table 3 Evaluation of Activation Energy of Conduction of 2, 2'-HBDF-II
Diameter of pellet (r) = 1.523cm.
Surface area of the pellet (A) = 1.821$cm.^2$
Thickness of the pellet (l) = 0.198 cm. A/l = 9.201cm

Temp (K)	1000/T (K^{-1})	Resistance (Ohm) 'R'	Resistance ρ= R. A/l	Conductivity $\sigma = 1/\rho$	Log σ
303	3.30	$1.4494x10^{11}$	$1.3335x10^{12}$	$7.4989x10^{-13}$	-12.1250
308	3.24	$1.0440x10^{10}$	$9.6050x10^{11}$	$1.0411x10^{-12}$	-11.9825
313	3.19	$8.0893x10^{10}$	$7.4421x10^{11}$	$1.3436x10^{-12}$	-11.8717
318	3.14	$7.2625x10^{10}$	$5.9552x10^{11}$	$1.6791x10^{-12}$	-11.7749
323	3.09	$5.1216x10^{10}$	$4.7119x10^{11}$	$2.1222x10^{-12}$	-11.6732
328	3.04	$4.1726x10^{10}$	$3.8388x10^{11}$	$2.6049x10^{-12}$	-11.5842
333	3.00	$3.7154x10^{10}$	$3.4182x10^{11}$	$2.9254x10^{-12}$	-11.5338
338	2.95	$3.3745x10^{10}$	$3.1045x10^{11}$	$3.2210x10^{-12}$	-11.4092
343	2.91	$2.3211x10^{10}$	$2.1355x10^{11}$	$4.6827x10^{-12}$	-11.3295
348	2.87	$1.9579x10^{10}$	$1.8013x10^{11}$	$5.5513x10^{-12}$	-11.2556
353	2.83	$1.5754x10^{10}$	$1.4494x10^{11}$	$6.8992x10^{-12}$	-11.1612
358	2.79	$1.3624x10^{10}$	$1.2534x10^{11}$	$7.9781x10^{-12}$	-11.0981
363	2.75	$1.0273x10^{9}$	$9.4514x10^{10}$	$1.0580x10^{-11}$	-10.9755
368	2.71	$9.1730x10^{9}$	$8.4391x10^{10}$	$1.1848x10^{-11}$	-10.9263
373	2.68	$7.1847x10^{9}$	$6.6099x10^{10}$	$1.5128x10^{-11}$	-10.8202
378	2.64	$6.7067x10^{9}$	$6.1702x10^{10}$	$1.6206x10^{-11}$	-10.7903
383	2.61	$5.1500x10^{9}$	$4.7380x10^{10}$	$2.1105x10^{-11}$	-10.6756
388	2.57	$5.0120x10^{9}$	$4.6110x10^{10}$	$2.1687x10^{-11}$	-10.6638
393	2.54	$4.1305x10^{9}$	$3.8001x10^{10}$	$2.6314x10^{-11}$	-10.5798
398	2.51	$3.7671x10^{9}$	$3.4657x10^{10}$	$2.8853x10^{-11}$	-10.5398
403	2.48	$3.3198x10^{9}$	$3.0542x10^{10}$	$3.2741x10^{-11}$	-10.4849
408	2.45	$2.8741x10^{9}$	$2.6442x10^{10}$	$3.7818x10^{-11}$	-10.4223
413	2.42	$2.4695x10^{9}$	$2.2719x10^{10}$	$4.4014x10^{-11}$	-10.2564
418	2.39	$2.2341x10^{9}$	$2.0554x10^{10}$	$4.8651x10^{-11}$	-10.3129
423	2.36	$1.9797x10^{9}$	$1.8213x10^{10}$	$5.4903x10^{-11}$	-10.2604

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Table 4 Evaluation of Activation Energy of Conduction of 2, 2'-HBDF-III
Diameter of pellet (r) = 1.470cm.
Surface area of the pellet (A) = 1.698cm.^{2}
Thickness of the pellet (l) = 0.199 cm. A/l = 8.535cm

Temp (K)	1000/T (K^{-1})	Resistance (Ohm) 'R'	Resistance ρ= R. A/l	Conductivity $\sigma = 1/\rho$	Log σ
303	3.30	$8.3518x10^{10}$	$7.0990x10^{11}$	$1.4086x10^{-12}$	-11.8512
308	3.24	$6.7714x10^{10}$	$5.7557x10^{11}$	$1.7374x10^{-12}$	-11.7601
313	3.19	$5.3577x10^{10}$	$4.5540x10^{11}$	$2.1958x10^{-12}$	-11.6584
318	3.14	$4.2774x10^{10}$	$3.6358x10^{11}$	$2.7504x10^{-12}$	-11.5606
323	3.09	$3.7590x10^{10}$	$3.1952x10^{11}$	$3.1296x10^{-12}$	-11.5045
328	3.04	$2.6679x10^{10}$	$2.2677x10^{11}$	$4.4096x10^{-12}$	-11.3556
333	3.00	$2.2324x10^{10}$	$1.8975x10^{11}$	$5.2698x10^{-12}$	-11.2782
338	2.95	$1.4685x10^{10}$	$1.2480x10^{11}$	$8.0112x10^{-12}$	-11.0963
343	2.91	$1.3154x10^{10}$	$1.1181x10^{11}$	$8.9433x10^{-12}$	-11.0485
348	2.87	$1.1300x10^{9}$	$9.6050x10^{10}$	$1.0411x10^{-11}$	-10.9825
353	2.83	$9.0715x10^{9}$	$7.7108x10^{10}$	$1.2968x10^{-11}$	-10.8871
358	2.79	$7.6540x10^{9}$	$6.4980x10^{10}$	$1.5388x10^{-11}$	-10.8128
363	2.75	$6.6239x10^{9}$	$5.6728x10^{10}$	$1.7627x10^{-11}$	-10.7538
368	2.71	$5.3110x10^{9}$	$4.5143x10^{10}$	$2.2151x10^{-11}$	-10.6546
373	2.68	$4.4882x10^{9}$	$3.8150x10^{10}$	$2.6211x10^{-11}$	-10.5815
378	2.64	$3.6650x10^{9}$	$3.1153x10^{10}$	$3.2099x10^{-11}$	-10.4935
383	2.61	$3.1137x10^{9}$	$2.6466x10^{10}$	$3.7783x10^{-11}$	-10.4227
388	2.57	$2.6672x10^{9}$	$2.2161x10^{10}$	$4.5123x10^{-11}$	-10.3456
393	2.54	$2.2079x10^{9}$	$1.8767x10^{10}$	$5.3284x10^{-11}$	-10.2734
398	2.51	$1.9736x10^{9}$	$1.6776x10^{10}$	$5.9607x10^{-11}$	-10.2247
403	2.48	$1.6431x10^{9}$	$1.3966x10^{10}$	$7.1597x10^{-11}$	-10.1451
408	2.45	$1.3860x10^{9}$	$1.1781x10^{10}$	$8.4878x10^{-11}$	-10.0712
413	2.42	$1.1955x10^{9}$	$1.0162x10^{10}$	$9.8401x10^{-11}$	-10.0070
418	2.39	$1.0806x10^{8}$	$9.1854x10^{9}$	$1.0886x10^{-10}$	-9.9631
423	2.36	$9.7651x10^{8}$	$8.3004x10^{9}$	$1.2047x10^{-10}$	-9.9191

Table 5 Evaluation of Activation Energy of Conduction of 2, 2'-HBDF-IV
Diameter of pellet (r) = 1.477cm.
Surface area of the pellet (A) = 1.714cm.^{2}
Thickness of the pellet (l) = 0.208 cm. A/l = 8.243cm

Temp (K)	1000/T (K^{-1})	Resistance (Ohm) 'R'	Resistance ρ= R. A/l	Conductivity $\sigma = 1/\rho$	Log σ
303	3.30	$501367x10^{10}$	$4.2121x10^{11}$	$2.3741x10^{-12}$	-11.6245
308	3.24	$3.9508x10^{10}$	$3.2396x10^{11}$	$3.0867x10^{-12}$	-11.5105
313	3.19	$3.6592x10^{10}$	$3.0005x10^{11}$	$3.3327x10^{-12}$	-11.4772
318	3.14	$2.8792x10^{10}$	$2.3610x10^{11}$	$4.2354x10^{-12}$	-11.3731
323	3.09	$2.2976x10^{10}$	$1.8840x10^{11}$	$5.3076x10^{-12}$	-11.2751
328	3.04	$1.7938x10^{10}$	$1.4709x10^{11}$	$6.7982x10^{-12}$	-11.1676
333	3.00	$1.4167x10^{10}$	$1.1617x10^{11}$	$8.6079x10^{-12}$	-11.0651
338	2.95	$1.1357x10^{9}$	$9.3132x10^{10}$	$1.0737x10^{-11}$	-10.9691
343	2.91	$9.1156x10^{9}$	$7.4748x10^{10}$	$1.3378x10^{-11}$	-10.8736
348	2.87	$7.8829x10^{9}$	$6.4639x10^{10}$	$1.5470x10^{-11}$	-10.8105
353	2.83	$6.8247x10^{9}$	$5.5962x10^{10}$	$1.7868x10^{-11}$	-10.7479
358	2.79	$5.2648x10^{9}$	$4.3171x10^{10}$	$2.3163x10^{-11}$	-10.6352
363	2.75	$4.4206x10^{9}$	$3.6249x10^{10}$	$2.7586x10^{-11}$	-10.5593
368	2.71	$3.6600x10^{9}$	$3.0012x10^{10}$	$3.3319x10^{-11}$	-10.4773
373	2.68	$3.1636x10^{9}$	$2.5941x10^{10}$	$3.8547x10^{-11}$	-10.4140
378	2.64	$2.6193x10^{9}$	$2.1478x10^{10}$	$4.6558x10^{-11}$	-10.3302
383	2.61	$2.2432x10^{9}$	$1.8395x10^{10}$	$5.4362x10^{-11}$	-10.2647
388	2.57	$1.7938x10^{9}$	$1.4709x10^{10}$	$6.7982x10^{-11}$	-10.1676
393	2.54	$1.6760x10^{9}$	$1.3743x10^{10}$	$7.2761x10^{-11}$	-10.1381
398	2.51	$1.2983x10^{9}$	$1.0646x10^{10}$	$9.3929x10^{-11}$	-10.0272
403	2.48	$1.2155x10^{8}$	$9.9678x10^{9}$	$1.0032x10^{-10}$	-9.9986
408	2.45	$1.0242x10^{8}$	$8.3984x10^{9}$	$1.1906x10^{-10}$	-9.9242
413	2.42	$1.1227x10^{8}$	$9.2066x10^{9}$	$1.0861x10^{-10}$	-9.9641
418	2.39	$7.4590x10^{8}$	$6.1164x10^{9}$	$1.6349x10^{-10}$	-9.7865
423	2.36	$6.8452x10^{8}$	$5.6130x10^{9}$	$1.7815x10^{-10}$	-9.7492

Antimicrobial Screening

The microbial screening results of 2, 2'-HBDF copolymer ligand show (Table 6) higher activity is due to the donor atoms of the ligand and the π-electrons delocalization. This effect increases the lipophilic character, which favours the permeation through the lipoid layer of the bacterial and fungal membranes (Patel M. 2003). The higher activity may also be due to the presence of - OH and the aromatic ring(Singh N et.al 2000). It is perceived that the factors such as solubility, conductivity, dipole moment and cell permeability mechanism may be alternative reasons for the increased activity of the metal complexes (Bagihalli G. B., Patil S. A., Badami P. S. (2009). The ligand has good inhibition against the growth of Gram-negative bacteria which induces tumour. Hence the copolymer ligand may possess antitumor activity. The Gram-positive bacteria are both pathogenic and invasive. The copolymer has good inhibition characteristics against the growth of this pathogen. *Aspergillus niger* cause aspergillosis, the growth of the fungus is controlled by the copolymer chelates to some extent. The *Candida albicans* can penetrate into the intestinal walls and cause diseases. From the findings, the growth of *Candida albicans* is inhibited by the addition of 2, 2'-HBDF copolymer resin.

Table 6. Antimicrobial activities of 2, 2'-HBDF copolymer resin.

Copolymer	Diameter of zone of inhibition (mm)			
	S. Aureus	***E. Coli***	***A. Niger***	***C. Albicans***
2, 2'-HBDF-II	15	16	17	15
Solvent (DMSO)	--	--	--	--

Conclusions

The plots of log σ Vs 1000/T were found to be linear in the temperature range under study, which indicate that the Wilson's exponential law $\sigma = \sigma_0 \exp^{(-\Delta E/ kT)}$ is obeyed. These terpolymers may be ranked as semiconductors. The electrical conductivity of TMF copolymers at room temperature lies in the range of $1.4x10^{-13}$ to $2.3x10^{-12}$ Siemen. The energy of activation is found to decrease in the order: 2,2'-HBDF-I > 2,2'-HBDF -II > 2,2'-HBDF -III > 2,2'-HBDF -IV and electrical conductivity is found to increase in the order: 2,2'-HBDF -I < 2,2'-HBDF -II < 2,2'-HBDF -III < 2,2'-HBDF - IV. The energy of activation (Ea) of electrical conduction calculated from the slopes of the plots is found to be in the range of 7.1×10^{-20} to 4.5×10^{-20} J/K.

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Attitude of Students and Teachers towards Teaching-Learning and Evaluation Process in Higher Education

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Abstract

In higher education institutions, with the help of the teaching-learning and evaluation process, students develop their understanding and skills in their chosen field according to their interests and needs, which provides them with the necessary tools to face the challenges of the outside world as well as achieve real success in their chosen field. The purpose of this research paper is to look into teachers' and students' attitude toward the teaching-learning and evaluation process at the undergraduate and postgraduate levels in higher education institutions in India. The respondents included teachers and students from various disciplines. The purpose of this research paper is to negotiate teachers' and students' attitude about the teaching-learning and evaluation process on the basis of level of program (undergraduate and postgraduate level). The results showed that both students and teachers had positive attitudes towards the teaching-learning and evaluation process, with postgraduate students and teachers showing higher satisfaction levels than their undergraduate counterparts. Overall, the findings have implications for policy and practice in higher education institutions in India, suggesting the need for greater attention to these areas to raise the level of teaching-learning and evaluation generally.

Keywords- Attitude, Teaching-Learning and Evaluation Process, Higher Education

Introduction

In institutions of higher education, teaching-learning and evaluation process of students and teachers at both undergraduate and postgraduate levels are influenced to a great extent by various factors such as social status, economic status, intellectual status, educational status, personal experiences, and personal values. At the undergraduate level, students are largely dependent on the teacher for learning and various types of guidance. Teachers at this level emphasize creative thinking, intellectual dedication, and learning because most undergraduate students are less active than postgraduate students. This involves a structured and traditional approach, and rote learning is more prevalent. Undergraduate students view exams and grades as success, thus developing less of a deep understanding of the subject. While postgraduate students focus more on subject learning, in which research skills and an active approach to advanced thinking play an important role, independent thinking and self-study at this stage require the student to be self-directed and self-motivated. It requires logical thinking, analysis, and application of knowledge, resulting in a deeper understanding of the subject. Similarly, teachers may also have different attitudes towards teaching-learning and evaluation process based on their experience, training, and personal beliefs. Some teachers focus on delivering subject material to students, Some teachers focus on lectures and textbooks, while others focus on student-centered approaches and problems. Some teachers view evaluation primarily as a measure of student performance, while others see it as an opportunity for learning and growth. Overall, understanding the attitude of students and teachers towards the teaching-learning and evaluation process can help in the improvement and development of effective educational systems and better strategies, which can bring unprecedented changes in the development of the educational system. Thus, to understand the difference in thinking, expectations, and experiences towards the teaching-learning and evaluation process in higher educational institutions, learning is important regarding view of students and teachers towards the Teaching-Learning and Evaluation Process at both undergraduate and postgraduate levels.

Review of Related Literature

Bhargava, A. (2014) conducted an article on “Attitudes of student teachers toward the teaching profession”. A ready-made tool was used to explore the impact of students and science and social science disciplines on teachers' and students' attitudes toward the teaching area. There were several categories studied, including context of discipline and students. 96 of the 100 students in the sample gave a response. Calculations were made to determine the "t" value and mean scores, in order to determine how differently different categories felt about the teaching profession. **Blazer, D. (2016**) conducted a study on "Teacher and Teaching Effects on Students' Attitudes and Behavior". The researcher has explained in this research paper how teachers affect the achievement of students on standardized tests, while in reality, proper approach and foresight are necessary for success. Prior studies have shown that upper-primary teachers have a major effect on students' efficacy in mathematics and self-reported measures of

classroom behavior. The emotional support given by the teachers and the organization of the classroom brings about the necessary improvement in the attitude and behavior of the students. However, educators who are successful in raising test scores frequently struggle to change the attitudes and behaviors of their pupils. These findings support established theories about the multifaceted nature of instruction and the need to develop plans to enhance all teachers' abilities. **Ifeoma, A. R. (2016)** conducted a study on "Assessment of students' attitudes and perceptions of teaching practice: The case of undergraduates of Delta State University, Abraca". Researcher used a post-hoc design in this descriptive survey method. 280 respondents were selected, and interviews and questionnaires were used to obtain the data. In this research paper, appropriate statistic were used. The collected data were analyzed through means, standard deviations, and percentages. The significance level was 0.05. In conclusion, it was found that Teaching practice is viewed positively by university teacher. This was reflected in their activities, like writing daily lesson notes, their regular attendance, and their interest in every program. Additionally, students and faculty reported that his interactions with his advisors were positive. According to a study on lecturers' supervision of teachers in rural schools, some of the teachers felt neglected by their supervision, which left some of the teachers unhappy. The study's findings included a recommendation for Delta State University to ensure that student teachers are posted to institutions with convenient access to lecture halls. **Mandal, A. (2020)** conducted a study on "Attitudes of teacher-teachers and student-teachers towards a two-year B.Ed." program: A review-based evaluation". To understand the behavioral situation in a lonely framework with a wider reach of ideas, the qualitative method was used and the content analysis method was adopted. The result shows that most student teachers should be guided through a practical pedagogical strategy based on set-theoretic knowledge. Most of the teachers have a two-year B.Ed. degree there is no positive feeling about the program. The overall curriculum emphasizes that B.Ed. how important is the curriculum? The institutes must follow the rules and regulations mentioned in the 2014 NCTE Regulations to produce qualified and responsible teachers in the future.

Significance of study

Both students and teachers at the undergraduate and postgraduate levels have a very important contribution to make towards the teaching-learning and evaluation processes that determine the quality of higher educational institutions in India. At the graduation level, students who are aware, alert, and self-motivated and who want to learn continuously have a higher success rate than other students. Those teachers who have a good understanding of their subject and are dedicated to teaching can make the subject accessible and interesting by bringing creativity to learning, which can result in phenomenal success in the skill development of the students. On the contrary, a negative attitude towards teaching, learning, and the evaluation process exposes the bad image of any educational institution. At the postgraduate level, the view of both about the teaching-learning and evaluation processes plays a very important role. As students mature at this postgraduate level, they are expected to be self-directed and self-motivated. Along with this, it is expected from the teachers that they are proficient in their subject and can guide the students properly. A positive approach to teaching and learning can help postgraduate students develop a deeper understanding of their subject matter and prepare them for advanced research or professional careers. The evaluation process is a very important part of higher education and plays a vital role in influencing the quality of education. Teachers who commit to fair and objective evaluation can help students develop a sense of confidence in their abilities and maintain academic integrity and can help foster a culture where students view assessment as a chance to grow and learn rather than a stressor or competition, making them more likely to do well. Thus, to ensure the quality of higher education at both the undergraduate and postgraduate levels, it is important to inculcate a positive attitude toward learning and assessment processes. Students and teachers who approach education with a sense of enthusiasm, curiosity, and dedication can create an environment that fosters intellectual growth and academic success. In the present study, researcher will try to know the attitude of students and teachers towards the Teaching-Learning and Evaluation Process on the basis of undergraduate and postgraduate levels.

Statement of the Problem

This study deals with the view of students and teachers about the teaching-learning and evaluation process in higher educational institutions, especially at the undergraduate and postgraduate levels. Also tries to find out and compare the attitudes of both groups towards various aspects, such as instructional methods, course materials, and evaluation procedures. The study focused on identifying any differences or similarities between the attitudes of undergraduate and graduate students and teachers and the reasons for these differences. The study's goal is to offer guidance on how to enhance the teaching-learning and evaluation process at both levels of higher education by taking into account the perspectives of both students and teachers. Therefore, the researcher has taken this topic entitled" **Attitude of Students and Teachers towards Teaching-Learning and Evaluation Process in Higher Education".**

Research Questions

1. What is the Attitude of students towards the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level)?
2. What is the Attitude of teachers towards the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level)?

Research Objectives

1. To study the attitude of students about the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).
2. To study the attitude of teachers about the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).

Research Hypotheses

1. To compare the attitude of students towards the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).
2. To compare the attitude of teachers towards the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).

Research Methodology

Research Method- In the present study, researcher used Descriptive survey method.

Variable-

Criterion Variable- Level of program (Undergraduate level & Postgraduate level

Dependent Variable- Teaching-Learning and Evaluation Process

3. Population of the study- In the present study, UG and PG students and teachers of Lucknow University were included.

4. Sample - In this present study, samples of 450 students and 150 Teachers of UG and PG level of science and arts were taken .

5- Sampling Technique- Purposive sampling method was employed by the researcher.

6- Tools- Self construction perception scale was employed by the researcher.

7- Data collection- The data for the study was collected by the researcher from UG and PG students and teachers separately.

8- Statistics use in the study- T test was used by the researcher.

Data analysis and interpretation-

Objective 1- To study the attitude of students about the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).

Null hypothesis Ho1- There is no significant difference between attitude of students towards the teaching-learning and evaluation process on the basis of level of program.

Table 1-

S.N.	Level of program	N	Mean Score	SD	DF	T Value
1	Undergraduate level	225	138.28	25.80	448	2.11
2	Postgraduate level	225	152.11	18.40		

Above table number 1 indicates that T value is 2.11, which is significant at 0.05 level of significance because T value 2.11 is greater than 1.96 (0.05 level). This means that the mean score of students at undergraduate and postgraduate level towards attitude of teaching-learning and evaluation process differ significantly. Thus, the null hypothesis that there is no significant difference in the mean scores of attitude towards teaching-learning and evaluation process of undergraduate and postgraduate students is not accepted. It can be said that undergraduate and postgraduate students were found to have the different attitude towards teaching-learning and evaluation process.

Objective 2- To study the attitude of teachers about the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).

Null hypothesis Ho2- To compare the attitude of teachers towards the Teaching-Learning and Evaluation Process on the basis of level of program (undergraduate and postgraduate level).

Table 2-

S.N.	Level of program	N	Mean Score	SD	DF	T Value
1	Undergraduate level	75	196.22	14.21	123	1.23
2	Postgraduate level	50	192.4	14.32		

Above table number 2 indicates that T value is 1.23, which is non-significant at 0.05 level of significance because T value 1.23 is smaller than 1.96 (0.05 level). This means that the mean

score of students at undergraduate and postgraduate level towards attitude of teaching-learning and evaluation process do not differ significantly. Thus, the null hypothesis that there is no significant difference in the mean scores of attitude towards teaching-learning and evaluation process of undergraduate and postgraduate students is accepted. It can be said that undergraduate and postgraduate students were found to have the same extent of attitudes towards teaching-learning and evaluation process.

Conclusion- Attitude of students and teachers can vary based on undergraduate and postgraduate level. Also can be vary based on cultural backgrounds, personal motivations, teaching methodologies, institutional support, and other contextual factors. Ultimately, fostering a positive attitude towards the teaching-learning and evaluation process requires a collaborative effort between students, teachers, and the educational institution to create an engaging and supportive learning environment.

Suggestions-

1. **For Students:**
   Embrace a growth mindset: Adopt the belief that intelligence and abilities can be developed through effort and practice. This mindset encourages students to view challenges as opportunities for growth rather than as failures.
   Take ownership of learning: Recognize that the responsibility for learning lies with the student. Actively engage in the learning process by attending classes, participating in discussions, completing assignments, and seeking clarification when needed.
2. **For Teachers:**
   Create an inclusive and supportive environment: Foster a classroom atmosphere that values diversity and encourages open dialogue. Make students feel respected, heard, and included in the learning process.
   Utilize varied teaching methods: Employ a mix of instructional strategies, such as lectures, group work, case studies, multimedia resources, and hands-on activities. This approach caters to diverse learning styles and keeps students engaged.
   Overall, fostering a positive attitude towards teaching-learning and evaluation requires a collaborative effort between students and teachers. When both parties are actively engaged and invested in the process, it enhances the overall educational experience and outcomes in higher education.

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Student Teachers' perspectives on themselves as Future Environmental Educators

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Abstract

Learning to teach environmental concepts within the context of a school subject needs understanding as well as chances for practice and reflection. To what extent a teacher can effectively bring environmental education into the classroom depends very much on the training he receives, whether it is pre-service or in-service. To the majority, the initial training may affect the rest of their days in the profession. Thus the intention of the study was to unearth out the perceptions of student teachers about the teaching of infused environmental concepts through the respective subjects which they are supposed to teach. The study explores student teachers' understanding of Environmental education (EE), incorporation of EE concepts into lesson planning, teaching of Environmental education in depth, difficulties in teaching infused EE concepts, knowledge of different EE dimensions, training needs and perception about themselves as future EE teachers. The study also included a qualitative content analysis of the syllabus for EE at teacher education level to determine how far it endows the student teachers to teach the environmental concepts as a cross-curricular theme. To address these concerns, the study employed a mixed method where both quantitative and qualitative data were collected concurrently through a questionnaire from two units (N=98) of prospective teachers doing the two year B.Ed. course under University of Kerala. The findings of the study revealed that a great percentage of the student teachers specified that their preparation did not equip them to teach EE effectively as future environmental educators. The study has implications for the concerns of both teacher educators and student teachers in order to recover their understanding of teaching of EE concepts in a cross-curricular framework.

Key words: Environmental Education (EE), Student teachers, Infused Environmental concepts, Cross-curricular

1 Introduction

Environmental protection and conservation has become one of the goals of school education. It is believed that the efforts to achieve this goal would bring about environmental literacy across the country which ultimately gives the environment some respite from its unprecedented exploitation and degradation. The most important factor in raising educational standards in schools is teacher preparation. Effective teacher preparation is necessary for the successful implementation of EE in the classroom because the policies created for schools are to be carried out by teachers. In the UNESCO-UNEP International Environmental Education programme, the importance of teacher preparation in advancing Environmental Education (EE) has been thoroughly demonstrated. Its significance was emphasised by the Tbilisi Intergovernmental Conference (UNESCO 1977a), which argued that the capacity of teacher education to adopt and implement a successful environmental education curriculum may determine the destiny of the environment. This conference acknowledged that the level of training that teachers got within environmental education would have a significant impact on the introduction of the subject in schools. Yet the best curricula and teaching aids, it has been argued, cannot achieve the desired results if those in charge of them do not fully comprehend the target of environmental education, are unable to guide the learning activities and experiments that make up such education, and are unable to make the best use of the resources at their disposal (UNESCO 1980). The importance of teacher education has been emphasised by Simpson et al. (1985), who contend that it not only prepares teachers to educate Environmental Education successfully but also serves as a catalyst for its inclusion in the curricula of schools. They believe that a top-down approach to curriculum innovation would arise from the creation of an excellent teacher training programme in environmental education. These authors believed that field-based teacher education, for mutually primary and secondary school teachers, was the most efficient way to raise environmental education levels in the general public. In a planned, orderly society, teacher education has the potential to be the biggest source of educational transformation, according to UNESCO (UNESCO 1976).It contends that effective teacher preparation in the field will result in a population that is environmentally literate, and that environmental action will follow. Accordingly, it views the addition of environmental education in teacher training as essential for both the environment's future and the discipline's future. It must come as no surprise that UNESCO has called teacher education "the priority of priorities" (UNESCO-UNEP 1990). The way in which UNESCO views the contribution of teacher education to environmental improvement reflects a growing intergovernmental and worldwide understanding of the significance of teacher preparation.

2 Rationale of the study

Due to EE's inherent multidisciplinary nature, it affects educators from all academic fields. The goals of EE go beyond those of most conventional courses, which are primarily focused on knowledge transfer and acquisition. EE attempts to change attitudes and behaviour while fostering the capacity for action. As a result, the role of the teacher is altered from one of information and knowledge transmitter to one of facilitator, helping students move from awareness to attitude change to the development of skills necessary to take action for a better environment. In the secondary school curriculum of Kerala state, there exists no separate subject as Environmental Education. However it is presumed that environmental concepts exist in all school subjects that reflect both multi-and inter-disciplinary nature of EE. This in itself does not serve the purpose. It is pathetic to say that those environmental concepts are almost taught as any other school subjects confining to only cognitive domain ignoring the affective and psychomotor domain. In favour of a secondary teacher to be an environmental educator must possess some extra abilities for the transaction of the infused environmental concepts. The teacher has to identify the infusion spot to infuse environmental dimension in whatever subject they are teaching. Also the teacher has an additional responsibility to find ways and means to teach environment related aspects during the transaction of their respective subjects without jeopardizing the latter's nature. This integrated approach to Environment Education is very much important to give holistic perspective to it. More over the teacher is expected to be environmentally literate and be aware of environmental concepts and issues of local, national and global level. Thus all the teachers are Environmental educators who should go beyond just covering portions for exams and make efforts to develop environmental sensitivity among pupils in order to inculcate a positive attitude towards the protection of environment. At the same time, to what extent a teacher can effectively bring Environmental Education into the classroom depends very much on the training he receives, whether it is pre-service or in-service. To the majority, the initial training may affect the rest of their days in the profession. As the entire prospective teachers are supposed to take up the task of educating about environment, it may be worthwhile to investigate how these would-be implementers are ready to environmentalize their subject syllabus. Thus the major questions arises in the mind of the researcher are

1. Is the syllabus for Environmental Education at secondary pre-service level capable of equipping the student teachers to teach the infused environmental concepts where ever possible?
2. What is the nature of student teachers' EE related knowledge with regard to the teaching of infused environmental concepts?

3 Methodology in brief

The present study is descriptive in nature and uses both qualitative and quantitative methodologies to collect data in accordance with the background information and research topic. Hence the study was framed as a mixed method. A qualitative content analysis of the syllabus for EE in Secondary Teacher Education curriculum was also examined for its relevance and how far it equips the prospective teachers in teaching of EE through infusion approach. Representative samples of student teachers in different subjects, two units (N=98) doing the two year B.Ed. course under University of Kerala were selected as the sample for collecting the data required. The tool used for collecting data required for the study is a Questionnaire for assessing the Prospective teachers' EE related perceptions with regard to the teaching of infused environmental concepts at secondary level. For getting a general idea about the various concepts/constructs involved in the teaching of infused environmental concepts, the related literature in the area under investigation was reviewed, beside having discussion with subject experts /teacher educators and existing practicing teachers so as to ensure the concept /construct validity of the tool prepared for the study. For this purpose the view of the student teachers with regard to certain dimensions such as adequacy of treatment of EE concepts in secondary school textbooks, extent of awareness about the major infused environmental concepts, familiarity with the dimensions of EE, understanding of effective pedagogies for EE, the advantages of teaching learning through infusion approach, the difficulties anticipated in teaching EE through Infusion approach and the perceptions of the would be teachers themselves as future Environmental Educators have been studied. The questionnaire items were prepared after surveying the literature related to the area under study .The criterion of content validity is assessed by a panel of experts in the field who judged its adequacy.

4 Findings and Discussion

4.1Findings from the analysis of the syllabus for EE at B.Ed. level

The primary goal of pre-service teacher education courses is to fully develop student teachers, notably in knowledge and skills, personalised care of learners, and techniques and evaluation intended to promote learning. No matter how well-structured an in-service programme is, any deficiencies and shortcomings in the pre-service training cannot be made up for. The B.Ed. course is expected to cater to the current curricular concerns of secondary school education. The two year B.Ed. course (2015-2017) of University of Kerala under the purview of this study includes four semesters. The paper EDU-11: *Developmental Perspectives in Education*

is a core paper in the semester three which includes *Educational Management, Environmental Education, Health Education and Entrepreneurship Education.* The contents of the paper have been divided into two major sections. The section A: Educational Management and Entrepreneur education and the section B: Environmental and Health Education. The unit three: Environmental awareness and importance of Environmental Education under the section B is the only unit solely dedicated to environmental education at B.Ed. level. The transitory study of the B.Ed. syllabus was done to find out how far EE is reflected in the syllabi of B.Ed. courses in general though the results does not depict the status prevalent in all universities. The guidelines for Teacher Preparation in EE are clearly portrayed in the document -The Tbilisi Declaration on Teacher Preparation and Professional Development (1977). The four basic essential elements identified so as to be included in all training programmes in EE at pre service and in service level are a) purpose and goals of EE b) functional knowledge of environmental sciences or how natural systems work c) educational methods and professional skills including value clarification and action oriented abilities and d) exposure to genuine circumstances that allow students to better develop their skill set. In addition to this the analysis of national papers such as NCF (2005), KCF (2007) and NCFTE (2009) were helpful in deciding the elements to look for while analyzing the syllabus. The content analysis of the text books at secondary level already helped the investigator to locate the infused environmental concepts and activities which the prospective teachers are supposed to teach.

The results of the analysis show that even though EE has been reflected in some ways, there are aspects that need to be addressed and there are scopes for improvement in others. A good amount of content on environment related topics find place in the syllabus. The concept, nature and scope of EE clearly form a part of the syllabus .Education for sustainable development and disaster management forms a part of the syllabus. The syllabus provides ample opportunities to enrich environmental content knowledge. Though the effort to include EE in the B.Ed. course itself is appreciated, the syllabus under purview of this study is also not without limitations. Information on how to incorporate EE is not provided in the syllabus. No specific pedagogy courses on EE find place in the syllabus. Then there are issues with regard to the inclusion of various looms used in the teaching of EE. The infusion approach has not found any place in the syllabus. The term 'Infusion' is not even mentioned in the syllabus which in turn reveals the non-alignment of the teacher education curriculum with that of NCF (2005) which spells out the secondary school curriculum. NCF (2005) also mentions that projects and activities will form the backbone of EE. However even this has not been spelt out in the two year B.Ed. syllabus. Nevertheless, local environmental concerns have not been taken into consideration in the syllabus. The analysis further reveals that the syllabus is biased towards the theory given the fact that projects and activities have not been emphasized. The opportunities to participate in the resolution of environmental issues are essential for achieving one of EE's goals of preparing problem-solvers. Thus EE will be meaningful only if teacher training programs inculcate problem solving skills through actual involvement in environmental issues. However the scope for developing this is found less in the syllabus under study. Something which is heart breaking is that among the expected learning outcomes listed not even a single one was related or associated with the enhancement of environmental pedagogic content knowledge needed for teaching the infused environmental concepts in schools

4.2 Findings from the analysis of the responses of the questionnaire

The major intention of the study was to determine the student teachers' perceptions regarding the teaching of infused EE concepts. Following a brief, descriptive explanation of the findings, the participant replies are presented in tabular form. Reference is made to the percentage while making comments about the answers to the questions. The findings in this regard are detailed below:

4.2.1Purpose of EE

. The responses on this aspect are reported below:

Table 4.1: Purpose of EE: Responses of student teachers

Ideas	Frequency	Percentage
awareness about the environment	40	41
study about environment	30	31
positive attitude towards environment	9	9
developing environmental knowledge/ concepts	11	11
acquiring the knowledge, abilities, attitudes, and values necessary for environmental protection	8	8

Table 4.1 demonstrates that EE was viewed in a variety of ways by those who were tasked with educating future generations. The majority of responders (40%) thought that EE was important for raising environmental consciousness and for encouraging environmental research (30%). The

responses' alignment with the five EE objectives—awareness, knowledge, attitudes, skills, and to some extent participation—as outlined at the Tbilisi conference was an interesting finding. It is crucial to keep in mind that the word "environmental awareness" only refers to knowing something about the environment; occasionally, it is used synonymously with EE. However, the phrase EE is more general and includes participation, attitudes, knowledge, and attitudes. It should not just be viewed as a method for raising environmental awareness, but also as a way to foster genuine care for preserving the standard of life on earth (UNESCO, 1985).Since EE was thought to be about fostering awareness or knowledge acquisition, even the method it was taught appeared to be about merely transferring knowledge to students.

4.2.2 Infusing EE concepts /issues into lessons

At present, it is not certain whether or not the student teachers take it obligatory to incorporate EE concepts/issues while teaching their respective subjects. The investigator therefore collected their responses regarding this aspect. Their ratings and results of the differences in their responses are presented in the Table 4.2

Table4.2: Incorporating EE concepts /issues into lessons: responses of student teachers

Statement	Students teachers' responses		
	Always	Sometimes	Never
Incorporation of EE concepts /issues into lessons	23 (23.46%)	59 (60.22%)	16 (16.32%)

Table 4. 2 shows that only 23.46% of the 98 participants who responded to the question said they always incorporate EE concepts and topics into their teaching.60% of the participants said that they either occasionally or never use EE concepts or issues in their teaching, whereas 16.32% never do so. The findings show that the method currently used to incorporate EE concepts and issues into the various lessons of study is not effective**.**

4.2.3 Teaching EE in immense deepness

Table 4.3: Responses of Student teachers regarding the teaching of EE in depth

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Teach EE in depth	(6.1%)	(40.8%)	(34.7%)	(14.3%)	(4.1%)

According to table 3 above, 46.9% of student teachers extensively cover EE aspects in their instruction, compared to 53.1% of student teachers. The answers to the previous two questions indicate that, although several dimensions are included in various school subjects to differing degrees, not all of them are thoroughly discussed.

Table4.4: Cross-tabulated subjects versus level of EE instruction

Responses	Eng	Mal	Hin	Mat	NS	PS		SS
Great Extent	(54.5%)	(41.3%)	(38.4%)	0	(66.7%)	(40%)		(75%)
Some Extent	(27.3%)	(58.7%)	(45.3%)	(42.8%)	(33.3%)	(20%)		(25%)
Not at all	(18.2%)	0	(16.3%)	(57.2%)	0	(40%)		0

While many student teachers in the social sciences (75%) and the natural and physical sciences (66.7 and 66.7 percent, respectively) said that they taught EE in great depth, many others said they never or only occasionally did so. These student teachers were instructing students in mathematics (100%) and languages (45 – 61.6%).

4.2.4 Infusion of EE into all subjects

Table 4.5: Responses regarding the infusion of EE in all subjects

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Infusion of EE into all learning areas	43 (43.8%)	35 (35.4%)	18 (18.8%)	2 (2.1%)	0

79.2% of those surveyed think that EE should be integrated into all topics. 18.8% and 2.1% of respondents indicated they did not entirely agree with this method of teaching EE.

4.2. Schooling EE as a Separate Subject

Table 4. 6: Schooling EE as a separate subject

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Schooling as a separate subject	29 (29.2%)	22 (22.9%)	31 (31.3%)	16 (6.3%)	10 (10.4%)

51.1% of interviewees said that EE should be taught as a separate subject, while 31.3% were not quite in agreement. Only 16.7% of respondents objected to teaching EE as a separate subject. In contrast, 79.2% of respondents to the previous question said that EE should be integrated into all topics. It appears that some respondents thought it should be taught as a separate subject in addition to being integrated into other disciplines. The respondents may have been uncertain or thought that both strategies would be advantageous. Incorporating EE "across the curriculum" is the "official" strategy for addressing the status of EE in the National Documents. Contradicting this strategy and showing that the respondents were not scared to challenge official policy is the relatively large percentage of teachers who support teaching EE as a single subject. From a completely different perspective, this would therefore suggest favourably that the questionnaire's question-response dependability is high.

4.2.6Insufficient time to teach EE

Table 4.7: Responses regarding the insufficient time to teach EE

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Insufficient time to teach EE	27 (27.1%)	33 (33.3%)	20 (20.8%)	4 (4.2%)	14 (14.6%)

Due to the focus on preparing students for, the majority of respondents (60.4%) agreed and strongly agreed that there was not enough time to teach EE in a meaningful way. Only 18.8% of respondents disagreed that there was not enough time to teach EE, while another 20.8% agreed to some extent that this was the case.

4.2.7Teaching EE by an expert

Table4. 8: Responses of student teachers regarding the Teaching of EE by an expert

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Teaching of EE by an expert	22 (22.9%)	27 (27.1%)	27 (27.1%)	10 (10.4%)	12 (12.5%)

The majority of survey participants, 50%, agreed or strongly agreed that EE should be taught by a topic expert. While 22.9% disagreed that EE should be taught by an expert, a further 27.1% agreed to some level with this assertion. The answers to this query are frequently closely related to those of the preceding query. In response to the previous question, 52.1% of respondents said they preferred that engineering and applied sciences (EE) be taught as a separate subject, and in response to this one, 50% said EE should be taught by an expert.

4.2.8 Importance of EE in the Curriculum

Table4.9: Responses of Student teachers concerning the Importance of EE in the curriculum

Statement	Student teachers' responses				
	Strongly agree	Agree	Partially agree	Disagree	Strongly disagree
Importance of EE in the curriculum	59 (60.4%)	31 (31.3%)	8 (8.3. %)	0	0

The vast majority of respondents felt that EE should be a key component of the curriculum. 91.7 percent of respondents agreed and strongly agreed that EE should be a key component of the

curriculum. 60.4% of them firmly agreed with this assertion. No respondents disagreed that EE should be a core component of the curriculum.

.4.2.9Knowledge of different EE dimensions

Effective teachers of EE must have a thorough understanding of the natural and artificial, ecological, political, economic, technological, social, governmental, cultural, and aesthetic components (UNESCO-UNEP).In light of this, it was important to provide information regarding the degree of environmental understanding in agreement with a comprehensive and systemic framework. The questions in this section are specifically related to the Van Rooyen Model from 2006.

Table 4.10: Responses of student teachers regarding the knowledge of different EE dimensions

DIMENSIONS	To a Great Extent	To Some Extent	Not at all
Biophysical	13(13.4%)	44(44.8%)	41(41.8%)
Social	26(26.6%)	65(66.3%)	7(7.1%)
Political-juridical	19(19.3%)	38(38.7%)	41(42%)
Economic	21(21.4%)	60(61.2%)	17(17.4%)
Scientific-Technological	27(27.5%)	44(45%)	27(27.5%)
Personal Contextual	25(25.5%) 15 (14.9%)	55(56.1%) 56(57.4%)	18(18.4%) 27(27.7%)

Teachers who have indicated that the dimensions are understandable to a great extent and some extent have been grouped together in the different dimensions and analyzed as follows:

89. 7% have indicated that they understood the social dimension;
82.6% understand the economic dimension;
81. 6% understand the personal dimension;
72. 5% understand the scientific-technological dimension;
72. 3% understand the contextual dimension;
58% understand the political dimension;
56.5% understand the biophysical dimension

The majority of educators incorporated the social, economic, and personal dimensions of EE into their lessons. Fewer teachers frequently understand the political and biophysical dimensions, which results in fewer teachers addressing them in their courses.

Table4.11: Understanding of EE dimensions cross-tabulated against subjects

Dimensions	Eng	Mal	Hin	Mat	NS	PS	SS
Bio-physical	63.6	59.1	50.6	42.9	83.3	33.4	50
Social	81.8	70.6	60.4	71.4	100	100	100
Political Juridicial	36.4	33.4	31.2	42.9	50	66.2	75
Economic	90.9	56.1	59.5	71.4	83.3	83.6	75
Scientific Technological	63.7	55.8	50.6	71.4	83.3	100	50
Personal	63.7	59.7	53.6	71.4	83.3	100	75
Contextual	90.9	52.3	49.1	42.9	83	66.1	75

The percentage of language teachers who said they understood the political-legal aspect was extremely low (31.2–36.4%). Only a small percentage of pre-service math teachers (42.9%), political-juridical (42.9%), and contextual (42.9%) understood the biophysical dimension. With the exception of the political-juridical dimension, which only 50% of the teachers were familiar with, a very high percentage of natural science teachers (80-100%) indicated an understanding of all dimensions. For the purpose of efficiently teaching physical science, a very high majority of teachers (80–100%) stated that they comprehended all dimensions. The bio-physical dimension was the only one that a small minority of social science professors (between 75 and 100%) said they did not comprehend. All dimensions were understood to a high degree by physical science teachers, with the exception of the biophysical, which was only understood by 33.4% of them.

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4.2.10 Student teacher's sensitivity about themselves as future EE teachers

Table 4.11: Responses of student teachers' sensitivity about themselves as future EE teachers

Statements	Student teachers' responses					
	Strongly agree	Agree	Partially Agree	Disagree		Strongly Disagree
I have been well trained in EE methodology	7 (6.7%)	15 (15%)	18 (18.3%)	31 (31.7%)		27 (28.3%)
I have mastered all content taught in EE	7 (6.7%)	9 (10%)	44 (45%)	31 (31.7%)		7 (6.7%)
I am in a better position to infuse EE concepts into the subject of the school curriculum	2 (1.7%)	13 (13.3%)	41 (41.7%)	27 (28.3%)		15 (15%)
I possess the necessary content, knowledge, skills and professional expertise to lead EE in the school	2 (1.7%)	8 (8.3%)	37 (38.3%)	18 (18.3%)		33 (33.3%)
I think I will be successful in teaching EE	1 (1%)	3 (3.3%)	34 (35%)	31 (31.7%)		29 (30%)

Student teachers' responses to this question reveal that they do not believe they will be future environmental educators capable of fostering children's environmental literacy. Due to a lack of training in EE methodology and subject matter, over two thirds (62%) of the respondents stated that they will not feel confident teaching EE. They argued that because EE is an integration of topics with shared themes, it can only be taught following instruction in its pedagogical principles and content knowledge. The national documents state that in order to give every kid the chance to understand EE concepts, pre-service teachers must incorporate EE concepts into their fields of instruction in the school curriculum. According to responses, over 70% of the student teachers included in the study's scope are not in a better position to integrate EE concepts into the relevant subject of the school curriculum. Since student teachers haven't been exposed to the idea of infusion, this could be challenging. 56 percent of respondents said they lacked the necessary material, knowledge, and professional expertise to run EE-related initiatives in the classroom. In the opinion of about 66.7% of respondents, teaching EE in schools won't be successful. As a result, the majority of aspiring teachers do not believe that they are successful in imparting the absorbed EE concepts after completing the teacher education course.

5 Recommendations and Conclusion

The study's findings supported the idea that student teachers lack the expertise needed to teach lessons that incorporate environmental topics. This shows that the EE program's secondary school implementation is problematic. A situation like this demonstrates the necessity to refocus the teacher education curriculum to enable the inclusion of appropriate pedagogical training for teaching EE concepts throughout the secondary school subjects. By refocusing the teacher education curriculum, aspiring teachers will be aware about the teaching of infused EE concepts across their topic before taking on their teaching responsibilities. In order to bring about the social changes required for sustainable development, this will guarantee that all teachers adhere to the teaching EE requirements. Overall, changing the teacher education curriculum to incorporate the instruction of infused EE ideas attests to the fact that teachers would be well-prepared to teach using the cross-curricular approach and train their students to be responsible citizens.

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Conceptual Study of Digital Education for Digital India

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Abstract

This paper is focuses on application of digital technology in educational field, which includes digital technology in teaching, learning and evaluation process.The objective of this study is to focus on conceptual information of digital education and later on it discusses on the importance and limitations involved in online and digital education and finally the study highlighted the core challenges of digital education in India. The study further focuses on macro level information regarding how digital technology plays an important role and act as bridge between sender and receiver in order to fulfill modern day approach. The study finally concluded that digital education should be complement to traditional mode of physical education then only the country can be able to reach the benefit of digital education.

Keywords

Digital technologies, cognitive, teaching, barriers, attitude, strategies

1. Introduction

"Technology will not replace great teachers but technology in the hands of the great teachers can be transformational"

Technology is one of the keywords of our world, yet it is also one of the most confused forms of elite and systematic knowledge. There is no denying the fact that technology has brought a revolution in many operational fields - be it gadgets or faster modes of communication or even the education sector. The outbreak of COVID-19 pandemic has resulted in tremendous change in the traditional mode of class room educational system, wherein the concept of online classes and usage of laptops has replaced black boards and text books. During the time of pandemic digital education was the sole source of learning for students in the country. Today, with the click of a button, students have immediate access to quality information available worldwide. They can gain practical and technical knowledge. Innovative audio-visual features can enhance their cognitive level. The study materials can be downloaded and saved for future reference. Teachers too can coordinate with students through electronic (e) classrooms and impart knowledge and share their ideas and resources and utilize the resources available on the internet for their various project work, research, etc.

2. Objectives

1. To understand the conceptual information of digital education
2. To study the importance of online and digital education
3. To understand the limitations of digital education
4. To understand the challenges of digital education

3. Importance of Digital Learning

A. Individualized Learning Experience: Conventional class room education system failed to capitalize interest of all students and not able to carry the momentum with the rest of other students in class. Digital learning methodology allows teachers to customize their teaching methodology and study materials by keeping in mind of student's psychology and ability of learning speed of individuals.

B. Students become Smarter: It gives enough freedom to students to explore what they need to know, it develop searching ability and utilize online resources, when we exposed them to digital learning tool that developsself-directed learning skills. It plays an important role to multiply their productivity, learning ability and magnify their efficiency

C. Unlimited Information: The world of internet is wide and having ocean of information. Earlier students would rely on limited edition of information, but now due to revolution took place in digital platform it breaks conventional barrier and allow students to discover. Lots of information available freely in the ocean of internet resources. Students have zero restrictions to explore the information and use this treasure of knowledge.

D. Smart Classrooms: Digital service provides innovative platform to teachers to teach concepts more creative way that helps students to understand the concepts innovative and fun. Traditional chalk and talk method is past now, modern day classrooms require smart board, projector, TV etc… which makes it easy to present concepts in picture or animation form that helps students to better understand, due to that students can pay more attention as they are extensively approachable to digital world.

E. Digitally Updated: In a fast growing world in terms of technology, resources and practices can easily outdated, as they boosting students to innovate new and update scientifically in terms of subject related. Now a days students are fascinating more towards electronics gadgets like phones, laptops etc.. So they must be technologically sound.

F. High Engagement Learning: Traditional education system has limited scope of engagement as it restricted only on textbooks, magazines, handwritten notes and instructor. Where as digital education platform provide wide range of choice to learn. They have ample

number of tools like smart board, white board, browser, games, drama, activity based learning session motives active participation from students.

G. Ease of Sharing: Digital learning system breaks the barrier of handwritten notes making process, avoid carrying bag of books, stops depending on library to gather information, create an environment to attend class by sitting in home, can able to collect any information from anywhere is just a click away which saves lot of students time, efficiency and physical labor. It makes easy to preserve information in the form of soft copies so that one can access from anywhere in the world.

H. Accountability in Students: Digital education system brings accountability to students so that they can track their academic progression easily. Digital evaluation process saves lot of time, energy and efficiency simultaneously which provide early result, breaks unnecessary fiscal burden and brings more transparent in evaluation process. It enables students to analyze their performance and come up with required solution on their own. Digital education system gives freedom to study to think independently, develop positive attitude. One can no longer depend on spoon feeding provided by teachers in class and parents in home regarding any information.

4. Challenges while incorporating online education

1. Incorporating online education in the general education system isn't an easy task, with the new set of rules brings many challenges.
2. India is an agrarian country, 60% of population dependent on agriculture. Out of that 30% of population not aware about computer literacy and they don't even know how to start it. Minimum computer knowledge is needed to provide digital education
3. Electronic gadgets needed for digital education which are expensive. Lower class people like farmers, maids, scavenger, who belong under below poverty level, for them it is hard to purchase laptop or phones and put every month internet connection
4. It is a big challenge for teachers also. They might be good at class room offline mode teaching, it doesn't mean their Excellency would carry in digital learning also.
5. Subjects like science needs practical class, eventhough teacher taught through digital mode practical experience also important to gain better knowledge,practical training also important to grasp what they have learned.
6. India is still lagging behind digital resources due to that it is difficult to conduct an online examination and students shows resistance to change from traditional class room mode to digital mode
7. Because of poor network connection in remote and socio-economic backward areas, it is difficult to broadcast live session and streaming for the children's related to academics. India is still facing network connectivity issue in most part of the country it costs a lot

5. Limitations of Digital Learning

1. Socioeconomic divide: India is a land of diversity having varieties of culture, ethnicity and beliefs, in addition to it India is a victim of huge class and socioeconomic divide, based on untouchability, gender, religion and economic status. Due to these constraints not even 30% of population can receive digital education. India has its unique topographic feature includes Ghats, river valley, plateaus, dense forest, deserts etc… these terrains and topography's are facing issues like proper electricity and internet facilities. Student's not able to engage digital classes consistently. As an alternative to this prerecorded class videos send through what's app or YouTubeso they can study at their convenience, but even these students have their own set of difficulties like lack of understanding of lessons, as a result they still deprived of the knowledge they should be provided with.

2. Gender differentiation: Implementation of digital learning creates gender differentiation. During COVID-19 lockdown period schools and colleges are shut downed, students rely on online classes, in that circumstance most of the students preferred to go work instead of attending classes, helps to their parents in domestic work, out of that major percentage was female students. Half of these could not get smart phone and internet packages as a result girls were spent most of their time and energy to engage household chores. Another problem is that parents denies to talk with their girl child and offered to serve on their behalf,where they had to talk in front of the male member which made them understand how difficult it is for them to study with online resources.

3. Internet drawbacks: Internet is an open source. Now a day's any information can accessible easily. It stands big challenge for online education because the teacher worked in colleges and universities expecting them to be uptodate digitally and deliver the concept effectively through online by keeping students psychology in mind, meanwhile it is unfair for children to adapt completely. There are main two factors affecting digital learning, one is difficult to maintain consistency by students. It is difficult for them to keep concentrate entire lecture, and another is for teacher to maintain body language and eye contact difficult to perceive in a digital teaching and learning.

4. The mental health of students: Young age group (6-12 year old) and adult student's for them digital learning system cost their mental health. They seem to involve in physical and practical way of learning than the virtual one. That is the age they should expose and engage

with group of peoples. Restricting them with in the four walls can lose their confidence it creates mental strain. Subjects like science, mathematics requires practical experience. Humanity subjects requires social experience, digital learning system doesn't create scientific temper and critical thinking ability.

5. Excessive screen time: Excessive screening also becomes problem to student's mental health. As they engrossed them self with class work, home-work, assignments, everything going digitally it creates mental strain to them. It puts strain on their eye and brain

6. Conclusion

India is shifting towards digitalization. For that digitalization of education certainly help in bridging the gap between the teacher and students in near future. The benefit of physical education cannot be replaceable with any mode of education, as it provides opportunity to engage with others and interact with teachers also plays great role in children's cognitive development. However to be useful digital education should be complement to traditional mode of physical education. Both these supplement to each other, then only will the country can able to reach the benefit of digital education by improving capacity of students learning to make Indian education system prosperous.

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Research Paper

Exploring India's Economic Achievements after Independence" – Some Observations

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Introduction :

India celebrated her 75th Independence Day on 15th August 2021. In March 2021 the government of India announced the celebration of its "Azadi ki Amrit Mahotsav", a two-year-long nationwide initiative to commemorate the milestone. India's economy has travelled many ups and downs since independence. Once branded as a 'third world country' a term used for underdeveloped countries, India is now among the biggest economies of the world. There is still a long journey for India to be a successful economy.

The journey of India's development over the last 75 years has seen significant milestones and reforms that enabled it to achieve substantial progress in many areas including raise in income levels, growth, literacy, life expectancy and a wide variety of other economic indicators. As India commemorates 75 glorious years as an independent nation, let's look back at some of the significant achievements of our economy over the years.

Achievements Of Indian Economy:

India has made decent progress in several areas during the last 75 years. The greatest achievements of the Indian Economy in the last few decades have been summarized below:

1. Fastest Growing Economy In The World:

India's average GDP growth during the 1970s and the 1980s was 4.4%. This improved to 5.5 % during the 1990s and jumped to a 6.5 % level during the last decade, excluding the pandemic year 2021. IMF projections for FY 2022 show that India will reclaim its status as the fastest-growing major economy in the world. India, with a GDP of over $ 2.6 trillion, is on its way to becoming the fifth largest economy in the world. Despite several hiccups in the global economic situation, India continued to exist as the world's fastest-growing large economy growing at a rate of 8.2 % in the first quarter of 2018-19. In the World Economic Outlook published in October 2021, the IMF projected that India's GDP will grow at 9.5% and 8.5% during 2021-2022 and 2022-2023 respectively. If it becomes true, then India will be amongst the fastest growing economies in the world. Whereas at present, India is the Sixth-largest economy behind the U.S.A, China, Japan, Germany, and the U.K..

2. 6TH Largest Economy:

India is now an economic powerhouse. In terms of Gross Domestic Product, internationally India is ranked 6th. Its rank was 18th in 1991. In dollar terms, India's GDP has grown by 9 times during this period from $ 266 billion in 1991 to $ 2.7 trillion in 2020.

3. Per Capita Income 5 Times Of 1991 (Dollar Terms):

Per capita income, which was $ 300 in 1991, has grown by more than 5 times to the $ 1,900 level today even after the sharp contraction in economic growth due to the COVID-19 pandemic and the consequent nationwide lockdown. The share of food in consumer expenditure is down from 63% to 49%, which is a sign of rising incomes.

4. Development In Agricultural Sector:

Agriculture is the most important sector in the Indian economy since independence and it generates livelihood for more than 50% of the population. The real gross value added by the agriculture, forestry and allied sectors went up from around Rs.1.502 billion in 1950-51 to around Rs.22.263 billion as per the 2011-12 calculations.

The conception of the green revolution during the 1960s was a game-changer for the country. It saw the adoption of modern technology and methods to produce high yielding variety seeds that significantly raised agricultural productivity and increased food grain production.

5. Millions Helped Out Of Poverty:

Poverty is defined as failing to reach a certain minimum consumption standard. The distribution of wealth in India is improving since the adoption of the liberalization of the economy and the poverty rate has significantly decreased.

To eradicate poverty, the government over the years has changed its policy giving importance to education, reservation of seats in government jobs, and increasing empowerment of women.

With the increase in per-capita income levels and increased governments support, the population below the poverty line (BPL) has been steadily declining. BPL population which was around 34% in 1991, has declined to 22% at present. India has pulled at least 17 crores of people out of poverty since 1990.

6. Prices Under Control:

Inflation in India was in double digits during the 1991 crisis. It was 16.7% in 1991. The average consumer price index during 1980-2000 was 9.05%. Inflation has decreased to a 6.33% level during the past two decades making goods and services more affordable.

7. India Reaching Closer To 100% Literacy:

Literacy levels in India were low at 52.21% in 1991, Improvement in education infrastructure, an increase in the number of teachers, and an increase in enrollments of children in the schools of rural areas, literacy rate has increased and presently it is 77.7%. The Gross enrollment ratio for higher education has increased from 6% in 1991 to 27% in 2020.

8. Population Growth Has Slowed:

An Improvement in living standards and levels of educational attainment has contributed to lower population growth of 1.2% during 2010-2019 in comparison to 2.16% during 1981-1991.

9. People In Pucca Houses More Than Doubled:

The number of people who have pucca houses has more than doubled from 32% in 1993 to 71% in 2015. The 'Housing for All' mission and the schemes like 'Indira Awaas Yojana' and 'Pradhan Mantri Awaas Yojana' have contributed to this development.

10. Life Expectancy High:

Life expectancy has improved to more than 70 years currently from 59 years in 1991. This is a result of better health facilities and the availability of nutritional food for the population.

11. Healthy And Fit India:

The number of doctors has now increased three times to 9.59 lakh from 3.65 lakh in 1991. The infant mortality rate has declined to 22.71 in 2021 from 86.56 in 1991. The maternal mortality rate has declined from 437 per 1000 in 1991 to 113 per 1000 in 2021.

12. Food Production:

Achieving "self-sufficiency" in food grains has been Independent India's biggest achievement from receiving food aid in the 1950s and in the 1960s to becoming a net exporter. India has seen notable progress in food production. The total food production, which stood at 54.92 million tons in 1950, rose to 305.44 million tons in 2020-2021.

13. Access To Electricity (Rural Areas):

The supply of electricity to rural India has been one of the goals of India's socio-economic policy. According to the ministry of power, in 1950, electricity could be transmitted to only 3,061 villages. In 2018, the Indian government announced that all of India's villages– 5,97,464 in total had been electrified, with 10 per cent of households in a village having access to electricity. There are millions in the country, still who live without electricity.

14. Indian Railways And Roadways:

India already had one of the biggest railways and longest tracks in the early years of Independence. In Independent India, the Indian Railways focused on unifying all rail gauges, electrification of railway lines and connecting northeast India to the mainland.

Concentration on the construction of roads connecting all the states of the country has improved the road connectivity between the states and generated employment in the process as well. The dream project like the 'Silchar-Sourastra Mahasadak' during the year 2003-2004 has the vision to connect this part of the country directly to other parts, although for some reasons it has slow progress in the south Assam region leading to a break in the connectivity, which needs to be addressed immediately and sincerely. Further, there has been tremendous progress in road infrastructure since 2014 apart from the continuation of construction of rural roads under the scheme 'Pradhan Mantri Gramin Sadak Yojana' (PMGSY), which has a positive effect on the rural economy of our country.

15. Research And Development:

India's space research has experienced phenomenal progress since independence. Satellites and rockets are successfully sent to space on several occasions. India's ambition to send its own spacecraft to Mars has been successful. Many countries of the world now send satellites to space with the help of India and its space research organization.

On the other hand, the nuclear programme conceptualized and initiated by Dr. Homy Bhaba has also attained success in nuclear science research in India. His programme has made possible the utilization of nuclear energy in defence, power generation, medicine and allied areas successful. Peaceful use of nuclear energy has raised India's reputation as a mature and responsible player in the field.

Conclusion:-

India has secured an important position in the world in economic development over the decades after independence. India has been considered as the biggest market for many International consumer brands which in turn also encouraged the international community to invest in India in manufacturing and infrastructural field. The outline of achievements highlighted above evidence that India has achieved phenomenal progress in its economy during the last 75 years, despite having experienced crises and/or contractions in between.

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Pilgrims Satisfaction Analysis of Dehu Pilgrime Centere In Pune District In Maharashtra

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Abstract:

Compared to other businesses, tourism is one of the fastest expanding sectors due to low capital expenditure. Since ancient times, religious tourism has been one of the more significant forms of travel. Due to its geographical features, including its position, lovely terrain, enjoyable waterbodies and waterfalls, and historic religious sites, the Haveli tehsil of the Pune district has a great deal of potential to expand the tourism business.

For the development of a pilgrim tourist destination, pilgrims' satisfaction with the services already offered in the tourist centre is crucial. The current study's objective is to gauge pilgrim happiness at Dehu, known for Vari**,** Varkari and 'Paalkhi' from Dehu to Pandharpur in month of Ashad**.** .The goal of the current study is to comprehend satisfaction.

Key Words: Pilgrim, Religious, Satisfaction, Facilities, Tourism, Destination

Introduction: - Any country's economy is significantly impacted by tourism. Today, one of India's industries with the quickest growth is tourism. More money is made exporting foreign currency than exporting any other commodity. The tourism sector offers a lot of potential for job growth.

The district of Pune in the state of Maharashtra has a long history of tourism. The history of the pilgrimage in the Pune district spans several centuries. Pune is the cultural centre of Maharashtra due to the abundance of forts, shrines, and temples in the area. The morphology of religious tourism attractions has changed because of pilgrimages to diverse locations. A rise in pilgrimages has an effect on religious institutions on both a socioeconomic and cultural level. The goal of this research paper is to examine the satisfaction index.

Study Area:- The primary pilgrimage site in Maharashtra is Dehu. A census town in the district of Pune is Dehu. It is 35 km from Pune and situated on the banks of the River Indrayani in the Haveli Taluka. It is located in latitude 18°43′00″ North and longitude 73°46′00″ East. It is typically 594 metres (1948 feet) above mean sea level. Sant Tukaram, a revered saint in Maharashtra, calls Dehu his home and spiritual centre. He worshipped Lord Vitthal his entire life. Sant Tukaram was a revered poet who is most known for his Gatha and Abhang.

Objectives of the Study: - To evaluate the satisfaction of pilgrims about the various facilities

Methodology: - The current research is supported by a sample survey. To gauge the satisfaction of pilgrims' visitors, Surveys were created, and during interviews, pilgrims were asked to rate the facilities as excellent, good, satisfactory, or unsatisfactory. Following that, the opinions of the pilgrim were translated into numerical values, such as 8 to 10 for excellent, 6 to 8 for good, 4 to 6 for satisfactory, and 0 to 4 for unsatisfactory. For each level of satisfaction, the factor-wise average values are computed. Total pleasure is obtained by multiplying these values by their respective frequency. The satisfaction index for the factor is calculated by dividing overall satisfaction by total frequency of the relevant factor. After calculating the satisfaction index then positional rank is assigned for values of satisfaction. For that, the following formula is used

$$Sti=\sum MiNi / N$$

Where,

Sti = Satisfaction Index for the 'I'th factor.

Mi= Numerical value for a particular level of satisfaction for the I th factor

Ni= Number of respondents deriving the particular value of satisfaction for the I th factor

N=Total number of respondents for that factor for all level of satisfaction.

Factor wise level of Satisfaction of Pilgrim Visiting Dehu

Information collected from the pilgrims was assessed factor wise for the study of level of satisfaction of the pilgrims. The total pilgrims interviewed were 412 and they were distributing according to their views about the facilities provided at the Dehu.

Table-1-Factor wise level of Satisfaction of Pilgrim Visiting Dehu

Sr. No.	Factors	Excellent	Good	Satisfactory	Un satisfactory	Total
1	Dev Darshan	312	86	14	0	412
2	Transportation	30	252	114	16	412
3	Accommodation	86	132	154	40	412
4	Local Security	78	164	146	24	412
5	Food & Drinking Water	78	184	124	26	412
6	Medical Facilities	98	148	138	28	412
7	Cleanliness and Conservation of	66	180	112	54	412

	Surrounding Area					
8	Darshan Queue Facilities	86	170	142	14	412
9	Tourist information Board and Guide	62	170	142	38	412
10	Parking	76	134	134	68	412
11	Custom and Traditions	160	162	80	10	412
12	Pollution Control Majors	46	184	100	82	412
13	Conservation of Religious Monument	112	168	112	20	412
14	Natural Scenery	92	178	124	18	412
15	Traders Behavior	76	152	150	34	412
16	Pujari Behavior	82	168	132	30	412
17	Local Peoples Behavior	84	146	150	32	412
18	Other tourists Behavior	94	206	102	10	412
19	Police Security	90	128	134	60	412
Average		95.16	163.79	121.26	31.79	412
Percentage		23.1	39.75	29.43	7.72	100
Source- Primary Data						

It can seen from the table that out of 412 tourists 312 pilgrims have ranked Dev Darshan facility as excellent, 86 as good, 14 as satisfactory and no one pilgrims have rank this facility as unsatisfactory. In case of Transportation facility out of 412 pilgrims 160 pilgrims have ranked this factor as excellent, 162 as good, 80 as satisfactory and only 10 pilgrims have rank this facility as unsatisfactory and so on.

Above table, reveals that 23.1% pilgrims noted facilities are excellent, 39.75% pilgrims noted as good, 29.43% pilgrims noted as satisfactory and 7.72% pilgrims noted as unsatisfactory. Therefore, the level of satisfaction of the pilgrims is very high. Only 7.72% pilgrims told that facilities are not satisfactory in Dehu at the time of survey.

Factor Wise Numerical Values of Pilgrim Visiting Dehu

Table No.2:- Factor Wise Numerical Values of Pilgrim Visiting Dehu

Sr. No.	Factors	Numerical Values			
		Excellent	Good	Satisfactory	Unsatisfactory
1	Dev Darshan	9.3	7.8	5.4	2.9
2	Transportation	9.5	7.5	5.8	3.3
3	Accommodation	8.9	6.9	5.3	3.4
4	Local Security	9.1	6.7	5.2	2.7
5	Food & Drinking Water	9.2	7.3	4.8	2.4
6	Medical Facilities	8.7	7.2	5.9	2.5
7	Cleanliness and Conservation of Surrounding Area	9.4	6.9	5.3	3.1
8	Darshan Queue Facilities	9.9	6.8	5.2	2.6
9	Tourist information Board and Guide	8.2	7.1	4.9	3.6
10	Parking	8.1	6.6	4.7	3.2
11	Custom and Traditions	9.5	6.7	4.4	2.9
12	Pollution Control Majors	8.1	6.2	4.3	2.5
13	Conservation of Religious Monument	8.9	6.8	4.6	2.6
14	Natural Scenery	9.4	7.4	5.6	3.8
15	Traders Behavior	9.6	7.3	4.3	3.9
16	Pujari Behavior	9.7	7.9	4.2	3.1
17	Local Peoples Behavior	9.5	7.2	4.1	2.6
18	Other tourists Behavior	8.2	6.3	5.5	2.5
19	Police Security	8.4	6.8	4.2	2.7
Source- Primary Data					

The factor wise average of satisfaction of pilgrims was calculated for facilities in the Dehu and displayed in the table as above. These average values then utilized to calculate

Satisfaction Index for the Dehu. The ranks are giving to these factors, which indicate the satisfaction about the factor.

Factor wise Satisfaction Index of pilgrims visiting Dehu (Points out of 10) and their Rank

Table No.3:- Factor wise Satisfaction Index of pilgrims Visiting Dehu and their Rank

Sr. No.	Factors	Satisfaction Index	Rank
1	Dev Darshan	8.85	1
2	Transportation	7.01	4
3	Accommodation	6.38	12
4	Local Security	6.39	11
5	Food & Drinking Water	6.60	8
6	Medical Facilities	6.80	5
7	Cleanliness and Conservation of Surrounding Area	6.37	13
8	Darshan Queue Facilities	6.75	6
9	Tourist information Board and Guide	6.18	15
10	Parking	5.70	18
11	Custom and Traditions	7.25	2
12	Pollution Control Majors	5.21	19
13	Conservation of Religious Monument	6.57	9
14	Natural Scenery	7.15	3
15	Traders Behavior	6.35	14
16	Pujari Behavior	6.72	7
17	Local Peoples Behavior	6.18	16
18	Other tourists Behavior	6.44	10
19	Police Security	5.71	17

Source- Primary Data

It is observed from above table that Dev Darshan facility have ranked highest (8.85). It means pilgrims are more satisfied with Dev Darshan facilities at Dehu. Sant **Tukaram** is the well-known Sant in Maharashtra and Dehu is the home and soul of him. The 2nd rank (7.25) received for Custom and Traditions. Dehu is known for the **Abhang** and **Gatha of** Sant **Tukaram, and it is also** known for Vari, **Varkari and** 'Paalkhi' from Dehu to Pandharpur in month of Ashad**.** It is clear that the main purpose of pilgrims to visit Dehu is spiritual purpose. The 3rd rank (7.15) goes to Natural Scenery. Dehu is situated on the bank of holy river Indrayani, Holy Mountain known as a Bhandra Dongar is very near to Dehu. The 4th rank (7.01) received for Transportation. Dehu has well connected by road to Pune, Pimpri-Chinchwad and Mumbai via road and railway. City bus facility also available here. The 5th rank (6.80) goes to Medical Facilities. Most of the tourist also satisfied with Darshan Queue Facilities, Pujari Behavior and Food & Drinking Water, it ranks 6th (6.75) and 7th (6.72), 8th (6.60) respectively.

Conservation of Religious Monument rank 9th (6.57), while other tourists Behavior and Local Security's rank is 10th (6.44) and 11th (6.39) respectively. These are the factor where pilgrims do not satisfied well, so from pilgrims' point of view these factors in Dehu needed more development.

The 12th (6.38), 13th (6.37) and 14th (6.35) ranks goes to Accommodation, Cleanliness and Conservation of Surrounding Area and Traders Behavior. The 15th (6.18) ranks goes to Tourist information Board and Guide and Local Peoples Behavior, and 17th (5.71) ranks goes and Police Security. The 18th (5.70) and 19th (5.21) ranks goes to Parking and Pollution Control Majors respectively. The pilgrims were not satisfied by facilities like Accommodation, Cleanliness and Conservation of Surrounding Area, Traders Behavior, Tourist information Board, Guide and Local Peoples Behavior, Police Security, Parking and Pollution Control Majors.

There is need to develop the Pollution Control Majors and Cleanliness and Conservation of Surrounding on the bank of river Indrayani and area near the temple. There is also need to develop safe parking units for vehicles of tourists and Police Security, better and cheap Accommodation facility for varkari. There is also scope to improve in Traders Behavior, Tourist information Board and Guide and Local Peoples Behavior.

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Factors wise Order of Importance of pilgrims Visiting Dehu

Table No. 4:- Factors wise Order of Importance of pilgrims Visiting Dehu

Sr. No.	Factors	Order of Importance				Total Respondents	Relative Importance (Points out of 10)	Rank
		Ist	IInd	IIIrd	IVth			
1	Dev Darshan	342	55	9	6	412	9.45	1
2	Transportation	274	55	43	40	412	8.42	5
3	Accommodation	265	59	46	42	412	8.32	6
4	Local Security	175	43	73	121	412	6.65	11
5	Food & Drinking Water	108	27	83	194	412	5.30	13
6	Medical Facilities	98	23	86	205	412	5.08	14
7	Cleanliness and Conservation of Surrounding Area	327	52	18	15	412	9.19	2
8	Darshan Queue Facilities	302	43	36	31	412	8.74	4
9	Tourist information Board and Guide	251	61	53	47	412	8.13	8
10	Parking	259	62	47	44	412	8.25	7
11	Custom and Traditions	320	35	33	24	412	8.95	3
12	Pollution Control Majors	232	58	55	67	412	7.76	9
13	Conservation of Religious Monument	204	56	63	89	412	7.28	10
14	Natural Scenery	135	31	81	165	412	5.83	12
15	Traders Behavior	7	9	111	285	412	3.41	19
16	Pujari Behavior	16	12	107	277	412	3.59	18
17	Local Peoples Behavior	69	21	92	230	412	4.57	15
18	Other tourists Behavior	43	17	101	251	412	4.10	16
19	Police Security	32	14	105	261	412	3.89	17

Source- Primary Data

As per table no 5.19 it observed that maximum importance is given to Dev Darshan (9.45), followed by Cleanliness and Conservation of Surrounding Area (9.19), Custom and Traditions (8.95), Darshan Queue Facilities (8.74), Transportation (8.42), Accommodation (8.32), while minimum points are given Traders Behavior facilities (3.41) by pilgrims.

Ultimate Satisfaction Index of pilgrims visiting Dehu

Table No.5:- Ultimate Satisfaction Index of pilgrims Visiting Dehu

Sr. No.	Factors	Points out of 10		
		Satisfaction Index	R.I.	SI X RI
1	Dev Darshan	8.85	9.45	83.61
2	Transportation	7.01	8.42	59.00
3	Accommodation	6.38	8.32	53.08
4	Local Security	6.39	6.65	42.50
5	Food & Drinking Water	6.6	5.30	34.96
6	Medical Facilities	6.8	5.08	34.58
7	Cleanliness and Conservation of Surrounding Area	6.37	9.19	58.56
8	Darshan Queue Facilities	6.75	8.74	58.98
9	Tourist information Board and Guide	6.18	8.13	50.25
10	Parking	5.7	8.25	47.04
11	Custom and Traditions	7.25	8.95	64.89
12	Pollution Control Majors	5.21	7.76	40.43
13	Conservation of Religious Monument	6.57	7.28	47.80
14	Natural Scenery	7.15	5.83	41.65
15	Traders Behavior	6.35	3.41	21.65
16	Pujari Behavior	6.72	3.59	24.10
17	Local Peoples Behavior	6.18	4.57	28.24
18	Other tourists Behavior	6.44	4.10	26.42
19	Police Security	5.71	3.89	22.21
Total			126.90	839.94

Source- Primary Data

Ultimate Satisfaction Index for Dehu is 6.62 out of ten points. This is the satisfactory level pilgrims. It is essential to provide better services to pilgrims.

Conclusion:-

1. Pilgrims visit to Dehu for spiritual purpose hence Dev Darshan facility ranked first. It means pilgrims are more satisfied with Dev Darshan facilities at Dehu. Sant Tukaram is the well-known Sant in Maharashtra and Dehu is the home and soul of him. The 2nd rank received for Custom and Traditions. Dehu is known for the Abhang and Gatha of Sant Tukaram, and it is also known for Vari, Varkari and 'Paalkhi' from Dehu to Pandharpur in month of Ashad
2. It is clearly shows that most of the pilgrim are satisfied facilities like Natural Scenery and Transportation facilities hence it is got 3rd, and 4th rank respectively.
3. Pilgrims are satisfied than their expectation with facilities like Dev Darshan, Natural Scenery, Transportation, Medical facilities, Darshan Queue Facilities and Custom and Traditions.
4. Accommodation, Cleanliness and Conservation of Surrounding Area, Tourist information Board and Guide, Parking and Pollution Control Majors. are the factors where pilgrims have not well satisfied, hence it is very much need to more development in these facilities in Dehu as per pilgrim point of view.
5. Pilgrims has given maximum importance is to Dev Darshan followed by Cleanliness and Conservation of Surrounding Area, Custom and Traditions, Darshan Queue Facilities, Transportation, Accommodation, while minimum points are given Traders Behavior facilities by pilgrims.
6. As per the Ultimate Satisfaction Index for Dehu pilgrims reach upto satisfactory level but it is essential to provide better services to pilgrims.

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Psychological Impact Of Covid-19 Among The Old Aged People

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Abstract
` The current Coronavirus disease (COVID-19) pandemic is a particular and rare situation and has raised international concern and this pandemic has caused ruin far and wide. India is also facing a difficult circumstance as the quantity of infected /positive cases is expanding step by step. With exacting preventive measures and limitations by the Indian Government as across the nation lockdown, the peoples are going through a range of psychological and emotional problems, fear and havoc being one of them. But COVID-19 is changing older people's daily schedules, the consideration and bolster they get, their capacity to remain socially connected, and how they are seen. Older adults are consistently reported to be more vulnerable to COVID-19.This study was conducted to explore the "Psychological impact of covid-19 among the old aged people". The Geriatric Depression Scale (GDS) is a 30-item self-report assessment used to identify depression in the elderly. The scale was first developed in 1982 by J.A. Yesavage and others, to assess depression, and Mental Health Checklist developed by P Kumar to assess the mental health of elder people. The sample size was 60 respondents (30 male and 30 female). Finding of Mean, SD, t-test and the Pearson Product moment Coefficient of correlation(r test) revealed that depression and mental health are correlated significantly. Also, Poor mental health status, depression was found to be high in elderly female groups of age range 55 -60 above.
Keywords: COVID-19, Lockdown, Depression, Old Age, Geriatric Depression Scale (GDS), Mental Health Battery.

Introduction

A question that arrives into many people's minds; what exactly is coronavirus? COVID-19 or better known as coronavirus is a disease that began in the world's most populous country, China, and spread all over the world. Covid-19 is a short name of Coronavirus disease that started in December 2019. When this disease enters a person's body, it clogs the respiratory system leading to shortness of breath. It is a fatal disease that mostly affects older people and children below the age of 10, the worst. Psychological effects of COVID-19 on the older people of age group 50-65.

As COVID-19 began, it badly affects older people and children. Old age is a worldwide phenomenon, generally accompanied by a number of problems that the aged have to face and get attuned to. There is a great body of evidence of a rise in morbidity, mortality, hospitalisation and loss of functional status related to common mental disorders in the elderly patients. Overlap of depression and anxiety is very common in older adults, with up to almost half of the elderly patients reporting significant depressive and anxiety symptoms.[1] Therefore, older people have recommended staying at home for a long time. They are vulnerable to this disease because of their underlying health conditions. This kind of situation frightened them and induced stress or anxiety. It adversely affects their mental health. Most of the older people have low immunity and suffer from different kinds of diseases like cardiovascular problems, diabetes, high blood pressure, etc. These people always need social gathering morning or evening walk, buy their groceries; go to the temple for worship, to engage themselves. Older people need companions or friends to talk with, so they can release their stress or tension and feel relaxed. It would be challenging to live alone for those older people who don't have any close friends or relatives with whom they can share their feelings.

This pandemic mostly affects older people because they are not well versed with the internet to engage themselves. Their sensory organs become very weak due to old age, so they are not able to involve themselves in any activity. Due to this pandemic, older people have to live in isolation that leads to fear or anxiety, leading them to go into a depression that is more dangerous than the coronavirus.

Older adults are consistently reported to be more vulnerable to COVID-19. India is also facing a difficult circumstance as the quantity of infected /positive cases is expanding step by step. With exacting preventive measures and limitations by the Indian Government as across the nation lockdown, the peoples are going through a range of psychological and emotional problems, fear and havoc being one of them. According to the Centre for disease control and Prevention (CDC), older adults with COVID-19 are more likely to be hospitalized (31-59%) and die of it (4-11%). This risk is much higher in older adults above the age of 85 years. Older people are being challenged by necessities to spend more time at home, absence of physical contact with other relatives, companions and partners, impermanent end of employment and different activities; and stress, anxiety, and dread of illness.

What makes older adults at a higher risk for mental health issues during the COVID-19 pandemic? ·

1. Awareness that older adults have a higher risk for severe respiratory problems due to COVID-19 including the risk for hospitalization, the requirement of ventilatory support, and a high mortality rate contribute to significant stress, anxiety, and other related mental health problems. ·
2. Older adults are likely to experience more stress and difficulty in accessing essential services due to the restrictions enforced to maintain the social distancing to prevent the spread of COVID-19 ·
3. Older adults are less likely to have social contact using technology and social media which are useful for maintaining social contact despite the need for physical distancing. · Social isolation is one of the important risk factors for mental health problems like depression and anxiety in older adults ·
4. Older adults have higher chances of worsening of pre-existing medical and psychiatric illnesses because of difficulty in ensuring regular medication and routine health care due to COVID-19 related restrictions.

Mental Health issues ·

1. Sleeplessness, feeling anxious, boredom, panic attacks, nightmares, feeling of emptiness, fear of contracting Covid-19, fear of spreading the infection to others, health anxiety, feeling of imprisonment, anxiety related to uncertainty about future, anxiety about death and dying in 37 Covid -19 and Mental Health in Older Adults A6 unnatural circumstances without access to other relatives are some of the psychological issues that can occur in older adults.
2. Some of them may develop depression, anxiety disorders, hypochondriasis, post-traumatic stress disorder, substance abuse/withdrawal, and related psychiatric disorders in these stressful situations.[2]

Responses to social distancing and lockdown

The social distancing and lockdown have also led to several changes in day-to-day activities, redistribution of home chores, extensive working from home, and greater time spent with those living together. Notwithstanding the importance of social distancing (although many prefer to use the term physical distancing), such a requirement has meant long separation from families (for those working away from their hometowns), financial stress, and interpersonal strain. Reactions can range from boredom and moodiness to anger, irritation, and frustration. Another maladaptive coping is through the use of mind-altering substances. Uncertainty and a sense of loss of control are undoubtedly the pathogenic agents for anxiety, panic, and depression.

In this context, I must say some events do not produce equal stress among different persons. The causes of individual differences, some people are very stress-prone. There are so many other causes of stress, but the research paper aims to find out the Psychological effect of Covid-19 among old aged people. During times of pandemic, many people exhibit (Show) stress or anxiety-related responses that include fear of becoming infected, fear of coming into contact with possible contaminated objects. Some people continue to disinfect everything of his/her house. Covid-19 has panicked many individuals of all age groups especially it affected badly elderly people. In this situation everything body passing through be a traumatic phase. Here I would like to quote news ….; published in Hindu Newspaper- Every morning I wake up with a panic attack. I sweat profusely even when my air conditioner is on full blast because I am worried how my day at work will be. While there have been no job cuts in my office, the environment has suddenly become very hostile. It is as if the organisation is forcing us to resign," (Courtesy Hindu) [3].

Covid-19 may stressful for people. Fear and anxiety about a new disease and what could happen can be overwhelming and cause strong emotions in adults and children. We are fighting against an invisible enemy. Stress shoots up when we think there is no medicine no vaccine. The coronavirus pandemic has forced all of us to stay home, work, and study from home Social distancing can make people feel isolated and lonely and can increase stress and anxiety.

Covid-19 has led to the internal and external war for humanity. On one side people are being addressed by external forces and government to maintain social distance, isolation, and other hygiene conditions. On the other hand, some sections of society, especially older adults, children, and sick people are fighting internally with the fear of uncertain situations rising due to the Covid-19 pandemic. This fear is giving rise to feels of anxiety, loneliness, and depression. Mental health is equally as important as physical health. In public mental health terms, the main psychological impact to date is elevated rates of stress or anxiety. But as new measures and impacts are introduced – especially quarantine and its effects on many people's usual activities, routines, or livelihoods – levels of loneliness, depression, harmful alcohol, and drug use, and self-harm or suicidal behavior are also expected to rise.

Mental Health as Philosophy of Life:-

In the words of **Wallace Wallin**, "Mental health is the application of a body of hygienic information and techniques culled from the sciences of psychology, child study, education, sociology, psychiatry, medicine, and biology for observation and improvement of mental health

of the individual and the community." Mental Health means the sound condition of the mind or psychologically being and freedom from mental diseases and mental disorders.

The concept of mental health is as old as human beings. **Bhatia**(1982)[5] describes it as the ability to balance desires, feelings, ambitions, and Ideals in one are daily living. It may also be understood as the behavioral characteristics of a person. According to **Kumar (1992)**[6], mental health is an index that shows the extent to which the person has been able to meet his environmental demands- social, emotional, or physical? A mentally healthy person shows a homogenous organization of desirable attributes, healthy values, and righteous self-concept, and a scientific perception of the world as a whole.

Mental health presents a humanistic approach towards self and others. It is an important factor that influences an individual's various activities, behavior, happiness, and performance. However, when s/he finds himself/herself trapped in a situation s/he does not have matching coping strategies to deal with it effectively; s/he gets himself/ herself mentally strained. This mental strain is generally reflected in symptoms like anxiety, tension, restlessness, or hopelessness among others. If it is felt for too long and too extensively by the person, these symptoms may take a definite form (or get 'synchronized') representing a given illness. Mental health therefore should not be confused with mental illness. It is a study of the pre-illness mental condition of the person. Mental health, as such, represents a psychic condition, which is characterized by mental peace, harmony, and content. It is identified by the absence of disabling and debilitating symptoms, both mental and somatic in the person (**Schneider's**, 1964)[7].

Physical symptoms:

1. Neck tension, headaches, gastrointestinal problems, etc.
2. Sleep-related problems
3. Appetite problems
4. Fatigue and lower energy, Etc.

Psychological and emotional symptoms:

1. Virus-related worries and insecurity
2. Powerlessness and feelings of being overwhelmed by events
3. Self-verbalization that does not always reflect reality
4. Negative vision of things or daily events
5. Insecurity, sadness, anger, and feelings of discouragement.

Behavioral symptoms:

1. Difficulty in attention
2. Irritation, aggression
3. Crying
4. Withdrawal, insularity
5. Lack of decisions making
6. Excessive use of alcohol, drugs, and/or medication Etc.

Geriatric Depression

Geriatric depression is a mental and emotional disorder affecting older adults. Feelings of sadness and occasional "blue" moods are normal. However, lasting depression is not a typical part of aging.

Older adults are more likely to suffer from **subsyndromal depression**. This type of depression doesn't always meet the full criteria for major depression. However, it can lead to major depression if left untreated.

Depression in older adults can reduce the quality of life, and it increases the risk of suicide.[8]

Causes of geriatric depression

There is no single cause of depression in any age group. Some research indicates that there could be a genetic link to the disease. However, biological, social, and psychological factors all play a role in depression in older adults.

Research suggests that the following may contribute to depression:

1. low levels of key neurotransmitter chemicals in the brain (such as serotonin and norepinephrine)
2. a family history of depression
3. traumatic life events, such as abuse or the death of a loved one
4. Complications associated with aging may contribute to depression in older adults. These problems can include:
5. limited mobility
6. isolation
7. facing mortality
8. transitioning from work to retirement
9. financial hardships
10. prolonged substance abuse
11. deaths of friends and loved ones

12. widowhood or divorce
13. chronic medical conditions

The present research paper study was planned and performed to review the Psychological effect of Covid-19 among old aged people.

Objective

1. To find out the significant difference of depression among elder female and elder male.
2. To find out the significant difference in mental health levels among elder female and elder male.
3. To find out the significant relationship between depression and mental health

Hypothesis

1. There will be no significant difference in depression among elder female and elder male.
2. There will be no significant difference in mental health among elder female and elder male.
3. There will be no significant relationship between depression and mental health.

Method of Study

Sample: The sample of the study consists of 60 respondents (30-30 elder male and female) Sample of the study was selected by simple random sampling from the Kaimur district(Bihar). The age range of elder males and females was 50-65 years above.

Variables

The variables in this part will be treated as follows:-

Independent variable

Gender

(1) Male
(2) Female

Dependent variables

Geriatric Depression Scale (GDS)
Mental health checklist(P Kumar)

Tools used:

The Geriatric Depression Scale (GDS) is a 30-item self-report assessment used to identify depression in the elderly. The scale was first developed in 1982 by J.A. Yesavage and others. . [9] [10],[11],[12] In the Geriatric Depression Scale; questions are answered "yes" or "no." A five-category response set is not utilized to ensure that the scale is simple enough to be used when testing ill or moderately cognitively impaired individuals, for whom a more complex set of answers may be confusing, or lead to inaccurate recording of responses.

The GDS is commonly used as a routine part of a Comprehensive Geriatric Assessment. One point is assigned to each answer and the cumulative score is rated on a scoring grid. The grid sets a range of 0-9 as "normal", 10-19 as "mildly depressed", and 20-30 as "severely depressed".

A diagnosis of clinical depression should not be based on GDS results alone. Although the test has well-established reliability and validity evaluated against other diagnostic criteria, responses should be considered along with results from a comprehensive diagnostic work-up. A short version of the GDS (GDS-SF) containing 15 questions has been developed, and the scale is available in languages other than English. The conducted research found the GDS-SF to be an adequate substitute for the original 30-item scale.

The GDS was validated against the Hamilton Rating Scale for Depression (HRS-D) and the Zung Self-Rating Depression Scale (SDS). It was found to have 92% sensitivity and 89% specificity when evaluated against diagnostic criteria.

Mental health Checklist (MHC): Mental Health Check List by Dr. Pramod Kumar Mental health Checklist by Pramod Kumar was used for data collection. Mental health Checklist consists of 11 items - 6 mental and 5 somatic, presented in a 4-point rating format e.g. 'rarely', 'at items', often and 'always'. A numerical value of 1, 2, 3, and 4 are assigned to the 4- response categories i.e. for 'rarely', 'at times', 'often', and 'always', respectively. The total score varies from 11 to 44, showing the highest to the lowest (poorest) mental health status of the person. The split-half reliability, correlating the odd-even items (applying the Spearman-brown formula for doubling the test length) has been found to be 70(N=30) with an index of reliability of .83 (Garrett, 1961). The test-retest reliability is also been studied. It is .65 (N=30) with an index of the reliability of .81. The retest was giving with a time interval of two weeks. The r-value of .70 and .65 .reliability are significant .01 level of confidence, showing that the test is reliable both in term of its internal consistency and stability of scores.[13]

Statistical Techniques Used By Spreadsheet Package

1. Mean
2. SD
3. t-test
4. Pearson Product moment coefficient

Treatment Of Data

HYPOTHESIS: 01. The Geriatric Depression of the elder female (50 to 65 above) would be not significantly higher than the elder male.

TABLE-1 Gender wise Comparison on Geriatric Depression Scale (GDS)

Gender	N	Mean	Median	SD	t-test	df	Level of significance
Elder Male	30	14.9	13	5.42	3.49	58	0.01
Elder Female	30	19.43	20	4.58			

Table no-1 revealed that the mean value on this scale of elder male was 14.9 with SD 5.42 similarly; the mean value of elder female was 19.43 with SD has 4.58 The calculated "t" value was 3.49. which was significant at or beyond 1% level of confidence. It indicates that there is a significant difference in gender-wise depression between the elder female and elder males. That's why the above null hypothesis is rejected. And the alternative hypothesis is accepted.

HYPOTHESIS: 02-There will be no significant difference in mental health among elderly people based on gender.

TABLE-2-Gender wise Comparison of mental health checklist

Gender	N	Mean	Median	SD	t-test	df	Level of significance
Elder Male	30	13.73	12	3.33	10.06	58	0.01
Elder Female	30	24.5	25.5	4.82			

Table no-2, revealed that the mean value on this scale of elder male was 13.73 with SD 3.33 similarly; the mean value of elder female was 25.5 with SD was 4.82. The calculated "t" value was 10.06 which was significant at or beyond 1% level of confidence. It indicates that there is a significant difference in the gender-wise mental health level between the elder female and elder males. That's why the above null hypothesis is rejected and the alternative hypothesis is accepted.

HYPOTHESIS: 03- There will be no significant relationship between Depression and Mental Health.

Using the product-moment method of coefficients of correlation, an attempt was made to explore the relationship between depression and mental health.

The table-03 Correlation coefficient between Mental health and Geriatric Depression

Variable	N	R	P Value
Mental Health and Depression	60	0.44	0.01

Table-03 –Revealed that mental health and depression exist a positive correlation (r = 0.44) which was significant at or beyond 1% level of confidence. Thus the hypothesis there will be no significant relationship between depression and mental health is rejected and the alternative hypothesis is accepted. This indicated that a person with a high level of depression tends to scores high on the mental health checklist.

Conclusions:-

1. Elder females have shown a moderate level of depression and the Elder male group has shown mild depression.
2. Elder females groups have lower mental health rather than the elder male.
3. Mental health is positively and significantly correlated with depression.

Psychological interventions for mental health issues related to COVID-19

1. Similar to other situations related to any disaster, most of the older adults are likely to have subsyndromal mental health issues like anxiety and depressive symptoms related to the threat of COVID-19.
2. This will require brief psychological and psychosocial intervention that can be delivered by any health care personnel, volunteers, etc with some guidance and training from mental health professionals (See Section on Simple Psychological Interventions).
3. Older adults need reassurance that most of the mental health issues experienced in these situations are normal reactions to abnormal stress.
4. They should also get appropriate information and clarification about various myths and false messages that are being spread through multiple unreliable sources.
5. Guidance about maintaining a routine, physical exercise, Yoga, meditation, a healthy diet, mental stimulation through home-based activities with appropriate safety precautions is essential.
6. Brief relaxation exercises and supportive therapy can be done for those having severe psychological distress.

7. Treatment by mental health professionals including medications and other interventions may be required for those with severe mental health disorders and emergencies

Prevention from covid-19:-

1. Try to avoid close contact with your visitors. For example, don't shake hands, elbow bump, or hug. Instead wave and verbally greet them.
2. Masks should be worn over the nose and mouth. Masks are especially important when it is difficult to stay at least 6 feet apart from others or when people are indoors to help protect each other.
3. Everyone should wash their hands for at least 20 seconds at the beginning and end of the visit and whenever you think your hands may have become contaminated.
4. If soap and water are not readily available, such as with outdoor visits or activities, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands and rub them together until they feel dry.

Recommendations:-

Old age is a world of loneliness and disease in itself. And in such a situation when they are separated from the society of the outside world, the situation becomes more painful. Because in old age a man wants to be closer to nature, he seeks life's pleasures in nature. But when problems such as lockdown began to emerge globally, which had a natural effect on the mental level is very common. Therefore, to get rid of this type of psychological mental side effect, they can be helped in coming out of it by adopting the following procedures

1. In old age, where there is a fear of loneliness on one side, to get rid of it, he can do yoga meditation and spiritual activities in the morning.
2. Limit your interactions with other people as much as possible.
3. Take precautions to prevent getting COVID-19 when you do interact with others.
4. In this time, they can be mentally satisfied by being busy reading spiritual mythological, and religious books or books according to his interest.
5. Such people should also pay special attention to their food because healthy food is responsible for a healthy body and a healthy brain resides in a healthy body.
6. Sleep deprivation is a common problem in old age. Therefore, they should try to get healthy sleep.
7. Keep interacting with your friends, friends, and relatives virtually, this will reduce the lack of social distance and the feeling of loneliness will not come in old age.
8. Spend time with your young children and teach them.
9. If sitting in the house suddenly starts distracting you from any negative thoughts that arise in your mind, then instead of being afraid of it, write it in the paper or diary. By doing this these negative thoughts will come out of your mind and your attention will not go on them.[14]

It is necessary to bear in mind that older adults are more vulnerable both physically and psychologically to the COVID-19 pandemic. All stakeholders must work together to ensure their health and well-being.[15]

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Research Paper
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Study of Rhizomes of Tectariacoadunata with special reference to Phytochemical and GC-MS

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Abstract:
Pteridophytes are one of the oldest and primitive vascular plant groups on the earth. Tectariacoadunata belongs to the family of Dryopteridaceae. The dried extract of rhizomes of Tectariacoadunata has various bioactivities such as antioxidant, antimicrobial and anti inflammatory. The present investigation was undertaken to study the presence of secondary metabolites and GC-MS analysis of rhizomes of fern. The secondary metabolites consist of Tannin, Flavonoids, Alkaloids, Saponin, Steroids and coumarin. All this phytochemical plays an important role in the development of plants.The GC-MS study reveals that the presence of 11 metabolites.
Keywords: - *Tectariacoadunata, Qual itative Phytochemical analysis, GC-MS study.*

Introduction:

Medicinal plants are the backbone of traditional medicine, which means more than 3.3 billion peoples in the less developed countries utilize medicinal plant of regular basis (Davidson, 2000). Medicinal plants are used by 80 % of the world population as the only available medicines especially in developing countries. The use of medicinal plant is very wide it is commonly considered that herbal drugs are cheaper and safer as compared to synthetic drugs and may be used without or minimum side effect.

PteridophytesTectariacoadunata (J.Smith) C. Chr. is one of the medicinally important plant. The rhizome of T. coadunata is used against anthelmintic activity, stomach pains, gastrointestinal disorders, eradication of worms in Childrens. Fresh rhizome and frond is used in insect bites or getting relief in centipede bites and extraction of dried rhizome, stem and stipe is used in respiratory disorders like cold cough, asthma and bronchitis (J. Malviyaet.al. 2012).On the basis of number of applications of Rhizomes of Tectariacoadunata, this plant was taken for the present study.

Material and Methods:

Source of the material

The collection of the plants and fresh rhizomes of TectariaCoadunata was done in the Month of September and October from different area of ShahuwadiTahsil of Kolhapur district. The collected samples were brought to laboratory for further observation. The fresh rhizomes were cleaned thoroughly and washed repeatedly with tap water. The cleaned rhizomes were then air dried at room temperature and grounded to powder form and kept ready for further analysis

Phytochemical Screening:

Qualitative Analysis

Extraction: The powdered rhizome of TectariaCoadunata was subjected to extraction with Acetone, Chloroform, Water and Ethyl Acetate using Soxhlet apparatus. The extracts were dried under shades and stored for further analysis. Qualitative Phytochemical test were carried out adopting standards procedure (Treaseet.al 1983, Kokate, et.al 1997 and Hegdeet.al, 2010)

GC-MS Analysis

The Clarus 680 G C was used in the analysis employed a fused silica column, packed with Elite-5MS (5% biphenyl 95% dimethylpolysiloxane, 30 m × 0.25 mm ID × 250µm df) and the components were separated using Helium as carrier gas at a constant flow of 1 ml/min. The injector temperature was set at 260°C during the chromatographic run.

The 1µL of extract sample injected into the instrument the oven temperature was as follows: 60 °C (2 min); followed by 300 °C at the rate of 10 °C min−1; and 300 °C, where it was held for 6 min. The mass detector conditions were: transfer line temperature 240 °C; ion source temperature 240 °C; and ionization mode electron impact at 70 eV, a scan time 0.2 sec and scan interval of 0.1 sec. The fragments from 40 to 600 Da. The spectrums of the components were compared with the database of spectrum of known components stored in the GC-MS NIST (2008) library.

Result and Discussion

The rhizomes of Tectariacoadunata was subjected to extraction by various solvents by using Soxhlet apparatus. The qualitative phytochemical analysis result was shown in Table 1. The aqueous extract of Tectariacoadunata contains more secondary metabolites as compared to other. The ethyl acetate extract contain less number of secondary metabolites.

The GC-MS spectrum was shown in Table 2. About 11 compounds were identified based on retention time, peak area and interpretation of mass spectra. Amongst these most prevailing

compounds is N- Hexadecanoic acid, Undecanoic acid, Oleic acid, Elcosanoic acid N-Hexadecanoic acid possess number of biological activities such as Anti-inflammatory (Aparna, et.al, 2012), Antioxidant, hypocholesterolemicnematicide, pesticide, anti androgenic flavor, hemolytic, 5-Alpha reductase inhibitor (Kumar, et.al,2010) potent mosquito larvicide (Rahuman, et.al, 2000). The Oleic acid contains antibacterial properties (Awa, et.al, 2012.). Similar work were carried out by Dubalet.al in which determined 16 secondary metabolites from the plants (Dubal, et.al 2013)

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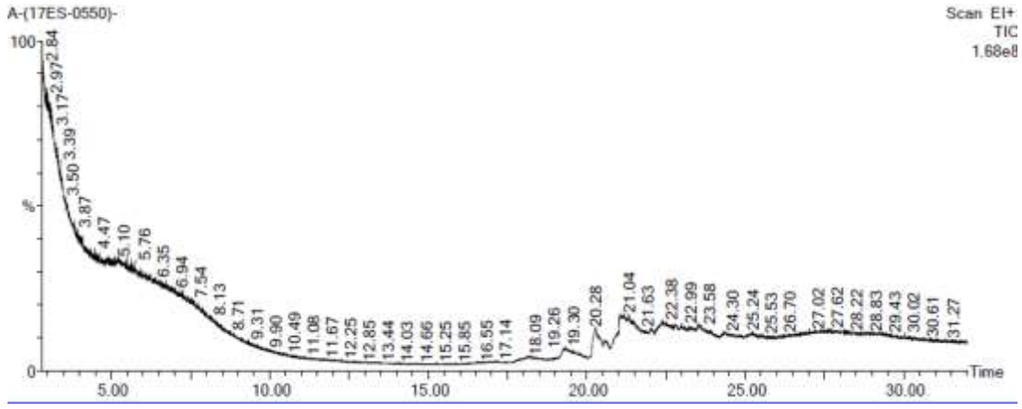
Table 1. Qualitative Phytochemical Analysis

Sr. No.	Content	Acetone Extract	Chloroform Extract	Water Extract	Methanol Extract	Ethyl Acetate Extract
1	Saponin	-	-	+	-	-
2	Steroid	-	-	+	+	-
3	Tannin	+	-	+	+	-
4	Anthocyanin	-	-	-	-	-
5	Coumarin	-	-	-	-	-
6	Emodin	+	-	+	+	-
7	Protein	-	-	+	-	-
8	Flavonoid	-	-	+	-	-
9	Diterpene	-	-	+	-	-
10	Phenol	+	-	+	+	-
11	Anthraquinone	-	-	-	+	+
12	Carbohydrate	-	-	-	-	-
13	Quinones	+	-	+	-	-

- = Absent, + = Present

Table 2. GC-MS report of Rhizomes of Tectariacoadunata.

#	RT	Scan	Height	Area	Area %	Norm %
1	19.300	3299	3,727,907	385,983.1	3.390	12.74
2	19.345	3308	4,180,885	218,162.2	1.916	7.20
3	19.430	3325	2,616,700	196,572.8	1.726	6.49
4	20.285	3496	14,068,298	2,971,756.8	26.100	98.12
5	20.570	3553	5,261,694	613,290.7	5.386	20.25
6	20.835	3606	3,749,965	162,394.4	1.426	5.36
7	20.991	3637	6,454,044	741,557.1	6.513	24.48
8	21.166	3672	14,051,335	3,028,850.5	26.601	100.00
9	21.321	3703	12,863,059	2,587,462.0	22.724	85.43
10	21.586	3756	4,671,994	310,094.9	2.723	10.24
11	22.806	4000	2,697,444	170,121.1	1.494	5.62



A-(17ES-0550)-

Hit	REV	for	Compound Name	M.W.	Formula	CAS
1	885	730	N-HEXADECANOIC ACID	256	C16H32O2	57-10-3
2	875	794	PENTADECANOIC ACID	242	C15H30O2	1002-84-2
3	863	688	OLEIC ACID	282	C18H34O2	112-80-1
4	862	843	EICOSANOIC ACID	312	C20H40O2	506-30-9
5	849	744	4-FLUORO-1-METHYL-5-CARBOXYLIC ACID, ETHYL(ESTER)	172	C7H9O2N2F	900129-56-3
6	848	655	OCTADECANOIC ACID	284	C18H36O2	57-11-4
7	845	679	NONADECANOIC ACID	298	C19H38O2	646-30-0
8	844	697	N-DECANOIC ACID	172	C10H20O2	334-48-5
9	841	721	UNDECANOIC ACID	186	C11H22O2	112-37-8
10	841	671	PENTADECANOIC ACID	242	C15H30O2	1002-84-2
11	839	645	OCTADECANOIC ACID	284	C18H36O2	57-11-4
12	832	654	NONADECANOIC ACID	298	C19H38O2	646-30-0
13	831	691	N-DECANOIC ACID	172	C10H20O2	334-48-5
14	831	627	EICOSANOIC ACID	312	C20H40O2	506-30-9
15	829	666	HEPTADECANOIC ACID	270	C17H34O2	506-12-7
16	828	651	OCTADECANOIC ACID	284	C18H36O2	57-11-4
17	828	638	OCTADECANOIC ACID, 2-(2-HYDROXYETHOXY)ETHYL ESTER	372	C22H44O4	106-11-6

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Research Paper
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Analytical Hierarchy Process Based Multi-Criteria Analysis And Influence Technique For Agricultural Development Of Micro-Watersheds In Upper Mula River Basin In Maharashtra (India)

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Abstract:
Agricultural development is unique sign for development of agricultural base country. Multi-criteria, Analytical Hierarchy Process (AHP) Based Multi-Criteria Analysis and Influence Technique is suitable for Agricultural Development (AD). Six criterions (Crops) sugarcane, vegetables, pulses, fruits, rice and grains were selected for development indicators of Mula river basin in Ahmednagar district, Maharashtra (India). Expert opinions for ranking the criterion selected for influence. Sugarcane, vegetables and fruits show higher influences on development of watershed arrangement in the study area. Further, crops grains and pluses were show significant influence in kharip season. Using AHP techniques for influences were calculated based on weights estimated. Normalized and distribution of specific crops using the values of influences within the sub-watersheds. Agriculture developments influence are classified into very low (< Mean-1STD), low (Mean-1STD to Mean), moderate (Mean to Mean + 1STD), high (Mean + 1STD to Mean + 2STD), and very high (>Mean + 2STD) and agricultural development are classified into high (7.86%), moderate (15%) and low (77.14%) categories. The methodology is the effective tool for agricultural development of micro-watersheds.
Keywords: AHP; Ranking; Multi-criteria; Influence; Weights.

Introduction

Agricultural development is significantly representing overall development of the rural regions (Tschirley, 1998; Winnegge, 2005). After independence, Indian government focused on AD through upgrading the irrigation facilities (Johnson *et al.*, 2013), seeds (Tschirley, 1998; Wani *et al.*, 2008; Smith *et al.*, 2008), fertilizers (Wani *et al.*, 2008), technology (Bhan *et al.*, 1996; Peterman *et al.*, 2011), financial support (Pascual-Ferrer *et al.*, 2013; Zolekar and Bhagat, 2015), education and training (Montz, 2008; Vu *et al.*, 2014), etc. Organizations like National Bank for Agriculture and Rural Development (NBARD), Agricultural Finance Corporation (AFC), World Bank, Nationalized banks, etc. have provided financial assistance to farmers for the development of irrigation facilities. However, the expansion of irrigation has exploited the groundwater and water scarcity appeared in the summer season especially in drought regions (Kaushal and Belt, 2012). The irrigated agriculture and orchards began run out of water in these regions. Therefore, WMPs were suggested and undertaken by various governmental agencies, NGOs and local authorities in India for conservation of natural resources including water, soil, vegetation, etc. The main focus of implementing the WMPs was AD (Yongsheng, 2004). Therefore, the assessment of AD is important to understand the success of WMPs.

The study area shows variation in land, soil and rainfall characteristics, availability of water resources, quality of human resources and therefore nature of agriculture and cropping pattern in the region. The slope decreases towards the East from western hilly region. Higher rainfall, steep slopes and dense forests are observed in western hilly region. Paddy and *Nagali* are important crops in this area. Further, Sugarcane, Vegetables and Fruits are observed in the eastern part with the gentle slopes. Gumma *et al.* (2016) have used weighted integration of multiple thematic layers, Gassman *et al.* (2007), Daloglu *et al.* (2014) have used soil and water assessment tool, Panhalkar (2011) has used intersect overlay technique with GIS environment, Daloglu *et al.* (2014) have used Agent-Based Models (ABM) with combination of SWAT, Bouma *et al.* (2011) have used water balance of irrigation systems for AD. Further, AHP based multi-criteria analysis and influence technique is useful tool for quick assessment of AD in micro-watersheds. The crops like Sugarcane, Vegetables, Pulses, Fruits, Rice and Grains are economically useful crops selected for the analysis of AD in the region. Rice, *Nagali* and *Varai* are *rainfed* crops observed on hilly slopes and foothills areas (Su *et al.*, 2014). However, the crops like Sugarcane, Vegetables, Fruits, Grains and Pulses are observed in the eastern part due to development of irrigation facilities in the lands with gentle slopes. The area under Vegetable and Fruit crops is increased in the eastern part of the study region.

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Study area:

Upper section of Mula River basin (19° 03' 45.00" N to 19º 30' 02.00" N and 73º 33' 45.00" E to 74º 37' 31.00" E) in Ahmednagar district (India) within Akole, Sangamner, Parner and Rahuri tehsils was selected for impact analysis of WMPs for AD. The Mula River originates in *Ajoba Dongar*, near *Harishchandragad* located in the Sahyadri range and contributes water to Pravara River. The height varies from 512 to 1472.7 m and rainfall from 239 to 4846 mm. About 86.38% lands classified in the class 0º to 10º, 11.75% in 10º to 22º and 1.57% in 22º to 33º slope. The study area is the part of Deccan trap with compound pahoehoe flows and '*som aa Aa'* flows, Megacryast compound pahoehoe basaltic flows and Alluvium type geology. Slightly deep, well drained, fine, moderately calcareous soils on very gently sloping land are observed (1717.48 km^2) with moderate erosion. Further, very shallow excessively drained, loamy soils (422.85 km^2) on moderately sloping undulating land with severe erosion and strong stoniness are also observed. Rice is the major crop in the *kharif* (rainy) season for the western part of the basin whereas cereals like *Bajra*, Pulses and Groundnuts are observed as major crops in the *kharif* season and *Jawar*, Wheat, Maize and Sunflower, Vegetables in *rabi* (winter) season for eastern part. Western part shows subsistence type of agriculture fully depend on rainfall and only small patches near streams in eastern part observed seasonal irrigation for Vegetables. The Upper Mula basin has been divided into 140 micro-watershed namely SW0 to SW139 (Fig. 2) for analysis purposes.

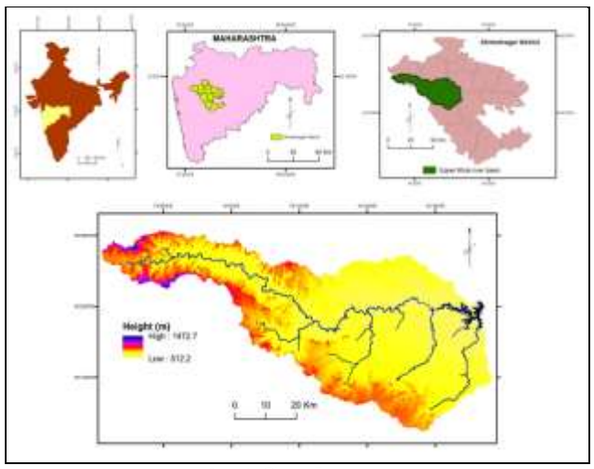

Fig.1 Study area

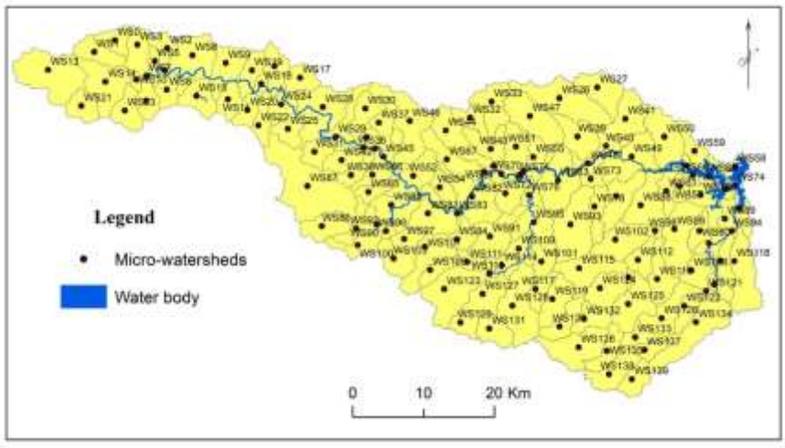

Fig. 2: Micro-watersheds

Methodology

Analytical Hierarchy Process based multi-criteria analysis and influence technique were used for AD of micro-watersheds in Mula River basin. The ranking (Table 1) of the crops have been performed based on experts' opinions collected using remote technique e.g. Google forms. The AD was performed through eight steps: 1) Delineation of micro-watersheds with the help of DEM, 2) Data collection and analysis for selected crops (criterions), 3) Ranking of the criterions, 4) Pairwise comparison matrix analysis, 5) Normalization of pairwise comparison matrix, 6) Calculation of weights, 7) Micro-watersheds wise normalization of calculated influences and 8) Calculation of AD according to the micro-watersheds.

3.1 Data

Data regarding selected crops e.g. Rice, Sugarcane, Vegetables, Grains, Pulses and Fruits was procured from government records available at tehsil offices (Akole, Sangamner, Rahuri and Parner) in Ahmednagar district for the year of 2019 and used for multi-criteria and

AHP analysis to calculate AD in micro-watersheds. GIS layers were prepared based on topographic maps (47E/10, 47E/11, 47E/14, 47E/15, 47I/2, 47I/3, 47I/4, 47I/6, 47I/7, 47I/8, 47I/10, 47I/11 and 47I/12) procured from SOI (Survey of India). ASTER DEM data was used for delineation of micro-watershed boundaries. The data and maps were loaded in GIS software for preparation of thematic layers.

3.2 Selection of criterions

Rice, Sugarcane, Vegetables, Grains, Pulses and Fruits were used for multi-criteria analysis using AHP and influence technique to calculate the AD in the study area. Rice, Sugarcane, Vegetables, Grains, Pulses and Fruits are economically important and principal crops in the region. Therefore, these crops were selected as criterion for assessment of AD.

3.3 AHP analysis for estimation of AD

Agricultural development of micro-watersheds was processed using AHP technique through six steps: 1) Determination of rank (Table 1) with the help of expert opinion, 2) Pairwise comparison, 3) Normalization of PCM of six selected crops, 4) Calculation of weights and influence of crops, 5) Normalization of micro-watersheds wise influences of selected crops and (6) Estimation of AD in micro-watersheds.

Table 1: Ranks: crops

Crops	Sugarcane	Rice	Grains	Pulses	Vegetables	Fruits
Rank	1	5	3	6	2	4

Table 2: Pairwise comparison matrix

Criterion	Sugarcane	Vegetables	Grains	Fruits	Rice	Pulses
Sugarcane	1.00	2.00	3.00	4.00	5.00	6.00
Vegetables	0.50	1.00	1.50	2.00	2.50	3.00
Grains	0.33	0.67	1.00	1.33	1.67	2.00
Fruits	0.25	0.50	0.75	1.00	1.25	1.50
Rice	0.20	0.40	0.60	0.80	1.00	1.20
Pulses	0.17	0.33	0.50	0.67	0.83	1.00
Sum	2.45	4.90	7.35	9.80	12.25	14.70

Table 3: Normalized pairwise comparison matrix

Criterion	Sugarcane	Vegetable	Grains	Fruits	Rice	Pulses	Sum	Weights	Influence %	%
Sugarcane	0.41	0.20	0.14	0.10	0.08	0.07	1.00	0.05	0.41	41
Vegetable	0.20	0.10	0.07	0.05	0.04	0.03	0.50	0.02	0.20	20
Grains	0.14	0.07	0.05	0.03	0.03	0.02	0.33	0.02	0.14	14
Fruits	0.10	0.05	0.03	0.03	0.02	0.02	0.25	0.01	0.10	10
Rice	0.08	0.04	0.03	0.02	0.02	0.01	0.20	0.01	0.08	8
Pulses	0.07	0.03	0.02	0.02	0.01	0.01	0.17	0.01	0.07	7
Sum							2.45	0.12	1.00	100

3.4 Determination of rank

Expert opinion was used for assigning the ranks (Table 1) to criterions selected for weighted analysis (Table 3). The ranks are useful for better understanding of unstandardized factors than the standardized (Bhagat, 2012). Zolekar and Bhagat (2015) have used experts' opinions for ranking the criterions in AHP based weighted overlay analysis for land suitability for AD. 1 to 6 ranks were assigned to selected crops (Table 1) (Ranjan *et al.*, 2013; Zolekar and Bhagat, 2015; Farhan and Anaba, 2016; Argyriou *et al.*, 2016; Gaikwad and Bhagat, 2018). Scholars like Ghanbarpour and Hipel (2011), Rekha *et al.* (2011), Feizizadeh *el al.* (2014), Sepehr *et al.* (2017) have been used multi-criteria decision-making and PCM for AD. PCM has been prepared (Table 4.2) to calculate the weights for calculation of influence for criterions selected (Elaalem, 2012; Zolekar and Bhagat, 2015). The PCM helps to recognize the association between the criterion in relation to groundwater holding capacity, surface erosion and influence in assessment for applications of conservation techniques in the watershed for AD (Emamgholi *et al.*, 2007; Ranjan *et al.*, 2014). The criterion values in PCM were divided by total of the column to find the cell values in normalized PCM (Table 3).

3.5 Weights and influences

Weights and influences were calculated as average of values of criterions in row of normalized PCM to get the weights of criterion (Zolekar and Bhagat, 2015; Maddahi *et al.*, 2017) (Table 3). Further, influences of the criterion selected for AD of micro-watersheds were estimated by calculating the cell values (%) (Gaikwad and Bhagat, 2017) (Equation 1, Table 3).

$$C_i = \frac{W_c}{W_s} \times 100 \qquad (1)$$

C_i = Normalized influence of criterion based on AHP
W_c = Estimated weights of criterion
W_s = Sum of estimated weights for all criterions
C_i = The share of criterion in total influence (100%) of criterion which can be distributed within the criterion according to estimated weights (Gaikwad and Bhagat, 2017).

3.6 Normalized influences

The influences of criterion interpret the share of individual criteria in sum of AD (100 %) and vary according to micro-watersheds (Silva *et al.*, 2007; Gaikwad and Bhagat, 2017). Here, micro-watersheds wise influences of criterion were normalized according to spatial distribution in micro-watersheds (Equation 2) (Gaikwad and Bhagat, 2017).

$$NDI_w = \frac{C_w}{C_s} \times C_{di} \quad (2)$$

NDI_w = Watershed wise normalized development influence
C_w = Cell value of criterion for the micro-watershed
C_s = Sum of cell values of criterion
C_{di} = Estimated development influence of criterion based on AHP

3.7 Weighted development

Sugarcane, Vegetables, Grains and Fruits have been widely used for assessment of AD. These crops can be useful to decide overall AD of micro-watersheds (Aher *et al.*, 2014) using normalized PCM (Ghanbarpour and Hipel, 2011), calculated influences (Table 3) for criterion and watershed wise normalized influences (Gaikwad and Bhagat, 2017).

$$AD_w = \sum_{i=1}^{n} NI_w \quad (3)$$

AD_w = Agricultural development of micro-watersheds
NI_w = Watershed wise normalized influence
n = Number of criterion
i = Criterion

1. Criterions

4.1 Rice

Rice is an important crop in *kharif* season on 24.50% NSA in western hilly region with higher rainfall (Su *et al.*, 2014) whereas no Rice cultivation was observed in the eastern part having less rainfall. Micro-watersheds, WS23 (73.21%), WS12 (69.47%), WS10 (52.28%) and WS8 (50.44%) show more than 50% NSA under Rice. 6 micro-watersheds shown less influence of Rice cultivation and two micro-watersheds show moderate influence.

Table 4: Distribution of area under Rice

Classes	Influence (%)	Watersheds
< Mean-1STD	00	115
Mean-1STD to Mean	< 0.06	06
Mean to Mean + 1STD	0.06 to 0.22	02
Mean + 1STD to Mean + 2STD	0.24 to 0.38	05
>Mean + 2STD	>0.38	12
Total		140
Mean		0.06
STD		0.16
Maximum		0.76
Minimum		00

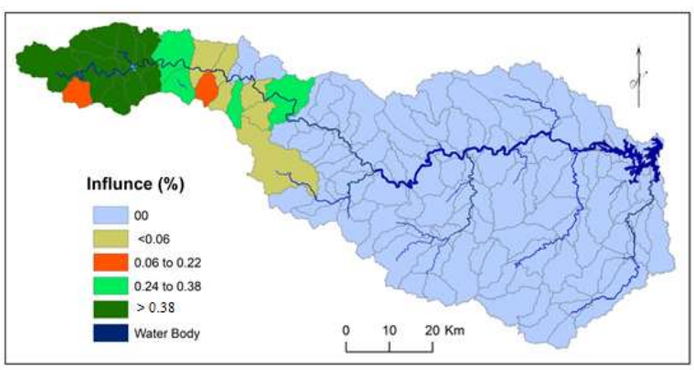

Figure 3: Rice

These micro-watersheds are located in western part with high rainfall, steep slope, thin soil layer and high erosion. 12 micro-watersheds show more Paddy cultivation in the villages viz: Wagdari, Tale, Lavali Kotul, Kothale (WS23), Pimpri, Shinde, Vihir, Kohane (WS12), Pimpri, Purushawadi, Khadki Bk., Khadki Kh. (WS10), Khadki Kh., Wanjulset and Somalwadi (WS8). All these micro-watersheds are located in western part with high rainfall, moderate to

steep slopes, marginally deep and extremely drained loamy soils and slightly deep good drained well calcareous soils and moderate erosion (Table 4, Figure 3)

4.2 Sugarcane

Sugarcane is a significant crop for tropical and sub-tropical regions (Driemeier *et al.*, 2016; Karpagam *et al.*, 2019). It is one of the economically important crops and has significant effect on the rural economy (Chandra *et al.*, 2018). The impacts of Sugarcane on the environment and society depend on the nature of rural economy (Gupta *et al.*, 2018). It is high influence crop with significant positive and negative ecological and socioeconomic impacts in the region (Hess *et al.*, 2016). Sugarcane is an economically important crop (Chogatapur *et al.*, 2017; Kona *et al.*, 2019) in the irrigated area of the *rainfed* region.

Table 5: Distribution of area under Sugarcane

Classes	Influence (%)	Watersheds
< Mean-1STD	00	101
Mean-1STD to Mean	< 0.29	15
Mean to Mean + 1STD	0.29 to 1.10	12
Mean + 1STD to Mean + 2STD	1.10 to 1.91	02
>Mean + 2STD	>1.91	10
Total		140
Mean		0.29
STD		0.81
Maximum		4.31
Minimum		00

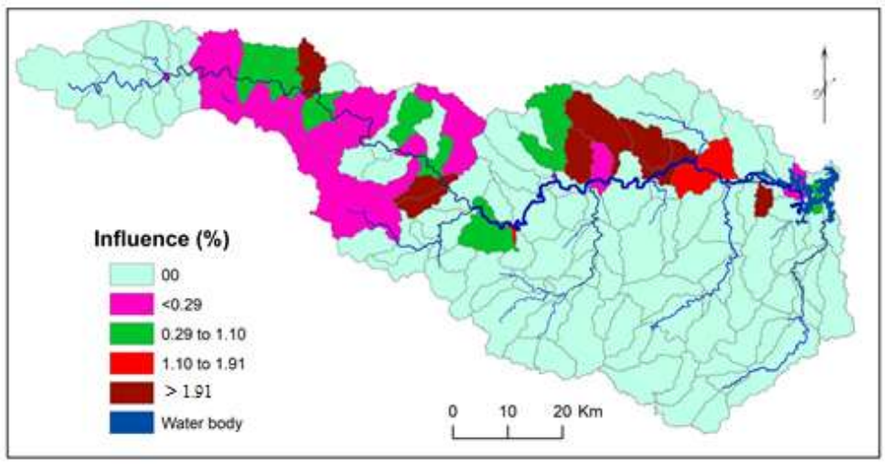

Figure 4: Sugarcane

About 12 micro-watersheds show 5.57% NSA with high and very high Sugarcane cultivation in downslope region in the East. Similar observation was reported by (Kulkarni and Subramanian, 2014) in case of Sugarcane cultivation in Mula and Mutha river basins, Maharashtra, India. Mogras, Dhamangaon Pat and Kotul villages of Akole tehsil, Shindodi Khambe, Darewadi, Bhojadari and Kumbharwadi villages in Sangamner tehsil and village Jambhali in Rahuri tehsil observed less (< 0.29) influence of Sugarcane cultivation. 2 micro-watersheds of the villages Shindodi Khambe, Darewadi, Bhojadari and Kumbharwadi in Sangamner tehsil Pangari of Akole tehsil and Jambhali in Rahuri tehsil show the higher Sugarcane cultivation (Table 5). 12 micro-watersheds show moderate (0.29 to 1.10) influence of Sugarcane cultivation. These micro-watersheds are located in eastern part of the study area with undulating landform, low rainfall, limited irrigation facilities and loamy soils. 2 micro-watersheds were observed with high influence of Sugarcane cultivation (1.10 to 1.91) and 10 micro-watersheds revealed very high (Table 5, Figure 4) influence of Sugarcane cultivation (>1.91) from the central part with moderate rainfall, gentle slope and deep soils. However, Sugarcane cultivation has decreased in the villages like Mogras, Dhamangaon Pat and Kotul and increased by 3.57% NSA in the villages Shiswad, Pimpalgaon Khand, Sherewadi, Thakarwadi and Lingdev of Akole tehsil, Darewadi and Bhojadari villages of Sangamner tehsil and Jambhali in Rahuri tehsil due to successful application of WMPs.

4.3 Vegetables

Vegetables are important cash crops (Perez and Tschinkel, 2003) in the study area. However, it is not observed in the hilly regions (9 micro-watersheds) of the western part of the study area (Table 6) with steep slopes, dense forests and the highland areas. In the villages of Paithan, Ambhol and Kotul, the crops like Tomato, Cabbage, Green bean, Cilantro, Brinjal, etc. are observed due to availability of irrigation facilities from Mula River. In the less rainfall from the eastern part of the study region, Vegetable crops are observed on the lands with irrigation

facilities. Six micro-watersheds including villages Mahalwadi, Savargaon Ghule, Sarole Pathar in Sangamner tehsil; Pimpalgaon Turk, Kanhur Pathar, Karandi and Goregaon in Parner tehsil show very high cultivation (>0.37 NSA) of Vegetables. The villages like Belapur, Jachakwadi, Chaitanyapur, Jambhale, Bramhanwada and Kunthewadi in Akole tehsil show high (0.26 to 0.37) influence of Vegetable cultivation (Table 6, Figure 5).

Table 6: Distribution of area under Vegetables

Classes	Influence (%)	Watersheds
< Mean-1STD	< 0.04	18
Mean-1STD to Mean	0.04 to 0.15	65
Mean to Mean + 1STD	0.15 to 0.26	35
Mean + 1STD to Mean + 2STD	0.26 to 0.37	15
>Mean + 2STD	>0.37	07
Total		140
Mean		0.15
STD		0.11
Maximum		0.48
Minimum		00

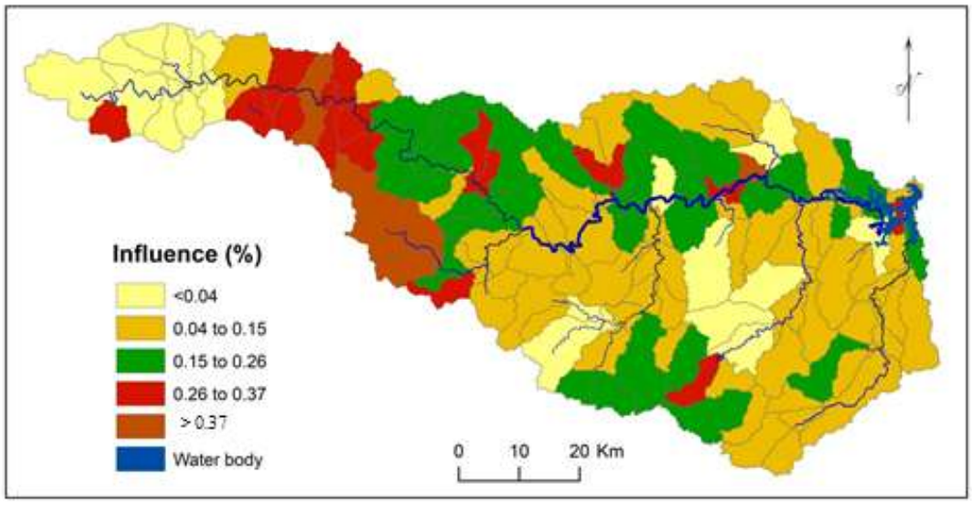

Figure 5: Vegetables

In central part of the study area, Pangari, Kotul, Bholewadi and Mogras villages of Akole tehsil show very high (>0.37) influence of Vegetable cultivation. Vegetable production has increased in Belapur, Jachakwadi, Chaitanyapur, Jambhale, Bramhanwada and Kunthewadi villages due to successful application of WMPs and dam constructed at Pimpalgaon on the Mula River. The use of new technologies for efficient irrigation like drip irrigation, sprinkler and use of mulching paper, availability of markets, transportation facilities and the economic awareness created among the farmers helped to increase the Vegetable production in the study area.

4.4 Grains

Grains are economically important crops in *rainfed* region. Western part of study area show thin soils, steep slopes and high rainfall (*kharif* season) therefore *Ragi, Saya, Nagali, Rala, Varai, Katki, Bantti, Bhadali, Kodara* and *Barly* are observed here. In *rabi* season, Wheat, Maize, *Jawar* and *Bajra* are observed in the region with less rainfall in the eastern part. One watershed show very high (>0.16) influence of cultivation of Grains (Table 7, Figure 6) in villages like Chas, Lahit Kh., Chand Suraj, Lahit Bk., in Akole tehsil and Kauthewadi and Jawale Baleshwar Sangamner tehsil.

In study area, 63 micro-watersheds show moderate (0.10 to 0.13) influence of cultivation of Grains. This is plateau region with fertile soils and available dug and tub-well irrigation. In Akole tehsil, more lands are under Vegetable cultivation because use of new technologies for efficient irrigation like drip irrigation, sprinkler and mulching paper, availability of market facilities, good transportation facilities and the economic awareness. Therefore, in foothill zone of the study area, the cultivation of Grains is decreasing from some decades. The villages like Khadki Bk., Khadki Kh., Purushawadi, Balthan, Savarkute, Dhamanvan, Shirpunje and Manik Ozar in Akole tehsil and Dhotre Kh., Gajadipur, Wadgaon Sawtal, Dhoki, Takali Dhokeshwar and Dhotre Bk. in Parner tehsil show positive change in Grains cultivation. The villages like Shiswad, Lavhali Kotul, Lavhali Otur, Wagdari, Kothale, Somalwadi, Ghoti, Sakirwadi, Shelad villages show more positive change in the cultivation of Grains.

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Table 7: Distribution of area under Grains

Classes	Influence (%)	Watersheds
< Mean-1STD	< 0.07	18
Mean-1STD to Mean	0.07 to 0.10	58
Mean to Mean + 1STD	0.10 to 0.13	63
Mean + 1STD to Mean + 2STD	0.13 to 0.16	01
>Mean + 2STD	>0.16	00
Total		140
Mean		0.10
STD		0.03
Maximum		0.15
Minimum		0.01

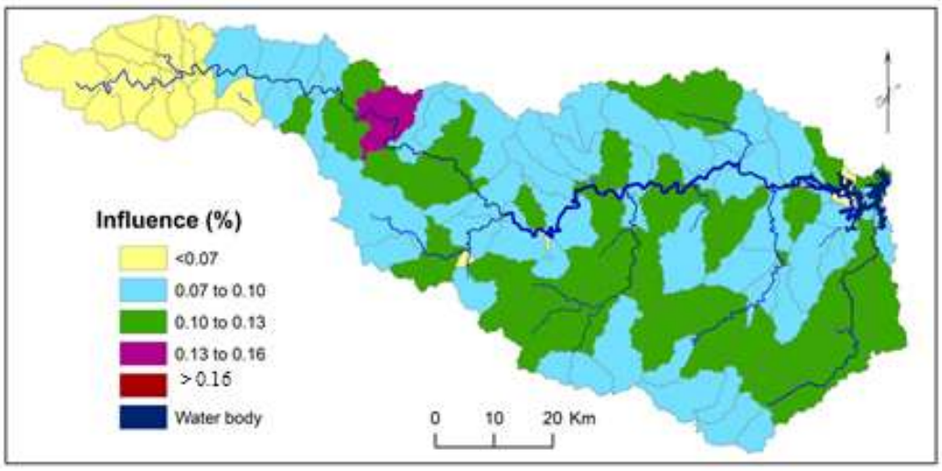

Figure 6: Grains

4.5 Pulses

Pulses like pigeon peas *Toor,* Green gram split *(Moong),* Black gram *(Udid),* Moth bean *(Matki),* Horse gram *(Hulga),* Pink lentil *(Masur), Pawta, Chawali,* Field bean, *Ghevda,* Bengal gram whole *(Harbhara) and Green peas* are an economically important crops in *rainfed* region. These crops are observed in lowlands and well drained soils in the hilly region. In western part of study area with thin soils, steep slopes, high rainfall these crops are observed in *kharif* season including *Hulga, Pawta, Chawali, Wal and Ghevda* and in the eastern part characterized with undulating landforms, less rainfall and loamy soils, Pulses like *Toor, Moong, Udid, Matki, Hulga, Pawta, Chawali* are observed. In Parner tehsil, 2 micro-watersheds including villages like Kaknewadi, Tikol, Pimpalgaon Turk and Kanhur show very high (>0.13) influence of Pulses. 16 micro-watersheds including villages: Shiswad, Ambhol, Pisewadi, Shinde, Bholewadi and Palsunde show high (0.12 to 0.19) influence of Pulses and Darewadi, Kumbharwadi, Varwandi, Kawthe Malkapur, Khambe and Kharshinde villages show high (0.09 to 0.13) influence of Pulses (Table 8, Figure 7). 28 micro-watersheds show very low Pulses cultivation located near to the river bank with deep soils, available irrigation facilities, gentle slope and moderate rainfall. Therefore, these micro-watersheds show cash crop. 58 micro-watersheds show low (< 0.05) influence of Pulses. These micro-watersheds are located in the plateau region with less rainfall, limited irrigation facility and undulating landforms.

Table 8: Distribution of area under Pulses

Classes	Influence (%)	Watersheds
< Mean-1STD	< 0.01	28
Mean-1STD to Mean	0.01 to 0.05	58
Mean to Mean + 1STD	0.05 to 0.09	36
Mean + 1STD to Mean + 2STD	0.09 to 0.13	16
>Mean + 2STD	>0.13	02
Total		140
Mean		0.05
STD		0.04
Maximum		0.17
Minimum		00

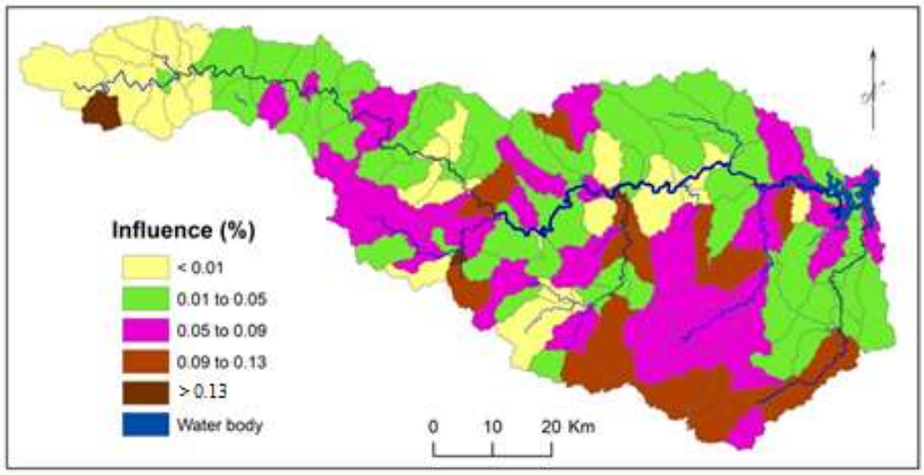

Figure 7: Pulses

4.6 Fruits

Fruits observed on lands with medium slopes, moderately shallow soils, less rainfall and fallow type of land use. Guava, Custard apple, Pomegranate, Chikoo, Banana, Papaya, Mango, Lemon, Watermelon and Grapes are planted in the region which receives less rainfall. Jackfruit, Amla, Black berry, Mango, etc. are observed in the western part have no economic importance for the farmers.

Table 9: Distribution of area under Fruit crops

Classes	Influence (%)	Watersheds
< Mean-1STD	00	36
Mean-1STD to Mean	< 0.07	55
Mean to Mean + 1STD	0.07 to 0.17	35
Mean + 1STD to Mean + 2STD	0.17 to 0.27	05
>Mean + 2STD	>0.27	09
Total		140
Mean		0.07
STD		0.10
Maximum		0.74
Minimum		00

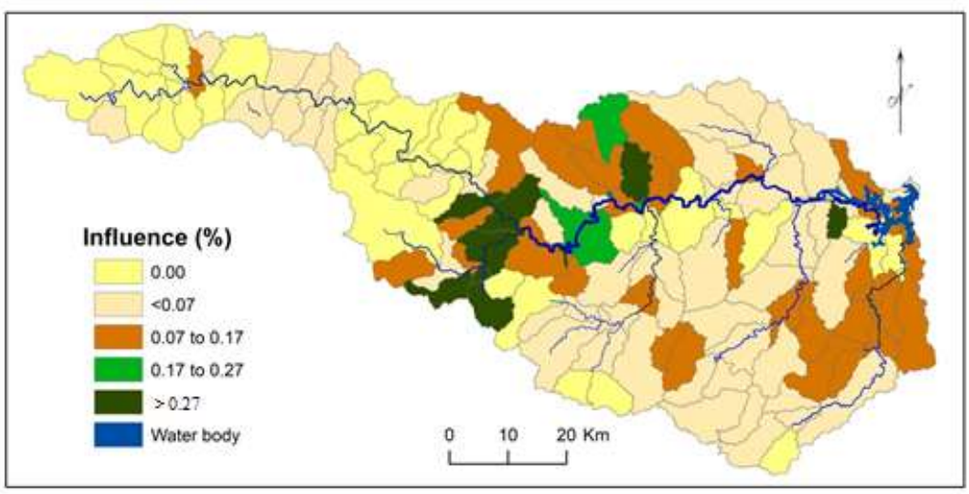

Figure 8: Fruits

The villages like Mhaswandi, Borbanwadi, Pemrewadi, Ambi Khalsa, Ghargaon, Sakur, Rankhambwadi, Kelewadi and Bambalewadi located in 2 micro-watersheds in Sangamner tehsil and Vankute in one watershed area of Parner tehsil show very high (>0.29) influence of Fruits' cultivation (Table 9, Figure 8). Out of 16 villages in Sangamner tehsil and Parner tehsil higher fruit production in the last decade and 61 micro-watersheds show less (< 0.07) influence of Fruits' cultivation. 29 micro-watersheds show moderate (0.07 to 0.18) influence of Fruits' cultivation (Figure 8). These micro-watersheds are located in central plateau region with moderate rainfall, thin soils, undulating landforms and water scarcity.

2. Agricultural development

The agricultural development was calculated using multi-criteria based AHP method and influences of criterions. Sugarcane, Vegetables, Pulses, Fruits, Rice and Grains were selected and ranked using expert opinion for estimations of weights and influences. Estimated influences of six criterions were normalized based on spatial distribution in selected micro-

watershed for AD in 2019. Estimated levels of AD were classified into three classes: high, moderate and less development (Table 10).

Table 10: Agricultural development

Level of development	No. of watersheds	%
High	11	7.86
Moderate	21	15
Less	108	77.14

5.1 High development

In study area, 11 (7.86%) micro-watersheds (Table 10) are classified into the class 'High development' (>1.56) for agriculture (Figure 9). These micro-watersheds are located near to bank of rivers with gentle slopes, moderate rainfall, accumulated soils and good irrigation facilities. The productivity of these soils is high and economic conditions of the farmers are good.

5.2 Moderate development

About 21 micro-watersheds (15%) are classified into the class, 'Moderate development' with gentle sloping lands (27.80% area) (Table 10) and calcareous soils with moderate erosion. Moderate surface erodibility, less rainfall and droughts are common phenomenon in the region. The population is occasionally migrating for livelihood to irrigated and urban areas.

5.3 Less development

About 108 micro-watersheds (77.14%) in the basin are classified into the class, 'Less development' with low rainfall, low irrigation, undulating surface, low erosion and comparatively less agricultural activity (Table 10). These micro-watersheds are located far away from the major rivers and dams with low groundwater potentials. Therefore, these micro-watersheds show less AD.

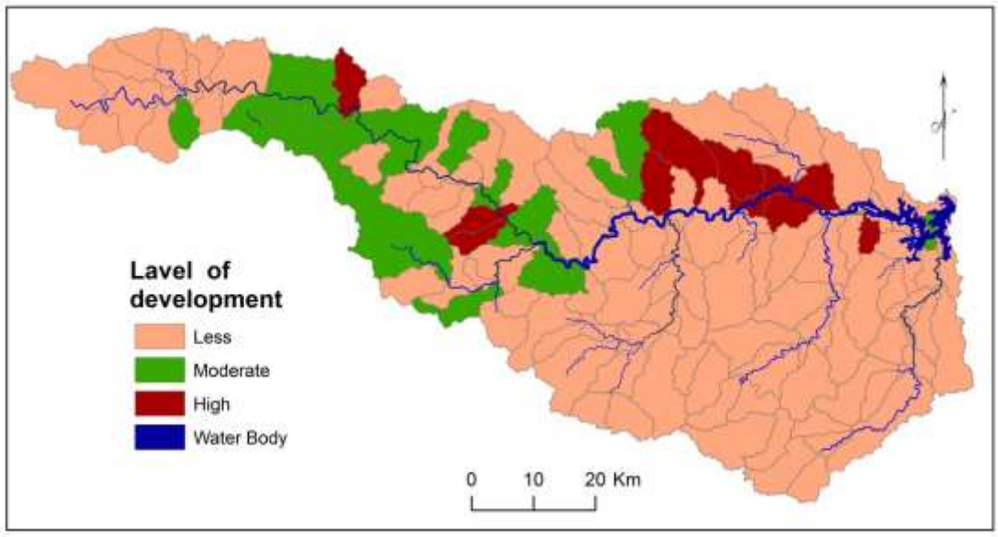

Figure 9: Agricultural development

Conclusions

1. AHP based multi-criteria analysis is useful for agricultural development of sub-watersheds for understanding, planning, management and development.
2. Six criterions i.e. Sugarcane, Vegetables, Pulses, Fruits, Rice and Grains were selected for agricultural development of sub-watersheds in the region.
3. Expert opinion is useful for ranking the criterion for agricultural development of selected watersheds.
4. Influences of criterion were estimated based on weights estimated using AHP methods. These values of influences are normalized using distribution of selected criterion within the sub-watersheds
5. Agricultural development was classified into three categories like: high (), moderate and low development.
6. The methodology formulated in this study can be efficient tool for estimation of agricultural development.

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Research Paper

Opportunities and Challenges of Digital Payments in India

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Abstract:

The Ministry of India's main initiative, the Digital India Programme, aims to make India a knowledge-based society and economy. "Faceless, Paperless, Cashless" is one of the professed roles of Digital India. The methodology for the work uses secondary data from research papers and information from the government, newspapers, the internet, article bulletin, and RBI publications. The study examined digital payment methods, opportunities, and challenges in India. This is a digital system, which helps to transfer money 24/7 Payments are made using a variety of electronic payments. Digital payments in India have the potential to transform the economy by promoting financial inclusion, increasing transparency, and promoting economic growth.

Keywords: Digital payment, Internet Banking, Mobile banking, E-payment.

Introduction:

Online or digital transactions that don't include a real money exchange are known as "digital payments." The payer and the payee, respectively, employ electronic means to exchange money in this case. To promote and encourage digital payments in the nation, the Indian government has been implementing several actions. The goal of the "Digital India" Programme is for the government to establish a "digitally empowered" "Faceless, Paperless, Cashless" economy. Digital payments come in a variety of forms and execution strategies. Digital payment is an efficient and cost-effective method of payment. It is convenient and secure. Digital transactions do not require any physical credit card, cash or bank account, providing a simple and safe way for consumers to make payments without any hassle. It is faster, more secure and cheaper than traditional payment methods such as cash or bank with more people using mobile for payments, digital payments are changing how we pay for everyday goods and services. Digital payments are a convenient way to pay for goods and services. People use digital payment systems like credit cards, mobile wallets, or bank accounts to buy items online, in physical stores, or by phone. Digital payments work just like any other form of payment: when you shop online, your credit card information is called upon, and the payment is processed automatically through your bank account. Digital payment has become very popular in the world, so many stores are using it to accept payment. It just may take some time to get used to this new thing. Digital payments make the payment process faster and easier for everyone, from businesses to consumers. Try out digital payments for free today. Digital payments are the future of money, and all of us will use them in some way over the next few years. It's not just about credit and debit card payments anymore. With digital, it's less expensive and more secure if you choose the best method. There's also a wide range of payment options that can fit your lifestyle and make shopping online so much easier digital payments are a direct, fast and convenient way to pay for everything you spend. You can make digital payments when you shop online, in-store or even at the ATM. Digital payments are the future of money, and we're helping to pave the way with our digital payment cards. Digital money is growing in popularity and becoming a bigger part of your life. Digital payment providers are rapidly gaining momentum and are expected to provide a variety of user-friendly solutions. Electronic transactions are expected to account for 20% of all transactions in 2030, according to a World Bank estimate. This is more than double the percentage of all transactions that were done in cash in 2014, as it was expected that 20% would go through digital payments by then. A digital currency is a form of money that is stored and transferred electronically in the cloud. Like paper money, digital currency can be used to buy items from a merchant but with one major difference: you can do so in real time, without sending them physical cash, which makes it easier for merchants to accept. This means that you need only have an internet connection to use the digital payment. Digital payments have several advantages over traditional payment methods, including fewer fees and more ease of use. In the age of digital payment, security and privacy have become major digital payments. Digital payment is the most secure method of payment and can be instantly sent and received at a very less fee. It reduces the cost of transactions and provides better security with your identity being secure due to numerous security features present within digital payments. digital payment is a system that allows the receiving bank to make payments through the internet. This is a digital system, which helps to transfer money 24/7 Payments are made using a variety of electronic payments.

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Literature Review:

Pahwa & Raj[2021] in their research, they have stated the digital payment method and the problems of its uses. Data is gathered from the users of e-payment methods in Delhi-NCR for this exploratory project. The most common issues clients have when using electronic payment methods are transaction difficulty, security, and inadequate internet connectivity. Findings of the study the three biggest issues that consumers encountered when using e-payment methods for purchases of goods and services are transaction failure, identity theft, and internet connectivity.

Shobha B.G. [2020] studied that India now has the chance to empower its people, encourage their use, and get rid of the antiquated banking system thanks to digital payments. It has now become crucial to comprehend and evaluate the current state of digital payment. This study used secondary data to examine the current state of various digital payments and discovered that use of digital modes has significantly increased over the past five years. The study's goal is to draw policymakers' attention to the issue so that everyone may benefit from digitization. Although digitalized payments are becoming more prevalent, cash is still king in many urban areas and the majority of rural areas. The main findings of the study regarding both the number and value of transactions, there has been a tremendous surge in the use of RTGS, ECS, NEFT, UPI, NACH, Credit cards, Debit cards, POS, and PPIs.

Dhanya B K [2019] in their research, they have stated the consumer perception of digital mode. The objective of the study is to know the awareness of digital payment and the most popular digital payment mode preferred by the customer. The study employs both secondary and primary data and is conducted in a descriptive manner. secondary information gathered from numerous published sources. Through the use of interviews, primary data are gathered from customers. Young, adult and senior age groups are separated into three categories for these customers. The results of this study can be used by decision-makers to adopt and improve the digital payment system and to understand how it affects user perception and intention. Users place a lot of emphasis on digital payments, and they are aware of how innovative technology and banking services have become a part of the new way of life.

Sujith and Julie[2017] in their research, have stated the opportunities and challenges of electronic payment systems in India. they used descriptive research methods and authentic secondary data-based research papers such as journals, research papers, magazines, articles, and websites. The objectives of the study are to explain the modes of e-payment, opportunities, challenges and prospects of the digital payment system in India. The main findings of the study e the payment system in India does not include physical cash or check it includes credit card and debit card smart card e- wallet etc. The usage of payment mechanisms, some of which we've examined in this article, has been the primary factor in the development of e-commerce online work. Theft of payment information, personal information, and fraudulent client rejection are the risks associated with online payments.

Franciska & Sahayaselv [2017] in this study, examined an overview of digital payments. this study focused on knowing the various types of digital payment .and exploring the many digital payment methods provided by the financial institution. The research is supported by secondary data. To conduct an effective study, books, journals, newspapers, and pertinent websites were consulted and used to gather the study's contents. The outcome suggests that the digital revolution has made transactions using less cash simple. As a result, 4018 billion transactions were made using mobile banking in 2015–2016, up from 60 billion in 2012–2013. Digital payments are being made in more remote locations thanks to the expansion of mobile networks, the Internet, and energy. It follows that a cashless transaction system is the way of the future.

Mamta et al., [2016] in their study have stated that the inquiry attempted to detect the problems and difficulties with electronic payment systems and provide some solutions to raise the standard of e-payment systems. Electronic payment system deployments are successful when security and protection concerns are managed in a way that appeals to both buyers and sellers and increases market trust in the system.

Objectives

1. To understand the digital payments of India.
2. To explain the digital payment methods of India.
3. To explain the opportunities and challenges of digital payment.

Research Methodology

The methodology for the work uses secondary data from research papers and information from the government, newspapers, the internet, article bulletin, and RBI publications. The descriptive methodology was utilized in this investigation. The secondary sources used for the data collection were articles, journals, books, websites, survey reports, committee reports, and publicly available government data. A descriptive research approach was employed.

Digital Payment: The Ministry of India's main initiative, the Digital India Programme, aims to make India into a knowledge-based society and economy. "Faceless, Paperless, Cashless" is one of the professed roles of Digital India. A variety of digital payment methods are offered in an effort to encourage cashless transactions and make India a society that uses less cash.

Digital payment methods in India

Digital payments are becoming increasingly popular and convenient in today's world. Here are some of the most common modes of digital payment:

Internet Banking: also known as online banking, is a service provided by banks and financial institutions that allows customers to access and manage their accounts over the internet. With internet banking, customers can perform a wide range of transactions and banking services, including checking account balances, transferring funds between accounts, paying bills, and applying for loans or credit cards. Internet banking services are typically secure, using encryption technology and other security measures to protect customers' personal and financial information. However, it is important for customers to take steps to protect their online banking credentials, such as creating strong passwords and keeping their login information confidential.

Banking Cards: More security, convenience, and control are provided by banking cards to consumers than by any other form of payment. A lot of freedom is also provided by the large range of cards that are accessible, including credit, debit, and prepaid cards. These cards offer two-factor verification, such as a secure PIN and an OTP, for safe transactions. Some examples of card payment methods are RuPay, Visa, and MasterCard. People can make purchases with payment cards in-person, over the phone, online, through mail-order catalogues, and at retail establishments. They facilitate easy transactions by saving both customers and retailers' time and money.

Debit Card: A debit card is a payment card that is linked to a checking or savings account at a bank or credit union. When a debit card is used to make a purchase, the funds are directly deducted from the cardholder's account. Debit cards can be used to withdraw cash from ATMs, make purchases online and in-person, and transfer money to other bank accounts. Debit cards can be used at merchants that accept payment through card networks such as Visa, Mastercard, or American Express. Some debit cards also offer rewards programs, cashback incentives, and fraud protection.

There are two types of debit cards: PIN-based and signature-based. A PIN-based transaction requires the cardholder to enter a personal identification number (PIN), while a signature-based transaction requires the cardholder to sign a receipt. Debit cards are widely used and accepted globally as a convenient and secure method of payment. However, it is important for cardholders to monitor their account activity and protect their card information to prevent fraudulent transactions.

Credit card: A credit card is a payment card that allows cardholders to borrow funds from a financial institution to make purchases or obtain cash advances. When a credit card is used to make a purchase, the cardholder is essentially borrowing money from the card issuer, with the promise to pay it back later. Credit cards typically come with a credit limit, which is the maximum amount of money a cardholder can borrow at any given time. Cardholders are required to make minimum monthly payments on their credit card balance, which includes the principal amount borrowed plus interest and any applicable fees.

Credit cards can be used to make purchases online and in-person, as well as withdraw cash from ATMs. Some credit cards also offer rewards programs, cashback incentives, and other perks such as travel insurance or extended warranties on purchases. Credit cards are widely accepted globally and are a convenient method of payment for many consumers. However, it is important for cardholders to use credit responsibly,

Prepaid Cards: Prepaid cards are similar to credit/debit cards but require the user to load funds onto the card before making a purchase. They can be used online or offline, just like credit/debit cards.

Mobile Banking: The most well-known digital banking option is mobile banking. It connects your smartphone to the bank. More than 200 banking transactions can be completed at any time, from the convenience of your home, workplace, or anywhere else in the world. In every person's daily life, a mobile phone is the technological equipment that is used the most frequently. A different method of offering banking services is mobile banking. Due to India's position as the second-largest telecom market in the world, there is a significant opportunity to develop mobile banking services throughout the nation.

Mobile Wallets: Mobile wallets are digital wallets that allow users to store payment information, such as credit card or bank account details, on their mobile devices. With a mobile wallet, users can make payments using their smartphones or other mobile devices, without the need for cash or physical payment cards.

Mobile wallets can be used to make payments in-person at merchants that accept payment through contactless payment systems, as well as online and in-app purchases. Some mobile wallets also offer features such as loyalty programs, coupons, and ticketing. Popular mobile wallet services include Apple Pay, Google Pay, Samsung Pay, PayPal, and Venmo. These services typically use near-field communication (NFC) technology or barcode scanning to facilitate payments

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QR codes: QR codes, or Quick Response codes, are two-dimensional barcodes that can be scanned using a smartphone or other mobile device equipped with a camera. QR codes can store a variety of information, such as website URLs, contact information, and payment information. In the context of digital payments, QR codes are becoming increasingly popular as a method of facilitating transactions. Merchants can display a QR code at their point of sale, and customers can scan the code using their smartphones to initiate a payment.

QR code payments can be used for both in-person and remote transactions, and they are typically processed through a mobile wallet or a banking app. QR codes can be more secure than traditional payment methods, as they can include dynamic authentication methods such as one-time passwords or biometric authentication. There are some popular QR codes ie. Paytm, Phone pay, Google Pay, Amazon pay etc.

Unstructured Supplementary Service Data (USSD)

The introduction of Unstructured Supplementary Service Data (USSD) has made it possible for digital payments to be more widely accepted and accessible. Users of this service can conduct business via mobile without a data connection by dialling *99# on any feature phone. Interbank account to account fund transfers, balance inquiries, mini statements, and other options are available through the interactive menu on the phone. In order to use this approach, the user must connect their phone to their bank account. To make digital transactions accessible to everyone, this direct-to-consumer solution combines two disparate industries: banks and telecom service providers.

Unified Payments Interface (UPI): Unified Payments Interface (UPI), which unifies various bank accounts and associated features on a smartphone application, is one of the most popular digital payment methods in India. Users can use the app to link their bank accounts and conduct transactions using their preferred account. Compared to other well-liked methods like NEFT, RTGS, or IMPS, UPI has made bank transfers much simpler. To send and receive money, The Unified Payments Interface employed a virtual ID as a unique identification, doing away with the need to repeatedly remember and enter bank details.

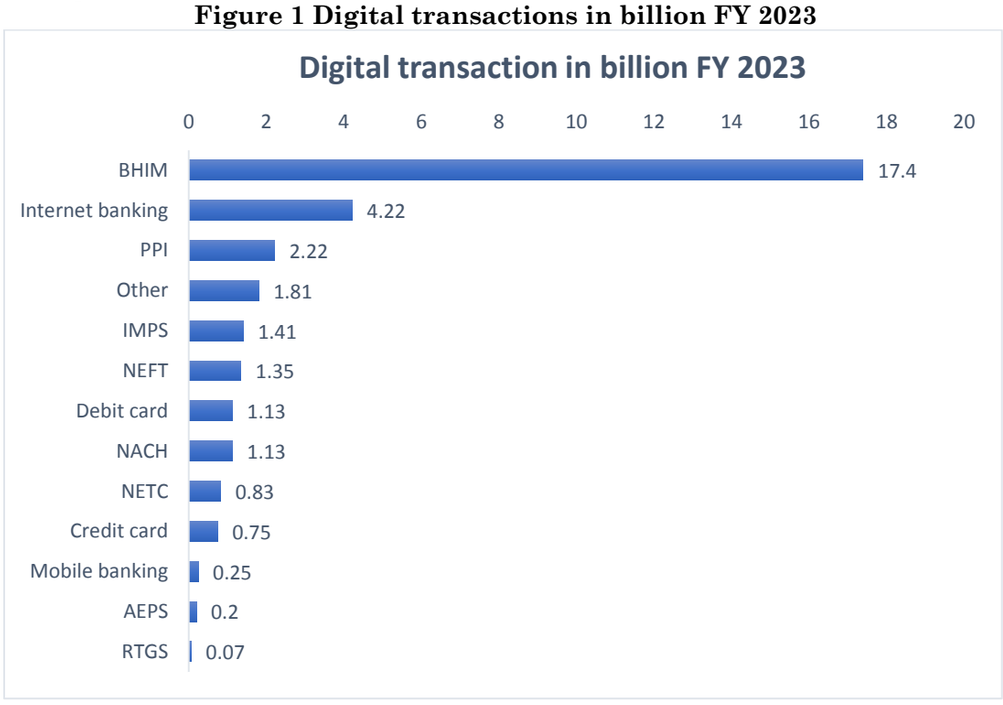
With 5.58 billion transactions totaling Rs 9.83 trillion in April 2022, the Unified Payments Interface (UPI) experienced its biggest monthly volume ever.

Aadhaar Enabled Payment System (AEPS): is a payment system in India that allows customers to make financial transactions using their Aadhaar number and biometric authentication. Aadhaar is a unique identification number issued to Indian citizens that is linked to their biometric data and demographic information.

With AEPS, customers can use their Aadhaar number and biometric authentication to access a range of banking services, including cash withdrawals, balance inquiries, and fund transfers, through their bank account. AEPS transactions can be initiated through a micro-ATM, which is a handheld device provided by banks to banking correspondents or merchants in remote or rural areas. AEPS is supported by the National Payments Corporation of India (NPCI), and it is a part of the government's broader Digital India initiative, which aims to promote the use of digital technology to improve access to government services and financial inclusion.

Data Interpretation

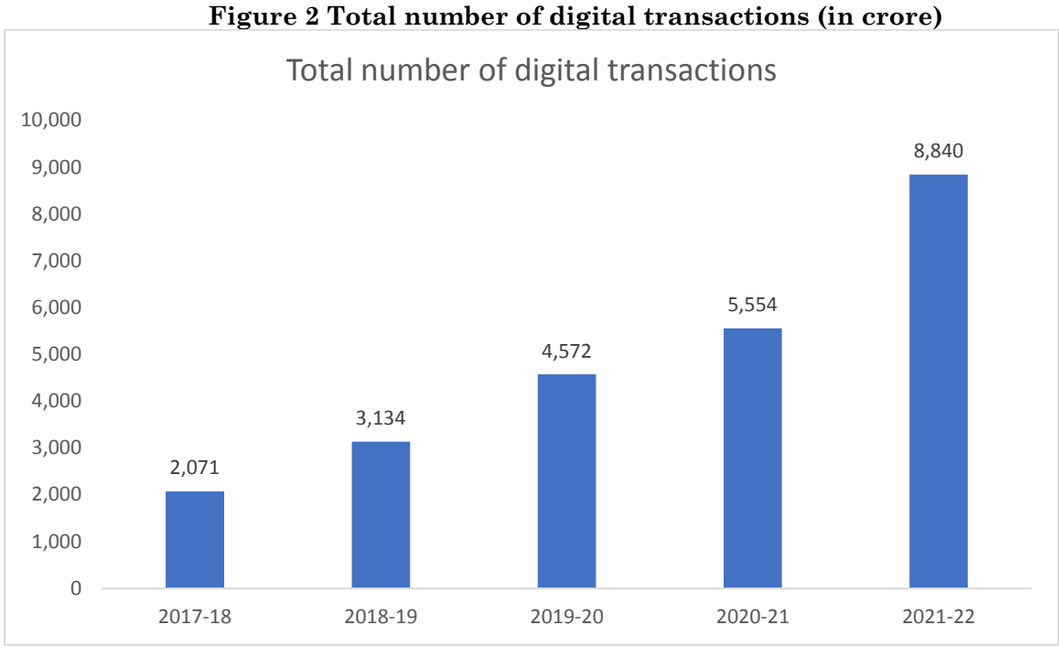
Figure 1 Digital transactions in billion FY 2023



Source: Statista

By mode, the number of digital payments made in India in FY 2023. With an estimated 17 billion transactions since like December 2022, BHIM, or the Bharat Interface for Money, became the most popular method of digital transaction in India. Following were almost 4 billion transactions in internet banking.

Figure 2 Total number of digital transactions (in crore)

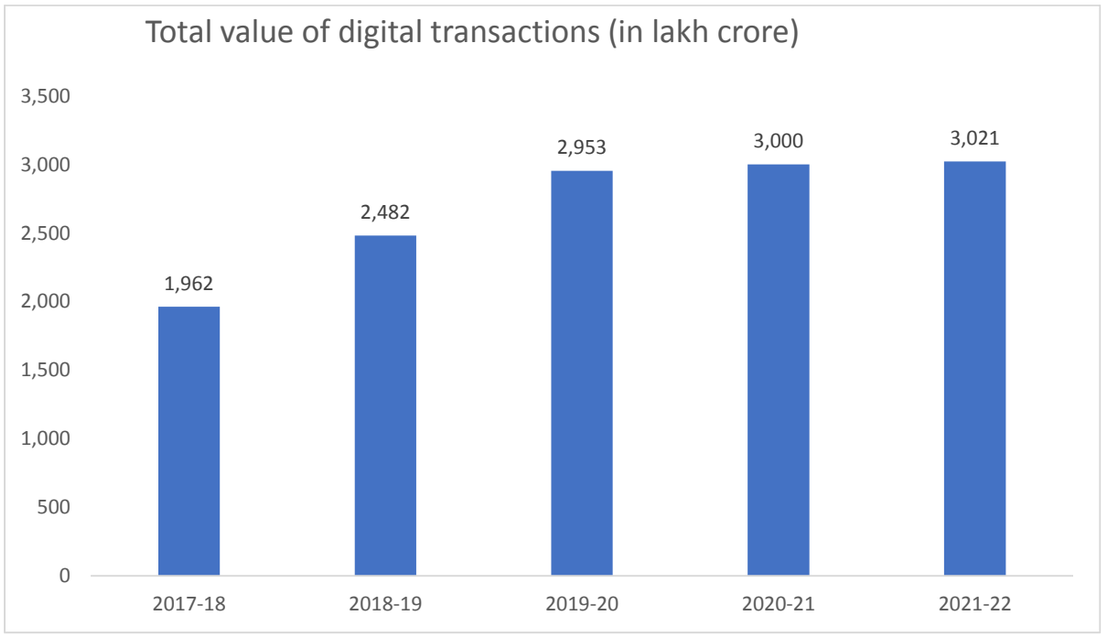


Source: RBI, NPCI and banks

Note: The major electronic payment methods are taken into account: BHIM-UPI, IMPS, NACH, AePS, NETC, debit cards, credit cards, NEFT, RTGS, PPI, and others.

Through the Government's collective efforts and those of other interested parties, the number of digital payment transactions has greatly expanded, rising from 2,071 crores in FY 2017–18 to 8,840 crore in FY 2021–22. (Source: RBI, NPCI and banks).

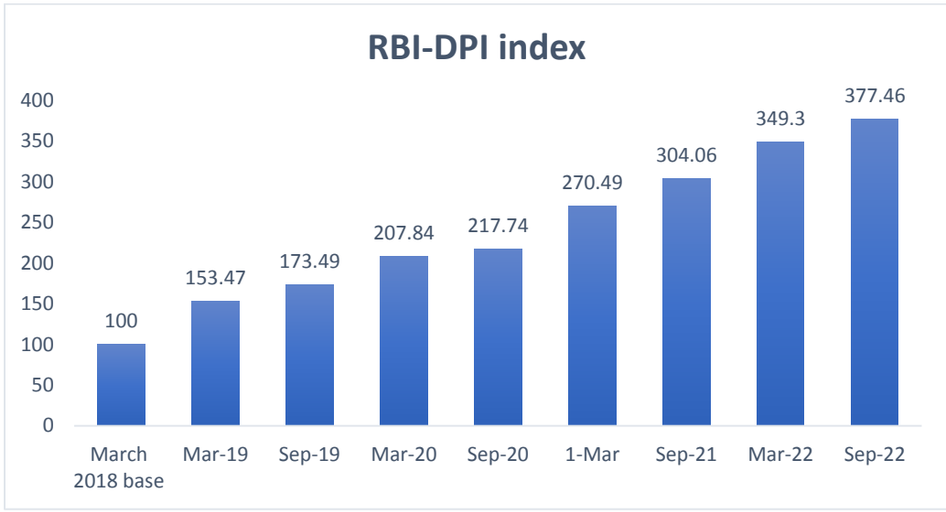
Figure 3 Total value of digital transactions (in lakh crore)



Source: RBI, NPCI and banks

Note: The major electronic payment methods are taken into account: BHIM-UPI, IMPS, NACH, AePS, NETC, debit cards, credit cards, NEFT, RTGS, PPI, and others.

Figure 4 RBI-DPI index



Source: RBI, NPCI and banks

Period RBI - DPI Index March 2018 (Base) 100 March 2019 153.47 September 2019 173.49 March 2020 207.84 September 2020 217.74 March 2021 270.59 September 2021 304.06 March 2022 349.30 September 2022 377.46

Opportunities of digital payments in India

Digital payments in India offer several opportunities to businesses, individuals, and the economy. Here are some of the key opportunities:

1. Financial Inclusion: Digital payments can help to increase financial inclusion by providing access to banking and payment services to people who may not have had access to traditional banking services before.
2. Convenience: Digital payments offer a convenient way for consumers to make transactions without the need for cash or physical payment cards. This can save time and reduce the risk of theft or loss of cash.
3. Cost-Effective: Digital payments can be cost-effective for businesses as they eliminate the need for cash handling and processing fees associated with traditional payment methods. This can result in lower transaction costs and increased efficiency.
4. Improved Security: Digital payments offer improved security as they eliminate the risks associated with carrying cash and the possibility of counterfeit currency. Digital payment systems also typically use encryption technology and other security measures to protect personal and financial information.
5. Increased Transparency: Digital payments can improve transparency in transactions and reduce the risk of fraud and corruption. Digital payment systems can provide an auditable trail of transactions, making it easier to detect and prevent fraudulent activities.
6. Boost to the Economy: Digital payments can boost the economy by promoting financial inclusion, reducing the informal cash-based economy, and increasing tax revenues for the government.

Challenges of digital payments in India

While digital payments in India offer many opportunities, they also face several challenges that need to be addressed. Here are some of the key challenges:

1. Low levels of digital literacy: Many people in India, especially in rural areas, are not familiar with digital payment methods and lack the digital literacy skills needed to use them effectively.
2. Infrastructure challenges: Digital payments rely on reliable and robust telecommunications and internet infrastructure, which is not always available in rural and remote areas of India.
3. Security concerns: Digital payments are vulnerable to cyberattacks, fraud, and data breaches, which can undermine trust in the system.
4. Limited acceptance: Digital payment systems need to be widely accepted by merchants and businesses to be successful, but many small businesses and vendors in India still prefer cash transactions due to the lack of awareness, infrastructure, or trust in digital payment systems.
5. Interoperability: There are currently multiple digital payment systems in India, and not all of them are interoperable with each other, which can create confusion and hinder adoption.
6. Regulatory challenges: The digital payment industry in India is subject to various regulations and guidelines, which can create complexity and confusion for businesses and consumers.

Conclusion

Overall, digital payments in India have the potential to transform the economy by promoting financial inclusion, increasing transparency, and promoting economic growth. these challenges need to be addressed through measures such as improving digital literacy, enhancing infrastructure, strengthening security, promoting interoperability, and creating a more conducive regulatory environment to ensure the success and growth of digital payments in India.

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Research Paper
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Depiction of Caste and Untouchability as a Root Cause of Discrimination in Daya Pawar's *Baluta* and Sharankumar Limbale's *The Outcaste*

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Abstract-

For centuries Untouchables were treated inhumanly and worse than animals, by Savarna Hindus. Several movements were made to fight against caste injustices. But it was Dr. Ambedkar who made them realize that they too are human beings like all other upper caste people. Taking inspiration from Dr. Ambedkar's works and words a new literate generation of untouchables started writing poems, stories, and autobiographies. This writing was a new movement in contemporary Marathi literature in Maharashtra, its motto was not art for art's sake instead it was art for life's sake. This literature is referred as Dalit literature and sometime Ambedkarite literature. Dalit writers realistically portrayed the caste system and untouchability as being soul cause of discrimination in their writing. The scope of Dalit literature is vast. For the sake of convenience for the present paper, the genre of autobiography is taken in which we could find a full sketch of life, and from vast Dalit autobiographies two Dalit autobiographies are selected. These are Daya Pawar's *Baluta* and Sharankumar Limbale's *The Outcaste,* which was originally titled *Akkarmashi*. Both narratives delineate caste injustices and atrocities on *the Mahar* community. Both autobiographies were primarily written in the Marathi language and later on they were translated into many other Indian and foreign languages. In 2015 Jerry Pinto translated *Baluta* into the English language with the same title. While Sharankumar Limbale's work *Akkarmashi* is translated into English by Santosh Bhoomkar in 2003.

Keywords- *Baluta, the Outcaste, Caste discrimination, Untouchable, Dalit, slavery,*

Depiction of Caste and Untouchability in Daya Pawar's *Baluta*

Daya Pawar's Autobiography *Baluta* is a landmark in the history of Dalit Literature. It paved the way for many other Dalit writers to write in this literary genre. While dealing with his life experiences he has exposed his victimization and humiliation due to his untouchable Caste.

Caste-based Nomenclature

The earlier name of Daya Pawar which was given by his parents was *Dagadu*. This name is caste-indicative and humiliating. If we just glance over the names of untouchables before their historic conversion to Buddhism led by Dr. Ambedkar we could find out such names as *Kacharu, Karu, Satwa, Zingru, Botaru, Sadkya, Sukya, Jogya,* etc. These names of untouchables were predefined by Caste System. *Brahmins* were named Vidyadhar, Shatriyas were named as Balram, *Vaishyas* were named as Lakshmikant whereas *Shudras* and untouchables were given shameful names as mentioned above.

Discrimination in School

Ancient Greek philosopher Plato defines education as a means to achieve individual and social justice. But this justice was a mirage to Indian untouchables. until the arrival of British rule and revolutionary movements by Mahatma Jyotirav Phule and Dr. Babasaheb Ambedkar. Like all other untouchables, Daya Pawar faced so many problems in his school life. He was not allowed to sit with upper-caste *Maratha* students. His mere touch could pollute them; he had to carry a granary sack for his sitting. The caste System denied him access to common drinking water and he had to go to *Maharwada* to quench his thirst. Even the teacher was not free from caste bias. His behavior was the same as that of other villagers.

Humiliating treatment in village rituals and festivals

Traditionally *Mahars* were art lovers. They were part of Tamasha, the village theater. They were experts in singing and playing musical instruments. When festivals were celebrated in the village untouchables were asked to entertain upper-caste people without giving them a paisa. There was a custom that on *Padwa* Untouchables must give music free of cost.

***Balutedari* another form of slavery**

The Balutedari system was a practical application of the caste system based on the division of labor. There were twelve *Balutedars* in the village system. Here Brahmins were top level and Mahar and Mang at the lowest level. The work of the Mahar people was to guard the village, send messages, catch criminals, remove the dead bodies of animals, cut wood, and beat drums in festivals. He was a loyal and obedient servant of all villagers. He was asked to perform all menial and unhygienic work. These people were paid very less *baluta*.

Worse than Animals

Daya Pawar compares his wretched life with animals and regrettably asserts that these animals are freer than his community. These animals have the liberty to wander everywhere but are not untouchables. These animals can drink water from rivers and tanks. Their urination and defecation don't pollute water bodies but the mere touch of *Mahar* pollutes it. Even after the death of these animals, untouchables are called upon to remove their carcasses.

Observance of Untouchability in Private and Public Places

Daya Pawar met with caste-based discrimination wherever he went, whether it was the home of Upper Caste or at the marketplace. There was a bazaar on every Thursday of the week at taluka place. All the family members of Daya Pawar were coming here. His mother was selling chicken eggs. But this marketplace was not free from caste bias. Traditionally the places of sellers were decided following caste hierarchy. Mahar people were sitting near the temple of *Mariaai*. Their place never changed. Caste discrimination was observed in hotels too. They were not allowed to sit with *savarnas*. Tea was served in a broken cup and it was compulsory to clean the cup by them.

Caste chased the protagonist both in the village and city

As pointed out above caste system was not just a division of work but it was a division of workers. Every caste had its work. The untouchables had to perform the most degradable and despicable works. Daya Pawar experienced all this victimization in his village. But when he went to the city with new aspirations and hopes caste chased him here too. Daya Pawar was offered a job as Clark cum Laboratory Assistant at Veterinary College, Parel. His work was to collect and prepare dung for examination and to clean the skin after the postmortem of animals. When Daya Pawar ponders over his job he admits that a high caste person could never accept this dirty job but he ought to do it to fill his stomach. This job reminds him of the same practices of his community in the village. Though Daya Pawar shifted from a rural area to urban background his lot is not changed.

Omnipresence of Caste

Daya Pawar in his autobiography *Baluta* depicted every aspect of life as predominantly occupied by caste discrimination. From birth to death and even before birth and after death caste is everywhere. Once a worker of *Satyashodhak Samaj* was having heated arguments with God in Maruti Temple at Aurangpur, and people gathered around him. Daya Pawar enters there and mixes with the crowd. Maratha people sense the presence of untouchables in the temple area, God was polluted. They abuse Daya Pawar verbally and physically. In the search for jobs, most of the untouchable families shifted to Mumbai. When a Dalit person died in the village, the Maratha people just observed the scenery from a distance but no one dared to give a shoulder to the deceased one. Not just the living person but even dead bodies met with caste injustices. When *Baban's* father dies in the village we witness this tragedy.

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Depiction of Caste and Untouchability in Sharankumar Limbale's *The Outcaste*

Sharankumar Limbale's autobiographical work *Akkarmashi (The Outcaste)* was published in 1984 when Limbale was twenty-five years old. In society, he was always abused and mocked. From his child age, he experienced inhuman treatment by upper-caste people.

Protagonist born with a stigma-Untouchable among Untouchable

Sharankumar Limbale's mother *Masamai* belonged to *the Mahar* caste. She was married to *Ithal Kamble* who was working at the farm of *Hanmanta Limbale* who belonged to *the Lingayat* caste. *Hanmanta Limbale* was fascinated by *Masamai*. He made a shrewd plan that Masamai divorced from her husband and become a concubine of Hanmanta. The narrator was teased as Akkarmashi (Outcaste) as he was the illegitimate son of a high-caste Lingayat man and a low-caste Mahar woman. He always felt ashamed about his being.

Humiliation at school by teachers and other students

The protagonist had high esteem for his teacher. He looks at him as King Rama. He dared not to touch the footwear of the teacher as his mere touch could pollute his beloved teacher. But his teacher was not concerned about this. He behaved like Dronacharya of Mahabharata. In this epic, Guru Dronacharya asked Eklavya to give his thumb. Limbale compares his teacher with Dronacharya for his treating him inferiorly. The teacher who ought to teach liberty and equality to his students was himself caste-biased. When there was recess time students of the upper castes were used to tease and humiliate the protagonist in front of the teacher. They were using abusive language and were shouting at Limbale as *dhed*. The teacher never scolded them. As mentioned above *Mahar* community at that time was performing degradable works like removing dead animals from the village area. The meat of these dead animals was consumed as food, otherwise, it was waste but this community was utilizing it to live their livelihood.

There was a separate seating place for Dalit students. They were not allowed to seat with upper-caste students. Usually, the school was held either in the temple of *Vithoba* or *Mahadeo*. Inside the temple, the boys and girls of the upper caste sat while the children of the Dalit Caste sat near the door of the temple. They were not allowed to enter the temple to have *the darshan* of God. Every Saturday teacher used to give menial work like cleaning and decorating the school to Dalit students.

Separate colonies and water resources for Untouchables

Houses of different castes were located in particular directions and areas of the village. The water sources of the Dalit community were also far away from the water resources of the Upper classes. They were not allowed to fetch water from their resources. Even their touch could pollute the water tanks and rivers. A tank of water was also divided according to the caste system. On the upper side tank upper caste people used to fill the water, and high caste women used to wash the clothes. Then just beside *Kunbi* and *Dhangars* used to fill water. then buffalos and domestic animals were washed and at last untouchables, communities were allowed to fetch water. Animals were more respectable than Dalits. This sequence of watersheds in which water is allowed to fill reminds us of the caste hierarchy.

Discrimination in Temple and Hotel

As already mentioned Dalits were not allowed to enter the temple instead they had to pray from a distance. God was getting defiled by their entry to the temple. Even in hotels caste rules were practiced. In the village there was Shivram's hotel, here Dalits were not allowed to sit with other customers, and separate utensils were used for untouchables though they were paying as much as other customers.

Untouchability among Untouchables

Untouchables were suppressed by upper-caste Hindus. But even among untouchable castes, there was caste bias. Some untouchable castes were supposed to be superior to other untouchable castes. They had never had cordial relations instead there was rivalry and discrimination. This aspect of untouchability is aptly narrated by Sharankumar Limbale in

his *Outcaste.* Once his grandmother Santamai was moving around her footwear was broken. She went to Chambhar across the stand to repair her footwear. But he rejected to repair her footwear as she belonged to Mahar Caste.

The hypocrisy of upper-caste people

Upper-caste people have a double standard regarding caste rules. A mere touch of untouchable pollutes them. But untouchable women are exceptions to this norm. His biological father seduced Masamai to satisfy his lust. But he was not willing to give his name to his son born out of an immoral relationship. They were not taking food or water from untouchables but liquor made by untouchable Santamai and Masamai was welcomed by them.

Rejection in Life and Identity Crisis

Being an *Akkarmashi(Outcaste)* protagonist's proposal of marriage was rejected many times. He faced many challenges in getting married and the same disgrace in the office at Ahmadpur where he worked as a telephone operator. He could not get a room on rent. Even after submitting herself to upper caste *Lingayat*, his mother remains low-caste *Mahar*, and the protagonist becomes even inferior to caste. Initially, he was rejected by schools as he was missing the name of his father. It was Bhosale teacher who enrolled the name of Sharankumar's biological father in the school roll.

Conclusion

Both the protagonists suffer this caste discrimination only because of their *Mahar* caste, supposed to be the low of the lowest in the caste hierarchy. To get birth in an untouchable family is a curse as it inflicted severe degradation. It is evident in *Baluta* and *The Outcaste* that this injustice is practiced everywhere from school to the temple, from houses to offices, from villages to cities, and from untouchables to untouchables. Sharankumar Limbale's *The Outcaste* reveals the hypocrisy of Upper caste men when they sexually exploit untouchable women as their concubines but they hesitate to give their name to the child borne out of this relationship. Both narratives narrate caste and untouchability as the root cause of discrimination. In his Aesthetics of Dalit Literature Sharankumar Limbale gives more importance to lived experiences *(anubhav)* of Dalit writers to mere speculation and imagination about the problem of untouchability*(anuman)* by non-Dalit writers.

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Chelation Ion Exchange Studies of Copolymer Resin from o-Toluidine, Biuret and Formaldehyde

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Abstract

The TBF copolymer resin was synthesized by the condensation of o-Toluidine and biuret with formaldehyde in the presence of 2M HCl as a catalyst at 120 ± 2 ^{0}C for 5 h with molar proportion of reactants. The TBF copolymer proved to be a selective chelating ion-exchange polymer for certain metals. Chelating ion-exchange properties of this polymer were studied for Cu^{2+}, Ni^{2+}, Co^{2+}, Zn^{2+}, and Pb^{2+} ions. A batch equilibrium method has been employed in the study of the selectivity of metal-ion uptake involving the measurements of the distribution of a given metal ion between the copolymer sample and a solution containing the metal ion. The study was carried out over a wide pH range and in media of various ionic strengths. The polymer showed higher selectivity for Cu^{2+}, Ni^{2+} than for Co^{2+}, Zn^{2+}, and Pb^{2+}ions. Study of distribution ratio as a function of pH indicates that the amount of metal ion taken by TBF copolymer resin increases with the increasing pH of the media.

Keywords: Synthesis, Condensation, Ion-exchange property, Distribution ratio.

Introduction

A resin is said to be ampholytic ion-exchanger resin if it contains both cation and anion as exchangeable ion. Some ion-exchanger resins have chelating properties making them highly selective towards certain metal ions. Studies of chelation ion-exchange properties of copolymer resin derived from 1,5-diaminonaphthalene, 2,4-dihydroxy- propiophenone and formaldehyde (Das NC et, al, 2022). Gharbi et al. (Gharbi S. 2014) have synthesized the chelating ion exchange resin by the condensation of 8-hydroxyquinoline with pyrogallol using formaldehyde as a cross linking agent at 120oC in DMF in the presence of HCl acid as catalyst. The cation exchange capacity was measured and the effect of pH and metal ion concentration on the ability of the ion-exchange were studied. The ratio of cation exchange reaction and the distribution coefficient in tartaric acid medium at different pH were also studied using the method of batch equilibrium. Rahangdale studied separation of toxic metals ions from waste water using pyrogallol-biuret-formaldehyde copolymer resin (Sanjiokumar S. Rahangdale et al 2020). A batch equilibrium method was employed in the study of the selectivity of metal ion uptake. The study was carried out over a wide pH range and in media of various ionic strengths. The polymer showed higher selectivity for Fe3+, Cu2+ ions than for Ni2+, Co2+, Zn2+, Cd2+, and Pb2+ ions. Study of distribution ratio as a function of pH indicates that the amount of metal ion taken by resin is increases with the increase of PH of the medium. The metal uptake properties of chelating azo polymeric resin were studied (Keerthiga et al. 2015). Synthesis and chelate ion exchange properties of copolymer resin: 8-hydroxyquinoline-5 sulphonic acid-catechol-formaldehyde (Mandavgade SK et.al. 2022). The chelating properties of synthesized resin such as total ion-exchange capacity, effect of pH, concentration and time for different metal ions Ni(II), Cu(II), Zn(II), Cd(II) and Pb(II) were also studied by employing batch equilibrium method. A new chelating copolymer resin (o-AABF) was synthesized through copolymerization of o-amino acetophenone, biuret and formaldehyde in acidic medium (HCl) by condensation reaction. Selectivity and binding capacity of copolymer resin studied by batch equilibrium method towards Ni2+, Co2+,Cd2+, Zn2+ and Cr3+ in different pH and treatment time (Rashid and Coworker,2017). A novel hexylthioglycolate ion-exchange resin from poly (ethyl acrylate - acrylonitrile - divinyl benzene) beads were prepared and adsorption capacities of this resin for Co(II), Ni(II), Cu(II), Zn(II), Cd(II), Hr(II), and Pb(II) at different pH was studied.(Dwivedi and coworker, 2014).

Synthesis of o-Toluidine–Biuret–Formaldehyde (o-TBF) Copolymer Resin.

The four different types of o-TBF copolymer resins have been successfully synthesized and abbreviated as given in Table 1.

Synthesis of o-TBF-I copolymer resin

The new copolymer resin o-TBF-I was synthesized by condensing o-Toluidine (1.07 g, 0.1 mol) and biuret (1.03 g, 0.1 mol) and formaldehyde (7.50 ml, 0.2 mol) in molar ratio of 1:1:2 in the presence of 2M (200 ml) HCl as a catalyst at 122ºC ± 2ºC for 5 hrs in the round bottom flask attached with water condenser and was heated in an oil bath with occasional shaking to ensure thorough mixing. The temperature of oil bath was controlled by dimmer state (Sanjiokumar et al, 2019, 2020, 2021). The resinous cream product obtained was removed

immediately as soon as the condensation reaction was over. The reaction is shown as follows in Fig. 1. The novel copolymer/activated charcoal composite was prepared by o-TBF copolymer and activated charcoal in 1:2 ratio. The copolymer was dissolved in 25 ml of DMSO and the activated charcoal was added into it and the mixture was subjected to ultrasonification for 3 hrs with constant stirring for 24 hrs at room temperature. After the specific time, the obtained composite was seperated, filtered and dried at 70^{0}C for 24 hrs (Santosh P. et.al. 2020).

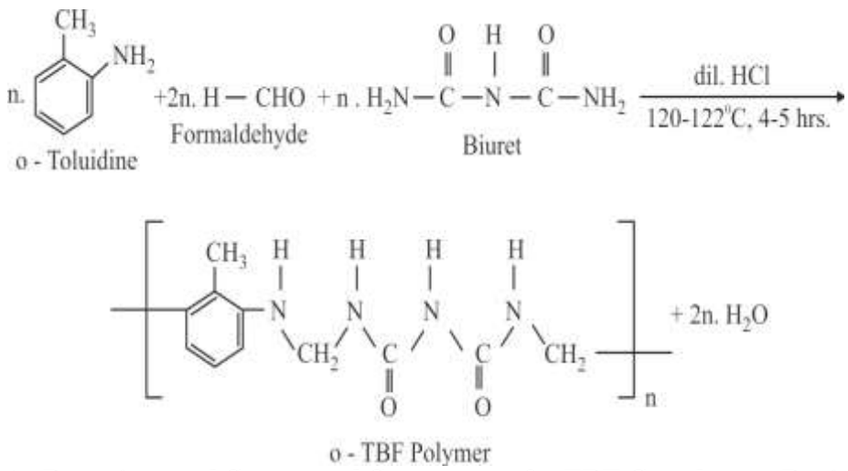

Fig. 1 : Reaction and Suggested Structure of o-TBF Copolymer Resin

Purification of Resins

The separated copolymer resin was washed with hot water and methanol to remove unreacted starting materials and monomers. The properly washed resin was dried, powdered and then extracted with diethyl ether and then with petroleum ether to remove 4-hydroxybenzoic acid-formaldehyde copolymer which might be present along with o-TBF copolymer. The product so obtained was further purified by reprecipitation technique. For this purpose the copolymer resin was dissolved in 10% aqueous sodium hydroxide solution, stirred well, filtered, and reprecipitated by gradual drop wise addition of ice cold 1:1 (v/v concentrated hydrochloric acid/distilled water) with constant and rapid stirring to avoid lump formation. The process of re-precipitation was repeated twice. The copolymer sample o-TBF-I thus obtained was filtered and washed several times with hot water, dried in air, powdered and kept in vacuum desiccators over silica gel. The yield of the copolymer resin was found to be 81%. Similarly other copolymer resins o-TBF-II, o-TBF-III and o-TBF-IV were synthesized by varying the molar ratios of the starting materials viz. (2:1:3), (3:1:5) and (4:2:7), respectively with little variation of experimental conditions. The samples, yields and reaction details are tabulated in Table 1.

Table 1 Synthesis and Physical Data of o-TBF Copolymer Resins

		Reactans							
Copolymer Resin Abbreviation	**o-Toluidine o-T (mol)**	**Biuret B (mol)**	**Formaldehyde F (mol)**	**Molar ratio**	**Catalyst 2M/HCl (ml)**	**Reflux Temp. (K)**	**Time (hr)**	**Yield (%)**	**Melting point (K)**
o-TBF-I	0.1	0.1	0.2	1:1:2	200	395	5	69	434
o-TBF-II	0.2	0.1	0.3	2:1:3	200	395	5	79	423
o-TBF-III	0.3	0.1	0.5	3:1:5	200	395	5	86	429
o-TBF-IV	0.4	0.2	0.7	4:1:6	200	395	5	78	442

Ion-exchange properties

The ion-exchange property of TBF-copolymer resin was determined by the batch equilibrium method (Mane VD et. al. 2009, Tarase M. V. et. al. 2008, Gupta RH et. al. 2008, Suzuki E. 2002).

Determination of metal uptake in the presence of various electrolytes and different concentration

The copolymer sample (25 mg) was suspended in an electrolyte solution (25 ml) of known concentration. The pH of the suspension was adjusted to the required value by using either 0.1M HNO_3 or 0.1M NaOH. The suspension was stirred for 24 hrs at 30^{o}C. To this suspension 2 ml of 0.1M solution of the metal ion was added and the pH was adjusted to the required value. The mixture was again stirred at 30^{o}C for 24 hrs. The polymer was then filtered off and washed

with distilled water. The filtrate and the washing were collected and then the amount of metal ion was estimated by titrating against standard EDTA (ethylene diamine tetra-acetic acid) at the same pH (experimental reading). The same titration has been carried out without polymer (blank reading). The amount of metal ion uptake of the polymer was calculated from the difference between a blank experiment without polymer and the reading in the actual experiments. The experiment was repeated in the presence of several electrolytes (Rahangdale PK et. al. 2003). Metal ion, its pH range, buffer used, indicator used and colour change are given in Table 1. The metal ion uptake can be determined as, Metal ion adsorbed (uptake) by resin = (X-Y) Z millimols / gm.

Where,

'Z' ml is the difference between actual experimental reading and blank reading.

'X' mg is metal ion in the 2ml 0.1M metal nitrate solution before uptake.

'Y' mg is metal ion in the 2ml 0.1M metal nitrate solution after uptake.

By using this equation the uptake of various metal ions by resin can be calculated and expressed in terms of millimols per gram of the copolymer.

Estimation of rate of metal ion uptake as function of time

The time required for attaining the state of equilibrium under the given pH was evaluated by a series of experiment carried out to determine the amount of metal ion adsorbed by the copolymer at specific time intervals. The copolymer sample (25mg) was mechanically stirred with 25ml of 1M $NaNO_3$to allow the copolymer to swell at room temperature. Metal ion solution (0.1M, 2ml) was added to this and pH of the content was adjusted to the required value by addition of either 0.1M HNO_3 or 0.1M NaOH. After the specific time interval, the particular suspension was filtered and washed with the distilled water. The filtrate was collected and the unabsorbed metal was estimated by titration with standard EDTA solution using appropriate indicator. Under the experimental condition it is observed that, the state of equilibrium is established within 24 h at 25^0C (Boto BA, 1987). The rate of metal ion uptake is expressed as the percentage of the amount of metal ion taken up after a specific time related to that in the state of equilibrium. The percent amount of metal ions taken up at different time is defined as

$$\text{Percentage of metal ion uptake at different time} = \frac{\text{Amount of metal ion adsorbed}}{\text{Amount of metal ion adsorbed at equilibrium}} \times 100$$

Using this expression, the amount of metal adsorbed by polymer after specific time intervals was calculated and expressed in terms of percentage metal ion adsorbed. This experiment was performed using 0.1M metal nitrate solution of Cu^{2+}, Ni^{2+}, Co^{2+}, Zn^{2+}, and Pb^{2+}ions.

Evaluation of the distribution of metal ions at different pH

The distribution of each one of the five metal ions, i.e. Cu^{2+}, Ni^{2+}, Co^{2+},Zn^{2+} and Pb^{2+} between the copolymer phase and the aqueous phase was estimated at 25^0C and in the presence of a 1M $NaNO_3$ solution. The experiments were carried out as described above at different pH values. The distribution ratio (D) was defined by the following relationship (Boto BA, 1987).

$$D = \frac{\text{Weight (mg) of metal ion taken up by 1g of polymer}}{\text{Weight (mg) of metal ion present in 1 ml of solution}}$$

If we consider

'Z' is the difference between actual experiment reading and blank reading,

'X' gm is the amount of metal ion in 2ml 0.1M metal nitrate solution,

'Y' gm of metal ion in 2ml of metal nitrate solution after uptake.

$$\text{Metal ion adsorbed (uptake) by the resin} = \frac{ZX}{Y}\,\frac{2}{0.025} = \left(\frac{ZX}{Y}\right)80$$

Table 2. Data of experimental procedure for direct EDTA titration

Metal Ion	pH range	Buffer used	Indicator used	Colour change
Fe(III) Cu(II)	2-3 9-10	Dil.HNO3/dil.NaOH Dil.HNO_3/dil.NaOH	Variamine blue Fast sulphone black-F	Blue to Yellow Purple to green
Ni(II)	7-10	Aq.NH_3/NH_4Cl	Mureoxide	Yellow to violet
Co(II)	6	Hexamine	Xylenol orange	Red to yellow
Zn(II) Cd(II)	10 5	Aq.NH_3/NH_4Cl Hexamine	Eriochromeblack-T Xylenol orange	Wine red to blue Red-Yellow
Pb(II)	6	Hexamine	Xylenol orange	Red to yellow

Result And Discussion

o-Toluidine-Biuret -Formaldehyde (o-TBF) Copolymer Resins

The experimental result of the batch equilibrium study carried out for all the four o-TBF copolymer resins are given in the Table 3 to 5. From this study, the following generalization was made.

(a) Effect of Electrolytes on Metal Ion Uptake

The amount of metal ions taken up from a given amount of o-TBF copolymers and its composite depends on the nature and concentration of the electrolyte present in the solution. In presence of perchlorate, chloride and nitrate ions, the uptake of Cu2+ and Ni2+ ions increases with increasing concentration of the electrolytes, whereas in presence of sulphate ions, the amount of the above mentioned ions taken up by the copolymers decreases with increasing concentration of the electrolytes (Shah BA, 2007). Moreover, the amount of Co2+, Zn2+ and Pb2+ ions taken up by the copolymer samples decreases with increasing concentration of the chloride, nitrate, perchlorate and sulphate ions (Masram DT, 2014). This may be explained in terms of the stability constants of the complexes which Cu2+, Ni2+, Co2+, Zn2+ and Pb2+ ions form with these anions. $SO_4$2- might form rather strong complexes with Ni2+ and Cu2+ ions, while ClO4 -, NO3- and Cl- might form weak complexes and, therefore, might not be expected to influence the position of the Ni2+ and Cu2+ chelates equilibrium as much as $SO_4$2-.Sulphate, perchlorate, nitrate and chloride might form rather strong chelates with Co2+, Zn2+ and Pb2+ and therefore might be expected to influence the position of the Co2+, Zn2+ and Pb2+ chelates equilibrium. This type of trend has been observed by other earlier workers in the field (Katkamwar SS. 2012, Bhatt RR et al, 2012). The metal ion capacity of copolymer/activated charcoal composite is also found to be higher. The copolymer and composite was found to posses higher metal ion uptake for Co2+ and Cd2+ than the other selective metal ions.

(b) Evaluation of the Rates of Metal Ion Uptake

The rate of metal adsorption was determined to find out the shortest period of time for which equilibrium could be carried out while operating as close to equilibrium conditions as possible. The data of metal ion uptake at various shaking time intervals. These results indicate that the time taken for the uptake of the different metal ions at a given stage depends on the nature of metal ion under given conditions.It is found that Cu2+, Ni2+, Co2+ and Zn2+ ions require about 5h for the establishment of the equilibrium where as Pb2+ions required almost 6h for equilibrium. Thus, the rate of metal ion uptake follows the order Cu2+, Ni2+, Co2+, Zn2+> Pb2+ for all the copolymers and its composite. The trend is good agreement with earlier workers (Singru RN, 2010). The metal ion capacity of copolymer/activated charcoal composite is also found to be higher.The copolymer and composite was found to posses higher metal ion uptake for Co2+ and Cd2+ than the other selective metal ions.

(c) Distribution Ratio of Metal Ions at Different pH

The results of effect of pH on the amount of metal ion distributed between two phases can be explained by the result. The data on the distribution ratio as a function of pH indicates that the distribution of each metal between the polymers phases and aqueous phase increase with increasing pH of the medium. The results indicate that the relative amount of metal ion adsorbed by the copolymer resin and its composite increase with increasing pH of the medium. The study was carried out upto definite pH value for the particular metal ion to prevent hydrolysis of the metal ions at higher pH. Cu2+ and Ni2+ have highest distribution ratio at pH 2.5 to 6, therefore these ions can be taken up more selectively between the ranges of pH 2.5-6. The other three ions Co2+, Zn2+and Pb2+ have lower distribution ratio over pH range of 2.5 to 6. The different distribution ratio obtained for different metal ions may be due to the difference in stability of the complex formation during adsorption. The high distribution ratio may be due to higher stability constant of metal ligand complexes and vice versa. Cu2+ and Ni2+ may form more stable complex, indicate that these ions adsorbed more selectively to the higher extent, rather than Co2+, Zn2+and Pb2+ which may form rather weak complexes with ligand during the course of time, therefore these ions adsorb to a least extent over an entire pH range study (Patel HJ et al 2008). The metal ion capacity of copolymer/activated charcoal composite is also found to be higher. The copolymer and composite was found to posses higher metal ion uptake for Co2+ and Cd2+ than the other selective metal ions. But,when the pH increases, the concentration of H+ decreases which leads to the higher mobility of heavy metal ions for the higher uptake by the synthesized adsorbents. In the present study the observed order of distribution ratios of divalent ions measured in the range of pH 2.5 to 6 is found to be Cu (II) > Ni (II) > Co (II) > Zn (II) >Pb (II). The results are in good agreement with earlier co-workers (Kapadia M et al 2008). Hence, the results of this type of study are helpful in selecting the optima pH for a selective uptake of a metal ion from a mixture of different ion.

Table 3 Effect of metal ion uptake by composite

Metal	Concentration Of electrolytes (mol L^{-1})	Metal ion uptake in the presence of electrolytes(m.mol/g)		
		NaCI	$NaNO_3$	$NaClO_4$
Cu^{2+}	0.1	1.63	1.61	1.64
	0.5	1.61	2.384	2.15
	1.0	2.8	2.195	2.13
Ni^{2+}	0.1	0.7468	1.453	0.481
	0.5	1.11	1.674	0.746
	1.0	1.274	1.816	0.82
Co^{2+}	0.1	1.09	0.847	0.56
	0.5	1.08	1.09	0.641
	1.0	1.186	1.60	0.753
Zn^{2+}	0.1	0.421	0.469	0.631
	0.5	0.56	0.748	0.712
	1.0	0.56	1.089	0.86
Pb^{2+}	0.1	0.319	0.397	0.584
	0.5	0.489	0.632	0.691
	1.0	0.593	0.898	0.734

Table 4 Rate of metal ion uptake by composite

Ietalion	Equilibrium attainment (%)						
	Time (h)						
	1	2	3	4	5	6	7
Cu^{2+}	31	55	79	99	-	-	-
Ni^{2+}	10	25	38	52	63	81	79
Co^{2+}	12	27	35	56	65	81	84
Zn^{2+}	14	19	29	31	45	51	78
Pb^{2+}	4	5	9	14	33	42	61

Table 5 Metal ion uptake at different pH by composite

Ietalion	Metal ion uptake (m.mol/g)					
	pH of the medium					
	1.5	2	3	4	5	6
Cu^{2+}	0.59	1.11	1.13	1.45	1.85	2.51
Ni^{2+}	0.49	0.93	0.98	1.11	1.45	2.98
Co^{2+}	0.27	0.48	0.75	0.87	1.11	1.71
Zn^{2+}	0.22	2.29	0.14	0.50	0.79	1.31
Pb^{2+}	0.13	0.25	0.32	0.40	0.68	1.10

Conclusion

A copolymer TBF based on the condensation reaction of pyrogallol and biuret with formaldehyde in the presence of acid catalyst was prepared. TBF is a selective chelating ion-exchange copolymer resin for certain metals. The copolymer resin showed a higher selectivity for Cu^{2+} and Ni^{2+} ions than for Co^{2+}, Zn^{2+}, and Pb^{2+} ions. The uptake of some metal ions by the

resin was carried out by the batch equilibrium technique. The uptake capacities of metal ions by the copolymer resin were pH dependent. From the results of distribution coefficients, it can be observed that Cu (II) has higher value of distribution ratio. Due to considerable difference in the uptake capacities at different pH and media of electrolyte, the rate of metal ion uptake and distribution ratios at equilibrium, it is possible to use for separation of particular metal ions from their mixture.

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UGC CARE Listed (Group -I) Journal

Dalit Literature: past, present & Future

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Abstract:-
Emergence and Literature of Dalit Movement

The Dalit movement in the social sphere appears to have emerged in roughly the final stages of the nineteenth century. From 1905, the nature of that movement was not only social but also ideological, applications, statements, articles, along with folk songs, pageants, poems, poetry, bhajans and qawwali programs were to take the form of literature. From all this, the spark of social awakening, inner consciousness and self-reflection was coming out from the social mind. It can be said that it was primarily of secondary nature as literature.

Keywords:-

Sant Vangmaya is also included in Dalit movement. Since then Dalits have developed a sense of untouchability. That is, famous Dalit literature was written in Maharashtra. In this, Shankarao Kharata's novels, 1 N.R. Shende's stories, Panditi and Shahiri * Shahir's poems, powades, dramas, Dalit poetry as well as all dignitaries, writers, writers who come in Dalit literature have contributed to Dalit literature.

Introduction:-

How Dalit literature started will be presented in Introduction. In order to understand the history of Dalit society or the information of this class in the Indian society from the ancient Vedic period to the medieval period and from the medieval period to the modern period or the future period, the consultation of Dalit literature is seen in the above period.

There have been many social, economic and political transitions/transformations in Marathi literature and Dalit literature in the past of this history.

While passing through many stages from one stage, to another stage, from the second to the third, his intellect got a kind of mirror of his life in nature. It is the name of a human religion, rupguna, class, religionkarma, varna, class, caste-ku. It has to be admitted that in some places unknown Sana regulation man is a race of man and the real human race and as man in history i.e. past, present and future time has the same beautiful and memorable nature.

Past Dalit's Literature:

What was the past of Dalit Literature in the past or literary, Dalitish, Dalit Literature. While analyzing this, it is observed that the life of the Dalit community is going through a very difficult situation. The 2 Dalit literary movement, which thought through the social literature of ancient times, turned out to be opposed to Chaitanyaism. Her story of rebellion shows the readiness to fight, as the society seems to have shunned progressive thought after seeing a philosophy that keeps an entire human race down. Accordingly, it seems that the subject of the emergence of Dalit literature has become a bit superficial.

Because it took some time to create the thought array of such a society which was dormant till then. Dalit literature emerged to make the oppressors aware of the increasingly changing nature of Dalit society. This rise was not sudden but the work of ancient and medieval saints became equally important.

Ancient India of Past (Performance of Saints):

During this time in India, the work done by some saints became important. Also the same thoughts were prevalent even before the saints. Brahman is truth. Human creation nullifies "Transformation is just an illusion." Mankind and human life were saved due to the performance of saints. During the literary period of the saints, literature social vision and thoughts of social equality in Dalit society came forward, during that time most of the literature was in Sanskrit language. Brahmins and Kshatriyas were the superior caste to learn the language of the Sanskrit Brahmins. Hindu castes and Dalits had no rights. The Vedas had reached the common mind. Due to this, Dalit literature in India progressed at a very slow pace.

Present social life:-

At present there is a lot of upheaval in the Dalit movement / literature. It can be shocking for India / world. At present caste discrimination, caste discrimination, banning of bread, various deities and many worships are creating social strata / different social segments and the Dalit class / Dalit Literature is being damaged. Hard and poor life and even in this period caste differentiation is being observed in the country to some extent.

Discrimination about Varna caste and Dalit caste should be ended. He seems to have taken up the torch of thought to get rid of this varna system. In addition to this, the former president of Nashik Marathi Sahitya Sammelan, Mr. Shri Uttam Kamble and Justice Dharmadhikari, Gangadhar Pantawane, Ph. Mr. Shinde, Sadanand More, Shripal Sabnis, Laxmikant Deshmukh, Aruna Dhere, Father Francis Dibrito etc. Literary writers in this present time. Phule's Dalit poetry or saints' poetry and Ch. Shahu Maharaj, Sayajirao Gaikwad,

Dr. Babasaheb Ambedkar, Dadasaheb Gaikwad, Shantabai Dani, Baburao Bagul, Vamandada Kardak's Marathi literature and Dalit literature are being enlightened by the above writers and writers in presenting Dalit movement and Dalit Literature in front of society in India.

Dalit movement and future:-

Republican Party of India Dr. Written by Akash Kshirsagar Dr. Babasaheb Ambedkar was influenced by Saint Kabir's thoughts on religion, ethics and equality. Also Babasaheb saw the future of Dalit society because he was loaded with the thoughts of freedom, equality and brotherhood. He had truly diagnosed the suffering of Dalits. Dalit issue is a social issue. As a solution to this, Bhiskrit Hitkarini Sabha, Independent 4 Labor Party, Scheduled Caste Federation etc. were organized to change the political system and for the overall progress of our Dalit society. Dr. Babasaheb Amdekar had established the above organizations for the social, economic and political progress of the Dalit class. Later, Babasaheb founded the Republican Party of India in 1956, but the Dalit class and other backward communities did not seem to have succeeded in the mission and purpose of this party. Many parties seem to have formed various constituent parties within several organizations and the Republican Party. Prakash Ambedkar's Bharatiya Bahujan Federation, Ramdas Athawale's (Athawale group), R.Su. Gavai group, Kawade group, various parties and groups were formed. Babasaheb's goal and purpose was to continue the establishment of Republican Party of India. But Babasaheb's goals and policies were not accepted by Dalit class. As a result, the Dalit movement appears to have stalled in the middle. Dalit Literature and this organization will not be able to stop the social hierarchy in the future or in the future. Also, it is not possible to say whether Dalit literature and social change took place or Dalit class progressed or not.

Conclusion

Hon. Jyotirao Phule, Savitribai Phule, Ch. The basic philosophy of Shahu Maharaj and the entire Ambedkar debate is for all civilizations and societies who want to leave the status quo and go with the new transformative science. It appears so. Any argument or philosophy in it is not for one community but for all. All welfare is gamy. But it is not the ignorance or narrow-mindedness of this psyche in not understanding it, but its position-loving attitude that is effective here.

Secondly Ambedkar does not stand reference to the caste of the person? And one who thinks from a caste point of view is due to the vision made up of social caste, feelings, traditions and customs of that psyche.

Ambedkar Dalit society and Dalit literature have not only rejected Hinduism, culture and scriptures but have rejected all recognition of their hegemony over the Bahujan society. That is why Dalit literature was considered as the literature of a free mind. But in Dalit Literature or with the inspiration of Dalit society, the above writers, writers, poets, Powada, Kawane etc. Dalit literature has inspired the backward and rejected society to live as human beings.

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Interview

1. Shri. Karunasagar Pay (Nashik)
2. Shri. D. L. Karad (Nashik)
3. Shri. Tanaji Jaibhave (Nashik)
4. Comrade- Sunil Malusare (Nashik)
5. Comrade- Raju Desale (Nashik)
6. Prof. Dr. Gangadhar Ahire (Nashikroad)
7. Shri. Manohar Roopwate (Nashikroad)

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Research Paper
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Plant Leaf Disease Classification Using SVM and CNN Algorithms

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Abstract: -
The detection and diagnosis of plant leaf diseases is a major concern in agriculture. Farmers need to track crop fields and recognize signs of disease at early as possible. The images processing is an aid to the identification and classification of leaf diseases. For the identification of leaf disease, there are three image features, i.e., texture, color, and shape. Textures are the most important feature out of the three. Image features value entered in CNN. The k-fold methods are used for train the model greater accuracy evaluation. The image features provide input for the identification of a disease and are reliable using the GLCM algorithm. CNN provides 92.53 % accuracy.
Keywords: Texture Features, GLCM, CNN, k-fold

1. Introduction

India is an agrarian nation with approximately 70% of its population relying on agriculture for their livelihoods. For farmers, the process of selecting appropriate crops and finding effective herbicides and pesticides is diverse and extensive. The presence of diseases in plants has a significant detrimental impact on agricultural products, leading to a substantial reduction in both their quality and productivity[1]. Therefore, strategies and technical knowledge and the field became an important matter to be mastered. The systematic and structured should be developing so that they will use by operators to increase the overall production. In most cases, disease symptoms are seen on the leaves, stem, and fruit [2]. It needs to be detected that disease but very time appointing an expert would may be more costly. Continuous monitoring with naked-eye observation is not possible for a farmer. So, we use digital image processing techniques [3]. Particular medications can be custom fitted to battle particular pathogens if plant illnesses are accurately analyzed and recognized early and ecological increases[4].Initially, the input RGB image is converted into the HIS model. The k-mean segmentation is an efficient segment of the disease affected area of leaves of crops. The GLCM is a features extraction algorithm that measures the feature values from the ROI disease-affected image from the 'H' component [5]. Exact disease finding is a difficult task for farmers which results in loss of income to the farmers and the state[6]. In the classical method, expert people detected diseases in leaves by naked eyes which are very expensive for farmers [7]. The main goals of the research are:

1. To study the disease of plant leaf.
2. To calculate disease-affected area on a leaf.
3. To calculate essential features from leaf images
4. To choose the correct classifier with the help of result comparison.

The research purpose is to improve the farmer's economical life by increasing the production of crop. The disease identification and exact pesticide suggestion is a crucial part of this work. To make the system that is automatically run and identify the disease is reduce the effort and cost of farmers. Feature extract from the image is a crucial part for finding the accuracy of disease-affected leaf [8].

2. Literature Review

Leaf images affected by the disease are pre-processed by resizing the image or color conversion of an image or calculate the histogram of an image. To remove the noise from image filters is used and enhance the image quality. The color, shape, and texture features are calculated by different segmented methods, k-mean is the most popular method used for finding the region ROI of the image. In some work combination of texture, color, and shape features are used to classify the various diseases on a leaf. The texture features are mostly used in the disease detection of the leaf. These calculated values were given to the classifier and the leaf disease was classified by this method. Machine learning classifiers are used for leaf disease classification. After studying the previous work, found the research gap for our research work.

1. For the identification and classification of the correct disease, feature selections are more important. The strategy for image classification is critical and balanced.
2. Most researchers find the twenty-three features or some researchers find two features of the leaf disease. More image features make the classifier more time-consuming and cost-intensive, and few features make the classifier less efficient if the dataset differs. The model can go in underfitting.
3. The leaf disease data collection for most research work is not obtained from an open farm or nursery. Leaf disease samples were obtained from an online platform. Plant leaf diseases are collected from open farms and nurseries for this work.

4. To make the model more suitable, the size of the leaf sample data set is very limited.

We chose the suitable features of different plant leaf disease from the digital image in this work. Texture and shape features are derived from that images. The feature vector set for the classification and identification of plant leaf disease as an input to classifiers.

3. Diseases on Plant Leaf

Plant leaf samples are collected from open farms of Nandurbar District with a different session at the early stage, middle stage, and last stage of the disease. These samples are collected from July to February of the year. In this study, four diseases and one healthy leaf were observed in plant leaves. The affected diseases are harmful to crop production. There is a variety of disease spot which are same with different disease spot which makes confusion to recognize the disease[9]. The wrong prediction of the disease may go in the wrong direction regarding spraying pesticide or chemical treatment. The loss of money and time in this is very useless [10]. Leaf plants affected by fungal, bacterial, and viral diseases are captured by the digital camera[11].

Table 1. Sample collection of plant leaf diseases

Sr. No	Name of Disease	Total
1	Cercospora Leaf Spot	103
2	Anthracnose	101
3	Leaf Curl	102
4	Powdery Mildew	100
5	Healthy Leaf	100

The total sample size of a leaf is 506 collected. The samples are maintained by the disease with their intensity. These symptoms of all samples are confirmed by agriculture experts. The growth of the disease is divided into three states i.e., early-stage middle stage, and last stage. The farms are visited annually and, for each disease, samples are collected during the year. The external parameters of humidity, humidity, temperature and heavy rain influence the growth cycle of each disease.

4. Proposed Model

Image processing has some fundamental steps for the classification and identification of results. They are image preprocessing, image segmentation, image feature extraction, and Classification. The following figure shows the flow of research work that is applied in this work. Firstly, we take samples of a disease-affected leaf of crop. Then for preprocessing the image apply the resizing of images. An original image is in RGB form then converts into HSI form. Image is segmented by K-mean algorithm, and features of the image are extracted using the GLCM algorithm[12][13]. These extracted features a train and tested for classification. The classifier is applying for disease identification, and classification.

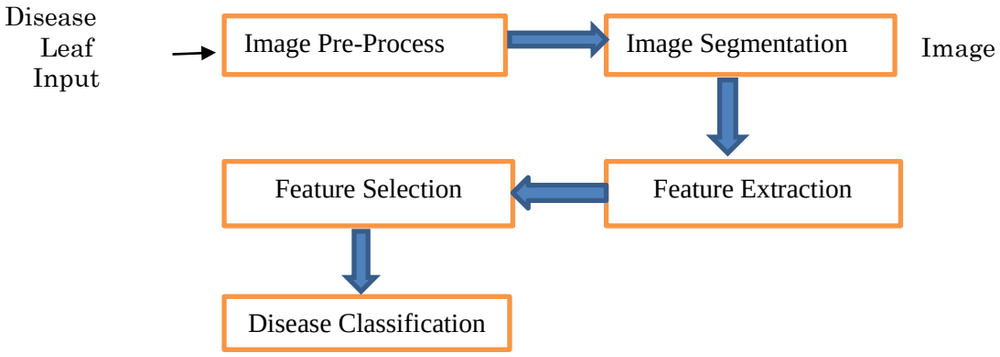

Figure.7 Proposed Model of Leaf Disease Detection, and Classification System (LDDCS)

In above figure show that, identification, and classification of plant leaf disease with help of image processing fundamental steps. The diagram indicates the flow of research work step by step. The classification of the disease will be getting by machine learning and deep learning algorithm classifiers.

4.1 Image Preprocessing

The plant leaf is acquired as an image that can be of different sizes. The size of the resized image becomes 255 × 255 diseases affected leaf of plants are captured by digital camera. A digital camera (Canon EOS REBEL T2i, 20 Megapixels) was used for image acquisition. All of the images are stored in the standard format of JPEG. In preprocessing procedure original image is an RGB image, and it was converted into HIS format to reduce the dimension, and complexity of the image.

4.2 Segmentation

The K-mean segmentation method is applied on images for disease-affected parts isolated from the 'H' component of HIS image. Using k-mean cluster segmentation, the proposed system calculates the region of interest with iterations. However, K-mean clustering is used to separate the leaf image into different clusters. In our case, k=3 is chosen, and the three clusters will have the background, diseased portion of the leaf, and normal green leaf. We have fixed the cluster value as two for the disease portion is maximum covered in this cluster.

4.3 Feature Extraction

The GLCM algorithm is used in the plant leaf disease image to measure features one by one, and extracted features will be tested. Contrast, Energy, Correlation, Entropy, Cluster Shadow, Cluster Prominence, Kurtosis, and skewness are the top priority features. This selection of features is a combination of the features of texture and color.

4.4 Classification

The machine learning algorithms is used for the classification purpose to classify the data that is Support Vector Machine (SVM) and one Deep Learning Algorithm Convolution Neural Network (CNN) gives the result with accuracy. On the same data set, the machine learning, and deep learning algorithms function differently on different hyperparameters for leaf disease detection [29]. Every outcome depends on the size of the data for training, and testing. The test data may change, and the resulting outcome will change. One way of strengthening the K-fold cross-validation over the holdout approach is used[14]. The data set is split into k subsets, and k times are repeated by the holdout process. One of the k subsets is used as the test set each time, and the other k-1 subsets are combined to form the training set [15].

4.4.2 Support Vector Machine (SVM)

SVM constructs a hyperplane in the space, which can be used for classification that has the highest distance to the closest training data point of any class [16]. The multisvm () function is used to classify the result of leaf disease detection, and classification[17]. SVM uses the RBF kernel to classify plant leaf disease. The fitcsvm and predict function are used for training the data set, and test data set respectively. The kernel functions linear, polynomial and RBF also help in giving decision boundaries for higher dimensions. In the following table, we have been calculating the accuracy of using RBF kernel with other performance measurement parameters like precision, recall, F1_Score.

Table 3: SVM Result with Kernels

Kernel	Accuracy	Precision	Recall	F1_Score
Polynomial	68.42	0.1	0.21	0.14
Linear	71.46	0.21	0.28	0.2
RFB	85.7	0.79	0.64	0.65

In the above table RBF provides more accuracy over the linear and polynomial kernel. The accuracy is 85.7 % in the RBF kernel at iteration 300. The accuracy of the linear and polynomial kernels is not greater than that of the RBF kernel.

4.4.3 Convolutional Neural Network (CNN)

A CNN consists of an input layer, a layer of output, as well as numerous hidden layers. Convolutional layers, pooling layers, completely linked layers, and normalization layers (ReLU) are usually the hidden layers of a CNN. Input from CNN was generated by the GLCM feature set. CNN presented image texture features as input to describe the identification of the plant leaf disease. For better performance, we have to use the epoch size performance tuning parameter. The varying effect is the increase in the epoch size of the accuracy and another output measure. The cross-fold method is used. The 2-fold gives optimum output after an experiment on the CNN model than other folds.

Table 4: CNN Result with epoch

Epoch	Accuracy	Precision	Recall	F1_Score
5	81.56	0.80	0.78	0.69
10	82.52	0.76	0.68	0.69
15	87.97	0.77	0.67	0.78
20	**95.33**	**0.89**	**0.98**	**0.93**
25	91.54	0.80	0.83	0.81

The epoch is a neural network that learns input data patterns by reading the input dataset and applying various calculations to it. At epoch size 20 we get 95.33% which is maximum accuracy.

5. Result and Discussion

In SVM, and CNN, leaf images of affected diseases are qualified for disease detection, and classification. The training is based in various ways on each classifier's

hyperparameter. The kernel function is used for accuracy in SVM, and the RBF kernel gives maximum accuracy after iteration variation. The image texture features are inputted into CNN, an epoch used in it as a hyperparameter. The number of epochs is increased or decrease the accuracy is change.

Table 6: Comparison of KNN SVM, and CNN Results

Classifier	**Accuracy**	**Precision**	**Recall**	**F1_Score**
SVM	85.07	0.79	0.64	0.65
CNN	**95.33**	**0.89**	**0.98**	**0.93**

After comparing machine learning classifiers, and deep learning classifier, conclude that CNN provides better accuracy with less timing than SVM. In detecting plant leaf disease when used with texture features, deep learning architectures have achieved good efficiency. We provided a performance comparison of five image datasets for the disease class.

6. Conclusion

The data collection consists of five plant leaf diseases. These images are preprocessed by converting the HIS color to RGB images. Using the K-mean cluster algorithm, the 'H' elements of the affected portion of the leaf are segmented. Using the GLCM algorithm, feature extracted from cluster part of leaf image. The features are tested, and train then sorted based on maximum accuracy. With the best linear combination SVM and CNN get input of selected of image features. There are 70% images for training, and 30% images are being tested. To evaluate the data properly, the K-fold method is used. The CNN deep learning algorithm offers 95.33 % accuracy, and the SVM machine learning algorithms offer 85.07 % accuracy. Therefore, CNN is said to be better than SVM. In future other leaf disease detection is also performing using various dataset with different diseases.

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Arbuscular Mycorrhizal Species Composition During Rainy Season From Polluted Sites And Their Role As Biofertilizer

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Abstract:
Arbuscular mycorrhizae (AM) exhibit the most positive obligate symbiotic relationship, with roots of majority of plants. They show higher ecological amplitude under adverse environmental conditions. The current study deals with the study of diversity of AM fungi during rainy season with respect to rhizosphere soil analysis for AM species composition and their subsequent role as bio-fertilizer. Spores of *Glomus, Sclerocystis* and *Scutellospora* were observed. The observed species were also detected in root colonization analysis, using standard staining methods. The spore density was highest for *Glomus*. It proved to be a dominant species. The application of bio-fertilizer product prepared with these dominant species was proved to be a potent bio-fertilizer in the field trials with chili crop.
Keywords: -ArbuscularMycorrhiza (AM)*, Glomus,Sclerocystis,Scutellospora*

Introduction:
The mutually beneficial relationship between the feeder roots of plants and fungi is called mycorrhiza (Frank, 1885)'*Mycos'* meaning fungus and '*rhiza'* meaning root (Trappe,2005).Arbuscular Mycorrhizal(AM) fungi show obligatory symbiosis and form natural partnership with Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. They are even found in nutrient deficient soils. AM fungi play an essential role in plant growth, plant protection (from drought, temperature, and salinity) and soil quality. Around 80% of plants are colonized by AM fungi which belong to Glomeromycota and members of family Endogonaceae.AM fungi are employed both in agriculture and forestry (Rodrigues and Muthukumar, 2009).

The present paper deals with investigation of species composition of Arbuscular Mycorrhizae in industrially polluted MIDC area of Dombivli in Thane district of Maharashtra, with respect to their association with seasonal weeds surrounding fifteen industries of MIDC area, located at Sagarli in Dombivli (East) during rainy season.Thus, in present context, study of AM fungi for myco-remediation is an emerging significant alternative technology in the clean-up of metal contaminated soil to maintain status of environment and to use it as biofertilizer inoculums in more efficient way to serve in better way for fulfilling the growing nutritional needs of humankind.

Statement of the problem: The current study deals with identifying AM fungi species prevalent during rainy season that can be used as bio-fertilizers.

Scope of research: The seasonal AM fungi species found during rainy season can be effectively used as bio-fertilizer, with increased concentration of macronutrients.

Need of research subject: AM spores that are isolated during rainy season can be multiplied through trap culture and can be successfully used as bio fertilizer, throughout the year.

Hypothesis of problem: The pure inoculum of AM species, observed during rainy season can be used to clean up heavy metal pollution from the soils around industries, thus mycoremediation through AM fungi can be used as effective and ecofriendly technology**.**

Research methodology: The selected study sites were fifteen industries from MIDC, Sagarli of Dombivli (East). Different seasonal weed samples were collected growing near selected industries, along with rhizosphere soil and the spores were isolated, identified and recorded. The original percentage of carbon, nitrogen, phosphorus and potassium was estimated in the soil collected from paddy field and the field trials were taken with chili (*Capsicum annuum*, L.) crop in the same paddy field by using VAM bio fertilizer product with composition of same species, raised through trap culture technique.

Research techniques: For collection of roots and rhizosphere soil samples, a steel pipe was inclined and driven into soil up to 25cm of root zone at different depths.AM fungal spores were isolated from rhizosphere soil samples, by wet sieving and decanting method (Gerdemann and Nicolson, 1963). The isolated spores were observed by lifting them with pinhead and mounting on the slide containing lactophenol as mounting medium. The isolated spores were observed under stereomicroscope, identified, and categorized. Ink and vinegar staining (Vierheilig *et.al.,* 1998) and Trypan blue staining (Philips and Hayman, 1970) of roots were carried out for root colonization of AM fungal species. Thus, AM fungal species, inhabitants of soil polluted sites were surveyed during winter season (November 2021-February, 2022). The percent root colonization with soils of rhizosphere zone from all the weed samples was calculated. The percentage frequency with individual industry was also calculated. Root colonization was

calculated using formula:-

$$\textbf{Percent AM colonization} = \frac{\textbf{No. of root segments with AM structures}}{\textbf{Total no. of root segments examined}} \times \mathbf{100}$$

Data analysis: The percent root colonization, presence of vesicles, arbuscules, spores and coiled hyphae were noticed. The spore density was also calculated. The data of percentage of organic carbon, nitrogen, potassium and phosphorus of the field soil samples, taken before the field trials was compared with data of percentage of organic carbon, nitrogen, potassium and phosphorus of the field soil samples taken after the field trials, carried out by using VAM bio-fertilizer product.

Testing hypothesis: The data was analyzed and tested for significant increase in uptake of macronutrients after the treatment of VAM bio-fertilizer. Thus the hypothesis of role of VAM as bio-fertilizer was tested.

Observations: About 80% of *Glomus* species were recorded from genus *Glomus* such as *G. albidium, G. badium, G.citricola, G. coronatum G. diphanum, G. fecundisporum, G. hoi G. leptotichum, G. macrocarpum, Glomus occultum, Glomus reticulatum* and *G. tenerum* along with species of *Sclerocystis* like *S. rubiformis* and *S. sinuosus*. The species recorded from genus *Scutellospora* were *S. calospora* and *S. persica* respectively. There was significant increase in macronutrient contents after the treatment of bio-fertilizer product with composition of above mentioned AM fungi species.

Description of spores observed:

1) *Glomus albidum*- Walker & Rhodes (1981)

The spores were isolated from rhizosphere soil of *Commelinabenghalensis* and *Oxaliscorniculata*collected during growing season and *Paspalam conjugatum* and *Cynodon dactylon* during winter season.The spores are observed with one subtending hypha borne singly in the soil on coenocytic hyphae. Mature spore shows diameter about 196 x 140 µm, globose to sub globose, occasionally ovoid or irregular. The observed spores were yellowish to brownish yellow. Spore walls continuous with hyphal walls consisting of an outer hyaline wall and light-yellow inner wall. The subtending hypha was bilayered, straight with 12 µm, in thickness. Spores of *Glomus albidum* can be easily distinguished from others due to their brownish yellow colouration, globose to sub globose shape and size ranging from 150-200 µm (Gehlot and Singh, 2015). This species is closely related to *G. gibbosum* (Walker *et. al.*, 1995) and can be distinguished based on four layered walls in the *G. gibbosum* as compared to two layered in *G. albidum* (Blaszkowski *et. al.,* 2001).

2) *Glomus badium*- Oehl, Redecker and Sieverd (2005)

The spores were isolated from rhizosphere soil of *Phyllanthus amarus* collected during winter and summer season, *Eragrostistenella (Poatenella) in* summer season and *Cleome rutidosperma* and *Commelinabenghalensis* in rainy season. The observed spores were brownish, globose with diameter of 280 µm. The germ tubes initiation is observed at two positions. The spore wall consists of three layers. The subtending hypha is recurved.

The most distinguishing characters of *G. badium* are its small sporocarps lacking a peridium and composed of many, brownish orange to reddish brown, relatively small spores. The innermost flexible to semi-flexible and coloured layer of the three-layered spore wall also is a diagnostic property of this species (Ohel *et.al.,* 2005; Blaszkowski, *et.al.,* 2010 and Goto *et.al.,* 2012).

3) *Glomus citricola*- Tang and Zang (1984)

The spores were isolated from rhizosphere soil of *Commelinabenghalensis, Cynodon dactylon* and *Oxalis corniculata* during rainy season and rhizosphere soil of *Scoparia dulcis* from summer season. The single spores were observed in sporocarps. The observed spores were globose with dimensions of about 56 x 84 µm. The subtending hypha was hyaline. The spore wall is thick.

The observed spores were sub-pyriform, the average observed dimensions are 112 x 56 µm. The spore wall is thin, composed of two walls. The attachment of spore is sublateral.

This species is reported by several authors from India before (Jayaprakash& Nagarajan, 2017; Shrivastava *et.al.,* 2012).Like other Species of *Glomus* it also shows globoid spores produced on soil surface (Frank *et.al.,* 2003). Not much literature is available on the said species.

4) *Glomus coronatum*- Giovannetti(1983) and (1991)

The spores, present in sporocarps, were isolated from rhizosphere soil of *Calotropis gigantea* in summer, rhizosphere soil of *Commelina benghalensis. Oxalis corniculata* and *Cynodon dactylon* collected during rainy season. The sporocarps were surrounded by a peridium. The isolated spores were globose, brownish orange in colour with single funnel-shaped subtending hypha. The observed diameter was 252 µm. The observed spore wall was bilayered.

The distinctive characters of *G. coronatum* are its large and greyish orange to brownish orange spores and the wide, funnel-shaped subtending hypha. The wall of spores consists of two layers (Blaszkowski, 1994 and Cavagnaro *et. al.,* 2001). According to Giovannetti *et. al.,* (1991), *G. coronatum* produces spores in sporocarps surrounded by a peridium.

5) *Glomus diphanum*- Morton & Walker (1984)

The spores were isolated singly from rhizosphere soil of *Commelinabenghalensis*, *Heliotropium indicum* and *Cleome rutidosperma* during rainy season. The spores were found in isolated clusters. The observed spores were globose, hyaline, blackish, with about 56 µm in diameter. The spore wall comprises of three layers and elongated subtending hypha was observed. The length observed was about 196 µm and the diameter was 28 µm.

Glomus diaphanum probably has a worldwide distribution. The spores of *G. diaphanum* occur singly in the soil, globoid and hyaline with flexible to semi-flexible innermost wall layer (Morton & Walker, 1984; Morton 1985; Oehl *et. al.,* 2003 and Oehl *et. al.,* 2005).

6) *Glomus fecundisporum*- Schenck and Smith(1982)

The spores were isolated from rhizosphere soil of *Commelina benghalensis* and *Oxalis corniculata* during rainy season. The spores were formed singly or in loose clusters, with globose, pale yellow to white in colour. The observed diameter was140 µm. The spore wall was smooth in young spores and rough in mature spores. The subtending hyphae were hyaline, about 84 µm in length and 28 µm in diameter. The hyphal coils were seen in root colonization samples of *Commelina benghalensis.*

Glomus fecundisporum is a hyaline to dirty-white spored species with spores frequently borne in clusters. The spores consisting of inner and outer walls of approximately equal thickness (Lee *et.al.,* 1993).

It forms mycorrhizal associations with plant roots but not forming typical vesicles or arbuscules; coiling hyphae formed in outer cortical cells with hypha, walls becoming indistinct and after growth through 2 to 3 cortical cells; hypha contents frequently enlarging to fill cell lumen (Schenck & Smith, 1982).

7) *Glomus hoi*– Berch and Trappe (1985)

The spores were isolated from rhizosphere soil of *Commelinabenghalensis*and*Cleome rutidosperma*, during rainy season and *Phyllanthus amarus and Heliotropium indicum* during winter season.

The spores were as single spore in the soil. Each one of them was globose, subglobose, ellipsoidal or irregular in shape, in diameter, light brown in colour. The observed diameter is 140 µm x 112µm.

The spores can be easily distinguished from other species on the basis of solitary appearnce; globose, subglobose, ellipsoidal or irregular in shape and light brown in colour. The spore wall is composed of two distinct, separable layers. (Berch& Trappe, 1985; Blaszkowski, 2003 and Wilde *et.al.,* 2009).

8) *Glomus leptotichum* –Schenck and Smith (1982)

The spores were isolated from *Commelina benghalensis*, *Cleome rutidosperma* and *Oxalis corniculata* during rainy season. The spores were found singly but in loose clusters. The spores were globose, hyaline, light yellow to pinkish in colour (as collected from polluted environment). The observed diameter ranges from 56 µm to 252 µm. The length of subtending hypha was about 112 µm and diameter was 28 µm. The spore wall is composed of three layers some ornamentations are also observed. The root colonization in the roots of *Cleome rutidosperma* is observed in the form of hyphal coiling.

Glomus leptotichum typically has large, white to cream-colored spores with hyaline walls bearing a faint reticulum of ridges. Spores and extrametrical vesicles are produced both terminally and in an intercalary manner (Schenck and Smith, 1982). Because of its large size and white to cream-colored spores it could possibly be confused with *G. lacteum* but *G. leptotichum* lacks the merging hyphae on the attachment associated with *G. lacteum*. *Glomus fecundisporum* which *G. leptotichum* resembles somewhat, has generally smaller spores with yellow to brown walls, gray-white contents, and lacks a reticulum (Morton *et.al.,* 1997; Johnson *et. al*., 1991 and Murakoshi *et. al*., (1998).

9) *Glomus macrocarpum*- Tulasne and Tulasne (1845)

The spores were isolated from *Cynodon dactylon* during summer season. *Cleome rutidosperma*, *Commelina benghlensis* and *Oxalis corniculata* during rainy season.

The spores were found singly in the soil. The observed spores were globose, pear shaped, orange to reddish. The diameter observed was 112 µm. The spore wall was 14 µm, in thickness. The thin, curved subtending hypha. The breadth of observed hypha was 14µm.

Literature indicates that it is a widely distributed throughout the world, although it occurs irregularly (Blaszkowski *et. al.,* 2002).

Spores usually slightly longer than wide, sub globose, avg. of 150–250 µm. Spore wall composed of two distinct layers, spores tapering to the point of attachment of the single persistent hypha (Gehlot & Singh, 2015)

10) *Glomus occultum*- Walker (1982)

The spores were isolated from *Paspalam conjugatum* rhizosphere soil during winter and *Oxalis corniculata* rhizosphere soil from rainy season. The spores occur singly and are sub globose. The observed diameter is 56X86 µm. The spore wall consists of two layers. The sub tending hypha, observed appeared as funnel- shaped 28 µm in length and 14 µm in diameter.

It is probably globally widespread (Walker, 1982; Miller *et al.,* 1985; Morton, 1985 and Puppi *et al.,* 1986). Although it is one of the most widespread but difficult to detect (Millner,2001).
Glomus occultum spores are often colorless, and globose, ellipsoid, or irregular, possessing three thin walls, the inner two often adhering tightly (Morton, 1985).

11) *Glomus reticulatum-* Bhattacharjee and Mukerji (1980)

The spores were extracted from rhizosphere soil of *Commelina benghalensis* and *Portulaca oleracea* from rainy season and *Eclipta prostrata* and *Vernonia sinusoroides* collected during summer season. The spores were found singly, dark brown to reddish or black, globose with 140 µm in diameter. The outer and inner walls of the spores are clearly visible under 100X. The outer wall was about 5 µm in thickness. The subtending hyphae were funnel- shaped and about 10 µm wide (Bhattacharjee & Mukerji, 1980).
Spores are borne freely and singly in soil, globose to subglobose or ellipsoidal, dark brown to brownish black, having reticulate ornamentation. Spore wall structure consists of double wall. Outer wall is laminated, and inner wall is with regular reticulate (Manoharachary*et.al.,* 2005; Kulkarni *et.al.,* 1997; Mishra *et.al.,* 2016; Wang *et.al.,* 2015 and Shekhar and Basu, 2017).

12) *Glomus tenerum-* Tandy (1975)

The spores were isolated from rhizosphere soil of *Commelinabenghalensis* collected during rainy season, *Calotropis gigantea* and *Vernonia sinusoroides*collected during summer season and from Phyllanthus amarus in winter season. The observed spores were shiny, translucent, yellowish brown, thin walled, with some oil globules. The diameter of observed spores was about 56 µm.
The spores are yellow, orange to brown, globose rarely pyriform. Subtending hyphae are cylindrical with globose thick-walled vesicles (Tandy, 1975).
Glomus tenerum differs from other *Glomus* species in having two walls, larger spores, a plug cutting off spore contents and finer-subtending hyphae (McGee, 1986; McGee & Trappe, 2002 and Oehl *et.al.,* 2011).

13) *Scelerocystis rubiformis* - (Gerd. & Trappe, 1974) Almeida and Schenck (1990)

The spores were isolated from rhizosphere soil of *Paspalam conjugatum* collected in winter, *Cassia tora* soil collected in rainy season and rhizosphere soil of *Cleome rutidosperma* collected during summer season. The sporocarps were dark brown, with 392 µm in diameter. The peridium was not found. The spores were found in tightly interwoven hyphae. The spores were dark brown, ellipsoidal with 112 µm in diameter. The small, stalk like projection was observed protruding near the base of spores. The subtending hypha was thick walled.
It probably is a widely distributed fungus in the world and very common in India (Bhattacharjee *et. al.,* 1980; Ragupathy and Mahadevan 1993).
The distinctive features of *G. rubiforme* are its sporocarps with relatively small, coloured spores originated from a centrally positioned hyphal plexus (Almedia and Schenck, 1990; Blaszkowski *et. al.,* 1998; Wu, 1993).
The wall of *G. rubiforme* spores is composed of two layers: outer layer is a thin and hyaline whereas the inner layer is thicker and laminated. The subtending hypha is funnel shaped (Gerdemann and Trappe, 1974 and Almeida and Schenck, 1990).

14) *Sclerocystis sinuosus-* Gerdemann and Bakshi (1976)

=*Glomus sinuosum*

The spores were isolated from rhizosphere soil of *Commelina benghalensis*, *Oxalis corniculata* and *Phyllanthus* amarus from rainy season. The spores are found in compact, thick walled reddish brown sporocarps with sinuous or wavy hyphae, occurring in the soil in groups. The observed diameter of sporocarps was 280 µm. The observed spores were orange to brownish orange or were reddish brown, sub globose, pulvinate and ellipsoidal, the dimensions observed were 28 µm X 56 µm, radiating and in single layer with single subtending hypha.
The spores are obovate, elliptical, fusiform-elliptical to clavate, radiating out in a single layer from a central plexus of hyphae (Ammani *et.al.,* 1986; Almeida and Schenck, 1990 and Muthukumar *et.al*., 2000). The spore wall is brown and thick, generally thickest near spore base. The thick-walled sinuous hyphae that tightly enclose the sporocarps easily distinguish *S. sinuosa* from all other *Sclerocystis* (Gerdemann and Bakshi, 1976).

15) Scutellospora calospora- Nicolson and Gerdemann (1968) Walker and Sanders (1986)

The spores were isolated from rhizosphere soil of *Cleome rutidosperma* during winter season, *Scoparia dulcis* from summer soil sample collection and *Commelina benghaensis* in rainy season. The spores were found singly, terminally on a subtending hypha, which was bulbous, suspensor-like cell. It was ovoid, pale greenish yellow in colour, with dimensions of 196X252 µm. The spore wall consists of two tightly attached layers. The bulbous sporogenous cells were found terminally on septate subtending hypha. The germination shield was ellipsoidal and hyaline.
The shape of spore ranges from sub globose to ellipsoid to oblong, sometimes irregular. Both the wall layers are of same thickness (Nicolson and Gerdemann, 1968).
Spores resemble those of spores of *S. pellucida* except they have a smaller size and are oblong. They are very similar to the spores of *S. dipurpurascens*, in size, shape, and color and differs in its inner wall structure (Koske and Walker, 1986; Morton, 2000)

16) *Scutellospora persica-* Koske and Walker (1985)

The spores were isolated from summer collection from rhizosphere soil of *Eragrostistenella (Poatenella*) and rainy season rhizosphere soil collection of *Commelinabenghalensis*. The observed spore was found as single spore, terminally on a bulbous suspensor-like cell, apricot yellow in colour, subglobose, with dimensions as 364 µm in length and 336 µm in width. The germination shield is light yellow to brownish. The germ pore was protruding out, prominently visible as globoid structure. (Deshpande and Gosavi, 2022)

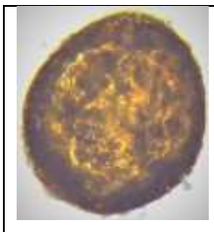
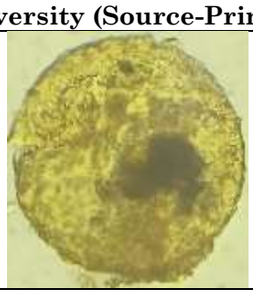
Spores are formed singly in the soil, terminally on a bulbous suspensor-like cell. They are globose to subglobose. The distinctive properties of *S. persica* are its large and dark yellow to apricot yellow spores ornamented with small warts (Morton, 1995)

Tables and figures for observation: -

TABLE I Root colonization with AM species found in rhizosphere soil of rainy season weeds:

Name of the weeds	**AM Spores observed from rhizosphere soil**	**Average percentage of root colonization**
Cynodon dactylon	*Acaulospora mellea, Glomus citricola, Glomus coronatum,*	**40**
Commelina benghalensis	*Acaulospora mellea, Glomus albidum, Glomus ambisporum, Glomus aurantium, Glomus badium, Glomus caledonium, Glomus citricola, Glomus claroideum, Glomus convolutum, Glomus coronatum, Glomus diphanum, Glomus etunicatum, Glomus fecundisporum, Glomus glomerulatum, Glomus hoi, Glomus leptotichum, Glomus macrocarpum, Glomus pubescens, Glomus reticulatum, Gloms tenerum, Glomus trimurales, Sclerocystissinuosa, , Scutellosporacalospora, Scutellosporapersica*	**80**
Oxalis corniculata	*Acaulospora mellea, Glomus albidum, Glomus ambisporum, Glomus citricola, Glomus claroideum, Glomus convolutum, Glomus coronatum, Glomus fecundisporum, Glomus fulvum, Glomus glomerulatum, Glomus leptotichum, Glomus macrocarpum, Glomus occultum, Glomus pubescens, Glomus pulvinatum, Sclerocystissinuosa*	**70**
Cleome rutidosperma	*Gigasoracalospora, Glomus badium, Glomus diphanum, Glomus hoi, Glomus leptotichum, Glomus macrocarpum, Glomus monosporum*	**30**
Portulaca oleracea	*Glomus pubescens, Glomus reticulatum*	**50**
Heliotropium indicum	*Glomus diphanum*	**40**
Phyllanthus amarus	*Sclerocystissinuosa*	**10**
Cassia tora	*Sclerocystisrubiformis*	**10**

TABLE II AM Fungi spore diversity (Source-Primary)

			
Glomus albidum	***Glomus badium***	***Glomus citricola***	***Glomus coronatum***
			
Glomus diphanum	***Glomus fecundisporum***	***Glomus hoi***	***Glomus leptotichum***

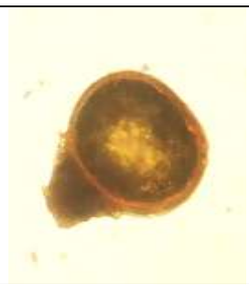
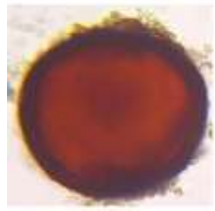
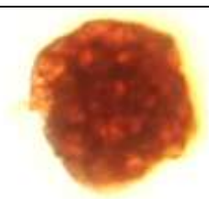
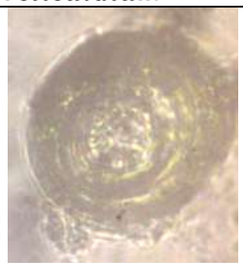
			
Glomus macrocarpum	***Glomus occultum***	***Glomus reticulatum***	***Glomus tenerum***
			
Sclerocystis rubiformis	***Sclerocystis sinuosus***	***Scutellospora calospora***	***Scutellospora persica***

TABLE III-Percentage of organic carbon, nitrogen and phosphorus in a field before and after the application of VAM bio-fertilizer product

Field condition	% carbon(C) in the field soil	%nitrogen (N) in the field soil	% phosphous (P) in the field soil	% potassium (K) in the field soil
Before the application of VAM bio-fertilizer product	1.14	0.13	0.14	0.20
After the application of VAM- biofertilizer product	1.75	0.20	0.24	0.26

Discussion: Based on current survey, seasonal weeds like *Commelina benghalensis* and *Oxalis corniculata* show more diversity by harboring different species of AM fungi in their rhizosphere soil. Root colonization studies also support this observation. The most common and potent AM fungi species have adapted for polluted habitats but their colour and size has been deviated from spores growing symbiotically with weeds of normal habitat. Plant receives support from AM fungi, with the help of its symbiotic association, in the aspect of uptake of Phosphorus and other nutrients (Hart and Forsythe, 2012), enhancement of growth hormones, increase of protein content, increase of lipid, sugars, amino acid levels, increase of tolerance to heavy metals, increase of salinity tolerance and resistance to root-borne pathogens (Upadhyaya *et al.,* 2010; Orwin *et al.*, 2011 and Jacott *et al.*, 2017).

Conclusions: Thus, it may be concluded that these rainy season species of AM fungi especially genus *Glomus* from Endogonaceae can play a significant role as biofertilizer. Thus, *Glomus* as dominant genera, along with other genera like *Sclerocystis* and *Scutellospora* have played a great role as potent bio-fertilizers that are not only eco-friendly, but have shown remarkable increase in uptake of all the macronutrients, responsible for increasing soil fertility and thereby supporting the boosted plant growth.

Suggestions and recommendations: It is further suggested that the potential role of AM fungi in mycoremediation of soil polluted with heavy metals can be enhanced by inoculating hyper-accumulator plants with mycorrhizal fungi, most appropriate for the polluted site. However, there is a need to develop new methods and to optimize the conditions to grow in enormous quantities and characterize, develop, and screen considerable number of AM fungi for tolerance to metals (Miransari, 2011). The dominant species of AM fungi observed during rainy season can be used to degrade heavy metals in the soil and thus can be used as a great tool for safe environmental cleanup strategy. Thus, mycoremediation through local dominant AM fungal species can be used as cost effective, highly specific, easy, eco-friendly model for such industrial belts all over the world.

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Research Paper
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The Survey of Dominant and Traditional Medicinal Plants Used By Gond Tribe of Nagzira at Bhandara District, Maharashtra.

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Nagpur and H. T. Janbandhu

Introduction

The ethnomedical survey was undertaken to collect information for dominant plant species and for traditional uses of the medicinal in Nagzira village of Bhandara and Gondia district of Maharashtra. Our country is called as the botanical garden of the world, owing to wealth of herbal medicines. Nagzira is located between Bhandara and Gondia district of Maharashtra. Closest National Highway is NH -53 . Nagzira it is wildlife sanctuary is located in the arms of nature and adorned with a picturesque landscape, luxuriant vegetation and serves as a living outdoor. The name of Nagzira is a temple of 'Naag' (Snake) which is exactly in the middle of nagzira and a temple of Mahadev. There was also a village inside the forest called as 'Nangthana' that adds up to the name of the forest. Nagzira got its name from this temple and 'zira' (zara) in Marathi means a perennial source of water that comes out from a hill in pongezara, Nagzira. In wildlife sanctuary of Nagzira 34 species of mammals, 166 species of birds, 36 species of reptiles and four species of amphibians. The invertebrate fauna includes a number of butterfly and other insect species. Large wild mammals found here include the tiger, leopard, Indian gaur, sambar, nilgai, chital, wild boar, sloth bear, barking deer, mouse deer and wild dog. There is also an elephant named Rupa. Nearly 30,000 tourists visit this sanctuary annually.

About Gond Tribe :-

The term Gond refers to the tribal people who live all over the Indians Deccan peninsula. They describe themselves as (hill people) or koi or koitur . Gond tribe Gondwana the Gond are tribe community mostly found in forest of central India. They are widely spread in the chindwada district of M. P , baster district of Chhattisgarh and also in the part of Maharashtra Andhra themselves is koi or koitur which means unclear gonds are one of the largest tribal group in the world.

Tribes like Gond believe in the theory of platonic with plants, animal and birds, as totem . These communities are religious minded who worship plants as a symbol of God. They have platonic relationship with plant like *Tectona grandis* (Teak) ,*Shorea robusta* (Sal) , *Musa indica* (Banana) , *Ficus benghalensis* (Banyan), *Gossypium herbaceum* (Cotton), *Butea monosperma* (Palash) etc. There are several myths, folklores, stories and taboos in support of existence of such relationships with plants. Joint Forest Management (JFM) program has been introduced in tribal dominated forest villages Gond tribe speak gondi language which is related to the tango and other travillion languages. In the northern part of Gond are often seen speaking the local Hindi and Marathi. Some of the gonds in the southern part also speak parsi or person. Gonds are mainly divided into four tribes namely Raj Gond, madia Gond, dhurve Gond, khatulwar Gond . Gonds means dhoti which is the long piece of cotton cloth wrapped around the waist passing through the legs. Women were soft cotton sarees along with choli or blouse (fig- 1) . Gond is a dominant tribe of India as well as of Nagzira, Chhattisgarh etc. This tribes is partially dependent on forests for their livelihood. They collect roots, tubers, and fruits from the forests. Hunting and fishing is one of their occupations. Gonds better agriculturists as compared to other tribes of the area. Tribal communities use plants in everyday life for food fodder and shelter.

The staple food gonds are the two millets known as kudu or kulki rice is the ceremonial feast of the gonds. Which they refer eating during fire of festivals. most of the gonds are the meat consumers. Gonds have been largely influence by the Hindus and for a long time have been participating the Hindus culture and traditions. It's populations growth rate over the decade 2001 – 2011 was 5.65% Bhandara has a sex ratio of 982 females for every 1000 males and a literacy rate of 83. 76% .


Gond Tribal Woman

(Figure – 1)

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Research Paper
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Geography :- Gondia district lies at lattitudes 20.39 and 21. 38 north longitudes 79. 27 to 80. 42 east . The adjoining districts to Gondia are no northern side Balaghat district of Madhya Pradesh and on eastern side Rajnandgaon district of Chhattisgarh state . To the south and west Chandrapur district and Bhandara district of Maharashtra .

The district headquarters is situated at Gondia situated an Mumbai – Calcutta railway route which is 1060 km from Mumbai, capital of state .

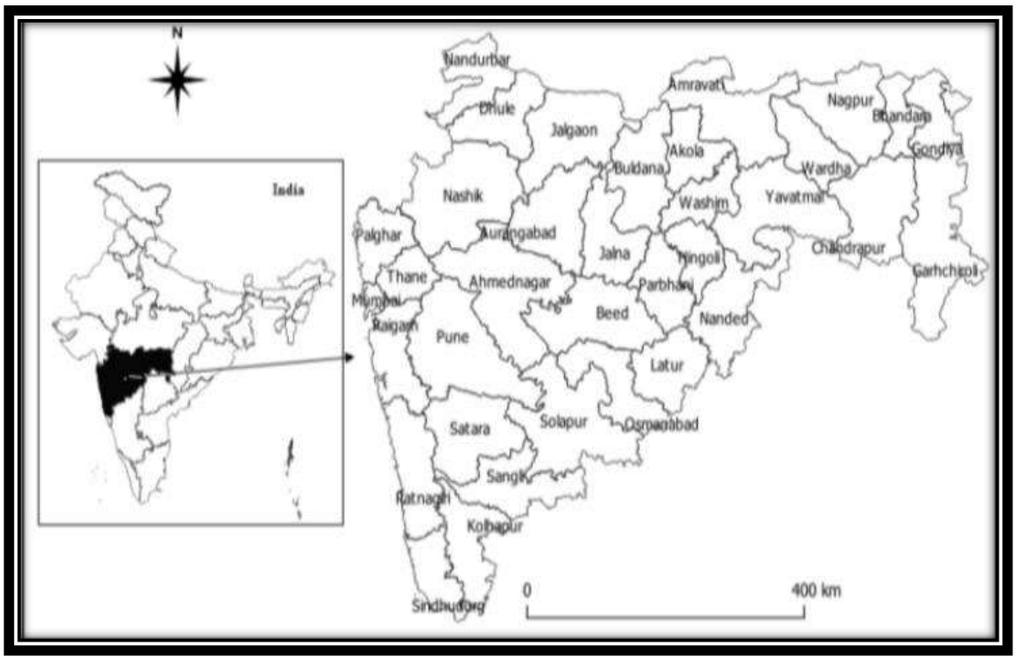
Soil :- The predominant soil cover in the district is clay, clay-gravel, sandy loam, deep black soil, radish and yellowish brown soil on the hill. Slopes, brown and gray soil of plains and laterite and lateritic soil .

Rainfall :-. Average relative humidity is 62%. The average annual rainfall in this area is 1063 mm .

Temperature :- Gondia- Bhandara district experience extreme variation in tempreture with very hot summer and very cold winter. The mean maximum temperature is 46.3'c and the mean minimum temperature of the district is 90'c .

Vegetation :- The vegetation of the area is of mixed deciduous type.

Distance Form Nagpur :- The distance of this village form nagpur is upto 120 km . Minimum 2 to 3 hours is required to reach this village or wild life sanctuary Nagzira form nagpur by bus via Bhandara, sakoli lakhni on the national highway No. 6 (Bombay- Calcutta) .



(Figure – 2)

The present work restricts to the exploration and documentation of dominant plants and traditional medicine uses of plants of cure various disease used by Gond tribe .

Methodology divided by following parts.

1. Study period
2. Study Area
3. Study Method

The survey was carried out during March to April 2022 Nagzira is located in state Maharashtra district Gondia and Bhandara . Tahsil- situated in Arjuni (sadak) Goregaon & Tiroda Thasil of Gondia district and Sakoli Bhandara, Lakhni Tahsil of Bhandara district.

Circle :- Geographically the area of this sanctuary comes under the Nagpur circle of the state forest department. The administration and management of this sanctuary comes under the control of the chief conservation of forest (wildlife) , Nagpur.

Division :- The administration and management of this sanctuary comes directly under conservation of forests (wildlife) , Bhandara and Gondia.

Ranges :- The area of this sanctuary comes under the Nagzira range.

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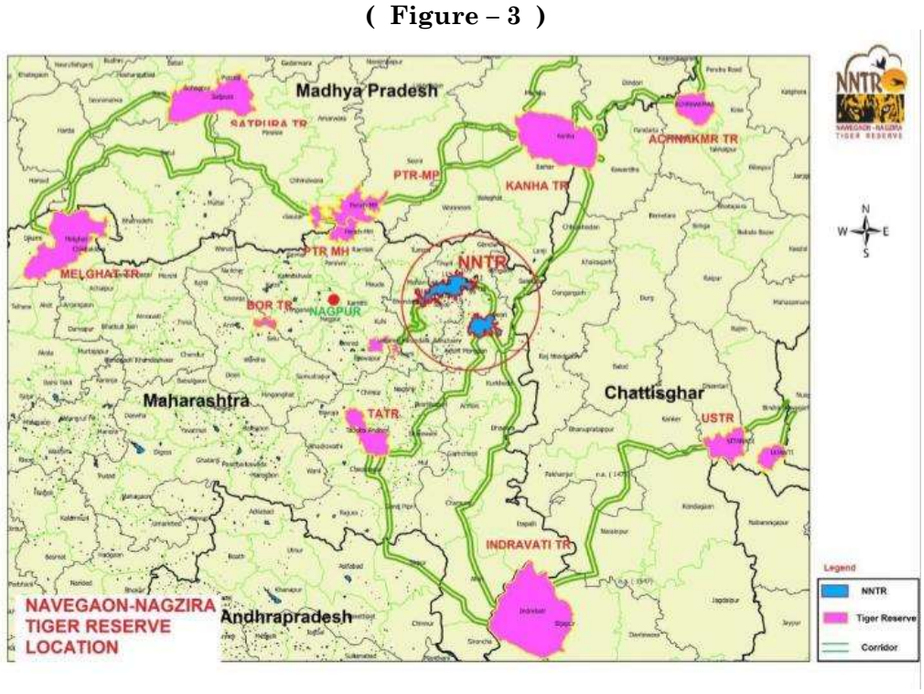
(Figure – 3)



Study Method :-

The field survey was conducted to collect information during April 2022. Information was collected mainly form Gond's medicine men or Baiga , help was taken from the village headmen and experienced old Gond persons , local forest officials, village headmen about the medicinal uses of plants, local names of plants and their medicinal uses

The study was carried out by participatory method to explore information for the treatment of various diseases by using traditional plants by tribal people of Nagzira form Gondia and Bhandara district of Maharashtra state .The information was documented involving field study and interaction with Gond tribal people through the interview and group discussion. Local people include knowledgeable person, tribal communities and traditional herbal hearlers family, common name and their medicinal uses were enumerated. The information on the use medicinal plant was collected plants during field surveys in Nagzira area of Bhandara and Gondia district. Gond tribes like other tribes belief in God or super natural power they believe land mark things like tree and forest grooves as the dwelling places of the souls of their ancestors and super power. Before going to collection of medicinal plants NWFPs they declare about it in the village and collect the NWFPs in sustainable manner. They never cut the plants which are used in their socio-religious customs like *Mangifera indica* (Aam), *Ficus benghalennis* (Barh), *F.religiosa* (Peepal), *Aegle marmelos* (Bel), *Syzygium cumini* (Jamun), Woodfordia fruiticosa (Dhawai), *Ocimum sanctum* (Tulsi) and *Embelia tajriam-cottom* (Baibidang). The time of collection of under ground part viz. tuber, rhizome and bulb, they leave some part of it for regeneration and avoid viz tube repeated collection from the same place. Similarly collection of whole plants or branches fruits or flowers, they avoid to cut the trees particularly the main trunk and collect only required part in required quantity. There collection time and method causes least harm to the plants.

During the survey of medicinal plants that used the Gond tribal into the treatment of various disease.

Observation

The Table Include The Information About Dominant plants And Their Ethnobotanical

Sr. No	Botanical name of plants	Local name	Family	Ethnobotanical & Ethnomedicinal Uses
1	*Semecarpus anacardium*	Biba	Anacardiaceae	The fruit of this species are eastern to relieve indigestion. The oil form the seed of this plant is anthelmintic & it has been also reported to be good for the treatment of scabies.
2	*Cleistanthus collinus*	Garadi	Phyllanthaceae	The plant have; antiseptic, antifungal, insecticidal and larvicidal property.

3	*Diospyros melanoxylon*	Temburin	Ebenaceae	The leaves have also been extensively used in Indian traditional medicine as a diuretic, styptic, laxative, and carminative.
4	*Buchanania cochinchinesis*	Char	Anacardiaceae	Seeds are often crushed to create a powder that is then used as a flavoring or spice in many authentic Indian dishes.
5	*Madhuca longifolia*	Mohful (Mahua)	Sapotaceae	Mahua preparations are used for removing intestinal worms, in respiratory infections and in cases of debility and emaciation. The astringent bark extract is used for dental-related problems, rheumatism, and diabetes.
6	*Bambusa bamboo*	Bas	Poaceae	The branches of tree used in making thatching of huts , ladder . Stem- splits used manufacturers of basket and mats.
7	*Butea monosperma*	Palas	Fabaceae	Wood of this species of chief source of household fuel.
8	*Anogeissus latifolia*	Dhavda	Combretaceae	The tree is the source of Indian gum, also known as ghatti gum, which is used for calico printing among other uses.
9	*Terminalia chebula*	Hirda	Combretaceae	Fruit are used in ayurvedic preparation called triphala churna.
10	*Bombax ceiba*	Kate savar	Malvaceae	The fruit floss used for stuffing of pillows, cushions. Wood is used making of light furniture.
11	*Tectona grandis*	Sag tree	Lamiaceae	It is used in the manufacture of outdoor furniture and boat decks.
12	*Leucaena leucocephala*	Subabul	Fabaceae	Leaves are used feed in domestic animals.
13	*Cassica fistula*	Bahawa	Fabaceae	The fresh leaves & flower used the treatment of skin disease.
14	*Terminalia arjuna*	Arjun	Combretaceae	The wood of this tree is used in the manufacture of furniture.
15	*Holarrhena antidysentrica*	Kuda	Apocynaceae	Flowers are used in coocking purpose.
16	*Millettia pinnata*	Karanji	Fabaceae	The oil and residue of the plant are toxic and induce nausea and vomiting if ingested in its natural form, the fruits, sprouts and seeds are used in traditional medicine.
17	*Phaenix* dactylifera	Shindi or kharjuri	Arecaceae	Branches are used in broom cleaning floor
18	Phyllanthus emblica	Aavda	Phyllanthaceae	Used in Ayurveda as a potent rasayana and in traditional medicine for the treatment of diarrhea,

				jaundice, and inflammation.
19	*Eucalyptus globulus*	Nilgiri	Myrtaceae	They may help decrease pain, promote relaxation, and relieve cold symptoms.
20	*Acassia arebica*	Babul	Fabaceae	It's a dietary fiber that can dissolve in water. As a medicine, acacia is taken by mouth to reduce cholesterol levels and to help increase weight loss.
21	*Ziziphus mauritiana*	Bor	Rhamnaceae	The fruit is used to make medicine. Zizyphus is used for improving muscular strength and weight, for preventing liver diseases and stress ulcers, and as a sedative.
22	*Azadirachta indica*	Neem or kadunimb	Meliaceae	Entire plant used as medicine in various diseases.
23	*Aegle marmelos*	Bael	Rutaceae	Tribal & local people use the fruits of this tree for making of pickles. The leaves,bark,root,fruits and seeds are used in traditional medicine.
24	*Feronia limonia*	Kavat	Rutaceae	It is ayurvedic plant used for the treatment of nausea, vomiting acts as antidote against some poisons.
25	*Bauchinia racemosa*	Aapta	Fabaceae	It is medicinal plant phytochemicals and pharmacological activities.
26	*Careya arborea*	Kumbhi	Lecythidaceae	Careya arborea is an Ayurvedic herb used for the treatment of ulcer, cough, eruptions in the skin, wound and promotes digestion.
27	*Ficus racemosa*	Umbar	Moraceae	Latex of stem useful in piles and diarrhea.
28	*Sapindus mukarossi*	Reetha	Sapindaceae	It is medicinal plant is given treatment of hair fall and dandruff.
29	*Tamarindus indica*	Chinch	Fabaceae	It is used in food making.
30	*Ficus religiosa*	Peempal	Moraceae	Root are used in medicine
31	*Pithecellobium dulce*	Chnchbeelai	Fabaceae	The bark is used as an astringent for dysentery .
32	*Mangifera indica*	Mango or amba	Anacardiaceae	The dried seed powder is given in cough.
33	*Sterculia urens*	Karu	Malvaceae	Remove the hand rashes
34	*Syzygium cumini*	Jambolan	Myrtaceae	The powdered bark of this species is give to relieve stomach problems.

The table includes the information about medical plants used for various ailments by Gond tribe

Sr. No	**Botanical name of the plant**	**Local name**	**Family**	**Plant part use**	**Uses and mode of administration**
1	*Phyllanthus niruri*	Ranaavri	Phyllanthaceae	Entire plant	**Yellow fever** The entire plant are crushed and made water

					extract 1 cup is orally in 3- 5 days.
2	*Martynai diandra*	Waghnakhi	Martyniaceae	Fruit	**Jaundice** Fruits oil are used in the treatment of jaundice pain .
3	*Catharanthus roseus*	Sadafuli	Apocynaceae	Leaf	**Blood suger** 2½ leaf are used in control blood suger
4	*Cordia myxa*	Shelvat	Boraginaceae	Bark	**Yellow fever** Brak are crushed remove the extract these extract give in 4 to 5 days in the treatment of yellow fever.
5	*Achyranthes* aspera	Kutri	Amaranthaceae	Root	An aqueous extracts of this plant is used in the treatment of eye disorders and for treatment of cough and indigestion.
6	*Ricinus communis*	Arandi	Euphorbiaceae	Leaves	**Jaundice** Paste of 5gm leaves ricinus communis and lawsonia inermis is applied to the leg for the treatment of jaundice pain.
7	*Anogeissus latifolia*	Dhavda	Combretaceae	Bark	**Itching** 5gm of bark crushed and made fine peast given the treatment of itching part of body.
8	*Cassia Tora*	Tarota	Caesalpinaceae	Entire plant	**Psoriasis** A whole plant extract of this species is used to cure psoriasis.
9	*Syzygium cumini*	Jambolan	Myrtaceae	Bark	**Kidney stones** 5gm dired powder mixed with one glass of water is given for the treatment of kidney stones.
10	*Careya arbarea*	Kumbhi	Lecythidaceae	Bark	**White discharg** One glass extract of bark are one month given to the treatment of White discharg in female
11	*Calatropis procera*	Rui	Ascalpidiaceae	Leaves	**Bal cough** Honey & kamyasindur are apply in leaves an

					warm gently and put in children chess. These given treatment of bal cough.
12	*Achyranthes aspera*	Kutri	Amaranthaceae	Root	**Bite of dog, Scorpion, Ringworm** Bangla pan and root of kutri plant mixed with and give in dog bite or scorpion bite person.
13	*Bombax ceiba*	Kate savari	Malvaceae	Root	**Dysentery** 2 spoons of water extract of roots are given to the patients for the treatment of dysentery.
14	*Trigonella foenum-graecum*	Methi	Fabaceae (caesalpinioideae)	Seed	**Jaundice** 5gm of seed dired powder mixed with one glass of water is given the treatment of jaundice.
15	*Terminalia belarica*	Beheda	Combrataceae	Stem, branches & fruit	**Cough**, **fever**, **leprosy**, **piles etc** . The dried fruit of this tree is used in the treatment of cough, fever, indigestion, dropsy, etc. The fruit has long been used in the ayurvedic preparation called triphala churna.
16	*Sapindus laurifoliatus*	Reetha	Sapindaceae	Fruits	**Hair growth** A shampoo made form the fruits of this tree is reputed to promote hair growth.
17	*Ricinus communis*	Arand	Euphorbiaceae	Leaves, seeds, oil	**Swelling** 1.The leaves of this species is used in the treatment of swelling. 2. Castor oil is given to mother before & after childbirth.
18	*Ocimum basilicum*	Kali tulsi	Lamiaceae	Leaves	**Cold, cough and skin infection** Leaves of this species is often used as a tonic , leave are helpful treatment of skin

					infection. Leaves added to tea or honey to relieve symptoms of cold & cough .
19	*Asparagus adscendens*	Satawari	Liliaceae	Rhizome	**Digestive**, **jaundice & liver.** Rhizome of this plant used to treat digestive problem, jaundice & liver ailments.
20	*Aegle marmelos*	Bel	Rutaceae	Leave, root,& fruit	**Diarrhea & piles** The fruit of this species used to treat diarrhea and piles. Leaves are good for diabetes.
21	*Butea monosperma*	Palas	Fabaceae	Flowers and fruits	**Burning and skin disease** An extracts of flower of this tree used of burning sensation & other skin disease.
22	*Cymbopogon flexuous*	Gauti chai (Tikhadi)	Poaceae	Entire plant	**Cough & blood disorders** Specific use lies in the treatment of blood disorders, coughs & indigestion.
23	*Mimosa pudica*	Lajari	Mimosaceae	Root	**Snake bite** Against snake bite root paste mixed with raw rice water is given orally.
24	*Rauwolfia serpentina*	Sarpagandha	Apocynaceae	Root	**Insomnia** The powdered root of this species taken with butter is used in the treatment of insomnia.
25	*Calatropis procera* (Wild)	Rui	Ascalpidiaceae	Entire plant and latex	**Dog bite**, **cough & asthma** A paste made the entire plant of this species is mixed with sugar & applied over dog bite. Dry leaves are smoked as a treatment for cough & asthma .
26	*Ficus racemosa*	Umber	Moraceae	Wood, leaves, latex & fruit	**Mouth wash & diarrhea** Leaves used as a mouth wash for spongy gum.

					Latex of stem useful in piles & diarrhea.
27	*Asparagus racemosa*	Satawari	Asparagaceae	Root	**Calcium deficiency** 5 to 10gm dired root powder mixed with one glass of milk it gives for the treatment of calcium deficiency
28	*Andrographis paniculata*	Bhui neem	Acanthaceae	Entire plant	**Fever**, **cough**, **cold.** 1 cup extract of leaves are given to the treatment of cough, cold, fever
29	*Withania somnifera*	Ashwagandha	Solanaceae	Root	**Calcium deficiency** 15 to 20gm dired root powder mixed with one glass of milk it is given for the treatment of calcium deficiency.
34	*Adhatoda vasica*	Adulsa	Acanthaceae	Leaves	**Asthma** The decoction of leaves are given to cure asthma and other bronchial troubles.

Dominant Plants In Nagzira Forest

Madhuca longifolia

Semecarpus anacardium

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Holarrhena antidysentrica

Careya arboreal

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Anogeissus latifolia

Casia fistula

Terminalia bellirica

Boswllia serrata

Terminalia chebula

Dalbergia sissoo

Millettia pinnata

Soymida febrifuga

Gymnosporia senegalensis

Clestanthus collins

Bauchinia racemosa

<u>Medicinal Plants Used By Gond Tribe In Nagzira</u>

Asparagus adscendens

Adathoda vasica

Ocimum basilicum

Butea monosperma

Tridax procumbens

Cymbopogon flexuous

Ricinus communis

Catharanthus roseues

Solanum xanthocarpal

Tephrosia purpurea

Calatropis procera

Medicine stored in dried from by the local people

Interview with the local people and gond people of Nagzira village

Results And Discussion

During the interaction with people, discussion revealed some traditional plants were used to cure various diseases. It was found that plant species belonging method drug preparation, mode of administration probable dosage and duration of treatment. The value of medicinal plant to the mankind is very proven. This Ethnomedicinal survey reveals that the people of Gond community have vast knowledge of herbal medicines and even today they rely on traditional medicinal practices inherited this knowledge from generation to generation.

This study documented the Ethnobotanical information of 34 species in dominant plants belonging to 18 families and the ethnomedical information of 34 species in medicinal plants belonging to 28 families useful in treatment of about 23 aliments (Diseases) most of this plants species are growing wild plant used in the treatment were Herbs, trees, climbers and shrubs. These 34 plants are used for treatment of disease.

Rakhi Gupta, M.G. Vairale, S. Wate (2009) carried out survey in Ethnomedicinal plants used by Gond tribe of Bhandara Districts Of Maharashtra in the treatment of Diarrhoea and Dysentery. The survey reported 38 plants species belonging to 27 families. They found that the plants such as *Lawsonia inermis* is used to treat Diarrhoea Ground roots with Neem and Ginger leaves & paste is given with boil water to check Diarrhoea in babies, *Tridax procumbens* whole plant made into past and taken orally in Diarrhoea, *Aegle marmelos* fruit pulp is given internally to cure diarrhoea for 3-5 days, *Butea monosperma* crude leaf extract used internally twice a day to cure Diarrhoea. But during my Study it was found that the Gond people of Nagzira village used these some plants *Aegle marmelos* for treatment of Diarrhoea, *Tridax procumbens* used in diarrhoea in babies, *Butea monosperma* used as burning and skin disease.
Praveen S. Qureshi (2014) carried out similar survey in Gondia District and documented 22 plants species belonging to 18 families in Ethnomedicobotany of Gondia District (M.S) India, 3 plants species documented by them are also recorded by me . The plant species are *Bombax ceiba* - root decoction to cure irregular menstruation and Dysentery, *Asparagus recemosus* – root, stem to control excess bleeding discharge during mensuration but Gond people in Nagzira village used in calcium deficiency, *Withania somnifera* – root powder used in calcium deficiency.

P.T. Humane (2017) carried out survey in local people of Bhandara District (M.S) the Medicinal plants used as *Terminalia arjuna* of the family Combrataceae it is used in treatment of cough and stomach problems, *Andrographis paniculata* of family Acanthaceae used in the cough, cold and fever. *Semecarpus anacardium* of family Anacardiaceae used in the treatment of cough, piles and boils, *Asparagus adscendens* of family Liliaceae it is used in treatment of digestive problem, jaundice and liver ailments. In similar Study were also noted by me in Nagzira region their use in medicinal plants is also same to the Bhandara region.

Sikarwar, R.L.S, and J.K. Maheshwari (1992) carried out survey in some unrecorded Ethnomedicinal plants from Amarkantak M.P. The survey reported 202 plant species belonging to 64 families they found that the plant such as *Ricinus communis* it is used to treat yellow fever, *Anogeissus latifolia* is used to treat Burning and Skin disease , *Syzygium cumini* is used to treat stomach problems . But during my Study it was found that the Gond people of Nagzira village used these same plants *Ricinus communis* for treatment of jaundice, *Anogeissus latifolia* for treatment of itching, *Syzygium cumini* for treatment of kidney stones.

R. Rathinamoorthy and G. Thilagavathi (2014) carried out *Terminalia chebula* on Pharmacological and Biochemical studies. *Terminalia chebula* is one of the most commonly used plants in traditional system of medicine in Indian subcontinent. The plant *Terminalia chebula* - fruit are used in ayurvedic preparation called triphala churna. But in my Study area their use was different i.e used to treat different disease such as Stomach problems and cough .
Similar Study was carried out by Ved. Prakash (1996) They provided data on 35 medicinal plants 2 plants in their study were also noted by me but their use was different (i.e used to treat different disease). The plant *Sapindus laurifoliatus* fruit paste Used as hair growth and dandruff, *Ocimum basilicum* leaves are used for cough, cold and skin infection

The Indian subcontinent provides the ethnobotanist with an excellent outdoor laboratory for the study of biodiversity. Several regions have been well explored for ethnomedicines, and these areas are today documented in the literature (Bhatnagar et al., 1973; Bhalla et al., 1992; Bajpai & Mitra, 1997; Dubey et al., 2001; Jain, 1963; Kamble & Pradhan, 1980; Koche et al., 2008; Naik, 1986; Rothe 2005 and Rothe et al., 2004). Still some core areas remain Undisturbed. However, the illiteracy of the tribals regarding the natural wealth conservation, the plant biodiversity is Now seems to be depleting. Therefore, it is necessary to increase awareness in the tribal community and document. The indigenous knowledge they have. Increasing awareness and making tribals accountable to conserve the existing Biodiversity may help to insure our natural wealth.

Similar study was carried out by S. B. Shambharkar , D. P Gogle (2017) . They provided data on 25 medicinal plants 6 plants in their study were also noted by me but their use was different (i.e used to treat different disease) . The plant Syzygium cumini (Bark) used in kidney stones, Aegle marmelos (leaves) used in diarrhoea and piles , Butea monosperma (fruits and flower) used in swollen part of rachies , Ricinus communis (leaves) used in swelling , Boswellia serrata (Bark) used in injury , Terminalia chebula (fruit) used in cough and ayurvedic medicine.

During the present survey percentage of male was higher as female . Female were not available and no any coined of medicinal information. The interviews age ranged between 45 to 70 years. The old people are very much knowledgeble than that of young people but some young people are knowledgeable about traditional medicine.

Conclusion

The current study was carried out to get knowledge about the medicinal plants which are used in tribal people in the various diseases.

Present studies, therefore bear special significance. To be first of its kind to document the traditional knowledge of Gond is one of dominant tribe of Nagzira as well as India tribe is one of developed tribe with a systematic recording the plants. The survey of the people of Gond tribes has indicated their dependence on natural products, derived mostly form the forest. This is indicated in the form of their efforts for sustainable utilization of forest products.

Study was carried out among Gond tribe of Nagzira form Gondia and Bhandara district of Maharashtra state. Interaction with these Gond people was done through personal interviews and group discussion total plants were enlisted for treatment of various diseases. Man always tries to adjust himself with different difficult situations and problems and needs to overcome his problems. Disease is common in human society but method of combating diseases varies from place to place.There are huge number of plants which are used as herbal medicines and people prefer them because of their less side effects and have more benefits as a result of the combinations of medicinal constituents joined with natural components. Conventional folk medicines have great importance because they include experiences of native people and also have information about ethno botanical plants. In digenous medication is popular in both rural and urban areas because they are effective, secure and low priced through ethno Botanical surveys form native people and practitioners is collected and recognised in order to identify plants that can be source of drug against various infection.

In Nagzira district detailed study on ethno Botany of medicinal plants used in various diseases were reported. The study represent a contribution to the existing knowledge of folk remedies that are of various diseases, which to be most common ailment amongst rural population, because of their unhygienic living condition. The documentation of such knowledge plants an important role in forming the health policies for the people and also for the extraction and characterization of the bioactive compounds so that people in the same or in other regions can make use of it.

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Libraries without users in covid-19 pandemic: reflection on the roles of library and information professionals

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Abstract

The role of health science librarians in the coronavirus epidemic is examined in this Regular Feature. The global spread of COVID-19 has been fast. Lockdowns have been implemented in all major cities throughout the world. The first case was discovered on March 21st, 2020 in western Maharashtra, and there have been more than 1500 confirmed cases and 12 fatalities since then. An additional 12,000 cases are being investigated throughout the nation. If preventative precautions are not taken, this will only become worse. A curfew has been imposed at all Indian institutions and colleges. University librarians played a critical part in this crisis by educating the general population about the need of good health, assisting medical professionals and researchers, and continuing to provide conventional library services to the residents of western Maharashtra.

Keywords: Asia, west; global health; librarianship, health science; public health

Introduction

1.1.COVID 19

Pandemics have plagued mankind several times throughout history, with some posing a greater threat to the human race as a whole. It's tough situation, all over again, for each nation in a battle against the coronavirus (COVID-19). New viruses like the Coronavirus are spreading swiftly over the globe. People who are infected with the COVID-19 virus often experience symptoms of sickness and recovery without the need for further medical care. It's more common for those over the age of 65 and those who have underlying medical conditions such as dialysis or diabetes to acquire major health issues. 'Libraries hold the energy that fires the imagination,' declared American writer and filmmaker Sidney Sheldon. To us, they provide a window into the world, inspiring us to explore, to accomplish, and to contribute to a better quality of life. Maintaining social distance regulations in this pandemic circumstance of COVID 19 causes physical library systems to become completely stalled, which helps prevent the spread of viral infection. It is a family of viruses known as Coronavirus. Library professionals play a critical role here, serving the whole community on a digital platform. Libraries are one of the finest locations to learn without the fear of needing to purchase anything. In addition to students, researchers, professionals, and many other members of our society, libraries are a vital part of our daily lives.

1.2.Library and information professionals

Library users' information requirements are best served by those who have researched this topic. It is possible for them to be librarians, archivists, or records managers. The library authority hires a suitable number of people with various academic degrees and/or expertise in the library to fulfil the demand of library users. People who work in libraries are called library employees or LIS professionals.

1.2.1. The Role of Librarians and Information Specialists in a Pandemic

1. A librarian's involvement in a pandemic has three dimensions:
2. Generating and sharing information on the importance of preventing illness in the general population;
3. By offering scholars, academics, and researchers with information on the most recent advances, research, and literature;
4. To meet the core needs of regular library users

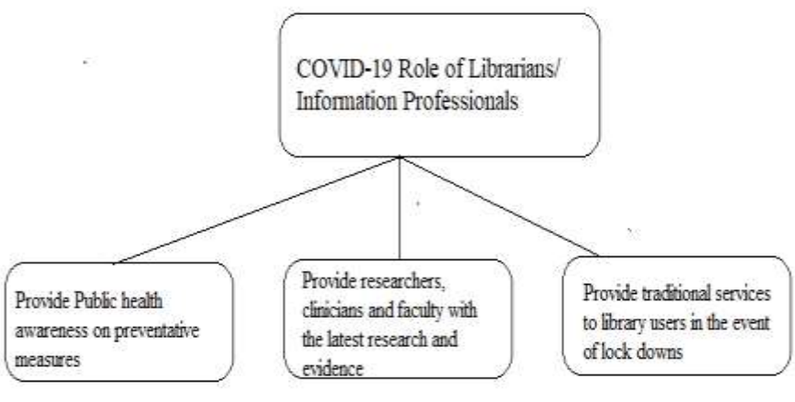


Figure 1 - Roles of Library and Information Professionals during a Pandemic

An examination of the three primary responsibilities that librarians may perform during a pandemic

- **Increase public health awareness about COVID-19.**

To be successful in public health, techniques such as school closures, remote working, home isolation, and monitoring the health of symptomatic patients through telephone or online health consultations must gain societal approval. There are several topics that need to be included in COVID-19 awareness campaigns, such as the steps individuals can take to prevent transmission – for example, general instructions on using masks, handwashing, and sanitizers, the avoidance of handshakes, and various other ways to control the virus's spread. It is the obligation of all librarians (public, specialty, academic, and medical) to disseminate evidence-based information regarding this epidemic. Other relevant material might include case histories from persons who have recovered from this coronavirus, as well as recommendations on healthy diet and lifestyle choices that can lower the chance of contracting this condition. There are three critical messages that must be communicated:

1. **The significance of social distance.**
   To limit disease transmission, those who are suspected of having COVID should practise social distancing, remaining at home to preserve social distance from family, friends, and strangers.
2. **Quarantine measures may be used.**
   One of the oldest and most successful techniques for managing infectious illness outbreaks is quarantine. During the pandemic emergency in China, quarantine was a successful approach. It is also an efficient method of containing an influenza epidemic.
3. **Advice on how to prevent being scammed.**
   Misinformation is propagated via various social media platforms, such as Facebook, Twitter, WhatsApp, Instagram, and others, in the era of social media. Librarians and information professionals strive to mitigate this by only distributing trustworthy information. Trustworthy information may be shared with library users through institutional and personal social media profiles, and platforms aim to keep rumours and false news at bay.

1.3.Library professionals' difficulties during covid 19

1. Throughout the globe, library professionals face a variety of issues in determining which services to provide and how to manage lockdown circumstances ranging from minor limitations to complete shutdown.
2. Many prestigious libraries, like the National Library of India, the Delhi Public Library, and other prestigious libraries throughout the globe, are afflicted by lockdown circumstances, hurting the whole community of researchers, students, scholars, readers, and so on. The closure of libraries has a significant effect on the communities we serve.
3. University and college libraries, as well as school libraries, are closed, and many competitive and academic tests are still waiting; thus, at this critical moment, Library Professionals may support those students in our country who want information through the internet platform.
4. It is natural for people to experience emotions ranging from normal to unhappy, anxious, puzzled, and scared/angry during a crisis. The most difficult issue for library professionals during this lockdown is to manage with these circumstances while engaging the whole community in a healthy atmosphere.
5. For the purpose of opening libraries to the public in accordance with government norms and in the public's benefit.
6. It is difficult to limit or close a library for the following social distancing concepts.

1.3.1. How to tackles the above mentioned challenges by the library professionals society during covid 19

1. By adhering to government standards, Library Professionals may break the chain of coronavirus and deliver various services remotely.
2. Gather factual data and transform it into helpful knowledge that will correctly assist the whole community in various professions.
3. Engage the entire community through social media and organise the Reading Books challenge, poster writing competitions, skill development programme, and so on that have helped people manage normal life as before and develop skills that will help them reduce stress during this pandemic's challenging time.
4. We are aware that the federal and state governments are making many choices and using a variety of techniques to better serve their constituents. All information may be published by library professionals via Social Media Platforms.
5. Library professionals may experiment with the following ICT technologies and share their findings with the community. Library Professionals can provide Cloud-based Library Services, Authentication Technologies: Remote Access, Electronic Resource Management System ERMs: CORAL, Discovery Services, Library Service Platform/LibGuides/IRs, OA Resource Advocacy, and Library Service Marketing via Blogs and other Social Networking tools.

6. Library professionals may provide open sources, open coursewares/OERs, open learning resources, webinars, virtual classrooms, ORCID, and citation creation tools such as Mendeley and Zotero.
7. To supply users with information resources - "Different kinds of services and collections may be connected together and made available on electronic platforms."
8. Provide library services to users in accordance with government regulations and human interests.
9. Because library professionals may play a significant role in serving the whole community, it is crucial to describe the varied duties of library professionals in this COVID 19 pandemic scenario.

1.3.2. **Negative Impacts of COVID-19 on Libraries**

According to the report, library closures have occurred all around the globe since the onset of the COVID-19 epidemic. Libraries, when they are not closed, are faced with difficult decisions about which services to give and how, ranging from slight limits to outright shutdown. Meanwhile, the closing of all educational institutions has had an impact on libraries in 177 nations. Universities, national and research libraries are also closed in several of these nations (IFLA, 2020). According to the findings, almost 3,000 libraries throughout the nation have been closed. However, the International Federation of Library Associations (IFLA) cautioned that limiting services or closing a library is a tough choice that must be made after an evaluation of the proportional risks. Furthermore, it was discovered that the closing of libraries in practically all nations throughout the globe, including Nigeria, merely means that librarians would be unable to retain hard/soft copies of information and make such hard copies accessible to the public. Unfortunately, western Maharashtra libraries have yet to completely digitise and make services accessible online, making it very difficult to spread accurate and up-to-date information regarding COVID-19.

1.4.Objectives

1. To examine the many problems and how Library Professionals are coping with them in this COVID 19 pandemic scenario.
2. To address the many conventional duties of Library Professionals in the present COVID19 scenario.
3. To examine the significance of librarians in this pandemic circumstance. To learn about the many sorts of libraries' resources and services available throughout the lockdown time.
4. To describe the different critical responsibilities of Library Professionals as information preservers.

Scope of the paper

This paper reflects on role of librarians during a pandemic in the context of Pakistan**.**

2. Literature Review

2.1. Adomi, E. E., & Oyovwe-Tinuoye, G. O. (2021). According to the paper, based on the study's findings, LIS professionals are interested in COVID-19 information on preventive measures, cures, causes, and symptoms, how to provide library services to users, the availability of preventive or safety devices in the library, and staff safety when libraries eventually open to the user community. Furthermore, the Internet, social media, television, radio, the Nigeria Centre for Disease Control website, the World Health Organization website, and friends, colleagues, family members, or neighbours are the primary sources of information for LIS professionals on COVID-19.

2.2. K. Chakraborty, P. S. L. Kureshi, S. B. Gajbe, N. Upadhyay, and D. Devi (2020). The current research gathered data from reliable sources, namely government official websites of Indian states such as MyGov COVID-19, UTs, and national/international organisations, among others. The legitimate information sources offered to the research community are mentioned once the data has been analysed and studied. Using the Scopus abstracting databases, this work additionally illustrates the ratio of COVID-19 papers to highly cited publications. This study is a unique research endeavour that focuses on the roles and duties of the Library and librarians in crisis circumstances. As a result, this research will benefit librarians, information providers, practitioners, policymakers, researchers, and development activities in this sector.

2.3. P. Bhati and I. Kumar (2020). This study focuses on the diverse duties of library professionals during pandemic situations such as COVID 19. It also outlines the advocacy role carried on by Library Professionals. It tracks the amount of digital platforms that are accessible all over the globe. It also encourages people to utilise social media/networks. Library professionals can help the broader community with their intellectual pursuits. The purpose of Library Professionals is to locate information based on the needs of the user, to function as an information disseminator, and to arrange knowledge from various information pools.

2.4. A. Nandi (2021). The advent of the COVID-19 pandemic prompted abrupt and dramatic adjustments in library service delivery, since strong social distance and lockdown measures were enacted in the early stages of the epidemic. Even at this tough and uncertain time, the Internet and online technologies have created a new and unequalled environment, allowing libraries to expand and deepen research, teaching, and learning. The idea and practise of

libraries giving remote access to digital resources is not new, but the user-friendly approach used by UPES libraries, as well as the volume of materials made accessible during the epidemic, is remarkable.

2.5. B. I. Okike (2020). Librarians should act as catalysts for efficient information distribution in order to foster real knowledge. To educate users, librarians should distribute knowledge using current and new media outlets. Libraries should establish working relationships with health agencies and communication organisations with the goal of cooperative development of collections, referrals, and information shared and learning for users and a new breed of reimagined librarians for better information dissemination, especially at a time when there is a great need for accurate health-related information resources in an ever-increasing digital environment.

2.6. J. Zhou (2021). According to the findings of this research, online libraries are a critical source of knowledge in the context of non-contact education. The study's findings from China and Italy show that the COVID-19 pandemic has revealed the need for digital transformation strategies and programmes for libraries that will address the major library-related issues, such as chronic funding shortages, a lack of professionally trained staff, a lack of legislation and policies, a lack of digital infrastructure, and so on. According to the findings of this research, distant learning encounters challenges such as a traditional perspective of education among students and instructors, as well as a suspicion of advances. One way may be to have favourable experiences with distant learning and accessing online resources. As a result, libraries should focus on the quality of digital services and publish time-sensitive material vital to the learning routine.

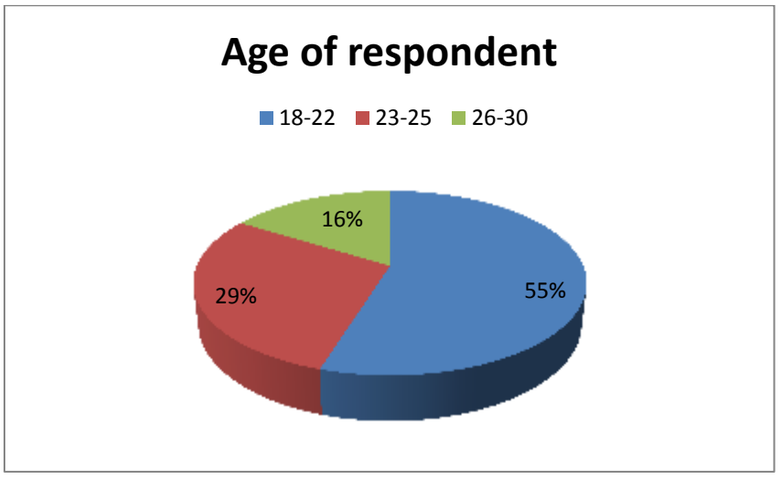
3. Methodology

The study gathered secondary data from the internet, newspapers, and journals to determine the effects of the COVID-19 pandemic on libraries, what new ways, resources, and services libraries have developed to help combat the new COVID-19 disease, the constraints faced by Nigerian libraries in effectively combating the COVID-19 pandemic, and what measures can be taken to overcome these constraints. The project comprises a comprehensive desk investigation on libraries across western Maharashtra in response to the COVID 19 outbreak. The research employed qualitative analysis to discover and categorise major themes, evaluate patterns, and comprehend social context.

4. Data Analysis

1. Age of respondent

		Frequency	Percent	Valid Percent
Valid	18-22	17	54.8	54.8
	23-25	9	29.0	29.0
	26-30	5	16.1	16.1
	Total	31	100.0	100.0



Analysis

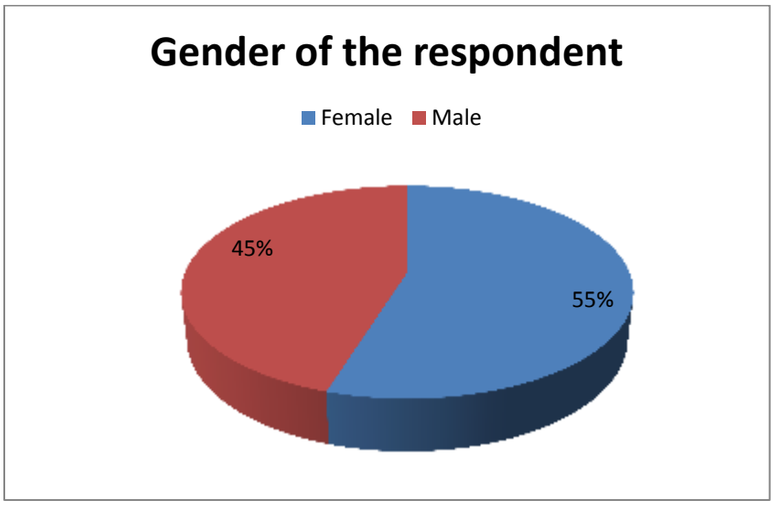
As shown in above graph, we have taken the responses of 31 librarians. We have taken the responses of people which ranges from 18-22, 23-50 and 26-30 age group. As shown in above table, 17people that is 54.8% librarians are from age group of 18-22.

Interpretation

According to survey, most of the librarians are of the age group of 18-22.

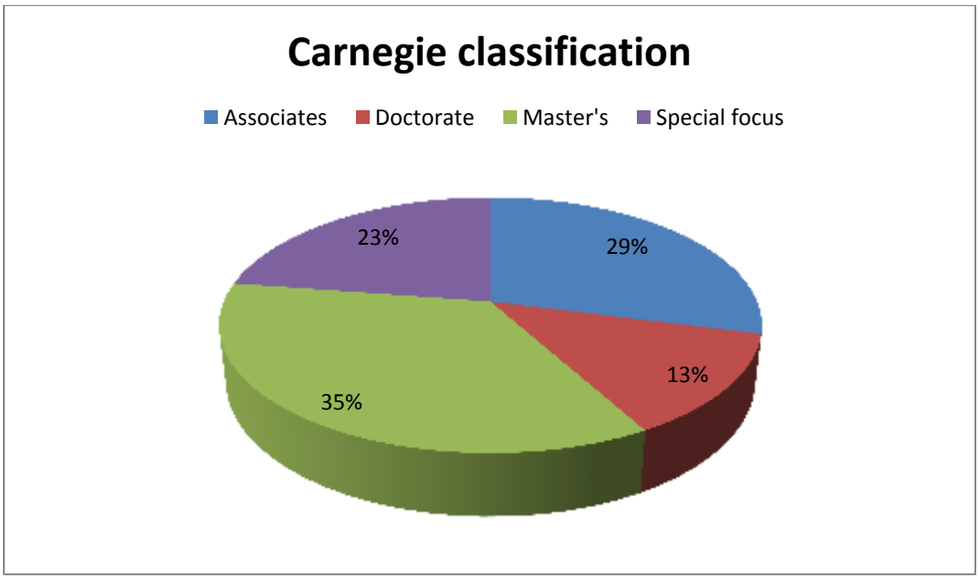
Q2. Gender of the respondent

		Frequency	Percent	Valid Percent
Valid	Female	17	54.8	54.8
	Male	14	45.2	45.2
	Total	31	100.0	100.0



Analysis
As shown in above graph, we have taken the responses of 31 librarians. IN survey 45% respondent were male respondent and 55% respondent were male.
Interpretation
According to survey, most of the respondent were male.
Q3. Carnegie classification

		Frequency	Percent	Valid Percent
Valid	Associates	9	29.0	29.0
	Doctorate	4	12.9	12.9
	Master's	11	35.5	35.5
	Special focus	7	22.6	22.6
	Total	31	100.0	100.0



Analysis
As shown in above graph, we have taken the responses of 31 librarians. IN survey 35% respondent were associates, 29% respondents were special focus oriented, 135respondents were doctorate and 35% respondents were masters'.
Interpretation
According to survey, most of the were master's.

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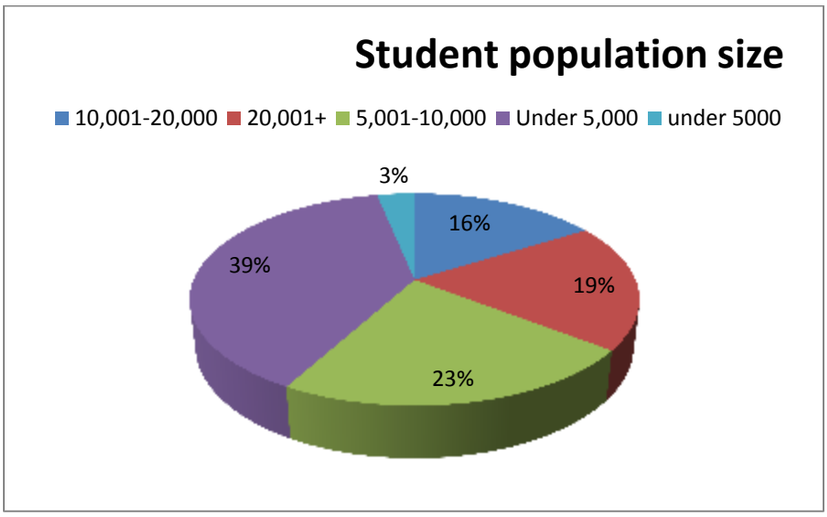
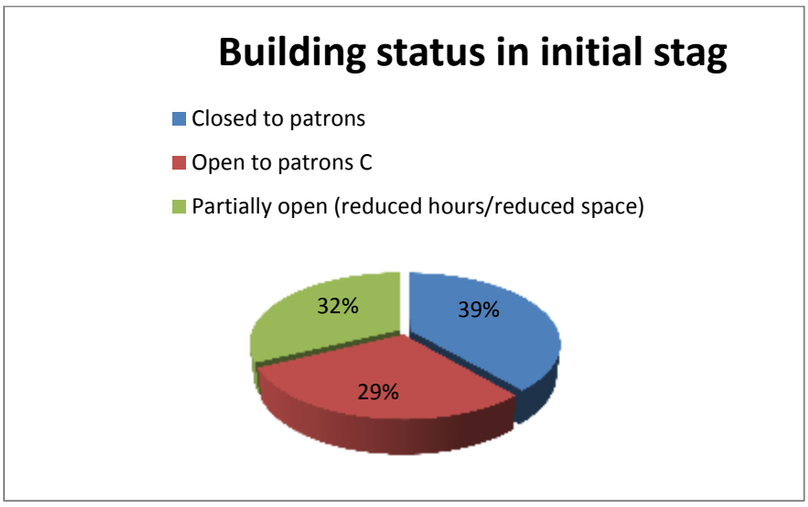
Q4. Student population size

		Frequency	Percent	Valid Percent
Valid	10,001-20,000	5	16.1	16.1
	20,001+	6	19.4	19.4
	5,001-10,000	7	22.6	22.6
	Under 5,000	12	38.7	38.7
	under 5000	1	3.2	3.2
	Total	31	100.0	100.0



Q5. Building status in initial stag

		Frequency	Percent	Valid Percent
Valid	Closed to patrons	12	38.7	38.7
	Open to patrons C	9	29.0	29.0
	Partially open (reduced hours/reduced space)	10	32.3	32.3
	Total	31	100.0	100.0



Analysis

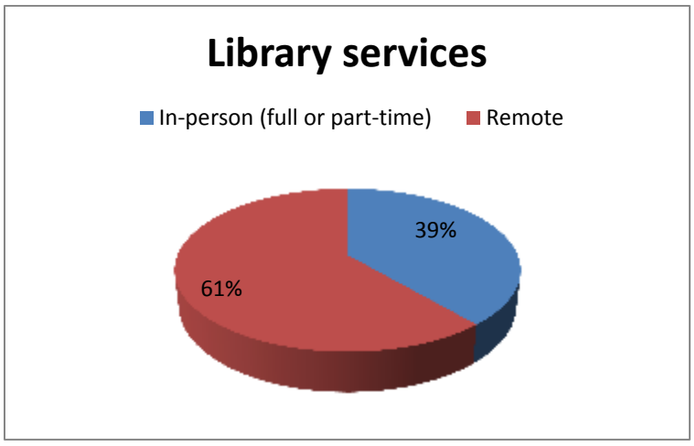
As shown in above graph, we have taken the responses of 31 librarians. IN survey 38.7% respondent said initially library is closed to patrons, 29% respondents were open to patrons C. 32.3% respondents said library was partially open.

Interpretation

According to survey, initially library was closed to patrons.

Q6. Library services

		Frequency	Percent	Valid Percent
Valid	In-person (full or part-time)	12	38.7	38.7
	Remote	19	61.3	61.3
	Total	31	100.0	100.0



Analysis

As shown in above graph, we have taken the responses of 31 librarians. IN survey 39% respondents said library services were in-person, while 61% respondents said library services were remote.

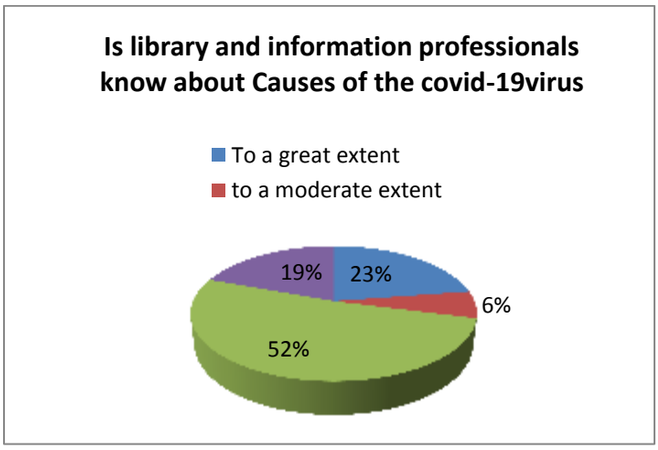
Interpretation

According to survey, library services were remote after the pandemic.

Q7. Covid-19 information needs to know LIS professions

A. Causes of the covid-19virus

		Frequency	Percent	Valid Percent
	To a great extent	7	21.9	21.9
	to a moderate extent	2	6.3	6.3
	To a very great extent	16	50.0	50.0
	To no extent	6	18.8	18.8
	Total	32	100.0	100.0



Analysis

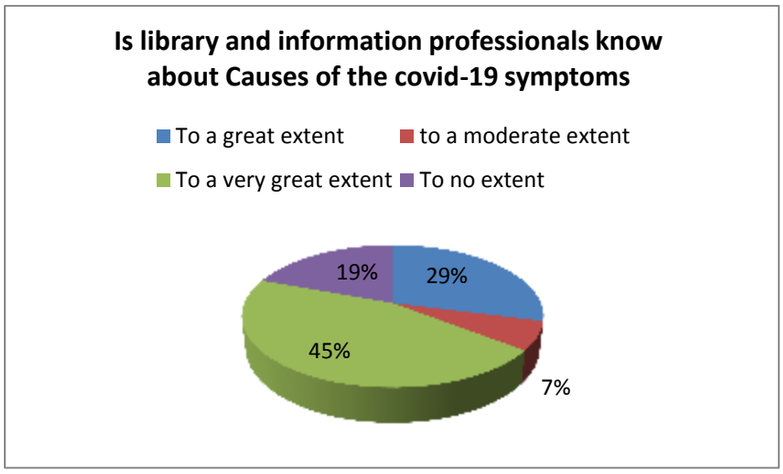
As shown in above graph, we have taken the responses of 31 librarians. In that we asked librarians about do they have knowledge about causes covid-19 virus.From that most of the respondents that is 50% respondents said it is necessary for library professionals to have great knowledge of causes covid-19 virus.

Interpretation

According to survey, library professionals should have great knowledge of causes covid-19 virus.

Q7B. Symptoms of covid-19

		Frequency	Percent	Valid Percent
	To a great extent	9	28.1	28.1
	to a moderate extent	2	6.3	6.3
	To a very great extent	14	43.8	43.8
	To no extent	6	18.8	18.8
	Total	32	100.0	100.0



Analysis

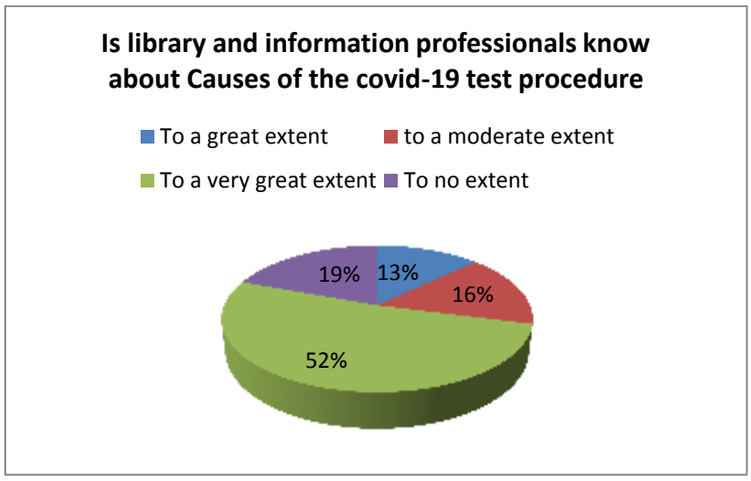
As shown in above graph, we have taken the responses of 31 librarians. In that we asked librarians about do they have knowledge about covid -19 symptoms. From that most of the respondents that is 43.8% respondents said it is necessary for library professionals to have great knowledge of covid-19 symptoms

Interpretation

According to survey, library professionals should have great knowledge of covid-19 test symptoms.

Q7C. Covid-19 test procedure

		Frequency	Percent	Valid Percent
	To a great extent	4	12.5	12.5
	to a moderate extent	5	15.6	15.6
	To a very great extent	16	50.0	50.0
	To no extent	6	18.8	18.8
	Total	32	100.0	100.0



Analysis

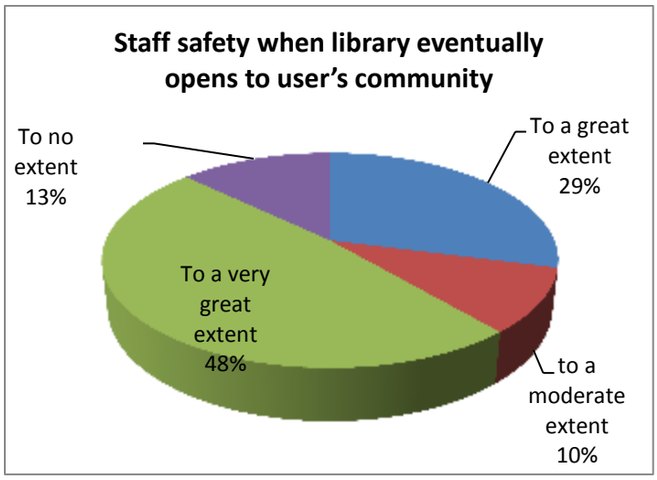
As shown in above graph, we have taken the responses of 31 librarians. In that we asked librarians about do they have knowledge about covid -19 test procedure. From that most of the respondents that is 50% respondents said it is necessary for library professionals to have great knowledge of covid-19 test procedure.

Interpretation

According to survey, library professionals should have great knowledge of covid-19 test procedure.

Q7D. Staff safety when library eventually opens to user's community

		Frequency	Percent	Valid Percent
	To a great extent	9	28.1	28.1
	to a moderate extent	3	9.4	9.4
	To a very great extent	15	46.9	46.9
	To no extent	4	12.5	12.5
	Total	32	100.0	100.0



Analysis

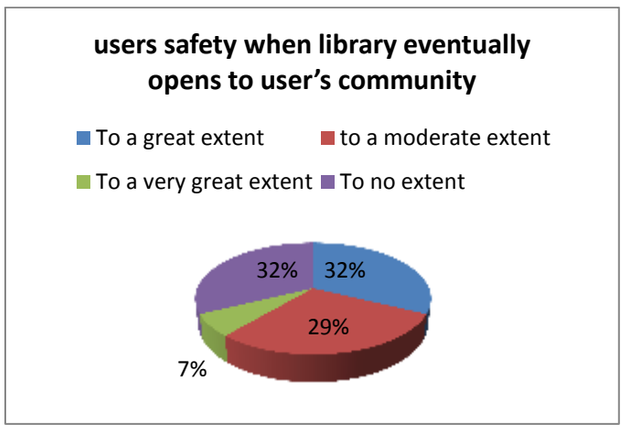
As shown in above graph, we have taken the responses of 31 librarians. In that we asked librarians about staff safety when library eventually opens to users community. From that most of the respondents that is 31.3 respondents said it is necessary to for librarians to take care of staff safety when library open to users communit**y.**

Interpretation

According to survey, library professionals should take care of staff safety when library open to users community.

Q7E.users safety when library eventually opens to user's community

		Frequency	Percent	Valid Percent
	To a great extent	10	31.3	31.3
	to a moderate extent	9	28.1	28.1
	To a very great extent	2	6.3	6.3
	To no extent	10	31.3	31.3
	Total	32	100.0	100.0



Analysis

As shown in above graph, we have taken the responses of 31 librarians. In that we asked librarians about users safety when library eventually opens to users community. From that most of the respondents that is 31.3 respondents said it is necessary to for librarians to take care of users safety when library open to users community.

Interpretation

According to survey, library professionals should take care of users' safety when library open to users community.

4. Findings

Currently, Library Professionals are doing a variety of integrated/multiple tasks in addition to their conventional employment. During the lockdown time, we may supply e-resources using new technology or tools.

Library professionals all across the globe are realising the need of transitioning from conventional practise to multidimensional responsibilities. As a consequence, Library Professionals are now performing multidimensional and flexible roles in order to satisfy the need and expectations of societies, organisations, institutions, libraries, and so on, and this is a requirement of the current scenario in Covid19.

1. Most of the librarians are of the age group of 18-22.
2. Most of the respondent was male.
3. Most of the were master's.
4. Initially library was closed to patrons.

5. Library services were remote after the pandemic
6. library professionals should have great knowledge of causes covid-19 virus.
7. library professionals should have great knowledge of covid-19 test symptoms.
8. library professionals should have great knowledge of covid-19 test procedure.
9. library professionals should take care of staff safety when library open to users community.
10. library professionals should take care of users' safety when library open to users community.

In the event of a pandemic, a digital platform is the most effective approach to serve the whole population.

5. Conclusion

The COVID-19 epidemic is having a tremendous influence on governments, organisations, and people all around the globe, including libraries/librarians. Libraries of all kinds and varieties throughout the globe are working hard to help lessen the effects of the unique COVID-19 epidemic. As a result, they have created additional programmes, resources, and services. Libraries help research and medial scientists by offering legitimate news sources, databases, and linkages. They are developing specific programmes and activities like as virtual story-telling and digital content, they are more lenient with item return deadlines, and they have a variety of efforts to collect and conserve pandemic-related things.

Library Professionals must do all in this Covid19 epidemic emergency. Easy access to information is a fundamental condition, since it is required for the massive demands of all possible consumers. The user's future demand is for digital platforms for education. In a pandemic crisis, a digital library is in high need. In this case, library personnel may assist as stress relievers. Library and information workers must be prepared to address the needs of readers, whether for COVID 19 or any other pandemic crisis. The only method to prevent the spread of this virus COVID 19 from one person to another is via social distance. The social obligation of library professionals is to provide users with access to information. In a pandemic crisis, the need for information is also growing.

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Research Paper
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Contribution of India to Research on Big Data

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Abstract

Information has become an essential asset for the growth of organisations in every sector of our society. With the rate at which data has increased, organisations must upgrade their technological architecture for the improvement of their products and services as the traditional data management and processing systems are not capable of handling such a great amount of stream data. Retrieval of value from this data boosts the creation and adoption of advanced technologies. The article focuses on the growth of literature of Indian origin on big data over a period of ten years from 2011 to 2021 and scientometric analysis of data retrieved, top publication sources, different categories of documents published in this domain, prominent subject areas in the big data research and top institutes that contributed most to the big data research during this period.

Keywords: Big data, big data analytics, big data research, scientometric analysis, India.

1. Introduction

In today's era of information, when advances in modern technologies have provided smart devices and equipment within reach of every ordinary being, the internet has become a platform where billions of people communicate and share data. Information has become a quintessential asset to organisations in every sector for efficiently providing effective services. These organisations collect, store and analyse the data of their customers, products, services, transactions, email communications, messaging services, collaboration tools and various other types of data. So, organisations must deal with these floods of data generated within the organisations and by their customers.

The worth of data does not lie in how much data an organisation has at a point in time but rather in how that gathered data is utilised by that organisation. Technological researchers are constantly improving the methods to utilise this enormous amount of available data in order to improve services. Valuable insights can be obtained by analysing this data using big data analytics, which helps organisations in decision-making and benefits them in time and cost reductions, optimisation of product development, failure analysis, and re-calculating risk portfolios and thriving in business communities.

1.1 The Concept of Big Data

According to (Ed Dumbill, 2013) in (Anna & Mannan, 2020), "Big data is the data that cannot be handled by the traditional database and processing systems. Such type of data does not fit the traditional architecture of the database systems and moves at a very high speed. One must choose advanced ways to process the data and extract the value from this data".

Gartner defined big data as: "Big data is high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation."

(De Mauro et al., 2016) proposed a definition based on various aspects such as volume, velocity, variety of information, Technology and Analytical methods to derive such information and its value to society. They defined big data as: "the Information asset characterised by such a High Volume, Velocity and Variety to require specific Technology and Analytical Methods for its transformation into Value."

Whereas, (Ahmed & Ameen, 2017) defined big data that: "it is trustable and authentic data of multiple formats generated and delivered from different geospatial locations and large enough not to be processed by particular software, a spreadsheet or a computer and which may create value for organisations." (Zhan & Widén, 2019) reviewed the articles and analysed 35 definitions from different authors. On the bases of their study, they proposed a definition of big data: "Big Data refers to data with large size, fast growing speed, and various types which can complicate data handling techniques but also boost the creation of technological solutions. Value is generated by the proper operation and use of big data."

Big data is not just only the large amount of data. Rather, it can be defined as the huge volume of data that is created in various forms and at a very high speed. The data constantly changes its true nature behaving differently for different context. Storage and processing of such data cannot be handled by traditional systems. Retrieval of value from this data boost the creation and adoption of advanced technologies.

2. Statement of the Problem

The present research article is entitled "Contribution of India to Research on Big Data". With the recent technological developments, the volume of data is continuously growing. This data is available in various forms and is too large and complex to be handled by the traditional processing systems. Since the origin of the word big data, to elucidate the issues related to big

data such as creation, capturing, storage, and analysis, authors from different backgrounds and origin penned articles, books, reports, dissertations, from all over the world. The article focused on the growth of literature on big data in Indian origin over a period of ten years from 2011 to 2021. After the literature survey it was found that numerous studies have been done on "big data" in India during the said period with Scopus Database.

3. Objectives

The objectives of the study are:

1. To examine the year wise growth in Big Data publications;
2. To find out growth rate of Big Data publications using CAGR, AGR, RGR and DT;
3. To find out top ten publication sources (journals/conference proceedings);
4. To find out number of publications on Big Data categorised by different document types;
5. To find the most prominent subject areas in the field of Big Data research;
6. To identify the top ten institutions contributing to Big Data research;

4. Methodology

Big data is relatively a new field while talking about Library and Information Science and it has been observed that this field is not studied in depth previously by researchers with respect to the field of librarianship. The study was conducted to understand the concept of big data and explore its use, implementation and scope in the field of library and information science. Author used secondary research method to explore India's contribution towards the research in the field of Big data and its applications in Library and Information Science, contribution in any form such as journal Articles, conference proceedings, books, book chapters, reviews and many more. Data of the published articles from 2011 to 2021 have been obtained through Scopus database using the search term big data in title, keyword and/or abstract. The search was further refined to country of origin to India. The retrieved data was analysed and interpreted using MS-Excel.

5. Findings

India has contributed significantly to the research and development under the Big Data keyword and its related branches such as Machine Learning, Internet of Things, Data Mining, Cloud Computing, Artificial Intelligence etc. Over the last ten years, i.e. from 2011 to 2021, there has been enormous growth in India in journal articles, conference papers, books, book chapters, review articles and other research publications. Author searched the Scopus Database by using the keyword "Big Data" and limiting the search criteria to the Publication Year range of "2011 to 2021", where selecting "India" as the country of origin of the document. Scopus Database retrieved 47,834 such primary documents based on the search criteria. And further analysed the search results using different metrics showing the following results.

5.1 Documents by Publications Per Year

The following table shows the growth in the number of publications over these years, from only 354 publications in 2011 to 13718 publications in 2021, showing an exponential growth during the period.

Table 1: Year Wise Publication Distribution of Documents from 2011 to 2021 (Source: Scopus)

Year	Documents Published
2021	**13718**
2020	**9485**
2019	**8551**
2018	**5764**
2017	**3308**
2016	**2783**
2015	**1679**
2014	**1064**
2013	**654**
2012	**474**
2011	**354**

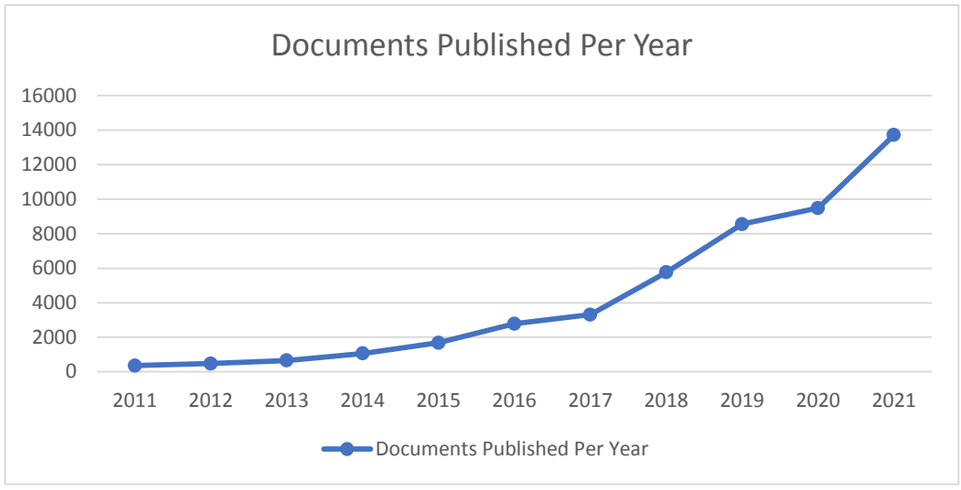


Figure 1: Year Wise Publication Distribution of Documents from 2011 to 2021

The chart shows that the concept of big data in India started to grow after 2010, showing exponential growth in big data in the years following.

5.1.1 Annual Growth Rate

Author used the formula for Annual Growth Rate (AGR) given by (Santha kumar & Kaliyaperumal, 2015). Table 2 shows the calculation of annual big data publications in journals in India from 2011 to 2021.

The formula used for the calculation of AGR is as follows:

$$AGR = \frac{w_2 - w_1}{w_1} \times 100$$

Where W2 represents the total number of publications in the current year, and W1 represents the initial number of publications at the start of a year, i.e., the total number of publications in the previous year.

5.1.2 Compound Annual Growth Rate (CAGR)

The Compound Annual Growth Rate represents a constant growth rate over a period of time through a geometric progression ratio. Generally, CAGR is represented in percentage by calculating the nth root of the total percentage growth rate with 'n' be the number of years in the corresponding period. It can be represented through the following mathematical equation given by (Santha kumar & Kaliyaperumal, 2015):

$$CAGR = \left(\frac{Ending\ Value}{Beginning\ Value}\right)^{\frac{1}{Ending\ Time - Beginning\ Time}} - 1$$

Where, Beginning Value and Ending Value correspond to the value at the beginning of the period and value at the end of the period respectively.

5.1.3 Relative Growth Rate and Doubling Time

The Relative Growth Rate shows the increase in number of articles per unit of time as a proportion of its size at that moment in time. It is also called as Exponential Growth Rate. The mean relative growth rate over a specific period of time interval can be expressed by the following equation given by (Kumar, 2017) (Kumar & Kaliyaperumal, 2015):

$$1 - 2R = \frac{Log\ W_2 - Log\ W_1}{T_2 - T_1}$$

Here,

1-2R = is the mean relative growth rate for the specific time interval;

$Log_e\ W_1$= Natural Log of initial number of articles;

$Log_e\ W_2$= Natural Log of final number of articles after a specific period of time;

T_2-T_1 = Difference between Final Time and Initial Time.

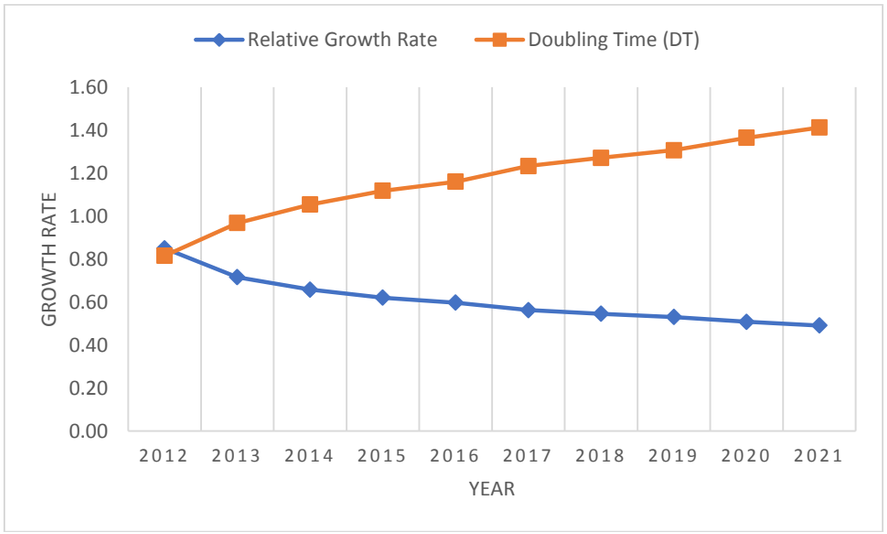
Doubling Time (DT) represents the time in which research publications on big data are doubled and is calculated by the following formula (Bharati et al., 2020) (Narendra & Kannappanavar, 2020).

$$Doubling\ Time\ (DT) = \frac{0.693}{R}$$

Here 0.693 is a constant, and R is the relative growth rate of the corresponding year.

Table 2: Growth of Big Data Publication in India from 2011 to 2021 in terms of CAGR, AGR and RGR and DT

Year	Initial No. of Publications (W1)	New Publications in Year (W2)	Cumulative Sum	Compound Annual Growth Rate (CAGR)	Annual Growth Rate (AGR)	Relative Growth Rate (RGR)	Doubling Time (DT)
2011	-	354	354	Not Defined	Not defined	Not Defined	Not Defined
2012	354	474	828	33.90	33.90	0.85	0.82
2013	474	654	1482	35.92	37.97	0.72	0.97
2014	654	1064	2546	44.32	62.69	0.66	1.05
2015	1064	1679	4225	47.57	57.80	0.62	1.12
2016	1679	2783	7008	51.04	65.75	0.60	1.16
2017	2783	3308	10316	45.13	18.86	0.56	1.23
2018	3308	5764	16080	48.97	74.24	0.55	1.27
2019	5764	8551	24631	48.89	48.35	0.53	1.31
2020	8551	9485	34116	44.10	10.92	0.51	1.37
2021	9485	13718	47834	44.15	44.63	0.49	1.41
	Total	**47834**					



The data in table 2 corresponds to the total publication data from a period of 2011 to 2021 retrieved form Scopus database using keywords “big data” and its related terms having “India” as a place of origin analysed on the basis of metrics to measure growth such as CAGR, AGR, and RG and DT. The growth rate shows a constant increase in the number of publications per year. The highest percentage increase was shown around 74.24 percent from year 2017-2018. Where, the lowest percent increase 10.92 percent between 2019-2020. During rest of the period the percent increase was near to 50 percent per year. The RGR was 0.85 in 2012 and decreased to 0.56 in 2017. There was a small decrease to 0.55 in 2018 and after that it decreased to 0.49 in 2021. In the table 2, the DT shows a gradual increase from 0.82 in 2012 to 1.41 in 2021.

5.2 Documents by Top Publication Sources

Based on the retrieved search results top 10 sources (journals/conference proceedings), having contributed more than 300 publications towards the big data research in India, are identified as follows.

Table 3: Average No. of Documents Published Per Year by Top 10 Sources

Source	Avg. No. of Documents per Year
Advances In Intelligent Systems and Computing	1553
Lecture Notes in Networks and Systems	689
International Journal of Recent Technology and Engineering	608
International Journal of Innovative Technology and Exploring Engineering	575
Journal Of Advanced Research in Dynamical and Control Systems	544
Communications in Computer and Information Science	508
Lecture Notes in Electrical Engineering	501
Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics	447
Lecture Notes on Data Engineering and Communications Technologies	405
International Journal of Engineering and Advanced Technology	403

The following figure shows the number of documents published by these top sources per year from year 2011 to 2021.

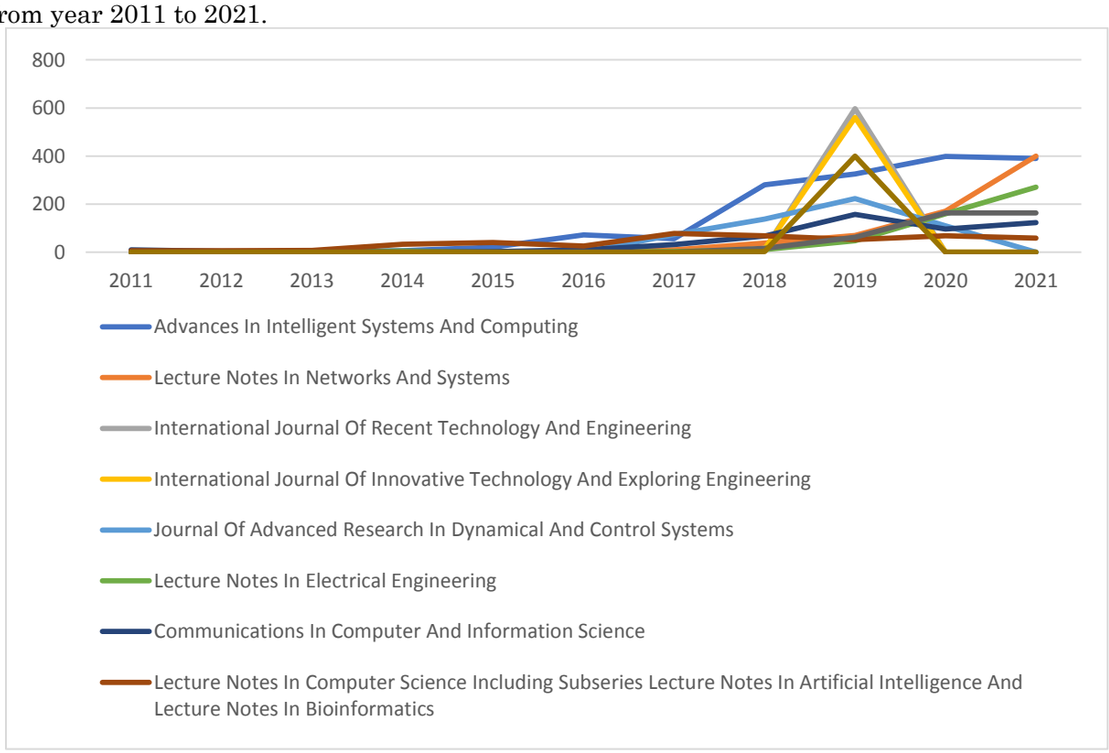


Figure 2: No. of Documents published by Top Sources Per Year from 2011 to 2021

5.3 Documents by Type of Publication

Our search retrieved various types of the documents such as articles, conference papers, book chapters, review articles, books, editorials, notes, letters, short surveys, data papers, erratum, retracted and some under undefined category of documents.

Table 4: Distribution of Documents Published by the Type of Publication

Document type	Number of Documents Published
Article	24204
Conference Paper	16991
Book Chapter	3415
Review	2476

Document type	Number of Documents Published
Book	312
Editorial	205
Note	67
Retracted	55
Letter	52
Short Survey	25
Data Paper	13
Erratum	11
Undefined	8

The distribution of documents published in different forms can be seen in the following pie chart.

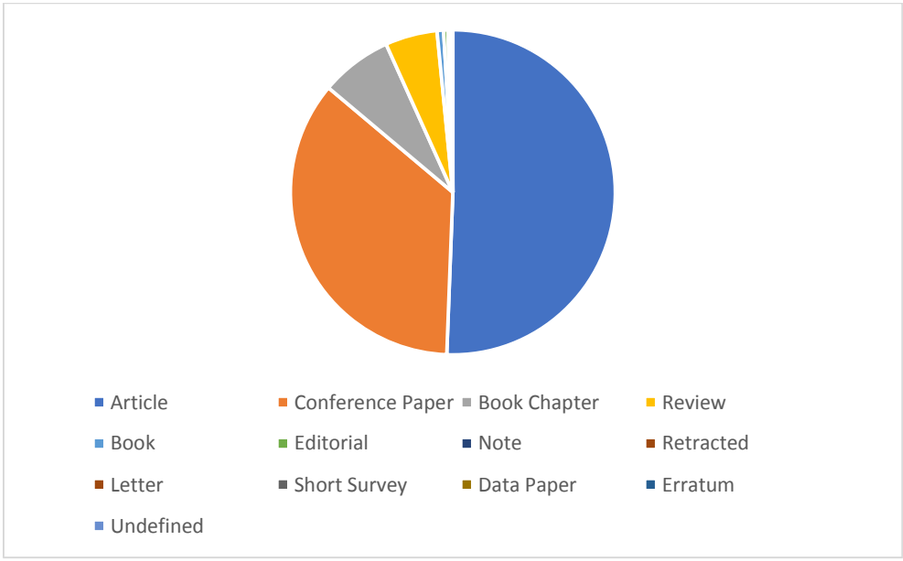


Figure 3: Type-wise Distribution of Documents

Out of these types, Articles top the list with 24204 documents published as journal articles covering 51 percent of the total documents published in all these years. Where 16991 documents were published as Conference papers having 36 percent of all documents published. These two categories of documents cover almost 87 percent of the total documents published on Big Data in India over the selected range of years.

5.4 Documents by Subject Area

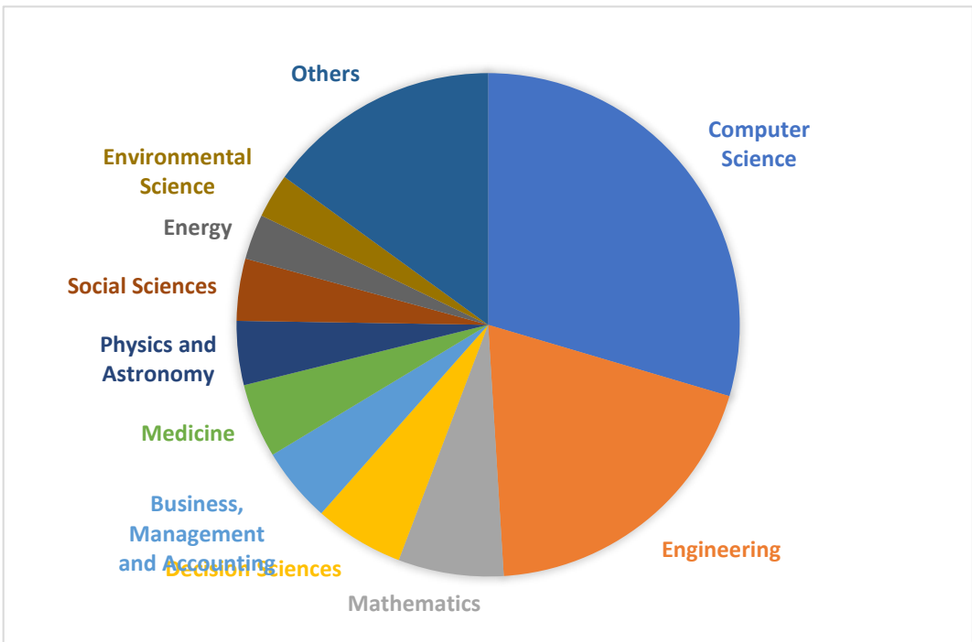
The documents with the keyword "big data" are published in different subject areas. The following table shows the different subject areas and the number of documents published in these areas over the years of study.

Table 5: Number of Documents published in Different Subject Areas from 2011 to 2021

Subject Area	No. of Documents Published
Computer Science	28919
Engineering	19007
Mathematics	6625
Decision Sciences	5623
Business, Management and Accounting	4727
Medicine	4667
Physics and Astronomy	4020

Social Sciences	3900
Energy	2840
Environmental Science	2784
Biochemistry, Genetics and Molecular Biology	2746
Agricultural and Biological Sciences	1757
Materials Science	1752
Earth and Planetary Sciences	1334
Economics, Econometrics and Finance	1289
Chemical Engineering	1082
Pharmacology, Toxicology and Pharmaceutics	920
Chemistry	859
Multidisciplinary	724
Immunology and Microbiology	596
Arts and Humanities	454
Neuroscience	369
Psychology	347
Health Professions	236
Nursing	106
Veterinary	72
Dentistry	33

Figure 4: Subject Wise Distribution of Documents



The subject wise distribution of the published documents is shown in the pie chart. The subject wise distribution shows that Computer Science contributed the largest share towards the publication of documents under big data and its related branches with overall 30 percent contribution out of all published documents. After that Engineering field contributed 19 percent

publications towards the field. These two subject areas only contributed a total of 49 percent publications towards the evolution of big data concept in India.

5.5 Documents by Affiliation

Indian universities and education institutions play a vital role in introducing and advancing new concepts and technologies with their cutting-edge research contribution in every field. Every now and then, Indian educational institutions have contributed avant-garde in research and advancement of subjects in the country.

Table 6: Number of Documents published by different Universities and Institutions from 2011 to 2021

Affiliation	No. of Documents
Vellore Institute of Technology	1551
Amity University	1144
Anna University	700
K L Deemed to be University	693
SRM Institute of Science and Technology	616
Thapar Institute of Engineering and Technology	576
Indian Institute of Technology Delhi	546
Indian Institute of Technology Kharagpur	541
University of Delhi	506
Lovely Professional University	492

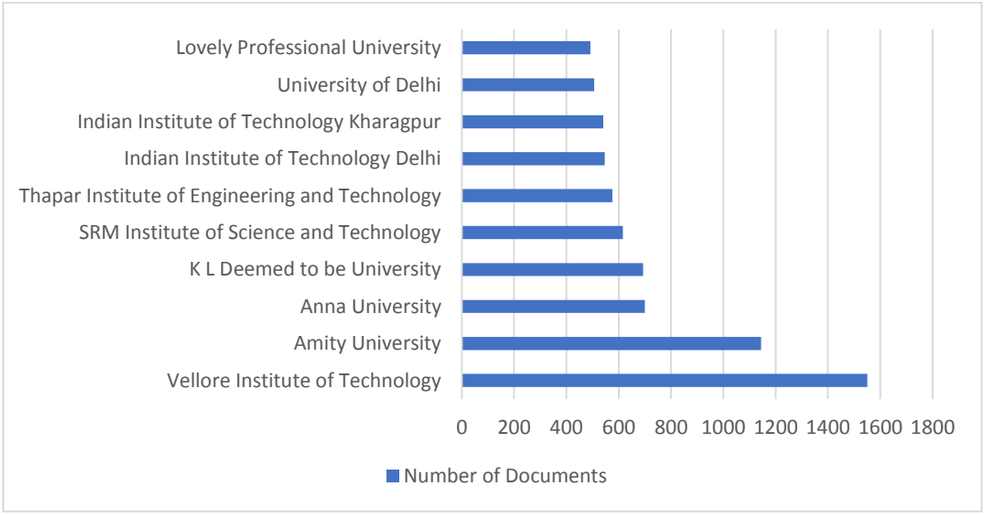


Figure 5: Documents Published by Different Universities and Educational Institutions

6. Debate and Discussion

The data as retrieved from Scopus Database shows a continuous growth in journal articles published with theme of big data. In 2011 only 354 articles were published by different authors whereas in 2021 13718 articles were published showing approximately 3800 percent increase in the total number of publications. Academic journals and conference proceedings have a great relevance to research. They ensure in-depth knowledge over the topic and contribute to the world of knowledge. Top ten sources of big data research were found having more than 300 average number of articles published per year on the concept. Out of these "Advances In Intelligent Systems and Computing" emerged to be at the top with an average of 1553 publications per year, followed by "Lecture Notes in Networks and Systems" and "International Journal of Recent Technology and Engineering" and so on. Journal articles contribute most to the research over the topic. Out of 47834 documents such retrieved, with 24204 documents, journal articles contributed approximately 51 percent of the total documents published during the period, followed with conference papers having 16991 documents covering 36 percent contribution towards the growth of topic.

Over the period, big data has influenced every sector of our society. Data as retrieved showed this influence in different subject areas. With approximately 50 percent of the total publications, Computer science and Engineering are the most prominent subject areas that

have contributed to the research in big data in India followed by Mathematics with 7 percent and Decision science with 6% overall contribution. Although big data was first introduced to gain insights in business and decision making, but Business, Management and Accounting sector contritubted only percent of overall publications to the research in big data. Over this period, the growth in big data and its related technologocial innovations are a result of continuous research contribution in all subject areas. Academic institutions play a vital role in research and development of any new area. Indian academic and research institutions have contributed at large in the field of big data research. Institutions such as Vellore Institute of Technology, Amity University, Anna University, K L Deemed to be University, SRM Institute of Science and Technology, Thapar Institute of Engineering and Technology, Indian Institute of Technology Delhi, Indian Institute of Technology Kharagpur, University of Delhi and Lovely Professional University are the top 10 institutions that contributed towards the research of big data during the said period.

7. Conclusion and Future Research

It is quite surprising fact that today we produce more data in just 2 years than the overall data produced in the decades of history. The term Big Data not only describes the data in large volume, coming in fast and in various forms, but it is also the technology and practice. From every self-driving car to cashier-less stores, the data scientists have worked for and implemented the vision of sophisticated big data operations. There has been a significant improvement in the concept, technology and its usage strategies for different industries, since big data first entered in the picture. Libraries are also prevalently using the technologies such as Clouds, Internet of Things (IoT) devices, and edge computing etc., to understand their users and to improve their potential.

The term “Big Data” is a multifaceted term that is rapidly evolving and changing the ways in which our society lives, thinks and works (Garoufallou & Gaitanou, 2021). Big data research in Library and Information Science is still in the phase of its infancy. At one hand, in the fields such as Computer Science, Engineering, Business and Management, big data research has done wonders. But on the other hand it is near to negligible in the field of library and information science. Some of the recent Big Data trends and technologies that can be beneficial for the libraries and can be considered for research and exploration in the field of library and information science are, Data as Service, artificial intelligence and machine learning enabled smart technologies, Natural Language Processing, Hybrid Clouds, Edge and Quantum Computing, DataOps, Predictive analytics, Data Fabrics, X Analytics, and Augmented Data Management.

The literature indicated huge opportunities for libraries having big data in the picture. Library and information professionals have always played a vital role in the growth and development of our society. And now with the emergence of new technologies in libraries, thye have some new roles to play to facilitate creation and distribution of knowledge in the community. But the one thing we can be sure about is that the real value of data and the ways in which we can utilize the information, is still unexplored in the field of library and information science. As the keepers of information, it is the moral obligation of us, library professional, to keep up with the rapid technological changes. Information and training should be imparted among library professionals to meet the challenges in use and implementation of such technologies in libraries for the benefit of our society.

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Research Paper

Spatial Analysis and Change in Agricultural Land Use Efficiency in Chandrapur District (Maharashtra State)

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Abstract

Agriculture is the basic occupation of man and the main economy depends on it. Land use plan has a unique importance in agricultural management. Agricultural development is seen in areas where land use is organized and planned. Chandrapur district is the eastern district of Maharashtra state and the agricultural development is moderate. In the present research paper, agricultural land utilization efficiency and its change in Chandrapur district is studied tehsil wise.

Keyword: Agricultural, Land Use Efficiency Index, Change, Gross, Net

Introduction: Agricultural land use efficiency can be defined as the net sown area yield or the proportion of re-cropped area. Gross crop area as a percentage of net crop area provides a measure of land use efficiency (Singh, 1975). Areas with higher agricultural land use efficiency index have higher land use efficiency. Agricultural production and income is influenced by land use efficiency. Present paper reveals the tehsil wise analysis of agricultural land use efficiency and change in Chandrapur district.

Objectives of the Study The main objectives of the present study are as follows,

1. To study and analysis of tehsil wise agricultural land use efficiency in Chandrapur district.
2. To discuss the tehsil wise change in agricultural land use efficiency in Chandrapur district.

Data Source and Methodology

The information used for the present research work is obtained through secondary sources. This information is compiled from District Agriculture Office, Crop and Seasonal Reports and Socio-Economic Reviews. And Pre-published material related to the research topic.

The formula suggested by Jasbeer Singh has been used to calculate the agricultural land use efficiency index in the district. For this the following formula is used,

$$\mathbf{ALUE} = \frac{\boldsymbol{GCA}}{\boldsymbol{NSA}}\mathbf{X100}$$

ALUE – Land Use Efficiency
GCA – Gross Crop Area
NSA – Net Sown Area

Change = Current Year Land Use Efficiency – Last Decade Land Use Efficiency

The analysis presented is based on the data source for the period **2011** and **2021.** The statistics obtained by the formula are represented in a table and displayed in a distribution map. Also the change is shown with the help of a graph.

Study Area: Chandrapur district is located in southeast of Maharashtra state. The district lies in between 18^0 4' north to 20^0 5' north latitudes and 78^0 5' east to 80^0 6' east longitudes. Totalgeographical area of the district is 11443 SqKm and stands at 14^{th} number in Maharashtra state about the geographical area. According to the 2011 census total population of the district is 2204307 and out of them 50.98% is male and 49.02% are female population. Gadchiroli district is abounded with Gadchiroli district at east, Yavatmal towards west. Wainganga river makes the eastern boundary of the district.

Agricultural Land Use Efficiency Tehsil wise distribution of agricultural land use efficiency is shown in table no 1.

Table No. 1 Agricultural Land Use Efficiency in Chandrapur District (2011-2021)

Name	**2011**	**2021**
Warora	118.17	115.08
Chimur	111.93	131.74
Nagbhir	113.27	127.17
Brahmapuri	127.13	121.63
Sawali	106.75	103.65
Sindewahi	114.72	118.47
Bhadravati	111.39	130.36
Chandrapur	102.39	123.54
Mul	105.41	120.68
Pombhurna	100.00	124.59
Ballarpur	105.54	103.56
Korpana	100.00	100.00
Rajura	100.00	117.10
Gondpipri	100.57	121.08
Jiwati	100.00	100.00
Total District	**109.18**	**117.61**

Source – Agricultural Land Use Efficiency Index is Calculated by Author

The efficiency index is divided into three groups, efficiency index more than 120 is considered as high agricultural land use efficiency, index in between 110 to 120 as moderate and index less than 110 considered as low land use efficiency.

Total index of the district is calculated 109.18 in the year 2011 and 117.61 in the year 2021. The growth is found in efficiency index during period 2001 to 2021. This efficiency was low in 2011 and moderate in 2021.

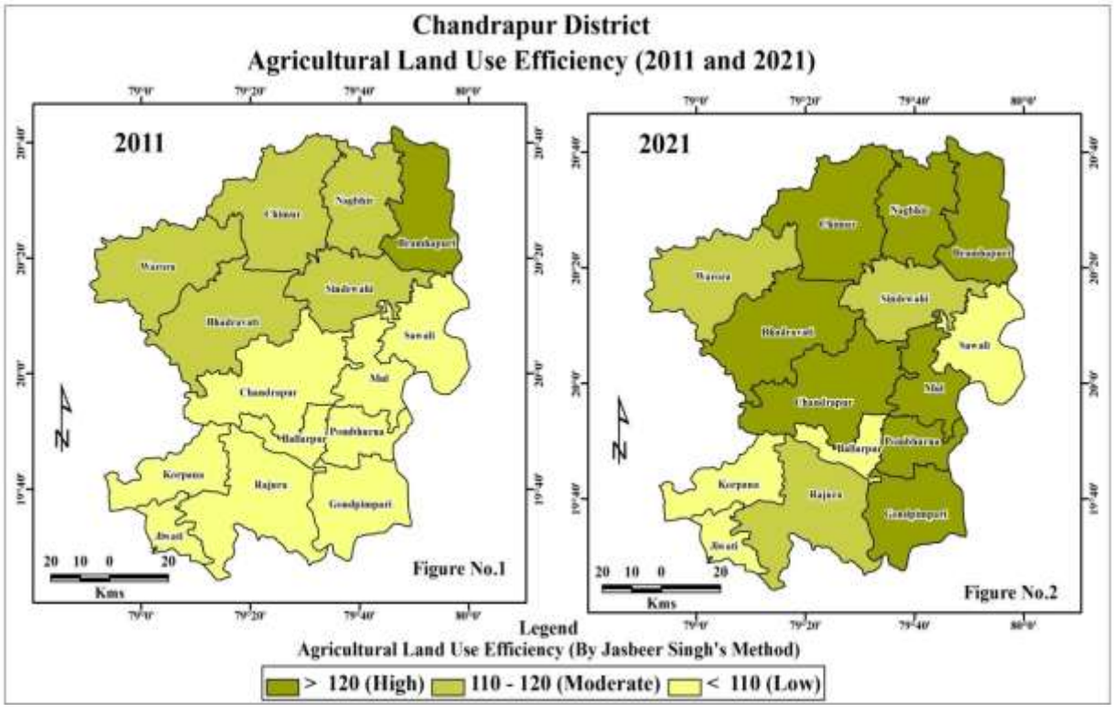
High Agricultural Land Use Efficiency

In the year 2011 only Bramhapuri (127.13) tehsil recorded this index greater than 120 and found the high efficiency of agriculture land use in the district.

In the period 2021 Chimur (131.74), Bhadravati (130.36), Nagbhir (127.17), Pombhurna (124.59), Chnadrapur (123.54) Bramhpuri (121.63), Gondpipri (121.08) and Mul (120.68) these 8 tehsils recorded the index more than 120. The index has increased in 2021 due to widening gap between total cropped area and net cultivated area in these tehsils. The index is highest in the Chimur in 2021.

Moderate Agricultural Land Use Efficiency

In the study area total 5 tehsils i.e. Warora (118.17), Sindewahi (114.72), Nagbhir (113.27), Chimur (111.93) and Bhadravati (111.39) found the moderate agricultural land use efficiency. In the year 2021 Sindewahi (118.47), Rajura (117.10) and Warora (115.08) tehsil found moderate efficiency. These tehsils were also moderate in 2011, therefore there is no any specific change is occurred in these three tehsils.



Low Agricultural Land Use Efficiency

Low agricultural land use efficiency is found in 9 tehsils in the year 2011. Out of them Pombhurna, Rajura, Korapna, and Jiwati tehsil found the index exact 100. There is no difference in total crop land and net sown area in these tehsils. Other tehsils like Gondpipri (100.57), Chandrapur (102.39), Mul (105.41), Ballarpur 9105.54) and Sawali (106.75) found the index in between 100 to 107.

In the year 2021 again Korapna and Jiwati tehsil found this index 100. Ballarpur (103.56) and Sawali (103.65) tehsils found index less than 105. The index of Ballarpur and Sawali tehsil has decreased in 2021 than 2011.

Change in Agricultural Land Use Efficiency

Both positive and negative changes are occurred in agricultural land use efficiency in Chandrapur district during the period 2011 to 2021. Tehsil wise changes are shown in table no

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Table No. 2
Change in Agricultural Land Use Efficiency in Chandrapur District (2011 to 2021)

Name	Change (2011 to 2021)
Warora	-3.09
Chimur	+19.81
Nagbhir	+13.90
Brahmapuri	-5.50
Sawali	-3.10
Sindewahi	+3.74
Bhadravati	+18.96
Chandrapur	+21.15
Mul	+15.27
Pombhurna	+24.59
Ballarpur	-1.98
Korpana	0.00
Rajura	+17.10
Gondpipri	+20.51
Jiwati	0.00
Total District	**+8.43**

Source – Calculated by Author

Positive Changes

The index of total district is increased by 8.43 in 2021 than 2011. The average agricultural efficiency is increased in the entire district. But there is variations are found in tehsil wise changes in efficiency. The maximum positive change is occurred in Pombhurna (24.59) tehsil and then it found in Chandrapur (21.15), Gondpipri (20.51) tehsil. This index is increased by more than 20 in the year 2011. All these three tehsils are found high agricultural land use efficiency in 2011 and growth than 2001. The growth of Chimur (19.91), Bhadravati (18.96), Rajura (17.10), Mul (15.27), and Nagbhir (13.90) is in between 10 to 20. The lowest positive change is found in Sindewahi tehsil i.e. 3.74

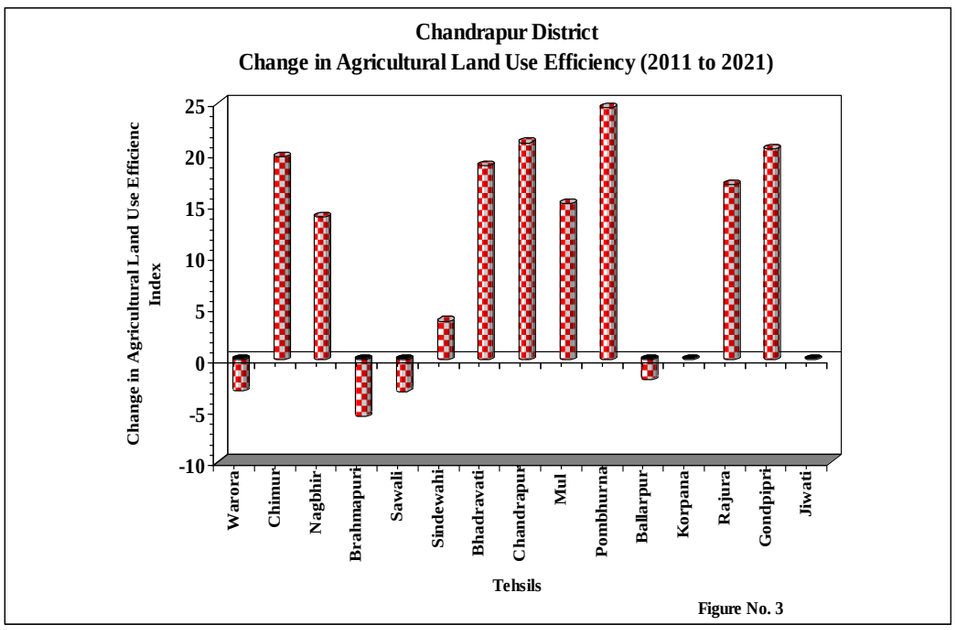

Figure No. 3

Negative Changes

The agricultural land use efficiency is decreased in Ballarpur (-1.98), Warora (-3.09), Sawali (-3.10), and Bramhapuri (-5.50) tehsils. Sawali and Ballarpur tehsils are low in both 2011 and 2021, while Warora tehsil is moderate and Bramhapuri is high. But their index has decreased. This index has decreased due to instability in agricultural land use in these tehsils.

No Changes

There is no change is found in agricultural land use efficiency in Korapna and Jiwati tehsil. Their index is 100 in both decades. Total crop land and net sown area is same in these two tehsils. There is no any improvement is found in the agricultural pattern in this area during the period 2011 to 2021.

Conclusions and Suggestions

Average agricultural land use efficiency has increased in Chandrapur district from 2011 to 2021, but this increase is small. Due to the lack of proper utilization of agricultural land and its planning, there is a difference in this efficiency according to tehsil.

In two tehsils namely Jiwati and Korpana there is no difference between total cropped area and net cultivated area. Therefore, the agricultural land utilization efficiency in this tehsil is found to be stable. In two tehsils, Jiwati and Korpana, due to this, the development of agriculture has also low compared to other tehsils. In Bramhapuri tehsil the efficiency is high in both 2011 and 2021, but in 2021 this efficiency has decreased. A negative change has taken place in this tehsil as the gap between cropped area and net area has decreased. The gap between net area and total cropped area requires proper coordination tools for future development of agriculture.

Agricultural land use efficiency index is increased in Pombhurna, Chandrapur and Gondpipari tehsils. In the year 2011 the efficiency in this tehsil was low and in 2021 it has become high. This is indicative of proper planning of agricultural land in this tehsil.

This has also resulted in increased productivity in areas of Chandrapur district where land use efficiency has declined. It is necessary to maintain a sufficient distance between the total crop area and the net area, and also to keep the suitable agricultural land fallow for some time. Because it will increase the fertility of the agricultural land and increase the agricultural income. For the overall development of agriculture in the district, it is necessary to increase the efficiency of land by spreading new techniques of land use.

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Comparative Study of Communication Patterns in Girish Karnad's *Naga-Mandala* and *Hayavadana*

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Abstract:

Effective communication plays a vital role in healthy human relationships. The origin of human Communication functions as a safety valve for the purgation of the saturated emotions and feelings. With the advancement of technology, communication has developed by leaps and bounds. Today, communication has become faster and accurate as never before. However, another rather dark side of the fact cannot be neglected. The advanced technology had made the communication and thereby human relationships more complicated. The original purpose of communication that is to exchange the emotions and feelings somewhere has changed its nature. The communicational gap leads to thwarted human relationships. Girish Karnad deals with the theme of same dented human relationships as a major theme in his plays. The characters in his plays found as the victim of miscommunication or the lack of proper communication. The emotional touch in the communication is in danger zone in spite of availability of so many advanced methods and modes of communication around us. The communication gap in the human relations may lead to the destruction of the human relations. That's why it becomes necessary to communicate effectively for the better and healthy human relationships.

Key Words: Girish Karnad, *Hayavadana*, *Naga-Mandala*, communication, human relationships, barriers to communication

Girish Karnad (1938-2019) significantly deals with the theme of human relations in his plays. His main concern is man-woman relationship in most of his play. His plays discuss the damaged man-woman relationship due to lack of communication or poor communication.

The play *Naga-Mandala* (1990) observes the pattern of one way communication in the beginning and dominates almost the thorough play. In the play, Rani is newly married to Appanna. She has a number of aspirations and dreams of a happy married life like any other girl. She enters in the house of Appana with many wishes in her mind. But, her dreams are shattered very soon as Appana proves as a worst husband. He ill-treats his wife as bad as slave. There is no communication between them. Communication is the first step towards the foundation of concrete human relations. Such communication is not initiated between them and that's why they are deprived of good life partners.

In another play *Hayavadana* (1975), Devadatta is not able to propose Padmini himself. He takes the help of his bosom friend Kapila. Kapila functions as an agent in the communication where the feeling sand emotions of one person (sender) are reached to another person (receiver) successfully. Kapila becomes a mediator of communication between a lover and would be wife. The same mediator is considered as a barrier afterwards by Devadatta. He finds that his wife is more interested in communication with Kapila. He complains of it as:

PADMINI (*back at the window*): Where is Kapila?
DEAVADATTA: …and drool over Kapila all day.
PADMINI (*taken aback*): What do you mean?
DEVADATTA: What else should I say? The other day I wanted to read
a play of Bhasa's to you and sure enough Kapila drops in. (Karnad:1975, 20)

This communication assures Padmini's fascination towards Kapila and Deavadatta's jealousy over it. Understanding is the crux of any successful communication. Without understanding the message, communication is in vain. Understanding is expected from both the ends viz, sender and the receiver. It is a praiseworthy skill of Karnad who shows that even the communication can be misunderstood at divine level. In the play *Hayavadana*, the Goddess Kali fails to understand the mind of Hayavadana and makes him a full horse instead of a human. Thus, a miscommunication proves as a life changer in his life.

The words and actions used for praising and appreciating someone lead to positive and affectionate communication and thereby strong bondage in the human relationships. Appreciation is one of the strong psychological needs of human being. It pleases the person and creates affectionate relations. Every person aspires that he/she should be appreciated by others. It gives the happiness of social acceptance and approval. Every human likes to be praised of his/her beauty. It creates sense of satisfaction and pleasure. Rani in *Naga-Mandala* also strongly feels and desires the same feedback in the form of love and affection from her husband. When such type of feedback is received, the sender finds satisfaction and becomes eager and excited for more communication. Rani doesn't get such type of response from Appanna which leads to turmoil in their relationship as husband and wife. She pines for the love of her husband she is deprived of. On the other hand, Naga in the form of Appanna appreciates the beauty of Rani. He showers the words of appreciation to please Rani.

The verbal communication is found insufficient when the matter of affectionate relations is considered. The action plays equal vital role in the relationship. Devadatta is a fine poet and writer. He praises and appreciates Padmini's beauty through his poems. It gives the sense of happiness to Padmini. But, it is not enough for Padmini. Padmini is such a type of woman who pines for a strong man. Verbal appreciation is not enough for her. That's why, she is attracted strongly towards the steel bodied Kapila. She finds more comfort in communication with Kapila who hardly knows any type of poetry and literature. He uses crude language even for communication. His style of communication surpasses the superfluous way of communication possessed by a learned Brahmin Devadatta.

The social position matters in communication as well. Persons belonging to different social strata communicate from different point of view and in a different style. In the play *Hayavadana*, Devadatta belongs to upper well learned Brahmin caste while Kapila is a son of ironsmith who belongs to a lower caste. This alma-matter of superiority and inferiority complex plays a significant role in communication between two persons belonging to different classes in Indian society. Kapila never shares equal seat with Devadatta though they are bosom friends. Kapila prefers to seat on the ground. He accepts and listens to his every order. The communication between two friends is like one way communication. Devadatta is sender and Kapila is receiver. Kapila listens to his friend and follows his words without any hesitation promptly. Their communication reflects upon the Indian social hierarchy. Devadatta falls in love with Padmini. He wants to propose her for marriage. But he doesn't possess the courage to go for it. He insists his friend Kapila to propose Padmini on his behalf. Without hesitating anymore, Kapila proceeds towards Padmini's residence.

Nonverbal communication is not just supplementary to verbal communication but sometimes it gives the exact meaning aimed through the message. Karnad uses various forms of non-verbal communication to boost the verbal communication. The door frame of Padmini's house has an engraving of a two-headed bird at the top. This is the only clue provided to Kapila by Devadatta to find out her house. This two headed bird symbolises the dual mentality and confusion that Padmini very soon going to face in her married life. As the time passes, we witness the double folded mental status of Padmini as she finds herself involved in both the men. Karnad uses the dolls in *Hayavadana*. The communication between two dolls highlights the cognition process going on in Padmini's mind. Her secret pining for a man other than her husband is exposed through the communication between the dolls.

DOLL I (*in a hushed voice*): Hey.
DOLL II: Yes?
DOLL I: Look.
DOLL II: Where?
DOLL I: Behind her eyelids. She is dreaming.
DOLL II: I don't see anything.
DOLL I: It's still hazy – hasn't started yet. Do you see it now?
DOLL II (*eagerly*): Yes, yes.
(*They stare at her.*)
DOLL I: A man.
DOLL II: But not her husband.
DOLL I: No, someone else. (Karnad:1975, 48)

The communication between the dolls is very much seminal and symbolic. It clearly suggests the audience that there is someone in Padmini's mind whom she meets in her dreams other than her husband.

Karnad uses dramatic technique as a mediator between the stage and the audience as uses the character of Bhagavata in *Hayavadana*. Bhagavata communicates with the audience directly in the beginning and sets the plot of the play. Through this communication the audience gets an idea about what they are going to witness very soon on the stage. Bhagavata also intervenes in between during the play when the situation demands explanation for the audience. Similarly, *Naga-Mandala* the plot of the play is set through the communication among the flames that have gathered in a dilapidated temple outside a village. The communication among the flames and a man over there provides the settings of the play for the audience.

Karnad successfully brings forth the suppression of women at the hands of patriarchy through the communication pattern they follow. In the play *Naga-Mandala*, Rani is excommunicated in and out. She is locked in the house so that she can't communicate with anyone outside the house. Her husband Appanna also hardly communicates with her. The only communication that takes place between them is:

RANI: Listen – (*Fumbling for words*) Listen – I feel – frightened – alone at night –
APPANNA: What is there to be scared of? Just keep to yourself. No one will bother you. Rice!
(*Pause.*)

RANI: Please, you could –
APPANNA: Look, I don't like idle chatter. Do as you are told, you understand?

(*Finishes his meal, gets up*.)
I'll be back tomorrow, for lunch. (Karnad:1990, 7)

We find no trace of affection and care as there should be in the communication between a husband and wife. This communication pattern brings forth the lifelessness and dryness in the relationship between Rani and Appanna. As the time moves Appanna suspects that someone definitely communicates with Rani. The excommunication that is imposed upon Rani is a symbol of patriarchy and ownership asserted by Appanna. He never wishes that anything will crack his egoism as a husband. He keeps a dog and then a mongoose outside the house when he is outside to keep strict watch on Rani. The dog and the mongoose symbolise the barriers which are deliberately created by Appanna so that Rani cannot communicate with anyone in the world outside. A blind lady named Kurudavva plays the role of an agent of communication. She comes to knows about the loveless relations between Rani and her husband Appanna.

For Kurudavva, her son Kappanna is the only source of communication. She is a blind and carried away by her son Kappanna on his back. He informs her ever details in the village. Through her son Kurudavva comes to know about the plight of Rani. She also provides the solution on her problem. In the later part, Kappanna goes on missing who was the agent of communication for Kurudavva. Without her son, she runs helter-skelter in the village like a mad person. She discloses her mind to Rani:

KURUDAVVA: Now I wander about calling him. They tell me
he is not in the village. They think I am mad. I know he is
not here. I know he won't come back. But what can I do?
How can I sit in the house doing nothing? I must do
something for him. (Karnad:1990, 38)

Her madness is because of the loss of communication as her son is not available as an agent of communication for her.

Appanna never shares a word of affection with his wife, Rani. She is also silenced by Naga in the form of Appanna though he showers the love and affection Rani pines for. Whenever Rani is confused of the dual behaviour of Appanna, she tries to interrogate the truth and every time she is silenced. This process of silencing is a symbol of patriarchal manipulation in the society. Rani is in chaotic mentality as she is unable to understand the weird behaviour of her husband. She expresses her plight as she is denied any type of proper communication:

NAGA: (*Sadly*) I realize it cannot remain a secret for long. That is why
I said, as long as possible. Please, do as I tell you.
RANI: (*Blankly*) Yes, I shall. Don't ask questions. Do as I tell you.
Don't ask questions. Do as I tell you. I won't ask questions.
I shall do what you tell me. Scowls in the day. Embraces
at night. The face in the morning unrelated to the touch at night.
But day or night, one motto does not change: Don't ask questions.
Do as I tell you. (Karnad:1990, 32)

The communication pattern doesn't change between Rani and her husband Appanna or Naga in the form of Appanna. Appanna doesn't show any affection for her and thereby adopts a one way communication where he plays the role of sender and Rani is on receiving end. Naga in the form of Appanna loves Rani like anything, adores her, calls her as 'queen' but still she is denied the communication when needs answers of her some questions. Such type of mono way of communication between husband and wife is still observed in one or other form that affects the marital relations at its worst level. We observe the worst level of communication on the part of Appanna when he comes to know about the pregnancy of his wife. He uses abusive and unconstitutional language for her.

APPANNA: Aren't you ashamed to admit it, you harlot? I locked you in,
and yet you managed to find a lover! Tell me who it is. Who did you go with your sari off?
RANI: I swear to you I haven't done anything wrong!
APPANNA: You haven't? And yet you have a bloated tummy. Just
pumped air into it, did you? And you think I'll let you get away
with that? You shame me in front of the whole village, you
darken my face, you slut – ! (Karnad:1990, 33)

The above communication brings into light the darker side of Appanna's personality. He is dishonest, disloyal, and treacherous with his wife and expects loyalty on her part. He accuses her of adultery in front of the whole village.

To conclude, one can observe various patterns of communication in the plays Hayavadana and Nagamandala by Girish Karnad. These patterns play a seminal role as they highlight social context in the play. Sometimes they prove as supplementary to convey the thorough of the text. Karnad uses tools of non-verbal communication with verbal

communication to make the situation clearer for the audience. He also makes the non-human things to communicate to explore the psyche of the characters on the stage. He is the master to use such techniques on the stage and there is no question in it.

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"Importance of Knowledge Management in Academic Libraries in India".

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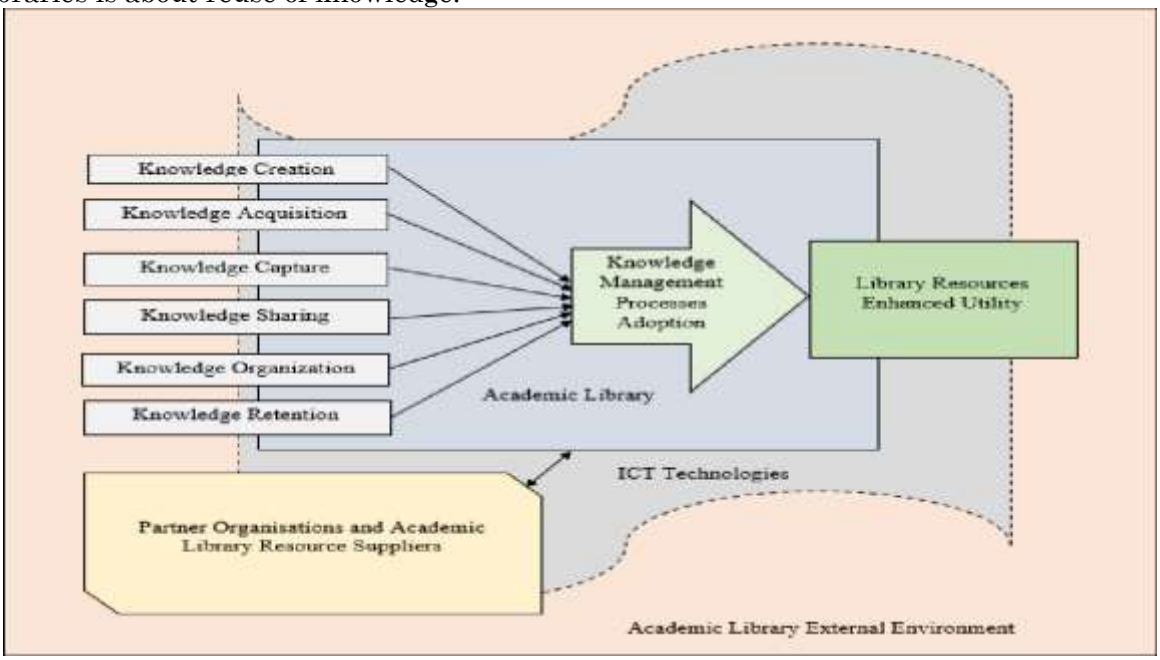
Summary:
The services provided by librarians and information specialists may be enhanced with the use of knowledge management. Knowledge specialists in the information industry need to rethink their identities. Organization-wide implementation of knowledge management to facilitate communication and collaboration across silos. Whoever will put it to the greatest use in furthering the organization's objectives. It facilitates the collection, categorization, and dissemination of knowledge among groups bound by shared interests. Nowadays, knowledge management is a useful resource. Help organisations and governments manage their knowledge more effectively. Knowledge management is an Apply best management practices in the form of human resources. Knowledge is a feeling. Knowledge Management Folder information, textual information, will be a system that users can search and display. Data stored digitally includes paper documents, photographs, emails, faxes, audio files, video files, etc.
Keywords: ICT, Information and Knowledge Management, Library and Information Science.

Introduction

The KM system is a tangible, all-encompassing entity. Ordered to gather electronic information creates a virtual model of decentralised organisation and contains as much variety as any other information source. KM will be a key requirement. All successful companies in the coming years. Library Knowledge Management Knowledge management in libraries is about reuse of knowledge.



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1. The acquiring process: actively seeking out previously acquired information, Recognize the requirements, and start searching Connect with the user in a variety of ways and in an acceptable format.
2. The formation: Training and Research
3. Package design: Creating content, whether it books or magazines, and doing design and editing work.
4. Make use of what you already know.
5. Make a database of your information.
6. Establishing a foundation of knowledge.
7: Repurpose previously acquired information

Software engineering and product development expertise. In our highly informational era, the value of knowledge management cannot be overstated. What the library is doing. The worth of KM is proportional to the efficiency with which members of the organisation can cope with the present and plan for the future. Managed knowledge does not require on-demand access. The situation is based on individual or The crew brought the situation. As required Access management knowledge to face every situation Collaborate with anyone in the organization. Similar situations have been known before.

Benefits of Knowledge Management

1. Reduce the exodus of intellectuals from the coast arranged.
2. Reduce costs by reducing economies of scale and archiving Extent of getting information from outside
3. Evidence
4. Increase productivity by imparting knowledge Fast and easy.
5. Break down internal communication barriers arranged.

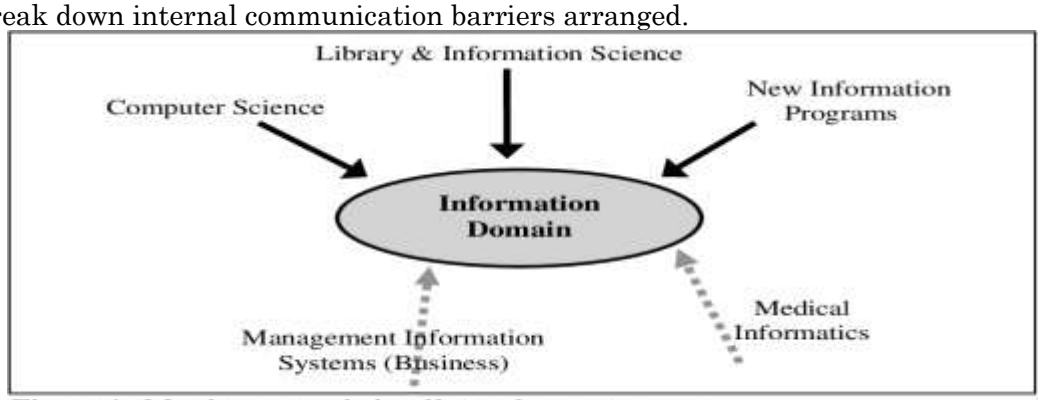

Figure 1: Moving towards intellectual convergence
Source: Durrance (2004)

Knowing this, knowledge management is essential for libraries. To better the library's services, to record and to produce data that would allow users to contribute and benefit from their knowledge Facilitate all processes in a way that is accessible to the user. miles and data. Problems in Managing Knowledge. Establishing what constitutes "useful" information inside the company. Having data about something does not always make you knowledgeable about it. In the end, it doesn't matter how much you know. It is crucial to get useful information from Big Data.

1. Knowledge management centres on those who use it. Relationship between what individuals know and the means by which that knowledge is supported Aims of the company or group. It pulls down people's skills, intuition, ideas, and drives. In other words, this is not some kind of technical idea. Knowledge management may be aided by technology; however, we advise you to avoid bringing up the point right away.
2. The system of strategic goals is connected to the knowledge management goals. This is all the data that is used. Extremely significant, applicable, and dispassionate.
3. K M is continually evolving. Know-how management doesn't have any such unbreakable rules. Sometimes it's merely "not out of date" practise since knowledge is continuously being evaluated, updated, and amended. This is an evolving and persistent procedure.
4. The value of K M is rising. Collaboration relies on the sharing of knowledge, networks, and alliances. Businesses may engage in a two-way dialogue with subject-matter experts. Offer guidance and training to managers based on the most recent advancements in the sector. Integration between the Foundation and its constituents is facilitated by forums, councils, and boards.
5. To sum up, KM is a visionary. The approach uses commercial language rather than technical jargon, and it aims to inspire confidence and a shared sense of purpose among managers. Shared ambition. Construction of necessary facilities or company-wide architectural plans.

Knowledge management is essential. Knowledge management-based projects have been shown to be useful by many different types of companies. As a result of these encounters, experts in knowledge management Encourage productive rivalry between businesses and groups. To be effective in the modern world, people must always be active. I solved a problem for a translation service that has been bothering me for a while. Learn from your mistakes and move forward. simultaneous cross-time-space knowledge sharing and organisation building Effectively putting acquired information to use is crucial.

Consider the following Key Questions –

(a) Find a way to transfer knowledge to groups or people who can reuse it.
(b) Interpreting the learner Others can use it.
(c) Receiving group or individual adoption Knowledge applied in a specific context. Knowledge Management Technology Library Information Technology is K.M. In the library Gaining knowledge is K.M. There are Library. Broadly I.T. application Human brain alone is not enough to acquire knowledge. to carry out such a crucial role in contemporary society, given the rapid pace at which scientific and technological advances are being made Connections between sources of information and those who use them Informatics and computer networks. This configuration knows that the network exists.

Libraries have a crucial role in the creation of works of thought. Library building and a few methods and instruments The ability to work together is one of K.M.'s greatest strengths. Integrations with pre-existing email and web System and web-based process introduction. Where do people in the community save and swap paperwork? Put together a central repository of knowledge and use it to facilitate communication amongst interested parties. These hubs will serve as such venues, hosting research, discussion, and more. You may use this to enrol in a training course that is offered online.

Conclusion

Knowledge management, as was previously said, offers as a group, we can foster lasting innovation and knowledge exchange via collaboration. Do things that will help you to learn. The library industry can take a page out of the corporate world's playbook. Concerns about business, competition, privacy, and finances surround libraries that practise knowledge management. The field of library science provides a wealth of applicable information and skills for the field of knowledge management. Scholars are the greatest at generating new information. K.M. be an essential component of every successful business Within the ensuing years. Without a proper foundation, knowledge management system implementation will lag behind those who already have one in place. The System for Managing Knowledge Rising productivity is a long-term investment that will bear fruit. To better serve their patrons, librarians should provide training to their employees. The right kind of IT infrastructure, including a library of useful applications and knowledge management systems, is made available. Upgrade your services so that they are more quick, accurate, and convenient for your users.

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Research Paper

Analysis of the Indian Pharmaceutical Sector: Current Status, Challenges and Opportunities

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Abstract

An essential component of society is business enterprise. A corporate firm's motivation will immediately influence society, including the environment, customers, employees, suppliers, and other stakeholders. The Indian pharmaceutical market is in a good position because there are a lot of medications that have recently lost their patents. Pharmaceutical manufacturers are focusing on manufacturing, and this trend is anticipated to continue as pharmaceuticals' share of the Indian and global pharmaceutical markets rises. The pharmaceutical regulatory environment is becoming increasingly strict on a global scale. The inability of pharmaceutical companies in India to actively participate in international markets was hampered by several additional problems, including uncertainty over the market's maturity level, the importance of investing in this industry, and differences in regulatory rigour. This article aims to describe the pharmaceutical market environment in India and throughout the world. Additionally, it covers the important difficulties that are present. It also considers a few indicators that show the pharmaceutical sector in India has a promising future.

Keywords: Pharmaceutical products, Pharma Market; Indian Companies, Challenges

Introduction

The need for health care services has expanded as health has emerged as one of the most important problems in many societies. Most nations have seen a rise in health spending due to these high needs. The pharmaceutical business is not an exception in this respect, and it is one of the sectors that has significantly contributed to rising healthcare costs [1,2]. On the other hand, medicine is recognized as the key and most efficient factor in enhancing public health and controlling specific diseases among individuals [3].

Furthermore, the two biggest issues that nations confront globally are enhancing public health and growing the pharmaceutical business. Governments closely monitor and regulate the pharmaceutical business since it is one of the most important components of any health system. Pharmaceutical firms' development and expansion have been significantly impacted by the implementation of some severe regulations and the government's microscopic oversight. A poor choice of laws or policies might end the existence of several pharmaceutical businesses, endangering the general public's health in the process. On the other hand, applying appropriate rules will aid in the growth and development of this business and ensure that pharmaceuticals are available where they should be, at the correct price, and of the highest possible quality, eventually improving community health. Meanwhile, pharmaceutical firms should work to adapt to these regulations to, first, retain their existing state and, second, spur expansion and growth by utilizing current opportunities or by converting threats into opportunities [4,5].

India's highly specialized pharmaceutical business has shown tremendous potential in recent decades. In terms of value, the sector came in at number ten, but volume rankings put it at number three. By 2023, the Indian pharmaceutical industry will reach USD 55 billion; under a future development scenario, it might even reach USD 70 billion. [6].

Indian Pharmaceutical Industry

Over the last 50 years, the Indian pharmaceutical sector has experienced a substantial expansion in the domestic and international markets. As a result, the proportion of "Made in India" medications in the Indian pharma sector increased to 80% in 2020 from providing just 5% of the world's medicine consumption in 1969 (95% share with global pharma). More significantly, over the same time, the nation also gained a dominant position in the worldwide generic drugs market and is today referred to as the "Pharmacy of the world" [7].

More than 20% of the volume of the worldwide generics market and 62% of the global demand for vaccines are contributed by the Indian pharmaceutical sector. As a result, the sector sometimes called the "archetype of affordable healthcare," has significantly improved public health outcomes in India and worldwide [8].

One of the top 10 industries for lowering the trade imbalance and luring in Foreign Direct Investment (FDI), the pharmaceutical industry has been a key contributor to India's economic growth. Between April 2000 and June 2020, the medicines and pharmaceuticals industry received cumulative FDI inflows totalling US$16.54 billion [9]. Additionally, the trade surplus it has been producing, US$20.7 billion in pharmaceutical exports and US$2.31 billion in imports in FY20, makes it of utmost significance [10]. The industry is third in volume and 14th in value globally, employing about 2.7 million people directly or indirectly [11,12].

In their article titled "Opportunities and challenges for Indian pharmaceutical companies in overseas markets and need of digital tools for sustainable success," Reddy and Rao noted that Indian pharmaceutical companies are finding it difficult to survive in international markets as a result of competition, a lack of market knowledge, a convoluted regulatory pathway, and a failure to adopt the most recent digital technologies. The major goal of the study is to determine how various digital technologies may be used by various pharma sector disciplines to succeed in international markets. They discover a definite demand for domain-based digital tools for Indian pharmaceutical businesses to compete and survive in international markets [13].

The challenges, opportunities, and performance of the Indian pharmaceutical industry post-TRIPS noted that the country's patent law was changed to be compatible with the agreement on trade-related aspects of intellectual property rights (TRIPS), but that this change has created many difficulties for India's generic pharmaceutical producers. They learn that the industry's top generic businesses have inconsistent performance [14]

Objectives

This study aims to examine the Indian pharmaceutical industry's development possibilities. The report discusses its present situation, development pattern, several difficulties, and its outlook for the future. The study also focuses on stringent regulatory requirements in existing and developing economies that prevent the entry of new players and prevent this sector from expanding. This process entails thoroughly assessing the literature from secondary databases, reports, and research papers on the pharmaceutical business, IBEF, EY, McKinsey and Company studies, etc.

Indian Pharmaceutical Industry's Challenges

The regulatory environment for pharmacies across the world is becoming increasingly restrictive. To compete in the global market, the Indian pharmaceutical sector needs a strong regulatory framework. However, the industry is now dealing with several difficulties, including:

Lack of a consistent environment for pricing and policy- This problem is brought on by India's frequent and unforeseen domestic pricing policy changes. For investments and inventions, it has produced a hazy atmosphere. IPA recommends that the government and stakeholders collaborate to create a strategy for making pharmaceuticals for Indian patients that are reasonably priced.

Lack of competencies in the innovation sector- Despite India's abundant talent and labour. The government must invest in research projects and people to boost India's innovation. The subjectivity in some regulatory decision-making processes should be eliminated, and the government should encourage clinical research.

Impact of outside markets-According to reports, India depends largely on other nations for its active pharmaceutical ingredients (API) and other intermediates. For example, China is the source of imports for 80% of APIs. India is thus at the mercy of erratic price changes and supply interruptions. To stabilize supply, it is required to implement infrastructure improvements in the area of internal facilities.

Quality compliance investigation: Since 2009, India has received the most FDA inspections; as a result, ongoing investments in raising quality standards will divert funds away from other areas of development and growth.

Clinical trials: These are the industry's gold standard procedures for assessing the efficacy and safety of medications, and they must be validated before receiving regulatory clearance. India is evolving as a pharmacy, R&D, and clinical trial knowledge centre. To promote the development of affordable treatments for various illnesses, including diarrhoea, TB, malaria, meningitis, etc., the pharmaceutical sector must expand. Additionally, clinical trial regulatory delays are seriously impeding this prospect. As a result, the rate of innovation and the expansion of the clinical trial sector have been hampered. Additionally, issues including inadequate regulatory monitoring, the requirement for protections for informed consent for vulnerable groups, and compensation standards for patients for trial-related fatalities have come to light as major worries. As a result, our nation is losing out on many potentials because of the abovementioned restrictions during clinical trials.

Consistent code on sales and marketing: To organize marketing activities and avoid corruption, the Department of Pharma has provided rules on a consistent code of sales and marketing practices that apply to all pharmaceutical enterprises. However, the tax authorities utilize the Central Board of Direct Taxes (CBDT) circular based on MCI recommendations to decide what sales and marketing costs are allowed. The Department of Pharma rules differ from the MCI guidelines on sales and marketing methods. Therefore, the Department of Pharma's and MCI's standards have distinct benchmarks. Clarity is increasingly desired from the viewpoints of the tax authorities and the pharmaceutical business.

Mandatory licensing: The pharmaceutical sector currently adheres to tight laws and regulations on manufacturing and good manufacturing practices for developing drugs in domestic and foreign markets. Both Indian and international pharmaceutical enterprises will become unstable due to the widespread practice of forced licensing. However, drug affordability and the need to preserve intellectual property should coexist harmoniously.

Producing high-quality medications: The Indian pharmaceutical sector effectively produces reasonably priced medications for the domestic market and export. Overseas markets must have growing faith in Indian-made medicines. To achieve this, the authorities must establish quality standards on par with international norms through suitable legislation and guarantee that these requirements are strictly upheld.

It would boost the Indian pharmaceutical sector, which makes up a significant portion of the Indian economy, by holistically concentrating on the abovementioned issues [15].

Conclusion

COVID-19 has well demonstrated the necessity of a good healthcare system, and a country's economy and society may be at risk if one does not exist. Applying lessons from the difficulties and best practices that arose throughout the pandemic is appropriate as India continues to combat COVID-19 and stabilize its economic growth trajectory. The infrastructure for providing healthcare must be quickly built and made available to the whole population. The healthcare and economic results of the nation have greatly benefited from the contributions of the Indian pharmaceutical sector. The epidemic has increased the industry's potential and problems in many ways. India has a chance because of the widening trust gap with China, but Vietnam and Malaysia are becoming increasingly competitive. Two-thirds of India's bulk pharmaceuticals or drug intermediates are imports from China.

The sector must leverage its advantages while taking a major step toward innovation to succeed in the post-pandemic future. New capabilities must be implemented across all business processes to improve efficiency and aid the industry in moving up the value chain. The government must provide enablers and a business climate that promotes growth. The report's following chapters go through the chances and obstacles the nation has in achieving its goal of fair and long-term access to healthcare and the best course of action. Additionally, it gives the sector insight into realising its goal of being the go-to source for cutting-edge pharmaceuticals worldwide. The Indian pharmaceutical sector has the chance to build on its strengths and implement significant reforms to rekindle innovation-led industrial growth and achieve the goal of US$130 billion by 2030.

The pharmaceutical market is growing due to a variety of factors, including increasing pressure to reduce healthcare costs, an increase in the prevalence of several chronic diseases, encouraging findings from numerous clinical trials, and rising demand for a variety of medicinal treatments, such as for rheumatoid arthritis, blood disorders, and other ailments. In addition, an increasing number of drugs are also going off-patent, which is driving up drug demand. But obstacles, including high production costs and complexity, as well as strict regulatory requirements in both developed and emerging nations, limit the entry of new competitors and inhibit the growth of this industry. Therefore, it is important to foster a dynamic business environment to provide all participants with the knowledge and precise inventory needed to compete in business encounters at the market entry stage and get access to local and foreign markets.

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Research Paper
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Analysis of Services and Facilities Provided Through Academic Digital Libraries In Higher Education System In India

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Abstract

Digital transformation in the education sector has implied the involvement of sustainable management, in order to adapt to the changes imposed by new technologies. A dedicated unit for the purpose of orchestrating the building of digital infrastructure, digital content and capacity building will be created in the Ministry to look after the e-education needs of both school and higher education. Since technology is rapidly evolving, and needs specialists to deliver high quality e-learning, a vibrant ecosystem has to be encouraged to create solutions that not only solve India's challenges of scale, diversity, equity, but also evolve in keeping with the rapid changes in technology, whose half-life reduces with each passing year. This centre will, therefore, consist of experts drawn from the field of administration, education, educational technology, digital pedagogy and assessment, e-governance, etc.

Empirically explored digital transformation of the basic education of the young generation initiated by the COVID -19 pandemic. Reveals a variety of digital divides emerging and being reinforced as well as barriers to digital transformation encountered. Makes visible children's basic education as a significant area of concern for information management research. Argues we can offer a valuable contribution to children's basic education and teacher education our expertise on digital transformation.

Key words: digital transformation, digital divides, e-learning, educational technology, digital infrastructure

Introduction:

In the 21st century known as the digital age, with globalization, structures in almost every area is influenced rapidly by developing and changing information and communication technologies. It is impossible for education to remain insensitive to these developments and changes. Digital learning is replacing traditional educational methods more and more every day. With how rapidly classrooms are changing, it is best to forget methods you may remember from when you were in school and start thinking about newer teaching and learning techniques based on digital learning tools and technologies. The inclusion of digital learning in the classrooms can vary from simply using tablets instead of paper to using elaborate software programs and equipment as opposed to the simple pen.

The pandemic forced us to take an extraordinary digital leap in our everyday life and practices, including our children and their education. In a flash, their education was transformed from a traditional classroom practice to a remote, digitalized one. Suddenly, an entire generation of children had to start managing and mastering with digital tools to participate in their compulsory basic education. This required significant adjustments not only from children and their teachers, but also from their families, school administration and the entire society. Teachers and schools had to take the lead in this sudden, unexpected digital transformation of children's basic education, without being well prepared for it. Even if digitalization in education has been a hot topic already for ages within different disciplines and digital tools are extensively already utilized in schools, teachers, schools and educational administration have been poorly prepared for acting as leaders and change agents in digital transformation.

The teachers have showed great resilience, creativity and perseverance in responding to the challenging situation of the COVID-19. Some have identified valuable digital practices that they wish to utilize also in the future. Schools and educational administration of the city may have provided valuable support. However, the teachers expressed worries regarding their pupils, having lack of access to some of them and having a fear of the problems caused by the lock-down for their future education.

This could entail using sites, services, programs, teaching tools, and technologies like study aids built for at-home use. Even social networks and communication platforms can be used to create and manage digital assignments and agendas. Irrespective of how much technology is integrated into the classroom, digital learning has come to play a crucial role in education. It empowers students by getting them to be more interested in learning and expanding their horizons. Here is how digital learning is a setup from traditional education methods.

Digital transformation of our education system will require commitment from all stakeholders. There is a growing need to integrate the smart use of digital technologies to enhance the teaching-learning experience. New technologies in education such as cloud computing, MOOCs, smart boards etc. are already impacting the teaching-learning process in a

big way. Leadership support will play a crucial role to make digital transformation in education is effective in schools and colleges.

Academic leaders need to adopt new working ways and approaches that involve the use of innovative technology. Adoption of new educational technologies will enable teachers to make drastic improvements in academic delivery and students' assessment process. It can enable a better learning experience for students and improve job prospects .One of the major reasons for the inclusion of digital technologies in education transformation is the development of more personalized content with greater access to courses for skill development. However, digitalization will only be effective if the technology is used as a tool to drive systemic and institutional changes to impart knowledge and develop job skills and not merely to automate and fast track the process of learning.

Digital transformation is slow process in education which became an urgent topic in the spring of 2020 due to COVID-19. In mid March, the Government closed the schools and universities and the classes were held in online form. This faced both students and teachers with unexpected challenges.

Advantages Of Digital Transformation

Online education can enhance instructional learning, especially in higher education by creating a blended learning experience that combines both traditional classroom-based methods and modern technology. Another important advantage of the digital transformation in education is in the management of education itself.

Challenges In Digital Transformation

Meanwhile, millions from Government schools and colleges, especially in rural areas, will not even have access to education due to Covid -19 the lockdown. According to the Key Indicators of Household Social Consumption on Education in India report, based on the 2017-18 National Sample Survey, less than 15% of rural Indian households have Internet (as opposed to 42% urban Indian households). A mere 13% of people surveyed (aged above five) in rural areas just 8.5% of females could use the Internet.

The poorest households cannot afford a smart phone or a computer. Several parents are not happy with this new set-up. "They complain of increased screen time for children. There are a few parents who aren't comfortable with technology themselves they crib about it. So, their children, too, might look at it negatively. At times, classes get disturbed due to Internet issues. In nuclear families, especially, parents might have to miss work to take care of their children. Some of them could be healthcare professionals, who are desperately needed to mitigate the pandemic.

A Culture Of Transformation

A Culture of Transformation Digital Transformation is not about technology, it's about culture. Through a digitalization of the learning experience, both teachers and students are able to improve their skills, with a common goal: to create a more engaging and effective education process. Here are some ways that digital tools are shifting education

Philosophy Of Teaching

Every teacher has a unique teaching style. Over a period, they would have built a rapport with the children. This is done through observing their body language in class, their interaction with classmates how it is different in small groups and large groups. Now, they just see them on computer screens and there could be a lot of disturbances.

Digital infrastructure:

There is a need to invest in creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration. This will ensure that the technology-based solutions do not become outdated with the rapid advances in technology.

Online teaching platform and tools:

Appropriate existing e-learning platforms such as SWAYAM, DIKSHA, will be extended to provide teachers with a structured, user-friendly, rich set of assistive tools for monitoring progress of learners. Tools, such as, two-way video and two way-audio interfaces for holding online classes are a real necessity as the present pandemic has shown.

Addressing the digital divide:

Given the fact that there still persists a substantial section of the population whose digital access is highly limited, the existing mass media, such as television, radio, and community radio will be extensively used for telecast and broadcasts. Such educational programmes will be made available 24/7 in different languages to cater to the varying needs of the student population. A special focus on content in all Indian languages will be emphasized and required; digital content will need to reach the teachers and students in their medium of instruction as far as possible.

Online assessment and examinations:

Appropriate bodies, such as the proposed National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies will design and implement assessment

frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics. Studies will be undertaken to pilot new ways of assessment using education technologies focusing on 21st century skills

Why Digital Transformation For Education?

Gone are the days when students sit in the classroom and learn solely by listening to lectures. Today, education must be collaborative and interactive. Teachers are making drastic changes to the way they approach instruction, with technology in the classroom playing a major role. Digital transformation positively impacts student learning by opening a world of endless possibilities and collaboration.

What is digital transformation?

It is NOT a basic hardware or software upgrade (although that can play a part). Digital transformation is a physical and philosophical change designed to meet the ever growing demands of your students, faculty and campus to create a learning environment where everything connects. This is an ecosystem that combines technology, services and security to bridge the digital gap to create collaborative, interactive and personalized learning experiences.

What issues are driving digital transformation?

1. Campus security
2. Information security
3. Student success
4. IT strategy
5. Data enablement
6. Student centric services
7. Affordability
8. Digital integration
9. Artificial intelligence

How do you create a digitally transformed campus?

1. Build a strong IT foundation
2. Foster successful students
3. Create a safe campus
4. Deliver state-of-the-art cyber security
5. Deploy operational efficiencies

What do I need to do in order to digitally transform?

Digital transformation starts with a strategy. A clearly defined strategy that leverages opportunities presented by the new technology while meeting the objectives. The following four steps will help you develop a digital transformation strategy for education:

1. Connect everything to support tomorrow's digital world Set up strong strategic partnerships and build an ecosystem connecting your people, processes and things to build a communications network that is high capacity, secure and smart.
2. Deploy analytics to automate, understand and save money Use real life, real-time data to drive strategic initiatives that improve performance, roll out upgrades and make infrastructure decisions.
3. Roll out new business models "Freemium" software and on-demand services are cheaper, more flexible and simpler to manage than traditional systems, and may be just the ticket for your campus.
4. Move towards a single, simple platform whether it is on-premises or in the cloud, the ultimate goal of digital transformation is to provide a single platform as the foundation of your network and communications infrastructure.

Digital transformation in education: The challenges

To understand how a full and sustainable digital transformation can take place, it's important to examine the potential challenges or roadblocks an institution might face. By understanding such issues it will be possible to overcome them.

1. A reluctance to adapt
2. A reluctance to adapt
3. Data silos
4. A lack of direction or strategy
5. System-based compatibility

Digital transformation in education: The solutions

1. Develop a strategy
2. Train and invest in skills
3. Integrate and leverage digital data
4. Automate
5. Embrace the power of mobile
6. Experiment with emerging technologies
7. Focus on digital citizenship

The digital transformation due to the COVID-19 was not smooth and without challenges but half of the students liked it and they would prefer it in the future. Our analysis allows

drawing a few remarks and conclusions. Firstly, half of the students preferred online education and they are willing to continue it. Secondly, the students who had no technical issues would prefer to use their own devices during the tutorials. Finally, the students who will not prefer online education are divided by technical issues and other concerns.

Online education was considered successful because about half of the students would prefer it in the future. Almost all of these responses agreed upon that weekly class are necessary. Hence, they would like to learn from home with the well established schedule of semesters. Acceptance of rescheduled training like intensive courses would require further investigation because there were no specific questions about it. Current results show that the students think that weekly classes are indispensable. These students did not mention technical issues and had the necessary infrastructure.

Conclusion

Digital transformation is creating a world of difference by rethinking the digital tools that are used in the classroom. Digital tools are driving new levels of collaboration and innovation to create a campus of endless learning possibilities.

At present, education institutions worldwide are faced with multifaceted challenges, including the growing impact of digitalization and changing expectations from students, staff, and faculty. Thanks to the brutality of the corona virus pandemic, digital transformation in education have shifted from important to essential within a few months. It has highlighted the gap that is prevalent in this community between the necessities and 'not' in this period. Further, as this sector becomes competitive, digital transformation is now becoming a must for survival as this new digital world requires educators to adapt and adopt digital technologies, methodologies, and mindsets.

Students enjoyed the digital education and half of them are willing to continue it in the future. Students would prefer to use their own devices during on tutorials which allow some changes in the labour environments. Unfortunately, some students had technical issues which may be caused by the heterogeneous software environment and can be solved with support material. Therefore, the successful utilization of the digital education can be achieved in the near future.

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Research Paper
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Formulation and quality evaluation of Multigrain Neutra-chikki

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Abstract

An organism assimilates food and utilises it for development and maintenance through the process of nutrition, which is an organic process of nourishing or being fed. The study of food and drink in humans is a field of science that provides sources of nutrients for the body. Nutrition is the process of giving the materials required for life in the form of food to cells and organisms. A healthy diet can prevent or treat a number of common health issues.

Chikki a traditional candy delicacy created with groundnut and jaggery is enjoyed by people of all age group in India. An attempt was made to improve its nutritional quality by developing a multigrain Nutra-chikki with pumpkin seed, fennel seed and peanut, and the nutritional assessment were evaluated. The prepared multigrain Nutra-chikki was also organoleptically assessed using a sensory affective hedonic scale.

The results indicates that multigrain Nutra-chikki comprises of protein 14.78 g, fat 16.6 g, and minerals like iron 9.67 mg, calcium 269.9 mg which is nutritionally superior to groundnut chikki. It also showed acceptable sensory score of 8.3 for overall characteristics against groundnut chikki.

Keywords: *Nutraceutical, Chikki, Pumpkin, Fennel, Peanut.*

Introduction

The term "nutraceutical" is a combination of "nutrition" and "pharmaceutical." Nutraceuticals, broadly speaking, are foods or components of foods that significantly alter and maintain the normal physiological processes that support healthy human beings. The food products used as nutraceuticals can be categorised as dietary fibre, prebiotics, probiotics, polyunsaturated fatty acids, antioxidants and other different types of herbal natural foods. These dietary supplements are used to treat a number of illnesses, including diabetes, cholesterol, osteoporosis, cancer, obesity, and cardiovascular disease. Overall, "nutraceutical" has ushered in a new era of medicine and health, one in which the food industry has evolved into a field focused on research. This article aims to educate readers on the benefits of dietary supplements for treating a variety of diseases.[1]

The global market for nutraceuticals, which include herbal and dietary supplements, is expanding quickly and is already worth more than $100 billion USD. Curcumin from turmeric, glucosamine from ginseng, and omega-3 fatty acids from linseed are a few of the popular plant-derived (herbal) nutraceuticals.[2]

Pumpkins seeds are produced all over the world as a vegetable and medicine.[3] Pumpkin seeds are rich in antioxidants, healthy fats, and minerals. Possible benefits of eating pumpkin seeds include boosting bone health, sexual wellbeing, and the immune system.[4,5] It also contains a lot of different amino acids, carotenoids, dietary fiber, vitamins, and minerals. It is a very effective health supplement as a result.[6]

The dried form of fennel, known as saunf, is a storehouse of essential nutrients. Low in calories and high in vitamin C, saunf seeds support the immune system, promote the creation of collagen, and act as a strong antioxidant that scavenges free radicals. Fennel seeds, which are high in manganese, stimulate metabolism, activate enzymes, control blood sugar, and build bones. In addition to these, significant amounts of selenium, calcium, magnesium, potassium, and iron support skin health, regulate blood pressure, and treat anaemia.[7,8]

Thus present study was developed with the intention of incorporating these multigrains such as pumpkin seeds, fennel seeds and peanuts as nutritional source to the traditional Indian sweet jaggery based chikki, which is popular throughout the country and consumed by all the sections of the population.

Materials And Method:

Materials used:

1. Pumpkin seeds:

Pumpkin seeds are a nutrient-dense food that has also demonstrated several medical benefits. It has 2gms of protein, 2gms of fat, and 7 gm of carbohydrates. The seed may be used as a dietary supplement since it contains a high quantity of macro elements (magnesium, phosphorus, and calcium) and a moderate amount of micro elements (calcium, manganese, copper, and zinc)[8].

2. Jaggery:

Traditional Indian sweetener known as jaggery is both readily available and nutritive. The macronutrients included in jaggery provide a variety of health benefits, including antitoxin and

anticancer properties. It has been shown to be superior to white sugar. It is known to create heat and provide a human body with rapid energy. It contains 0.15 gm of proteins, 574.5 calories, 0% fat and 147 gm of carbohydrates[9].

3. Fennel Seeds:

Fennel has long been employed as a carminative ingredient. It could assist in removing the built-up gas from the stomach, reducing bloating. Infants' gas (flatulence) may also be treated with fennel water. The release of digestive secretions required for efficient meal digestion and absorption may be encouraged by fennel seeds. Fennel extract may be employed due to its ability to prevent gastrointestinal injury. But, if you encounter gastrointestinal issues, you must contact your healthcare professional[10].

4. Peanuts:

Interestingly, peanuts do not belong to the nut family. Together with green peas, soybeans, and lentils, they are classed as legumes. The peanut plant most likely originated in South America, most likely in Brazil or Peru. In South America, scientists discovered 3,500-year-old ceramics shaped like peanuts and adorned with peanuts. It contains 39 gm of protein, 850 calories, 73 gm of fats and 24 gm of carbohydrates[11].

Table no. 1: Composition of Chikki[12]

Sr. No	Composition	Ratio
1	Pumpkin Seeds	13gm
2	Jaggery	150gm
3	Fennel	2gm
4	Peanuts	150gm

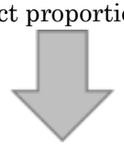
Preparation & Standardization of Chikki:

a. ***Selection of material***

Selection of good quality material was done such as Pumpkin seeds, groundnuts, fennel and Nutraceutical jaggery.

b. ***Weighing of material***

Weighing the material was done for its correct proportion.



c. ***Roasting of Peanuts***

Peanuts were roasted at 120-140 ℃ foe 25 min. The roasted were split, uncovered & germ removed. The peanuts were then crushed into small bits and these were collected into a bowl.

d. ***Roasting of pumpkin seeds:***

Pumpkin seeds were roasted at 50-100 ℃ for 10 min.

e. ***Preparation of jaggery syrup:***

Small quantity of jagerry with 10 ml of water was heated to dissolve.
And the syrup was prepared.

f. ***Preparation of Nutra-chikki:***

The syrup was heated at 148 ℃ to liquify the syrup and then roasted peanuts, pumpkin seeds and fennel were add to it one by one. All the ingredients were mixed together.

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g. ***Dusting of tray:***
Sugar powder was sprinkled on the tray to avoid sticking of the chikki.

h. ***Cutting of chikki:***
With a knife, the chikki was cut into square pieces.

i. ***Packaging:***
Primary packaging and secondary packaging was done.[12,13,14]

Quality analysis

In this analysis we estimated Protein content through Kjendhal method, Fat was estimated by soxhlet method, Carbohydrates, Moisture, Ash and Crude fiber was determined by AOAC, 2002 method.[15,16]

Sensory evaluation

The organoleptic evaluation with respect of colour, odour, texture, taste, appearance and overall acceptability were evaluated by Twelve trained/semi trained judges evaluated using 9 point hedonic scale.[17]

Storage condition

Chikki (100g) were stored at room temperature in polypropylene bags. The product's stability was assessed based on its texture, flavour, taste, appearance, and colour.[18]

Result And Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Figure No. 1: Formulated Chikki

Chemical composition of the prepared Nutra-chikki*:*

The chemical constituents like moisture, protein, fat, ash content of standardized Nutra-chikki and groundnut chikki were analysed and given in table 2.

Table No. 2: Proximate analysis of Chikki

Sensory analysis

Sr. No.	Parameters (per150 gm)	Nutra chikki
1	Protein (g)	14.78g
2	Fat(g)	16.6g
3	Calcium(mg)	269.9mg
4	Iron(mg)	9.67mg
5	Ash(g)	46.5%
6	Moisture(g)	59.87

The nutra-chikki is prepared with combinations of grains was organoleptically accepted with the range of scores (7.8 to 8.4). The nutra-chikki consisting of Pumpkin seeds, fennel, peanuts had an average score of 8.3. Then the prepared chikki was appealed to have good taste and better Nutraceutical value.

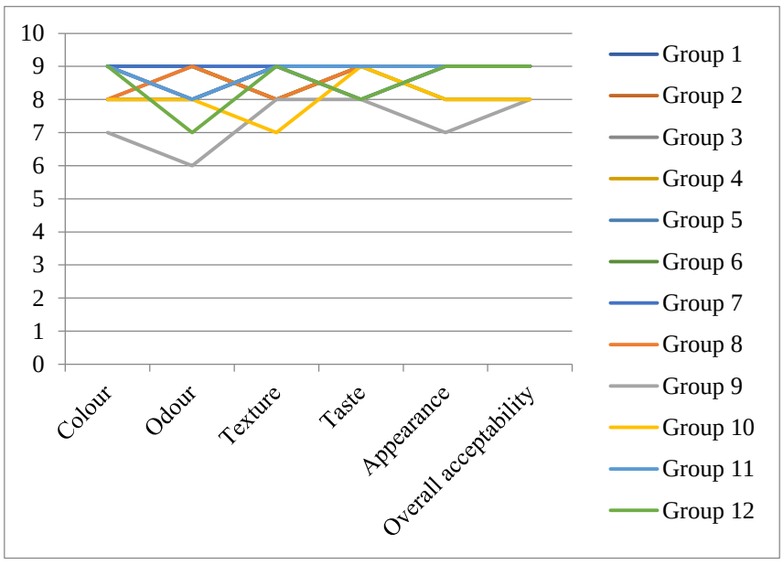

Figure No. 2: Evaluation scores of Prepared Chikki (Hedonic Scale)

Conclusion

The lifestyle modifications have contributed many disorders to the people due to reduction of needed nutrients from the Food they eat. Considering this, the multigrain Nutra-chikki was prepared by mixing of pumpkin seed, fennel seeds and peanuts. The study was carried out with the view to study the health Benefits, physical appearance and evaluation parameters of Nutra-chikki.

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Transgender: Status in India

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Transgender community includes Hijras, Eunuchs, Kothis, Aravanis, Jogappas, Shiv-Shakthis etc., who have been a part of Indian society for centuries. The Vedic and Puranic literatures mention "tritiyaprakriti" meaning the third gender and "napunsaka" meaning someone with the loss of procreativeability. The word *hijra* used in the Indian language appears to be derived from the Persian word hiz, i.e., someone whois effeminate and/or ineffective or incompetent. Another commonly used word is *kinnar*, whereas *chhakka* is used in a derogatory context. Though most of the eunuchs seen todayare begging at traffic signals or during weddings, they were a respected lot during the Mughal rule in the Medieval India. The word "eunuch" is derived from the Greek word "*Euneukhos*" which literally means bed chamber attendant." Hence, they were put in charge of harems due to their emasculation. During the British rule, they were denied civil rights and were considered a separate caste or tribe who did kidnapping and castration of children and danced and dressed-like women.

The LGBTQ group is referred to as the "lesbian, gay, bisexual, transgender, and queer community" which includes those with gender dysphoria and different sexual orientations. The lesbian and gay people have been accepted in many parts of the world and have also got their rights, but the transgender is still without rights.

Prevalence Of Transgender In India

Indian census has never recognized the third gender, i.e., transgender while collecting census data for years. However, in the Census of 2011, data of transgender were collected in the category of "Others" under Gender with details related to their employment, literacy, and caste. The census revealed the total population of transgender to be around 4.88 lakh. The data have been primarily linked to the males section as they are usually counted as men, but on request, they may be counted as women. Due to this, it is impossible to comment on the actual transgender population, though the census has provided an approximate estimate. The 2011 census also reported 55,000 children as transgender identified by their parents.

Current Scenario

The Supreme Court of India passed a unique judgment in April 2014 stating one's sexual orientation as the integral part of personality, dignity, and freedom and identified transgender as a third gender. In the National Legal Services Authority (NLSA) versus Union of India case, the apex court provided the transgender (Hijras and Eunuchs) a legal identity along with seven other directions. Post the NLSA judgment; various courts passed favorable orders for the transgender community.

Based on the NLSA judgment, the Rajya Sabha passed the Rights of Transgender Bill, 2014. However, the government then passed another Bill, Rights for Transgender Persons Bill, 2015, modifying on the 2014 bill by removing the provisions relating to Transgender Rights Court as well as the National and State Commissions. The 2015 Bill underwent further changes, and another bill was introduced in the Lok Sabha in 2016 — the transgender persons (Protection of Rights Bill), which invited criticism from the transgender and activists.[5]

The Transgender Persons (Protection Of Rights) Bill, 2016

The Lok Sabha on December 17, **2018 passed the Transgender (Protection of Rights) Bill,** which seeks to define transgender and prohibit discrimination against them.

Highlights of the Bill-

1. **Prohibition against discrimination**- It prohibits discrimination in relation to opportunities for education, job, health care services, and access to services, accommodation, transport etc. It directs the central and state govts to provide welfare schemes in these areas.
2. **Procedure for transgender recognition**- The certificate of identity has to be obtained from the **District Magistrate**, who will issue the certificate based on the recommendations of a **District Screening Committee**, comprising the Chief Medical Officer, District Social Welfare Officer, Psychologist or Psychiatrist, and a representative of transgender community.
3. **Right of residence**- No transgender person shall be separated from parents or immediate family on the ground of being a transgender.
4. **Offences like compelling a transgender person to beg,** denial of access to a public place, physical and sexual abuse, etc. would attract up to two years' imprisonment and a fine.
5. The bill **Criminalises Begging by Transgender persons** so as to induce them to undertake other sustainable vocations.

Need for a revised bill/ Concerns of 2016 bill:

6. **Against self-identified gender expression**: Under this district screening committee's assent was required for getting transgender certificate which undermined **Right of Self Identification** as per NALSA judgement.
7. **No reservation**: The bill was silent on Affirmative actions regarding transgenders and no reservation in jobs or education was proposed.
8. **Criminalization of begging:** It made transgender communities more vulnerable, as they are forced to do begging due to lack of employment opportunities and criminalizing the same was a threat to their livelihood.
9. **Limited protection against sexual abuse:** The bill failed to accord equal protection to transgenders in consonance with women as many offences under the IPC such as rape, stalking, sexual harassment etc are applicable only if the victim is female. For example, definition of rape under Section 376 IPC deals with crime committed against a female but doesn't mention transgender. Further the bill made "sexual abuse" punishable, with a disproportionate punishment of imprisonment only up to 2 years
10. **No civil rights recognized:** The Bill didn't catered to civil rights such as marriage, civil partnership, adoption and property rights.
11. **National Commission not enough**: The bill proposed a transgender commission at the national level which was not enough. The need is to establish a welfare board for transgender, and a helpline number for those in distress at regional and local levels.
12. **Bar on separation from family:** There was a bar on forcible separation of transgender persons from their families, except through court orders. However, it was within the family that many transgender persons faced harassment and abuse, and often felt driven to flee their homes
13. **The Transgender Persons (Protection of Rights) Bill, 2019**
14. The **Transgender Persons (Protection of Rights) Bill,** 2019 was passed by the Lok Sabha in August, 2019 and now Rajya Sabha has also passed it.

Key Provisions:

1. **Definition of a transgender person:** The Bill defines a transgender person as one whose gender does not match the gender assigned at birth. It includes trans-men and trans-women, persons with intersex variations, gender-queers, and persons with socio-cultural identities, such as kinnar and hijra.
2. **Prohibition against discrimination:** The Bill prohibits the discrimination against a transgender person, including denial of service or unfair treatment.
3. **Right of residence:** Every transgender person shall have a right to reside and be included in his household. If the immediate family is unable to care for the transgender person, the person may be placed in a rehabilitation centre, on the orders of a competent court.
4. **Employment:** No government or private entity can discriminate against a transgender person in employment matters, including recruitment, and promotion. Every establishment is required to designate a person to be a complaint officer to deal with complaints in relation to the Act.
5. **Education:** Educational institutions funded or recognised by the relevant government shall provide inclusive education, sports and recreational facilities for transgender persons, without discrimination.
6. **Health care:** The government must take steps to provide health facilities to transgender persons including separate HIV surveillance centres, and sex reassignment surgeries.
7. **Certificate of identity for a transgender person:** A transgender person may make an application to the District Magistrate for a certificate of identity, indicating the gender as 'transgender'. A revised certificate may be obtained only if the individual undergoes surgery to change their gender either as a male or a female.
8. **Welfare measures by the government:** The Bill states that the relevant government will take measures to ensure the full inclusion and participation of transgender persons in society.
9. It must also take steps for their rescue and rehabilitation, vocational training and self-employment, create schemes that are transgender sensitive, and promote their participation in cultural activities.

Key issues and analysis

The Supreme Court has held that the right to self-identification of gender is part of the right to dignity and autonomy under Article 21 of the Constitution. However, objective criteria may be required to determineone's gender to be eligible for entitlements.

The Bill states that a person recognized as "transgender" would have the right to "self-perceived' gender identity. However, it does not provide for the enforcement of such a right. A District Screening Committee would issue a certificate of identity to recognize transgender persons.

The definition of "transgender persons" in the Bill is at variance with the definitions recognized by internationalbodies and experts in India.

The Bill includes terms such as "trans-men," "trans-women," persons with "intersex

variations," and "gender-queers" in its definition of transgender persons. However, these terms have not been defined.[6]

There are several other areas which need clarifications such as certain criminal and personal laws which are currentlyin existence and only recognize the genders of "man" and "woman." It is unclear how such laws would apply to transgender persons who may not identify with either of the two genders. Hence, these laws would need amendments.

Lacunas addressed from Previous Bill:

1. **Decriminalised Begging:** Transgenders are forced to beg owing to lack of employment opportunities and criminalising the same was grave injustice for them due to this the new bill decriminalised begging by transgenders.
2. **No District Screening Committee:** In earlier bill screening committee was to give its assent to District Magistrate for issuing certificate of identity which undermined right of self-determination, now certificate will be issued after self-declaration by a person in front of district magistrate.

Remaining Bottlenecks:

1. **Problem of Nomenclature:** A more comprehensive term like LGBTQ (Lesbian, Gay, Bisexual, Transgender, Queer) would have been more appropriate rather than focusing on rights of transgenders only.
2. **Against the Spirit of Self Perceived Identity**: The Bill states that a person will be recognised as 'transgender' on the basis of a Certificate of Identity issued by a District Magistrate. In such a case, it is **unclear what the term 'self-perceived' gender identity** entails and how it will be enforced.
3. **No Review Mechanism:** If a transgender person is denied a Certificate of Identity, the Bill does not provide a mechanism for appeal or review of such decision of the District Magistrate.
4. **No role of Chief Medical Officer:** The Standing Committee, emphasised on the importance of the role of the Chief Medical Officer to check any potential misuse of the certificate. However, the 2019 Bill removes the provisions for a District Screening Committee and leaves the power to issue the Certificate with the District Magistrate, based on procedure notified through rules.
5. **Ambiguity on other rights**: Currently several criminal and civil laws recognise two categories of gender i.e. man and woman. The Bill recognises a third gender i.e. 'transgender'. However, the Bill does not clarify how the existing laws will apply to transgender persons.
6. **Compartmentalization of Discrimination**: Bill expressly prohibits discrimination against a transgender person, **only on nine types** of discriminatory acts. Discrimination is a multidimensional concept and to name just nine types is a travesty of justice.
7. **No Reservation:** In the **NALSA judgement,** the state and central govts were asked to extend backward class reservation to transgenders in education and public employment. But the bill fails to address that issue.
8. **Lighter Sentences:** There are lighter punishments for several criminal offences, such as "sexual abuse" and "physical abuse" if they are committed against transgender people in comparison to females.
9. **National Commission not enough**: A transgender commission at the national level is not enough. There is need for a welfare board for transgender, and a helpline number for those in distress at regional and local levels.
10. **Sex Selective Reassignmnet Surgeries:** Some activists are criticising this provision as according to him it is defying the order of nature and encouraging forceful or non consensual sex reassignmnet surgeries.

Way Forward:

More State level initiatives are needed for augmenting their welfare like:

1. **Tamil Nadu** established a **transgender welfare board i**n 2008.
2. **Kerala** brought the '**State Policy for Transgenders in Kerala 2015'** to provide the "right to live with dignity." It was the first state to have a transgender policy.
3. **Odisha** is the first state to give transgender people social welfare benefits.
4. **Andhra Pradesh** also announced pension scheme for transgender community.

1. **Socio Economic support**: Provide opportunities in social and economic activities by encouraging their incorporation in government initiatives and bringing reservation for them in education and employment. **Ernakulam District Panchayat** helped 6 transgender people to open Kerala's 1st Transgender run hotel named **Ruchimudra**.
2. **Grassroot Support:** Local governments need to play a positive and proactive role in removal of taboos and discrimination. Moreover, reservation in panchayats can also be done to empower them.
3. **Child Protection laws:** It needs to be strengthened to address issues faced by transgender adolescents. The abandonment of children is a punishable offence under Section 317 of IPC

(Indian Penal Code) .The age limit of child for this offence need to be increased to 18 years as abandonment of transgender children usually takes place between 12 and 18 years.

4. **Sensitization:** The Home Department of the Government of India must take initiative and work in coordination with the State Governments for sensitizing the law enforcement agencies and by involving all the stakeholders to identify the measures and to implement the constitutional goal of social justice and the rule of law.

Medical Lexicon

1. The following definitions help in understanding the various gender-related terminologies:[7-9]
2. Assigned gender – refers to a person's initial assignment as male or female at birth. It is based on the child's genitalia and other visible physical sex characteristics
3. Agendered – "without gender," individuals identifying as
4. having no gender identity
5. Cisgender – describes individuals whose gender identity or expression aligns with the sex assigned to them at birth
6. Closeted – describes an LGBTQ person who has not disclosed their sexual orientation or gender identity
7. Coming out – The process in which a person first acknowledges, accepts, and appreciates his or her sexual orientation or gender identity and begins to share that with others
8. Gender – denotes the public (and usually legally recognized) lived role as boy or girl, man, or woman. Biological factors combined with social and psychological factors contribute to gender development
9. Gender-atypical – refers to physical features or behaviors that are not typical of individuals Gender expression – the manner in which a person communicates about gender to others through external means such as clothing, appearance, or mannerisms. This communication may be conscious or subconscious and may or may not reflect their gender identity or sexual orientation
10. Gender-nonconforming – refers to behaviors that are not typical of individuals with the same assigned gender in a given society
11. Gender reassignment - denotes an official (and usually legal) change of gender
12. Gender identity – is a category of social identity and refers to an individual's identification as male, female or, occasionally, some category other than male or female. It is one's deeply held core sense of being male, female, some of both or neither and does not always correspond to biological sex
13. Gender dysphonia – as a general descriptive term refers to an individual's discontent with the assigned gender. It is more specifically defined when used as a diagnosis
14. Gender expansiveness – conveys a wider, more flexible range of gender identity and/or expression than typically associated with the binary gender system
15. Gender fluidity – a person who does not identify with a single fixed gender, of or relating to a person having or expressing a fluid or unfixed gender identity
16. Gender queer – gender queer people typically reject notions of static categories of gender and embrace a fluidity of gender identity and often, though not always, sexual orientation. People who identify as "gender queer" may see themselves as being both male and female, neither male nor female or as falling completely outside these categories
17. Transgender – refers to the broad spectrum of individuals who transiently or persistently identify with a gender different from their gender at birth.(Note: The term transgendered is not generally used)
18. Transsexual – refers to an individual who seeks, or has undergone, a social transition from male-to-female or female to male. In many, but not all, cases this also involves a physical transition through cross-sex hormone treatment and genital surgery (sex reassignment surgery)
19. Transphobia - fear and hatred of, or discomfort with, transgender people.

Conclusion

The Government of India today has taken a stance and introduced several welfare policies and schemes for the transgender which would be a big step forward. These include census, documentation, issuing of the citizenship ID Cards, issuing passports along with social, economic, political transformation, housing, legal measures, police reforms, legal and constitutional safeguards to prevent human rights violations of the transgender community and institutional mechanisms to address specific concerns of transgender people.

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A Survey on the Awareness of Past and Present Practices of Machilipatnam Kalamkari

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Abstract

The Traditional Block printed Textile Industry of India involves Craftsmen with intrinsic traditional wisdom of Natural Dyeing and Hand Block Printing using indigenous and eco-friendly substances. The port town Machilipatnam/ Masulipatnam of Krishna district is known as the birthplace of the heritage craft Kalamkari, practiced since the 15th Century. The craft is slowly getting transitioned to the use of synthetic dyes and screen printing with pigments causing hazardous effluent and adverse environmental impacts. An attempt was made to highlight the distinguishing features Machilipatnam Klamkari, the changes and evolution that the craft has experienced under the influence of modern urban markets as the artisans attempt to shift from sustainable craft tradition.

Although Craft is independent of the ever-changing fashion trends, the availability of resources and craftsmen to revive traditional art/clothing is declining. This is, thereby, turning time-honoured craft Kalamkari and its styles into mere history.

A survey was conducted with the master craftsmen who are into block printing of the Kalamkari cluster of Andhra Pradesh including Machilipatnam, Polavaram, Pedana, Kappaldoddi, Guduru and also block makers of that region. However the data collected from Master craftsmen and in few cases their family members, who are continuing the profession next to them had lent scope to know their awareness of craft in the past and present, their concerns and vision for the sustenance of craft. The results and findings of the survey emphasises the need for reviving the traditional craft of Kalamkari and re-establishing the skilled craft communities.

Key words: Handicrafts, Block Printing, Kalamkari, Craft practices, Craft revival

Introduction

India has had a rich cultural heritage with indigenous skillsets of craftsmen from times immortal and hand-spun and hand woven textiles as well as hand painting, hand printing and hand processing of handloom cloths were amongst the crafts that were perfected by the Indian crafts persons. Skill acquisition comes not through formal schooling but through experience gained by crafts people over long years from early on in life learning nuances of the craft from the home environment (Venkateswara Rao 2011).

Better known among these hand woven and hand printing craft forms that had brought laurels to India was the Kalamkari Industry of Masulipatnam. The distinctive feature of Kalamkari printed textiles was the use of plant and mineral based dyes particularly madder. With its pre historic Persian links motifs such as ***Butti***, ***Paisely cone*** and the ***Mihrab*** which eventually precipitated to block work around mid19th century (Gwande 2017 and Gillow2008). Today a great deal has changed in the dyeing process of Machilipatnam. Alizarin used in place or organic matter, Indigo dyeing has been almost given up, as has been the use of Kalam to apply wax resist (Sethna 1985). According to a recent account, Kalamkari units of varying sizes employ approximately 4000 people in the cluster, with Pedana being a local hub of screen printing using pigments and chemicals to go for bulk production and a quick turnover (Edwards 2016).

Though the craft was contemporised in several ways owing to its acceptance by the young generation and also by the consumer who is price conscious, recently, with the markets flooded with cheaper imitations of block printed Kalamkari produced using screens and pigments followed by drop in demand, perhaps will be the next on the list for losing its popularity and usage. However, several Indian fashion designers are coming together now to bring this immortal art back to the fore. In this paper, an attempt was made to conduct survey the Master craftsmen to know their awareness on present status of the craft to suggest suitable interventions needed. Structured interviews are conducted as they are twice as effective as unstructured interviews. Open ended questions allow people to express what they think in their own words (Kumar 2011). Qualitative analysis is one of the best methods of research which provides depth and detail by analysing things more than just numbers and sizes. Hence data was analysed qualitatively for further interpretation. The results and findings of the survey emphasises the need for reviving the traditional craft of *Kalamkari* and re-establishing the skilled craft communities.

Objectives

To Check the awareness of Master craftsmen regarding the past glory of the craft, which followed sustainable production practices and the sense of privilege they hold for the profession they are into. To evaluate if they are conscious about the present day practices leading to environmental pollution and gradual loss of traditional knowledge / Intellectual property.

To derive alternative practices / interventions suitable for the available craft resources at present for sustenance of the craft.

Hypothesis

1. All master craftsmen are aware of the changes that took place over a period of last 5 to 10 years in the craft cluster
2. The master craftsmen played a major role in building craft awareness and training young generations
3. Master craftsmen can best reveal the speciality of Machilipatnam Kalamkari in comparison to other block prints of India

Methodology

A sample of eleven Master Craftsmen of Block printed *Kalamkari*, who are also members of the "Vegetable Hand Block *Kalamkari* Printers Welfare Association, Krishna Dt. of Andhra Pradesh were chosen for the study out of the population of master craftsmen distributed in the established geographical areas of Kalamkari production. This include *Machilipatnam(MP)* town and surrounding villages namely *Pedana (PD), Guduru(GD), Polavaram(PL) and Kappal doddi(KP)* and also *Chirala* of *Prakasham* Dt. The study was a result of several field visits undertaken and also documentation of the craft as it is practiced in their units, which contribute a major share of *Kalamkari* production. Though the extent of the survey is three fold with the responses collected from Master craftsmen(MC) including block printers(BP), block makers(BM) and next generation practitioners(MCF). For uniformity, this paper excludes the responses of block makers (BM) in the analysis of awareness regarding past and present status of the craft.

The method of research is exploratory. Structured Interview was chosen as a method of data collection and Interview schedule was used as an instrument or tool for primary data collection as it was a researcher administered survey involving personal interaction. An in depth interaction was undertaken with major focus on understanding the present status of the craft (Post GI) in terms of its continuation of practice of *Kalamkari* in its traditional / sustainable form to propose required interventions for the sustenance of craft.

Qualitative analysis (Ql A) was preferred for in depth reasoning and quality of results. The data was classified into keywords /patterns in order to assess responses and conclude results. The data used was in the text form. However, the in-depth knowledge of the investigator on research area supported efficient interpretation of results. Simple statistical tools like mean and Mode are used for evaluation and the results were presented in percentages wherever feasible.

Findings and Discussion

Master Craftsmen and their awareness regarding the past and present status of the craft:

Roots of learning: The senior most master craftsmen of the cluster had their roots of learning from the gurus like Ponnuru Purushotham and Rekapalli Parthasarathi, who were master craftsmen then at Balyalagudem Cooperative Society, established in the year 1960s and existed till 1980 at Machilipatnam. Dr. Kamaladevi Chattopadhyaya, Advisory Chairman of All India Handicraft board had contributed immensely for the revival of block printed Kalamkari craft post-Independence. All master craftsmen of Kalamkari cluster belong to weavers' community and their fathers and forefathers practiced handlooms on which later block prints were employed. The next generation learnt from the present master craftsmen and from the training offered by Weavers Service Center (WSC), Vijayawada.

Experience of Master craftsmen in the cluster:

Table No 1: Experience of Master Craftsmen in the Machilipatnam Kalamkari Cluster

Experience of Master Craftsmen is ranging from 8 to 52 years. With only one crafts men from

Experience in Craft (in Yrs.)	5-15	16-25	26-35	35 & Above
No. of Craftsmen	1	2	6	2

the next generation and 2 are senior most who are former presidents of Vegetable Hand block Printers Welfare Association, Pedana, Krishna Dt. More than 50% of the craftsmen served the Craft for 26-35 years.

Significance of craft to the artisan: The craftsmen affirmed that the craft signifies only as an article of sale and not a religious, ritual or group social activity for the artisans involved.

Changes observed over a period of time (past 5/10 years): In an attempt made to know the awareness of Master craftsmen who had an experience ranging from 20 to 30 years in the

journey of practicing Kalamkarit, the survey revealed the following observations pertaining to the changes which took place in craft over a period of last 5 to 10 years. The analysis of responses reveals that almost 50 % of the master craftsmen expressed painting technique which was mainly practiced in Kalamkari is completely not followed now and hence considered as extinct. Also the main ingredient 'Tumma Jiguru' natural gum used as a thickener in printing paste earlier has now lost its existence. To some extent, the use of live vat, Mixing of milk while myrobalan treatment, Use of wax for resist, Elaborate practices of the past in fabric preparation, printing, dyeing and washing, Design innovation and use of varied natural coloured backgrounds in the block printed merchandise are also not seen in the present day practices.

The survey also reveals that the practices of using cow dung for kora fabric preparation, boiling of gum, use of manjistha, hand block printing, final treatment with alum and other time taking traditional practices are slowly disappearing. In place of disappearing practices, screen printing, use of pigments and chemical substitutions in second colour prints, use of alternative mordant, contemporary designs and use of a variety of fabrics in printing process are fast evolving replacing the past practices. However, Block printing, Block making, use of cotton fabrics, boiling with natural dyes, bed sheets as main items of production remained stable

Distinguishing features of Machilipatnam Kalamkari in comparison to other traditional block prints of India: The distinguishing characteristics of Kalamkari in comparison to other traditional block prints of India tend to be use of Persian stylised florals and creepers with specific style of saw toothed outlines, Use of figurative motifs like peacocks, elephants, birds and mango motifs, Use of limited variety of natural mordants and dyes for all over coloured backgrounds and prints with no practice of Butis.

Identity of Master Craftsmen in practicing specific style of Kalamkari in the cluster: In another attempt made to understand the areas of work the traditional craftsman feel privileged for knowing and having practiced in the craft for several decades for which they are well known, they threw limelight on their respective specialisations in producing Mehrabs (Fig.1), Tree of life panels (Fig 2), printing on carpets, using traditional process of printing, using a variety of fabrics and raw material of good quality, Quality and clarity of prints and printing on white backgrounds. They affirmed those as their favourite items to make.

Trainings offered in traditional block printing method: All master craftsmen have trained their family members, artisans, visitors from various institutions and also taken up training under Govt. schemes. Thy further responded that they are looking forward to train many more from younger generations in the future.

Figure 2: Tree of life

Figure 3: Nachu Mamidi kaya

Aspects of Kalamkari craft that are hard to achieve: With respect to the awareness of master craftsmen regarding the aspects of traditional kalamkari which are difficult to achieve, majority of them opined that the intricate and elaborate motifs of *Tree of Life* wall hangers (Fig.2), Machilipatnam *Mihrabs* used on doorways/ curtain panels (Fig.1), '*nachu maamidi kaya*'- an intricately patterned Mango motif with floral twines (Fig.3), *Pandu / Dhoni stambham* one-way motifs used in borders, creation of *floral sprays in chakra , square and diamond shapes* in bed sheet printing, maintaining consistency in colour/print quality of yardage goods and Reproducibility in any piece of work are considered to be time taking in the process of production of traditional Kalamkari. **Concerns on present status of Kalamkari production as detailed by Master craftsmen:** Though the artisans feel that the use of geometric contemporary motifs in multi colours, Screen printing, use of pigments in second colour printing, direct printing on whites are not suitable for Kalamkari, they are taking up

production owing to the current market needs. They also pointed out their dislike towards their own practices of production at a fast pace which affects quality.

During the interaction, senior master craftsmen have expressed their concern over the unethical practices followed by other craftsmen like use of screens, pigments and chemical alternatives to dyes and mordants, skipping of steps for faster production, use of inferior quality of raw material and fabrics, copying of designs stating that they pose an unhealthy competition at craft cluster.

Importance of continuing the craft tradition: The craftsmen proclaimed that Kalamkari is a Traditional craft, which is inherited from their family provided livelihood to many artisans who are directly or indirectly associated with the activities of the craft supporting their survival. Kalamkari being a unique craft of India signifying our art of sustainable production it has to be treasured and should not be allowed for extinction. They further explained that younger generations not taking craft further owing to the laborious and time taking processes may pose a threat to its survival.

The best giveback for the craft in the words of Master craftsmen: According to them, their best giveback for the craft would be by practicing the craft continuously honouring traditional process of production without ignoring any threats possible to the motherland in the process of its production, training the young and new generations with respect to the livelihood that it offers. The craftsmen deliberated the need for the craft to be taken to a global scale by making Kalamkari as a household item abroad to bring back the previous glory.

Awards received: The ***Machilipatnam Mehrab*** created by Master Artisan Late. Sri. P. M. Eswarudu and his father Late. Sri. Nageswara Rao for the Festival of India in 1982 is a Masterpiece of Kalamkari. He had received UNESCO excellent award in 2008 for Kalamkari gold painted Mehrab and also a Lifetime achievement award by Craft Council of Telangana in 2017. Mr. Vinnakota V.V. Surendrakumar had received a State award in 2014 given by Lepakshi for bedsheets produced by him. Mr. Metla Durga Nageswar Rao Received Best artisan, Best supplier and Best producer awards from Sri Lanka Govt. and honorary Doctorate from SIPA, South Indian Producers Association, India. Many of their clients in the US and Europe received best collection of fabrics and textiles awards for the items supplied by them through buyers.

What makes a good Kalamkari fabric?

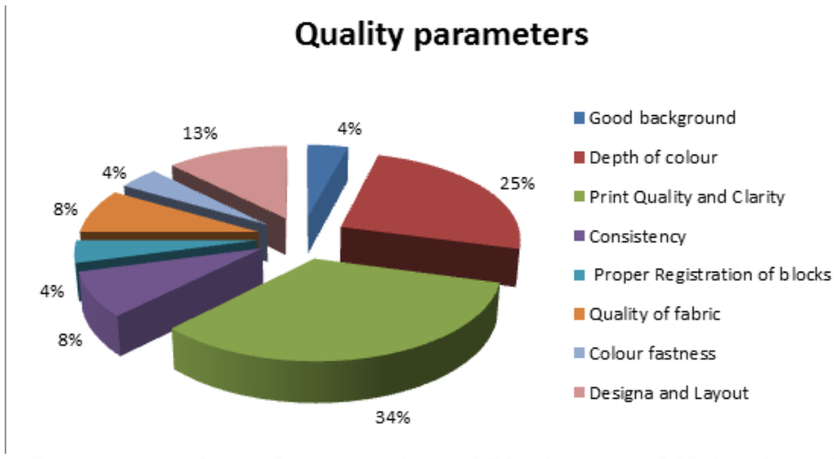

Figure 4: Parameters for judging quality of Block printed Kalamkari fabric

The master craftsmen of the cluster explained the parameters based on which a piece of Kalamkari can be judged for its quality (Fig.4). 34% of the responses stressed on the importance of Clarity and quality of print followed by 25% mentioning the need for depth of shade or colour strength. Design and layout representing 13%, Quality of Fabric and Consistency 8% each and the remaining responses include parameters like good background, colour fastness and proper registration of blocks.

Summary

Out of 11 master craftsmen it is found that almost all craftsmen inherited the art of Kalamkari from their ancestors and regard it as their tradition and occupation. All craftsmen are found to have rich experience in the traditional craft practices. It was observed that the respondents are quite aware of the past practices which are now extinct and also about the disappearing. It was discouraging to note that the craftsmen witnessed the evolution of contemporary practices like use of screens, pigments, chemicals and several other deviations to the printing and dyeing processes all for the sake of easier and faster production. The distinguishing features limited only to this craft earlier continued to exist even till date. The awareness of painstaking efforts in achieving master pieces of art can instil confidence in the young generation for the revival of the craft legacy.

Conclusion & Implications

It is evident from the study that the commercial aspects of craft are dominating over the traditional practices which are in turn affecting the quality of craft. If proper support and awareness is inculcated through practical demonstrations, trainings and exhibition of rare collections with focus on product diversification productivity can be enhanced. Design and technology intervention can uplift the confidence in new generation to accept family profession. The master craftsmen seem to have less exposure to craft related websites, magazines and online marketing which is a key factor in today's success. Hence, specific training in these areas is need of the hour. Last but not the least, the reason for the less patronage to take up this exquisite handicraft forward, proper recognition and encouragement through awards by Government and non- Government agencies is highly recommended.

Suggestions For Future Research

1. Similar survey can be taken up with the job workers at craft cluster who work for the orders that they receive from Master craftsmen or marketing agents who are not part of the craft activity
2. A consumer survey can be taken up to evaluate their awareness and preference of traditional and contemporary block prints of Kalamkari
3. A retail market survey can be conducted to see the range of options available for consumers to buy from traditional and contemporary print styles

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Research Paper
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Feasibility of iron and zinc fortification in Jaggery Powder

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Abstract:

Fortification of iron and zinc in jaggery powder can be an effective strategy to increasethe intake of these essential minerals in populations at risk of deficiencies. However, itis important to ensure that the fortified product is safe, effective, and acceptable to thetarget population. The feasibility of fortifying jaggery powder with iron and zinc depends on several factors, including the availability of iron and zinc compounds, the cost of fortification, the stability of the fortified product, and the acceptability of the fortified product to the target population. Jaggery powder, a traditional sweetener derived from sugarcane juice or palm sap, is known for its nutritional value and rich mineral content. Fortification of jaggery powder with iron and zinc has emerged as a potential solution to address these deficiencies. This article explores the feasibility of iron and zinc fortification in jaggery powder, considering various aspects such as availability of fortificants, stability of fortified product, cost implications, and consumer acceptability.

Keywords: Fortification, fortifying jaggery, jaggery, jaggery powder,

Introduction:

Iron and zinc fortification of jaggery powder is technically feasible, but there are several factors that need to be taken into consideration. Jaggery powder, a traditional sweetenerderived from sugarcane juice or palm sap, is known for its nutritional value and rich mineral content. However, it is often deficient in essential minerals like iron and zinc. Iron and zinc play vital roles in human health, and deficiencies in these minerals can lead to significant health issues, particularly in populations with limited access to diverse and balanced diets. Jaggery powder is rich in carbohydrates, but it is low in essential micronutrients such as iron and zinc. Iron and zinc are important micronutrients that play a critical role in many physiological processes in the human body. Iron is required for the production of hemoglobin, which is a protein in red blood cells that carries oxygen throughout the body. Zinc is important for immune function, growth and development, and wound healing. Fortification of jaggery powder with iron and zinc can help to address micronutrient deficiencies in populations that consume this traditional sweetener. However, there are several factors that need to be taken into consideration:

Stability:

Iron and zinc can interact with other components in jaggery powder, which can affect their stability and bioavailability. Therefore, it is important to select a suitable fortificant that is stable in jaggery powder.

Bioavailability:

The bioavailability of iron and zinc in jaggery powder can be influenced by factors such as the presence of inhibitors or enhancers of absorption. For example, the presence of phytates in jaggery powder can inhibit the absorption of both iron and zinc. Therefore, it is important to select a fortificant that has high bioavailability. The bioavailability ofiron and zinc in jaggery can be limited due to the presence of inhibitors of absorption such as phytates and polyphenols. However, processing methods such as soaking and fermentation can help to improve the bioavailability of these nutrients. Fortification with bioavailable forms of iron and zinc can also help to increase the amount of these nutrients available for absorption in the body.

Sensory properties:

The addition of iron and zinc to jaggery powder can affect its sensory properties, such as taste, color, and texture. Therefore, it is important to conduct sensory evaluations to ensure that the fortified jaggery powder is acceptable to consumers. It is important to note that the addition of iron and zinc to jaggery should not significantly affect the taste and color of the product if the fortificant is added in appropriate amounts. In addition, the fortification process should be carefully designed to ensure that the particle size of
the fortificant is appropriate for the jaggery product, and that the fortificant is evenly distributed throughout the product.

Cost:

The cost of fortification can be a barrier to implementation, especially in resource- limited settings. Therefore, it is important to consider the cost-effectiveness of fortification, and to explore strategies for reducing costs, such as using low-cost fortificants.

Chemical Properties of Jaggery:

Jaggery is a natural sweetener that is produced from the sap of sugarcane or palm trees. It is composed primarily of sucrose, glucose, and fructose, with smaller amounts of other carbohydrates such as maltose and raffinose. Jaggery also contains several minerals and vitamins, including iron, magnesium, potassium, and vitamins B1, B2, and B3. The mineral content of jaggery can vary depending on the specific type and source of the product. Fortification of jaggery powder with iron and zinc is technically feasible, but it is important to

consider factors such as stability, bioavailability, sensory properties, and cost when designing and implementing a fortification program.

The amount of iron and zinc in jaggery:

The amount of iron and zinc in jaggery can vary depending on several factors such as the source of the jaggery, the processing method used, and the soil in which the sugarcane or palm trees were grown. Generally, jaggery is not considered to be a good source of iron and zinc. According to the USDA Food Composition Database, 100 grams of jaggery contains approximately 0.5 milligrams of iron and 0.2 milligrams of zinc. However, these values may vary depending on the specific type and source of jaggery. It is important to note that the bioavailability of these nutrients in jaggery powder can be low due to the presence of phytates and other inhibitors of absorption. Therefore, if iron and zinc fortification of jaggery powder is desired, it would be necessary to add additional amounts of these nutrients to the product to achieve meaningful levels that can address nutrient deficiencies in the population.

How to measure iron from jaggery powder? (Chemical Analysis):

The iron content of jaggery can be determined through chemical analysis. One common method for measuring iron in jaggery is atomic absorption spectroscopy (AAS). AAS involves atomizing a sample of the jaggery and passing light through the resulting vapor. The absorption of light by the vapor is measured, which can be used to determine the concentration of iron in the sample. Other methods for measuring iron in jaggery include inductively coupled plasma (ICP) spectroscopy and colorimetric methods. These methods involve different chemical reactions that produce a measurable signal that can be used to determine the iron content of the jaggery.

The chemical properties of zinc in jaggery powder:

The chemical properties of zinc in jaggery powder are similar to those of zinc in other foods and supplements. Zinc is a chemical element with the symbol Zn and atomic number 30. It is a transitional metal that is found in the Earth's crust and is essential for many biological processes in the human body, including immune function, DNA synthesis, and wound healing. Zinc is also important for the proper functioning of taste and smell receptors. Zinc in jaggery powder is present in the form of zinc ions (Zn^{2+}). These ions are released when the jaggery is dissolved in water or other liquids. Zinc ions can bind to other molecules in the body, including enzymes and proteins, to help regulate their activity. The amount of zinc in jaggery powder can vary depending on the source and processing method. The zinc content of jaggery can be determined through chemical analysis using methods such as atomic absorption spectroscopy (AAS) or inductively coupled plasma (ICP) spectroscopy. In summary, zinc in jaggery powder is present in the form of zinc ions (Zn^{2+}) and has chemical properties similar to zinc in other foods and supplements. The amount of zinc in jaggery powder can vary depending on the source and processing method, and can be determined through chemical analysis using methods such as AAS or ICP spectroscopy. Zinc is an essential mineral that plays a crucial role in many biological processes in the human body.

Organoleptic analysis of jaggery powder:

Organoleptic analysis of jaggery powder involves the evaluation of its sensory properties, such as appearance, color, odor, flavor, and texture. These properties can impact the consumer's acceptability and preference for the product.

Appearance: The appearance of jaggery powder can be evaluated based on its color, size, and shape. The powder should be uniform in color and free of lumps.

Color: Jaggery powder can vary in color depending on the type of raw material used and the processing method. The color can range from light brown to dark brown. The color should be uniform, and any discoloration or variation should be noted.

Odor: Jaggery powder has a characteristic sweet aroma. The aroma should be pleasant and free of any off-flavors or odors.

Flavor: The flavor of jaggery powder is sweet, with a caramel-like taste. The sweetness level should be appropriate, and there should be no bitterness or other off-flavors.

Texture: The texture of jaggery powder can vary depending on the processing method. It can range from fine and powdery to coarse and grainy. The texture should be consistent, and any variation should be noted. The organoleptic analysis of jaggery powder can provide valuable information on its sensory properties, which can impact its consumer acceptability and preference. The analysis can help identify any sensory defects or issues with the product, which can be addressed through process optimization or formulation adjustments.

Jaggery Powder and Organic Compound:

Jaggery, like most organic compounds, is made up of covalent bonds between its constituent atoms. Covalent bonds involve the sharing of electrons between atoms to form a stable molecule. The main components of jaggery, such as sucrose, glucose, and fructose, are formed through covalent bonds between carbon, oxygen, and hydrogen atoms. For example, sucrose is formed through a glycosidic bond between a glucose molecule and a fructose molecule. This bond involves the sharing of electrons between the carbon and oxygen atoms in the two sugar molecules.Jaggery also contains minerals such as iron, magnesium, and potassium. These minerals are typically present in ionic form, which means they are held together by ionic bonds. Ionic bonds involve the transfer of electrons between atoms, resulting in the formation of ions

with opposite charges that are attracted to each other. In short, the main components of jaggery are held together by covalent bonds between atoms, while the minerals in jaggery are typically present in ionic form and held together by ionic bonds.

Iron Metabolism and Jaggery:

Iron metabolism in the body involves the absorption, distribution, and storage of iron. The absorption of iron from the diet is regulated by a complex system of proteins and pathways, and the majority of dietary iron is absorbed in the duodenum and upper jejunum of the small intestine. Once absorbed, iron is transported by transferrin, a protein that binds to iron and delivers it to cells throughout the body. Iron is also storedin the liver, spleen, and bone marrow, where it is bound to a protein called ferritin. The regulation of iron metabolism in the body is primarily controlled by the hormone hepcidin. Hepcidin regulates the absorption and distribution of iron in the body by binding to ferroportin, a protein that exports iron out of cells. When hepcidin levels arehigh, ferroportin is degraded, reducing iron export and promoting iron storage. When hepcidin levels are low, ferroportin is increased, allowing for increased iron export andmobilization. While jaggery is a good source of iron, the iron it contains is in the non-heme form, which is less easily absorbed by the body than heme iron found in animal products. Nonetheless, consuming jaggery along with vitamin C-rich foods can help improve the absorption of non-heme iron in the body. Iron metabolism in the body is regulated by a complex system of proteins and pathways, and is primarily controlled bythe hormone hepcidin.

Conclusion:

Finally we can say that, the acceptability of the fortified product to the target populationis critical for the success of the fortification program. The taste, texture, and color of the fortified jaggery powder should be acceptable to consumers, and any negative perceptions or beliefs about fortified foods should be addressed through education and communication. Jaggaery powder fortified included for preparation of four traditional products namely Puranpoli, Gulpapadi, Chikki and Tamarind chutney/sauce. Iron and zinc fortification in jaggery powder presents a promising opportunity to enhance the nutritional quality of this traditional sweetener and address deficiencies in iron and zinc. The feasibility of fortification is influenced by various factors such as the availability and stability of fortificants, cost implications, quality control measures, and consumer acceptability. Comprehensive studies, including analytical testing, sensory analysis, cost-effectiveness evaluations, and health impact assessments, are necessary to ensure the successful implementation of iron and zinc fortification programs in jaggery powder. By improving the nutritional value of jaggery powder, fortification can
contribute to promoting public health and combating micronutrient deficiencies in at- risk populations.

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A Study on Role of Ict Tools in Mathematics Teaching And Learning

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Abstract

The goal of this examine is to discover the position of the software of ICT equipment in Mathematics coaching. Learning and communication technologies (ICT) are an vital a part of day by day existence, inclusive of the coaching-getting to know system. Mathematics is taken into consideration the queen of all sciences. For a protracted time, the position of arithmetic become decreased to the in simple terms instructional domain. But at present, the position of arithmetic isn't confined to the in simple terms instructional domain. It has entered the sector of era and industry. This paper will spotlight the significance of the mixing of expertise and verbal exchange technologies (ICT) into the coaching and getting to know of arithmetic in Teacher Training College and School level. The method of the studies is a one of a kind related to an interpretative, communication, remark and examine secondary sources, like books, articles, journals, thesis, college news, professional opinion, and websites, etc. Finally, significant guidelines are given.

Keywords: ICT, mathematics, learning, technologies

Introduction

The examine is mainly vital in Teacher-Training Colleges as it gives a duration of guidance for the college students' destiny publications earlier than making choices approximately the scholar much less scientifically or scientifically that arithmetic is crucial or even crucial. Mathematics as a technological know-how-primarily based totally route or field is referred to as a queen of all subjects. Sometimes the instructor of arithmetic does now no longer have enough expertise, however it's far important to examine into ideas that contradict what the concept of arithmetic says or implies. However, arithmetic is a completely unique subject, which inspires the purchase of specialised technological know-how talents and expertise, and is the reason the herbal phenomena of existence in society. It is some thing that grows in civilization as the amount call for of humans increases. It originated from a sensible problem, and the guys had to clear up those problems. It has contributed to the improvement of civilization and different disciplines and the improvement of culture. Despite the summary nature of arithmetic, its coaching is the clinical questioning amongst college students; A intellectual set that calls for college students to take the examination via tests. Globalization and technological extrade have created a brand new worldwide economic system pushed with the aid of using era, data-pushed, and expertise-pushed (Tinio, 2009). It has been proposed that the improvement of ICT has emerge as a critical problem to fulfill the desires of the training system (Chao, 2015). ICT is a device that helps the getting to know system and holds the promise of recent answers to all of the demanding situations that training is facing (Oduma & Ile, 2014). Jef Peeraer (2005) highlighting the elements affecting the mixing of ICT into coaching exercise in Vietnam's better training teachers (Jef Peeraer, 2005).

Thus the interplay is a approach to have interaction instructors & college students thru a hierarchy of duties starting on the essential stage of navigation and finishing in greater dynamic interactions that create real-existence stimulations (Aldrich, 2005; Roy, 2006). Externally the lively participation of the scholar thru e-mastering is impossible, and it allows the e-learner to examine for a lifetime (Kumbhar, 2009). There is a wonderful dating inside college students' mastering and using ICT (Harrison et al., 2002) Both NCTM (The National Council of Teachers of Mathematics) and BECTA (British Educational Communications and Technology Agency) targeted at the era as enabling, in addition to encouraging the learner to consciousness on reflection, verification, selections making and problem-fixing (NCTM, 2000., BECTA, 2003). The prospect of ICT is a promising exercise withinside the arithmetic study room, however the fulfillment of this workout is specially depending on numerous issues, consisting of instructors' perceptions of ICT skills, instructors' attitudes in the direction of ICT contribution to arithmetic coaching, and instructors' attitudes in the direction of ICT contribution to college students' arithmetic mastering. Teacher Passion of ICT withinside the study room arithmetic, arithmetic trainer withinside the presence of ICT withinside the study room shallowness and feel of control, and instructors intention to mobilize ICT of their training (Baya'a, 2013). These opportunities of ICT combine a proposed exercise into the arithmetic study room. Although the above description of the elements affecting ICT convergence on the faculty is involved, this workout will end result best if positive situations exist met. ICT withinside the study room, particularly withinside the incorporation of a wonderful final results will rely upon the subsequent elements: instructors 'attitudes to the contribution of ICT for coaching arithmetic, arithmetic training of college students and instructors attitudes in the direction of the function of ICT, mathematics instructors to apply ICT withinside the study

room feel, that presence of ICT withinside the study room arithmetic instructors' shallowness and study room management cappotential to combine ICT in training for instructors and attractions. While pre-provider instructors remedy math problems, they consciousness at the social and sociomathematical norms which might be hooked up for the duration of the interactions of pre-provider instructors (Tatsis, 2008). It is the speech of the pre-provider instructors to pick out the regulated policies whilst fixing a mission associated with the definition of arithmetic (Sánchez, 2014). From time immemorial training has grow to be a image of civilization and development — Tripoli's idea of training as an entire factor to instructors, college students, and the environment. Not best arithmetic instructors however the exceptional of all instructors withinside the trainer training branch additionally have to be met (Das et al., 2019). In the modern-day era, training relies upon at the bodily and greater importantly, the technological know-how of technological know-how for technological improvement. Therefore, mental ideas deliver enormous significance withinside the mastering process. Thus, the coverage of studentcentered training has received momentum during the last few decades. As such, all of the achievements which might be agreed upon in specific topics or greater virtually marked via way of means of college students are synonymous with their cognitive development. Mathematics is taken into consideration a tough question. Mathematics theoretically presents a easy recovery of logical reasoning and knowledge. It makes it as a selected problem in comparison to others and suggests an smooth manner to examine different things. Development is a non-stop process, that's constantly underway. Providing and obtaining an training is one of the traits that set humans other than different residing things. For superior knowledge, human beings are always enhancing their coaching-mastering gear and strategies. Information Communication Technology (ICT) is an engine of innovation in training, and we will see withinside the twenty first century, the mental, socio-economic, and technological modifications it brings to faculty. It has modified the function of statistics specialists and is turning into famous withinside the library.

Objectives of the Study

The present studies is directed at reaching the subsequent purposes:

1. To discover the mindset of Mathematics instructors closer to the usage of ICT.
2. To discover the mindset of Mathematics history instructors closer to the usage of ICT.
3. To discover the lecturers of diverse degrees of revel in on their mindset closer to ICT.
4. To have a look at Mathematics coaching closer to the usage of ICT.
5. To have a look at lecture room coaching with a aggregate of Mathematics & ICT.
6. To discover the ICT equipment utilized in Mathematics coaching and gaining knowledge of at Teacher-Training Colleges.

The Methodology of the Study

This have a look at applies an interpretative technique in which qualitative facts have been accrued and analyzed through a report have a look at of the studies papers from journals, books, edited books, reviews, on line documents. The method of the proposed studies is primarily based totally at the report-primarily based totally analysis.

Methodology Employed

1. It is primarily based totally on qualitative studies.
2. It is likewise a report-primarily based totally analytical have a look at.
3. It has the leader traits of latest documentbased analytical studies.

Research Materials

1. Government documents,
2. Peer-reviewed Journals,
3. Books,
4. Magazines,
5. On-line reviews from a few applicable and dependable net sources

Data Collection Process

Multiple methods including analyzing worldwide and countrywide journals, library consultation, on line journals, periodical, newspapers, and monographs have remained employed.

Data Analysis

They have a look at employs modern report-primarily based totally analytical technique. To have a look at the received facts, the studies additionally adopts historic and sociological strategies.

Meaning of ICT

ICT stands for Information and Communication Technology. It is the aggregate of terms, i.e., Information Technology and Communication Technology. "Information Technology is a scientific, technological, and engineering field and control method utilized in handing the facts; it's utility and affiliation with social, economic, and cultural matters."- UNESCO (2002). According to Prytherch (2000), "ICTs are networks that offer new possibilities for coaching, gaining knowledge of, and schooling via the transport of virtual content." According to Blurton, C. (2002), ICTs stand for facts and conversation technology and are classified as a "numerous

set of technological equipment and gadgets used to communicate, and to create, distribute, store, and control facts."

ICT Tools

ICT is converting tactics of Mathematics coaching and gaining knowledge of through including factors of energy to lecture room training environments, together with digital environments for the purpose. The new virtual ICT isn't always a unmarried technology; it's miles a aggregate of hardware, software, multimedia, and transport systems. Today, ICT in training includes a large variety of unexpectedly evolving technology along with Desktop, NoteBook, and Handheld Computers, Digital Cameras, the Internet, Cloud Computing, the World Wide Web, Spread Sheets, Tutorials, Simulations, email, Local Area Networking, Bluetooth, Streaming, and DVDs; and programs along with phrase processors, Virtual Environment, Simulator, Digital libraries, Computer-Mediated Conferencing, videoconferencing, Emulator etc. ICT permits for the manufacturing of virtual assets along with virtual libraries, in which students, instructors, and specialists can get entry to have a look at cloth and route cloth from everywhere at any time.

Use of ICTs in Mathematics Teaching and Learning in School

The teachers of the school are urgently guided. In this case, it is important that trained teachers can apply them in future school courses as they learn the connection to ICT in mathematics. As shown, various mathematical images of geometry can be presented to students using a projector. The use of ICT in 2D and 3D images gives students a clear idea. With the help of the internet, students are always free to access new information and data. Various theories of trigonometry allow ICT to depend on real-world applications. Self-regulatory students are aware of the strengths and weaknesses of their studies and the strategies they use to address their daily challenges (Dweck & Leggett, 1988).

Challenges in Learning both Mathematics Content and Computer Technology

Difficulty in using ICT and math software is related to the lack of knowledge of the techniques available to math teachers and how to use them when learning math. doing. Math teachers face significant challenges in both math content and computer technology.

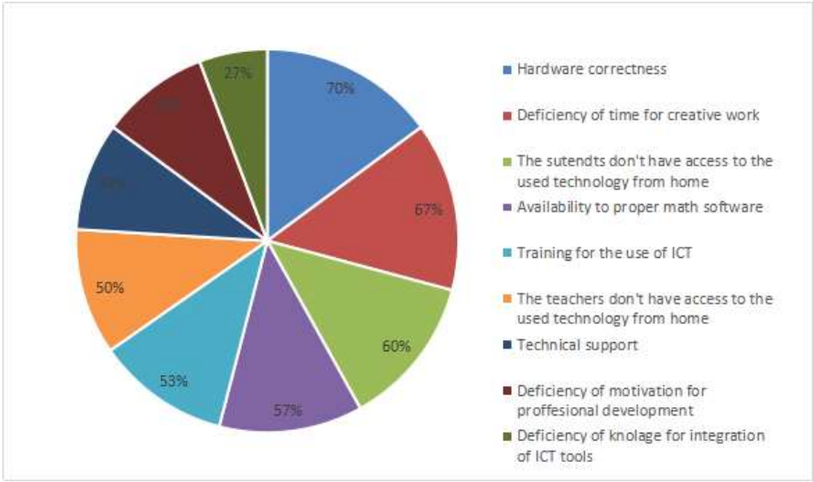

Fig1. Challenges in ICT education

Environment Factors Affecting Students' Learning towards Mathematics

Several studies have attempted to explain the impact of teaching mathematics on a variety of factors. Recently, many researchers have shown that student learning is influenced by factors in the learning environment, such as: B. Curriculum, teacher support, assessment methods, parental influence, educational institutions, etc. The concept of function in mathematics plays an important role in student learning and influences the entire mathematics curriculum. Students of all grades learned the concept of function, which is characterized by a formal perspective, standards of relevance, and understanding of teaching materials / learning standards. , Etc. (Yüksel Dede, 2006).

Student Factors in Mathematics Learning

Many believe that student factors related to environmental factors can affect their effectiveness in learning mathematics. Studies have shown that teaching methods in mathematics should be designed with student reasons in mind. Student attitudes towards mathematics are a major factor influencing math learning outcomes.

The Use of ICT in the Mathematics Classroom

Use of ICT in Math Classes is primarily of concern to math teachers. By using ICT as a learning tool, these teachers can maximize the impact of ICT on mathematics education (Becta, 2003). Students are taught to apply a problem-solving process when working in a collaborative group or using a computer to solve a problem, after which ICT is involved in the development.

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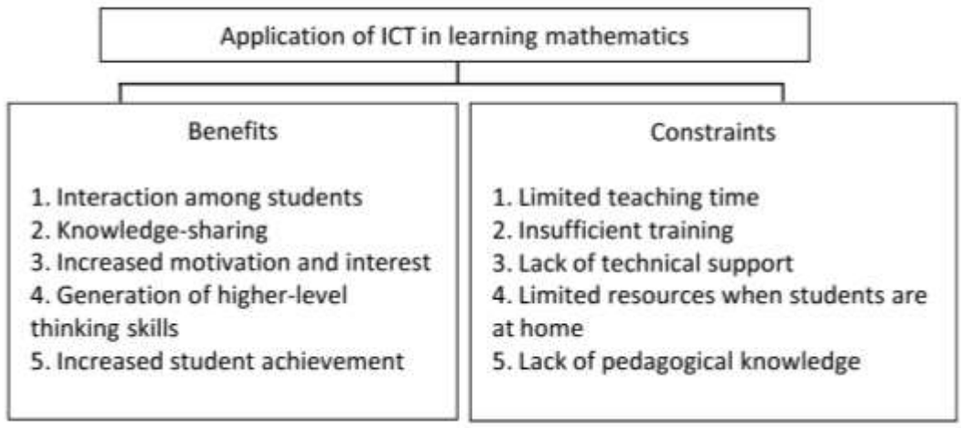
Mathematics & ICT

Students can use ICT as a tool to make calculations, draw diagrams, and help solve problems. The most obvious example of ICT used in this way is when a student uses a calculator or the like to calculate more complex numbers. However, you can use a spreadsheet, computer algebra system, or graphing calculator to solve the problem through testing and improvement or search methods. Mathematics students can use graphing calculators and chart plotters instead of algebra to solve equations graphically. Students can easily perform statistical analysis of the collected data using the rich statistical features of graphing calculators. Creating images with dynamic geometry packages helps students understand, solve, and prove geometry problems. When students use ICT as a tool to find things, solve problems, and understand what's happening, it often helps them develop their skills in using and applying math. .. Although ICT is a powerful and powerful tool, students need to acquire the necessary technical skills to use the opportunities offered constructively and efficiently.



Example

1. Use a calculator or spreadsheet for a simple single calculation.
2. Graphing calculator will help you to draw a diagram when the sketch is more appropriate.
3. Use a spreadsheet or graphing calculator to solve quadratic equations such as X2 + X = 20.
4. Common Geometry and Trigonometry Applications:
5. Draw triangles, cubes, etc.
6. Measure the actual distance.
7. I am using Excel tool

Use of ICT Tools in Mathematics

Maxima is an algebra solver software program. The software is primarily based totally on Computer Lisp and works with all POSIX concepts together with Linux, Unix, OS X, and BSD. For drawing it makes use of Gnuplot. Geogebra is a math software program this is beneficial for each instructors and college students alike. It is a sturdy platform that facilitates preschoolers analyze math successfully and remedy math issues on specific subjects that consist of vectors, calculus, linear programming, algebra, complicated numbers, statistics, and more. SymPy is a Python archive for symbolic arithmetic. It targets to end up a full-featured laptop algebra system (CAS) at the same time as retaining the code as easy as feasible to be understandable and without problems extensible.

Educational Implications

1. The use of ICT in training facilitates in growing essential and clinical wondering the various college students and the instructors. It motivates the learner to take part in studying sports at any time and from anywhere.
2. It facilitates in alternate and stocks thoughts amongst instructors for expert growth.
3. ICT has extensively utilized to enhance get admission to and the first-class of trainer training. ICT equipment decorate coaching, and facilitate studying the use of multimodal courseware, Integrate ICT the use of pedagogical improvements to expand better-order wondering competencies amongst learners.
4. ICT equipment together with radio, T.V., Internet, laptop, laptop, tablets, and plenty of different hardware and software program programs may be appropriated withinside the coaching-studying process. These equipment can deliver blessings withinside the regions of content, curriculum, instruction, and assessment.
5. In India, in particular training has 3 tiers which are number one or fundamental stage, secondary and senior secondary stage, and better stage. The first-class of a majority of these tiers may be adjusted with the aid of using using ICT equipment and techniques.

Conclusions

This examine indicates that ICT integration in Mathematics. From literature displayed numerous issues to software ICT in arithmetic. ICT integration in Mathematics-training has a superb effect on each the coaching and studying process. The examine become carried out out to

decide the impediments to integration of ICT in arithmetic coaching and studying in Teacher-Training colleges & secondary college tiers. There are a few obstacles to combine ICT in coaching and studying arithmetic in numerous branches of arithmetic. In the future, we will amplify my examine to the better training stage for expert development.

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Research Paper
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Traditional Medicinal Plants Used By Kolam Tribe Of Nimgavhan Village, Yavatmal District, Maharashtra

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Abstract

India Is Rich In Medicinal Plant Diversity Distributed In Different Geographical And Environmental Condition And Associated Tribal And Folk Knowledge System. The Tribal Mostly Depend On Forests For Their Livelihood (Gupta *Et Al*, 2010). Folk Medicines Today Play A Key Role In The Developing Countries Due To Lack Or Limited Modern Health Services.

Tribal People Utilize Plants As Herbal Medicines, Which Are Effective Against A Number Of Diseases And This Knowledge Is Generally Transmitted Orally From Generation To Generation.The Traditional Knowledge Of Medicinal Plants That Are In Use By "Kolam Tribe" Residing In Nimgavhan Village Of Yavatmal District, Maharashtra. Yavatmal District Is Rich In Ethnobotanical Plants. Different Plant Parts Such As Root Stem, Leaves, Flowers, Tuber, Rhizome, Bulb Were Found To Be In Use By Kolam Tribe. The Kolams Are Considered In Dravidian Group Of Tribes And Ethically And Culturally Akin Of Gonds (Russel And Hiralal, 1973).

The Present Study Was Done Through Structured Questionnaires In Consultation With The Tribal Practitioner And Has Resulted In The Documentation Of 34 Medicinal Plant Species Belonging To 28 Families And Used To Treat About 28 Ailments .

Introduction

India Is Known For Its Traditional Medicinal Systems – Ayurveda, Siddha And Unani. Medical Systems Are Found Mentioned Even In Ancient Vedas And Other Scriptures. The Ayurvedic Concept Appeared And Developed Between 2500 And 500 BC In India (V. Subhose *Et Al., 2005)*. Use Of Plants As A Source Of Medicine Has Been An Ancient Practice And Is An Important Component Of The Healthcare System In India.Plants Have Been Used For Medicinal Purposes Long Before Prehistoric Period . Ancient Unani Manuscript ,Egyptian Papyrus And Chinese Writings Described The Use Of Herbs. Evidence Exist That Unani Hakims, Indian Vaids And European And Mediterranean Cultures Using Herbs For Over 4000 Years As Medicines.

According To The World Health Organisation (WHO) ,Traditional Medicine Is Some Total Of The Knowledge, Skills And Practices Based On The Theories, Beliefs And Experience Is Indigenous To Different Cultures Whether Explicable Or Not, Used In The Maintenance Of Health As Well As In The Prevention ,Diagnosis, Improvement Or Treatment Of Physical And Mental Illness. After The Discovery Of Modern Medicines, People Started To Use Modern Medicines And Neglected Traditional Medicines, But Nowadays Because Of The Adverse Drug Reaction, Allergies, Increased Side Effects And High Cost Of Modern Medicines There Is Increase In Interest And Awareness About Traditional Medicines As These Are Natural And Derived From Plant Materials, Very Safe With No Or Minimal Side Effects And Herbal Treatment Is Independent Of Any Age Group And Gender.

In India, About 70% Of The Rural Population Depends On Traditional Medicines. Most Healers/Practitioners Of The Traditional Systems Of Medicine Prepare Formulations By Their Own Recipes And Dispense To The Patients (M. M. Pandey *Et Al., 2013).* Tribal People Utilize Plants As Herbal Medicines, Which Are Effective Against A Number Of Diseases And This Knowledge Is Generally Transmitted Orally From Generation To Generation.

The Present Study Documents The Traditional Knowledge Of Medicinal Plants That Are In Use By "Kolam Tribe" Presiding In Nimgavhan Village Of Yavatmal District, Maharashtra. Yavatmal District Is Rich In Ethnobotanical Plants. Different Plant Parts Such As Root Stem, Leaves, Flowers, Tuber, Rhizome, Bulb Were Found To Be In Use By Kolam Tribe.

The Present Study Was Done Through Structured Questionnaires In Consultation With The Tribal Practitioner And Has Resulted In The Documentation Of **34** Medicinal Plant Species Belonging To **28** Families And Used To Treat About **28** Ailments .

About Kolam Tribe :

Kolam Tribe Are Mostly Found In Telangana, Chhattisgarh, Madhya Pradesh And Maharashtra State Of India. They Are Common In Yavatmal, Chandrapur And Nanded District Of Maharashtra. They Live In Hamlet's Called "Pod".They Speak Kolami Language And They Belongs To An Agricultural Community.

The Kolams Are Considered In Dravidian Group Of Tribes And Ethically And Culturally Akin Of Gonds (Russel And Hiralal, 1973).The Kolams Are Also Identified As Metlokur, Mannerwarlu Or Mughlaikul. People Of Kolam Community Believes Their Race Originated During Pandav Of Great Mahabharata And They Called Themselves Pandavvanshi.

The Word "Kola" Means Stick Or Bamboo In Their Dialect As Such Call Themselves As Kolavar. Bamboo Occupies Am Important Place In Cultural And Religious Lives Of The People.

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The Traditional Medicinal Man Measures A Charmed Stick Before Prescribing Herbal Medicine To Sick People. They Trace Their Descent To Bheema And Hidimba The Well Known Characters Of Mahabharata. (Bharathi Karri ,2019) The Kolam Habitats Are Surrounded By Deep Forest. They Are Recognized As Primitive Tribal Group. Kolam People Follow Hindu Rituals Ceremonies And Traditions. In Telangana Kolams Are Present Only In One District That Is Adilabad (Old) ,Where About 225 Kolam Habitats Are Identified. (Manoj Kumar Nalla *Et Al. 2018)* Kolam Community Strongly Believes In Indigenous Knowledge Of Herbal Treatments. Tattooing Is Very Common Among Kolams (Deogaonkar And Baxi, 2003; Vinatha Naini Et Al, 2013) Ery Common Among Kolams (Deogaonkar And Baxi, 2003; Vinatha Naini Et Al, 2013). Gaon Bandhani Is An Important Ritual Which Is Also Called As Sati In Kolami Dialect . For The Kolam Pod This Ritual Is Festive Occasion And None Tries To Miss It. Gaon Bandhani Literally Means Fortification Of Village Boundaries So As To Ward Off All The Evils Including Ghosts, Out Side Gods, Epidemics, Diseases Etc. The Use Of Herbal Medicine Is A First Priority Among Them, They Mostly Depend On Herbal Medicine For Health Care ,Hence They Approach The Local Healers Known As Makulak For Herbal Medicines Who Have Great Knowledge On Use Of Medicinal Plants. Kolam Healers Provide Medicines In Free Of Cost; A Few Of Them Sells Herbs In Local Weekly Markets To Get Cash For Their Livelihood. (Manjusha Wath *Et Al ,2014)*

Methodology

Study Area :

The Study Was Carried Out In Nimgavhan Village Of Yavatmal District. Most Of People In Nimgavhan Belongs To Kolam Community And They Still Believe In Herbal Medicines For Treating Various Ailments.

Location :- It Is Situated 27km Away From Sub-District Headquarter Kalamb And 45km Away From District Headquarter Yavatmal. It Is Located In Biogeographic Zone Ranges From 20°21'07.8"N Latitude And 78°26'34.3"E Longitude.

Rainfall :- Average Rainfall Is 911mms -.

Climate :-The Climate Is Dry And Hot In Summer With A Moderately Cold Winter. The Average Daily Temperature In May Reaches 42 °C (108 °F). The Average Daily Minimum Temperature Is 13 °C (55 °F) In December.

Soil :- Black Cotton Soil

About Yavatmal District :- Yavatmal District Is Situated In The South-Western Part Of Wardha Penganga-Wainganga Basin. It Is Surrounded By Amravati And Wardha District To The North. Chandrapur District To The East. Andhra Pradesh State And Nanded District To The South And Parbhani And Akola District.

Population Of Nimgavhan :- Nimgavhan Village Is Situated In Tehsil Kalamb, District Yavatmal And In State Of Maharashtra India. Village Has Population Of 418 As Per Census Data Of 2011, In Which Male Population Is 228 And Female Population Is 190. Total Geographical Area Of Nimgavhan Village Is 401 Hectares. Population Density Of Nimgavhan Is 1 Persons Per Hectares. Total Number Of House Hold In Village Is 116.

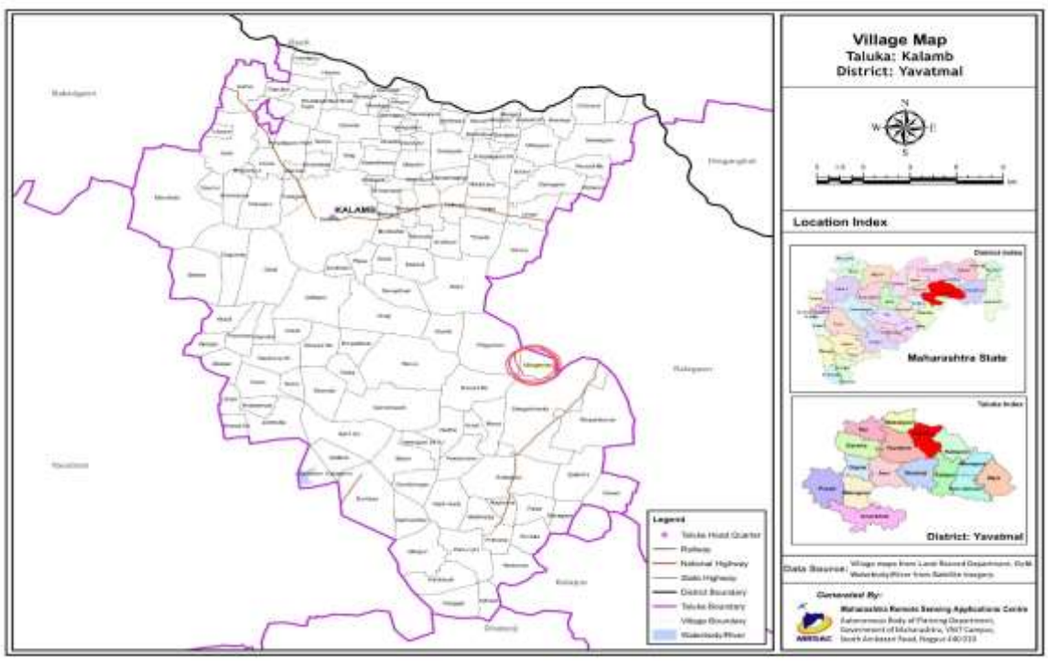

Fig. 1: Map Showing Villages In Kalamb Tahsil And Red Colored Encircled Area Showing Nimgavhan.

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Survey Methodology :

The Data Was Collected By Field Visits During The Months Of Feb- March 2022.The Survey Was Conducted Particularly With Kolam Tribe In Nimgavhan Village , Kalamb Taluka, Yavatmal District Of Maharashtra. The Information Was Gathered From Tribal Medicine Men(Vaidya) And People Of Tribal Community Who Knew Well About This Surrounding Plants And Their Local Names. About 10 To 15 People (Age -18-65 Years Old) Were Interviewed Who Regularly Used Plants To Cure Diseases And Has Knowledge About It. The Interviews Were Conducted In Local Language To Avoid Translation Problems.

Data Work Collected Through Structure Questionnaires. The Questionnaires Were Developed According To Get Information On Medicinal Plants Including The Local Name Of The Plants, Name Of Diseases For Which A Particular Plant Was Used And The Part Of Plant Used, Preparation Of Herbal Medicine, Mode Of Administration ,Doses Etc. The Informants Were Asked To Show The Plants Or Its Plant Part If Available.

Data Sheet Was Carefully Prepared For Documentation. Personal Details Of The Informants Were Also Entered On Data Sheet Along With Information Of Medicinal Plants They Used.

Identification Of Medicinal Plants : The Medicinal Plants Were Collected And Identified According To The External Morphology, Habitat And Floral Characteristics By Using Internet And Standard Floras Such As –

1. Cook (1958) – The Flora Of Presidency Of Bombay. Vol I, II, III
2. Naik (1998) - The Flora Of Marathwada
3. Singh And Karthikeyan (2000) – Flora Of Maharashtra State. Vol I, II, III
4. Internet – Pictures Of Some Plants Were Taken From Internet

Observation

The Table Includes The Information About Medicinal Plants Used For Various Ailments By Kolam Tribe

Botanical Name Of Plant	**Local Name**	**Family**	**Plant Part Used**	**Uses And Mode Of Administration**
Ailanthus Excelsa	Maharukh	Simaroubaceae	Leaves	**Diarrhoea** (In Children) : The Juice Of Fresh Leaves Extracted And Given Only 2-3 Drops Of It Orally.
Ehretia Laevis	Khanduchakka	Boraginaceae	Leaves	**Wound Healing, Joint Pain And Minor Fracture** : Take Fresh Leaves And Grind It With Water To Make Paste Then Apply This Paste On Wound, Or On Fractured Area.
Cadaba Fruticosa	Kali Takli	Capparaceae	Leaves	**Diarrhoea** : Extract Juice From Leaves And Given 2,3 Drops Orally Twice A Day.
***Allium Cepa* L.**	Kanda, Onion	Amaryllidaceae	Bulb	**Fever**: Make Homogeneous Mixture Of Onion, Camphor And Oil And Apply It On Whole Body, It Helps To Lower The Body Temperature.
***Piper Betle* L.**	Betel, Vida	Piperaceae	Leaves	**Asthma And Cough :** Betel Leaves Applied With Castor Oil Is Warmed And Tied Over The Chest Relieves Asthma And Cough In Children.

Azadirachta Indica	Kadunimb	Meliaceae	Leaves	**Measles**: Extract Juice From Its Leaves Mix It With Cow's Urine (Gomutra) And Apply It On Whole Body.
Picrorhiza Kurroa	Kutki	Plantaginaceae	Rhizome	**Constipation, Use To Increase Appetite And Used As Tonic :** Rhizome Powder Is Taken Along With Honey Or Water
***Plumbago Zeylanica* L.**	Chitrak	Plumbaginaceae	Roots	**Snake Bite, Scorpion Bite, Ringworm, Itching :** Rub The Root On Affected Area Of Skin
Tribulus Terestris	Sarata, Gokharu	Zygophyllaceae	Leaves	**Wound Healing, Itching :** Extract Juice From Its Leaves And Apply It On Wound Or Itching Area Of Skin.
***Butea Monosperma* (Lam.)**	Palash	Fabaceae (	Flowers	**Strangury** : Juice Of Its Flower With Rock Sugar /Rock Candy Given Orally Twice A Day.
Caesalpinia Bonduc	Sagargota	Fabaceae (Caesalpinioideae)	Leaves	**Haemorrhoids /Piles :** Leaf Juice Of *Caesalpinia Bonduc And Tribulus Terrestris* Mixed With Butter Milk And This Mixture Is Given Orally
***Mimosa Pudica* L.**	Lajurli /Lajwanti	Fabaceae (Caesalpinioideae)	Leaves	**Depression And Anxiety :** Boil The Leaves In Water, Extract The Juice (Kadhaa) And Given Orally, It Works As Antidepressant
Discorea Bulbifera	Dukkarkand	Dioscoreaceae	Tuber	**Leucorrhoea** : Crush/ Grind The Tuber And Take 1 Tablespoon Of This Powder With Yoghurt Orally.
Torenia Indica	Torani	Linderniaceae	Leaves And Flowers	**Headache**: Extract Juice From Leaves And Put 2 Drops Of It In Each Ear.
***Datura Innoxia* (Mill.)**	Pandhara Dhotra	Solanaceae	Leaves	**Rheumatoid Arthritis :** Boil The Leaves In Eating Lime Solution And Extract The Juice, Apply Juice On Inflamed

				And Swollen Joints.
Acacia Nilotica	Babhool	Fabaceae (Caesalpinioideae)	Leaves And Bark	**Toothache, Oral Health :** Chew Small Pieces Of Fresh Bark For Good Oral Health It Strengthen Teethes And Heals The Gum. Chewing Babhool Leaves Give Relief From Toothache.
Lagenaria Siceraria **(Melina) Standl.**	Dudhi Bhopla	Cucurbitaceae	Leaves	**Abdominal Bloating** (In Children): Apply Castor Oil On Leaves, Warm It, And Keep The Warm Leaves On Stomach Or Wrap It Around Stomach By Using Cloth.
Andrographis Peniculata **Nees**	Bhuinimb, Kalmegh	Acanthaceae	Leaves	**Fever, Improve Appetite, COVID-19:** Juice From Leaves Extracted And Given Orally .
Abrus Precatorius **L.**	Gunja	Fabaceae	Root	**Cough:** Root Powder Mixed With Pure Butter And Given Orally. **Leucorrhoea** : Take 5 Gm Of Ganja Root Powder With Rice Water After Food Twice Daily. **Night Blindness** : Make Kajal Of Root And Cow's Ghee And Apply It Under Eyes .
Vitex Negundo **L.**	Nirgundi	Lamiaceae	Leaves	**Joint Pain** : Boil The Leaves In Water And Take A Bath In This Water Daily. **Cough** : Boil 10 Gm Of Leaf Paste In 100ml Of Water And Drink It Twice Or Thrice Daily.
Ficus Racemosa **L.**	Umbar, Audumbar	Moraceae	Latex	**Cough And Cold :** Apply The Milky Latex On Forehead, And 1 Tablespoon Of Latex Is Given Orally 3 Times In A Week. **Swelling** : Latex Gives Relief When Applied On Any Swelling

***Boswellia Serrata* Roxb.**	Salai	Burseraceae	Bark	**Regulates Menstrual Cycle :** Make Powder Of The Bark And Take It With Yoghurt Or Tak Orally
Aegle Marmelos	Bel	Rutaceae	Fruit And Leaf	**Diarrhoea :** Consume Bel Fruit Pulp Along With Honey Or Sugar **Diabetes :** Consume 3 Leaves Of Bel Daily In Morning It Controls Blood Sugar Leve**l.**
***Annona Squamosa* L.**	Sitaphal	Annonaceae	Leaf	**Ringworm :** Leaf Paste Applied For Treating Ringworm And Itching
***Phyllanthus Emblica* L.**	Aawla	Phyllanthaceae	Bark	**Burning :** Mix The Ash Obtained From Stem Bark With Coconut Oil And Apply This Paste Externally On Burned Skin Area
Alocacia Macrorrhizos	Alu, Bramharakshas	Araceae	Leaf	**Cysts (Gathan) :** Wrapped The Warm Leaves Around The Cyst By Using Cloth
Calotropis Gigantea	Rui ,Madar	Apocynaceae	Flower	**Cough :** Make Powder From Dry Flowers And Consume It Along With Honey (Both ½ Tablespoon In Quantity)
***Achyranthes Aspera* Linn.**	Chirchita, Aaghada	Amaranthaceae	Root	**Snake Bite, Scorpion Bite** : Root Extract Is Given Orally**.**
Tridax Procumbens	Kambarmodi	Asteraceae	Leaf	**Wound Healing :** Leaf Extract Is Applied Externally On Wound Or Injured Area .
***Catharanthus Roseus* L.**	Sadaphuli	Apocynaceae	Leaf	**Diabetes :** Eat 2-3 Leaves Daily It Controls Blood Sugar Level.
Carica Papaya	Papai	Caricaceae	Leaf	**Control Blood Sugar Level :** Intake Of Papaya Leaf Juice Daily Controls Blood Sugar Level And Increases Blood Platelets Count
Mangifera Indica	Aamba	Anacardiaceae	Bark	**Typhoid :** Bark Paste Decoction Is Taken Orally For Two Consecutive Days To Relieve Typhoid Fever. Relieve

***Pergularia Daemia* (Forssk) Chiov.**	Utaran	Apocynaceae	Leaves	**Antirheumatic:** Dried Leaves Paste Is Applied Externally To Affected Area **Diarrhoea (Infants) :** Stem And Root Bark Extract Is Taken To Treat Fever And Diarrhoea In Infants
***Terminalia Arjuna* (Roxb)**	Arjun, Aanjan	Combretaceae	Bark	**Pimples :** Bark Paste Is Applied Externally On Face Once In A Week For 15-20 Minutes

Lanthus Excelsa

Figure 2: Leaves of *Ehretia Laevis* Roxb

***Ehretia Laevis* Roxb**

Cadaba Fruticosa

***Allium Cepa* L.**

***Piper Betle* L.**

Azadirachta Indica

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Research Paper

Icrorhiza Kurroa

Plumbago Zeylanica L.

Tribulus Terestris

***Butea Monosperma* (Lam.)**

Caesalpinia Bonduc

***Mimosa Pudica* L.**

Discorea Bulbifera

Torenia Indica

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UGC CARE Listed (Group -I) Journal

Research Paper

***Datura Innoxia* (Mill)**

Acacia Nilotica

Lagenaria Siceraria

Andrographis Peniculata

***Abrus Precatorius* L.**

***Vitex Negundo* L.**

***Ficus racemosa* L.**

***Boswellia serrata* Roxb**

Aegle marmelos

Annona squamosa

Phyllanthus emblica

Alocacia macrorrhizos

Calotropis gigantea

Achyranthes aspera

Tridax procumbens

Catharanthus roseus

Andrographis peniculata Nees

Boswellia serrata

Carica papaya

Mangifera indica

***Pergularia daemia* (Forssk) Chiov.**

***Terminalia arjuna* (Roxb)**

Caesalpinia bonduc

Mimosa pudica

Picrorhiza kurroa

Vitex negundo

The above table shows pictures of some medicinal plants (dried and living) which were stored and planted by Vaidya of Nimgavhan village

Mr. Bharat Bhoyar,(Vaidya/healer) of Nimgavhan village showing the Medicinal plants (most of them were stored in dry form)

Women of kolam community(Mrs.Sunanda Kasar And Kavita Kasar) giving information about the plants they use as medicines

Interview with local people of Nimgavhan

Tribal children

Result And Discussion

This Ethnomedicinal Survey Reveals That The People Of Kolam Community Have Vast Knowledge Of Herbal Medicines And Even Today They Rely On Traditional Medicinal Practices Inherited This Knowledge From Generation To Generation.

This Study Documented The Ethnobotanical Information Of **34 Plants** Species Belonging To **28 Families** Useful In Treatment Of About **28 Ailments (Diseases).** Most Of This Plant Species Are Growing Wild. Plants Used In The Treatment Were Herbs, Trees, Climbers And Shrubs. These 34 Plants Are Used For Treatment Of Diseases Such As Cough (5),Diarrhoea (4), Wound Healing (3), Leucorrhoea (2), Fever (2),Snake/Scorpion Bite (2), Ringworm And Itching (2), Diabetes (2), Asthma (1),Measles (1), Constipation (1), Strangury (1), Haemorrhoids (1),Depression And Anxiety (1), Joint Pain And Minor Fracture (1), Headache (1), Rheumatoid Arthritis (1),Toothache (1),Abdominal Bloating (1),Night Blindness (1) ,Swelling (1),Burning (1),Cysts (1),Covid -19, Irregular Menstrual Cycle (1) Pimples (1),Typhoid (1),Increase Platelets (1). Some Of These Plants Are Used To Treat More Than One Disease.

Different Parts Of The Plant Such As Roots, Stem, Leaves, Flowers, Fruits, Tubers, Latex Etc. Are Used For Preparation Of Medicines. Leaves Were The Mostly Used Plants Part ,Leaves Of About 20 Plants Were Used In Drug Formulation As Compared To Roots(3),Bark (5), Flower (2),Rhizome (1),Fruit (1),Latex (1). Drug Formulation Such As Paste, Decoction, Juice Are Prepared. For Some Diseases Only Plant Part Is Used In Drug Formulation While In Some Plant Part Along With Other Substances Such As Honey, Milk, Butter, Yoghurt, Rice Water, Oil Etc. Are Used.

In Mode Of Administration Of Drugs Both Oral Administration As Well As External Application Is Prescribed. Generally For Skin Diseases Such As Ringworm, Itching, Wound Healing, Joint Pain, Swelling, Snake And Scorpion Bite Etc. External Application Of Drug Is

Prescribed And For Diseases Such As Diarrhoea, Cough And Cold, Constipation, Diabetes Etc. Oral Administration Is Prescribed.

The People Of Study Area And The Herbal Healers Collect The Medicinal Plants From The Forest Around Their Village And They Store The Medicinal Plants (Dry Form) Which Are Not Available Throughout The Year Means The Plants Which Are Seasonal . Generally The Fresh Leaves Roots, Flowers Etc. Are Used But If The Fresh Plant Part Is Not Available Then They Use Dry Material .

During The Survey It Was Found That Younger Generation Is Not That Much Aware Or Interested In Traditional Medicinal Practices. While Elder People Have More Knowledge About It And They Have Used More Medicinal Plants And Given Us More Information During Interview. Similarly Men Have More Knowledge About Medicinal Plants As Compared To Women. Herbal Healers (Vaidya) Have Immense Knowledge About Which Medicinal Plant Is Useful On Which Disease But He Was Hesitant To Disclose His Knowledge.

Similar Study Was Carried Out By Rao *Et* Al. (2012). They Provided Data On 31 Medicinal Plants, 3 Plants In Their Study Were Also Noted By Me But Their Use Was Different (I.E. Used To Treat Different Diseases) . The Three Plants Are – ***Ailanthus Excelsa*** *(*Bark Decoction Is Administered To Patients Suffering From Typhoid And Jaundice) , ***Butea Monosperma*** (Stem Bark Decoction Is Consumed To Control Vomiting) , ***Phyllanthus Emblica*** *(*Bark Is Chewed To Relieve Jaw Pain Associated With Toothache) .

P. S. Lachure (2012), Carried Out Survey On Ethnomedicinal Plants Used By Tribes In Digras Region Of Yavatmal District And Documented Plants Along With Their Medicinal Properties Such As *Abrus Precatorius* L. (Uterine Stimulant), *Achyranthes Aspera* (Toothache And Astringent), *Annona Squamosa* L. (Treatment Of Dysentery), *Azadirachta Indica* (Antimicrobial And Insecticidal) , *Tribulus Terrestris* L. (Tonic In Sexual Inadequacy) ,*Tridax Procumbens* L. (Antiseptic, Insecticidal) ,*Vitex Negundo* (Anti Inflammatory, Analgesic) . People Of Nimgavhan Village Used These Plants For Treating Different Diseases Such As *Abrus Precatorius* (Cough, Night Blindness, Leucorrhoea), *Achyranthes Aspera* (Snake And Scorpion Bite) , *Annona Squamosa (*Ringworm), But 3 Plants *Azadirachta Indica, Tridax Procumbens, Vitex Negundo* Are Used To Treat Same Diseases In Both The Study Areas. Mukund Dhore *Et Al.,*(2012) Presented A Paper Deals With Documentation Of Ethnomedicinal Uses Of Plants Particularly The Fertility Regulatory Plants Used By Kolam, Gond, Banjara Tribals Of Yavatmal District. Plants Like *Abrus Precatorius, Azadirachta Indica, Annona Squamosa, Calotropis Gigantea, Carica Papaya, Plumbago Zeylanica* Are Abortifacient, Induce Abortion Or Have Antifertility Activity .

N. Rama Krishna, Ch. Saidulu, S.Kistamma (2014) Carried Out Survey In Mancherial And Jannaram Reserve Forest Division Of Adilabad District, India. The Survey Reported 68 Plant Species Belonging To 33 Families. They Found That The Plants Such As ***Aegle Marmelos*** **(Linn)** Is Used To Treat Ulcers, Magget Infested Stores For This Leaf Paste Is Used As External Application. Also The Leaves Along With Those Of *Dolichandrone Falcate* ,A Pinch Of Common Salt And Turmeric Are Crushed With Goat's Milk, Extract Is Used As Eye Drop Twice A Day For Opacity Of Cornea. ***Caesalpinia Bonduc*** **L.** -Leaf Paste Is Used To Treat Hydrocele, Slightly Warm Leaf Decoction Is Poured On Affected Area Daily For Treatment Of Paralysis. ***Plumbago Zeylanica*** **L.** Leaves Are Used As Curry In Case Of Fever, ***Phyllanthus Emblica*** **L.** Is Used To Treat Dental Problems – Fruit Juice Is Mixed With Garlic Juice Is Dropped In Affected Dental Area. But During My Study It Was Found That The Kolam People Of Nimgavhan Village Used These Same Plants *Aegle Marmelos* (Linn) For Treatment Of Diarrhoea ,Diabetes And *Caesalpinia Bonduc* L. For Haemorrhoids /Piles, *Plumbago Zeylanica* L. For Snake/Scorpion Bite, Ringworm, Itching, *Phyllanthus Emblica* L. For Skin Burning .

Chavhan V. N. Et Al (2020), Carried Out Similar Survey In Yavatmal District And Documented 78 Plant Species Belonging To 47 Families In Ethnomedicobotany Of Yavatmal District (MS), India. 6 Plant Species Documented By Them Are Also Recorded By Me. The Plant Species Are ***Annona Squamosa*** **L.** – Leaf Juice Is Given To Check The Habit Of Liquor Consumption. ***Azadirachta Indica*** (Leaf Decoction Is Given On Swelling Caused By Accident And To Treat Typhoid), ***Butea Monosperma*** Seed Paste Is Used For Enhancing Fertility In Woman. ***Cadaba Fruticosa*** **L.** -Leaves Are Used To Treat Arthritis, Body Ache, Body Swelling, ***Calotropis Gigantea*** **L.** Root Bark And ***Piper Betle*** **L.** Leaf Is Used To Treat Fever. People Of My Study Area Used These Plants To Treat Different Diseases Such As *Annona Squamosa* L. (Ringworm), *Azadirachta Indica* L. (Measles), *Butea Monosperma (*Strangury), *Cadaba Fruticosa L.* (Diarrhoea), *Calotropis Gigantea* L. (Cough), *Piper Betle* L. (Asthma And Cough). Ramchandra Kulkarni And Kailash Sontakke (2020) ,Carried Out Survey On Ethnomedicinal Plants Of Kinwat Region Of Nanded District And Documented 40 Plant Species. Out Of 40 Plants 8 Plants Are Also Recorded By Me, Out Of These 8 Plants 3 Plants Are Used For Treatment Of Same Diseases In Both Kinwat Region And Nimgavhan And These Plants Are ***Picrorhiza Kurroa*** (Roots – Loss Of Appetite), ***Ehretia Laevis*** **Roxb.** (Bark – Fracture And Wound Healing), ***Ailanthus Excelsa*** **Roxb.** (Leaves -Worm And Dysentery) . Remaining 5 Plants Are Used For Different Diseases ***Datura Innoxia*** (Leaves- Paralysis ***) , Achyranthes***

Aspera* L.** (Leaves -Goiter) , ***Aegle Marmelos (Leaves -Vata) ***,Azadirachta Indica*** (Bark - Jaundice, Stomachache, Malarial Fever) ***,Butea Monosperma (*Lam)** (Bark -White Discharge, Appendix).

Conclusion

The Present Study Was Carried Out In Nimgavhan Village Of Yavatmal District To Get The Information About Medicinal Plants Which Are Used By The People Of Kolam Community To Cure Various Ailments. During The Survey It Was Found That Kolam People Have Great Knowledge About Medicinal Plants And They Are Very Much Dependent On This Medicinal Plants As They Use This Herbal Medicines For Primary Health Care And They Prefer These Traditional Medicines On Allopathic Or Modern Medicines Because This Are Easily Available, Low Costs And Do Not Have Any Side Effects. Herbal Medicinal Treatment Is Prescribed To All Age Group From Infants To Older People And Used In Daily Life Such As For Headache, Fever, Cold, Cough Or For Treating Diseases Such As Diabetes, Piles, Paralysis Etc. It Was Also Noted That Treatment Of Some Plants Are Restricted To Particular Age Group Or Gender And Doses Of Drugs Are Different For Different Age Groups.

The Knowledge Of Traditional Medicines Transferred Orally From Generation To Generation From Thousands Of Years But Now Younger Generation Is Not Interested In Preserving This Knowledge Therefore There Is An Urgent Need To Document And Conserve Traditional Medicinal Plants As It Is Rapidly Disappearing Due To Influence Of Western Medicines, Negligence Of Young Generation, Overexploitation Of Plants And Rapid Deforestation. It Is Important To Collect The Information And Develop Database Of Medicinal Plants For Future Research And Development Of New Drugs. It Is Necessary To Conserve These Medicinal Plants Because Some Of These Plants May Contain Undiscovered Pharmacological Properties Which Can Serve As An Ingredient For The Development Of New Drugs. It Is Observed That Younger Generation Is Not Interested To Continue This Traditional Medicinal Practices And Therefore The Number Of Traditional Herbal Healers Is Decreasing. Hence There Is Urgent Need To Record And Preserve All The Information On Plants Used By Kolam Community Before It Lost Completely .

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Research Paper
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Impact of Online Teaching and Learning on the Under-Graduate Students during the Pandemic.

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Abstract:

COVID-19 is a highly infectious disease caused by coronavirus 2 (SARS-CoV-2). It has originated in Wuhan city of China. The coronavirus triggered first phase in the form of nationwide lockdown in India which commenced on March 25, 2020. It has globally put, over 1.2 billion children out of the classroom. This situation challenged the educational system across the world and forced educators to shift to an online mode of teaching abruptly. Many academic institutions that were forced to transform entirely to online teaching and learning. Hence, there was distinctive rise in e-learning, whereby teaching is undertaken through digital platforms.

The lack of digital tools is a major drawback amongst students, there is difficulty in understanding, social isolation and poor communication skills. The impact of the virus was so strong that online education became an omnipresent part of education, resulting in no further physical interaction of teachers with students. Due to the lockdown, students have not connected with the outer world resulting in lack of exposure. Since, students have been introduced to virtual platforms it made them well versed with technology with digital identity.

On the other side of education i.e., the teachers, were greatly benefitted by teaching online, in such a way that it has increased their awareness of students' needs and methods to create engaging activities. Few teachers, realised it is easier to teach face-to-face after teaching online, while other teachers disagreed and faced challenges when returning to the face-to face classroom. The student teacher rapport has been affected very badly as the whole surrounding has drastically changed on account of unprecedented advent of pandemic. This research paper makes analysis of Impact of Online Teaching and Learning on the Under-Graduate Students during the Pandemic.

Key words: Pandemic, Lockdown, Online Teaching and Learning, Challenges, Isolation.

Hypothesis:

1. E-learning creates a creative ambiance on the students and teachers.

Research Methodology:

The researcher used both quantitative and qualitative methodologies in order to study the perceptions of stakeholders based on the online teaching-learning process among undergraduate students during covid 19. The researcher has also conducted physical interaction with teachers, students as well as parents, for the purpose of understanding various nuances of online teaching and learning scenarios.

The researcher has specifically constructed a brief questionnaire for students, teachers as well as parents. The questionnaire designed for the students focuses on the conveniences and inconveniences faced by the students during the process of online learning. With regards to teachers, it highlights the challenges in terms of adaptability with the technology, interacting during online sessions, preparation of material for conducting online class along with making the class interesting and effective. The parent's questionnaire is an embodiment of the impact of online learning teaching and learning amongst the students.

(i) Total responses from students: 354, (Age range: 18-23)

Out of which responses were received from students belonging to the following streams:

1. Faculty of Arts 27.7%, Faculty of Science 45.2%, Faculty of Commerce 22.3%, Faculty of Engineering 2.3%, Faculty of Design 0.6%, Faculty of Law 0.3%, Faculty of Medical 0.3% And, 1.4% from other Faculties.
2. (ii) Total responses from Teachers: 39, (Age range: 21-50) Out of which responses were received from teachers specializing in the following study area: Field of languages, Field of Information Technology, Field of Science.
3. And they had students from the following streams: Faculty of Science 46.7%, Faculty of Arts 23.3%, Faculty of Commerce 10%, Faculty of Design 3.3% And other faculties 16.7%.
   (iii)Total responses from Parents: 116
   Out of which responses were received from parents who had the following profession:

1. Working crowd 34.5%, Home-makers 25.9%, People owning a business 16.4%.

Preliminary Work:

This research conducted a comprehensive comparative study of available e-learning platforms and analysed primary data collected

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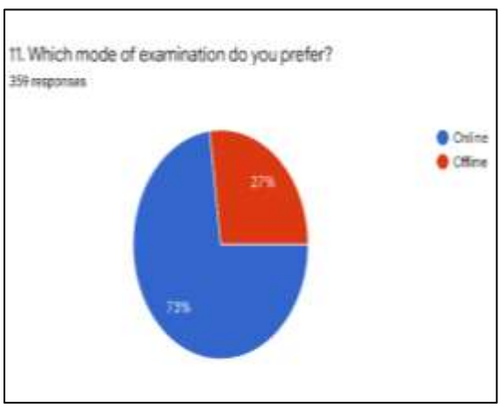
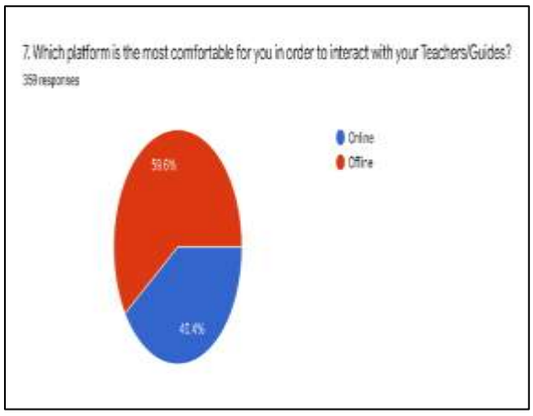
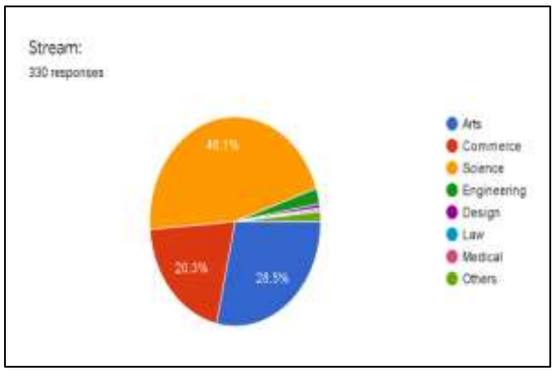
through an online survey of 500 stakeholders from various colleges and institutions. The researchers used multiple methods, including interviews, forms, reference books, journals, and research papers, to gather information and understand the perspectives of parents, teachers, and students on online learning. The study focused on undergraduate teaching and learning methods. By predicting and comparing the viewpoints of students, teachers, and parents, the research aimed to identify bottlenecks in online learning. The researchers finalized Google Forms as the survey platform for collecting quantitative data. The research ensured ethical considerations by obtaining informed consent from all participants and avoiding personal health information or sensitive data in the questionnaires.







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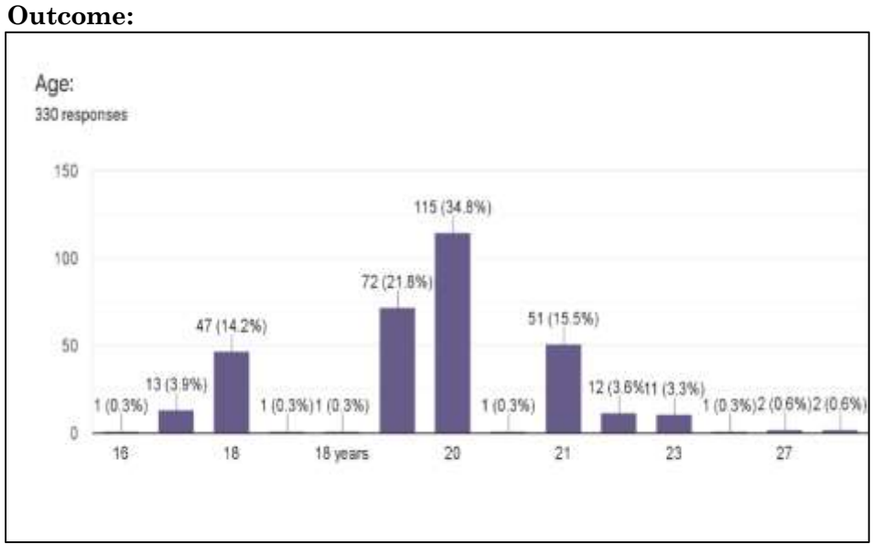

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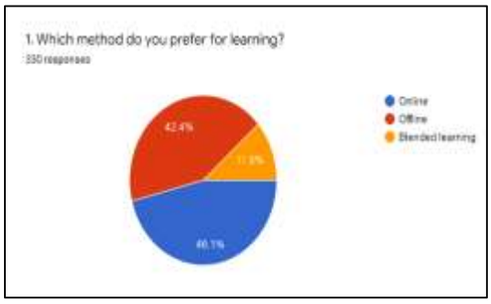
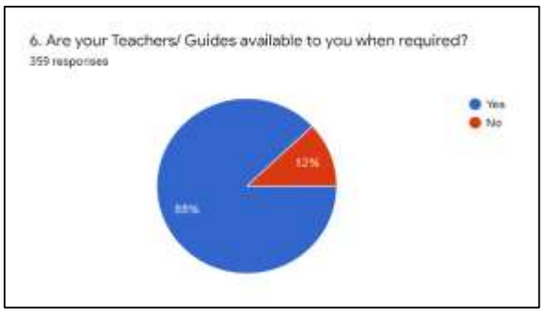
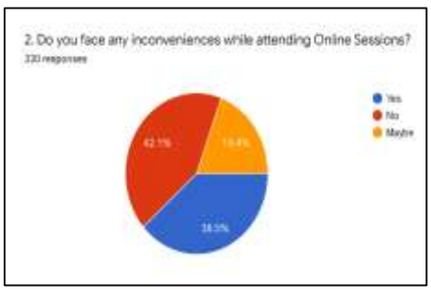
Results and analysis of the questionnaire for students.

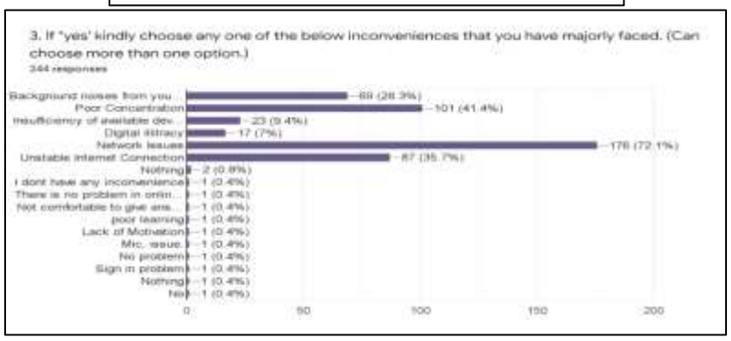
From the age range of 18-23, the maximum respondents were around the age of 20. Most of the respondents belonged to the faculty of science while the least responses were received from the faculty of Law and Medicine.



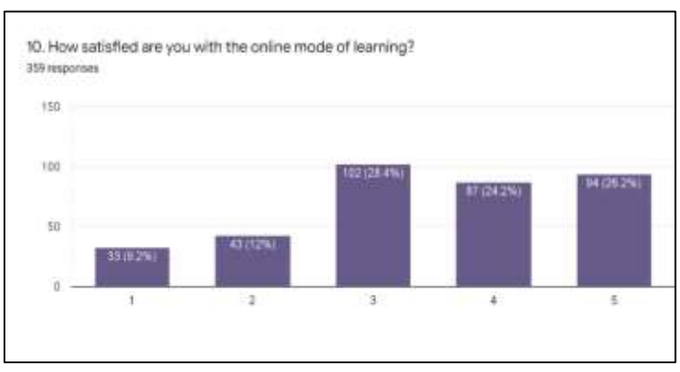
According to the survey 46.1% students preferred learning online; but the received numerical are very close to their preference of offline learning that 42.4%. The survey also showed that maximum students did not face as such any inconveniences.







From the given inconveniences the students faced the issue of network the most.



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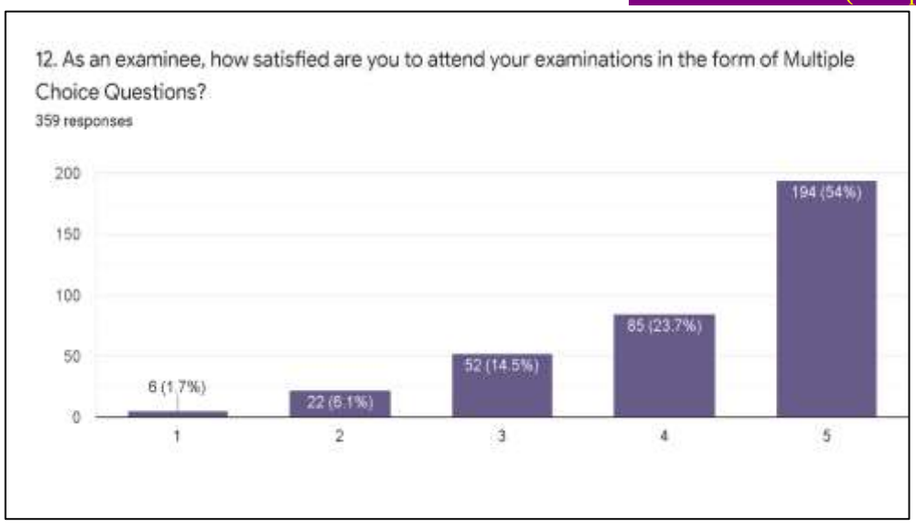
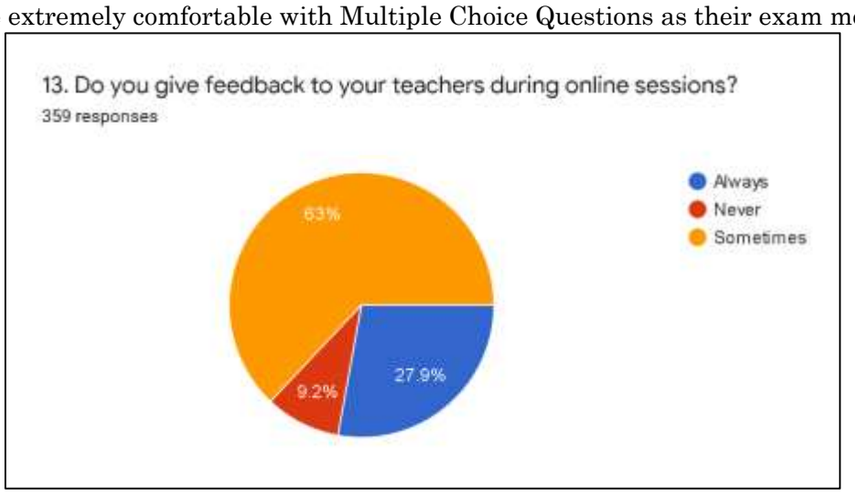
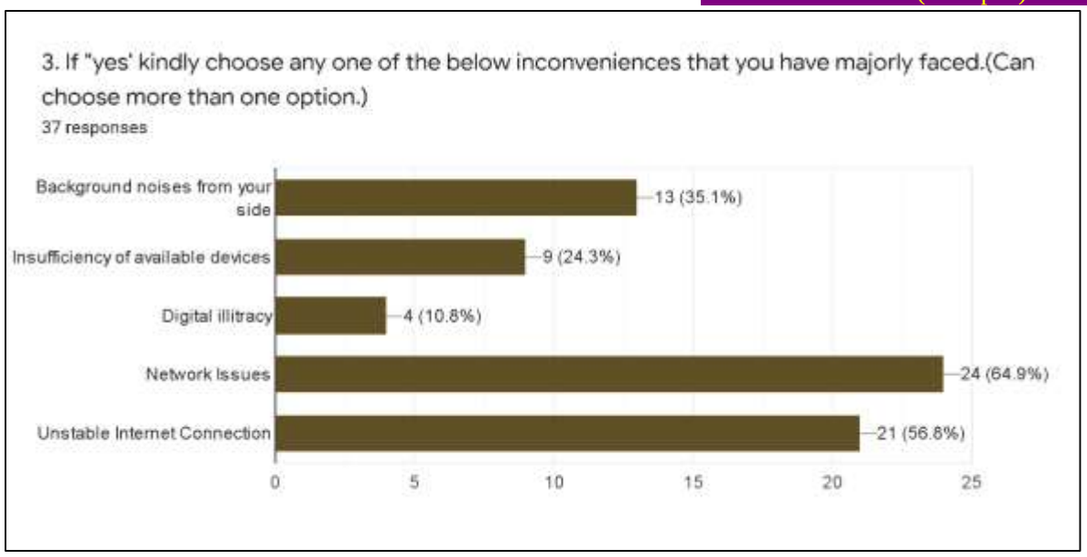
Research Paper



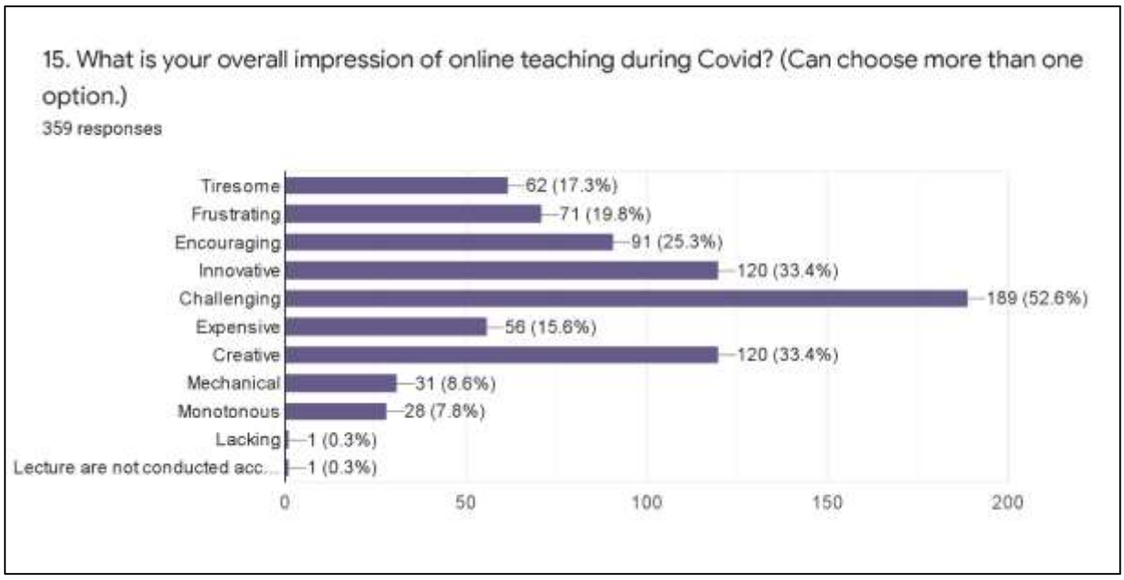
From the above data we can conclude that moderate responses are received from the students which can be seen in the favour of online learning. Even from the examination point of view students are extremely comfortable with Multiple Choice Questions as their exam mode.



From the above data we can observe that students believe that their skills are moderately being developed but the responses lean more towards the response that their skills are being developed.



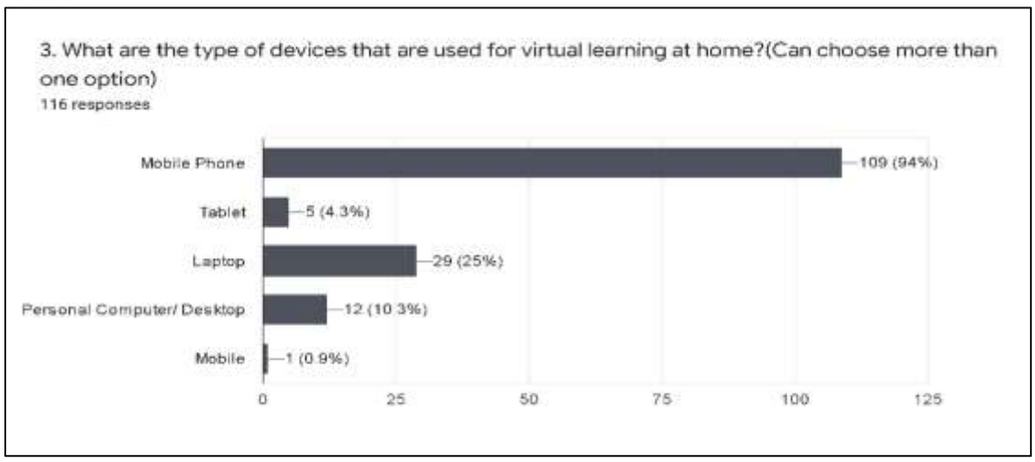
According to the above graphs students believe that online method is challenging, innovative, creative, and encouraging.

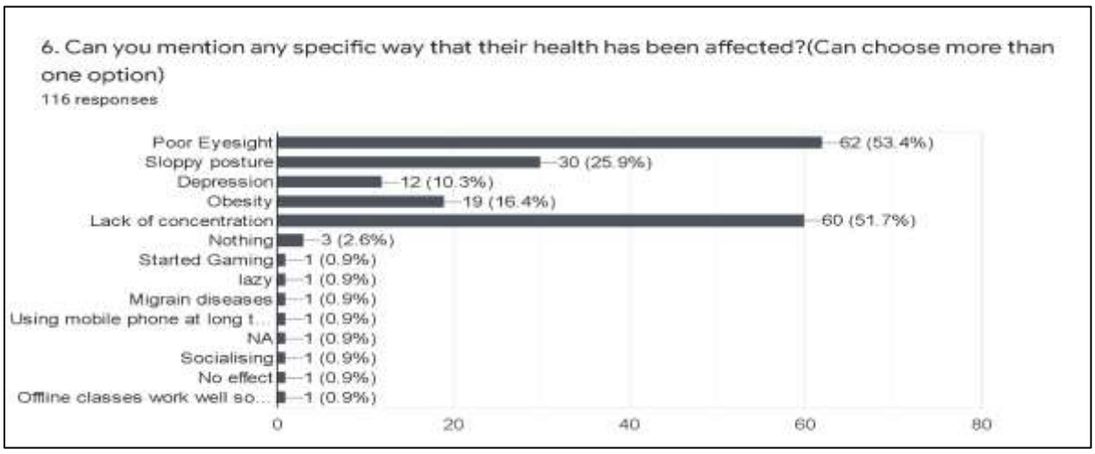


Results and analysis of the questionnaire for Teachers.

Results and analysis of the questionnaire for parents.

From the above graph it was observed that network issues is the major inconvenience faced by the teachers.





Conclusion:

In this way, an attempt has been made to explore impact of online teaching and learning on the under graduate students during the pandemic.

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Research Paper
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State of Art of Library Websites of Academic Colleges of Maharashtra State

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Abstract

Lately the library had to transfer its services and operations in view of the rapid developments in the field of information and technology. Moreover, the way information is accumulated, stored, shared and provided as per demand is also changing very rapidly. In view of this the library websites provide an opportunity to interact with its user about the changes occurring in the functioning of libraries. Moreover, the website design is an output of the thinking of its creator and barring few common aspects there appears a special feature in these websites. In view of the above, this study has been carried out to study the state of art of websites of academic colleges of Maharashtra. The study was conducted by using standard methodology and the data was collected using an online survey method. All the statistical analysis was carried out by using SPSS 18.0 Software. Based on the results of this study, it was evident that the websites of most of the libraries are designed by professional developer and with an aim to improve usability of resources. The results also indicate that the librarians need skills with respect to new technologies apart from core traditional librarianship skills. Furthermore, most of the librarians revealed that simple navigation and easy access to search are very important feature of a user friendly library website.

Keywords: Library, information technology, website design, usability of resources, skills

Introduction

The concept of librarianship in higher education has changed significantly in the last few years. The library services have now crossed the boundaries of four walls and are in the realm of digital world. In the present scenario of globalization, the librarian should think towards extending the facilities to the users apart from his institution by marketing their services. The librarian will have to be more pro- active in this aspect and the librarian must undertake the study about needs and demands of the users in terms of information (Silvis et al., 2019). Accordingly, librarian must design, develop and provide information product and services, to meet such needs and demands and rushed out to them rather wait for them to come to the library. One such initiative is the availability of content through online platforms or the dedicated library website (Ehrenpreis and Delooper, 2022). A library website incorporated into the college's website is one incredible idea that will set the educational institution apart from the competition. This kind of development has become relatively simple and it has the potential will to bring various advantages to the institution.

Gone are the days when students relied exclusively on textbooks to get all of the essential information. Today, students have access to a wide range of informational resources that prove to be an invaluable part of the academic process. The digitalization of the library shows commitment to modernization and the willingness to embrace new trends and developments by the management (Hugar, 2019). A comprehensive library website can contain much more than that is available through traditional modes of information seeking. Both students and parents will appreciate the modern development of the library website (Astani and Elhindi, 2008). Having access to the library book database through the website is important because it will enable students to participate in the academic process regardless of their location (Mellone and Williams 2010). Students today are heavily-reliant on digital technology (Kumaran and Subangi, 2017). They prefer the format and they find it much easier to use than traditional methods of information seeking. It is expected that the special collection, services and facilities available are to be kept before the users and encourage them to avail these facilities for their academic work (Richardson et al., 2023). Many libraries use information brochures for the advertisement of their consultancies and expertise. Taking this into consideration as mentioned earlier, the librarian should develop the information packages for the users and reach up to them instead of waiting them to come to library (Narnaware and Rokade, 2022). Hosting of website for the library is one of the most effective ways in the IT environment (Okeji et al., 2020). Hence, the librarian must acquire the skill of web page designing and he must have knowledge of it. In view of the importance of the library websites, present investigation was carried out to assess the state-of-art of the same i.e. library websites of the academic colleges of Maharashtra.

Research Methodology

There are many ways of outlining the basic method shared by all fields of scientific inquiry. In the present investigation, the researcher followed a general research method such as

i) define the question, ii) gather information and resources (observe), iii) form hypothesis, iv) data collection, v) analyze data and vi) interpret data and draw conclusions.

Study Area

The study area for this research work is Maharashtra State of India and NAAC accredited Academic Colleges situated in the state.

Research Design

The study is conducted by using a technique of descriptive research design.

Universe and Population of the study

On the basis of the reconnaissance survey it was observed that there are approximately 800 NAAC accredited academic colleges with Grade A, A++, B and B++ from the NAAC and are affiliated to various UGC recognized Universities in Maharashtra. Libraries of all the 800 academic colleges affiliated to various universities were considered as the population of the study.

Sampling, Sampling Method and Sample Size

For the present study library professionals working in academic colleges affiliated to various UGC recognized universities in Maharashtra were selected using random sampling technique. In this study, a representative sample size for this population was determined on the basis of the Table for Determining Sample Size for a Finite Population developed by Krejcie and Morgan (1970). According to this model, for the above mentioned population i.e. 800 need 270 samples, however, during the course of this study researcher could get information from 341 librarians. The selection of librarians was carried out randomly. Thus, the final sample size for this study is 341.

Primary data collection

The primary data was collected using a structured questionnaire and by following survey method. Prior to its use the reliability and validity of the questionnaire was tested.

Statistical Analysis of Data and Significance Level

Analysis of data was carried out with the help of appropriate statistical tests. The descriptive statistics, such as frequency, mode, percentage, etc were determined from the collected data. The Chi-Square test was used as an inferential statistical test. All the statistical analysis was carried out by using SPSS 18.0 Software. The significance level was chosen to be 0.05 (or equivalently, 5%).

Statistical Analysis & Interpretation

Development of website

Table 1: Development of website

Library website development	**Nos.**	**Percentage**
Developed new website by own	89	26.1
Made changes to an existing website	39	11.4
Professional Developer designed the website	182	53.4
Other	31	9.1
Total	**341**	**100**

Chi–square 169.581; **df:** 3, **p**<0.05; **Table Value: 7**.82

Above Table 1 shows information pertaining to development of website. 26.1% respondents have developed the website by their own while 11.4% respondents have made changes to an existing website. Further according to 53.4% respondents professional developer has designed the website and according to 9.1% respondents website is designed by other sources.

Main objectives of developing library website

Table 2: Main objectives of developing library website

Objectives of developing website	**Nos.**	**Percentage**
Convenience	37	10.9
To improve usability of resources	238	69.8
Better information sharing	201	58.9
Information Security	29	8.5
Aesthetics	52	15.2
USP for promoting college	68	19.9
Other	22	6.5

Above Table 2 shows information pertaining to objective of developing library website. According to 10.9% respondents library website is developed for convenience of the users while 69.8% respondents feel that library website is developed to improve usability of resources. In addition to this 58.9%, 8.5% and 15.2% respondents feel that library websites have been

developed for better information sharing, information security and aesthetics respectively. Furthermore, according to 19.9% respondents library website serves as a USP for promoting college and 6.5% respondents have developed library website for other reason.

Opinion of librarians about the skills of librarian

Table 3: Opinion about the demands of technical knowledge from librarians apart from core traditional librarianship skills

Response	**Nos.**	**Percentage**
Yes	291	85.3
No	35	10.3
Don't Know	15	4.4
Total	**341**	**100**

Chi–square 416.794; **df:** 2, **p**<0.05; **Table Value**: 5.99

Above Table 3 shows information pertaining to opinion of the librarians about the demands of technical knowledge from librarians apart from core traditional librarianship skills. According to 85.3% respondents there is demand of technical knowledge from librarians apart from core traditional librarianship skills while 4.4% respondents are not sure about it. Further 10.3% respondents do not feel there is demand of technical knowledge from librarians apart from core traditional librarianship skills.

Influence of various factors in development of college library website

Table 4: Influence of various factors in development of college library website

Attributes	**Extent of Influence**							
	High		**Moderate**		**Low**		**Total**	
	No	**Per**	**No**	**Per**	**No**	**Per**	**No**	**Per**
Institutional forces	188	55.1	134	39.3	19	5.6	341	100.0
Budgetary allocations	92	27.0	175	51.3	74	21.7	341	100.0
Technical Knowledge	255	74.8	71	20.8	15	4.4	341	100.0
Support, input from secondary sources	81	23.8	192	56.3	68	19.9	341	100.0
Input from different types of users	88	25.8	231	67.7	22	6.5	341	100.0

Above Table 4 shows information pertaining to influence of various factors in development of college library website.

1. **Institutional Forces:** According to 55.1% respondents institutional forces highly influence development of college library website while 39.3% respondents feel that institutional forces have moderate influence. Further according to 5.6% respondents institutional forces has less influence in development of college library website.
2. **Budgetary allocations:** According to 27.0% respondents budgetary allocations highly influence development of college library website while 51.3% respondents feel that budgetary allocations have moderate influence. Further according to 21.7% respondents budgetary allocations has less influence in development of college library website.
3. **Technical Knowledge:** According to 74.8% respondents technical knowledge highly influence development of college library website while 20.8% respondents feel that technical knowledge have moderate influence. Further according to 4.4% respondents technical knowledge has less influence in development of college library website.
4. **Support, input from secondary sources:** According to 23.8% respondents support, input from secondary sources highly influence development of college library website while 56.3% respondents feel that support, input from secondary sources have moderate influence. Further according to 19.9% respondents support, input from secondary sources has less influence in development of college library website.
5. **Input from different types of users:** According to 25.8% respondents input from different types of users highly influence development of college library website while 67.7% respondents feel that input from different types of users have moderate influence. Further according to 6.5% respondents input from different types of users has less influence in development of college library website.

3.5 Important features of a user friendly library website

Table 5: Important features of a user friendly library website

Features	Very Important		Moderately Important		Slightly Important		Total	
	No	Per	No	Per	No	Per	No	Per
Easy Access to Search	266	78.0	42	12.3	33	9.7	341	100.0
Simple Navigation	294	86.2	18	5.3	29	8.5	341	100.0
Home Page is a Gateway	119	34.9	58	17.0	164	48.1	341	100.0
Empower All its Users	99	29.0	207	60.7	35	10.3	341	100.0
Regularly Updated Content	133	39.0	187	54.8	21	6.2	341	100.0
Visible Contact Details	257	75.4	76	22.3	8	2.3	341	100.0

Above Table 5 shows information pertaining to important features of a user friendly library website.

1. **Easy Access to Search:** According to 78.0% respondents easy access to search is very important feature of a user friendly library website while 12.3% respondents feel that it has moderate importance. Further according to 9.7% respondents easy access to search is slightly important feature of a user friendly library website.
2. **Simple Navigation:** According to 86.2% respondents simple navigation is very important feature of a user friendly library website while 5.3% respondents feel that it has moderate importance. Further according to 8.5% respondents simple navigation is slightly important feature of a user friendly library website.
3. **Home Page is a Gateway:** According to 34.9% respondents home page gateway is very important feature of a user friendly library website while 17.0% respondents feel that it has moderate importance. Further according to 48.1% respondents home page gateway is slightly important feature of a user friendly library website.
4. **Empower all its users:** According to 29.0% respondents empowering all users is very important feature of a user friendly library website while 60.7% respondents feel that it has moderate importance. Further according to 10.3% respondents empowering all users is slightly important feature of a user friendly library website.
5. **Regularly updated content:** According to 39.0% respondents regularly updated content is very important feature of a user friendly library website while 54.8% respondents feel that it has moderate importance. Further according to 6.2% respondents regularly updated content is slightly important feature of a user friendly library website.
6. **Visible contact details:** According to 75.4% respondents visible contact details is very important feature of a user friendly library website while 22.3% respondents feel that it has moderate importance. Further according to 2.3% respondents visible contact details is slightly important feature of a user friendly library website.

3.6 Availability of Web 2.0 tools on the library website

Table 6: Availability of Web 2.0 tools on the library website

Response	Nos.	Percentage
Yes	265	77.7
No	59	17.3
Can't say	17	5.0
Total	**341**	**100**

Chi–square 310.018; **df:** 2, **p**<0.05; **Table Value**: 5.99

Above Table 6 shows information pertaining to opinion of the librarians about web 2.0 tools should be available on the library website. According to 77.7% respondents web 2.0 tools should be available on the library website while 5.0% respondents are unsure about it. Further 17.3% respondents do not feel that web 2.0 tools should be available on the library website.

3.7 Opinion about getting time for developing a library website

Table 7: Opinion about getting time for developing a library website

Response	Nos.	Percentage
Yes	83	24.3
No	204	59.8
Can't say	54	15.8
Total	**341**	**100**

Chi–square 111.376; **df:** 2, **p**<0.05; **Table Value**: 5.99

Above Table 7 shows information pertaining to opinion of the librarians about getting time for developing a library website. 24.3% respondents do not get time for developing a library

website while 15.8% respondents are not sure about it. Further 59.8% respondents do not get time for developing of library website.

4.0Conclusions

4.1Development of website

On the basis of the study results it is evident that most of the library websites are designed by professional developer.

1. **Main objectives of developing library website**
   From the study results it is evident that most of the library websites are developed to improve usability of resources.
2. **Opinion of librarians about the skills of librarian**
   From the study results it is evident that there is demand of technical knowledge from librarians apart from core traditional librarianship skills.
3. **Influence of various factors in development of college library website**
   In view of the study results it is evident that technical knowledge and institutional forces highly influence development of college library website.
4. **Important features of a user friendly library website**
   In view of the study results it is evident that most of the librarians feel that simple navigation and easy access to search are very important feature of a user friendly library website.
5. **Web 2.0 tools should be available on the library website**
   On the basis of the study results it is evident that most of the librarians feel that web 2.0 tools should be available on the library website.
6. **Opinion about getting time for developing a library website**
   From the study results it is evident that most of the librarians do not get time for developing a library website.

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A Study on Financial Analysis and Performance of Agricultural Production System of Selected Commodities in Maharashtra

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Abstract

Every state plays a major role in India's economic development. Know Top 3 Crop Producing States in India Uttar Pradesh is the top agricultural state in India with state-level crop production including millets, rice, sugarcane, food grains and many others. Attracting and growing businesses strengthens our economy by providing locally produced goods and services. Strong businesses pay taxes for important services like schools, roads, fire and police. Economic progress is possible without development. That means an increase in GDP, but most people see no real improvement in living standards. This may be due to: Economic growth can only benefit a small percentage of the population. Without a good understanding of economics, people may unknowingly make irrational decisions. For example, people buy goods when they buy them, even if they don't normally buy the goods, even at the sale price. Economics helps to eliminate these errors by teaching the right decision making

Key words: Agricultural production, economic system, development, employment, analysis and performance etc.

Introduction:

India ranks 142 in the list of per capita income among 197 countries of the world. This information has been revealed in the data released by the International Monetary Fund. India's per capita income is very low among the countries considered to be the largest economy in the world. An economy is a system in which finite goods and services are produced, distributed or traded, and consumed by various agents within a given geographical area. Economic agents include individuals, businesses, organizations, or governments. The sluggish GDP growth can be attributed to the aggressive rate hike by the Reserve Bank of India to curb high inflation levels in the country. Apart from these factors, slowdown in exports and consumer demand has contributed to the decline. As a result of inflation, the purchasing power of households decreases as prices rise. Inflation affects various sectors of the economy, favorable to some and unfavorable to others. There are many possible causes of a weak economy, from domestic political factors to global market conditions. Regardless of the proximate causes, high levels of unemployment, debt or inflation can weaken the economy by reducing consumer discretionary spending.

Problems of the Study:

Agricultural management is the study of how agribusiness can be maximized by applying economic principles and managerial skills to the various processes of production and financial organization of the agricultural sector. Like the management of other industrial organizations, the agricultural manager also has to use the available resources sparingly to achieve the planned goals. Other industries have little control over the conditions under which they operate. But due to factors like weather, rainfall, pest infestation, changes in prices in agriculture, the agricultural manager feels the anxiety of uncertainty and has to make decisions according to the frequently changing situation. As the effects of these factors are found in different forms in different parts of the world, the problems of agricultural management are varied and in relation to these problems it is the responsibility of every farmer to make the right decisions for maximum benefit by making adequate use of the available productive factors.

Objectives of the Study:

1. To study the effects of Indian agricultural productivity on the farming class.
2. To study the effects of nature and changes in crop composition on the economic conditions of farmers.
3. To study Indian agricultural productivity patterns and present status.

Significance of the Study:

Productivity of agriculture is the ability of agriculture to produce. Productivity per hectare per person and per capital Productivity is high when agricultural output is high. Conversely, when output is low, productivity is low. Agricultural productivity is important to increase agricultural production. In countries where introduction i is available on a large scale, agriculture is practiced extensively. In countries with limited land area, intensive cultivation is practiced in which agricultural productivity is important. Where the productivity of agricultural land is high, high production with low labor capital gives low productivity of agriculture, no surplus production with the help of labor capital.

Scope of the Study:

Markets In developing countries, the agriculture sector fulfills the growing population's need for food grains as well as raw materials required for various industries. There is a difference between agricultural production and agricultural productivity. Among the various factors required for farming, farmers first need fertile land and then water. Agriculture is possible if water is abundant and the most important factor for agriculture is that manpower is available in large quantities and the crops can be maintained at that time.

Period of the Study:

While studying the agricultural productivity in Maharashtra and the actual guaranteed price to the farmers in the market, it includes the factors required for actual production. While studying the productivity of agricultural commodities and actual output in agriculture the researcher has completed the member research assuming the year 2022 23.

Limitation of the Study:

The relationship between holding area size and agricultural productivity has been expressed by agronomists in various ways. The more fertile the land, the more productive it is. In some places the natural fertility is high and in some places it is low and although the soil texture is low, it is possible to increase the productivity of the land based on changes in the proper use of fertilizers and biological techniques. Land productivity and irrigation facilities appear to be the limitations of this current production. Due to the lack of various technologies, it is not possible for the farmers to practice farming in modern ways, so the increasing productivity of agriculture is less compared to others.

Research Methodology:

While studying agricultural productivity and agronomy, the researcher has used many secondary research methods including research papers, journals, newspapers, articles, reference books, serial books, annual reports, government reports, audio videos, images, statistical reports, library, etc.

Research Method:

While studying the agricultural productivity and agronomy the researcher has completed the member research using descriptive analysis method.

Results and Discussion:

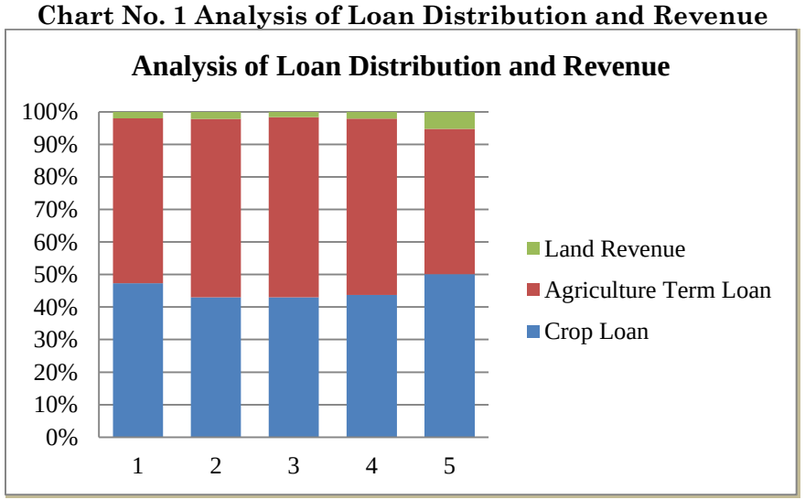
While using the available production factors, the agricultural manager has to make decisions as to what should be the ratio in their combination. How much to spend for the destruction of vermin, how much to spend on capital to increase the productivity of the land, what kind and how much fertilizer to use for the land, these decisions have to be taken by looking at the available capital supply.

Table No. 1 Analysis of Loan Distribution and Revenue (in Crore)

Particulars	2018-19	2019-20-	2020-21	2021-22	2022-23
Crop Loan	49,251	42,453	53,049	46,285	38,083
Agriculture Term Loan	52,837	54,163	68,153	57,365	33,905
Land Revenue	2,088	2,155	2,063	2,200	4,000
Coefficient	0.1954	0.1546	0.2367	0.1465	0.1796
Std. dev.	0.312	0.265	0.874	0.648	0.549
Total	**104,176**	**98,771**	**123,265**	**105,850**	**75,988**

Source: Economic Survey of Maharashtra, 2022-23

Chart No. 1 Analysis of Loan Distribution and Revenue



India's economy is agrarian. The pre-independence dependence on agriculture has now reduced. But the development of agriculture sector is important for the overall economy of the country. The development of agriculture sector is a help for the development of industry and service sectors of the country. As agriculture is the basic and major industry of India, agriculture plays a unique role in the Indian economy. In developing nations like India, where the means of livelihood is provided, agriculture as well as agriculture-related activities and industries need to be developed. The multi-year five-year plan will reduce the number of people dependent on agriculture even as industrial and economic development takes place, but since India's economic development is heavily dependent on agricultural development, agriculture will continue to play an important role in the future. Government revenue is largely dependent on India's agricultural income. If agriculture fails in a given year, it also has a significant impact on the government budget. If the income of farmers decreases, it also has a negative impact on industry and trade.

Table No. 2 Nominal per Capita State Income (Actual Performance) (In crore)

Year	Per Capita State Income
2018-19	1,82,865
2019-20	1,89,889
2020-21	1,83,704
2021-22	2,15,233
2022-23	2,42,247

Source: Economic Survey of Maharashtra, 2022-23

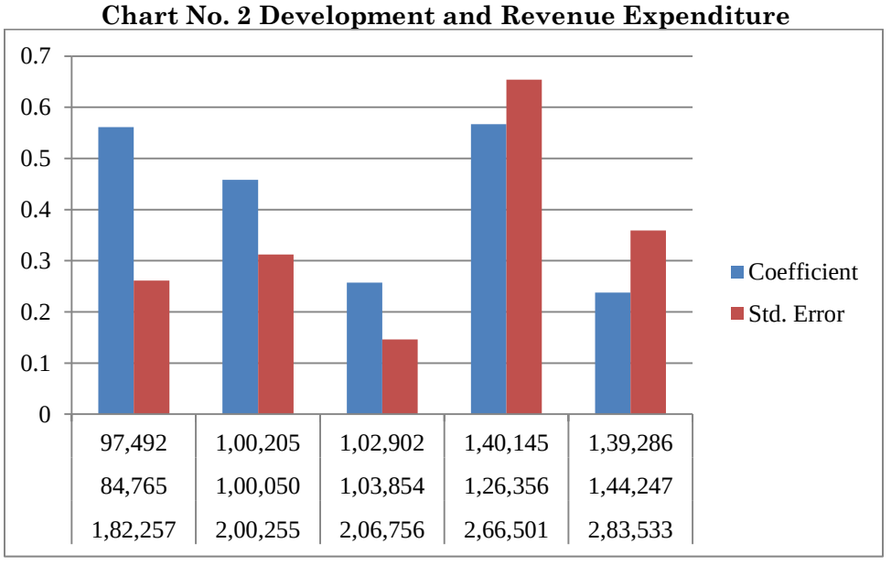
Most of the people in a country like India work in the agricultural sector. They have to depend on agriculture sector for their livelihood. Although employment is being provided in the agricultural sector, the standard of living of the people has not improved. Migration of seasonal employment is a problem in the agricultural sector. Lack of self-employment opportunities, lack of vocational and technical education, joint family system, lack of scientific approach, etc., the increasing population in rural areas is dependent on agriculture, hence the importance of the agricultural sector. The raw material required for the industry is available from agriculture, among which is cotton oil seed, the industry depends on inputs from many agricultural sectors.

Table No. 3 Development and Revenue Expenditure (in Crore)

Year	Development expenditure	Revenue Expenditure	Actual Difference	Coefficient	Std. Error
2018-19	1,82,257	84,765	97,492	0.561	0.261
2019-20	2,00,255	1,00,050	1,00,205	0.458	0.312
2020-21	2,06,756	1,03,854	1,02,902	0.257	0.146
2021-22	2,66,501	1,26,356	1,40,145	0.567	0.654
2022-23	2,83,533	1,44,247	1,39,286	0.238	0.359

Source: Economic Survey of Maharashtra, 2022-23

Chart No. 2 Development and Revenue Expenditure



Supply of raw materials- Indian agriculture supplies the raw materials required for various industries through the agricultural sector. In this, products like sugarcane, cotton, oilseeds, rubber are supplied from the agricultural sector to the industrial sector. Indian

Agriculture The task of supplying food to the growing population of India is carried out by the agricultural sector. The agricultural development policy of the Government of India is primarily designed to achieve self-sufficiency and self-reliance in food production. Looking at the historical background of Indian agriculture sector, it seems that Indian agriculture was traditional and subsistence type. This mainly focused on the production of food crops. Due to this, agriculture was not viewed from a commercial point of view. After independence, the Indian government has made efforts to develop the agricultural sector through economic planning.

Conclusion:

Agriculture plays an important role in the economic development of the country. Agriculture is viewed as a sector that supplies raw materials for industrial development to meet the primary needs of the country's population. Agriculture plays a major role in the country's economy as agriculture is seen as the major source of livelihood while 74 % of the country's total population lives in rural areas. Direct and indirect livelihood depends on agriculture and allied business. The livelihood of the people living in the rural areas is dependent on the produce from agriculture. The supply of food grains to the people is largely from the agriculture sector and to supply the Indian people with food grains, agriculture takes a large number of crops including wheat, rice, sorghum, millet, pulses, oilseeds, etc. as subsidies. The animal husbandry business has started a white revolution due to artificial insemination and the agriculture sector is being considered in a big way to provide subsidies to the huge population. Agriculture sector provides fodder for livestock and hence many people depend on livestock for their livelihood.

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A Case Study On Library & Information Science Online Education System In India With Special Reference To Higher Education Of Maharashtra

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Abstract

In India, individuals are depending intensely on solid web associations, PCs, or cell phones to return to business during the new ordinary. The emergency has prodded understudies to get e-learning openings, as there is seemingly no end in sight. As the nation takes to online schooling, the current pandemic is affecting country understudies more than the individuals who live in urban areas. Be that as it may, e-learning is changing the area even in far off provincial regions. Level 3 and level 4 towns are raising the stakes by putting resources into the upgrade of advanced training measures. While many are benefiting as much as possible from what web based realizing offers, neighborhood specialists are thinking that its intense to incorporate high velocity web offices. In addition, individuals in provincial regions need to likewise manage discontinuous force supply and more seasoned electronic gadgets, which are regularly a prevention to consistent access The online instruction space in India has been making up for lost time for years and years at this point. In any case, it has been to a great extent utilized for skilling and is floated without anyone else learning. Schools and universities have seldom needed to show exclusively online not at all like post-March 2020 when Covid changed the training worldview and everybody, independent of their openness to learning on the web, have needed to adjust and learn. The current emergency has turned the emphasis on the blemishes in the framework - absence of admittance to quality training for all, absence of comprehensive schooling, shortage of qualified instructors and low spotlight on fundamental abilities. For 12-year-old Rahul Oak, concentrating in an administration helped school that obliges oppressed and the transient local area kids in Mumbai, educational time presently implies he needs to run out of his home to the furthest limit of the path a couple of moments before class begins so he can take advantage of the sign that will fire up his parent's cell phone and he can see his educator on the web. "There is no sign at home," says Shingare. "I would prefer not to miss my day by day meetings thus now it's anything but a training to be prepared and rushed to the furthest limit of the path and sit outside and pay attention to the instructor

Key words: Online Education, Issues, Challenges, Student

Introduction

Online training sets aside cash and time As online schooling is through web, so it very well may be effectively gotten to anyplace, whenever. You can get to the substance early morning, late evening, at home, in cafeteria, or on the train. As the substance is by and large preloaded, so you can download the talks/recordings and watch them whenever it might suit you consistently. Additionally cost of online instruction is extremely low in contrast with vis-à-vis schooling. Likewise there is an incredible reserve funds on inn and transportation charges. Since all the substance is accessible on the web, so you need not accepting books too. Restricted Social cooperation Since online instruction can be gotten to at home or some other helpful spot, there is exceptionally restricted direct communication with the educator and others doing the course. As per Dhirendra Kumar (2010), particularly those courses which are independent, there is extremely less conversation among the companions. The vast majority of the conversation happens through email, visit room or conversation gatherings. There isn't any grounds environment to work on friendly collaboration. So you can't foster any friendly connections which do help in the profession development.

There are sets of guardians who like online classes, while others have denounced it's anything but, a public overview led by LocalCircles, a web-based media and local area stage, which got 8,287 reactions from 204 regions of the country. Residents were asked what ought to be the way forward as certain states in the nation have restricted online classes. Accordingly, 31% guardians said that the prohibition on online classes should proceed, while 49% said online classes ought to be begun however restricted to two hours out of every day. Around 15% said online classes ought to be begun and run for the term of normal school hours which could be 4-6 hours while around 3% were uncertain.

Issues facing online education

Advanced gap: Students who, in principle, approach e-showing should rely upon badly designed techniques, for example, cell phones The Covid-19 pandemic has upset the training area around the world. Classes have been suspended to implement social removing and instructive establishments, from schools to colleges, have moved to online strategies for educating and assessment. As the quantity of cases keeps on ascending, there is no conviction about when regularity will be reestablished. This has energized a type of a lasting slant, if not a total shift, to online training. The new National Education Policy (NEP) endorsed last month

additionally discusses being prepared for computerized and online schooling, in spite of the fact that it adds a rider that the advanced separation should be wiped out to completely profit with such techniques Three-fourths of understudies in India didn't approach the web at home, as per a 2017-18 all-India NSO overview. The portion of the individuals who didn't Ahave PCs, including gadgets, for example, palm-tops and tablets, was a lot more noteworthy - 89%. Admittance to these offices was higher among understudies at more elevated levels of schooling. In any case, even at the most significant levels, an enormous portion of understudies didn't approach these offices. True to form, admittance to the web and PCs is straightforwardly identified with family livelihoods.

Absence of admittance to the web and gadgets has additionally made a hole in computerized education. As numerous as 76% of understudies in India in the 5-35 age bunch didn't have a clue how to utilize a PC. The portion of the individuals who didn't have the foggiest idea how to utilize the web was 74.5%. Indeed, this hole ascends with a fall in pay levels. 55% of understudies among the top 20% of families by month to month per capita consumption (MPCE) realized how to utilize a PC and web while these extents were just 9% and 10% among the base 20%.

Challenges to system

Advanced gap: Students who, in principle, approach e-showing should rely upon badly designed techniques, for example, cell phones The Covid-19 pandemic has upset the training area around the world. Classes have been suspended to implement social removing and instructive establishments, from schools to colleges, have moved to online strategies for educating and assessment. As the quantity of cases keeps on ascending, there is no conviction about when regularity will be reestablished. This has energized a type of a lasting slant, if not a total shift, to online training. The new National Education Policy (NEP) endorsed last month additionally discusses being prepared for computerized and online schooling, in spite of the fact that it adds a rider that the advanced separation should be wiped out to completely profit with such techniques Three-fourths of understudies in India didn't approach the web at home, as per a 2017-18 all-India NSO overview. The portion of the individuals who didn't Ahave PCs, including gadgets, for example, palm-tops and tablets, was a lot more noteworthy - 89%. Admittance to these offices was higher among understudies at more elevated levels of schooling. In any case, even at the most significant levels, an enormous portion of understudies didn't approach these offices. True to form, admittance to the web and PCs is straightforwardly identified with family livelihoods.

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Future of online education

Could online training supplant schools? It can't be the lone choice as socialization and fundamental abilities can't be supplanted by internet realizing which is imperative for training. In any case, a few specialists proposed it can work pair with disconnected classes post-pandemic. That way, it can assist with connecting geological limits, The current commotion to the customary instructive framework in India will function admirably for associations that empower advanced education among their workers. "This will mean a lot more appeal for an assortment of chief schooling just as online-based specific bosses programs," said Vishwanathan Iyer ACA, PhD, Professor – Accounting, Economics and Finance Area, Dean TA PAI Management Institute.He expects the interest for projects of Work-Integrated-Learning assortment to go up because of online training. In the push for online schooling post-pandemic, what should be figured in is that the least fortunate of helpless understudies are not forgotten about as they don't have the assets to get to it. One method of doing that recommended Mahmaya Navlakha of Arthan is for government to step in to make this new arrangement of learning workable for all. "All things considered, community society has its restriction. The public authority can devise a program which guarantees normalization and quality by working with specialists in the field and make a system that makes incorporation," Navlakha said.

Key Challenges for Online Education in India

There are some normal difficulties that were thought of while setting up the new instruction strategy. Some of them are given underneath. Over 30% of the country's populace isn't PC proficient. Some of them even don't have the foggiest idea how to begin a PC. Not every person can manage the cost of a PC or a PC. A few segments of the general public like ranchers, servants, housecleaners, sweepers and servers may confront troubles buying a PC. A few

educators are curious about the new arrangement of schooling. They are not very much prepared for online schooling classes. Other than this, it's anything but essential that a decent study hall instructor will be a decent educator in the online homeroom. There are a predetermined number of assets accessible to lead an online assessment in India. Other than this, there is a limit for the quantity of inquiries that can be posed in the test. Specific sort of subjects and courses, for example, science and performing expressions cannot be instructed in the advanced schooling space. The online instruction framework is all the more a sort of screen-based learning framework which limits the understudies to perform practicals. The web network isn't acceptable all over the place. There are a few urban communities of India where individuals are as yet utilizing 2G or 3G web association.

Online Teaching Tools and Methods

The current e-learning stages, for example, DIKSHA and SWAYAM will be stretched out to furnish instructors with an easy to use and very much organized climate. These stages will be refreshed with some arrangement of apparatuses like two-way sound interface and two-way video that can assist the educators with leading web based classing and screen the advancement of understudies. All subjects can't be instructed on the web: Construction in math, for example, is hard to show on the web, said a mathematical instructor, Vidya Ganeshan who has been showing the subject for longer than 10 years. "It is hard to show a couple of new ideas in an online homeroom however we utilize an intuitive application as understudies center at home is an issue other than the intricacy of the theme. Prior, the quiet catch was at the educator's end and we could quiet understudies who intruded on class however with the new Microsoft Teams for training application, a few kids play no-show and will not address when an inquiry is posed as the quiet catch is in their grasp currently!" Parents, youngsters need time to get medium: Parents and understudies have not been presented to this new arrangement of learning and will take to adjust to the new type of instruction., which is available in 14 urban communities across India, as of late led a review among the guardians across India in regards to online schooling and discovered one moment level of respondents had reservations concerning web network equipment issues term of the classes capacity to help their kids and programming contrariness and an excessive amount of in general screen time including instruction The difficulties are genuinely low and with time will wilt away, said Peshwa Acharya, head promoting official.**Online education:**

Challenges faced by rural communities

As the nation takes to online training, the current pandemic is affecting provincial understudies more than the individuals who live in urban communities. The entire world is changing in accordance with the truth of the Covid-19 pandemic by discovering options in contrast to the disturbances caused hitherto. Enterprises are permitting their labor forces to telecommute, while schools and universities are moving classes on the web. In India, individuals are depending intensely on solid web associations, PCs, or cell phones to return to business during the new typical. The emergency has poked understudies to get e-learning openings, as there is seemingly no end in sight. As the nation takes to online training, the current pandemic is affecting country understudies more than the individuals who live in urban areas. Nonetheless, e-learning is changing the area even in far off rustic regions. Level 3 and level 4 towns are raising the stakes by putting resources into the upgrade of advanced instruction measures. While many are capitalizing on what web based realizing offers, neighborhood specialists are thinking that its intense to coordinate rapid web offices. In addition, individuals in rustic regions need to likewise manage discontinuous force supply and more seasoned electronic gadgets, which are frequently a block to consistent access. Sadly, understudies in rustic India are denied the freshest gadgets and levels of availability to online substance that metropolitan Indians appreciate every day. In contrast to their partners in urban areas, a lower level of understudies in towns have work area or PCs. They rely upon their relatives' cell phones for learning and going to classes, making it a laborious exercise. Observing little screens to devour however much data as could reasonably be expected for extended periods of time could be impeding to understudies' wellbeing.

Moreover, buying information plans for learning could likewise bring about a ton of costs for families who face monetary imperatives. It could additionally influence the cooperation levels of the two educators and understudies concerning live classes. Computerized education and the advanced gap have been not kidding worries for our country for longer than 10 years. Numerous educators and understudies in provincial regions can't coordinate to the specialized abilities of educationalists and understudies in urban areas. They face road obstructions while moving from disconnected to online instruction, which could be a justification uneasiness among country networks. Aggregate endeavors of common society associations, policymakers and the public authority are needed to make an easy to use advanced interface so educators and understudies think that its helpful for continuous learning. On the splendid side, every one of the partners have made critical interests in further developing admittance to computerized administrations and e-getting the hang of; expanding on prior framework could facilitate the cycle of advanced consideration. Instructors would have the option to change easily in the event

that they get the imperative help. Neighborhood and public governments should cooperate with the IT and edtech areas to accelerate the way toward bringing imaginative and practical online instruction apparatuses to country India.

Online Assessments and Examination

Some administration bodies like School Boards, NTA, proposed National Assessment Center or PARAKH will deal with planning another appraisal structure. The new structure will be intended to inspect the exhibition of the understudies according to the refreshed guidelines of online instruction. Other than this, the system will be founded on 21st-century innovation. Besides, buying information plans for learning could likewise cause a great deal of costs for families who face monetary limitations. It could additionally influence the cooperation levels of the two instructors and understudies concerning live classes. Computerized proficiency and the advanced gap have been not kidding worries for our country for longer than 10 years. Numerous instructors and understudies in rustic regions can't coordinate to the specialized abilities of educationalists and understudies in urban communities.

Challenges in Online Learning

Contrasting face-with face learning with internet learning delivers huge inadequacies in the online mode, for example, absence of human interface, nonattendance of chances of cooperative learning, educator oversight and the most glaring being absence of chances for involved learning in complex subjects like science and arithmetic. Moreover, in the midst of the surge of facilitating on the web classes the best showing practices such a tending to students Multiples Intelligences Learning Styles and giving a separated learning experience have been consigned to the sideline. So how does the top of a school address the difficulties of value learning in online mode and is it conceivable to outfit innovation to give a rich, vivid and comprehensive learning experience to the understudies?

Conclusion:

In any case, it has been to a great extent utilized for skilling and is floated without anyone else learning. Schools and universities have seldom needed to show exclusively online not at all like post-March 2020 when Covid changed the training worldview and everybody, independent of their openness to learning on the web, have needed to adjust and learn. This has energized a type of a lasting slant, if not a total shift, to online training. The new National Education Policy endorsed last month additionally discusses being prepared for computerized and online schooling, in spite of the fact that it adds a rider that the advanced separation should be wiped out to completely profit with such techniques Three-fourths of understudies in India didn't approach the web at home, as per a all-India NSO overview. " Contrasting face-with face learning with internet learning delivers huge inadequacies in the online mode, for example, absence of human interface, nonattendance of chances of cooperative learning, educator oversight and the most glaring being absence of chances for involved learning in complex subjects like science and arithmetic.

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Effective and efficient Utilization of Library Resource in Education

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Abstract:
In educational institutions, members need to understand the impact of resources on enriching the education system. In order to achieve educational goals and expand the education system, resource usage must be effectively controlled. Key resources to consider are teaching and learning resources, human resources, financial resources, and physical resources. Teaching-learning resources are considered teaching-learning materials. Educators should ensure that appropriate teaching and learning resources are used for the grade level of the student. People are individuals. Individuals must continually strive to improve their skills and abilities. Funds are funds. Material resources are a factor in the environmental conditions of an educational institution. This includes playgrounds, library facilities, laboratory facilities, technology and infrastructure. The main areas considered in this study are resource types that affect education, management of physical resources, expansion of information technology (IT) facility capabilities, and constraints on resource use.
Keywords: library, Education, Resources, Utilization

1. Introduction

Library resource utilization is an integral part of the management of educational institutions from kindergarten to university. Library resources are viewed as essential contributions to the improvement of the education system. The education system is determined by the provision of library resources, their maximum use and management. Advances in science and technology enable school authorities and educators to use the latest innovative technologies and methods to expand the way teaching and learning are done. There is a direct correlation between the quality of school facilities, teaching and learning materials, teaching and learning methods, teaching strategies and teaching staff. When research is conducted on the impact of resource use in education, the main aspects considered are the use of educational materials, the use of library resources, environmental conditions, the provision of infrastructure and other facilities, machinery and equipment, policies and strategies and programmes and procedures (Mugure, 2012).

The availability and use of library resources within an organization are critical to achieving goals and objectives. The work performance of members of an educational institution and the learning outcomes of students are affected by the appropriate use of school library resources. Investment in educational resources is the most important aspect to ensure that an institution fosters cooperation and integration among students and creates a comfortable and friendly school environment. The material, human, and financial resources invested in an educational institution affect not only the education system, but also aspects of teacher and student motivation and educational outcomes. In some educational institutions resource availability is not very high. Therefore, they are experiencing obstacles in improving their education system and achieving their goals and objectives due to lack of resources.

2. Types of library resources that affect education

The main resources that influence the education system fall into her three categories:

1. Teaching-Learning Resources:

Teaching and learning resources primarily used by educational institutions include textbooks, articles, reports, documents, projects, handouts, other reading materials, guides, reference books, models, excursions, site visits, diagrams, structures, blueprints, Calculators, computers, projectors, mobile phones, the Internet. They are important resources used by both teachers and students to achieve desired academic performance. When students have access to these resources, they can independently perform tasks and activities.

Professional documents used for teaching and learning include work plans, lesson plans, student progress records, class notebooks, and class books. These documents ensure proper planning and preparation, curriculum implementation, follow-up, and proper use of available resources for the benefit of learners. In-service training is necessary to keep teachers up to date with the changes taking place across the education system. The most significant changes relate to new policies, procedures, programs and strategies. Educators are responsible for the effective use of teaching and learning resources.

When it comes to teaching and learning resources, it is important to use the latest innovative technologies and methods. Teachers use different types of technology and the latest scientific and innovative methods in the educational environment of all levels of educational institutions. A common innovation method is the use of technology and the Internet. Both educators and students are now using the Internet to raise awareness related to various issues and concepts.

2. Human Resources:

Human Resources are the people who make up the workforce within an organization. Human resources are made up of people and their knowledge, skills and abilities. Another

important aspect of human resources is an individual's ability to perform tasks and activities. When educators or staffs are employed in educational institutions, it is very important that they acquire professionalism in technical, mechanical, administrative, social and other tasks. They should be kept up to date with the latest scientific and innovative methods used in the educational system. Human resources are required to fulfil their roles and functions in accordance with changes in the educational system. In addition to academic background, skills, and abilities, human resources with moral and ethical qualities are essential. You must practice effective communication skills, honesty, honesty and integrity. Individuals in the workplace usually have to experience challenges and problems in performing their duties. It is important to stay calm and calm and deal effectively with problems and challenges. A teacher's primary role is to impart knowledge to students, contribute to their advancement, and participate in community service. The availability and utilization of human resources is considered a key success factor in the education system. It is said that the attitudes and behavior of human resources are influenced by working environment conditions. When the appropriate infrastructure, facilities, facilities, materials and equipment are available within the work environment, individuals are able to perform their duties in an appropriate manner. Although the number of work tasks usually causes stress in the workplace, implementing measures and using effective time management skills can help individuals reduce stress in the workplace. We believe that maintaining a comfortable and friendly work environment, as well as favourable conditions and relationships with others, is essential to enable our employees to participate effectively in the achievement of their personal and professional goals. It is considered

3. Financial Resources:

Financial resources are considered to be of paramount importance for the effective implementation of tasks and activities. Educational institutions with adequate financial resources can improve teaching and learning methods, infrastructure, facilities, public facilities, teaching materials, equipment and general environmental conditions. Research shows that well-equipped classrooms keep students focused on learning and committed to their academic goals. Appropriate furnishings for the weather conditions, heating and cooling facilities, clean drinking water and toilets should be available to facilitate learning. Sufficient financial resources must be available to be able to provide all these facilities

In addition to academic learning, educational institutions need to transfer knowledge and skills to students in the form of extracurricular and creative activities. These include sports, physical activity, artwork, crafts, songs, music, dance, yoga, meditation, and more. The participation of students and teachers in these activities promotes their development. If they are interested in a particular extracurricular activity, they may even pursue it professionally. Therefore, educational institutions need financial means to introduce courses related to these activities. . You need to hire instructors with sufficient qualifications and skills to perform their duties in an appropriate manner. If you hire staff, the funds will also be used for advertising placements and other procedures.

When individuals seek employment opportunities, their primary goal is to generate income to maintain living conditions. When individuals are satisfied with their pay and benefits, they feel motivated to fulfil their job responsibilities and implement methods and strategies for retaining their jobs. You may lose interest in your work. Usually, highly educated and qualified people quit and look for other high paying jobs. It is therefore imperative for organizations and educational institutions to ensure that payments are compatible with the performance of their professional duties. To do this, you need sufficient financial resources. Funding is therefore critical to bring about change in the individual and collective education system.

3. Limitations in Resource Utilization

Many limitations encountered when using resources Individuals employed by an educational institution. Various limits are stipulated as follows:

A) **Inappropriate Teaching-Learning Materials:** The various types of teaching materials used by teachers may be of poor quality or unavailable. When using appropriate materials/learning materials to teach a particular subject, it is necessary to ensure that the materials are in good condition. In educational institutions, technology and computers are not available in every classroom. Teachers usually use the blackboard to communicate their lessons. Whiteboards are used in higher education institutions, especially in university departments. Therefore, it is important to ensure that crayons and markers are readily available and that the materials are of high quality.

B) Lack of Knowledge: As already mentioned educators and other members of educational institutions must be well-informed and informed. Research shows that sometimes educators themselves don't have enough knowledge, especially when it comes to topics. Therefore, if it is not informative in terms of subject areas, students will experience obstacles in facilitating their learning and properly performing their professional duties. Due to the lack of internet, books and other resources, educators are often unable to develop a full understanding of issues and resource usage**.**

C) Lack of Financial Resources: Financial resources are considered to be of utmost importance in the performance of any task or function. With sufficient financial resources, educational institutions can adequately meet their needs and requirements. Lack of funds, on the other hand, is an obstacle to meeting needs and achieving desired goals and objectives. Authorities must ensure that members of educational institutions do not experience problems or challenges in fulfilling their professional duties and achieving their academic goals.

D) **Lack of Preparedness of Teachers:** The unwillingness of human development teachers to teach competently and learn effectively is seen as a major impediment to utilizing resources to achieve educational goals. Teachers should have key information that is primarily related to the subject matter and concepts. In addition to scientific subjects, they must know the strategies necessary to properly practice them within the framework of teaching and learning methods. Additionally, they must be aware of the proper use of resources and act as guides and mentors for their students. If teachers are not aware of these aspects, they are not prepared to perform their professional duties in a well-organized manner.

E) Lack of Equal Rights and Opportunities: Providing equal rights and opportunities to all students and other members is fundamental. Do not discriminate against others on the basis of caste, creed, race, religion, gender, age, ethnicity, or socioeconomic background. Resources are used for operations and job satisfaction is achieved when individuals are given equal rights and opportunities. Students are more motivated to study if they are provided with the same rights and opportunities. Equal rights and lack of equality of opportunity are seen as restrictions on the use of resources.

F) Problems in Organizing Workshops and Training Programs – Due to limited resources, individuals find it difficult to organize seminars and training programs. The main objective of organizing seminars and training programs is to raise the awareness of individuals about modern, scientific and innovative methods and approaches. When people attend these seminars, they can generate the necessary information and awareness. Financial resources are considered the most important for organizing seminars and training programs. When financial resources are insufficient, obstacles may arise when organizing seminars and training programs.

G) Problems in Organizing Extra-curricular and Creative Activities: The introduction of extracurricular and creative activities is considered essential in the education system. It is essential to encourage students to participate in these activities. When students participate in these activities, they foster thinking and develop an interest and enthusiasm for studying and attending educational institutions. To organize extracurricular activities, such as singing, dancing, sports, physical activity, crafts, artwork, role-playing, yoga, meditation, taekwondo, etc., resources are required. . Therefore, due to limited resources, problems and challenges arise in organizing extracurricular and creative activities.

H) Problems in Providing Machinery and Equipment – To strengthen the education system, it is necessary to provide machinery, equipment, technology and other essential materials. Due to limited resources, it is difficult for educational institutions to provide equipment. For example, in offices, administrative staffs use computers and other technologies, such as printers, scanners, mobile technology, etc. to perform its duties properly. When having problems with equipment and machinery, they will certainly have difficulties in the process of performing their tasks.

F) Occurrence of Conflicts and Disagreements: Conflicts and disagreements between individuals may arise in the work environment. When these take on a larger form, individuals certainly face limitations in using resources and accomplishing tasks. Therefore, it is imperative that individuals practice dispute resolution methods peacefully. You cannot work in isolation. It is important for individuals to integrate with each other and work collaboratively to achieve their professional goals. Conflicts and disagreements should not escalate in the work environment, especially in educational institutions.

4. Conclusion

Resources are viewed as an integral part of educational institutions as well as other organizations. The main types of resources that affect education systems are teaching and learning resources, human resources, and financial resources. In order to expand the possibilities of information technology, individuals need to be more aware of their strategies and approaches. These include proper knowledge possession, rational decision-making, organization of training and development programs, infrastructure, hardware and software, development and renewal, recruitment, expenditure management, allocation of material resources, and human resource management. It's an assignment. When these strategies are efficiently implemented, an individual can leverage her IT resources in implementing various tasks and functions in her institution. Various limitations occur in the process of using resources. These include inadequate teaching-learning materials, lack of knowledge, lack of financial resources, lack of motivation of teachers, lack of equal rights and opportunities, problems in introducing modern and innovative methods, lack of workshops and training programmes. It's an organizing problem, an organizational problem Obstacles to extracurricular and creative activities,

problems with the provision of machinery and equipment, conflicts and disagreements. It is important that all members of the educational institution have sufficient knowledge and skills to overcome their limitations. Overcoming limitations allows individuals to use resources to advance institutional progress.

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দ্বিরালাপ সংগ্রহ - ১

আমাদের চিন্তাচর্চা

সম্পাদনা
তপোধীর ভট্টাচার্য
স্বপ্না ভট্টাচার্য

মানুষ আজও কথা বলে। কী সেই কথা? দুই একে দুই, দুই, দু'তনে চার, তিন দু'তনে ছয়...এই ধারাপাতের বৃত্তের ছকে দাঁড়িয়ে অস্থির পদচারণা, ভোগের নেশায় বেহুঁশ আচরণ,...যৌনাচারের বেলেল্লাপনায় ডুগডুগি বাজানো সময় ক্ষয় করে দিচ্ছে যে সুস্থ জীবনবোধকে—সেখানে কি সমার্থক সঙ্গ অথবা সঙ্গহীনতা?

বিজয়া দেব

জনারণ্য এই শহর তবু বড় একা লাগে

যেহেতু সম্পর্ককে মানুষ নির্মাণ করে আবার সম্পর্কই মানুষকে তৈরি করে তাই বলা যায় এই দুই-এর মধ্যে অবশ্যই একটা দ্বিরালাপ চলতে থাকে। যে-কোনও একটি সম্পর্কে যুক্ত হওয়ার পর সেই বন্ধন যদি কখনও ছিন্ন হয় তখন এর রেশ খুব সহজে কাটিয়ে ওঠা যায় না। আবার এটাও তো সত্য যে নতুন মানুষের সঙ্গে বিভিন্ন সময় নতুন করে গড়া সম্পর্ক আমাদের জীবনকে নতুন মাত্রা দেয়। স্বাভাবিকভাবেই প্রশ্ন ওঠে, সম্পর্কের এত ইতিবাচক দিক থাকা সত্ত্বেও নিঃসঙ্গতার প্রসঙ্গ উঠে আসে কেন? তাহলে কি সম্পর্ক মানুষকে কিছু দেয় না? আর যদি দেয় তাহলে কেন বলা হয় 'বড় একা লাগে এ আঁধারে মেঘের খেলা আকাশ পারে।'

বিশ্বায়নের এই অত্যাধুনিক পৃথিবীতে প্রতিনিয়ত প্রচলিত ধরনকে পাল্টে ফেলার প্রস্তুতি চলছে। একদিকে যেমন অচেনা জগৎকে চেনা করে তোলার প্রয়াস তো আবার অন্যদিকে চেনা জগৎকে অচেনা করে তুলে সমকালীন মানুষ হয়ে উঠেছে বদ্ধপরিকর। তাহলে এমন পরিবেশে এ ধরনের গুঞ্জন কেন ধ্বনিত হয়, 'মানুষ বড় একলা তুমি মানুষ হয়ে পাশে দাঁড়াও।' পথ চলতে চলতে যেমন এই কথাগুলি ভাবিয়ে তোলে কোনো সংবেদনশীল মানুষকে আবার সেকথাগুলো ভাবতে ভাবতে পথ চলতে হয় তার। আবার 'কেন' এই শব্দটি উঠে আসা মাত্রই এর সূত্র ধরে আরেকটি প্রশ্ন চলে আসে: 'কী করণীয়?' এই সম্পর্কটাই বা কখন নিঃসঙ্গতায় পর্যবসিত হয়? আবার নিঃসঙ্গতারও ভেতরে তো একটি সঙ্গের আকাঙ্ক্ষা আছে।

পরিচিত নামের নাগপাশে আবদ্ধ প্রতিটি সম্পর্ককে পাওয়া যাবে, তা যেমন সত্য নয়, আবার পাশাপাশি এটাও তো সত্য যে, নামবিহীন সম্পর্কের বীজও হৃদয়ে বপন হতে পারে, হয়ে থাকে অর্থাৎ চিরাচরিত নামের খোলসকে ভেঙে দিয়ে খোলামেলা বাঁধনছাড়া সম্পর্ককে মেনে নিতে হয়। অবশ্য প্রচলিত সংস্কারকে তুড়ি মেরে নতুনকে স্বীকার করতেও যেন কোথাও বাধার সৃষ্টি হয়। আর এরই সূত্র ধরে দেখা দেয় বর্ণনাতীত নিঃসঙ্গতা। অথচ চেনা সম্পর্কের মধ্য থেকে দাঁত, নখ বেরিয়ে আসে কতভাবে। এই সম্পর্ক কি সম্পর্ক নাকি সঙ্গ তৈরি করার ছলে নিঃসঙ্গতার চাষ? সম্পর্কের বিন্যাস থেকে বেরিয়ে আসে নিঃসঙ্গতা। এটাও আপেক্ষিক সত্য যে ক্ষণিক শৃঙ্খল মুক্ত করে অনন্ত শৃঙ্খলে বাঁধতে গেলে অর্থাৎ বাঁধতে বাঁধতে সম্পর্ককে খোলা এবং খুলতে খুলতে সম্পর্ককে বাঁধা : এই দুই-এর মধ্যেই সম্পর্কের সঙ্গ এবং নিঃসঙ্গতা উভয়ই কার্যকরী হয়ে ওঠে।

স্বাভাবিক ভাবেই প্রশ্ন ফিরে আসে : 'কী করণীয়?' অর্থাৎ ব্যস্ততাবহুল জীবনে নিঃসঙ্গতা কতটুকু প্রভাব ফেলতে পারে? এই প্রসঙ্গে বলাই বাহুল্য আজকের বৈদ্যুতিন

...মের পৃথিবীতে যেখানে 'সময়ের অভাব' শব্দটি অনিবার্য ভাবে প্রযোজ্য, সেখানে ...নিঃসঙ্গতার আদৌ কোনও স্থান আছে? যদি বলি হ্যাঁ, তবে তা থেকে উত্তরণের ...াই বা কী? হয়তো অন্য কোনও কিছুর অভ্যাস, যা চিরন্তন সত্য, চির শাশ্বত, ...সুন্দর অর্থাৎ ভালবেসে পড়ার অভ্যাস ও ভাবনার মন্থন। যেহেতু প্রতিটি মানুষই ...মতান্তর সৃষ্টি হওয়াটাও অসম্ভব নয়। মানুষের ধারণায় এই কথা থাকতেই পারে, ...তার একমাত্র প্রতিষেধক হতে পারে মানুষই কেননা, 'মানুষ মানুষেরই জন্য'। ...এভাবে বলা যায়,

'জড়ায়ে আছে বাধা ছাড়ায়ে যেতে চাই
ছাড়াতে গেলে ব্যথা বাজে,

.....

আমি যে প্রাণ ভরি তাদের ঘৃণা করি
তবুও তাই ভালবাসি'

...খন যে-কথাগুলো না-বললে আপাত-সমাপ্তিতে পৌঁছানো দুরূহ হয়ে যায়, ...ম্পর্কের বিনির্মাণ ও এর মধ্য দিয়ে সম্পর্কের পুনর্নির্মাণের প্রয়াসই মানুষের ...ক। সাহচর্যে নতুন হয়ে ওঠা এবং সেইসঙ্গে নিঃসঙ্গতাকেও নতুন করে ...তে শেখানো-ই জীবনের প্রকৃত পাঠ।

রূপা ভট্টাচার্য

নারীপরিসর

সমাজ ও সাহিত্য

সম্পাদনা

বরুণজ্যোতি চৌধুরী

রূপা ভট্টাচার্য

মল্লিকা সেনগুপ্ত, নারী কবিতার ভুবন

'সময়ের কিনারা থেকে সময়ের দূরতর অন্তঃস্থলে সত্য আছে, ভালো আছে, তবুও সত্যের আবিষ্কারে', মল্লিকা সেনগুপ্তের বহুমাত্রিক কাব্যপরিমণ্ডল পরিক্রমা করতে গিয়ে জীবনানন্দের বহুস্বরিক বাচন মনে এল, জীবন ও কবিতা একই জিনিসের দুরকম উৎসারণ। এই ধারণাকে প্রণিধান যোগ্য করে যদি এগিয়ে যাই, তখন দেখি বাংলা সাহিত্যে নারী কবিদের সংখ্যা খুবই কম। সত্যি কথা বলতে কি, নারী কবিদের রচনা যে উল্লেখযোগ্য এই ধারণাটিই তৈরি হয়নি; আমাদের দেশে মেয়েদের লেখালেখি নিয়ে আগ্রহ তো একেবারে হাল আমলের কথা। কিন্তু আমাদের পড়া তো সামাজিক ও সাংস্কৃতিক ইতিহাসেরই একটা নির্মাণ। এই সত্য আমরা আগে ততটা বুঝতে পারিনি। আমরা ভেবেছি পুরুষের চোখ দিয়ে যেসব কবিতার ভাষা ও ভাবনা ব্যক্ত হচ্ছে, তাতে যারা নারী তাদেরও জীবন সমানভাবে ব্যক্ত হচ্ছে। নারীর ভাবনার যে আলাদা একটা পরিসর আছে এটা নিয়ে সচেতনতা তখনই এল, যখন প্রতীচ্যে নারীচেতনাবাদী ভাবনা দিনদিন জোরালো হয়ে উঠল। তবে আমাদের দেশে তা পৌঁছেছে অনেক দেরিতে। বলা ভালো আমাদের বিদ্যায়তনিক পাঠে পিতৃতান্ত্রিক ভাবনা এতটাই নির্লজ্জ ভাবে প্রখর যে সেখানে মেয়েদের কবিতার আলাদা পরিসর কখনও স্বীকৃতি পায় না। অথচ আমাদের বাংলা সাহিত্যে রাজলক্ষ্মী দেবী, কবিতা সিংহ, কেতকী কুশারী ডাইসন, বিজয়া মুখোপাধ্যায়, গীতা চট্টোপাধ্যায়, রমা ঘোষ, দেবারতি মিত্র : এরা ষাটের দশক থেকে সত্তরের দশকের আগেই নিজেদের আলাদা কণ্ঠস্বর ব্যক্ত করেছেন। যদিও তাদের বিশ্ববীক্ষা হয়তো নারীচেতনাবাদী নয়, তাদের অবস্থানও যে সর্বত্র সমান মাত্রায় প্রতিফলিত হয়, তাও বলা যায় না; কিন্তু মেয়েদের বয়ান যে তথাকথিত লিঙ্গ-নিরপেক্ষ অর্থাৎ পুরুষের বয়ান থেকে আলাদা, এই ভাবনাটা কিন্তু তাঁরাই আমাদের মধ্যে ক্রমশ ছড়িয়ে দিয়েছেন।

সত্তরের দশকের শেষে বা বলা যায় আশির দশকের গোড়া থেকেই বাংলা কবিতায় নারী কবিদের উপস্থিতি অত্যন্ত প্রবল এবং তাঁরা একটা পাঠান্তর বা পর্বান্তর সূচনা করতে পেরেছেন। এই প্রেক্ষিতে কবি মল্লিকা সেনগুপ্ত বিশেষ করে আমাদের নিবিড় পাঠ দাবি করেন। যদিও তিনি মুখ্যত একজন কবি, তবে তাঁর কিছু কিছু প্রবন্ধের বই যথেষ্ঠ সাড়া জাগিয়েছে। যেমন 'স্ত্রীলিঙ্গ নির্মাণ', 'পুরুষ নয় পুরুষতন্ত্র' ইত্যাদি। এবং এর মধ্যে দেখা যায় যে কবিতায় যা বোঝাতে বা বলতে চাইছেন, তার পরিপূরক হিসেবে এইসব প্রবন্ধ অত্যন্ত তীক্ষ্ণ ও জোরালো

ভাবে প্রতিবাদী কণ্ঠস্বরকে আমাদের সামনে তুলে ধরেছে। আমরা যেভাবে সাহিত্যকে দেখে অভ্যস্ত, এর বাইরে একটা বিকল্প দৃষ্টিও থাকা সম্ভব, মল্লিকার কবিতা আমাদের সেটা অবহিত করে তুলেছে। আর এভাবেই তিনি আমাদের অনেক চিরাচরিত ভাবনার সঙ্গে করতে চেয়েছেন। তাঁর প্রথম কবিতার বই 'চল্লিশ চাঁদের আয়ু' (১৯৮৩)। আমাদের এ সমাজে সর্বভারতীয় প্রেক্ষিত যে লিঙ্গ-বৈষম্যের দ্বারা কন্টাকাকীর্ণ, আমাদের ব্যক্তিগত অনুভূতি বা নান্দনিক উপলব্ধি (যা আমাদের) সেটাও কি আশ্চর্যভাবে লিঙ্গ-অভিজ্ঞানের দ্বারা নির্দিষ্ট সেটা মল্লিকা বুঝিয়ে দিয়েছেন। তাই তাঁর 'চল্লিশ চাঁদের আয়ু' থেকে অন্যান্য কবিতা পরিক্রমা করলে বোঝা যায় প্রায় প্রতিটি কবিতাই গভীর ভাবে সাংস্কৃতিক রাজনীতি সম্পন্ন। পিতৃতান্ত্রিক লৈঙ্গিক প্রতাপ আবহমান কাল ধরে মেয়েদের যে পাকে পাকে জড়িয়ে রেখেছে, তাকে স্পষ্ট করে তোলার জন্যই মল্লিকা যেন কবিতাকে তাঁর যুদ্ধের উপকরণ হিসেবে ব্যবহার করেছেন। 'চল্লিশ চাঁদের আয়ু'র পর প্রকাশিত হয় 'সোহাগ শর্বরী' (১৯৮৭), 'আমি সিন্ধুর মেয়ে' (১৯৮৮), 'হাঘরে ও দেবদাসী' (১৯৯১), 'অর্ধেক পৃথিবী' (১৯৯৫), 'মেয়েদের অআকখ' (১৯৯৭), 'কথামানবী' (১৯৯৭), 'আমরা লাস্য আমার লড়াই' (২০০১), 'দেওয়ালির রাত' (২০০১), 'পুরুষকে খোলাচিঠি' (২০০২), 'ছেলেকে ঘি পড়াতে গিয়ে' (২০০৫), 'আমাকে সারিয়ে দাও ভালবাসা' (২০০৬), এইসব বই এর মধ্য দিয়ে সেসব বয়ানের মুখোমুখি হই আমরা; তার মধ্য দিয়ে একটাই বার্তা উঠে আসে পাঠকের কাছে যে, পুরুষতন্ত্র নারীত্বের যে আঙ্‌রাখা নির্মাণ করেছে চিরকাল, নারীকে দেবতার আসনে বসিয়েছে, নতুন চেতনা সম্পন্ন কবি তাকে প্রশ্নে বিদ্ধ করেছেন। মেয়েদের উপর পুরুষেরা চাপিয়ে দেয় যে কল্পনার তৈরি একটা প্রতিকৃতি এক আদর্শায়িত প্রতিমা, অনেক সজ্জা প্রসাধন, তার আড়ালে লৈঙ্গিক প্রতাপের যে বিকার, তার কুশ্রীতা জান্তবতা কীভাবে উপস্থিত সেদিকে তর্জনি সংকেত করেছেন মল্লিকা। মল্লিকা কখনও বিষয়ীকে বড় করে তুলতে চাননি তাঁর কবিতার প্রধানতম বৈশিষ্ট্য হচ্ছে পিতৃতান্ত্রিক প্রতাপের প্রত্যাখ্যান, শুদ্ধ কবিতার নামে অনেক সময় মেয়েদের একটি স্পর্শভীরু জায়গায় নিয়ে যাওয়া হয়, তাদের আসল পরিচয় ও অবস্থানগত সত্য তো এই যে তারা নৈঃশব্দ্য দ্বারা লাঞ্ছিত। তাদের নারীপরিসর কখনই চোখে ধরা পড়ে না। এটাকেই স্পষ্ট করে তুলতে চেয়েছেন মল্লিকা। তিনি বিষয়টাকেই বড় করে তুলতে চেয়েছেন। তিনি কবিতার সূক্ষ্মতা ও গভীরতাকে অব্যাহত রেখেই বিষয়ের প্রাধান্যকে মান্যতা দিয়েছেন। আসলে তিনি লিঙ্গ-নিরপেক্ষ ধারণাকে প্রত্যাখ্যান করতে চেয়েছেন। তিনি লৈঙ্গিক আধিপত্যের বিরুদ্ধে যুদ্ধের ঘোষণা করেছেন। তিনি যে নারীপরিসরের কথা ভাবেন তা বহুধারিক। তা যতটা সামাজিক, ততটাই রাজনৈতিক, যতটা সাংস্কৃতিক, ততটাই মনস্তাত্ত্বিক। পুরুষতন্ত্র মেয়েদের অভিজ্ঞানটাকেও দখল করে নিতে চেয়েছে। আর তাই মেয়েদের পরিসর অন্ধকার কুক্ষরিবরে আচ্ছন্ন। পারাপারহীন যে এক নৈঃশব্দ্য জাগিয়ে রেখেছে নারী পরিসরকে, তা-ই মন্থন করে মল্লিকা সেনগুপ্তের আবির্ভাব। আধুনিকতাবাদ যে ব্যক্তি-অভিজ্ঞানী সমষ্টিচেতনার মধ্য দিয়ে নারী-পাঠকৃতিকে এক উত্তরণের দিশা দেখিয়েছেন।

শরীরকেন্দ্রিক অভিজ্ঞতা ও উপলব্ধি মন্থন করে একদিকে ব্যক্তিগত ও অন্যদিকে নৈর্ব্যক্তিক যে দ্বিরালাপের গ্রন্থনা তৈরি করে, তার সফল উপস্থাপনা এই সংকলনে লক্ষ করা যায়—

'শত শরতের বীর্যে আমার স্বামীকে সাজাও
অগ্নিদেবতা— আমার প্রথম স্বামী ছিল সোম
দ্বিতীয় দেবতা না, গন্ধর্ব, তৃতীয় অগ্নি
তুমি, যে আমাকে মানুষ স্বামীর হাতে তুলে দেবে।'

(অগ্নি প্রদক্ষিণ)

ঐতিহ্যের পুনর্নির্মাণ করে নারীর নিজস্ব কবিতার ভুবনকে তুলে ধরতে চেয়েছেন। নারীর ব্যতিক্রমী বয়ানকে নান্দনিক প্রতিষ্ঠা দিয়েছেন মল্লিকা।

"যে রাত কাটালে প্রণাম জানাও তাকে হে রমণী / বন্দনা করো
পুরুষের, বলো আমিই পৃথিবী / তুমি .... / আর সাক্ষি রইল
ওখানে কামুক, / এই মাটি ঘাস মেট্রোপলিস সব আমাদের।"

(সহবাস)

তারপর 'আমি সিন্ধুর মেয়ে' এর দিকে দৃষ্টি ফেরালে সূক্ষ্ম কাব্যভাষার, ব্যাপকতর পরিধি লক্ষ করা যায়। সব মিলিয়ে এই সংকলনটি বহুমাত্রিক বলা যায়। নারীর জৈবিক অভিজ্ঞান কীভাবে কবিতায় চিহ্নায়ন প্রকরণ হয়ে উঠেছে তা জোরালো ভাবে লক্ষ করা যায়। তবে সবচেয়ে বেশি দৃষ্টি আকর্ষণ করে এই সংকলনে তা হল, মল্লিকার প্রবণতা ঋজু ও সহজ হয়ে ওঠার দিকে। লৈঙ্গিক অবস্থান নিয়ে কবিতা লিখতে গিয়ে যখন 'জলের মাছ' কবিতায় লেখেন,

"শীত ও গ্রীষ্মের মধ্যে আমি কার আঙুলে নির্ভর করব বলো
/ জলের তছনছ আমূল কোলাহল, শরীর নিয়ে আমি উঠে
এলাম ...."

আবার 'সম্রাজ্ঞীর প্রেম' কবিতায় যখন তিনি বলেন,

"আমার যত রূপ বিড়ম্বনা শুধু, শরীর ক্ষয়ে গেল,
মাটির কান্নায়, প্রেমের মধুটুকু পিঁপড়ে খেয়ে নেয়।'

তাই বলা যায়, পাঠকৃতি ক্রমশ মল্লিকার হাত ধরেই যেন লিঙ্গ-নিরপেক্ষতার ধারণাকে চুরমার করে দিচ্ছে। 'মা-ভূমি' নামক কবিতাটি নারীপাঠকৃতির একটা চমৎকার শিল্পিত নিদর্শন। যেখানে মেয়েদের সম্পূর্ণ নিজস্ব শারীরিক অভিজ্ঞানের প্রকাশ ঘটেছে।

"আঠাশ দিনের মাথায় আমার
রক্তকলস পূর্ণতা পায়
আঠাশ দিনের মাথায় গাছের
ডগায় ফুটছে রুদ্রপলাশ
এখন আমার সানুদেশ জুড়ে

"আমার কবিতা গ্রামীণ পটচিত্রের মতো মানুষ আর মেয়ে
মানুষের ছবির কথা লিখতে চেয়েছে। কথামানবীর মতোই
ইতিহাসের ছাই ও ভস্মের মধ্যে নারী নামক তো আগুন চাপা
পড়ে আছে, আমি তারই ভাষ্যকার। আমি আগুনের আত্মকথন।
আমি কান্না পড়ি, আগুন লিখি, নিগ্রহ দেখি, অঙ্গার খাই,
লাঞ্ছিত হই, আগুন লিখি।"

এই আগুনের আত্মকথন ও ইতিহাসের ভস্মস্তূপ থেকে পূর্বমাতৃকাদের দহনকথা সঙ্গে নিয়ে নিষ্ক্রমণ তো অতুলনীয়। তবে তার আগে তিনি কষাঘাত করতে চেয়েছেন পঞ্চাশের এই কুযুক্তিশৃঙ্খলকে যেমন, 'তাই পবিত্র যা ব্যক্তিগত'। এই ব্যক্তিগত পবিত্রতার অন্তরালে রয়েছে নিপীড়নের ইতিহাস, নারী-নিগ্রহ। এই চূড়ান্ত যন্ত্রণাজনক সত্যটাকে ভাঙতে চেয়েছেন মল্লিকা। 'কথামানবী'তেও ফুটে উঠেছে এর সর্বাত্মক বিনির্মাণের ঘোষণা।

"কথামানবী সেই নারী যে যুগান্তরের অপমান আর অবহেলার পরেও ভালবাসতে পারে, প্রতিবাদ করতে পারে, যে নতুন জন্ম নিয়ে ফিরে আসে দ্রৌপদী, গঙ্গা, সুলতানা রাজিয়া, মাধবী, মেধা পাটেকার, মালতী, মুদি, শাহবানু বা খনার মধ্য দিয়ে, যে হেঁটে চলে যুগ থেকে যুগান্তর মিশে থাকে প্রতিটি ভারত-কন্যার রক্তে, যে ইতিহাস এবং অনাগত, একক এবং সহস্র, অশ্রু এবং আগুন; যার শুরু আছে কিন্তু শেষ কোথায় সে নিজেও জানে না।"

মানুষের অসম্পূর্ণ ইতিহাসকে পূর্ণতার দিকে সঞ্চারিত করাই কবির প্রকৃত অভিপ্রায়। মল্লিকার কথামানবীর সুরেই জেগে উঠেছিল।

"ভারতবর্ষের মেয়েরা কোনও দিন রাজা হয়নি। প্রজাও হয়নি। হয়েছে রাজার বউ আর প্রজার বউ। সুয়োরাণি, দুয়োরাণি, আর ঘুঁটেকুড়ানি। একবার, শুধু একবার রাজা হয়েছিলাম, মাত্র কয়েক দিনের জন্য আমি কথামানবী হয়ে উঠেছিলাম সুলতানা রাজিয়া। দিল্লীশ্বরী। আঃ অবশ্য লোকজনের কী অশান্তি! একটা খুবসুরত জেনানা একা একা দিল্লীর মসনদে বসে থাকবে, দিল্লীর মরদের কাউকে বিয়ে না করে বাদশাহী চালিয়ে যাবে। এও কী সম্ভব! তাবড় তাবড় পুরুষেরা এরকম অনাসৃষ্টি কাণ্ড মেনে নেবে! নাঃ মেনে নেয়নি। মেনে নিলে ভারতবর্ষের ইতিহাস অন্যভাবে লেখা হতো। আজ দেশ স্বাধীন হয়েছে। স্বাধীনতার পঞ্চাশ বছর হয়েছে। পঞ্চায়েতে মেয়েদের আনাগোনা হচ্ছে। কিন্তু মহিলা বিল ফিরিয়ে দিলেন রাজনীতির পুরুষ পুঙ্গবেরা। মেয়েরা সম্মানে সামনে শাসন ক্ষমতা হাতে নেবে, এই দৃশ্য দেখার চেয়ে তারা মরে যাবেন সেও ভি আচ্ছা। মেয়েদের আটকাতে হবে, করেঙ্গে ইয়া মরেঙ্গে বলে ঝাঁপিয়ে পড়লেন অমুক প্রসাদ যাদবের দল। সেই ট্র্যাডিশন সমানে চলছে, যেমন চলছিল আমার রাজিয়া জন্ম ..."

তাই বলা যায় একটি বিকল্প বয়ানের প্রস্তুতি কবিতার ছত্রে ছত্রে ধ্বনিত।

সুবোধ সরকারের সঙ্গে বিয়ের পর প্রকাশিত হয় 'সোহাগ শর্বরী'। মল্লিকার কবিতার ভুবন পরিক্রমা করে এই বইটিকে মল্লিকার জলবিভাজন রেখা বলা যেতে পারে। এখানে

আমাকে জাগিয়ে দাও ঝলমলে জীবনের স্বাদে
মাথাভর্তি চুল দাও, চোখে দাও কটাক্ষ বিদ্যুৎ
আমার আকাশে দাও মেঘ বৃষ্টি আলো।
(আমাকে সাজিয়ে দাও ভালবাসা১)

শিশির তোমার কেন কোনওদিন অসুখ করে না,
রোদ্দুর কখনও বুঝি মন খারাপ হয় না তোমার?
সারস তোমাকে কেউ প্রতারণা করেনি কখনও?
আমিও শিশির হয়ে, রোদ্দুর, সারস হয়ে থেকে যেতে চাই পৃথিবীতে
(আমাকে সাজিয়ে দাও ভালবাসা ২২)

মল্লিকা আজ ইন্দ্রিয়াতীত। তবু দৃপ্ত কণ্ঠে বলতে পারছি মল্লিকা অমর। মল্লিকারা বেঁচে আছেন বেঁচে থাকবেন এবং সম্পূর্ণ মানবিক পৃথিবীর প্রত্যাশী অমল হৃদয়ের কাছে আর মানবকেন্দ্রিক নান্দনিকতার পূর্ণ প্রতিষ্ঠার লড়াইও থাকবে অব্যাহত। সৃষ্টি হবে নব পথ ও পাথেয় তাই 'আগুনের পথে হেঁটে যায় যারা সাহসী / তার পথে বেজে উঠুক পাঞ্চজন্য।

সব মিলিয়ে মল্লিকা সেনগুপ্তের কবিতার ভুবন পরিক্রমণ করে আমরা এসে পৌঁছই সূর্যোদয়ের নুতন পরিসরে। এখানেই মল্লিকার অনন্যতা।

কুয়াশা জমছে নীরক্ত শ্বেত
রক্ত নামছে উষর মাটিতে
মাতৃভূমি গুল্মগর্ভা হবেন।'

আর এখানেই যেন নারীসত্তা ও তার নির্মাণ-এর দিকটি লক্ষ করা যায় তো অন্যদিকে ব্যক্তি-নারীর বাইরে গিয়ে সমষ্টি নারীচেতনার দিকটিও প্রতিফলিত হয়ে ওঠে। যেমন, 'আগুন বাহক' কবিতাটিতে রয়েছে,

''সুপুরুষ এসেছিল, আসেনি নারীরা
আমি সিন্ধুর মেয়ে, মাটি জল ঘাসে
মথিত নক্ষত্র আমি, যোদ্ধা ও মানুষ
কালো মেয়েদের পায়ে তামার গগন
এত দীপ্যমান চোখে ঘোড়সওয়ারেরা
গর্ভে অগ্নি ঢেলে দিল, জন্মাল কার্তিক
শুধু বীর যোদ্ধা নন, রক্তের মিশ্রণ
আমার সন্তান স্বামী সহোদর এরা
আমারই গর্ভে হল নদীমাতৃক।'

এটাকেই বলা যায় ইতিহাসের নারীচেতনাবাদী পাঠ। যে-ইতিহাস প্রচলিত ধারায় ছিল 'হিজ স্টোরি', তাকেই এক নব আঙ্গিকে রূপান্তরিত করলেন মল্লিকা। 'হার স্টোরি'তে। 'কন্যা', 'স্বয়ংবরা মাটি', 'তস্কর পালাল', 'বাতাসের ছেলে' ও 'অশ্বমেধ' ইত্যাদি পাঠকৃতির মধ্যে সাংস্কৃতিক বিশ্বকোষের বহুমাত্রিক বৌদ্ধিক প্রয়োগ লক্ষ করা যায়। বলাই বাহুল্য, আটপৌরে বাংলা ভাষাতেও মল্লিকা মন্দাক্রান্তা ছন্দের সাবলীল ও লাবণ্যময় সংযোগ ঘটিয়েছেন। মেয়েলি বাচনের আরও নিদর্শন চিরে চিরে ব্যাপ্ত হয় এই পঙ্‌ক্তিগুলির মধ্যে, 'ভাসুরের কাছাকাছি এলোচুলে থাকি না, কখনও/খোঁপায় জড়িয়ে নেব লাল ফিতে।' যৌন সম্পর্কজনিত শারীরিক অভিজ্ঞতার খুব সাহসী ও অকপট অভিব্যক্তির পরিচয় মেলে তাঁর 'জম্বু দ্বীপের চাঁদ' ও 'স্বামীর কালো হাত' কবিতাদ্বয়ের মধ্যে। যা আমাদের শুচিতামনস্ক পাঠাভ্যাসের অচলায়তনে এক বিশাল বিস্ফোরণ সৃষ্টি করে।

'হাঘরে ও দেবদাসী' কাব্য সংকলনে তাঁর বাচন আরও শানিত হয়েছে। কাব্যিকতার নানা উপকরণ তিনি যোগ করেছন। বলা ভালো আটপৌরে গদ্যের ভঙ্গিটিকে তিনি কবিতায় স্থান দিয়েছেন। প্রান্তিক নারীর তথাকথিত ইতিহাস তাঁর দৃষ্টি আকর্ষণ করেছে। এখানে উল্লেখ করা যেতে পারে 'আম্রপালী' কবিতার শেষ পঙ্‌ক্তিদ্বয়।

''আম্রপালী পালিয়ে যায়, পেছনে তার সমাজ তাড়া করে
আম্রপালী বাঁচতে চায়, সমাজ চায় প্রাণ লোপ হোক।'

এটাকে বলা যেতে পারে ইতিহাসের কৃষ্ণ যবনিকা যা উত্তোলন ও জীবন পুনঃপাঠের জন্য নারীচেতনার ইস্তাহার। তারপর 'অর্ধেক পৃথিবী' সংকলনে রয়েছে 'আপনি বলুন মার্কস' ও

'ফ্রয়েডকে খোলা চিঠি' এর মতো বহু আলোচিত কবিতা। মল্লিকা চান নারীচেতনাবাদী পথ হোক সর্বত্র। যেমন— 'আপনি বলুন মার্কস' এ তিনি লিখেছেন।

"কখনও বিপ্লব হলে
পৃথিবীতে স্বর্গরাজ্য হবে
শ্রেণীহীন রাষ্ট্রহীন আলোপৃথিবীর সেই দেশে,
আপনি বলুন মার্কস, মেয়েরা কি বিপ্লবের সেবাদাসী হবে?'

নিঃসন্দেহে আজকের এই পৃথিবীতে এটা একটা বিরাট প্রশ্ন। এই একই ভাবনার গুঞ্জন রয়েছে ফ্রয়েডকে খোলা চিঠিতেও। ফ্রয়েডীয় তত্ত্ব দৃষ্টিকটু ভাবেই পুরুষতন্ত্রের প্রতি পক্ষপাত সম্পন্ন। এবং এজন্যই তিনি সরাসরি ফ্রয়েডকে সম্বোধন করেছেন এবং সেখানে যে নারীর আত্মপরিচয় নির্মাণ হচ্ছে না এটাও তিনি স্পষ্ট করে দিয়েছেন। মহাভারতের কথাবীজ অবলম্বন করে লিখেছেন 'পাণ্ডুর পুত্রাকাঙ্ক্ষা' কাব্যটি। একই মনোভঙ্গি রয়েছে 'কন্যাদান' নামক কবিতায়। 'তুতান খামেনের মা' 'দুয়োরাণি' ইত্যাদি কবিতায়ও এই ভাবনার প্রসার ঘটেছে। ব্যক্তিগত ও নৈর্ব্যক্তিক কবিতার দ্বিরালাপকে তিনি সর্বত্রগামী করে তুলতে চেয়েছেন। নারী চেতনাবাদী ভাবনাকে অটুট রেখেই 'ভালবাসা', 'মা', 'ডাইনি', 'বিবাহগাথা', 'রানরাজা', 'অন্ত্রপুরুষ' ইত্যাদি কবিতায় উপস্থাপনা-বৈচিত্র্য, ভাষাগত ও বাচনগত বৈচিত্র্যকে ফুটিয়ে তুলেছেন। একুশ শতকে নতুন স্বপ্নে চোখকে রাঙিয়ে প্রকাশ পেল তাঁর কবিতার বই 'মেয়েদের অ আ ক খ'; এক নতুন প্রতিবাদী স্বর, এক নতুন বর্ণবোধ যেন ধ্বনিত হল তাঁর কবিতার ছত্রে ছত্রে।

"ধর্মেরি কল পুরুষ নাড়ে / ধর্ম ছুঁড়ে ভীষণ মারে;
নারীবাদের একুশ শতক / মেয়েরা চায় নিজস্ব হক;
বিবাহ মানে সারাজীবন / ভাঙাগড়ার অবগাহন;
ভালবাসার গুপ্তধন / নবজীবন অন্বেষণ;
যোনি আমার উপনিবেশ / শিব ঠাকুরের আপন দেশ।'

তাছাড়া 'আমরা লাসা আমরা লড়াই' ও 'দেওয়ালির রাত' কাব্য সংকলনও একুশ শতকেই আত্মপ্রকাশ করেছে। তাই বলা যায়, প্রায় দুই শতকের কবিতা চর্চায় মল্লিকা হয়ে উঠেছেন নারীচেতনাবাদী কবিদের মধ্যে অগ্রণী। স্পষ্টতা, ঋজুতা ও প্রত্যক্ষতাই তাঁর অভিজ্ঞান। লিঙ্গ-বৈষম্য প্রত্যাখ্যান করে তিনি এক সম্ভাব্য নতুন সত্যের জন্য যুদ্ধ চালিয়ে যাচ্ছেন। তবে তাঁর প্রায় সর্বশেষ কাব্যগ্রন্থ 'আমাকে সারিয়ে দাও ভালবাসা' আমাদের আপ্লুত ও বিষণ্ণ করে, যখন জানি যে কবি মারাত্মক কর্কট রোগের সঙ্গে যুদ্ধ চালিয়ে যাচ্ছেন। এই সংকলনের বেশ কিছু কবিতায় যদিও পরিচিত ভাবনার বিস্তার ঘটেছে, তবু, সাম্প্রতিক কবিতাগুলিতে স্পষ্টতই পুরোপুরি এক নতুন মল্লিকাকে পাচ্ছি। যার কণ্ঠস্বর জীবনের প্রতি ভালবাসায় স্নিগ্ধ কোমল ও সহনক্ষম। এর মধ্যে প্রচ্ছন্ন বিষণ্ণতা ও মানবিক কারুণ্য আমাদের মর্মস্পর্শ করে।

ক. ভালবাসা ভালবাসা বাঁচাও আমাকে

নারীপরিসর

সমাজে ও সাহিত্যে

সম্পাদনা

বরুণজ্যোতি চৌধুরী

বাংলা বিভাগ। আসাম বিশ্ববিদ্যালয়, শিলচর

দি সী বুক এজেন্সী। কলকাতা

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A REVIEW OF THE NOVEL "MALINI" BY RABINDRANATH TAGORE

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Abstract: Rabindranath Tagore was a poet, writer, painter, & philosopher from India who was of Bengali descent. The majority of his work is focused on fostering connections with average citizens. One of his most well-known works, Malini, tells the narrative of a beautiful princess who was a driving force in the adaptation of a traditional religion, despite the fact that she was influenced by the Buddhist religion. Rabindranath Tagore addresses the issue that arises in society whenever a member of it decides to practice a different faith via the lens of this story. People are able to relate to his tales very simply because the characters he portrays in his tales are portrayed in a manner that is extremely straightforward.

Keywords: Indian poet, Philosopher, Novelist, Painter, Rabindranath Tagore, Malini, Buddhist religion

Introduction:

In this post, we will talk about Rabindranath Tagore's Malini, which is one of the most well-known novels ever written. Malini was written in the early 20th century [1]. The accomplishments of Rabindranath Tagore are going to be the topic of discussion in this essay. In addition to that, we will watch a synopsis of the movie about his life as well as one of his novels. The well-known novel Malini, which tells a tale of love and hatred centered on religion, friendship, and devotion, will be the primary topic of discussion in the following chapter. We will talk about the characters in this book as well as the lessons that may be learned from reading this book. Tagore was very good at following the Buddha's precepts [2]. Tagore, who is himself a great exponent of humanity, was profoundly moved by the Buddhist philosophy of humanism [3]. Tagore, the author, paid his respects to the Blessed One, who prioritized the primacy of deed over the so-called nobility of birth. Tagore's three plays, Malini, Chandalika, &Natir Puja, were all inspired by different Buddhist tales, and they served as vehicles for him to extol the enduring values of Buddhism [4]. In the story of Malini, there is a royal princess by the name of Malini who, like Buddha, seeks to enlighten those who are mired in ignorance. In the following paragraphs, we will talk about Rabindranath Tagore's most significant accomplishment as well as the contribution he made to the realm of literature [5]. Because he was the first Indian artist to have his paintings seen in galleries in Europe and the United States, we will also investigate the ways in which he has influenced contemporary artists. The majority of the work, including drama, plays, stories, music, and playwrighting, was completed by him. This will be covered in the narrative. He conveyed his message on devotion, betrayal, and faith through the medium of his novel Malini, which is referenced in the following article.

The Life of Rabindranath Tagore:

The National Anthem of the United States was written by the Indian poet, writer, & philosopher Rabindranath Tagore. He is most remembered for penning this patriotic song. On May 8th, 1861, he entered the world in Kolkata. Banerjee (2020) claims that the fact that he was born into a family of social reformers and philosophers provides him with a genetic advantage that enables him to be such an outstanding poet and writer. The works of Rabindranath Tagore, which include poetry, short stories, and novels, span a wide range of topics related to Indian culture. Every one of the short tales and books that he wrote turned out to be ground-breaking, and they ushered in dramatic changes in society [6]. He wrote a number of books and short stories, all of which attempt to address the issue of division, territorial boundaries, & discrimination based on location. According to Som (2017), the purpose of the books, poetry, and short stories that he penned was to encourage fraternity all around

the world. A message of love and peace can be found throughout each and every book. Despite the fact that Rabindranath Tagore had a strong desire for patriotism, he was well aware that anything is good and healthy as long as it is done within reasonable boundaries [7]. Rabindranath Tagore discusses a wide variety of topics, including those related to society, politics, culture, religion, and morality. His compositions of puravi, also known as morning songs and evening songs, have earned him a lot of notoriety. In the year 1890, he penned a poem titled "Mansi," in which he discusses the various social and political difficulties of the time. Several of his most famous poems, like Sonar Tari, Chitra, Kalpana, and Naively, were written with the intention of conveying to the rest of the world a message of peace and fraternity [8]. According to Alam (2017), in addition to being a talented writer and poet, he was widely recognized for his work as an outstanding educator. He was the man who established the Shantiniketan University we know today. Instead of spending his time in religious institutions like temples and ashrams, Rabindranath Tagore devoted his life to serving humanity. When he passed away in Kolkata in 1941, it was the darkest hour for the nation as a whole.

The Contribution of Rabindranath Tagore:

Gitanjali, which was written by Rabindranath Tagore, was awarded the Nobel Prize in Literature in 1913. He is the first person of Asian descent to ever be awarded the Nobel Prize in Literature. According to Gourishankar (2017), he is also famous for being the author who first brought the form of the short story to Bengali literature [9]. Also, he is well-known for establishing a university that bears the name Shanti Niketan. In addition to being the composer of the National Anthem of Bangladesh, he is also the composer of the National Anthem of India. His work served as the basis for the composition of the national anthem of Sri Lanka. One of his most significant accomplishments is that he is often regarded as the best contemporary poet to come out of India. He began writing poetry when he was eight years old, and when he was sixteen, he composed a poem called BhanusinhaThakurerPadabali, which is now considered to be one of the most famous poems ever written. The concept that all of God's creations are interconnected is a recurring theme in Rabindranath Tagore's poetry. According to Richarson (2019), he is famous for the novel ideas that he has as well as the unique mind puzzles that he comes up with. At the age of twenty, he began writing plays, and by the time he was thirty, he had become the most prominent playwright of his day thanks to his works Chitrangada, Chandalika, & Shyama. Rabindranath Tagore is recognized as a towering figure in the world of literature during the 20th century, as stated by Tagore and Kiran (2017). Tagore is also noted for his contributions to the field of poetry [10]. Rabindranath Tagore's body of work includes not just poetry, short tales, and plays, but also eight novels, four novellas, and a collection of essays. Chokher Bali, Noukadubi Gora, GhareBaire, & Char Odhyay are just a few of the excellent works that he has written. Both new literacy criteria and a new artistic rate have been implemented everywhere around the country. The ideas that Rabindranath Tagore expressed in his writings had a significant effect on the way people thought in society. Another one of Rabindranath Tagore's accomplishments was that he began painting when he was sixty years old. He began by drawing doodles, and then he progressed to painting intriguing human features, bizarre monsters, and mystical landscapes. He died in 1941.

He is the first Indian artist to have his paintings displayed in Europe, Russia, and the United States, as stated by Narasipurum et al. (2018). His paintings have also been shown in India. He painted in a manner similar to that of current painters and went on to become an inspiration to many contemporary artists. There are more than 102 pieces that are identified as being in the collection of the National Gallery of Modern Art. Because he was one of the most well-known educationists, he is best remembered for establishing Visva-Bharati University. The fact that Rabindranath Tagore is the only individual to have written the national anthem for both countries is Rabindranath Tagore's most notable accomplishment. He has composed the song "Jan Gan Man" for India, as well as "Amar Shonar Bangla" for Bangladesh. Both of these songs are in the Bangla language. Further recognition came from Oxford University in the form of an honorary degree for Rabindranath Tagore. He was the very first author in the subject of education to be awarded with this prestigious prize. Rabindranath Tagore is sometimes referred to as Gurudev in some circles.

Literature by Rabindranath Tagore:

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Rabindranath Tagore is the author of a wide variety of works, including but not limited to novels, poems, essays, short tales, plays, travelogues, & thousands of songs. According to Mamilla et al. (2017), he is well-known for being the person who originated the form of the genre written in Bengali. The majority of the stories he wrote were motivated by the everyday experiences of regular people. In addition to that, he is well-known for his autographic writing. At the age of twenty, he composed his first play, which was titled Valmiki Pratibha. In it, he experimented with a broad variety of theatrical genres by using reimagined versions of kirtans and traditional tunes. Another poem by Rabindranath Tagore, Dakghar was written in 1912 and tells the story of a little boy named Amal who was staying with his uncle when he passed away from an incurable illness. The poem is set in the home of the boy's uncle.

According to Sarabhai & Joshi (2020), the works of Rabindranath Tagore are characterized by a rhythmic quality as well as an upbeat and lyrical tone. Visarjan, which is an adaptation of the novel Rajarshi, which is also written by him, is considered to be one of the best dramas that he has ever written [11]. In the year 1877, Rabindranath Tagore began composing his first short stories. His first attempt at writing a short story was titled "Bhikharini," and it told the tale of a woman who made a living by soliciting alms from strangers. He is the author of the book Galpaguchchha, which is a collection of eighty-four short stories. Rabindranath Tagore's creative and intellectually stimulating concepts are presented in the form of short stories that may be found in the book Galpaguchchha. Rabindranath Tagore's narrative focused mostly on everyday people and the problems they faced in their daily lives. His novels are titled Chaturanga and ShesherKobita, and he has authored both of them. In addition to his literary works, Rabindranath Tagore is most remembered for the RavindraSangeet, a collection of around 2,230 songs that he created.

Rabindranath Tagore's writings, whether poems, novels, or plays, were always rhythmic and lyrical in nature. In 1971, the song "Amar Shonar Bangla," which was written by Rabindranath Tagore during the protest of the division of Bengal, was chosen to be the national anthem of Bangladesh. Tagore wrote the song during the protests of the partition of Bengal. According to Singh & Deol (2019), his body of work served as the impetus for the composition of the national anthem of Sri Lanka. Rabindranath Tagore did not begin painting until he was sixty years old. A number of Rabindranath Tagore's works are based on scrimshaw created by the Malanggan people of northern New Ireland.

In each of his stories, he endeavored to give the protagonist the same perspective on life that he had. In his writings, he made a consistent effort to shake off the conventions of conventional culture. He is open-minded, and in his stories, he tries to put the issues concerning conventional culture and helps to develop modern society. He also contributes to the construction of modern civilization. The fact that his books have been translated into a wide variety of languages all around the world is evidence enough of his greatness as a writer. His tales almost always centered on the lowliness and the ills that were prevalent in society. In addition to that, he had an interest in politics, and he is opposed to the government of Britain. He was opposed to the ideas that Mahatma Gandhi advocated for and is against the Swadeshi Movement.

Synopsis of Malini, the Novel:

Rabindranath Tagore is responsible for the writing of a number of well-known poetic plays, including Malini. The narrative is told through Malini's perspective, and it touches on topics such as religion, devotion, friendship, & faith. This is a tale of love and loathing for each other. According to Banerjee (2020), Rabindranath Tagore attempted to alter the way that people think about religion through the medium of this work. He did so in the hope that it would influence their opinions. The main character of the book is a young woman named Malini who comes from a royal family but has an unconventional way of thinking. After receiving an education from a Buddhist monk, she finds that she is drawn to the Buddhist religion. Kemenkar, Supriya, the king, the queens, and the Brahmins are the other characters that appear in this drama. In the book, we will see that Malini is forced to deal with a number of challenges as a result of the diversity of her beliefs. Because she did not adhere to the customary religious practices, the Brahmins, Kemenkar, and Supriya, as well as the monarch, all advocated for her exile.

Once Malini had been exiled for a period of time, the story will show us that when she eventually came back, the Brahmins were prepared to acknowledge her as a goddess in some way. But, Kemenkar& Supriya were not satisfied. We discovered in the book that Kemenkar and Supriya had

been childhood best friends, and that when Kemenkar attempted to conquer the kingdom with the help of Supriya, Supriya betrayed him by notifying the monarch of his plans. The Kemenkar was not prepared to acknowledge Supriya's treachery, and as a result, he took his life. The fact that Kemenkar's best friend Malini asked his father for forgiveness despite the fact that Kemenkar had killed his comrade demonstrates how great Malini's ideology was.

Taking Notes from Malini:

The story of love and heartbreak is told in the novel Malini. Rabindranath Tagore aimed to demonstrate to the world the myriad guises that people might assume through the medium of this play. As we've seen in the story, Malini has to go through a lot of trouble due to the fact that her opinions are different from those of others, which demonstrates that it's not an easy thing to do to have a different perspective than other people. It is possible, according to Lewisoh (2017), to be a member of a royal family without having any interest in riches, success, or the royal pleasures associated with those things. Using the medium of this work, Rabindranath Tagore hoped to demonstrate to readers that they are free to practice their faith in whatever way that they see fit. As part of the friendship, we have also witnessed both treachery and vengeance. In this section, an essential lesson is being conveyed to society, namely that nobody is permanent among us. Everyone, for whatever reason, is capable of betraying someone else, as we saw in the book when Supriya deceived Kemenkar, who then took her life in order to exact his revenge. This demonstrates that betrayal can take place even in close friendships.

After finishing this book, we come away with the understanding that one should always have a generous spirit toward forgiving others. This is demonstrated by the fact that we witnessed how loyal Malini was when she pleaded with her father to forgive Kemenkar. The lesson that may be learned from this book is about faith, devotion, love, hate, and having the courage to have diverse opinions. This book demonstrates Rabindranath Tagore's more contemporary ideas, as he seeks to tear down the barriers that religion creates in society. She has risked exile from her palace in order to fulfill her childhood dream of becoming a prince. This demonstrates how difficult it was for regular people to follow other religions at that time period. He has the goal of challenging the conventional way that people in the society think about adhering to the established religion. A betrayal in the friendship is one of the themes explored in this book, which aims to teach its readers not to put their whole trust in anyone because it is possible for anyone to act differently at any time.

Evaluating Rabindranath Tagore's writings critically:

Rabindranath Tagore was possibly one of the rare writers who had the potential and literary skill to write in such a diverse range of genres. No other writer was able to produce work that was as eloquent and outstanding as what this one did, and on such a constant basis. He is also one of the few renowned writers & novelists who worked with literary categories ranging from songs to poems. His work can be found in many different types of literature. The author was also a deeply patriotic human being, as is evident from the fact that he turned down the honor of "Knighthood" when it was offered to him. According to Chakrabarty (2020), there are also a great number of stories, poetry, and prose pieces that demonstrate how much the author despises the superiors' practice of oppressing the inferiors. The relevant play Malini is an all-encompassing account of casteism as well as the effects it has on people and the lifestyles they lead. Malini can be said to be the similarity of every holistic as well as pure human being in this world, whereas Kemnakar& Supriya; who are also holistic in their feelings serve selfish purposes. It is a beautiful depiction of the consequences of following blindly certain ideologies without concerning or seeking the truth and logic behind the. The narrative illustrates how ignoring logic may change the course of people's lives in significant ways.

Not only in the play "Malini," but also in another of Rabindranath Tagore's well-known plays called "Guru," he depicts the same notions of the negative impacts of casteism and the consequences of it. The narrative also depicts a variety of other feelings, like love, vengeance, gratitude, and betrayal, among others. Rabindranath Tagore is considered to be one of the most influential writers of all time. His body of work is comprised of each and every type of emotion that humans are capable of feeling. This brilliant author has produced a body of work that encompasses the full range of human emotions, from betrayal to forgiveness and all in between (Chelliah and Litt 2019). When the book is analyzed

from a scholarly perspective, it is clear that the author made an effort to center the story around the unpopular principles of rationality with equality among all other types. This was the case because these concepts were not widely held during that era. It has been discovered that Rabindranath Tagore disregards the communal hierarchy of Brahmins as well as Brahmin ideology in many of the works that he has produced.

Even though he is a Brahmin, he has never stopped having a positive attitude about various types of people and the beliefs they hold. This can be seen in the autobiographical instances of his encounters with his family's tailors and maidworkers when he was a child. The writer possesses a dignified personality, which is reflected in his creative works as well as the secondary data sources, which exhibit the writer's dignified nature.

When the popularity of the work is compared to the fame that the author has received over the course of all these years, it is not difficult to conclude that he is possibly the best writer, poet, composer, and novelist to come out of the state of Bengal. This assertion can be made with relative ease. Rabindranath, like many other authors active during that time period, dedicated a significant portion of his body of work to illuminating the issues of injustice and prejudice. Malini is a comparable type of work, and an analysis of the play will assist the reader in comprehending how complicated and widespread the issue of caste discrimination was throughout the relevant time period indicated in the play-novel. The fact that every character in the play has reasoning to support their own beliefs is one of the most notable aspects of the play. With the exception of the play's main protagonist, Malini, none of the other characters are accepting of the beliefs of other people, which demonstrates how traditional norms and beliefs can make their respective adherents extremely closed-minded.

Conclusion:

We have covered Rabindranath Tagore's life story in this post for your reading pleasure. Poet, writer, social reformer, playwright, & storyteller Rabindranath Tagore was born in Bengal, India, and is of Indian descent. He is the author of a number of well-known books, including Chokher Bali, Chaturanga, The House and the World, and a great deal of other works. In this piece, we took a look at one of the most well-known books ever written, and its title was Malini. In the book, we follow the journey of a beautiful princess named Malini, who, due to her unconventional views on religion, is forced to overcome a number of obstacles. We have also witnessed the incident in which Kemenkar's childhood buddy Supriya betrayed him, prompting Kemenkar to take his own life in order to exact his vengeance. The themes of love, friendship, betrayal, and dedication run throughout this entire book. Because of his significant contributions to the world of literature, Rabindranath Tagore has been honored with a great number of accolades and awards. He is the first author to ever get an honorary degree from Oxford University and the first person of Asian descent to be awarded the Noble Prize. Shanti Niketan the emblematic representation of his desire in learning is something that he created himself.

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