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Editorial.....

It is heartening to note that our journal is able to sustain the enthusiasm and covering various facets of knowledge. It is our hope that IJMER would continue to live up to its fullest expectations savoring the thoughts of the intellectuals associated with its functioning .Our progress is steady and we are in a position now to receive evaluate and publish as many articles as we can. The response from the academicians and scholars is excellent and we are proud to acknowledge this stimulating aspect.

The writers with their rich research experience in the academic fields are contributing excellently and making IJMER march to progress as envisaged. The interdisciplinary topics bring in a spirit of immense participation enabling us to understand the relations in the growing competitive world. Our endeavour will be to keep IJMER as a perfect tool in making all its participants to work to unity with their thoughts and action.

The Editor thanks one and all for their input towards the growth of the **Knowledge Based Society**. All of us together are making continues efforts to make our predictions true in making IJMER, a Journal of Repute

Dr.K.Victor Babu
Editor-in-Chief

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ARCHAEOLOGICAL SITES OF LOWER SWARNAMUKHI RIVER VALLEY: A REAPPRAISAL

Venu Puvvadi

New Delhi, India

Introduction:

Andhra Pradesh is the richest regions in South Indiaⁱ so far as the occurrence of Early Historic sites are concerned.ⁱⁱ The linguistic state of Andhra Pradesh is one of the few geographical zones in the country, rich in archaeological sites ranging from prehistoric to historical periods. Coming to the early historical sites, perhaps, Andhra region is the richest zone, having early historical sites at every alternate village.

Andhra Pradesh, blessed with vast natural resources like high mountain ranges, perennial rivers, semi-perennial rivers, dense forests, a wide variety of flora and fauna provided a congenial habitat for man since prehistoric times.

The lower Swarnamukhi, a perennial river in the Nellore district in the state of Andhra Pradesh, flows in north-easterly directions. The south-eastern part of Andhra Pradesh consisting of Nellore region in the lower Swarnamukhi River area was not intensively explored for pre-historic, proto-historic and early historical sites. In the core region of lower Swarnamukhi River, some of the sites were reported.

Chambetipalem: 14.056347 Latitude 80.053092 Longitude

The site of Chambetipalem is located in the Vakadu tehsil of Nellore district in the lower Swarnamukhi river area. A habitational deposit was noticed just on the western outskirts of the village. Though habitational debris could be noticed in an area of about 2 acres, the full extent of the site could not be assessed properly as the ancient deposit is overlain by marshy clay and wind-blown sand. Interestingly the site yielded only red ware, red slipped, red washed, coarse red and pieces of Imitation amphorae.ⁱⁱⁱ

Duggiraja Patnam: 13.980130 Latitude 80.053092 Longitude

Duggiraj Patnam site is located in the tehsil of Vakadu in the district of Nellore. In the course of exploration by the Registering Officer of the Department of Archaeology and Museums, Government of Andhra Pradesh, located two mounds at Duggiraj patnam^{iv} near the coast of Bay of Bengal. Interestingly both the mounds yielded red polished ware.

Gottiprolu: 13.948050 Latitude 79.983611 Longitude

The site of Gottiprolu is located in the Naidupet tehsil in the Nellore district of lower Swarnamukhi river area. A huge less-disturbed ancient mound bound by mud fortification has been noticed^v on the southern outskirts of the village. From among the two occupation levels the pottery from the lower level, designated GTP-I yielded Black and Red ware of thin, fine fabric, some having metallic sheen and generally red to orange tinge on the outer surface while other wares include red slipped, black slipped and black burnished wares.

The upper levels above GTP-I yielded Black and Red, Black slipped and burnished, buff, red slipped and coarse red wares. Pieces of imitation amphorae also have been noticed in considerable quantity. Depending on the thickness of the deposit and pottery we could assign to the lowermost exposed layers to 600 B.C.

Kokkupadu: 14.058158 Latitude 80.066557 Longitude



Kokkupadu site is located in the Kota tehsil of Nellore district of lower Swarnamukhi river area. The habitational deposit at this site lies below the present village and the debris scattered over an area of about 15 acres. An examination of the foundation pits and other ditches revealed a deposit more than three feet in thickness, which yielded Black and Red ware, Red slipped ware, Buff and Black ware.^{vi} The presence of Black and Red ware indicates that the site was in occupation prior to the first century A.D. and seems to have been abandoned subsequently.

Kondurupalem: 14.548508 *Latitude* 79.911565 *Longitude*

The site of Kondurupalem is located in the tehsil of Vakadu in the Nellore district of lower Swarnamukhi river. Habitational vestiges in the form of pottery and other antiquities were noticed on sand covered mounds at this place. The site has yielded red, coarse red and grey wares and sherds of Kaolin pottery^{vii} in coarse fabric. One red ware sherd, much weathered, has revealed stamped design. Few pieces of white has yielded black and blue bangle pieces and a corroded copper coin.

Ozili: 14.003613 *Latitude* 79.906676 *Longitude*

Ozili site is located in the tehsil of Ozili in the Nellore district of lower Swarnamukhi river area. Habitational deposit has been noticed on the southern outskirts of the village. The pottery collection included red, coarse red, red slipped, red polished and black wares. One red polished sherd in very fine fabric has two incised lines on shoulder portion, below which there is an interconnected type design. Most of the pots have decoration on the shoulder, neck and rim portion. Incised design of short vertical lines is more common. The design seems to have been effected by a rouletting wheel.^{viii}

Puduru: 13.894160 *Latitude* 79.927665 *Longitude*

Puduru site is located in the Naidupeta tehsil in the district of Nellore. It covers an area of about 10 acres and is bounded by a mud fortification, reinforced by lateritic boulders.^{ix} The exposed sections reveal a thickness of about 1.5 m of deposit with different varieties of potsherds and the floor levels along with burnt bricks in alignment at places. The site Puduru also known as "Malay Kota and Muniratnapalle" in the present days.^x

In the recent past, Puduru in the Nellore district just beside the Swarnamukhi river basin was excavated and some information about the results of these excavations are available for us.

In the initial stages this site was first discovered by Shri. I.K.Sarma^{xi} of the south-eastern circle of the Archaeological Survey of India (ASI) in the years of 1973-74. From this site he noticed an early historical fortification, rectangular on plan, covering nearly 23.4 hectares in the west of the village in Puduru.^{xii}

Further the Birla Archaeological and Cultural Research Institute (BACRI), Hyderabad, under the direction of Kamalakar and V.V.Krishna Sastry carried out excavation at Puduru in the years of 1994-95.^{xiii}

They found that the south and the west sides of the mound are completely occupied by the permanent village settlement. An ancient terracotta ring-well right in the middle of the new settlement noticed by them. The northern side of the site was dug out for earth works by the local villagers.

Excavation conducted in four trenches in different areas of the site was revealed a single period of occupation belonging to the early historical period. Three



structural activities of well manufactured brunt-bricks were traced in three different trenches and in one of the trench has a wall with nine brick courses were exposed.

Along with the pottery, a number of perforated tile and animal bone pieces were also recovered. Other antiquities from the site included coins (tentatively datable to second to third century A.D.), beads and bone points. The semi-precious stone beads included carnelian, crystal, quartzite, amethyst, agate and chalcedony. A large quantity of iron slags and vitreous material were also found.

In continuation of the previous year work (1994-95), BACRI, Hyderabad resumed excavation under the same team at Puduru in the years of 1995-96.^{xiv} The present excavation revealed a series of brick structures which included a huge rectangular hall divided into several rooms prefaced by a running verandah, huge silos for storing food grains, bath rooms, cisterns, under-ground drainage system and soakage-pits etc.

The exposed sections reveal a thickness of about 1.5 m of deposit with different varieties of potsherds and the floor levels along with the burnt bricks in alignment at places. Black and red ware, red slipped ware, black burnished, tan an russet coated white painted ware were collected from the surface and sections. More interesting are the imitation Roman amphorae jars found. Apart from globular pots and dishes, the red ware also included storage jars in thick section and thumb impressed appliqué designs.

Siddhavaram: 14.172747 Latitude 79.554022 Longitude

The site of Siddhavaram is located in the tehsil of Kota in the Nellore district of lower Swarnamukhi river area. Extensively damaged habitational deposit area yielded Black and Red ware of fine fabric, red, red slipped, grey, black slipped and black burnished wares. And also found the coarse red storage jars and lids with perforations.

Significance:

At Kokkupadu, an examination of the foundation pits and other ditches revealed a deposit more than three feet in thickness which yielded Black and Red ware, Red slipped ware, Buff and Black ware. The presence of Black and Red ware indicates that the site was in occupation prior to the first century A.D. and seems to have been abandoned subsequently.

Interestingly the Chambetipalem site yielded only red ware, red slipped, red washed, coarse red and pieces of limitation amphorae. Presence of imitation amphorae indicates that the site has to be bracketed in the 2nd -3rd centuries A.D.

Kondurupalem site has yielded red, coarse red and grey wares and sherds of Kaolin pottery in coarse fabric. One red ware sherd, much weathered, has revealed stamped design akin to the ware from Kottapatnam. Few pieces of white have yielded black and blue bangle pieces. On pottery analogy from Kottapatnam, the beginnings of this site could be assigned to the 2nd century B.C.

Siddhavaram site yielded Black and Red ware of fine fabric, red, red slipped, grey, black slipped and black burnished wares. Coarse red storage jars and lids with perforations used either for draining water out of cooked rice or vegetables.

The pottery collection from Ozili site, included red, coarse red, red slipped, red polished and black wares. One red polished sherd in very fine fabric has two incised



lines on shoulder portion, below which there is an inter-connected type design. This design seems to have been impressed by a rouletting wheel this probably indicates the assimilation of Roman rouletting tradition by the local craftsmen. However, whereas the Romans used the rouletting design on the inner surface of the plates and dishes, here the design is given on the outer-surface of the pot. It should be noted that only one sherd of the red polished ware is reported from this site and none from other sites in the valley.

At Puduru site, I.K.Sarma noticed an early historical fortification, rectangular on plan in the west of the village. According to the local tradition, the fort once secured the mound and fortifications oriented north-south. Further excavation conducted by the BACRI noticed that the south and the west sides of the mound are completely occupied by the permanent village settlement. Presumably this portion of the mound is archaeologically potential as evident by the presence of antiquities over the surface. An ancient terracotta ring-well right in the middle of the new settlement proves this fact. Further similar type of terracotta ring-wells were found at Kaverpattinam, Kanchipuram and Karaikadu etc.^{xv} The northern side of the site was dug out for earth works by the local villagers. The brick wall was found to overlie a gravel fortification and the moat. Besides pottery, the structural remains in brick, thought that this site clearly indicate a late Satavahana-Ikshvaku assemblage at the site.^{xvi} A large quantity of iron slags and vitreous material were also found, which indicate the local manufacture of iron implements as well as glass for making beads.^{xvii} But with the initial stage of discovering this site brought a number of fruitful results and handful information in the form of pottery and the sites early settlement pattern when it was excavated in the years of 1994 and 1995.

In the years of 1995-1996 excavation revealed a series of brick structures which included a huge rectangular hall divided into several rooms. A close study of the construction levels of different structures revealed four phases of construction without much time gap between each phase. The brick utilized in different phases also vary in measurements. There were indications of reuse of bricks to repair the collapsed walls due to cyclone or flood. However the bricks from all the phases were well-brunt and strong enough to sustain the vagaries of nature.

More interesting are the imitation Roman amphorae jars found *in situ* in the sections, two jars were recovered. The bottom tapers to a point of about 2 cm stud, and thus the whole pot assumes conical shape. These recall those reported from Arikamedu.^{xviii} Apart from globular pots and dishes, red ware also included storage jars in thick section and thumb impressed appliquéd designs. The designs (dots) on the russet coated white painted ware compares exactly with the sherds from Gudimallam and thus could be dated to around the first century A.D.

During the earlier explorations, interesting artefacts in the form of Mediterranean Amphorae, devoid of handles, long and conical in shape with thickness were reported. Some jars with pointed bottom and a small circular opening at the top also have been found. Similar varieties of amphorae without handles were also found at a few Indo-Roman sites like Arikamedu, Kanchipuram, Nattamedu and Vasava samudram in the Tamilnadu.^{xix} Puduru on the borders of the Andhra-Tamilnadu states was given some of the details of settlement pattern of the early historical period in this region.



The pots are usually decorated with deeply incised horizontal lines. Vertical strokes are confined only to the grey ware. One thick red slipped sherd has a series of papal leaf design. Other noteworthy antiquities are earthen tuyers apart from the sites.

The extant evidence from different sites in South India indicate that the trade with Mediterranean region is more or less confined to the Satavahana period. Analysis of the Roman coin issues discovered at different places in India indicate that the Roman trade commenced during the rule of Augustus and ceased almost entirely by Cara Calla (A.D. 211-217).

That the Roman trade with this region had great influence on the pottery traditions in the lower Swarnamukhi valley is indicated by the fact that these of early historic sites explored. Some of the other sites also have yielded imitation Roman amphorae.

Conclusion:

The archaeological evidences are in the form of that the black and red ware, black ware, black burnished ware, red slipped ware, red ware, russet coated white painted ware and imitation Amphorae etc. belonging to the megalithic and early historical periods.

Puduru site have been reported the Roman amphorae jars already besides other antiquities. Not far away a megalithic cist burial is recently noticed consisting of the usual pottery types. The density of settlements and the presence of foreign goods at some of the sites in the area suggest that some of the locations were trading centres of the early historic times.

It may suggest that Pudur, Kondurupalem and Ozili sites played an important role as urban centres in the lower Swarnamukhi river basin. The character of these town and the political and mercantile set up cannot be ascertained for lack of evidence. But as the findings of amphorae at Puduru besides the typical Russet coated ware and Black and red wares suggest brisk trade not only in the northern coastal areas and western upland areas of Cuddapah and Kanchipuram region but also with the Mediterranean and South East Asian Countries.

Besides pottery, coins of lead having a standing bull inside a dotted circle on the obverse and blank on the reverse, assignable to the last quarter of the second century A.D., beads of semi-precious stones, glass bangles, iron implements and bone points were also recovered.^{xx}

The archaeological sites and monuments in the lower Swarnamukhi river valley shows great variety and uniqueness which calls for although study. Day by day the number of these monuments is dwindling and it is high time that the institutions engaged in archaeological work take up excavations and systematic study of these monuments before they completely disappear from the scene.

**References:**

- ⁱ Deo, S.B. "Historical Archaeology: Review and perspectives." in *Archaeological Perspectives in India since Independence*, ed. K.N. Dikshit. (Delhi: Books & Books, 1985), pp. 25-39.
- ⁱⁱ Venu Puvvadi. "Buddhism and Its Influence on Early Andhra and Orissa" in *Reconstruction of Indian History: society and Religion*, eds. Sadananda Nayak & Sankarsan Malik. (Ghaziabad (U.P.): N.B. Publications, 2020), p. 158.
- ⁱⁱⁱ Rao, K.P. "Archaeological Investigations in Swarnamukhi and Kalangi River Valleys" in *Sankaram: Recent Researches on Indian Culture (Professor Srinivasa Sankaranarayanan Festschrift)*, eds. S.S.Ramachandra Murthy, B.Rajendra Prasad & D.Kiran Krant Choudary. (New Delhi: Harman Publishing House, 2000), p. 12.
- ^{iv} *Indian Archaeology: A Review*, Archaeological survey of India, New Delhi, 1980-81, p.8.
- ^v Rao, K.P., *Op.cit.* 2000, p. 8.
- ^{vi} *Ibid*, p. 10.
- ^{vii} *Ibid*, p. 13.
- ^{viii} *Ibid*, p. 9.
- ^{ix} Sarma, I.K., "Archaeological Sources of Nellore District." *JAHRS*, Vol. - XXXVIII, Part –I. 1983-84, p. 52.
- ^x Venu Puvvadi. "Puduru: A Disturbed Megalithic Site from Lower Swarnamukhi River Valley." *Proceedings of the Indian History Congress*, Session - LXXVIII, Kolkata, 2017, pp. 983- 987.
- ^{xi} *Indian Archaeology: A Review*, ASI, New Delhi, 1973-74, p. 6
- ^{xii} Venu Puvvadi. *Op.cit.* 2017, pp. 983- 987.
- ^{xiii} *Indian Archaeology: A Review*, ASI, New Delhi, 1994-95, p. 2.
- ^{xiv} *Indian Archaeology: A Review*, ASI, New Delhi, 1995-96, p. 2
- ^{xv} Venu Puvvadi. *Op.cit.* 2017, pp. 983- 987.
- ^{xvi} *Indian Archaeology: A Review*, *Op.cit.* 1973-74, p. 6.
- ^{xvii} *Indian Archaeology: A Review*, *Op.cit.* 1994-95, p. 2.
- ^{xviii} *Ancient India*, Number -2, 1946, p.77.
- ^{xix} Venu Puvvadi. *Op.cit.* 2017, pp. 983- 987.
- ^{xx} *Indian Archaeology: A Review*, ASI, New Delhi, 1995-96, p. 4.



मानस रोग निर्णयःज्योतिषे

राजकमल् के
शोधच्छात्रः
राष्ट्रीयसंस्कृतविद्यापीठम्
तिरुपतिः

ABSTRACT

पूर्वजन्मार्जितपापं व्याधिरूपेण इहजन्मनि अनुभूयते। लोके रुग्णानां रोगपीडायाः हेतुः बहुधा कल्प्यते। भूतावेशवशाद्वा ग्रहन्चारजन्यदोषवशाद्वा त्रिदोषकोपवशाद्वा रोगपीडा सञ्चायते। वस्तुतस्तु पूर्वजन्मनि कृतपापसञ्चितफलान्येव रोगपीडायाः मुख्यहेतुः। ग्रहाणाम् अनिष्टस्थानसञ्चारकाले दुष्टग्रहाणां बाधा जायते। तन्निमित्तं वातपितकफादीनां कोपवशात् त्रिदोषजन्यव्याधयः सञ्चायते।

पष्ठाष्ठम द्वादशस्थानस्थ शुभग्रहाः अपि दुष्टस्थाः। तेषु लग्नाधिपस्य शत्रुग्रहाः अत्यन्तं रोगप्रदाः। दुष्टिक्षस्थानस्थितैः ग्रहैर्वा लग्नाधिपः येन ग्रहेण दृष्टो वा युतो वा, तेन ग्रहेण वा लग्नं येन ग्रहेण दृष्टो वा युतो वा तेन ग्रहेण वा रोगाः चिन्तनीयाः। प्राधान्येन एते विषयाः विचार्यन्ते -

- उन्मादकारणानि लक्षणानि च
- उन्मादरोगयोगाः

एवं मानस रोग निर्णयः ज्योतिषे कथं चिन्तयेत् इत्येवं विषयः शोधपत्रे निरूप्यते।

उपोद्धारः

वेदाङ्गेषु अन्यतमत्वात् ज्योतिशास्त्रं वेदस्य अथवा वेदपुरुषस्य नेत्रत्वेन विद्यते। यथा तावत् मयूराणां शिखा शिरसि शोभां त्रददाति, नागानां शिरसि रत्नं यथा शोभते तथा ज्योतिशास्त्रं वेदाङ्गेषु चक्षुर्भूत्वा मूर्द्धनि देशीप्यते।

वेदा हि यज्ञार्थमभिप्रवृत्ताः

कलानुपूर्वं विहिताश्च यज्ञाः।

तस्मादिदं कालविधानशस्त्रं

योज्योतिषं वेद सवेदयज्ञान्॥¹

वेदबोधित सर्वानुष्टानार्थं शुभाशुभकालनिर्णयः शास्त्रेण अनेनैव क्रियते। प्रत्येकं वेदानामपि तत्रद्रीत्या ज्योतिष चिन्तनानां दर्शनात् प्रत्येकं वेदेषु ज्योतिष भेदः कृतः। तथाहि -

ऋग्वेदम् - ऋग्वेद ज्योतिषम्

यजुर्वेदम् - यजुष ज्योतिषम्

अथर्ववेदम् - अथर्वण ज्योतिषम्

प्रमाणाभावात् सामवेदस्य ज्योतिषम् इति नाड्गीकृतम्।

एवं भूतमिदम् शास्त्रं सिद्धान्तसंहिताहोरात्मकं त्रिस्कन्धात्मकं इति प्रसिद्धं।

स्कन्धत्रयात्मकं ज्योतिशशस्त्रमेदत् षड्डगवत्।

¹ सिद्धान्तशिरोमणि: - 1/19



गणितं संहिता होराचेति स्कन्धत्रयं मतम्॥²

सिद्धान्तं संहिता होरा रन्पं स्कन्ध त्रयात्मकम्।

ज्योतिष निर्मलं चक्षुः ज्योतिशशास्त्रमनुत्तमम्॥³

स्कन्ध त्रयेऽपि आहत्य पडिवभागा: वर्तन्ते, ते च जतकं, गोलं, निमित्तं, प्रश्नं, मुहर्त्त, गणितं इति। तत्र जातके मानवजीवनमाधारीकृत्य जनन कालात् मरण पर्यन्तं जापमानाः अनुभवाः फलरूपेण भवन्ति इत्युक्तं। शरीरं तावत् राशिभिः भावैः ग्रहैः च सम्बद्धं भवति इति हेतोः राशिभावग्रहैः शरीरे जायमानानां सुखानां रोगाणां च चिन्तनं कर्तु शक्यते। न केवलं शरीरिक विषयाः व्यक्तिभवन्ति, अपि तु मानसिक विषयाः अपि राशि भावग्रहैः प्रकटी भूताः भवन्ति। शरीरं मनः स्वं परस्पर सापेक्षत्वेन विद्यते इत्यतः उभयत्रापि सुखावस्था रोगावस्था इति अवस्था दुयमपि अनुभूयते। पुराकाले वैद्या: शारीरिक मानसिक रोगान् निर्णेतु परिहर्तु च ज्योतिशशास्त्रं प्रयुज्यते स्म।

पूर्वजन्मार्जितपापं व्याधिरूपेण इहजन्मनि अनुभूयते। लोके रुग्णानां रोगपीडायाः हेतुः बहुधा कल्प्यते। भूतावेशवशाद्वा ग्रहचारजन्यदोषवशाद्वा त्रिदोषकोपवशाद्वा रोगपीडा सञ्चायते। वस्तुतस्तु पूर्वजन्मनि कृतपापसञ्चितफलान्येव रोगपीडायाः मुख्यहेतुः। ग्रहाणाम् अनिष्टस्थानसञ्चारकाले दुष्टग्रहाणां वाधा जायते। तन्निमित्तं वातपित्तकफादीनां कोपवशात् त्रिदोषजन्यव्याधयः सञ्चायते।

रोगः द्विविधा ज्ञेयाः निजागन्तुकभेदतः।

निजाश्वागन्तुकश्चापि प्रत्येकं द्विधा पुनः॥

निजाशरीरचित्तोद्घदृष्टादृष्टनिमित्तजाः।

तथैवागन्तुकश्चैव व्याधयस्युच्चतुर्विधाः॥⁴

निजागन्तुकभेदेन रोगाः द्विविधाः प्रोक्ताः। निजरोगाः शरीराश्रिताः चित्ताश्रिताः इति पुनः द्विविधाः। आगन्तुकः दृष्टादृष्टनिमित्तजौ इति द्वौ। निजरोगे शरीराश्रिताः वातजन्यं, पित्तजन्यं, कफजन्यं, वातपित्तजन्यं, वातकफजन्यं, पित्तकफजन्यं, सप्तिपादजन्यम् इति सप्तविधाः। निजरोगे मनसः आश्रिताः कामक्रोधभयलोभमदमात्सर्यशोकादिवेगवशात् उन्मादापस्मारादिमानसिकामयाः जायन्ते।

षष्ठाष्टम द्वादशस्थानस्थ शुभग्रहाः अपि दुष्टस्थाः। तेषु लग्नाधिपस्य शत्रुग्रहाः अत्यन्तं रोगप्रदाः। दुष्टिकस्थानस्थितैः ग्रहर्वा लग्नाधिपः येन ग्रहेण दृष्टो वा युतो वा, तेन ग्रहेण वा लग्नं येन ग्रहेण दृष्टो वा युतो वा तेन ग्रहेण वा रोगाः चिन्तनीयाः। अष्टमपञ्चमभावस्थितेन योगेक्षणाधिपेन मानस रोगाः ज्ञेयाः।

मानवस्य प्रवृत्तौ विद्यमान-असाधारणचेष्ट्याः साहायेन व्यवहारेण अवगम्यमानः मानसिक असाधारणत्वं मानसिक रोगः इति लक्ष्यते। ताः असाधारण चेष्टाः व्यक्तेः संस्कारस्य प्रभावेण जायमानाः न इति वयं जानीमः। अतः एव मानसिकरोगिणः प्रवृत्तयः कथं, प्रत्येकस्मिन् सन्दर्भेऽपि अनुभवः कथं जायते, प्रत्येकस्मिन् कार्यं तस्य व्यवहारः कथमित्यादीनां समेषां विचिन्तनं कृत्वा मानसिकरोगाणामवगमनं क्रियते।

² प्रश्नमार्गः - 1/5

³ नारदसंहिता - 1/4

⁴ प्रश्नमार्गः - 12/30



मानसिकरोगाणां मस्तिष्केन वा नाडीव्यूहेन वा संबन्धः स्यात्। एतादृशरोगाणां अवगमनोपायाः तथा चिकित्साविधयः च कालाकालेषु भिद्यन्ते। अधूनाऽपि मानसिक रोगाणां विभागीकरणे लोके समाननिर्वचनानि न सन्ति। लोकारोगसंस्थायाः मते लोके विद्यमानजनेषु व्यंशाधिकाः जनाः जीवनकाले एकवारं वा मानसिकरोगलक्षणानि दर्शयन्ति। अष्टमपञ्चमभावमिथ्योगेक्षणादिभिः मानसरोगाः ज्ञेयाः।

उन्मादकारणानि लक्षणानि च

हर्षेच्छाभयशोकादेः विरुद्धाशुचिभोजनात्।

गुरुदेवादिकोपात् च पञ्चोन्मादः भवन्त्यथ॥५

अतिहर्षः अमितेच्छा अतिभयम् अतिशोकः विरुद्धान्नवशात् अशुचिभोजनवशात् गुरुदेवतानां कोपशापवशात् च उन्मादरोगाः सञ्चायते। उन्मादरोगाः पञ्चविधाः प्रोक्ताः। तानि -

- 1) वातोन्मादः
- 2) पित्तोन्मादः
- 3) कफोन्मादः
- 4) वातपित्तकफोन्मादः
- 5) आगन्तुकोन्मादः इति।

1. वातोन्मादलक्षणानि

कारणैर्विना हसनं, करतालनं, गानालापनं, नर्तनम्, आक्रान्तनम्, अस्थानाङ्गविक्षेपः, ताम्रमृदुक्षतत्त्वः, जीर्णानन्तरं रोगाधिक्यम्, अमितवाक् इमानि वातोन्मादरोगलक्षणानि।

2. पित्तोन्मादलक्षणानि

सर्वकर्मसु अमितोत्साहः, अभिद्रवणतर्जनं, शीतान्नेषु इच्छा, रोषः, पित्तोष्णदेहता एते पित्तोन्मादलक्षणानि।

3. कफोन्मादलक्षणानि

विविक्तता, नारीप्रीत्वं, सदा निद्रा, अरुचिः, लालच्छ्रद्धिः, भुक्तौ बलम्, नखादिषु शुक्लता च कफोन्मादलक्षणानि।

4. वातपित्तकफोन्मादलक्षणानि

वातपित्तकफलक्षणयुक्तः उन्मादः वातपित्तकफोन्मादलक्षणम्।

5. आगन्तुकोन्मादलक्षणानि

देवग्रह-असुरग्रह-वाधया आगन्तुकोन्मादः जायते। देवग्रहवाधितोन्मादरोगी अतीव बलवान् ज्ञानी पराक्रमी च भवति। असुरग्रहवाधितोन्मादरोगी विपरीतं फलं प्रदर्शयति।

मानसरोगयोगाः (उन्मादरोगयोगाः)

मानसरोगयोगमधिकृत्य वृहज्ञातके वराहमिहिराचार्येण अनिष्टयोगाध्याये एवं कथितमस्ति यथा

संस्पृष्टः पवनेन मन्दकयुते द्यूने विलग्ने गुराँ।

सोन्मादोऽवनिसूनास्तभवने जीवे विलग्नाश्रिते॥

तद्वद्सूर्यसुतोदये अवनिसूते धर्मात्मजद्यूनगे।

जातो वा सहस्ररशितनये क्षीणे व्यये शीतगौ॥६

⁵ प्रश्नमार्गः 12/34



सप्तमे शनिः लग्ने गुरुः च यस्मिन् काले भवति तदा जन्म प्राप्तः वातरोगी स्यात्। सप्तमे शनिः लग्ने गुरुः, लग्ने शनिः पञ्चमे सप्तमे नवमे कुजः, क्षीणचन्द्रः शनिना साकं द्वादशे इत्येतेषु त्रिषु योगेषु जनिं प्राप्तः उन्मत्तः भवति।

शनिकुजवासरेषु जायमानस्य लग्ने त्रिकोणे वा सूर्यचन्द्रौ भवतः तथा आपोक्तिमे गुरुः वर्तते चेत् तस्य उन्मादः भवितुमर्हति।

बुधचन्द्रौ केन्द्रगतौ नान्यग्रहसंयुतौ न पतिवृष्टौ

योगोऽयं पैशाचस्त्रोत्पन्नः स उन्मादिः॥

जन्मकाले बुधचन्द्रौ केन्द्रे स्थितौ अन्ये ग्रहाः ग्रहयोगं विना तिष्ठेत्। तथा च राशिनाथस्य दृष्टिरपि न लभ्यते चेत् निश्चयेन उन्मादरोगी भविष्यति। एवं च प्रश्नमार्गे अष्टौ योगाः प्रतिपादितमस्ति यत्

लग्नस्थे धीषणे दिवाकरसुतौ भौमोऽथवा द्यूनगे

मन्त्रे लग्नगते मदात्मजतपः संस्थो महीनन्दनः।

मूर्तौ मूढशशीन्दुजौ कृशशशी मन्दश्च रिःफस्थितौ

पापोपेतकृशामृतांशुरुदयाय स्वान्तर्धर्मोपकः॥

अस्ते पापयुतौ मान्दि वित्विषष्टाष्टमान्त्यगः।

उन्माददायिनो योगः एवमष्टौ समीरितः॥¹⁷

उपर्युक्तयोगाः क्रमेण प्रदर्श्यन्ते।

- 1) यदा गुरुः लग्ने सप्तमे कुजः।
- 2) यदा गुरुः लग्ने सप्तमे शनिः।
- 3) लग्ने शनिः पञ्चमे सप्तमे नवमे वा कुजः।
- 4) लग्ने मौल्यस्थितौ चन्द्रबुधौ।
- 5) द्वादशे दुर्बलचन्द्रबुधौ।
- 6) पापयुक्तः दुर्बलचन्द्रः लग्ने एकादशे द्वितीये द्वादशे नवमे वा तिष्ठति।
- 7) सप्तमे पापसहितगुलिकः।
- 8) दुर्बलबुधः तृतीयाष्टमद्वादशेषु तिष्ठति।

एते अष्टयोगाः उन्मादयोगाः। एते योगाः प्रश्नचिन्तनावसरे जातके वा दृश्यन्ते चेत् तस्य जातकस्य उन्मादयोगः वर्तते, योगकाले सः योगः स्वस्य प्रभावं प्रदर्शयेत् इति वक्तव्यम्।

ज्योतिशशास्त्रग्रन्थेषु प्रश्नचिन्तनावसरे जातके च नैके उन्मादयोगाः प्रायश्चित्तानि च दरीदृश्यन्ते। अत्र ज्योतिशशास्त्रोक्त-उन्मादरोगाः स्थूलतया प्रस्तुताः। इतोऽपि केचन विषयेषु चर्चा अपेक्ष्यते। किन्तु बहुविस्तृतभ्यादत्रोपसंहृयते। इति शम्।

⁶ दृश्यजातकम्- 23/13

⁷ प्रश्नमार्गः - 12/31, 32



सहायकग्रन्थसूची

प्रश्नमार्ग: – पुनर्शेरी नीलकण्ठ शर्मा, कृष्णालयं पब्लिकेशन्स्

दैवज्ञवल्लभा – वराहमिहिरप्रणीता – चौखम्बा सुरभारती प्रकाशन्, वाराणसी

देवप्रश्नमुक्तावलि – ओणक्कूर् शड्करगणकन्, कृष्णालयं पब्लिकेशन्स्

बृहज्जातकम् - वराहमिहिरः (1994) मोत्तिलाल बनारसीदास् नवदेहली



LIQUIDITY AND PROFITABILITY TANGLE: AN EMPIRICAL STUDY OF SELECT INDIAN PAINT COMPANIES

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ABSTRACT

This empirical study attempts to investigate the profitability and liquidity tangle in the Indian Paint industry. Secondary data have been collected for the period of 10 years from 2009-2010 to 2018-2019 from money control. For the purpose of this study we have selected top 3 out of 5 Paint companies listed in the Bombay Stock Exchange (BSE) based on their market capitalization as on April 2, 2020. Panel Regression Analysis have been used for the purpose of measuring the trade-off between profitability and liquidity. Return on Assets (ROA) has been considered as the proxy for profitability measure and used as dependent variable .However, Current Ratio (CR), Inventory Turnover Ratio (ITOR), Working Capital Turnover Ratio (WCTOR) and Current Assets Turnover Ratio (CATOR) have been used as the proxy for liquidity measures and considered as independent variables. Log of Total Assets (LOGOFTA) has been used as a proxy for Firm Size and considered as control variable. The result of Hausman test confirms Random Effects Model (REM) to be the best fitted model. Data so collected have been analyzed using Excel and Stata 14 Software.

Keywords: Random Effects Model (REM), Tangle, Trade-off, Panel Regression Analysis, Hausman test.

I. INTRODUCTION

Working capital management essentially involves a liquidity- profitability tangle. In order to maintain its ability to meet current obligation and to remain competitive in the long run, a firm must have a sound base of working capital. This is because a firm's failure to meet the financial obligations may involve risk to the firm. On the other hand from the profitability perspective which is interpreted as ROA, a firm's objective is to churn out the maximum profit out of its invested capital pool. So, the liquidity-profitability tangle is that if a firm invests more in Current assets and Working capital so as to ensure sound liquidity ,this may endanger profitability .Again, if the firm decides to invest less in Current assets and Working capital, may enhance profitability but at the same time it may fail to meet its current obligation. Therefore there is a need to understand the relationship between liquidity and profitability of a firm in a given industry so as to be able to make proper decisions as far as working capital management is concerned.

Profitability and management efficiency are positively associated such that poor current profitability may threaten current management efficiency and vice versa. Profitability is



related to the goal of shareholders' wealth maximization, and investment in current assets is made only if an acceptable return is obtained (**Sandhar and Janglani, 2013**).

The concepts of liquidity management and corporate profitability are very important in the development, survival, sustainability, growth and performance of a firm. Yet, profitability does not translate to liquidity in all cases; a firm may be profitable without necessarily being liquid and vice versa, due to the realization and accrual concepts of financial reporting (**Owolabi and Obida, 2012**).

The study therefore aims to examine the liquidity- profitability tangle of top three paint companies listed in the BSE namely: Asian paints, Berger paints and Kansai Nerolac. In order to understand the relationship between liquidity and profitability, the impact of liquidity measures i.e. CR, ITOR, WCTOR, CATOR and LOGOFTA on firm's profitability i.e. ROA are explored.

II. PROFILE OF INDIAN PAINT INDUSTRY

India has been experiencing a major growth in paint sales over the last few years. Increasing levels of income, education and increasing urbanization has helped the paint market to grow considerably. Usage of enamel and emulsion paints over traditional white wash have also led to increasing penetration in the rural market and digitalization are also driving the paint industry. The paints sector is raw material intensive, with over 300 raw materials (50% petro-based derivatives) involved in the manufacturing process. The Indian paint market is expected to grow with over 75000 crores in terms of value for period of FY 2017-18 to FY 2022-23.

Major drivers of the paint market are changing customer needs, growth of automobile and infrastructure sector, entry of various Indian and international brands and easy availability of financing options. Along with growth factors there are challenges too such as seasonal demand and competition from unorganized players. Some other restraints are inventory management at dealer level.

The domestic paint industry is estimated to be a Rs 500 billion industry with the decorative paint category constituting almost 75% of this market while the industrial paint category constitutes the balance 25% of the paint market. The decorative paint market includes multiple categories depending on the nature of the surface like exterior wall paints, interior wall paints, wood finishes, enamels as well as ancillary products like primers, putties, etc. Whereas, the industrial paint category constitutes the balance 25% of the paint market and includes a broad array of segments like automotive coatings, marine coatings, packaging coatings, powder coatings, protective coatings and other general industrial coatings.

In FY19, the paint industry has expanded at the rate of 12% in volume terms and about 15% in value terms. The market for India paints and coatings is expected to expand at a CAGR of 8.56% during the forecast period of 2019 – 2024. Growing demand from the construction industry, coupled with rising infrastructure activities, is driving the demand for the market studied.



III. REVIEW OF LITERATURE

Following are some of the earlier literatures which have been studied both at the Indian level as well as International level.

Sandhar and Janglani (2013) attempted to study the association between liquidity and profitability for a period of five years from 2011-12 to 2015-16 for five selected pharmaceutical companies. The objective of the study was mainly to know whether companies earn profit while maintaining the necessary liquidity or are they ready to sacrifice liquidity for the sake of earning higher profit. Motaal's ultimate rank test technique and Spearman's Rank Coefficient of Correlation have been applied to analyze the data. The results showed negative correlation between profitability and Liquidity.

Kong, Musah and Antwi (2019) in their research paper explored the trade-off between liquidity and the profitability of non-financial firms listed on the Ghana Stock Exchange (GSE) using Panel Data Analysis. In the study, liquidity was surrogated by the Cash Flow Ratio (CFR) and the Cash Ratio (CaR), whilst profitability was proxied by Return on Capital Employed (ROCE). The result outcome highlighted that CFR had significant and positive on ROCE whereas CaR had insignificantly negative effect on ROCE.

Mwizarubi, Singh and Prusty (2015) examined the relationship between banks' profitability and liquidity by using three different models. For the purpose of this study five banks from Tanzania were taken into consideration for the time period from year 2006 to 2013. By using Hausman test and thereafter fixed effects approach, all the models revealed that there is no statistically significant relationship between banks' profitability and liquidity.

Samuel and Abdulateef (2016) have examined the relationship between liquidity management and profitability of 10 listed food and beverages companies in Nigeria over a 10-year period from 2004 to 2013. The study concludes that management of listed food and beverages companies in Nigeria can maximize the return to shareholders by shortening the cash conversion cycle of the companies to a justifiable minimum.

Safdar, Awan, et.al (2016) aimed to examine the liquidity-profitability trade off in Sugar Industry of Pakistan. Data have been collected for 5 years. Results of correlation analysis discovered that liquidity of sugar mills is positively and significantly correlated with all measures of profitability, i.e., ROA, ROE and ROCE. The study further concluded that managers can increase the firm's profitability and shareholder's value if they invest effectively and efficiently in liquid assets.

Jana (2018) attempts to examine the relationship and efficiency of working capital management strategies of FMCG companies in India. Secondary data has been collected from 15 FMCG companies for 5 years from 2013-2017. The study is being conducted using 3 dependent variables and 13 independent variables. Panel data analysis concluded that efficient management of working capital for FMCG Company not only has a positive relationship with profitability but significantly impacts on such firm's profitability.



Shah (2016) in his study has tried to investigate the influence of working capital management on firms' profitability under different business cycles in 65 non-financial firms listed on Karachi stock exchange of Pakistan by using the annual panel data for 10 years from the period of 2004 to 2013. The variables used includes ROA, current ratio, accounts receivable in days, accounts payable in days, inventories in days, sales and business cycles and cash conversion cycle. The result of regression analysis indicates that significant negative relationship exists between cash conversion cycle and its components with firms' profitability. Moreover, the business cycle affects the working capital management and firms' profitability relationship

Rizwan (2016) studied the influence of liquidity management on the profitability of listed firms in Pakistan. Data from 64 non-financial firms listed on the Karachi Stock Exchange (KSE) 100 Index for the period 2006 to 2011 was used for the study. From the study's multivariate regression analysis, liquidity measured by the current ratio and the cash conversion cycle had a significantly positive effect on the firms' profitability as measured by ROA, but liquidity proxied by the quick ratio and the cash ratio had insignificant influence on the firms' ROA.

IV. OBJECTIVES OF THE STUDY

The objective of the study is to investigate the relationship between liquidity and profitability of the Paint Industry in India.

V. RESEARCH HYPOTHESIS

Based on the above stated objective, the research hypothesis are formulated:

H₀₁: There is no significant relationship between Return on Assets (ROA) and Current Ratio (CR).

H₀₂: There is no significant relationship between Return on Assets (ROA) and Inventory Turnover Ratio (ITOR)

H₀₃: There is no significant relationship between Return on Assets (ROA) and Working Capital Turnover Ratio (WCTOR)

H₀₄: There is no significant relationship between Return on Assets (ROA) and Current Assets Turnover Ratio (CATOR)

H₀₅: There is no significant relationship between Return on Assets (ROA) and Log of Total Assets (LOGFTA)

V. RESEARCH METHODOLOGY

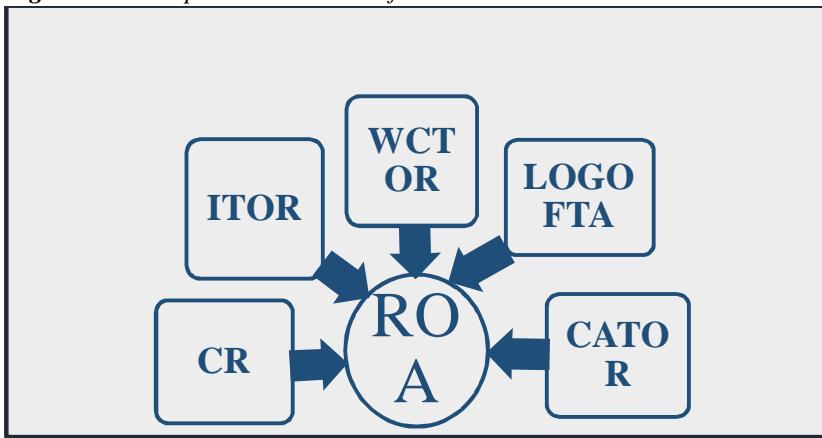
Sample selection: For this empirical study paint industry have been selected since, much research have not been undertaken for analyzing the relationship between profitability and liquidity in this sector of the economy. As on 2nd April, 2020, there were 5 paint companies listed in the Bombay Stock Exchange (BSE). Out of this, I have selected 3 top companies based on their market capitalization as on that date.

Study period: The present study has been conducted for a period of 10 years from 2009-10 to 2018-19 for the three sample companies. This gives a dataset of 30 firm year observations in the study.

Variable selection: Return on Assets (ROA) has been considered as the proxy for profitability measure and used as dependent variable. Whereas, Current Ratio (CR), Inventory Turnover Ratio (ITOR), Working Capital Turnover Ratio (WCTOR) and

Current Assets Turnover Ratio (CATOR) have been used as the proxy for liquidity measures and considered as independent variables Log of Total Assets (LOGFTA) has been used as a proxy for Firm Size and used as control variable.

Figure: 1 Conceptual Framework of the Model



Source: Author's Compilation

Model Selection and Specification: In case of short panel data (i.e. the cross-sectional units are greater than the number of time points), Random Effects Model (REM) is appropriate than the Fixed Effect Model (FEM), which suits long panel where number of time period exceeds the number of cross sectional units.(Joshi,L, K. 2017). In this study, cross-section units (I) = 3 and time period (T) = 10, so, we have obtained a long panel data of 50 firm-year observations. In order to arrive at the best suited model, Econometrical Fixed and Random Effects Model have been conducted. By applying the Hausman Test, the P- value being insignificant, we rejected the alternative hypothesis. That is we selected the Random Effects Model to be the appropriate model for our study which assumes that individual error components are not correlated with each other.

Considering the variables of the study, that is ROA as dependent variable and CR, ITOR, WCTOR, CATOR and LOGFTA as independent variables, the following Random Effects Econometric Model have been formulated.

$$\text{ROA}_{it} = B1 + B2 * \text{CR}_{it} + B3 * \text{ITOR}_{it} + B4 * \text{WCTOR}_{it} + B5 * \text{CATOR}_{it} + B6 * \text{LOGFTA}_{it} + w_{it}$$

Where,

$$w_{it} = (u_i + \varepsilon_{it}),$$

u_i =cross section random error component and ε_{it} = combined time series and cross section random error component.

$i= 1, 2, 3.$

$t= 2, 3...10$



VI. FINDINGS, ANALYSIS AND DISCUSSION

Table: 1 Descriptive Statistics

	ROA	CR	ITOR	WCTOR	LOGOFTA	CATOR
Mean	14.96	1.78	5.89	5.21	3.55	2.55
Standard Error	0.77	0.10	0.14	1.80	0.05	0.08
Median	14.01	1.64	5.84	6.50	3.55	2.55
Mode	#N/A	1.46	#N/A	#N/A	#N/A	#N/A
Standard Deviation	4.20	0.54	0.76	9.86	0.28	0.43
Sample Variance	17.60	0.29	0.58	97.24	0.08	0.19
Kurtosis	1.53	2.18	0.22	24.02	-0.22	3.81
Skewness	1.25	1.47	0.58	-4.62	0.18	0.84
Range	18.09	2.47	3.13	60.69	1.13	2.31
Minimum	9.16	0.92	4.72	-44.44	2.99	1.69
Maximum	27.25	3.39	7.85	16.26	4.12	4.00
Sum	448.77	53.39	176.63	156.26	106.63	76.40
Count	30	30	30	30	30	30

Source: Authors Computation using Excel

The Descriptive Statistics as represented in **Table 1** highlights the following results.

The highest value of mean (14.96) is of the ROA which is the profitability measure. Highest value of standard deviation (9.86) is of the WCTOR representing wide variation from its mean value however lowest standard deviation value (028) of LOGOFTA considered as the firm size shows no wide variation from its mean value. Skewness value of WCTOR is negative which implies a long left tail. However, kurtosis value of WCTOR and CATOR both being greater than 3 shows that they are leptokurtic in nature.

Table: 2 Correlation Matrix

	ROA	CR	ITOR	WCTOR	LOGOFTA	CATOR
ROA	1					
CR	-0.1761	1				
ITOR	0.61252	-0.2175	1			
WCTOR	-0.362	0.05683	-0.1667	1		
LOGOFTA	0.42701	0.04341	0.33933	0.0472	1	
CATOR	0.20076	-0.7675	0.42562	-0.4144	-0.0715	1

Source: Authors Computation using Excel

The above Correlation Matrix) shows the degree and type of association between the dependent variable and the independent variables and also among the independent variables themselves. **Table 2** posits that ROA has a strong and positive correlation with ITOR, moderate correlation with the firm size (LOGOFTA). However, there has been a very week and negative correlation between ROA and CR, which means more use of



current assets may actually hinder profitability of the organization but not much as the degree of association is not strong enough. Also the independent variables do not have very strong relationship among themselves (apparently), so, we may say there is no problem of multicollinearity in the dataset. More sophisticated test technique i.e. Variance Inflation Factor has been conducted to confirm such absence of multi collinearity problem in table 3.

Table: 3 Summary of VIF (Variance Inflation Factor)

Variables	Tolerance Statistic (1/VIF)	VIF
CATOR	0.218357	4.58
CR	0.309529	3.23
ITOR	0.641790	1.56
WCTOR	0.653488	1.53
LOGOFTA	0.817923	1.22

Source: Authors Computation using Stata

Table 3 above shows the results of VIF as represented in Appendix 4. All the independent variables are found to be less than 10, even less than 5 (as recommended by some researchers); also the Tolerance statistic which is the reciprocal of VIF are observed to be greater than 0.10 for all the independent variables . So, it may be concluded that there is no problem of multicollinearity in the given dataset.

Table: 4 Summary of Hausman Test

Hausman Test		
Random Vs. Fixed Effects Model		
Chi-Sq. Statistic	Chi-Sq. d.f	Prob.
10.70	5	0.0578

Source: Authors Computation using Stata

Hausman test as shown in **Table 4** is conducted to select the best fitted model out of Fixed Effects and Random Effects Model. The test follows Chi square distribution with the following hypothesis.

H_0 : Random Effects Model is the best

H_1 : Fixed Effects Model is the best

The result outcome of this test witnessed the P value of χ^2 as 0.0578 which is greater than 0.05 as represented in Appendix 2. Hence, the Null hypothesis is accepted, and the Alternative hypothesis is rejected with 95% confidence level. As a result, the Random Effects Model is considered as the best fitted model for the said study.

**Table: 5 Summary of Random Effects Model**

Dependent Variable		ROA
Variable	Coefficient	Prob.
C	8.648284	0.447
CR	-4.231493	0.016**
ITOR	3.441238	0.000*
WCTOR	-0.2213337	0.001*
LOGFTA	3.252823	0.120
CATOR	-6.607026	0.011**
R-squared		0.6222
Chi2 – Statistic		39.52
Probability of chi2 - stats.		0.0000*

Source: Authors Computation using Stata

[* significant at 1% level]

[** significant at 5% level]

Based on the results of Random Effects Model as represented in Appendix 1, the above **Table 5** highlights the results of individual co-efficient with their respective probabilities. ITOR showed a positive statistical significance at 1% level, WCTOR showed a negative statistical significance at 1% level and both CR and CATOR showed a negative statistical significance with 95% confidence interval i.e. at 5% significance level.

The co-efficient of ITOR is 3.441238, which implies an increase in the ITOR by 1% will lead to a rise in ROA by 3.441238% and it is highly statistically significant at 1% level. The co-efficient of WCTOR is -0.2213337 that is an increase in WCTOR by 1% would result in -0.2213337% decrease in ROA and it is statistically significant at 1% level. The co-efficient of CR and CATOR is -4.231493 and -6.607026 respectively which shows that an increase in CR and CATOR by 1% respectively would result in decrease in ROA by -4.231493 and -6.607026 respectively and both the results are statistically significant at 5% level.

For, the best fitted Random Effects Model, the Co-efficient of determination i.e. the R squared value is 0.6222 that is 62.22% of the variation is explained by the independent and the controlled variables but still 37.78% of the variation remains unexplained.

The Chi2 statistic and the probability of Chi2 statistic shows whether the overall predictability of the model is statistically significant or not. Here the probability is highly statistically significant. Because the P value of Chi2 statistic (0.000) is less than 0.01, this means the model is significant even at less than 1% level. This means we can reject the null hypothesis of no linear relationship and accept the alternative hypothesis of linear relationship between profitability and liquidity.

**Table: 6** Summary of D-W Stat Test

Durbin-Watson Test	
Durbin-Watson d-statistic (6,30)	1.610057

Source: Authors Computation using Stata

Durbin-Watson Stat (D-W Stat) can vary from 0 to 4. Value close to 2 meaning there is no autocorrelation in the residuals. From the above table1, the observed D-W Stat is 1.610057 which is close to 2 (**Table 6**). So it can be stated that adjacent residual/ error term (for first order only) are not correlated. So, the assumption of independent errors (no autocorrelation) is met in this Random Effects Model as shown in Appendix 3.

Table: 7 Summary of Wooldridge Test of Autocorrelation

Wooldridge Test of Autocorrelation		
F Statistic	d.f	Prob.
1.657	(1, 2)	0.3269

Source: Authors Computation using Stata

A more sophisticated test technique Wooldridge test (**Table 7**) is conducted to test the presence of first-order Autocorrelation. The hypothesis is as follows:

H₀: There is no first-order autocorrelation

H₁: There is first-order autocorrelation

From the above result, the P value (0.3269) of F statistic being greater than 0.05 as represented in Appendix 5, we fail to reject the Null hypothesis and therefore conclude that there exists no first-order autocorrelation in our dataset.

VI. CONCLUSION AND RECOMMENDATIONS

Working capital management (WCM) is the functional area of finance that covers all current accounts of the firm. It involves the relationship between a firm's short-term assets and its short-term liabilities. A firm is required to maintain a balance between liquidity and profitability while conducting its day-to-day operations. Liquidity is a prerequisite condition to ensure that a firm is able to meet its short-term obligations and its continued flow can also be guaranteed from a profitable venture (**Panigrahi, Raul and Gijare, 2018**).

For the purpose of the study an appropriate Panel Data Model which is the Random Effects Model has been used. It has been found that as much as 62.22% of variation in ROA can be explained due to the variables considered for liquidity. So, financial decisions should be made strategically to engage more investors and increase the level of investment in the companies.

The study highlighted that among the variables considered as liquidity measures, ITOR showed statistically significant and positive effect on ROA implying better inventory management can enhance the profitability of the organization. On the other hand, CR, WCTOR and CATOR showed a negative statistically significant effect on ROA implying more use of Current assets may endanger profitability.



The Durbin-Watson statistic value came to around 2 which means there is no problem of autocorrelation in the error terms. Further Wooldridge test for autocorrelation also confirms no autocorrelation in the error terms. The test result of Variance Inflation Factor (VIF) confirms no multicollinearity in the model.

Management must take appropriate steps in order strike a balance between liquidity and profitability so as not to compromise liquidity for profitability and vice-versa.

VII. BIBLIOGRAPHY

- [1]. Sandhar, S. K. and Janglani, S. (2013). A Study on Liquidity and Profitability of Selected Indian Cement Companies: A Regression Modelling Approach. *International Journal of Economics, Commerce and Management, UK*. Vol. 1. Issue. 1. Pp. 1-24.
- [2]. Owolabi, S. A. and Obida, S. S. (2012). Liquidity Management and Corporate Profitability: A case study of selected Manufacturing Companies listed on the Nigerian Stock Exchange. *Business Management Dynamics*. Vol. 2. Issue. 2, Pp. 10-25.
- [3]. Joshi, L, K. (2017). "Impact of Working Capital Policies on Profitability and Shareholder's Wealth in Indian Steel Industry: A Panel Data Approach". *The BESC Journal of Commerce and Management*. Vol. 3. Pp. 15 - 29.
- [4]. Panigrahi, k, A, Raul, N and Gijare, C (2018). "Liquidity and Profitability Trade-Off: A Study of Indian Pharmaceutical Companies". *Nmims Journal of Economics and Public Policy*. Vol. 3. Issue. 1. Pp. 42 - 56.
- [5]. Kong, Y, Musah, M and Antwi, K, S (2019). "Liquidity-Profitability Trade-Off: A Panel Study of Listed Non-Financial Firms in Ghana". *International Journal of Trend in Scientific Research and Development (IJTSRD)*. Vol. 3. Issue. 4. Pp.1086-1099.
- [6]. Mwizirubi, M, Singh, H and Prusty, S (2015). "Liquidity-Profitability Trade-off in Commercial Banks: Evidence from Tanzania". *Research Journal of Finance and Accounting*. Vol. 6. Issue. 7. Pp. 93-100.
- [7]. Samuel, T, O and Abdulateef, Y (2016). "Liquidity Management and Profitability of Listed Food and Beverages Companies in Nigeria". *IOSR Journal of Business and Management (IOSR-JBM)*. Vol. 18. Issue. 2. Pp. 167-176.
- [8]. Safdar, Z, M, Awan, Z, A, Ahmed, Z, Qureshi, I, M and Hasnains, T (2016). "What Does Matter? Liquidity or Profitability: A Case of Sugar Industry in Pakistan". *International Journal of Economics and Financial Issues*. Vol. 6. Issue. S3. Pp. 144-152.
- [9]. Jana, Debabrata (2018). "Impact of Working Capital Management on Profitability of the Selected Listed FMCG Companies in India". *International Research Journal of Business Studies*. Vol. II. Issue.1.Pp. 21-30.
- [10]. Shah, N (2016). "Impact of Working Capital Management on Firms Profitability in Different Business Cycles: Evidence from Pakistan" *Journal of Finance & Economics Research*. Vol.1. Issue. 1. Pp. 58-70.
- [11]. Rizwan, I. (2016). Impact of liquidity management on profitability of Pakistani firms: A case of KSE-100 Index. *International Journal of Innovation and Applied Studies*. Vol. 14. Issue. 2. Pp. 304-314.
- [12]. Gujarati, D. N. (2012). *Basic econometrics*. Chennai. Tamil Nadu: McGraw Hill Education (India) Private Limited.

**APPENDIX****1. Result of Random Effects Model**

.xreg roa cr itor wctor logofta cator, re					
Random-effects GLS regression	Number of obs = 30				
Group variable: idno	Number of groups = 3				
R-sq:	Obs per group:				
within = 0.3916	min = 10				
between = 0.9981	avg = 10.0				
overall = 0.6222	max = 10				
	Wald chi2(5) = 39.52				
corr(u_i, X) = 0 (assumed)	Prob > chi2 = 0.0000				
roa	Coef.	Std. Err.	z	P>z	[95% Conf.Interval]
cr	-4.231493	1.750419	-2.42	0.016	-7.662251 -.8007358
itor	3.441238	.8622013	3.99	0.000	1.751354 5.131121
wctor	-.2213337	.0660286	-3.35	0.001	-.3507473 -.0919201
logofta	3.252823	2.093426	1.55	0.120	-.8502173 7.355864
cator	-6.607026	2.593443	-2.55	0.011	-11.69008 -1.52397
_cons	8.648284	11.36124	0.76	0.447	-13.61934 30.91591
sigma_u	0				
sigma_e	2.4629554				
rho	0	(fraction of variance due to u_i)			

2. Result of Hausman Test

.hausman fe re
---- Coefficients ----
(b) (B) (b-B) sqrt(diag(V_b-V_B))
fe re Difference S.E.
cr -3.653186 -4.231493 .5783076 1.187559
itor 2.495343 3.441238 -.9458942
wctor -.2148258 -.2213337 .0065078
logofta -5.032381 3.252823 -8.285204 2.451463
cator -8.337363 -6.607026 -1.730337
b = consistent under Ho and Ha; obtained from xtreg
B =inconsistent under Ha, efficient under Ho; obtained from xtreg



Test: Ho: difference in coefficients not systematic

$$\text{chi2}(5) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 10.70$$

$$\text{Prob}>\text{chi2} = 0.0578$$

(V_b-V_B is not positive definite)

3. Result of Durbin-Watson Test

.estat dwatson

Durbin-Watson d-statistic (6,30)=1.610057

4. Result of Variance Inflation Factor (VIF)

.vif

Variable	VIF	1/VIF
cator	4.58	0.218357
cr	3.23	0.309529
Itor	1.56	0.641790
wctor	1.53	0.653488
logofta	1.22	0.817923
Mean VIF	2.42	

5. Result of Wooldridge Test of Autocorrelation

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Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 2) = 1.657

Prob > F = 0.3269



Effect of Na_2SO_4 salinity stress on germination studies of Sorghum cultivar Phulemavali and Maize cultivar Karveer

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Abstract – In the present study response to Na_2SO_4 salinity stress was observed using various salinity levels (0, 50mM, 100mM, 150mM, 200mM). The germination percentage, seedling growth (root shoot) length, fresh weight, dry weight was observed the proline content and protein was also determined and it was observed that germination percentage of both the varieties was reduced with increasing salinity. The proline content & protein content was increased in both the varieties with increasing Na_2SO_4 salinity.

Key words – Na_2SO_4 salinity, seed germination, Maize, sorghum

Materials and Methods

Jowar(Sorghum bicolor) variety phulemawali and Maize Zea mays Karveer were obtained from Mahatma Phule Krishi Vidyapeeth Rahuri, India. Response to Na_2SO_4 salinity at seed germination stage was studied using various salinity level (0, 50mM, 100mM, 150mM, 200mM Na_2SO_4). 10 healthy seeds for each treatment were surface sterilized (0.1% HgCl_2) for 5 min washed with distilled water and kept on blotting paper moistened with 10 ml distilled water served as control Na_2SO_4 salinity effect on seed germination was noted by using blotting papers moistened with 10 ml of different concentrations (25, 50, 100, 150 and 200mM) Na_2SO_4 salt. Petriplates were kept at 28°C room temperature the number of germinated seeds were counted after 120 hrs A seed was considered to have germinated when both plumule and radicle had emerged which was more than 0.5 cm.

A) Plant Growth Analysis –

The germination percentage, Root length, shoot length Fresh weight and dry weight of seedlings was recorded.

B) Biochemical Analysis –

1) Proline content was determined following the method of Bates et al (1973) and protein content was estimated using method of Lowrey et al (1995)

Results and Discussion

It has been observed from Fig 1 that germination of Jowar and Maize seeds was significantly influenced by increasing Na_2SO_4 salinity seed germination was



found to be decreased however germination percentage in both the varieties in control was seen to be 100 % Root length decreased considerably in both varieties as salinity increased. Shoot length also decreased with increasing salinity. Similar observations have been done by Naik and Karadge(2017) in Portulaca oleracea under Na_2SO_4 salinity. Several reports have been recorded that salinity affects seed germination of various plants. Egan et al (1997) have reported that there was inhibition of seed germination and they are of the opinion that inhibition of seed germination and early growth in *Atriplex prostrata* was due to osmotic effect and not specific ion toxicity of chloride or sulfate salts. Sosa L et al (2005)have reported that Na_2SO_4 salinity causes growth inhibition and toxicity in *Prosopis strombulifera* Grattan & Grieve C.M. 1998 have reported that many plants have a greater sulfate tolerance than chloride tolerance. Demir and Mavi 2008 have observed that there was greater tolerance of the pepper seeds to stress conditions and they are of the opinion that large amount of reserved materials is the cause of the tolerance and other reason is the structure of seed coat which protect the embryos until there is a specific concentration of the stress factor. Stoleru vasile et al 2019 have observed the effect of salinity and alkalinity stress on three Quinoa cultivars. and are of the opinion that during germination was differently affected with the salt type. Three cultivars Titicaca Vikinga and puno were studied and among them Titicaca was more sensitive and showed lowest germination rate and it was observed that . Seed germination was affected only at 300mM Na_2SO_4 . Peterson and Murphy 2015 have shown that there was a tolerance in four Chilean lowland quince cultivars. Naik and Karadge 2017 have observed that there is differential response of seed germination under Na_2SO_4 salinity. According to them light favours seed germination Houle et al 2000 have reported that seed germination, seedling emergence and early endurance are sensitive to salinity in endemic annual plant *Aster laurentianus* and pessarakli 2010 have explained that high salinity decreases substrate water potential and that leads to restriction of water and nutrient uptake. According to Azooz & Ahmad 2015 high salinity causes ionic imbalance and toxicity in plants. It is clear from Fig 2 & 3 that fresh weight of Jowar and Maize at seeding stage was found to decrease with increasing salt concentration & it was more in Jowar as compared to Maize which clearly indicates that Jowar is more sensitive to salinity Dry weight was seen to be decreased in both the cultivars. Fig 4 reveals that Assareh et al 2010 have observed that in *Halostachys caspica*. The germination percentage is more sensitive to Na_2SO_4 than NaCl and growth characters such as radicle plumule is more sensitive to Na_2SO_4 than NaCl . Their Results indicated that radicle plumule and plant length are more sensitive than germination percentage speed & index with rise in Na_2SO_4 salt. Reddy and Vora 1983 have shown that germination of Bara was delayed and radicle and plumule



decreased significantly with Na_2SO_4 salinity. Perez and Tambelini 1995 have observed toxic effects of Na_2SO_4 in *P.Strombulifera* leading to growth inhibition.

Laura Sosa et al (2005) have reported that germination of *Prosopis strombulifera* seeds is influenced by nature of ions in the salt solution and by the salt concentrations. Bouzid & Youcef(2006) have observed that Na_2SO_4 salinity has caused decrease in the growth in *Atriplex*. Momayez et al 2009 have observed influence of Na_2SO_4 salt on rice caused decrease in germination index and germination percentage and the tolerant genotypes showed a faster growth rate Walia et al (2005) & in growth similar observation have been carried out by Ahmad et al (2000) slight increase in dry weight was observed at lower salt level but decreased as salinity increased and they are of the opinion that decrease in dry weight is accompanied by increase in water content. Sosa L et al (2005) have observed that *Prosopis strombulifera* has increased synthesis of proline and they are of the opinion that when sulphate anion is present in the medium there is decrease in length of roots in water content roots of all the genotypes. In the present investigation Fig 4 & 5 proline and protein content was increased in both the varieties with increase in salinity of Na_2SO_4 Ahmed et al 2000 have reported that accumulation of proline was associated with percentage of water content and they are of the opinion that increase in proline content might not be associated with salinity tolerance but the extent of damage encountered by salt stress and it is confirmation with Hoai et al (2003). High proline content was observed in Sosa L et al (2005) due to Na_2SO_4 by Bouzid & Youcef(2006)

Conclusion

From the observations it is clear that significantly influenced by salt levels. The percentage emergence of both varieties was reduced with increasing Na_2SO_4 salt levels. The increase in salinity decreased the root lengths considerably in both varieties; there was an increase in root length Jowar (phulemawali) with increase in salt concentration, while there was decrease in root length in Maize (karveer) the root/shoot ratio Jowar (phulemawali) was increased in salinity while in Maize (karveer) it was increased till 50 mM and again it was decreased from 100Mm. The result of root length and shoot length and root/shoot ratio make it clear that Jowar (phulemawali) was less affected by salinity stress than Maize (karveer).

Fresh weight of the varieties at seedling levels was significantly influenced by salt levels, varietal difference and the interaction both. The above data showed that in both the varieties fresh weight was decreased by increasing salt concentration but fresh weight was decreased by increasing salt concentration

but fresh weight decrease in Maize(karveer) was lesser than decrease in Jowar (phulemawali) which indicates that the Jowar(phulemawali) is more sensitive to salinity than Maize (karveer).

Dry weight of Jowar and Maize seedling was significantly influenced by salt levels and a varietal difference was observed of both. From above result it is clear that dry weight was decreased in both the cultivars and decreased in dry weight of Maize (karveer) was higher than Jowar (phulemawali), which indicates that Jowar (phulemawali) is less sensitive to salinity than Maize (karveer)

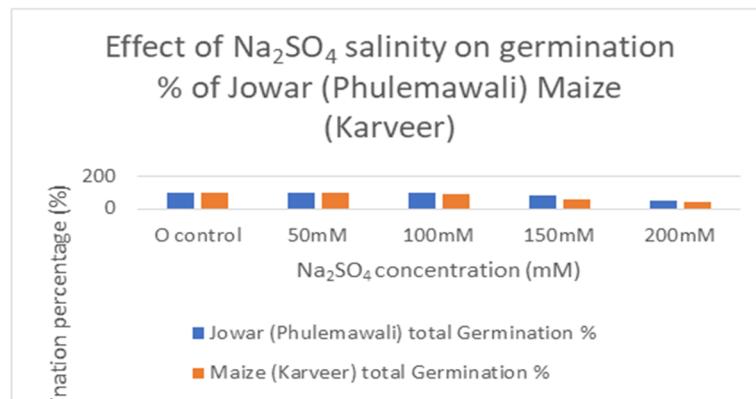


Fig 1

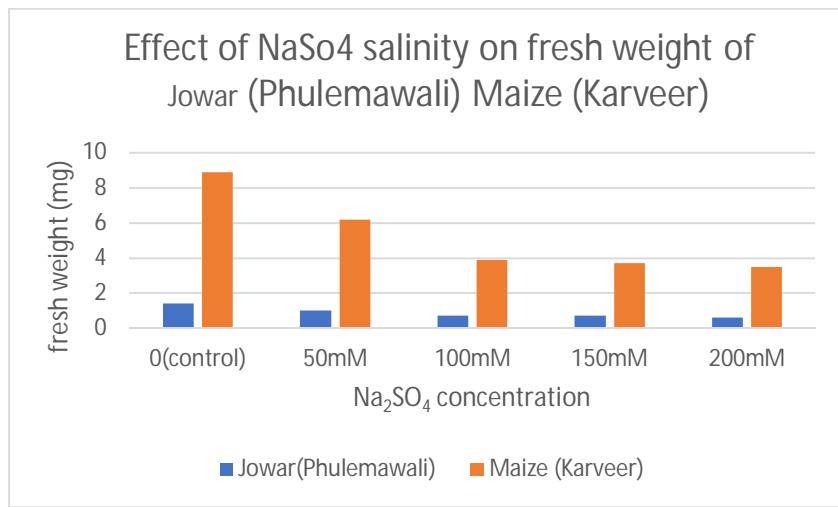


Fig 2

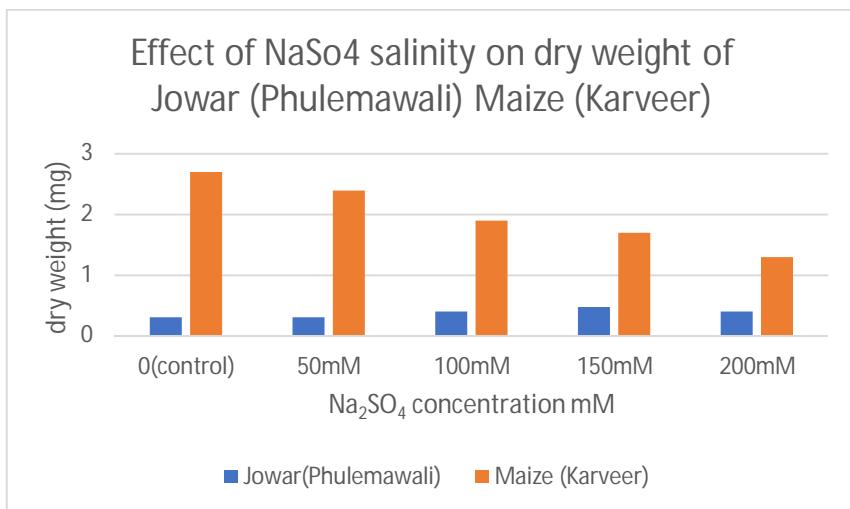


Fig 3

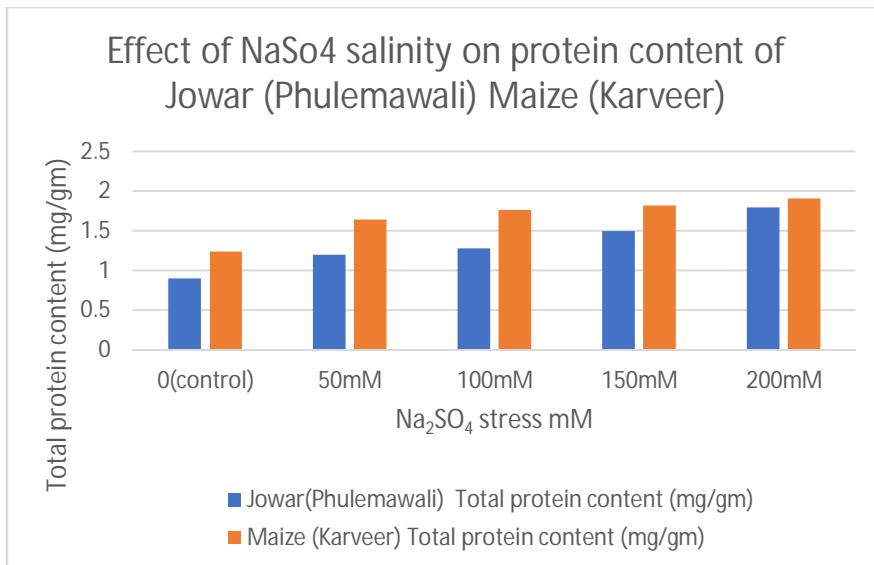


Fig 4

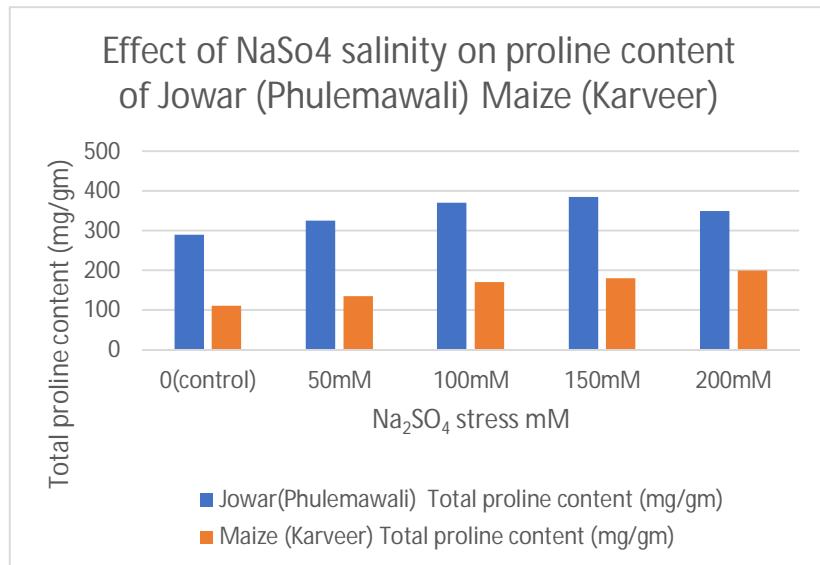


Fig 5

References

- [1] Ahmad, I., Iqbal, N., Iqbal, M., Aslam, Z. and Rasul E. (2000). Germination and seedling growth of rice (*Oryza sativa L.*) under saline conditions. Pakistan Journal of Biological Science, 3(2), 350 – 351.
- [2] Assareh M.H., Rasouli B, Amiri B.(2010). Effects of NaCl and Na₂SO₄ on germination and initial growth phase of *Halostachys caspica*, Desert, 119-125.
- [3] Azooz MM, Ahmad P, editors.(2015). Legumes Under Environmental Stress: yield, Improvement and Adaptations. Chichester, UK: John Wiley & Sons, Ltd.
- [4] Bates, L.S; Waldren, R.P.; Teare, I.D.(1973). Rapid determination of free proline for water-stress studies. Plant Soil, 39,205-2017, doi:10.1007/bf00018060
- [5] Bouzid N, Youcef D.(2006) Effect of Na₂SO₄ on the growth, water relations, proline, total soluble sugars and ion content of *Atriplex halimus* subsp. *Schweinfurthii* through in vitro culture, Anales de Biología, 28: 35-43
- [6] Demir, I.; Mavi, K.M.(2008). Effect of salt and osmotic stresses on the germination of pepper seeds of different maturation stages. Braz. Arch. Biol. Technol., 51,897-902.
- [7] EganTP, Ungar IA, Meekins JF. The effects of NaCl, KCL, Na₂SO₄ and K₂NO₄ on the germination of *Atriplex prostrata* (Chenopodiaceae). Journal of Plant Nutrition 20, 1997 1723-1730.
- [8] Grattan, S.R.; Grieve, C.M. (1998). Salinity-mineral nutrient relations in horticultural crops. Sci. Hortic., 78, 127-157, doi:10.1016/S0304-4238(98)00192-7
- [9] Hoai, N.T.T., Shim, I.S., Kobayashi, K. and Kenji, U. (2003). Accumulation of some nitrogen compounds in response to salt stress and their relationships with salt tolerance in rice (*Oryza sativa L.*) seedlings. Plant Growth Regulation, 41, 159 – 164.



- [10] Houle G, Morel L, Reynolds C, Siegel J. (2001). The effect of salinity on different developmental stages of an endemic annual plant, *Aster laurentianus* (Asteraceae). *Am J Bot*; 88(1):62-7.
- [11] Lowry,O.H., Rosenbrough, N.J., Furr,A.L and Randall,R.J. (1951). Protein measurement with the follin phenol reagent. *J. Biol. Chem.*, 193 : 262-275.
- [12] Momayyezi M.R, Zaharah A.R, Hanafi M.M and Mhd Razi I. (2009). Seed Germination and Proline Accumulation in Rice (*Oryza sativa L.*) as Affected by Salt Concentrations, *Pertanika J. Trop. Agric. Sci.*, 32 (2): 247 - 259
- [13] Naik V, Karadge B. (2017). Effect of NaCl and Na₂SO₄ salinities and light conditions on seed germination of purslane , *Journal of Plant Stress Physiology*, Vol 3, 1-4.
- [14] Perez A, Tambelini C. (1995). Effect of saline and water stress and early aging on the 'Algarroba' seed germination. *Pesquisa Agropecuaria Brasileira* 30, 1289-1295.
- [15] Pessarakli M. (2010). editor. *Handbook of Plant and Crop Stress*. 3rd ed. USA: CRC Press.
- [16] Peterson, A.; Murphy, K. 2015. Tolerance of lowland quinoa cultivars to sodium chloride and sodium sulfate salinity. *Crop Sci.*, 55,331-338.
- [17] Reddy, M.P. and Vora (1983). A.B. Effect of salinity on germination and free proline content of Bara seedlinhgs. *Proceedings of the Indian National Science Academy, B* 49(6): 702-705
- [18] Sosa L, Llanes A, Reinoso H, Reginato M and Luna V (2005). Osmotic and Specific Ion Effects on the Germination of *Prosopis strombulifera*, *Annals of Botany*, 96(2): 261-267.
- [19] Walia, H., Wilson, C., Condamine, P., Liu, X., Ismail, A.M., Zeng, L., Wanamaker, S.I., Mandal, J., Xu, J., Cui, X. and Close, T.J. (2005). Comparative transcriptional profiling of two contrasting rice genotypes under salinity stress during the vegetative growth stage. *Plant Physiology*, 139, 822 – 835.



THE ROLE OF BUSINESS INTELLIGENCE ON ECONOMIC DEVELOPMENT

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Abstract

Each and every business in the economy contributes to get growth in the economy by adopting advanced technology and it has reached to implementation of business intelligence to collect, analyze and to make strategies to achieve competitiveness. Business intelligence works for a common interest across organizations and industries to lessen costs, to improve revenues and to increase profitability. Which makes them altogether contributes to the development of economy. The study has done to study the role of business intelligence on economic development by considering sectors like banking, insurance, retail and telecommunication.

Key words: Banking, Business Intelligence, Economic Development, Insurance, Retailing, Telecommunication

Introduction

Now a days in the new economy customer satisfaction has not only comes down to an online communication about products and services but also a company has to provide better update to a content of products on the web and win clients' trust by identifying needs of customers and to overcome a competitor's company. Customer relationship has changed significantly due to the electronic commerce. Development of technologies has enabled customers to collect information rapidly and easily regarding to the supply of various products and services. With this customers can find out the best product with highest quality suppliers effortlessly. Because they are able to choose and to decide who provides the better offer. Therefore, bargaining power shifts towards the customer to whose performances determine the success of the company. With the help of adoption of new advanced technology, there will be reduction in the cost, which leads to decrease in the price of product and services. With high expectations from customer side, there is a need for a company to interact continuously with them through different paths like web, call center, shopping centre, e-mail, sms and so on. By internet direct contact with the customers will create the database of consumers to monitor their activities by the company.

Literature Review

1. Oswaldo Moscoso-Zea, Jorge Castro, Joel Paredes-Gualtor and Sergio Lujan-Mora (2019) presented a hybrid information infrastructure for business intelligence analytics and knowledge management based on an educational data warehouse and the proposed infrastructure serve to run different experiments to analyze educational data and academic processes and for the creation of explicit knowledge



using different algorithms and methods of educational data mining, learning analytical , online analytical processing and enterprise architectural analysis.

2. Patrick ward, Johann Windt and Thomas Kempton (2019) made an attempt to discuss the opportunity for sport science professionals to contribute beyond their domain specific expertise and apply these principles in a business intelligence function to support decision makers across the organization. The study suggests that the sport scientists grounding in scientific thinking and statistics positions them to assist in the development of robust decision making processes across the organization.
3. Ales Popovic and Tiago Oliveira (2018) developed a conceptual model and it indicates that business intelligence systems usage has a positive and significant correlation with the partial impacts on firm performance and that the partial system impacts on firm performance explain a considerably large share of the impacts on business intelligence system use on the variance in overall firm performance.
4. Sang Young Lee (2018) focused on intelligent technique and methodologies which are recently used for business intelligence in healthcare and the study found that successful healthcare organizations, it is important to empower staff and management for strategic decision making through data warehousing based on critical thinking.
5. Dr. S J Manjunath and Mohammad Nasrollahniya (2014) investigated the importance of business intelligence on organization's competitive advantage and found that the use of business intelligence by the insurance performers will be improved day by day and decision making relatively changed from intuition to use of business intelligence but it is still in the infancy stage.

Research gap: The purpose of the study is to focus on role of business intelligence on selected sectors of the economy together to know about their contributions for economic development.

Significance of the study: This study covers few different sectors of the economy to study the function of business intelligence on economic development.

Scope of the study: As business intelligence is the advanced concept of information technology for achieving the competitiveness of businesses there is a need to study the importance of the same on various sectors of to achieve economic development of Indian economy.

Objective of the study: The main objective of this paper is to study the role of business intelligence on economic development with different sectors of the economy.

Research type: Conceptual paper

Sources of data: For this study the data has been collected from secondary sources.

Business Intelligence



Business intelligence is a concept of using information technology as a tool for achieving the competitiveness of businesses, the perception of risk that occurs in the environment within the firm and the possibility of action. It involves the integration of traditional business functions with information technology communications and capabilities that are provided. The intent of business intelligence is the integrated and coordinated application of business information in order to comprehensively improve products, service, profits and the long-term health and growth of a company.

Business intelligence is the process of collection, treatment, analysis and use of strategic information for a company. Therefore, it is all about information that is important for a company. Effective business intelligence system allows data collection from all departments within the company, their analysis, preparation of the necessary reports and addressing those users who are most needed. This application accelerates the process of making business decisions with respect to the quality of data located in one central place, known as data warehouse. Business intelligence system integrates information and knowledge about customers, suppliers, competition and overall operations. It improves the strategic and operational planning control, business indicators, analysis and optimization of business operations, ensuring the successful targeting customers and tracking competitive activity and predicting future trends.

Business intelligence and economic development

Indian economy has three categorized sectors namely primary sector, secondary sector and tertiary sector which is also called as service sector. The tertiary sector includes service industry and it holds the highest importance among all sectors because it involves the provision of services to business as well as final consumers. It contributes 53.66 percent of the Indian gross domestic product (January 3, 2020). This sector includes banking, insurance, finance, logistics, information technology, telecom, healthcare, infrastructure, retail, food processing, fisheries, tourism and so on. For the study few of them were considered to know the role of business intelligence on economic development of our Indian economy. Because business intelligence can be exploited as a source and a strong support system for any organization to develop ideas for growth in today's competitive market scenario.

Banking sector: Business intelligence in banking connects across disparate systems, removing the need to generate reporting from each one individually. It allows organizations to measuring big data on their customers in quantities never sum before to help increase customer satisfaction. Commonly used banking business intelligence software includes Microsoft Power business intelligence, Tableau, Tibco Spot fire and Domo. Among them Microsoft Power Business Intelligence is the top of the list for the best business intelligence in banking software. Banks utilize business intelligence to determine customer needs and how their employees can respond to such demands. As a result they can offer a better customer experience. It helps to identify and pinpoint the reasons why customers switch to the competition. Business intelligence benefits banks to do a metadata analysis of existing banking data and make sure it's tagged in a useful way. It incorporates automation into banks data capture as much as possible. It helps to



think about what it means for business intelligence in banking if a data stream goes down and have plans in place for possibility. It clearly document data maps. On the other hand, banking system plays an important role in the modern economic world. Banks collect the savings of the individuals and lend them out to business-people and manufacturers. It helps in the creation of new capital in a country and thus helps the growth process than before due to implementation to developed and advanced technology called business intelligence.

Insurance sector: The goal of business intelligence is to present data in new, easy-to-understand ways so that it can be used to support crucial business decisions. It works for a common interest across organizations and industries to lessen costs, to improve revenues and to increase profitability. The changeability of the insurance sector necessitates that understanding data and utilizing it to make informed decisions have become major business goals. Insurance business intelligence systems include business analytics capabilities. Rolling data analytics management and migration functionalities all into one software system promotes better data quality and enables providers to be more efficient. Business intelligence benefits insurance company to fight against the fraud who are unchecked and out of control from insurance companies as they lose revenue due to fraud, they often raise insurance premiums and rates to recoup costs, which results in a negative customer experience. Business intelligence changes build efficiency into claims management. Companies can use their capability to review customers' prior claims and other essential information and to deliver more expedient service, as well as highly personalized customer experience. It helps to identify profitable opportunities like to monitor market trends, to look at products within their own catalog and to determine where spending a little extra time and attention could lead to increased profit. Business intelligence makes companies to better enable their sales team to spread out across the globe and to offer real-time reporting. Insurance generates significant impact on the economy by mobilizing domestic savings. It turns accumulated capital into productive investments. It enables to mitigate loss, financial stability and promotes trade and commerce activities those results into economic growth and development.

Retail sector: Retail sector accounts for over 10 percent of the country's gross domestic product and around 8 percent of the employment. India is the world's fifth largest global destination in the retail space. The retailers are employing business intelligence to comprehend the market in a better way, understand client purchasing power, trigger sales, productivity and minimizing the functional values. Business intelligence software is accelerated competition, to raise profit, customary credit card utilization, attractiveness of loyalty cards and radio frequency identification. Business intelligence benefits retail sector to add value to the business by triggering sales and productivity, to minimize functional value and enhance understanding of client purchasing power. It generates high revenues for the firm in addition with the cutthroat market competition, maximizing space utilization, benefiting from finance, driving sales and utilizing web as a sales network. Client needs and purchasing trends can be utilized by business intelligence to trigger future sales. The growth of retail sector leads to



growth in Indian economy due to increase in per capita income which in turn increases the household consumption, demographical changes, improvement in the standard of living, change in patterns of consumption and availability of low-cost consumer credit. This shows retailing is one of the most important industries in the economy and plays a predominant role in economic development of the country.

Telecommunication sector: The Economic Survey 2018-19 said that the telecom industry's contribution to gross domestic product is estimated to reach 8.2 percent by 2020. Business intelligence makes telecommunication companies to improve overall network performance, optimize service levels, minimize overhead costs and maximize profitability by ensuring consumer loyalty. Usually telecommunication industry faces many challenges regarding competition, regulations, technology shifts and customer demand for new features and services. These companies generate huge amounts of data from mobile phone usage, call detail records, network equipment, billing information, server logs and the growing connectivity of the subscribers and users. Business intelligence solution helps to improve overall network performance, optimize service levels, and minimize profitability by ensuring customer loyalty. Investment in infrastructural development and earned revenue may have strong impact on the gross domestic product in an economy. For the potential role of the telecommunication, a modern world as well as economy without telecommunication cannot be thought for one moment. Therefore, it can be considered that telecommunication is the blood flow of the modern economy which intensifies the productivity level that will in return make contribution toward the various important economic factors.

Conclusion

An economy is the large set of inter-related production and consumption activities that aid in determining how scarce resources are allocated. It's a combination of more of sectors and industries which contribute their own achievement to the economy by spending and implementing well advanced technology day by day like business intelligence, which leads to create more number of employment within the nation and increases standard of living and purchasing power of consumers in turn which leads to create demand for products and services. Banking sector makes systematic arrangement to get a proper flow of currency and encourages businesses. Insurance sector motivates people to make saving out of their earnings, which controls the circulation of money. Retailing sector is one which makes better utilization of advanced technology like business intelligence to make online trading to reach ultimate users. The continuous improvement of the telecommunication and information technology and the effective implementation of this technology enhance and promote the growth as well as the development of the various sector of the economy. Every sector joins their hands to get economic development by contributing to the gross domestic product of the economy.

References

1. Oswaldo Moscoso-ZEA, Jorge Castro, Joel Paredes-Gualtor and Sergio Lujan-Moea (2019), A Hybrid infrastructure of Enterprise Architecture and Business



Intelligence and Analytics for Knowledge Management in Education, IEEE Access, DOI: 10.1109/ACCESS.2019.2906343.

2. Patrick Ward, Johann Windt and Thomas Kempton (2019), Business Intelligence: How Sport Scientists can support International Journal of Sports Physiology and performance.
3. Ales Popovic and Tiago Oliveira (2018), Justifying business intelligence systems adoption in SMEs: Impact of systems use on firm performance, Industrial management and data systems, DOI: 10.1108/IMDS-02-2018-0085.
4. Sang Young Lee (2018), Architecture for business intelligence in the Health care sector, 4th International Conference on Advanced Engineering and Technology (4th ICAET), DOI: 10.1088/1757-899X/317/11012033.
5. Dr. S J Manjunath and Mohammad Nasrollahniya (2014), Business Intelligence for Competitive advantage: A case study of selected insurance companies in India, University of Mysore, Manasagangotri, Mysore.



ROLE OF MSMEs IN THE PRESENT FINANCIAL CRISIS

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Abstract:

The Micro, Small and Medium Enterprises (MSMEs) have been accepted as the engine of economic growth and for promoting equitable development in any country. In the context of Indian economy, MSMEs play a crucial role as they facilitate economic activity, provide employment and contribute to equal distribution. The contribution of MSMEs to other sectors has been immensely instrumental and it is the biggest employer next to agriculture in India. This sector has been facing several problems since demonetization and global economic slowdown. Adding fuel to the fire, the present most unforeseen prolonged lockdown due to COVID-19 has further impacted this sector adversely. However, it is the only sector which has the potential to propel the economy with low investments, operational flexibility and the capacity to generate incomes to many people by more employment.

Key words: Demonetization, Lockdown, Employer.

The Micro, Small and Medium Enterprises (MSMEs) have emerged as a highly vibrant and dynamic sector in the Indian economy. Around 63.4 millions of MSMEs in India contribute significantly to the country's economic growth. They account for about 45% of manufacturing output, more than 49% of exports and more importantly employs about 111million people i.e. 30% of workforce. Given its employment share, this sector is crucial to the economy's vitality and society's well-being. A study done by the Confederation of Indian Industries (CII) on the Indian MSMEs reveals that the contribution of this sector will be around 50% in the India's GDP by 2024. Moreover this sector had saved Indian economy from great recession in 2008 and still contributing like the backbone of the economy.

This sector has been facing several problems with demonetization and hasty implementation of Goods and Services Act. The credit crunch issue followed by global economic slowdown triggered its problems. The spread of Covid-19 pandemic worsen the situation globally and affected the entire human life all over the world. The Corona related lockdown may have the immediate impact on close to 2.5crore people in vulnerable jobs across India as per the estimations of latest period labor Force Survey. At present the country has been facing a big challenge economically and socially .To Overcome the present crisis, a big stimulus is needed from both demand side and supply side. At this juncture, role of MSMEs is very crucial though they are in critical position because they can absorb more unskilled and reverse migrant labor. By creating more employment they play very important role in the income generation and thereby increase the aggregate demand.

In this context this paper makes an attempt to examine the role of MSMEs in the revival of the economy.

**Objectives:**

1. To study the growth and importance of MSMEs
2. To examine the problems of MSMEs in recent times.
3. To observe the challenges on the advent of covid-19.
4. To examine the suggestions made for revival of the MSMEs.
5. To study the policy implications.

Methodology:

The present paper is mainly based on the secondary data collected from the Ministry of MSMEs, Annual reports of MSMEs, NSS data, journals, magazines and internet.

Definitions of Micro, Small and Medium Enterprises:

In accordance with the provision of Micro, Small and Medium enterprises Development (MSMED) Act 2006, the micro, small and medium enterprises are classified as below:

Manufacturing Sector

Enterprise category	Investment in Plant & machinery
Micro Enterprises	Does not exceed twenty five lakh rupees
Small enterprises	More than twenty five lakh rupees but does not exceed five crore rupees
Medium Enterprises	More than five crore rupees but does not exceed ten crore rupees

Service sector

Enterprise category	Investment in Equipment
Micro Enterprises	Does not exceed ten lakh rupees
Small enterprises	More than ten lakh rupees but does not exceed two crore rupees
Medium Enterprises	More than two crore rupees but does not exceed five crore rupees

Revised definition of MSME

- The basis of classifying MSMEs is proposed to change from “investment in plant and machinery/equipment” “to annual turnover”
- **Micro** ----A unit where annual turnover does not exceed Rs. 5 crores ;
- **Small**---A unit where annual turnover is more than Rs 5crore but does not exceed Rs 75crores ;
- **Medium**--A unit where annual turnover is more than Rs 75crore but does not exceed Rs 250 crores.

Growth and importance of MSME in India:

Micro, Small and medium enterprises in India offer a heterogeneous in terms of the size and structure of Units, variety of products and services, scale of production and application of technology. These enterprises are quite complementary to the large scale industries as ancillary units. They contribute to the socio economic development of the country quite significantly. It is estimated that the MSMEs in India constitute about 80% of total industries and produce about 80,000 value added products.

A. Category-wise distribution

As per the National Sample Survey (2015-16), there were 633.88 lakh unincorporated non agriculture MSMEs in the country engaged in different economic activities. The Micro sector with 630.52 lakh enterprises accounts for 99% ,followed by small to 3.31 lakh and Medium by 0.05lakh enterprises.

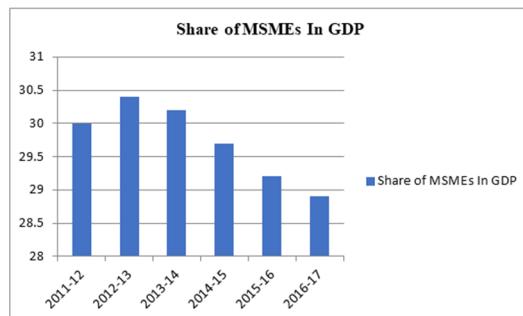
The following table shows the distribution of MSME category-wise in both rural and urban areas.

TABLE -1

Category	Rural	Urban	Total	Share (%)
Manufacturing	114.14	82.50	196.65	31
Trade	108.71	121.64	230.35	36
Other Services	102.00	104.85	206.85	33

B. Contribution to the economy

The contribution of MSMEs towards GDP is very significant. As per the Central Statistics Office Data, the contribution is ranging approximately 30% of the GDP which is depicted below.



Employment:

The MSME sector has been creating 11.1 crore jobs in the rural and urban areas across the country as per the NSS report. Nearly 360.41lakh jobs are found in manufacturing, 387.18 lakh in trade and 362.22 lakh jobs in service sectors of which 45% of jobs are in rural areas and remaining 55% in urban areas. This is very important to observe that large enterprises are moving towards rural areas and small units are concentrating in



urban areas to utilize the infrastructure and transport. This issue also is a reason for urban migration. However, prolonged lockdown in the covid-19 scenario makes these workers to move to their native places with the fear of closure of these small units. Hence there is a need to study the problems of MSMEs to tackle the situation

Problems of MSMEs in recent times:

Presently MSMEs are facing several problems in India as per various reports and surveys. The problems are as under;

1. Absence of adequate and timely credit
2. Limited scope to capital and technology
3. Low productive capacity due to lack of new techniques
4. Ineffective marketing strategy and less scope for advertisements
5. Non availability of skilled labor at affordable wages
6. Constraints on modernization and expansion

In addition to these conventional problems the MSMEs have been facing new problems such as

- Fall in the aggregate demand in the economy which reduced the market for MSMEs
- Disruptions in the business activity from demonetization decision since 2016
- Confusion with the hasty implementation of the goods and services tax in 2017 and frequent changes in the GST rates
- Pending payments in MSMEs increased from 8.61% in 2010-11 to 9.5% in 2015-16, which is a serious problem faced by this sector
- The liquidity crunch due to failure of NBFCs and the collapse of IL&FS adversely affected the long term credit availability to this sector
- Aversion of Banking sector to provide financial assistance to businesses with the growing problem of NPAs
- Inability to compete with the corporate sector in internal market as well as in the global market
- Disruption in the supply of raw materials from foreign markets
- Last but the most important is the restrictions on several activities in the entire economy with present prolonged lockdown due to the outbreak of Corona aggravated the situation and their entire production process came to a standstill.

Recent policy initiatives and suggestions:

Due to Covid -19 virus outbreak, MSMEs are experiencing several problems like low cash flow and lack of workforce as the daily wagers have gone to their villages. Businesses activities that are in manufacturing would also take a hit on export business as the situation remains uncertain. The services sector is also slowing down with more people opting for isolation.

The government of India has started taking some steps to protect the MSME sector.

- A. The Reserve Bank of India introduced Long term Repo Operations (LTRO) worth Rs.1,00,000crores to help banks increase lending at cheaper interest rates.
- B. The last date to file belated Income tax returns for the financial year 2018-19, is extended to 30th June.
- C. The dead line for GST returns filing for March, April and May is now June 30.



- D. Encouragement to public sector Banks to keep loans worth Rs. 60,000 crores ready.
- E. Reduction of reverse Repo rate increases the liquidity of Banks to enhance their further lending capacity.

However, these piecemeal measures announced by the Government of India and RBI may help MSMEs in short run. Moratorium on EMI payments for three months offered by banking sector is not helpful because it does not bring any additional liquid cash to MSMEs. Moreover, they will have to bear the extra cost of interest charged by lenders and a longer repayment period.

As the pandemic is an exceptional crisis, it requires longer period to recover. There is a need for bold and comprehensive package to ensure MSMEs to come back on track. It is the right time to implement the recommendations of the UK Sinha committee with regard to

- Creation of Distressed Fund of Rs. 5000crores to overcome credit crisis and NPA related problems.
- Fund of Funds worth Rs.10,000crores by the Government to support venture capitalists and private equity firms investing in MSMEs.
- Amending MSME Act 2006, to address the grievances of start-ups and MSMEs.
- Expansion of SIDBI to help NBFCs and micro finance institutions.
- Creation of loan portal “PSBLoanin59minutes.com” for timely sanction of loans.
- Provision of technical and digital assistance as well as e-market platform.
- Insurance coverage to individual entrepreneurs and to groups by the Government.

In addition to the above suggestions, quick payments due to MSMEs by the Industry help this sector to overcome liquidity crisis. Keeping abeyance on repayment of loans for some time and reschedule of loans, relaxing the guidelines of NPAs would be a saving move for this sector. The credit guarantee scheme to cover 75% advances, quick sanction of pending loans to new start-ups may be helpful to revive this sector. The survival of this sector is very much needed at this present economic crisis. Let us hope that the post corona period will definitely bring tremendous development to this sector in general and the entire economy in particular in the country.

REFERENCES

1. MSME Annual Report 2018-19
 2. MSME.gov.in
 3. <https://m.economictimes.com>
 4. <https://www.theweek.in>
 5. www.iasparliament.com /current Affairs
 6. [Indiatoday-17-04-2020](http://www.indiatoday.in)
 7. www.researchgate.net
 8. Civil Services TIMES, December, 2019
 9. The socio economic survey (2018-19), India.
 10. The Hindu news paper
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QUALITATIVE AND QUANTITATIVE PHYTOCHEMICAL ANALYSIS OF DIFFERENT PARTS OF *VITEX NEGUNDO* MEDICINAL PLANT

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Abstract

Medicinal plants are the most important source of the traditional medicines. Herbal medicines have been used in medical practices since antiquity. Objective of the present study is qualitative and quantitative phytochemical analysis of leaves and bark of *Vitex negundo*. In qualitative phytochemical analysis of secondary metabolites such as alkaloids, flavonoids, glycosides, terpenoids, steroids, tannins, saponins and phenols were screened in methanol, ethanol, chloroform, hexane and aqueous solvent extracts. Total alkaloids, flavonoids and terpenoids were quantified. In quantitative phytochemical analysis of *Vitex negundo* parts contained significantly higher level of total alkaloid (11.27 ± 0.94 mg/g) in bark. The flavonoid content (33.56 ± 1.68 mg/g) and total terpenoid contents (33.91 ± 1.84 mg/g) quantified the highest in the leaves. The phytochemical study draws attention to the need for further studies of the active secondary metabolites identified in the reported plant for the treatment of different diseases.

Keywords: Phytochemicals, Qualitative, Quantitative Analysis, *Vitex negundo*,

INTRODUCTION

Medicinal plants are the most important source of natural product to the health of human beings. Nowadays, the need of natural products for pharmaceutical purpose from the plants has attained a great interest in the recent research world due to the cost and the highly side effects that is associated with the chemically manufactured drugs. Many scientific investigations of traditional herbal remedies for different diseases have been found and this has lead in the development of alternative drugs². Phytochemicals are the chemicals produces by different parts of the plants. The bioactive compounds secondary metabolites such as flavonoids, alkaloids, glycosides, terpenoids, tannin, saponin, steroids, phenols etc. These constituents have various activities such as anti-arthritis, antimicrobial, antibacterial, anti-oxidant. Qualitative phytochemical analysis will help to understand variety of chemical compounds produced by plants and quantitative analysis of phytochemicals will help to identify, purify and extract the bioactive compounds for useful aspects to individual and communities³⁻⁵.



Vitex negundo is a small tree belonging to family Lamiaceae commonly known as Nirgundi⁶.

MATERIALS AND METHODS

Preparation of plant extracts- *Vitex negundo* plant parts (leaves and bark) were collected and wash with tap water and cut in short pieces and dry at room temperature then powdered using mixer grinder. 10 gram powder of material of each parts dissolved in 100 ml different solvents (methanol, ethanol, chloroform, hexane and aqueous) and left at room temperature (25–30°C) for 24 hours. Then it was filtered through 8 layers of muslin cloth and evaporated by water bath¹.

Qualitative phytochemical test⁸⁻⁹ –

1. Test for alkaloids

Meyer's test - 2 ml test solution was taken in a test tube and added 2 ml dil. HCl and few drops of Meyer's reagent formation of creamy white precipitate indicate presence of alkaloids.

Wagner's test – 2 ml test solution was taken in a test tube and added 2 ml 2% H₂SO₄ then boiled and added few drops of Wagner's reagent formation of reddish-brown precipitate it indicates presence of alkaloids.

2. Test for flavonoids

Ferric chloride test – 2 ml test solution was taken and added few drops of ferric chloride solution indicate blackish red colour presence of flavonoid.

Lead acetate solution test – 2 ml test solution treated with few drops of 10% lead acetate solution formation of yellow precipitate indicate the presence of flavonoids.

3. Test for glycosides

Keller-killiani test – 1 ml test solution treated with 2 ml glacial acetic acid and added few drops of 5% ferric chloride solution and 1 ml conc. H₂SO₄ then observed brown ring at interface indicate the presence of glycosides.

Bromine water test – 2 ml test solution was taken and added 2 ml bromine water then observed formation of yellow precipitation indicates the presence of glycosides.

4. Test for steroids

Liberman-Burchard reaction – 2 ml test solution treated with few drops of chloroform and conc. H₂SO₄ was carefully added to form a lower layer. A reddish brown colour at the interface indicates the presence of steroids.

5. Test for terpenoids

Solkowski test – 0.5 ml test solution was taken and added 2 ml chloroform and 1 ml conc. sulphuric acid then colour turned into red brown at the interface indicates presence of terpenoids.



6. Test for saponin

Foam test – 1 ml test solution mixed with 2 ml distilled water and shaken 5 min. and observed the formation of froth it indicates the presence of saponin.

7. Test for tannins

Gelatin test – 1 ml test solution treated with 2 ml gelatin solution and observed the formation of white precipitate it indicates the presence of tannin.

8. Test for phenols

Ferric chloride solution test – 1 ml test solution treated with 1 ml, 5% ferric chloride solution then colour turned into blue-black precipitate it indicates the presence of phenol.

Quantitative phytochemical test-

1. Determination of total alkaloids contents (TAC) -

5 grams of the plant sample were placed in a 250 ml beaker and 200 ml of 10% acetic acid in ethanol was added. The mixture was covered and allowed to stand for 4 hours. It was then filtered and the filtrate was concentrated on a water bath until it reaches a quarter of its original volume. Concentrated NH₄OH was added until precipitation was complete. The mixture was allowed to settle and the precipitate collected on a weighed filter paper and washed with dilute NH₄OH. The precipitate, alkaloid, was dried and weighed. Quantity of alkaloid was calculated as the difference in weight¹⁰.

2. Determination of total flavonoids contents (TFC) -

10 grams of plant sample were repeatedly extracted with 100 ml of 80% aqueous methanol at room temperature. The mixture was then filtered through a filter paper into a pre-weighed beaker. The filtrate was transferred into a water bath and allowed to evaporate to dryness and weighed. Quantity of flavonoids was calculated as weight of the extracted dry matter¹⁰.

3. Determination of total terpenoids contents (TTC) -

10 grams of plant powder were taken separately and soaked in alcohol for 24 hours. Then filtered, the filtrate was extracted with petroleum ether; the ether extract was treated as total terpenoids¹¹.

RESULTS

1. Qualitative analysis of phytochemicals.

The plant parts of *Vitex negundo* were collected wildly from the Jabalpur district of Central India after rainy season. The qualitative phytochemical analysis of secondary metabolites showed the presence of different types of phytochemical in different solvent extracts of different plant



parts (leaves and bark). Table - 1 shows the presence and absence of various phytochemicals of *Vitex negundo*.

Table - 1 Qualitative analysis of phytochemicals in two parts of *Vitex negundo* extracted with five solvents. M= methanol, E= ethanol, Ch= chloroform, H= hexane, Aq= aqueous extract.

PHYTOCONSTITUENTS AND TEST	LEAF					BARK				
	M	E	Ch	H	Aq	M	E	Ch	H	Aq
ALKALOIDS										
Mayer's test	-	-	-	-	-	+	-	-	-	-
Wagner' test	+	+	+	-	+	+	+	+	-	-
FLAVONOIDS										
Ferric chloride test	+	+	-	-	+	+	+	-	-	+
Lead acetate test	+	+	-	-	+	+	+	-	-	+
GLYCOSIDES										
Keller-killiani test	-	+	+	+	+	+	-	-	-	+
Bromine water test	+	+	-	-	-	-	-	-	-	-
STEROIDS	-	-	-	+	-	-	+	-	-	-
TERPENOIDS	+	+	+	+	+	+	-	+	-	-
SAPONINS	-	-	+	-	+	-	-	+	-	+
TANNINS	-	+	-	+	-	-	-	+	-	-
PHENOLS	+	+	-	-	+	+	+	-	-	+

+ = presence of constituent, - = absence of constituent

2. Quantitative determination of phytochemicals.

Quantitative estimation of the phytochemical constituents in *Vitex negundo* medicinal plant studied is summarized in table – 2 The highest yield of alkaloids (11.27 ± 0.94 mg/g) in the bark of *Vitex negundo* compare to the leaf (9.02 ± 0.58 mg/g) while flavonoid constituents were higher in *Vitex negundo* leaf (33.56 ± 1.68 mg/g) than bark (13.33 ± 0.76 mg/g). Similarly terpenoid



constituents were found the highest in *Vitex negundo* leaf (33.91 ± 1.84 mg/g) compare to the bark (28.53 ± 1.09 mg/g).

Table – 2 Quantitative estimation of pharmacologically important secondary metabolites in leaf and bark of *Vitex negundo*.

Phytoconstituents	Quantity (in mg/g)*	
	LEAF	BARK
Total Alkaloids	9.02 ± 0.58	11.27 ± 0.94
Total Flavonoids	33.56 ± 1.68	13.33 ± 0.76
Total Terpenoids	33.91 ± 1.84	28.53 ± 1.09

* Each mean value of three determination \pm SD

DISCUSSIONS

The plant *Vitex negundo* is a valuable medicinal plant. Each parts of this plant has contains medicinal properties that's why it is used to cure of various diseases viz. gonorrhoea, arthritis, diarrhoea, asthma, stomach-ache, angina, colds, cough etc. Leaves of *Vitex negundo* are anti-inflammatory, anti-gonorrhoeic, antipyretic, antiseptic and useful in bronchitis, asthma, enlargement of spleen, eye diseases, leucoderma, skin ulcers and toothache. Secondary metabolites are organic compounds derived from primary metabolites that helpful in the growth and development of plant but they don't play role in the maintenance of life processes in the plants¹⁰.

Secondary metabolites and their derivative play an important role in cell wall integrity and defence against pathogens. Alkaloids have generally toxic nature to other organism. They often have pharmacological effects they are used as medications, antimicrobial, antipyretic, local anaesthetic and stimulant, psychedelic, analgesic, antibacterial, anticancer, anti hypertension agent, antiasthma and antimalarial. Flavonoids have been shown to possess many pharmacological properties such as: anti- arthritic activities, anti-oxidant activities, anticancer activities and anti-microbial effects. Flavonoids may have a contributory effect to its fertility properties and other pharmacological effects the plant possesses. Terpenoids are a large class of naturally occurring organic compounds found in all plants and are major constituents of plants¹¹.

CONCLUSION

Medicinal plants have provided copious leads to combat various diseases from the down of civilization. Herbal medicines are the most demandable in the developed and developing countries for their primary healthcare because of their wide biological and medicinal activities, higher safety and lesser cost. *Vitex negundo* is an important medicinal plant with diverse pharmacological spectrum. It is very important to study the local



cultivars of medicinal plants so that their use in herbal drugs and as traditional and folk medicine can be more effective to the mankind.

REFERENCES

1. Islam MT, Mamun MAA, Rahman MH, Rahman MA, Akter MM and Ashraf MS. Qualitative and quantitative analysis of phytochemicals in some medicinal plants in Bangladesh. *Journal of Chemical, Biological and Physical Sciences* 2016; 6(2): 530-540.
2. Prabhavati RM, Prasad MP and Jayaramu M. Studies on Qualitative and Quantitative Phytochemical analysis of *Cissus quadrangularis*. *Advances in Applied Science Research* 2016; 7(4): 11-15.
3. Santhi K and Sengottuvel R. Qualitative and Quantitative Phytochemical analysis of *Moringa concanensis* Nimmo. *Int. Journal of Current Microbiology and Applied Sciences* 2016; 5(1): 633-640.
4. Feroz M, Ahmad R, Sindhu STAK and Shahbaz AM. Antifungal activities of saponin from indigenous plant roots. *Pak. Vet. J.* 1993; 13: 44.
5. Paval J, Kaitheri KS, Potu BK, Govindam S, Kumar RS, Narayanan SN and Moorkoth S. Anti arthritic potential of the plant *Justicia gendarussa* Burn F. *Clinical Science* 2009; 64(4): 357-360.
6. Khan A, Naz farroq U, Shahid M, Ullah I, Ali I, Rauf A and Mabkhot YN. Bioactive chromone Constituents from *Vitex negundo* alleviate pain and inflammation. *Journal of Pain Research* 2018; 11: 95-102.
7. Sugnathi N and Dubey S. Phytochemical Constituents and Pharmacological activities of *Vitex negundo* Linn. *Journal of Chemical and Pharmaceutical Research* 2016; 8(2): 800-807.
8. Raman N. *Phytochemical Techniques*. New Delhi Publishing Agencies: New Delhi. P. 2006.19.
9. Harborne JB. *Phytochemical methods*, New Delhi: Springer (India) pvt. Ltd: 2005. P.17.
10. Edeoga HO, Okwu DE and Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. *African Journal of Biotechnology* 2005; 4(7): 685-688.
11. Awasthi A, Singh R and Agrawal MK. Qualitative and quantitative phytochemical screening of different plant parts of *Phyllanthus amarus* Schum. & Thonn. Collected from central India with respect to the traditional claims for their medicinal uses. *IJPSR* 2015; 6(1): 393-398.



A STUDY ON THE INVESTOR PERCEPTION TOWARDS MUTUAL FUNDS

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ABSTRACT

Mutual fund concept in India is not so old in capital market. It is popular at day by day in India . There are different investment avenues for investors like shares, real estate ,Gold, fixed deposit etc. Mutual fund is one of them .It is collective form of investment where small investor invest in corporate and government securities and earn income through dividend and interest. Mutual fund is less risky as compare to other investment .The fund manager invest the money in different securities so that investor will get maximum return . In this paper we find out the investor perception toward mutual funds and scheme of mutual funds preferred by investors.

Key words: Mutual fund ,Risk. Maximum return, Fund manager.

INTRODUCTION

In 1964 UTI was the first mutual fund started in India. The main aim of UTI was to invest money of small investor in different avenues and get them maximum return. At starting it was growing at slow pace .Very few investors are attracted by this but after some time period people were aware about mutual fund and their benefits. After that in 1989 SBI launched different schemes which gave the tax benefits under section 80C. Mutual fund professionals invest the public money in different fund and each fund is divided into different fractions .This fraction is called units. There are different types of schemes for investors in mutual fund industry. Mutual fund industry is growing day by day because of high return and less risky at low cost. The fund manager play a important role for investors who don't have knowledge and time for stock market.

According to SEBI (Mutual Fund)Regulations,1983."Mutual fund is a fund established in the form of trust by a sponsor to raise money by the trustees through the sale of units to the public under one or more schemes for investing in securities in accordance with these regulations."

REVIEW OF LITERATURE

Alka Solank(2016) In her research paper a study of performance evaluation of mutual fund And reliance mutual fund concluded that investor who invested in reliance different schemes get better return as compared to other funds of another companies.

Dr.Binod Kumar Singh (2012 concluded in his study mutual fund behaviour and perception that investor are less aware about schemes and functions about mutual funds and age group also affects the investment decisions older age people are less interested in mutual funds as compare to young generation

Dr Gauri Prabhu (2012) concluded in research paper Perception of Indian Investor towards investment in mutual funds that investor are aware about MIP schemes .Most of the investor invest for tax purposes in MIP.



Dr.Ravi vyas(2012)analysed in his study Mutual fund investor behaviour and perception in Indore City that investor companies should give full disclosure to the investors, more tax benefits should be provided to them so that investor will attract more.

In(2013) Dr.S.Vasantha, Uma Maheswari, K.Subashini. analysed that investor should check all pros and cons before investing in mutual funds .According to their study no fund showed better results all the funds showed negative result according to sharpe index model

J.Lilly and Dr Anasuya (2014) studied that in tax saving in dividend scheme options investor get high rerun as compared to other schemes. They found that by Sharpe ratio, Treynor ratio.

Kumar Vikas [2010] analysed the five mutual funds of different mutual fund of last ten years from 2000 to 2009 .It was found that equity showed better result as compared to debt and balanced funds.

Shanmugham (2000) concluded in his study that what is the source of the investment an investor choose. In this research it is found that the investors are influenced by sociological and psychological and economic factors.

Madhusudhan V Jambodekar (1996) study to size-up the direction of mutual funds in investors and to identify factors influence mutual fund investment decision. The study found that main motive of investor are safety in mutual funds and they want more better services.

OBJECTIVES OF THE STUDY

- 1 To know the investor perception toward mutual funds
2. To know the awareness level of investors regarding mutual funds.
3. To study the type of scheme of mutual fund preferred by investor.

RESEARCH METHODOLOGY

Descriptive Research Design.

Sampling Size Sources of data Primary as well as secondary data was used.
The primary data for the study has been collected with the help of customers by using well-structured questionnaire and secondary data was collected from books, journals and various websites

Research Design 200 customers have been taken as the sample.

The sample area Some regions of Punjab

Sampling Technique Convenience sampling technique has been used in this study.

RESULT ANALYSIS

This section contains the analysis of data collected during the survey. Data is analyzed by using Google forms and as well as filling the questionnaire from personal interview.

Demographic Profile of Respondents

➤ Gender of the respondents

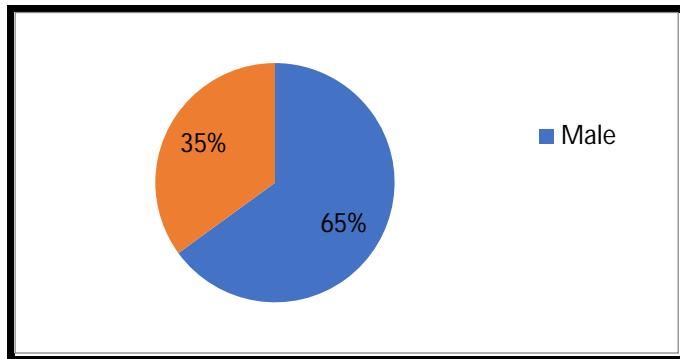


Fig 1 Gender of the respondents.

Fig 1 shows that 65% of the female and 35% are male .

➤ Age of the respondents

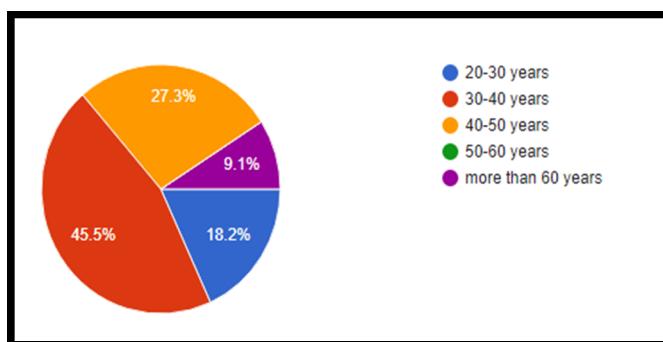


Fig 2 Age of the respondents

Fig 2 shows that 18.2% are between the age of 20-30 years ,45.5% are between the age of 30-40 years.27.3% are between the age of 40-50 years 9.1% are the persons more than 60 years

➤ Occupation

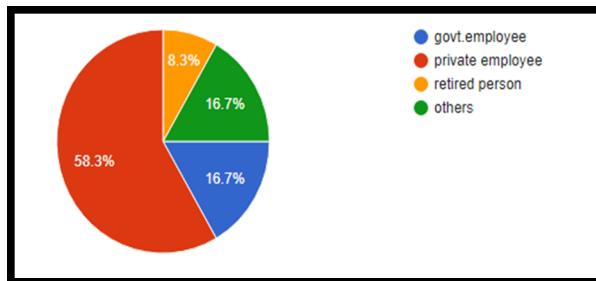


Fig 3 occupation of the respondents

Fig 3 shows that 58.3% people are private employees .8.3% are retired persons 16.7% are govt. employees and 16.7% people are others .

➤ Your annual income is in the range of

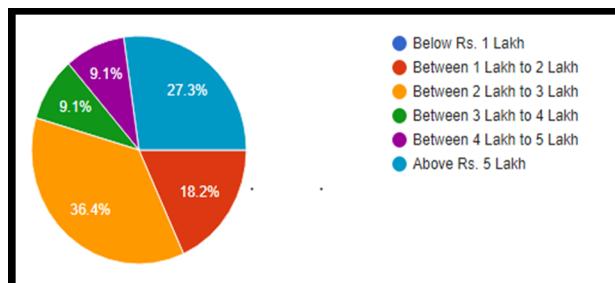


Fig 4 Income of the respondents

Fig 4 shows that 18.2% people has income between the range of 1lakh to 2 lakh 36.4% people has income between the range of 2 lakh to 3 lakh.9.1% people has income between the range of 3 lakh to 4 lakh and 9.1% people has income between the range of 4 lakh to 5 lakh and 27.3% people has income above 5 lakh .

➤ Do you know about Mutual Funds?

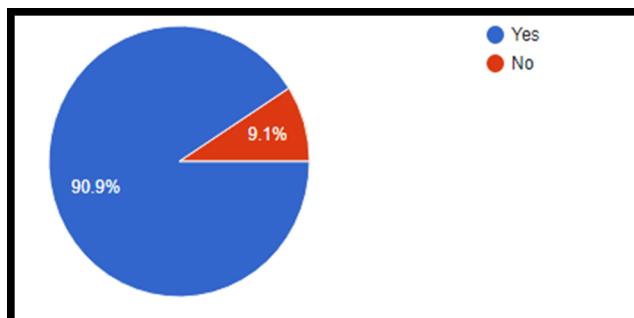


Fig 5 shows that 90.9% people have mutual funds and 9.1 % have taken no mutual funds.

- Are you invest in mutual funds? If no, then go to question no 20

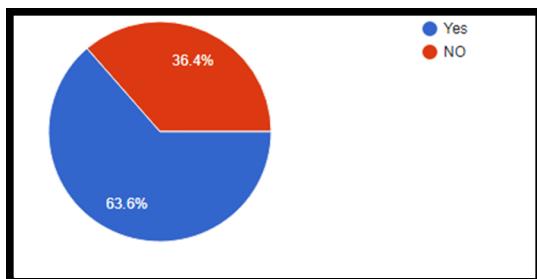


Fig 6 shows that 63.6% people invested in mutual funds ,36.4% people are not invested in mutual funds.

- If yes , then you have invested in which mutual Fun

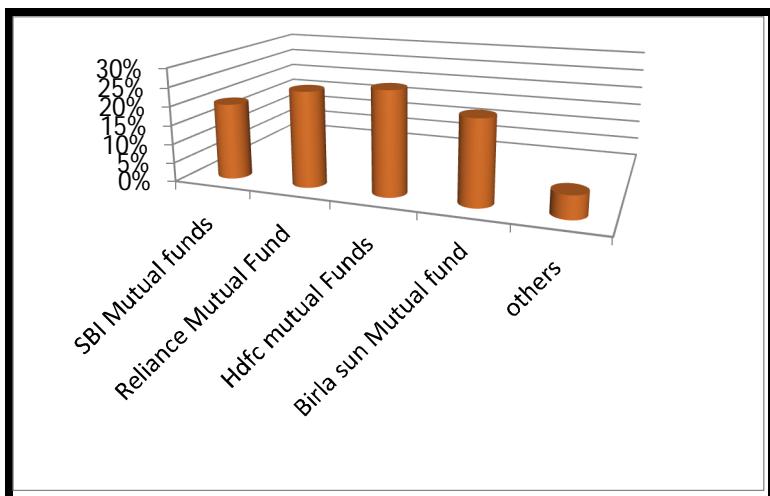


Fig 7 shows that 20 % people invested in mutual funds ,25% people are invested in reliance mutual funds ,27% people are invested in Hdfc mutual funds .18% people are invested in Birla sun life insurance and 8% people are invested in other mutual funds .

➤ How is your invest pattern .

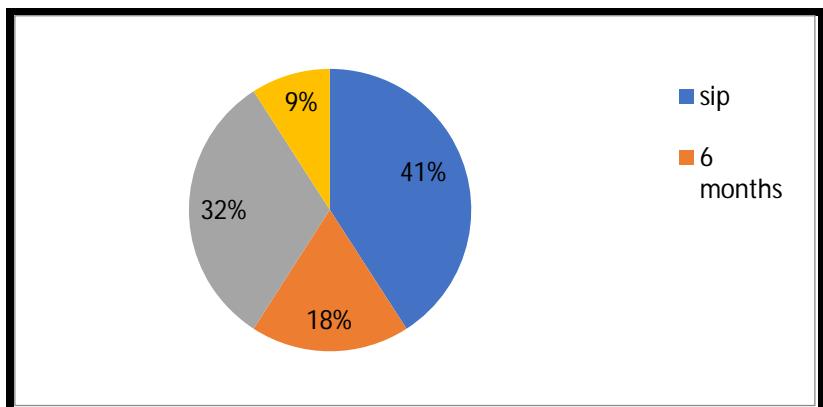


Fig 8 shows that 41% people are invested in SIP ,18% people are invested every 6 months ,32% people are invested after 1 year .9% people are invested very rare.

➤ You have invested in which type of Mutual Fund Scheme ?

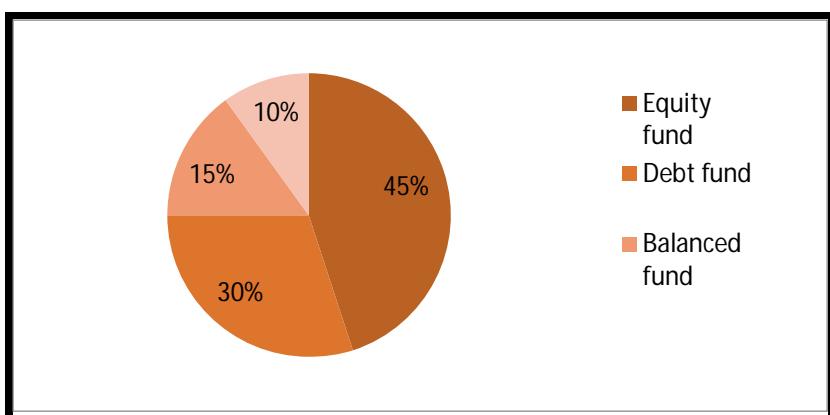


Fig 9 shows that 45% people are invested in equity funds,30% people are invested in debt fund ,15% are invested in balanced fund . only 10% are invested in hybrid funds

- If equity then which category.

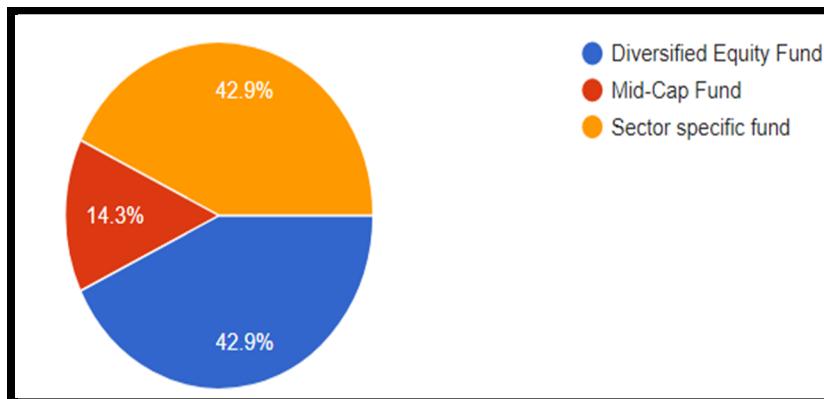


Fig 10 shows that 42.9% invested in diversified equity fund ,42.9% invested in sector specific funds and only 14.3% invested in mid cap fund.

- If Debt Funds then, in which category ?

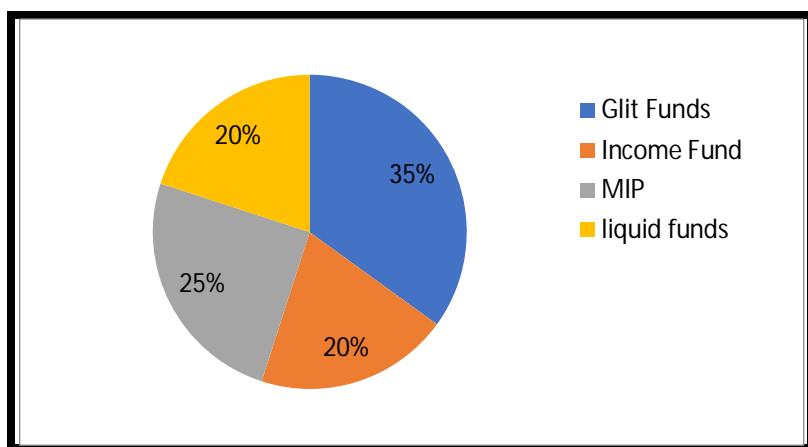


Fig 11 shows that 35% are invested in gilt funds 25% people are invested in MIP plans ,20% invested in income funds and also 20% people are invested in income funds .

- What do you look before investing in a particular mutual fund .

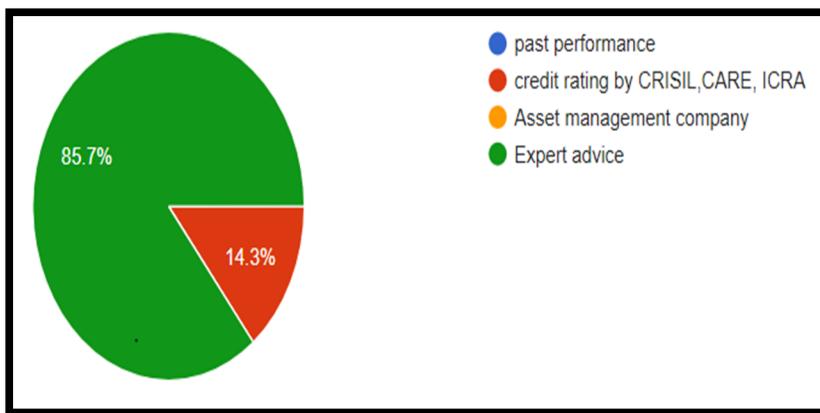


Fig 12 shows that 85.7% people are taken the expert advice and 14.3% people take the decision on the basis of credit ratings.

- **Where do you gather information about the performance of different mutual fund schemes?**

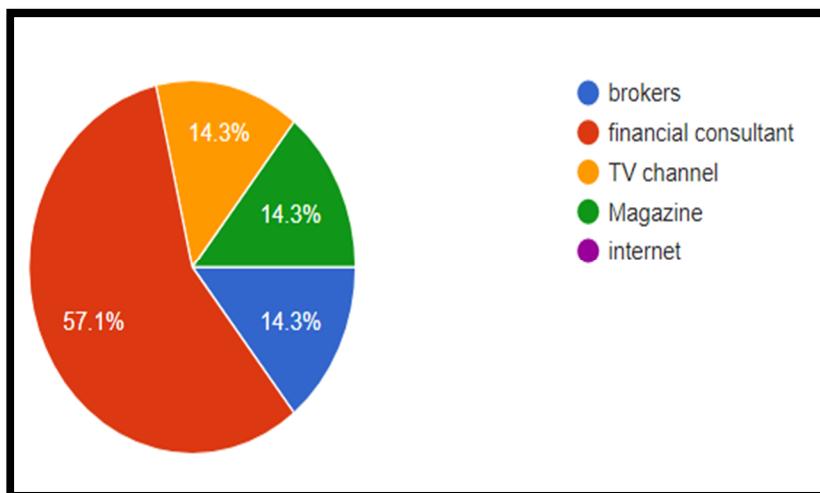


Fig 13 shows that 57.1% people gathered the information from the financial consultatants,14.3% people gather the information from the T.V and 14.3% people from the magazine

- Since how many years you are investing in Mutual Fund Schemes.

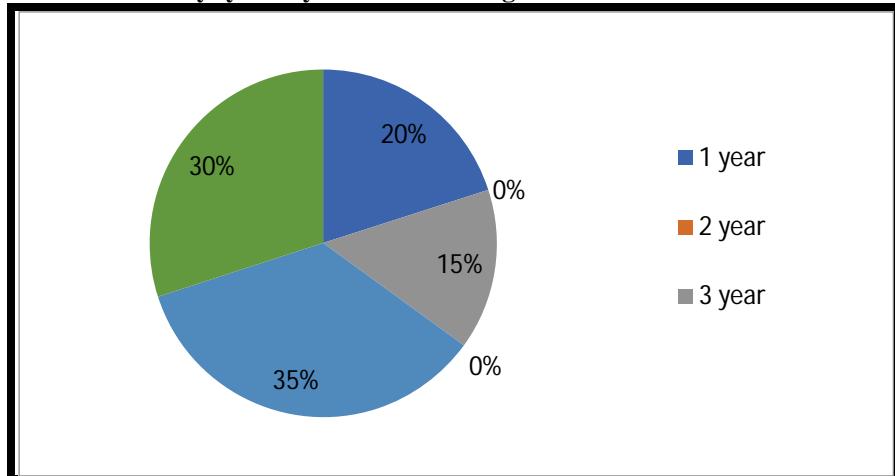


Fig 14 shows that 35% people are investing for more than 5 years 20% are investing for 1 years 15% are investing for 3 years and 30% are investing for 2 years .

- You invest in Mutual Fund Schemes because:

-

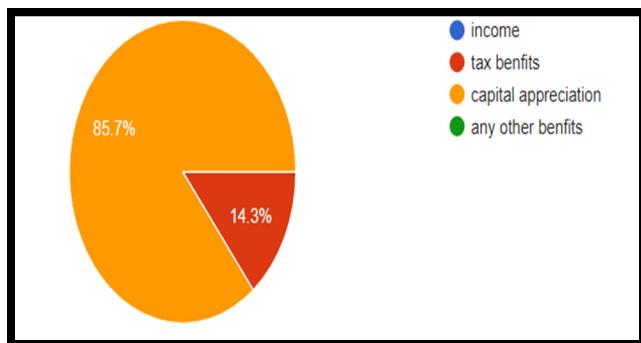


Fig 15 shows 85.7% are investing for capital appreciation and 14.3 % are investing for income tax purposes .

➤ Can mutual Funds be viewed as Risk Free investment?

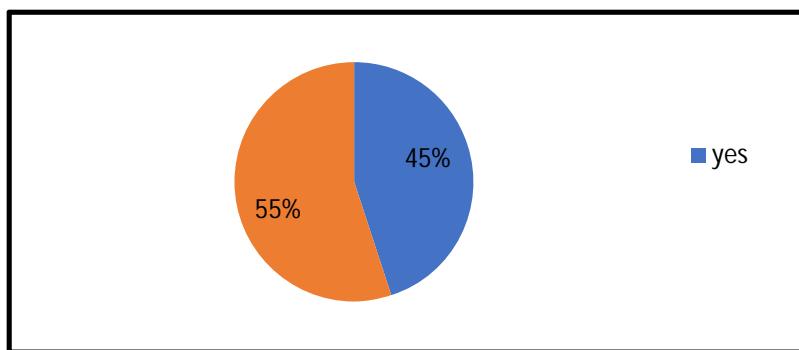


Fig 16 shows that 55% people said yes it is risk free investment and 45% people said no it is not free risk investment.

➤ How much amount of income you invest in mutual funds ?

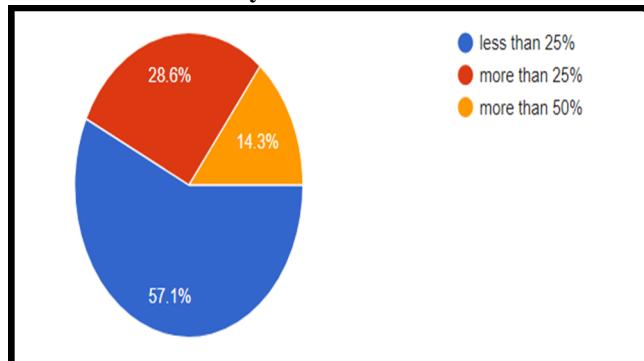


Fig 17 shows that 57.1% people invested only less than 25% of their investment. 28.6% invested more than 25% and 14.3% invested only more than 50%

- You invest in the financial instruments / securities which give:

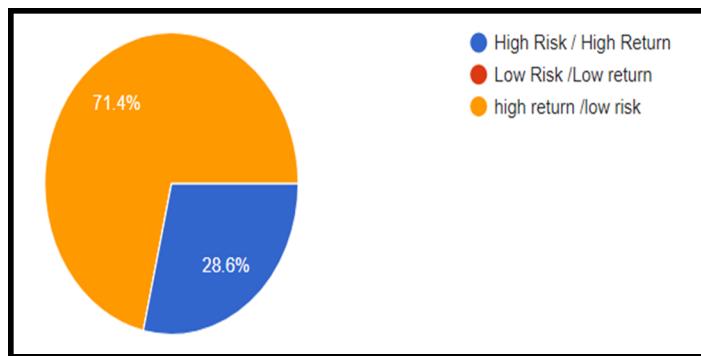


Fig 18 shows that 71.4% people wants high return low risk and 28.6% wants high risk and high return .

- Have you ever redeemed your Mutual Funds because of the below mentioned reasons.

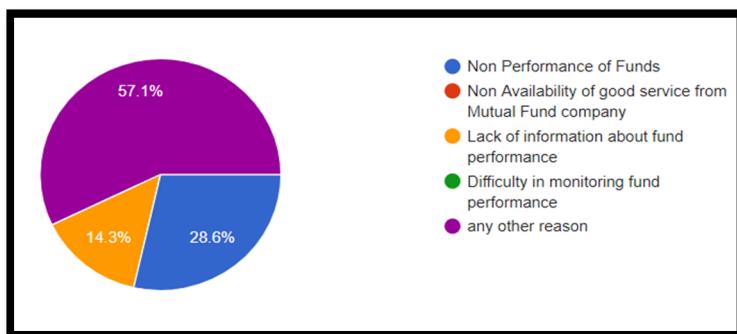


Fig 19 shows that 14.3% people said that redeemed their mutual funds lack of information about mutual funds ,28.6% people said that they redeemed due to non performance

- You have not invested in mutual funds because

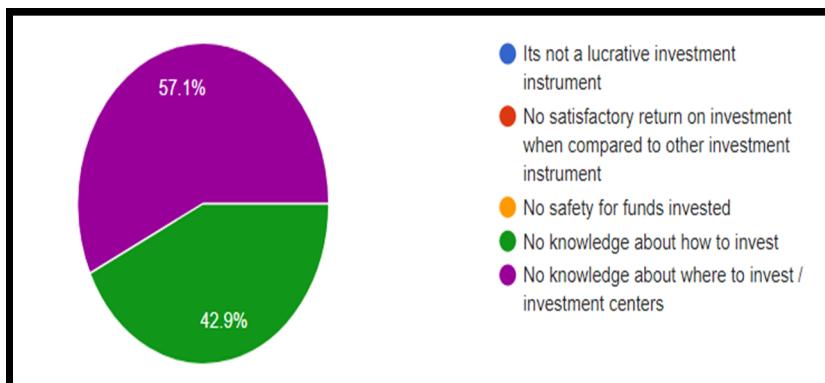


Fig 20 shows that 57.1% people do not have knowledge where to invest and 42.8% people do not have knowledge about how to invest .

- According to you, which one do you rate as the best investment instrument?

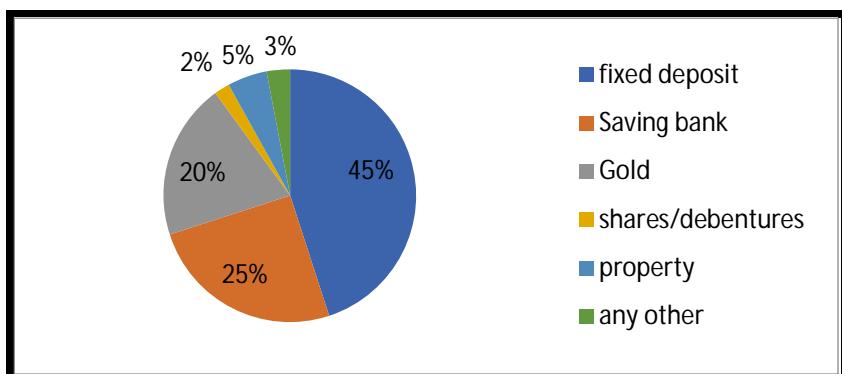


Fig 21 shows that 45% people agreed that fixed deposit is the safe investment .25% people agreed with savings .20agreed with gold .2%agreed with shares .5% agreed with property .

- Do you have any suggestion to improve the popularity of mutual funds among the investors.

Most of the investor are not aware about how and where to invest .Respondents said that more awareness camp should be setup and expert get their views where to invest and how they invest and what are the benefits of investing in that securities.

FINDINGS

Almost 63%people invested in mutual funds But they still are not aware about all the schemes . They are invested according to other people choice. Most people preferred equity scheme .They all less knowledge of mutual funds. Most people do



not invested due to risk in share market .They prefer to deposit their hard money in fixed deposit where the safety and security of their investment . People don't want to take the risk of high risk and high return .

SUGGESTIONS

Mostly people are not aware about mutual funds .There should be more advertisement and camps should be set up so that people should ask their doubts and invest on the basis of that. Now mostly people are inversing according to others choices .Expert lectures should be deliver because no one don't want to take the risk of share market .so people should safely invest their hard money .

BIBLOGRAPHY

- Rathnamani, V. (2013). Investor's Preferences towards Mutual Fund Industry in Trichy. OSR Journal of Business and Management (IOSR JBM) , 6 (6), 48-55.
- Shah, A., & Baser, N. (2012). Mutual Fund : Behavioural Finance Perspective . Asia Pacific Journal of Marketing & Management Review.
- Binod Kumar Singh (2012), "A study on Investors" attitude towards mutual funds as an investment option, International
- Journal of Research in Management, March 2012, Vol. 2, Issue 2, ISSN 2249-5908.
- Desigan G, Kalaiselvi S and Anusuya L. (2006), "Women Investor Perception Towards Investment: An Empirical Study",
- Indian Journal of Marketing, Apr 2006, Vol. 36, Issue 4.
- D. Rajasekhar (2013), "A study on investor's preference towards mutual funds with reference to Reliance private limited,
- Chennai – An empirical Analysis, International Research Journal of Business and Management, September 2013, Vol. III,
- ISSN 2322-083X
- Binod Kumar Singh (2012), "A study on Investors" attitude towards mutual funds as an investment option, International
- Journal of Research in Management, March 2012, Vol. 2, Issue 2, ISSN 2249-5908.
- Desigan G, Kalaiselvi S and Anusuya L. (2006), "Women Investor Perception Towards Investment: An Empirical Study",
- Indian Journal of Marketing, Apr 2006, Vol. 36, Issue 4.
- D. Rajasekhar (2013), "A study on investor's preference towards mutual funds with reference to Reliance private limited,
- Chennai – An empirical Analysis, International Research Journal of Business and Management, September 2013, Vol. III,
- ISSN 2322-083X
- Binod Kumar Singh (2012), "A study on Investors" attitude towards mutual funds as an investment option, International
- Journal of Research in Management, March 2012, Vol. 2, Issue 2, ISSN 2249-5908.
- Desigan G, Kalaiselvi S and Anusuya L. (2006), "Women Investor Perception Towards Investment: An Empirical Study",



- Indian Journal of Marketing, Apr 2006, Vol. 36, Issue 4.
- D. Rajasekhar (2013), "A study on investor's preference towards mutual funds with reference to Reliance private limited,
- Chennai – An empirical Analysis, International Research Journal of Business and Management, September 2013, Vol. III,
- ISSN 2322-083X
- Desi et al. (2014), "Women Investor's Perception towards Investment: An empirical Study", Indian Journal of Marketing. Retrieved from: <http://www.google.com>
- Parashar, N. (2009). Factors affecting perception of investors towards Mutual Funds. Symbiosis Centre for Management and Human Resource, Pune.
- Das, Sanjay, (2011). Small investor's perceptions on mutual funds in Assam: an Empirical Analysis. ABHINAV National Monthly Refereed Journal of Research in Commerce & Management, volume no.1, Issue no.8
- Kothari,.Pritam P. & Mindargi, Shivganga C. (2013). A Study of Investors Attitude towards Mutual Fund with Special Reference to Investors in Solapur City. International Journal of Accounting and Financial Management Research (IJAFMR), Vol. 3, Issue 2, 1-
- <https://www.investopedia.com/terms/m/mutualfund.asp>



A SHORT NOTE ABOUT INDIA'S IMPERATIVE MEASURES ON COVID-19 A VIRUS WAR

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Abstract:

This paper portrays the worldwide pandemic outbreak of COVID-19 in a societal view. Also it extends the analysis on the exigent approach of India, a populated, integrated and developing country against the spread of COVID-19.

Keywords: Corona Virus COVID -19, Pandemic, Awareness, Public, India.

1. Introduction:

The battle between humans and nature can be traced down back to history. Human need to be able to conquer the nature. Nature's powerfulness has always been demonstrated by its natural calamities to prove the mankind its optimal power. This tug of war has happened over the centuries.

The facts that are happening in the world makes us to astonish in many ways. An epidemic disease has attacked the world since every century. There is no any reason to believe behind this. But it cannot be without believing. In the year 1520, smallpox has affected 40% of the world's population originated from Mexico. In the year 1620 and 1720, Plague affected the more than 3,80,000 people originated from Italy and France. In 1820, Cholera affected more than 1,00,000 people of the Asian and the European countries. In 1920, Spanish flu affected people from 17,000,000 upto 100,000,000 over the people worldwide. In this year 2020, more than 6,00,000 people are attacked worldwide by the deadly Corona virus COVID-19.

Though the epidemic diseases spreaded worldwide in the past centuries, there were not sound in the fields of Science and Technology. But that century people had travelled their life with the lose of many millions of people so far. That period of time, there was no that much awareness among the people of the world. However those people crossed the epidemic and centuries went by. But inspite of so much means of improvement of technology in the present scenario, we are not able to control the spread of the disease now. World Health Organization (WHO) has declared this spread of Corona virus to be pandemic, First it was an epidemic disease, but later it started to spread worldwide and so it has become worldwide.

This pandemic outbreak started in the end of December 2019 at Wuhan, Hubei, China. First it started to spread lesser and later it become like a wind of spreading over China. This study will tell, from Wuhan, how it spreaded worldwide speedily.

2. Country wise Analysis:

The pandemic spread of Corona virus COVID-19 has spread to over 199 countries like a passing of a lightening. The countries which stands first stand in the spread of Covid-19

to more number of people are China, United States of America, Italy, Spain, South Korea, Germany, Iran, France and the list extends to Asian countries, European countries, African countries, North American countries. It has widely spreaded where no one thought about this nightmare in the world.

The spread of COVID – 19 started with a very small count in tens, then transformed to hundreds over weeks and almost in thousands and then to lakhs in the fourth and fifth week of affecting in a particular country. This is transforming to people infinitely in the world.

The following figure - 1 illustrates the spread of corona virus in China in weeks.

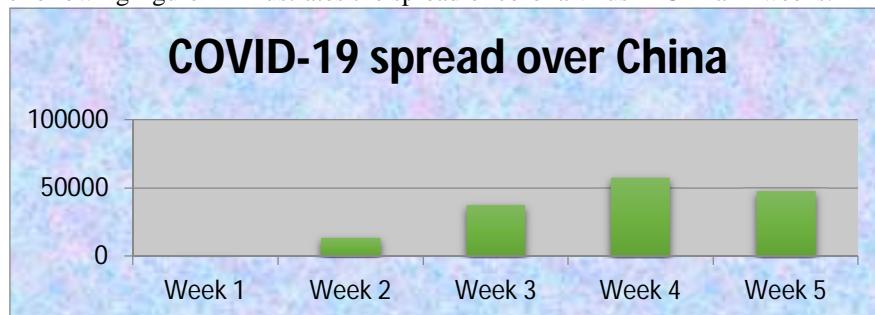


Figure 1

Almost in China, through the Corona virus COVID-19 originated, 96% of the population has recovered from those who was affected and only 4% of the affected population had died. But in Italy almost the recovered and died are more or less neared, 56% of the population have recovered and 44% of the affected population died. Really Italy had faced its surrender now. When in China from where it originated and quickly spreaded almost all parts of the Chinese country. They treated with western drugs and traditional Chinese medicine, almost 50,000 COVID-19 patients recovered. These controlled cold, cough, fever and fatigue. But once after China, it quickly spread to Italy. The reason behind Italy's failure is they did not know the seriousness of the COVID-19. They started living their life as usual.

The following Table-1 illustrates the spread of COVID-19 in some of the countries which affected more. Currently this data is subject to changing on the daily basis depending on its spread.

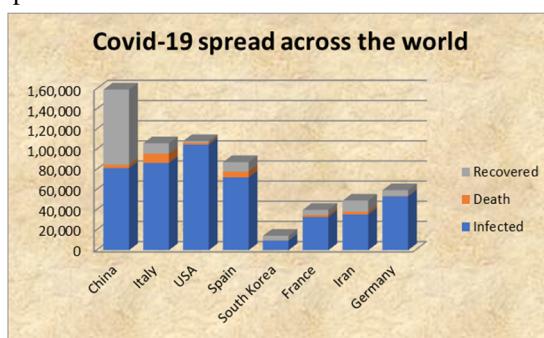


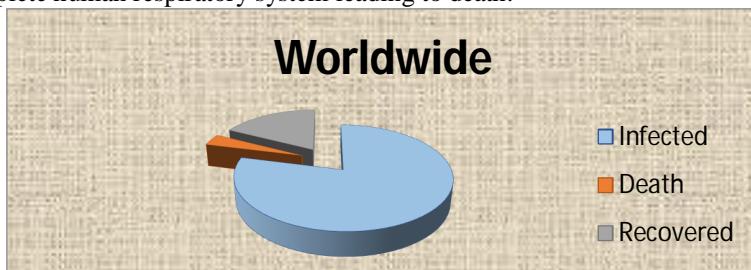
Figure - 2

Table - 1

Countries	Infected	Death	Recovered
China	81,394	3,295	74,588
Italy	86,498	9,134	10,361
USA	1,04,680	1,715	1,868
Spain	72,248	5,690	9,357
South Korea	9,478	144	4,528
France	32,964	1,995	4,948
Iran	35,408	2,517	11,133
Germany	53,340	399	5,673
Worldwide	6,21,080	28,662	1,37,363

(This data refers to as on 28-03-2020)

The main reason behind this spread is it quickly affects the people when there is direct contact between people. It spreads easily when a person sneezes or coughs without any simple preventive step to handle a hand kerchief or hold their hands close to the mouth covering him/her. Because when sneezed or coughed, the droplet of the person falls on the person on the other side and it gets spreaded on the other side person. When that person touches his/her hand on the facial parts of eyes, nose and mouth the virus gets into the other one before the droplet is dried easily. The corona virus COVID-19 needs a medium to survive and it goes easily into the human body to infect them with the symptoms of cold, cough, fever, severe head-ache, difficulties in breathing and it affects the complete human respiratory system leading to death.



Most of the European countries have failed in controlling measure of COVID-19. In spite of so many technologies development amidst this fast world, where we operate things in fingers, but people are not that much brained regarding basic disciplines. The reason behind the highest number of spread counts in USA, Spain and Italy is lack of awareness among people. They were very lethargic and also only less number of people followed the preventive measures. They might have avoided by wearing face masks, sanitizers to hands. First the people of this country didn't take it to their mind about the seriousness of the chain spread of COVID-19 and refused the measures and lived their life as usual. The World countries Government had put so much effors to control the people roaming in their streets, but due to lack of awareness and self – control, it spread vastly and it was almost the one of the reasons for the failure of the control of the pandemic.



3. Indian Scenario:

India is a country with the population of 130 million. Really it is a very huge task to control the spread of COVID-19 here. All countries which were affected previously do not have a huge population like India. The real scenario would be really bad when the situation goes beyond hand.

India is a developing country and still all the developed countries are struggling to strive for life. It is not time for India to compete with developed countries rather we can do preventive measures effectively which is the need of the hour. India recovers from this pandemic stage by stage.

3.1 Stage I: First of all, the Indian Government tried to find out the infected people. This COVID-19 has a huge spread only in the weeks of three and four. As, we were not stuck first, this data helped the Government of India to be cautious. Before it takes stand in the third and fourth weeks, the Government started its process of preventions. First the Airports were brought under total control, where all the domestic and international passengers were screened for COVID-19 and those with the symptoms were immediately quarantined and those infected were taken to the Isolation ward of Government Hospitals, specially to treat COVID-19 patients. The people who were quarantined in their home, where frequently followed by the police people to ensure their stay in home. The Government of India under Prime Minister Shri. Narendra Modi's guidance has taken effective measures to prepare the public mentally. The people of India where told be locked down completely on March 22nd,2020. The whole public of the country followed it elegantly. The event was so called "**Janta Curfew**" which means "**Stay home, stay safe**". Amidst this lockdown, the medical professionals contributed their goodness to the society and also among with them all the nurses, jaitors, corporation workers, police forces gave their selfless service to the public on that day. Indian Prime Minister requested the public to clap hands to the selfless servicing people at 5pm on that day from their home, roofs and gates. It was like a silent mission preparing the Indians mentally to face a war with an unseen enemy COVID-19.

3.2 Stage II: The next stage was stopping the unwanted transportations all over the country. All the people who entered India from February 15th, 2020 were started to be checked thoroughly with the passengers list whatever the mean of transportation may be road, water, air, rails. By taking all quicker measures 25% to 30% awareness came among the public people. All the Indian borders were closed. They started maintaining social distancing, frequent hand washing, using sanitizers, staying safe and healthy, staying at home, combat spreading, educating the community, cleanliness in cooking and taking care of each one which leads to the care of the entire society. Wearing masks were also instructed to the public while going out in the streets and roads of the country.

3.3 Stage III: All Indians are now rightly mentally and physically prepared to face the situation of the spread of COVID-19. Government initiated awareness among people using many slogans and captions.

"Stay in home and stay in peace or rest in peace".

"Be in home or be in hospital or be in photo frame".

The doctors said, "**I stayed at work for you, you stay in home for us**".



The Prime Minister of India has ordered entire lock down of the country for 21 days from March 24th, 2020 to April 14th, 2020. All the transports were completely stopped. The people must not come out for any unnecessary works other than the basic needs. May be we can call "Janta Curfew" a prior rehearsal for 21 days. This was told to be strictly implemented because, India is in the stage of week three and four as there is a huge chance of spreading COVID-19 if we are not restricting social distancing. All people were told not to come outside their home and the transport in roadways only will be carried out for emergency goods and basic needs. Restrictions for medical shops and fuel stations were given. All the grocery shops, vegetable shops, milk distributing vendors were given a time limit to meet the needs of the people of the country. However free supply of food by Government is running for the benefit of homeless people.

The Central Government of India has instructed all the State Government to follow this very strictly. Some State Government handled very brilliantly. The people got an appreciable awareness about COVID-19. Really media plays a very vital role in spreading this awareness. And all social media facebook, What's app, Twitter played a very vital role in reaching the awareness to the public very faster and the announcements from the Government too. In spite of this, states like Tamil Nadu, the Section 144 of the criminal procedure code (Cr Pc) of 1973 in the Indian Penal Code law was implemented which is like a curfew where no public can come outside their home stay and the people followed it.

3.4 Stage IV: Though so many measures are going on, upto 35% of the public are not knowing the seriousness of the spread and they come outside their home. The Indian Police force done Lathi charges on the people wherever necessary to threaten their visit outside, to the extreme they filed cases for violation of the law, vehicles of the public who roamed unnecessarily were seized, gave punishments which are harmless to the public may be like an exercise, taught them about the spread of the COVID-19, made the public to repeat the preventive measures of COVID-19 like a pledge and really it was an effort put by the Police force to the height of Mount Everest.

State Chief Ministers and District Collectors, they themselves visited the on – road streets to create the awareness to the public when buying things to maintain an one metre distance, to keep clean themselves, sanitize all the locks, switches in their own houses of the public. Containment zones have been marked and from it buzzer zones have been identified where in front of the homes stickers detailing that it is a quarantined home who are subject to be infected and no one should go inside that home or the home members should come out for no reason. Strict punishments are given for those who violate the rules. The Government implemented the drizzling of the sanitizer liquids using drones where it is impossible for the trucks or Lorries to enter in congested streets. The liquids were used two times a day morning and evening by the corporation workers.

3.5 Stage V: The co-operation is going well between the public and the Government. Information Technology sector employees are working from home and there is a chance for them to get their salary. But in India, there are lots of people who depends on daily wages and weekly wages for their survival. People arise solutions to the Government for their survival due to lock down for 21 days. Really it is a bad time for a developing country like India to compensate the fall in the country's economy. Some measures are



also taken by the Government to solve these issues. Not completely economy can be made settled in a good way, atleast it should be balanced. Government has told the banks, insurance companies not to claim EMI's for three months from the customers. Reserve Bank of India has reduced its interest rates from 5.1% to 4.4% for the small banks which are getting benefitted from them. Daily wage workers are given a certain amount of money by the Government and rice and wheat, which is the staple food of South India and North India are given for a price of 3 (INR) to the public. Some people are given money by the Government to survive depending on their economy and celebrities are contributing their funds to the public. Some Ministers have contributed their one month salary for the welfare of the public. Though, the economic situation is not that much efficient in India due to the impact of COVID-19, it can be tackled in the future, but being alive is very important currently.

4. Conclusions:

Corona virus has been unbiased by stretching its sting across the world starting from king to a lay person. Developed nations both financially and technologically are shivering by the impact of COVID-19. It is truly a challenge for a developing country like India with huge population count. We can see the health ministry along with the other departments and media working together and holding hands for a common cause of eradicating the corona virus. It is a struggling phase for India. The people whole heartedly believe that due to correct plans, proper executions and essential financial decisions, India can overcome this struggling phase and back to its original harmony.

References:

1. Coronavirus disease 2019 (COVID-19) Situation Report – 51, Data as reported by national authorities by 10 AM CET 11 March 2020
2. Ying Liu, Albert A Gayle, Annelies Wilder-Smith, Joacim Rocklöv, The reproductive number of COVID-19 is higher compared to SARS coronavirus ,*Journal of Travel Medicine*, Volume 27, Issue 2, March 2020.
3. Juliet Bedford, Delia Enria, Johan Giesecke, *David L Heymann, Chikwe Ihekweazu, Gary Kobinger, H Clifford Lane, Ziad Memish, Myoung-don Oh, Amadou Alpha Sall, Anne Schuchat, Kumnuan Ungchusak, Lothar H Wieler, COVID-19: TOWARDS CONTROLLING OF A PANDEMIC ,for the WHO Strategic and Technical Advisory Group for Infectious Hazards, Published Online March 16, 2020 [https://doi.org/10.1016/S0140-6736\(20\)30673-5](https://doi.org/10.1016/S0140-6736(20)30673-5)
4. WHO Virtual press conference on COVID-19. March 11, 2020. https://www.who.int/docs/default-source/coronavirus/transcripts/who-audio-emergencies-coronavirus-press-conference-full-and-final11mar2020.pdf?sfvrsn=cb432bb3_2 (accessed March 16, 2020).
5. WHO. A coordinated global research roadmap. 2020. <https://www.who.int/blueprint/priority-diseases/key-action/Roadmap-version-FINAL-for-WEB.pdf?ua=1> (accessed March 16, 2020).



6. WHO Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). February, 2020. <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf> (accessed March 13, 2020).
7. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020; published online Feb 24. DOI:10.1001/jama.2020.2648.
8. Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med* 2020; 382: 970–71.
9. The National Institute of Infectious Diseases, Japan. Field briefing: Diamond Princess COVID-19 cases. Feb 19, 2020. <https://www.niid.go.jp/niid/en/2019-ncov-e/9407-covid-dp-fe-01.html> (accessed March 16, 2020).
10. Zou L, Ruan F, Huang M, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *New Engl J Med* 2020; published online Feb 19. DOI:10.1056/NEJMc2001737.
11. Kim JY, Ko JH, Kim Y, et al. Viral load kinetics of SARS-CoV-2 infection in first two patients in Korea. *J Korean Med Sci* 2020; 35: e86. 10 Public Health King County, Seattle. Update: increasing King County COVID-19 case numbers for March 10, 2020 point to importance of social distancing. March 10, 2020.
12. WHO. 2019 Novel Coronavirus (2019-nCoV): strategic preparedness and response plan. February, 2020. <https://www.who.int/docs/default-source/coronaviruse/srp-04022020.pdf> (accessed March 16, 2020).



IN SILICO ANALYSIS OF THE PEPPERMINT AS POTENTIAL BIOPESTICIDE

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ABSTRACT

As aboriginal sources of medications, medicinal plants are used from the ancient times. *Andrographis paniculata* is one of the highly used potential medicinal plants in the world. This plant is traditionally used for the treatment of common cold, diarrhoea, fever due to several infective cause, jaundice, as a health tonic for the liver and cardiovascular health, and as an antioxidant. It is also used to improve sexual dysfunctions and serve as a contraceptive. All parts of this plant are used to extract the active phytochemicals, but the compositions of phytoconstituents widely differ from one part to another and with place, season, and time of harvest. We are using this property of Peppermint to get some new drugs for Graymold. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. In-silico analysis has done using software and we further targeted some of the genes responsible for Graymold and pharmacophores from Peppermint and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others. From this we can deduce that these two pharmacophores can be a solution to Lung Cancer in near future. Complementary and alternative medicine (CAM) is a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine. As cancer incidence rates and survival time increase, use of CAM will likely increase. However, little is known about the use of CAM in cancer patients, specifically in emerging countries.

KEY WORDS: Peppermint, Docking, In Silico Analysis, Graymold, Pharmacophore

INTRODUCTION

Emergence and spread of antibiotic resistance among pathogenic bacteria represents a major obstacle in the treatment of infectious diseases. Antimicrobial resistance (AMR) is a global health problem associated with increased morbidity and mortality. Factors associated with it are well documented and known, but unfortunately the root causes of it continue to be ignored. There are several reasons for the development of AMR. One of the most important is antibiotic overuse/and or improper use of antimicrobials that make the development and spread of resistance much more likely. Inadequate clinical diagnosis of an infection combined with the prescribing of improper antimicrobials



contributes to selective pressure and accelerates AMR. Moreover, the practice of adding antibiotics to agricultural feed promotes drug resistance. More than half of the antibiotics produced in the United States are used for agricultural purposes (**Hao et al., 2014; WHO, 2015a**). Developing countries are inequitably affected by leading infectious disease killers. Not only do we blame emerging infectious disease organisms, but resistant ones affecting populations where public health infrastructure is fragmented, vaccines are not readily available, there is the existence of substandard and counterfeit drugs, a lack of access to health-care services, and poor health-care seeking behaviour (**Sosa, 2004**). Many studies have reported that bacteria have developed resistance because of prolonged treatment with conventional antibiotics possessing a broad-range efficacy via toxic or growth- inhibitory effects on target organisms, rendering the traditional antibiotic treatment virtually ineffective (**Xavier and Bassler, 2003**). Therefore, there is increased demand for the development of alternative strategies to conventional antibiotic therapy (**Zeng et al., 2008**). Unfortunately, continuous increases in the global isolation rates of methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-resistant *Staphylococcus epidermidis* (MRSE) and carbapenem-resistant Gram-negative bacilli clinical isolates poses a serious therapeutic problem because no new antimicrobial agents are currently available for treatment of infected patients (**WHO, 2015a; Elabd et al., 2015; Asaad et al., 2013**). For medicinal purposes, the antimicrobial activity of substances derived from plant extracts has been recognized and widely studied for many years (**Mohamed et al., 2015; Hamoud et al., 2012**). *Mentha piperita* L., a medicinally important plant that belongs to the family Lamiaceae and is commonly known as peppermint, is a hybrid of *Mentha spicata* L. (spearmint) and *Mentha aquatic*. It was cultivated by the ancient Egyptians and documented in the Icelandic pharmacopoeia of the 13th Century. It is widely grown in temperate areas of the world, particularly in Europe, North America and North Africa, but is nowadays cultivated throughout all regions of the world (**Singh et al., 2011**). It is primarily cultivated for its oil, which is extracted from the leaves of the flowering plant. Peppermint oil is used for flavouring pharmaceuticals and oral preparations, such as tooth- pastes, dental creams and mouth washes. Higher and aromatic plants have traditionally been used in folk medicine as well as to extend the shelf life of food, showing inhibition against bacteria, fungi and yeast. Most of their properties are due to essential oils produced as secondary metabolites (**Saeed et al., 2006; Fabio et al., 2007; Bansod and Rai, 2008; Jeyakumar et al., 2011**). *Mentha piperita* (Lamiaceae), the peppermint (mint) plant is an aromatic perennial herb cultivated in most part of the world, have traditionally been used in folk medicine. Leaves of mint plant are frequently used in herbal tea and for culinary purpose to add flavour and aroma. The distinctive smell and flavour, a characteristic feature of *Mentha spp.* is due to the naturally occurring cyclic terpene alcohol called menthol. Menthol is prescribed as a medication for gastrointestinal disorders, common cold and musculoskeletal pain (**Patil et al., 2007**). The mint plants are rich sources of iron and magnesium, which play important role in human nutrition (**Arzani et al., 2007**). A large volume of literature is available on the medicinal properties of essential oils present in *Mentha spp.* (**Gulluce et al., 2007; Rasooli, 2008**). However, no much study has been directed toward the antioxidant and antimicrobial properties of the mint leaves which are locally available.



Botrytis cinerea is a necrotrophic fungus that affects many plant species, although its most notable hosts may be wine grapes. In viticulture, it is commonly known as "botrytis bunch rot"; in horticulture, it is usually called "grey mould" or "graymold". The fungus gives rise to two different kinds of infections on grapes. The first, grey rot, is the result of consistently wet or humid conditions, and typically results in the loss of the affected bunches. The second, noble rot, occurs when drier conditions follow wetter, and can result in distinctive sweet dessert wines, such as Sauternes or the Aszú of Tokaji/Grasă de Cotnari. The species name *Botrytis cinerea* is derived from the Latin for "grapes like ashes"; although poetic, the "grapes" refers to the bunching of the fungal spores on their conidiophores, and "ashes" just refers to the greyish colour of the spores *en masse*. The fungus is usually referred to by its anamorph (asexual form) name, because the sexual phase is rarely observed. The teleomorph (sexual form) is an ascomycete, *Botryotinia fuckeliana*, also known as *Botryotinia cinerea*. The disease, graymold, affects more than 200 dicotyledonous plant species and a few monocotyledonous plants found in temperate and subtropical regions. Serious economic losses can be a result of this disease to both field and greenhouse grown crops. The causal agent, *Botrytis cinerea* can infect mature or senescent tissues, plants prior to harvest, or seedlings. There is a wide variety of hosts infected by this pathogen including protein crops, fiber crops, oil crops, and horticultural crops. Horticultural crops include vegetables (examples are chickpeas, lettuce, broccoli, and beans) and small fruit crops (examples are grape, strawberry, and raspberry), these are most severely affected and devastated by graymold. Plant organs affected include fruits, flowers, leaves, storage organs, and shoots.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Graymold using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The In-silico analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

Table 1: The list of pharmacophores and the targeted genes from Graymold

Sl.N o	Pharmacophores from Peppermint	Targeted Genes from Graymold	PDB No of the Genes
1	Menthone	Mannitol-1-phosphate 5-dehydrogenase	5JNM
2	Beta Pinene	Deoxyribodipyrimidine photolyase	3UMV
3	Menthofuran	Mannitol-1-phosphate 5-dehydrogenase	3H2Z
4	1,8cineole	Deoxyribodipyrimidine Photolyase	2J08

Protein identification and preparation

The reported molecular targets responsible for Graymold are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were



prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

Active site identification

The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

Ligand preparation and filtration

A collection of 5 phytocompounds from Peppermint were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al., 2001**). The filtered compounds were then used for docking analysis.

Docking

The anti-inflammatory activity of all the 4 phytochemicals reported from Peppermint was assessed by docking these compounds against the respective active sites of the target proteins. Discovery studio 4.0 was used in this study to find the interacting compounds of Peppermint with the selected targets of arthritis. Strategies of Discovery Studio 4.0 are to exhaustively dock or score possible positions of each ligand in the binding site of the proteins. Docking study of the target proteins was done with natural compounds derived from Peppermint to find the preferred orientation and binding affinity of the compounds with each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER was used to score the interacting compounds. This method uses a gridbased representation of the protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness: Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The

molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

Protein preparation and active site identification

The three dimensional structures of the identified target proteins were retrieved from the protein data bank. PDB ID of the targeted protein structure are mentioned in Table 1.

Ramachandran Plot of the targeted gene

The Ramachandran plot is among the most central concepts in structural biology, seen in publications and textbooks alike. However, with the increasing numbers of known protein structures and greater accuracy of ultra-high resolution protein structures, we are still learning more about the basic principles of protein structure. The use of torsion angles to describe polypeptide and protein conformation was developed by Sasisekharan as part of his studies of the structure of collagen chains during his work as a graduate student in the research group of G.N. Ramachandran. The power of this approach was readily apparent and its use quickly became widespread. Using revised definitions, this so-called Ramachandran plot or ϕ , ψ -plot has remained nearly unchanged in the ensuing fifty years and continues to be an integral tool for protein structure research and education.

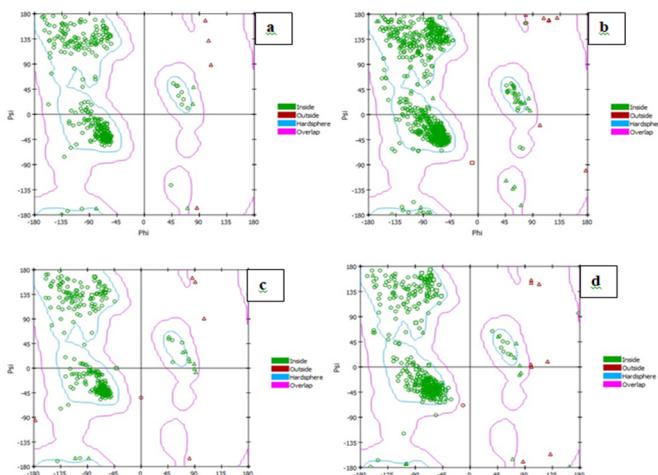


FIGURE 1: Ramachandran plot of (a) 5JNM (b) 3UMV (c) 3H2Z (d) 2J08

Hydrophobicity Plot of the Genes:

Protein–protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein–protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop hydrophobicity scales (for example, compatible with classical force fields (CFF) in calculating the energetics of protein folding) have encountered many difficulties.

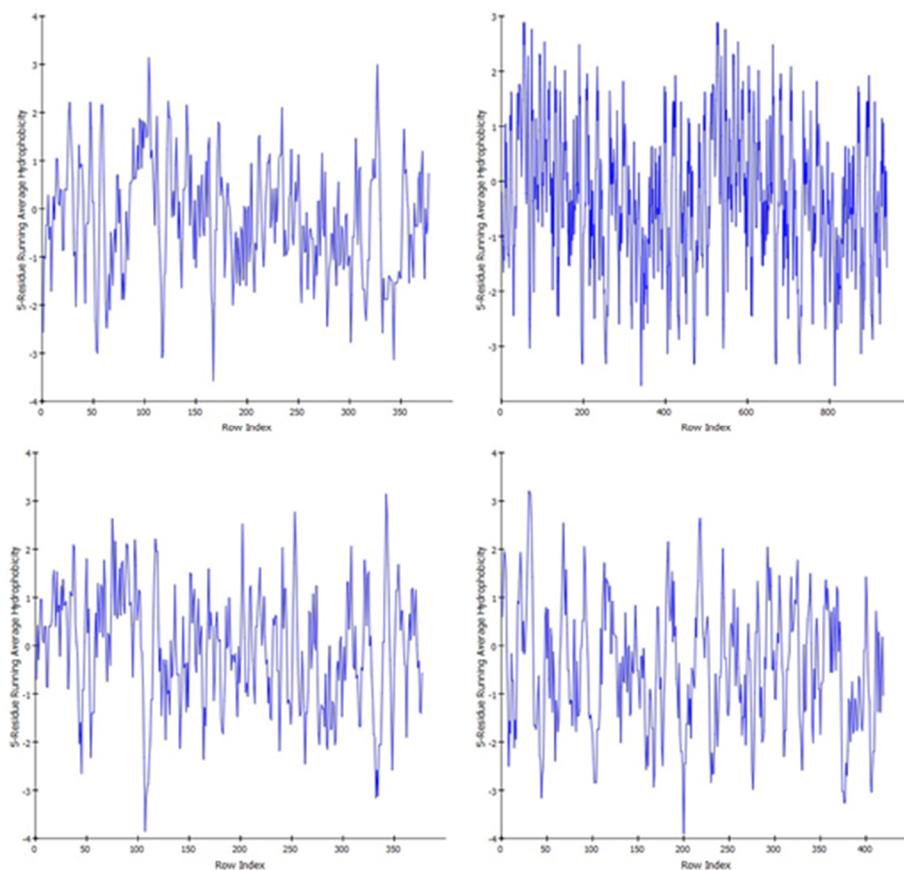


FIGURE 2: Hydrophobicity Plot of (a) 5JNM (b) 3UMV (c) 3H2Z (d) 2J08

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Breast administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared

to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.

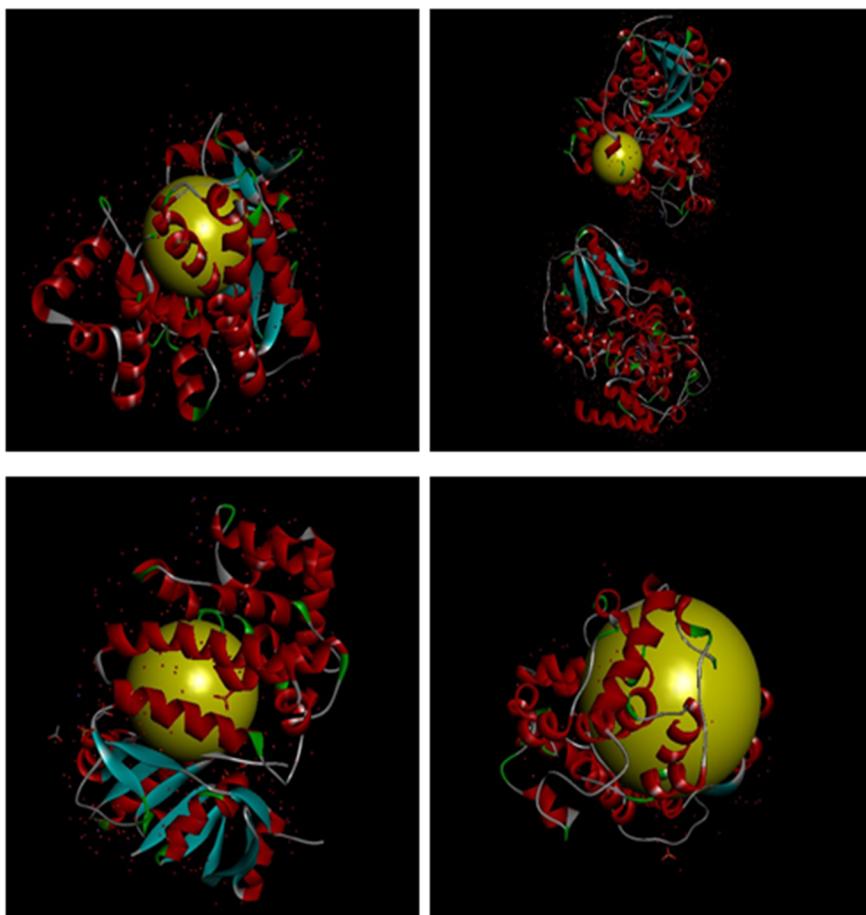


FIGURE 3: Docking Result of (a) 5JNM (b) 3UMV (c) 3H2Z (d) 2J08

ADMET Evaluation

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights in to the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharamacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

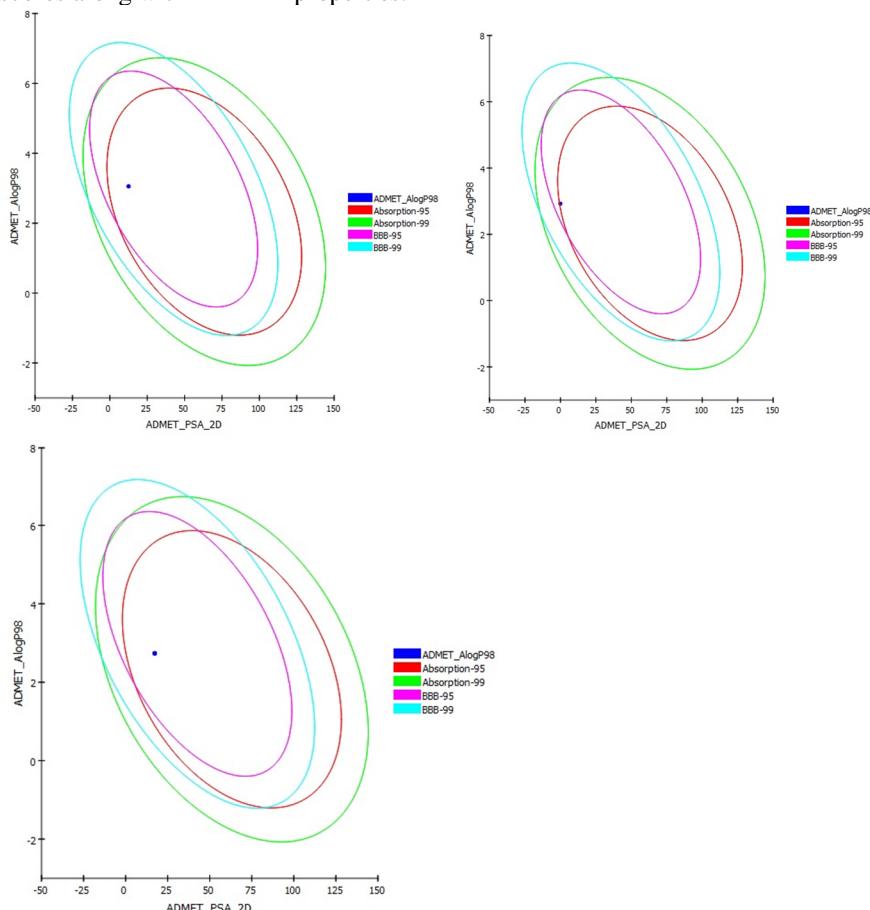


FIGURE 4: ADMET analysis report



CONCLUSION

CSCs typically exhibit three key characteristics, which are not mutually exclusive. Firstly, CSCs are highly tumorigenic and can form tumours in immune-deficient mice through xenotransplantation, which is not possible for non-CSCs. Secondly, CSCs that survive chemotherapy and radiotherapy generate resistance to such therapies through regulating intracellular stress; for example, regulating reactive oxygen species, which non-CSCs cannot. Thirdly, CSCs possess metastatic potential, illustrated by a report that CSCs have the ability to metastasize. The identified pharmacophores can be isolated from the Peppermint and can be commercialized as the natural drug for the Graymold which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products. The unique feature of the study is to targeted gene therapy for a particular cancer. This will help our future medicine to be completely allied to the Pharmacophores and the uses of synthetic and carcinogenic drug will reduce.

REFERENCES

- Alan J. Magill (2013). Hunter's tropical medicine and emerging infectious diseases (9th ed.). London: Saunders/Elsevier. pp. 568–572. ISBN 9781455740437. Archived from the original on 2017-02-28.
- Anna E. Newton (2014). "3 Infectious Diseases Related To Travel". CDC health information for international travel 2014 : the yellow book. ISBN 9780199948499. Archived from the original on 2015-07-02.
- Arzani A, Zein Ali H, Razmjoo K (2007). Iron and magnesium concentrations of mint accessions (*Mentha* spp.). *Pl. Physiol. Bioch.*, 45: 323-329.
- Asaad, A.M., Al-Ayed, M.S., Qureshi, M.A., 2013. Emergence of unusual nonfermenting gram-negative nosocomial pathogens in a Saudi Hospital. *Jpn. J. Infect. Dis.* 66, 507–511.
- Bansod, S., Rai, M., 2008. Antifungal activity of essential oils from Indian medicinal plants against pathogenic *Aspergillusfumigatus* and *A. niger*. *J Med Sci.* 3, 81–88.
- Chatham-Stephens K, Medalla F, Hughes M, Appiah GD, Aubert RD, Caidi H, et al. (January 2019). "Emergence of Extensively Drug-Resistant *Salmonella Typhi* Infections Among Travelers to or from Pakistan - United States, 2016-2018". *MMWR. Morbidity and Mortality Weekly Report.* 68 (1): 11–13. doi:10.15585/mmwr.mm6801a3. PMC 6342547. PMID 30629573.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Elabd, F.M., Al-Ayed, M.S., Asaad, A.M., Alsareii, S.A., et al., 2015. Molecular characterization of oxacillinases among carbapenem-resistant *Acinetobacter baumannii* nosocomial isolates in a Saudi hospital. *J. Infect. Public Health* 8, 242–247.
- Fabio, A., Cermelli, C., Fabio, G., Nicoletti, P., Quaglio, P., 2007. Screening of the antibacterial effects of a variety of essential oils on microorganisms responsible for respiratory infection. *J. Phytother. Res.* 21, 374–377.
- Gulluce M, Sahin F, Sokmen M, Ozer H, Daferara D, Sokmen A, Polissiou M, Adiguzel A, Ozkan H (2007). Antimicrobial and antioxidant properties of the essential oils and methanol extract from *Mentha longifolia* L. ssp. *longifolia*. *Food Chem.*, 104(4): 1449-1456.
- Hamoud, R., Sporer, F., Reichling, J., Wink, M., 2012. Antimicrobial activity of a traditionally used complex essential oil distillate (OlbasTropfen) in comparison to its individual essential oil ingredients. *Phytomedicine* 19, 969–976.
- Hao, H., Cheng, G., Iqbal, Z., Hussain, H.I., Huang, L., Dai, M., et al., 2014. Benefits and risks of antimicrobial use in food-producing animals. *Front. Microbiol.* 5, 288–298.
- Jeyakumar, E., Lawrence, R., Pa, T., 2011. Comparative evaluation in the efficacy of peppermint (*Mentha piperita*) oil with standards antibiotics against selected bacterial pathogens. *Asia. Pac. J. Trop. Biomed.* S253–S257.



- Kumar P, Kumar R (March 2017). "Enteric Fever". Indian Journal of Pediatrics. 84 (3): 227–230. doi:10.1007/s12098-016-2246-4. PMID 27796818.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv. Drug Deliv.*, 46(1-3):3-26.
- Mohamed, H.S.A.A., Abdelgadir, W.S., Almagboul, A.Z.I., 2015. In vitro antimicrobial activity of Anise seed (*Pimpinellaanisum* L.). *Int. J. Adv. Res.* 3, 359–367.
- Patil T, Ishiiji Y, Yosipovitch G (2007). Menthol: A refreshing look at this compound. *J. Am. Acad. Dermatol.*, 57: 873-878.
- Rasooli I (2008). Dental Biofilm prevention by *Mentha spicata* and *Eucalyptus camaldulensis* essential oils. *Int. J. Infect. Dis.*, 12(1): 167.
- Singh, R., Shushni, M.A.M., Belkheir, A., 2011. Antibacterial and antioxidant activities of *Mentha piperita* L. *Arab. J. Chem.* 8, 322–328.
- Sosa, A., 2004. Antibiotic policies in developing countries. In: Gould, I.M., van der Meer, J.W.M. (Eds.), *Antibiotic Policies: Theory and Practice*. Springer, New York, pp. 766.
- Sosa, A., 2010. Containment of antimicrobial resistance in developing countries and lessons learned. In: Sosa, A., Byarugaba, D.K., Amabile-Cuevas, C.F., Hsueh, P., Kariuki, S., Okeke, I.N. (Eds.), *Antimicrobial Resistance in Developing Countries*. Springer, pp. 447–461.
- Vos, Theo; Allen, Christine; Arora, Megha; Barber, Ryan M.; et al. (October 2016). "Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015". *Lancet.* 388 (10053): 1545–1602. doi:10.1016/S0140-6736(16)31678-6. PMC 5055577. PMID 27733282.
- Wang, Haidong; Naghavi, Mohsen; Allen, Christine; Barber, et al. (October 2016). "Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015". *Lancet.* 388 (10053): 1459–1544. doi:10.1016/s0140-6736(16)31012-1. PMC 5388903. PMID 27733281.
- World Health Organization (WHO), 2015. Sixty-eight World Health Assembly. Agenda item 15.1. A68/A/CONF.1 Rev.1. Global action plan on antimicrobial resistance. 25 May 2015. http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_ACONF1Rev1-en.pdf?ua=1.
- World Health Organization. Meeting of the Strategic Advisory Group of Experts on Immunization, October 2017—conclusions and recommendations. *Wkly Epidemiol Rec* 2017; 92:729–47.
- W. Li, X. Xu, H. Zhang et al., "Secondary metabolites from *Andrographis paniculata*," *Chemical and Pharmaceutical Bulletin*, vol. 55, no. 3, pp. 455–458, 2007.
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.
- Xavier, K.B., Bassler, B.L., 2003. Lux Squorumsensing: more than just a numbers game. *Curr. Opin. Microbiol.* 6, 191–197.
- Yap KP, Ho WS, Gan HM, Chai LC, Thong KL (2016). "Global MLST of *Salmonella Typhi* Revisited in Post-genomic Era: Genetic Conservation, Population Structure, and Comparative Genomics of Rare Sequence Types". *Frontiers in Microbiology*. 7: 270. doi:10.3389/fmicb.2016.00270. PMC 4774407. PMID 26973639.
- Zeng, Z., Qian, L., Cao, L., Tan, H., Huang, Y., Xue, X., et al., 2008. Virtual screening for novel quorum sensing inhibitors to eradicate biofilm formation of *Pseudomonasaeruginosa*. *Appl. Microbiol. Biotechnol.* 79, 119–126.



A STUDY ON THE PERCEPTION OF CITIZENS OF INDIA ON COVID-19

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Abstract

The Covid-19, a virus that has shook the entire world, through spread in lakhs on human beings and other side growing deaths. The government of affected countries are taking precautions measures to spread of Covid-19 and is declared as pandemic by World Health Organisation on 11 March 2020. The present paper is a research study made after 20 days of 'Lock Down' about the perception of citizens with regard to the initiatives taken by the government to break the spread of covid-19 and end it in Telangana state and India as whole.

Keywords: Covid-19, Perception, Corona Virus, precautions, government

Introduction

Covid-19 is also called as 'Novel Corona Virus' (SARS-CoV), belonging to family *Coronaviridae* within the order *Nidovirales*. This pandemic made all the countries to take precautions to break the spread and save themselves. Director General, World Health Organisation declared the outbreak of novel corona virus on 30th January, 2020 that constitutes a public health emergency of international concern by the advice of International Health Regulations Emergency Committee. World Health Organisation issued guidelines i.e. to trace the people suffering Corona virus symptoms, test and treat them.

India's first corona virus was found in Kerala, a student who had returned from Wuhan city, China. To detect the virus, tests are being conducted at National Institute of Virology, Pune, and expecting the increase of spread in other parts of country, government of India set up initial 12 additional labs at various places of India. In order to break spread Prime Minister Mr. Narendra Modi took initiations and declared Janata Curfew on 23rd March, 2020 and at 5pm all citizens clapped recognising services of doctors and others. On the very next day Prime Minister has taken decision to impose Lock Down for a period of 21 days nationwide from March 24th, 2020 to 14th April, 2020 to prevent the virus spread as there is no medicine/vaccine. The transport like railways, roadways including International & National flights are cancelled in India. On 4th April 2020 Prime Minister asked citizens to switch off only lights at 9pm for 9 minutes and light up diya or candles or mobile flashlights.

In Telangana, Chief Minister Mr. K.Chandrashekhar Rao taken initiation before Lock Down by closure of schools, colleges, universities from 15th March 2020 itself, Lock Down was initiated after the words of Prime Minister strictly, by closure of malls, theatres, industries, temples, mosques, churches, parks, private hospitals, stadiums, bars



& restaurants, wine shops and other places where there is a chance to form crowds and made people to stay safe in houses. Only emergency services like doctors, nurses, ANM, Police, Municipality workers and other government officials were assigned duties in addition to regular responsibilities.

The Government of India has launched mobile app on 2nd April, 2020 ‘Arogya Setu’ to enable people to assess the risk of Covid-19 infection with a tracker to know about infected and perform self assessment.

Preventive measures by Government for the public against the Covid-19

- Avoid physical greetings and have a safe greeting like Namaste, wave or nod.
- Wash your hands frequently with alcohol based hand sanitizer or with any soap for a period of 20 seconds under flowing water.
- Maintain social distancing at least one metre between yourself and other.
- Avoid touching eyes, nose and mouth if virus is in contact to hands may enter your body.
- Practicing the good respiratory hygiene by covering your mouth and nose with your bent elbow or tissue when you cough or sneeze, then dispose off in a safe place of the used tissue immediately.
- Seek immediate medical care if symptoms of fever, cough and difficulty in breathing found.

Objectives of the study

1. To study about the information awareness about Covid-19 in Telangana state.
2. To know about the precautions being followed.
3. To study about the problems being faced during Lockdown Period.

DATA COLLECTION

The research study consists of collection of Primary and secondary data to capture quality evidence for the analysis.

Primary Data:

The primary data is collected from a sample size of 121 respondents from Telangana state about their perceptions with regard to government initiatives and preventive measures through a well framed questionnaire.

Secondary Data:

It helps to improve the understanding of the problem. Secondary data was collected from various websites providing information about Covid-19.

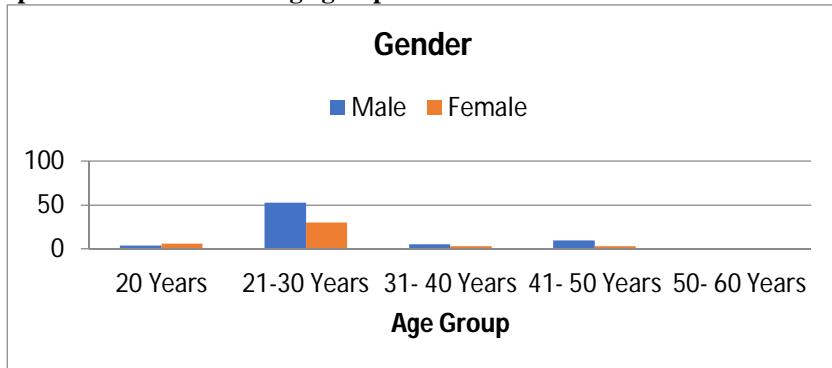
LIMITATIONS

- The research was done only in Telangana state through online questionnaire by randomly selecting the participants from different locations as the Lock Down condition is all over the country.
- Data was collected online in Google forms, so personal contact was not present at the time of collecting data.

DATA ANALYSIS AND INTERPRETATION:

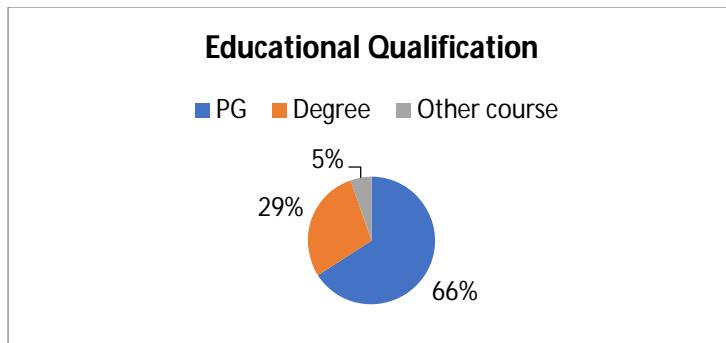
Percentage analysis is used as the descriptive statistical measures to describe the characteristics of the sample population. Percentage analysis computes the measures of variables selected for the study and its finding will give easy interpretation.

1. Respondents Gender and Age groups



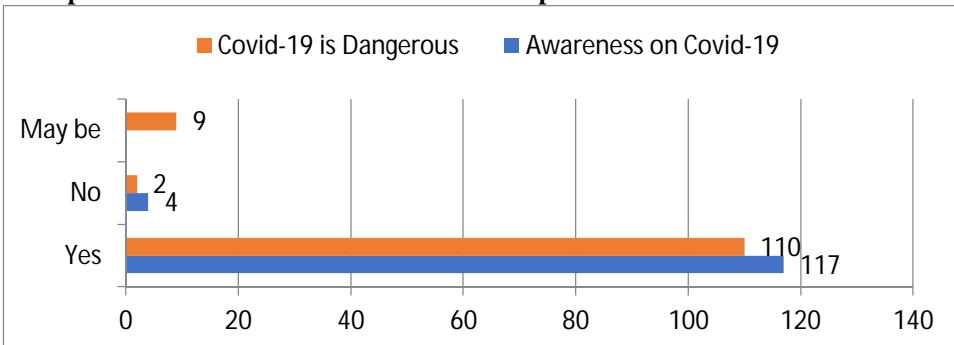
Interpretation: From the graph it was found that 62% of males and 38% females responded on the questionnaire. online questionnaire was served to answered respondents

2. Respondents Educational Qualification



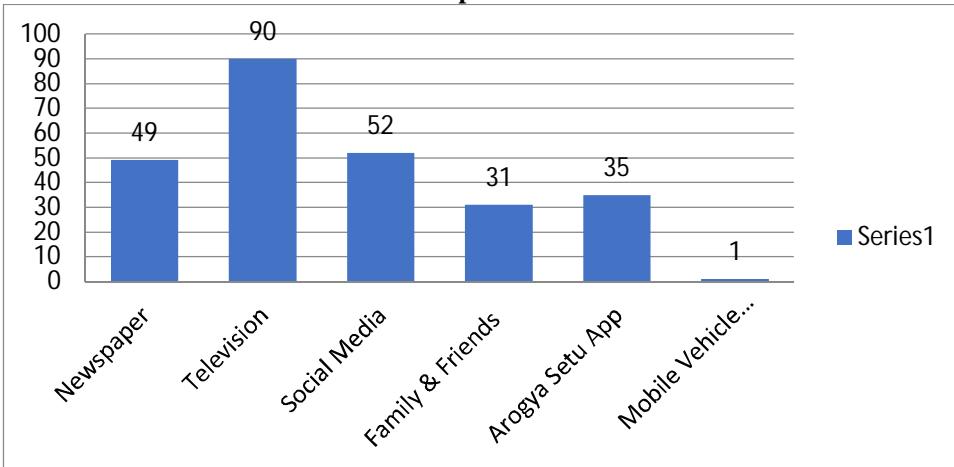
Interpretation: It was found that 66.1% of respondents were studying PG, 28.1% studied Degree and remaining 5.8% studied other courses. It means the respondents are well educated to respond. So, there is less chance of error.

3. Respondents awareness on Covid-19 & its impact on human life.



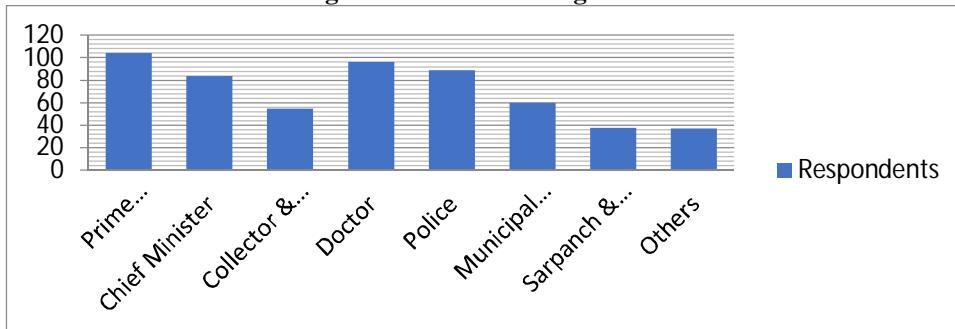
Interpretation: It was found 96.7% of respondents were aware about the Corona Virus and only 3.3% are unaware. 90.9% of respondents opined that corona virus is dangerous to human life, 7.4 % were not exact and 1.7% said that it was not that dangerous to human life.

4. Sources of Covid -19 information & Updates?



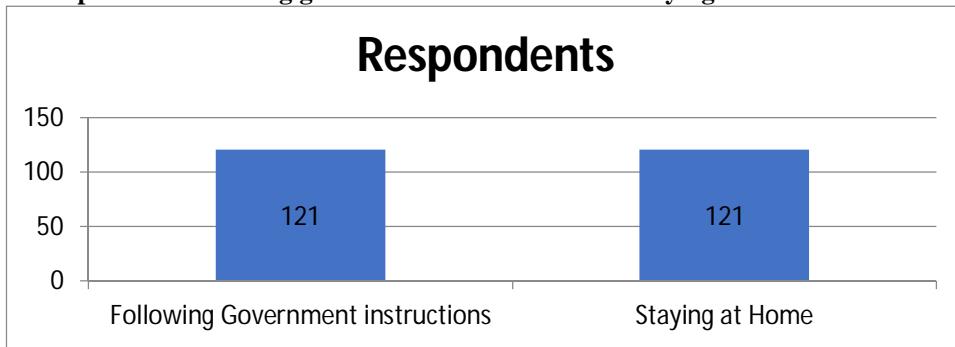
Interpretation: It was analysed that the information on the Covid-19 is provided by various modes like Television opined by 75% of respondents as people are staying in houses and for entertainment they are watching News, movies, Shows etc., and getting updates and safety measures to be taken frequently, 50% of respondents are using smart phones and getting information on social media, 41.7% of respondents are reading News paper,30% through Arogya Setu APP and 27.5% from family and friends.

5. Who are involved in taking effective measures against Covid-19?



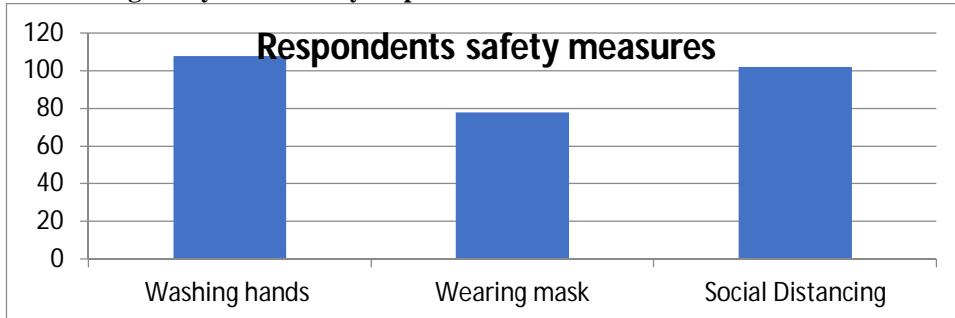
Interpretation: 86.7% of respondents opined that Prime Minister has taken effective measures for the safety of nation, 76.7 % mentioned Doctors are treating patients affected by Virus and advising the rest of citizens precautions & safety, 70% said that Telangana state Chief Minister is framing Lockdown strategies, taking spontaneous decisions, involving each and every politician and government officials and providing various facilities and services to common public required for survival, 69.2% opined on Police in implementing the Lock Down rules and regulations and controlling public in all the ways possible by requesting and even sometimes taking strict actions against who are irresponsible, 50% opined on Municipal staff for regular maintenance of hygienic conditions , 45.8% opined for collector and is sub ordinates in implementing government decisions,31.7 % opined of sarpanch and Gram panchayat staff at rural areas and 16.7% by volunteers.

6. Respondents following government instructions and staying at home.



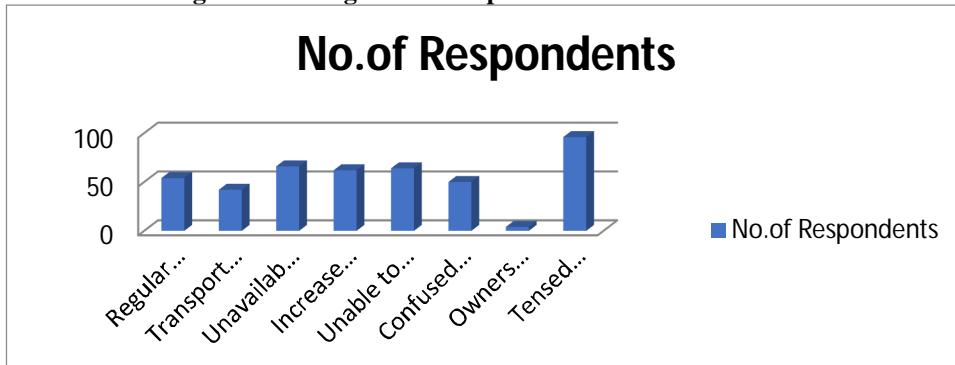
Interpretation: 100% of respondents mentioned they are following the instructions given by government and staying at home.

7. Following safety measures by respondents



Interpretation: It was analysed that 90.8% of respondents are washing hands frequently, 85% of respondents are maintaining social distancing and 64.2 % of respondents are wearing masks while coming out of their houses.

8. Problems being faced during lock down period



Interpretation: It was analysed from the data that many of the respondents are facing problems due to Lock Down as well as fear of Corona Virus. 24.1% of respondents said they were unable to go to hospitals in private for regular check up of self and their family members since the private hospitals were closed and were depending on pharmacists for treatment apart from symptoms of covid-19. 18.8% of respondents said they were facing transportation problems to move during limited hours to get groceries and vegetables etc as they were residing in far places to shops. 29.5 % respondents mentioned the prices of masks and sanitizers increased and were unavailable in market. 57.1 % respondents said the prices of groceries , vegetables etc increased and unaffordable. 42.9 % respondents were afraid of spread of Corona virus and its dangers. 28.6% respondents were unable to visit their family and friends during emergencies.



Findings:

The findings of the were based upon the opinions collected from the respondents:

- Respondents opined that they are aware of corona virus and it will affect the lungs and is dangerous to the human life and is related to Severe Acute Respiratory Syndrome family (SARS-CoV).
- Many respondents opined that Prime Minister is taking effective measures for the safety of nation by Lock Down which can stop the spread in community.
- Respondents opined that Telangana Chief Minister has designed strategy to fight virus spread, and monitoring situation day to day.
- It was found from the opinion of respondents that doctors are playing key role by treating patients to save lives and providing information on safety and daily routine to be followed.
- Respondents opined that Police Department is also playing vital role in controlling public and tracing people infected by requesting and sometimes taking strict actions against irresponsible people.
- Respondents said that Municipal Corporation staff are keeping premises clean and also spraying the disinfected liquids and available 24 hours and the same is followed by Sarpanch and Gram panchayat staff in rural.
- Respondents said they are strictly following precautions like use of masks and sanitizers but unavailability of stock is found at the time of repurchase.
- Respondents said that medicines like B complex and Vitamin C are unavailable at medical stores for immunity against corona virus, suggestion of doctors.
- It was found that the information on the Covid-19 is disseminated effectively by television rather than smart phones and social media. the remaining coverage is with news papers, and only least number are using Arogya Setu APP.
- Urban respondents opined that they are in stress due to residing near to infected area.
- Respondents from rural areas opined they are not in any stress and leading normal life by doing their agricultural works, dairy farms etc by taking precautions and blocked the entry of others in to the villages.
- Respondents purchased the commodities sufficient for 3 months leading to no stock situation to others on selected products.
- It was found the people habituated to drink alcohol regularly are facing the problem of withdrawal syndrome.
- It was found respondents were facing problems related to their jobs, family & self regular health checkups, increased prices; owner's pressuring tenants to vacate, unable to help relatives & friends during emergencies etc.

Conclusion:

It can be concluded that the Corona virus is pandemic and can be controlled by self safety and social distancing till a drug or vaccine is made. All Citizens are following



self safety and family safety. Prime Minister, Chief Minister, politicians, Doctors & health workers, Police, Municipal workers and other government officials are playing a key role in stopping the spread of corona virus. Research laboratories and pharma companies are working seriously to find drug or vaccine. Many of the industrialists, celebrities and rich people are donating funds and promoting precautionary messages give by WHO to fight against covid-19. The government is working seriously on building isolation wards, providing PPE kits and medicines, identifying hotspots and declaring containment zones to break the corona chain, setting control rooms, helpline centres, diagnosis laboratories, surveillance centres etc to end the spread of Corona virus.

References:

- <https://www.mygov.in/covid-19/>
- <https://www.who.int/india/emergencies/novel-coronavirus-2019>
- <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>
- <https://www.who.int/india/emergencies/india-situation-report>
- https://www.who.int/docs/default-source/wrindia/india-situation-report-1.pdf?sfvrsn=5ca2a672_0
- <https://cmr.asm.org/content/20/4/660>



IN SILICO ANALYSIS OF THE PEPPERMINT AS TARGETED THERAPY FOR TYPHOID

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ABSTRACT

As aboriginal sources of medications, medicinal plants are used from the ancient times. *Andrographis paniculata* is one of the highly used potential medicinal plants in the world. This plant is traditionally used for the treatment of common cold, diarrhoea, fever due to several infective cause, jaundice, as a health tonic for the liver and cardiovascular health, and as an antioxidant. It is also used to improve sexual dysfunctions and serve as a contraceptive. All parts of this plant are used to extract the active phytochemicals, but the compositions of phytoconstituents widely differ from one part to another and with place, season, and time of harvest. *Salmonella enterica* subspecies enterica serovar Typhi (*Salmonella Typhi*) is the cause of typhoid fever and a human host-restricted organism. Our understanding of the global burden of typhoid fever has improved in recent decades, with both an increase in the number and geographic representation of high-quality typhoid fever incidence studies, and greater sophistication of modeling approaches. The 2017 World Health Organization Strategic Advisory Group of Experts on Immunization recommendation for the introduction of typhoid conjugate vaccines for infants and children aged >6 months in typhoid-endemic countries is likely to require further improvements in our understanding of typhoid burden at the global and national levels. Furthermore, the recognition of the critical and synergistic role of water and sanitation improvements in concert with vaccine introduction emphasize the importance of improving our understanding of the sources, patterns, and modes of transmission of *Salmonella Typhi* in diverse settings.

KEY WORDS: Peppermint, Docking, In Silico Analysis, Typhoid, Pharmacophore

NTRODUCTION

Emergence and spread of antibiotic resistance among pathogenic bacteria represents a major obstacle in the treatment of infectious diseases. Antimicrobial resistance (AMR) is a global health problem associated with increased morbidity and mortality. Factors associated with it are well documented and known, but unfortunately the root causes of it continue to be ignored. There are several reasons for the development of AMR. One of the most important is antibiotic overuse/and or improper use of antimicrobials that make the development and spread of resistance much more likely. Inadequate clinical diagnosis of an infection combined with the prescribing of improper antimicrobials contributes to selective pressure and accelerates AMR. Moreover, the practice of adding antibiotics to agricultural feed promotes drug resistance. More than half of the antibiotics produced in the United States are used for agricultural purposes (Hao et al.,



2014; WHO, 2015a). Developing countries are inequitably affected by leading infectious disease killers. Not only do we blame emerging infectious disease organisms, but resistant ones affecting populations where public health infrastructure is fragmented, vaccines are not readily available, there is the existence of substandard and counterfeit drugs, a lack of access to health-care services, and poor health-care seeking behaviour (**Sosa, 2004**). Many studies have reported that bacteria have developed resistance because of prolonged treatment with conventional antibiotics possessing a broad-range efficacy via toxic or growth- inhibitory effects on target organisms, rendering the traditional antibiotic treatment virtually ineffective (**Xavier and Bassler, 2003**). Therefore, there is increased demand for the development of alternative strategies to conventional antibiotic therapy (**Zeng et al., 2008**). Unfortunately, continuous increases in the global isolation rates of methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-resistant *Staphylococcus epidermidis* (MRSE) and carbapenem-resistant Gram-negative bacilli clinical isolates poses a serious therapeutic problem because no new antimicrobial agents are currently available for treatment of infected patients (**WHO, 2015a; Elabd et al., 2015; Asaad et al., 2013**). For medicinal purposes, the antimicrobial activity of substances derived from plant extracts has been recognized and widely studied for many years (**Mohamed et al., 2015; Hamoud et al., 2012**). *Mentha piperita* L., a medicinally important plant that belongs to the family Lamiaceae and is commonly known as peppermint, is a hybrid of *Mentha spicata* L. (spearmint) and *Mentha aquatic*. It was cultivated by the ancient Egyptians and documented in the Icelandic pharmacopoeia of the 13th Century. It is widely grown in temperate areas of the world, particularly in Europe, North America and North Africa, but is nowadays cultivated throughout all regions of the world (**Singh et al., 2011**). It is primarily cultivated for its oil, which is extracted from the leaves of the flowering plant. Peppermint oil is used for flavouring pharmaceuticals and oral preparations, such as tooth- pastes, dental creams and mouth washes. Higher and aromatic plants have traditionally been used in folk medicine as well as to extend the shelf life of food, showing inhibition against bacteria, fungi and yeast. Most of their properties are due to essential oils produced as secondary metabolites (**Saeed et al., 2006; Fabio et al., 2007; Bansod and Rai, 2008; Jeyakumar et al., 2011**). *Mentha piperita* (Lamiaceae), the peppermint (mint) plant is an aromatic perennial herb cultivated in most part of the world, have traditionally been used in folk medicine. Leaves of mint plant are frequently used in herbal tea and for culinary purpose to add flavour and aroma. The distinctive smell and flavour, a characteristic feature of *Mentha spp.* is due to the naturally occurring cyclic terpene alcohol called menthol. Menthol is prescribed as a medication for gastrointestinal disorders, common cold and musculoskeletal pain (**Patil et al., 2007**). The mint plants are rich sources of iron and magnesium, which play important role in human nutrition (**Arzani et al., 2007**). A large volume of literature is available on the medicinal properties of essential oils present in *Mentha spp.* (**Gulluce et al., 2007; Rasooli, 2008**). However, no much study has been directed toward the antioxidant and antimicrobial properties of the mint leaves which are locally available. *Salmonella enterica* subspecies *enterica* serovar *Typhi* (*Salmonella Typhi*) is the cause of typhoid fever. Together, *Salmonella Typhi* and *Salmonella* serovar *Paratyphi A* are the major agents of enteric fever. Like other typhoidal *Salmonella* serovars, *Salmonella*



Typhi is a human host-restricted organism. The role of water as a vehicle for typhoid fever has been appreciated since the late 1800s (**Newton 2014, CDC 2016**) and the role of food not long after (**Wain et.al, 2015**). Our understanding of the global burden of typhoid fever has improved in recent decades, with an increase in both the number and geographic representation of high-quality typhoid fever incidence studies, and greater sophistication of modeling approaches. The 2017 World Health Organization (WHO) Strategic Advisory Group of Experts on Immunization (SAGE) recommendation for the introduction of typhoid conjugate vaccines (TCVs) for infants and children aged >6 months in typhoid-endemic countries (**WHO 2008**) is likely to require further improvements in our understanding of typhoid burden not only at the global level, but also at the national and subnational levels. Furthermore, the recognition of the critical and synergistic role of water and sanitation improvements in concert with vaccine introduction (**Crump and Mintz 2015, Theo et.al, 2016**) emphasizes the need to improve our understanding of the sources, patterns, and modes of transmission of *Salmonella Typhi* in diverse local settings. The Gram-negative bacterium that causes typhoid fever is *Salmonella enterica* subsp. *entericaserovarTyphi*. Based on MLST subtyping scheme, the two main sequence types of the *S. Typhi* are ST1 and ST2, which are currently widespread globally (**Stephens et.al, 2019, Wang et.al, 2016, Magill 2017**). The global phylogeographical analysis showed dominance of a haplotype 58 (H58) which probably originated in India during late 1980s and now spreading through the world carrying multidrug resistance. (**Jackson et.al, 2015, Yap et.al, 2016, Kumar and Kumar 2017**) A recently proposed and more detailed genotyping scheme has been reported in 2016 and is being used widely since. This scheme re-classified the nomenclature of H58 to genotype.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Typhoid using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The In-silico analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

Table 1: The list of pharmacophores and the targeted genes from Typhoid

Sl.N o	Pharmacophores from Peppermint	Targeted Genes from Typhoid	PDB No of the Genes
1	Menthone	L-lactate dehydrogenase A chain	5ZJD
2	Beta Pinene	Retinal dehydrogenase	6DUM
3	Menthofuran	lactate dehydrogenase	6MV8
4	1,8cineole	NADPH-dependent methylglyoxal reductase GRE2	4PVD



Protein identification and preparation

The reported molecular targets responsible for Typhoid are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

Active site identification

The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

Ligand preparation and filtration

A collection of 5 phytochemicals from Peppermint were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al.,2001**). The filtered compounds were then used for docking analysis.

Docking

The anti-inflammatory activity of all the 4 phytochemicals reported from Peppermint was assessed by docking these compounds against the respective active sites of the target proteins. Discovery studio 4.0 was used in this study to find the interacting compounds of Peppermint with the selected targets of arthritis. Strategies of Discovery Studio 4.0 are to exhaustively dock or score possible positions of each ligand in the binding site of the proteins. Docking study of the target proteins was done with natural compounds derived from Peppermint to find the preferred orientation and binding affinity of the compounds with each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER was used to score the interacting compounds. This method uses a gridbased representation of the



protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness

Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

Protein preparation and active site identification

The three dimensional structures of the identified target proteins were retrieved from the protein data bank. PDB ID of the targeted protein structure are mentioned in Table 1.

Ramachandran Plot of the targeted gene

The Ramachandran plot is among the most central concepts in structural biology, seen in publications and textbooks alike. However, with the increasing numbers of known protein structures and greater accuracy of ultra-high resolution protein structures, we are still learning more about the basic principles of protein structure. The use of torsion angles to describe polypeptide and protein conformation was developed by Sasisekharan as part of his studies of the structure of collagen chains during his work as a graduate student in the research group of G.N. Ramachandran. The power of this approach was readily apparent and its use quickly became widespread. Using revised definitions, this so-called Ramachandran plot or ϕ , ψ -plot has remained nearly unchanged in the ensuing fifty years and continues to be an integral tool for protein structure research and education.

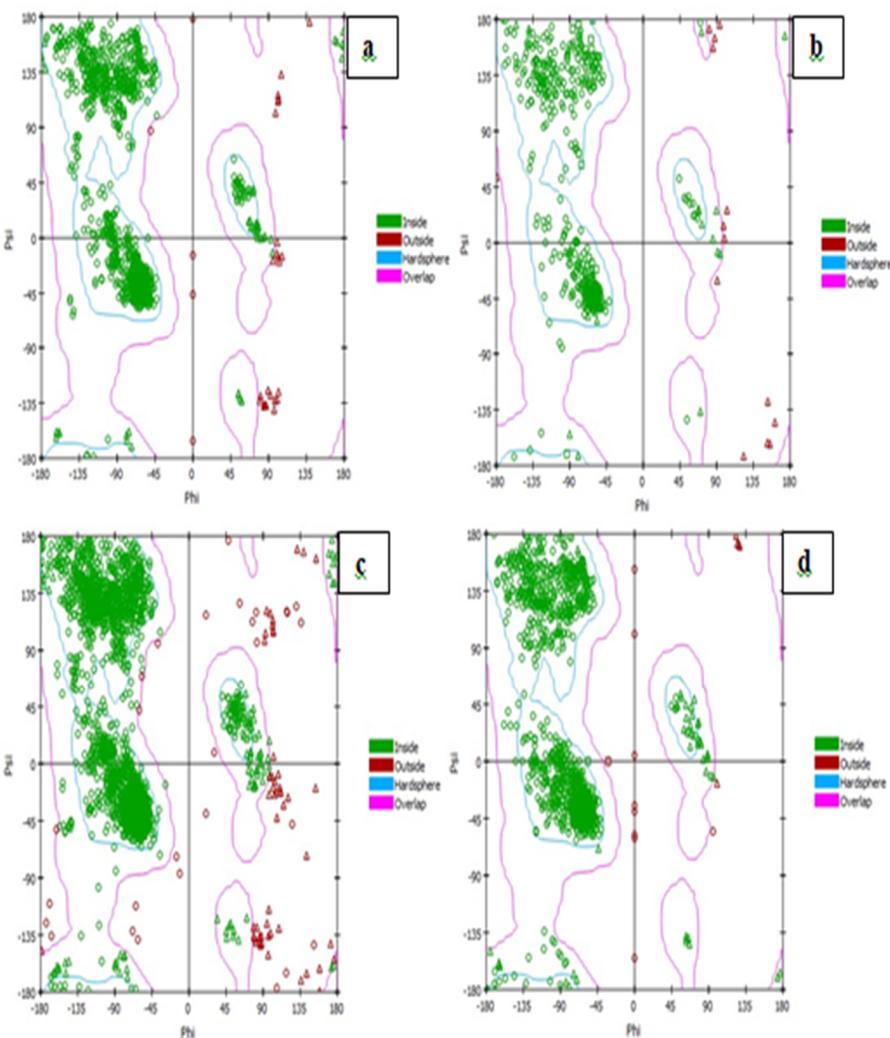


Fig 1: Ramachandran plot of (a) 6MV8(b) 6DUM (c) 5ZJD (d) 4PVD
Hydrophobicity Plot of the Genes:

Protein-protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein-protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop

hydrophobicity scales (for example, compatible with classical force fields (CFF) in calculating the energetics of protein folding) have encountered many difficulties.

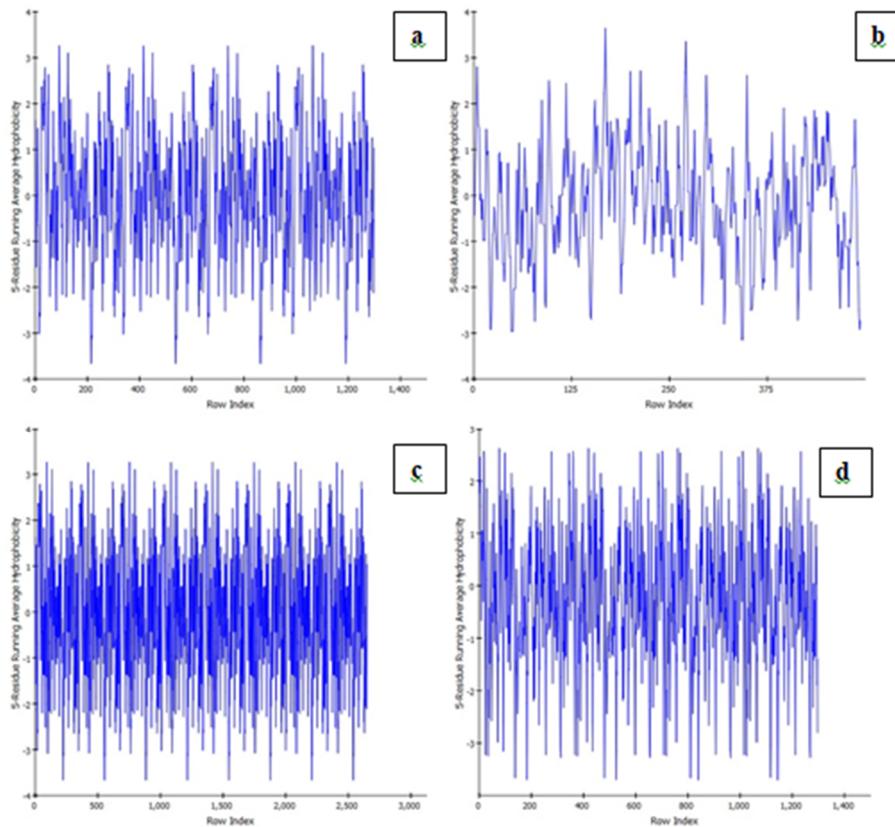


Fig 2: Hydrophobicity Plot of (a) 6MV8(b) 6DUM (c) 5ZJD (d) 4PVD

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Breast administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand

strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.

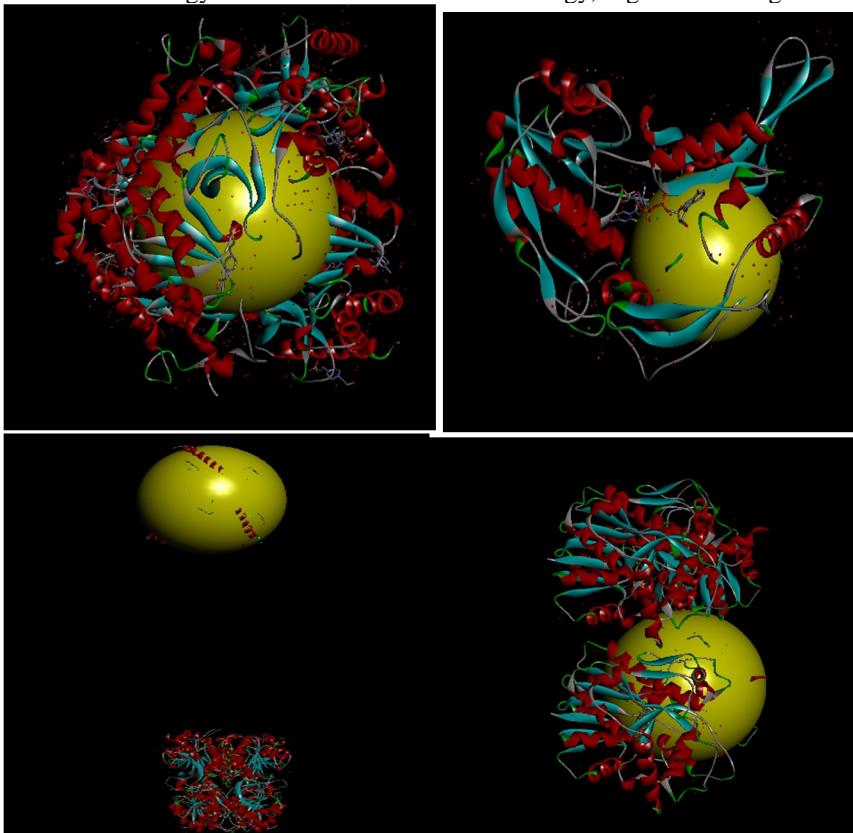


Fig 3: Docking Result of (a) 6MV8(b) 6DUM (c) 5ZJD (d) 4PVD ADMET Evaluation

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights in to the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharmacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds

were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

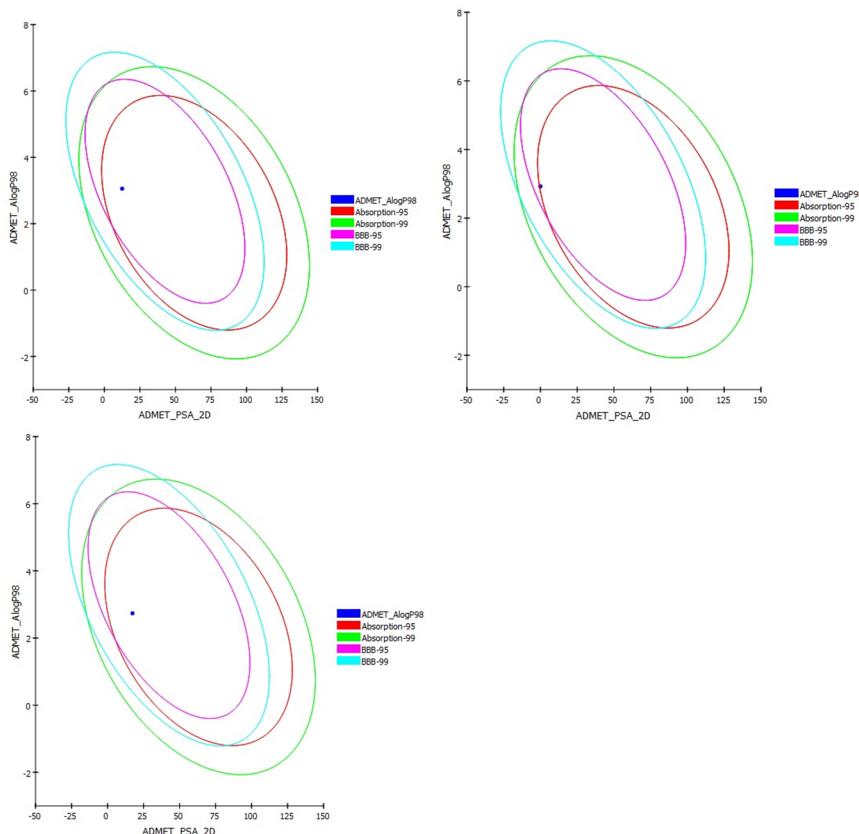


Fig 4: ADMET analysis report

CONCLUSION

CSCs typically exhibit three key characteristics, which are not mutually exclusive. Firstly, CSCs are highly tumorigenic and can form tumours in immune-deficient mice through xenotransplantation, which is not possible for non-CSCs. Secondly, CSCs that survive chemotherapy and radiotherapy generate resistance to such therapies through regulating intracellular stress; for example, regulating reactive oxygen species, which non-CSCs cannot. Thirdly, CSCs possess metastatic potential, illustrated by a report that CSCs have the ability to metastasize. The identified pharmacophores can be isolated from the Peppermint and can be commercialized as the natural drug for the Typhoid which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products.



The unique feature of the study is to targeted gene therapy for a particular cancer. This will help our future medicine to be completely allied to the Pharmachophores and the uses of synthetic and carcinogenic drug will reduce.

REFERENCES

- Alan J. Magill (2013). Hunter's tropical medicine and emerging infectious diseases (9th ed.). London: Saunders/Elsevier. pp. 568–572. ISBN 9781455740437. Archived from the original on 2017-02-28.
- Anna E. Newton (2014). "3 Infectious Diseases Related To Travel". CDC health information for international travel 2014 : the yellow book. ISBN 9780199948499. Archived from the original on 2015-07-02.
- Arzani A, Zein Ali H, Razmjoo K (2007). Iron and magnesium concentrations of mint accessions (*Mentha* spp.). *Pl. Physiol. Bioch.*, 45: 323-329.
- Asaad, A.M., Al-Ayed, M.S., Qureshi, M.A., 2013. Emergence of unusual nonfermenting gram-negative nosocomial pathogens in a Saudi Hospital. *Jpn. J. Infect. Dis.* 66, 507–511.
- Bansod, S., Rai, M., 2008. Antifungal activity of essential oils from Indian medicinal plants against pathogenic *Aspergillusfumigatus* and *A. niger*. *J Med Sci.* 3, 81–88.
- Budd W Typhoid fever, its nature, mode of spreading and prevention. London: Longmans Green and Co, 1873.
- Chatham-Stephens K, Medalla F, Hughes M, Appiah GD, Aubert RD, Caidi H, et al. (January 2019). "Emergence of Extensively Drug-Resistant *Salmonella Typhi* Infections Among Travelers to or from Pakistan - United States, 2016-2018". *MMWR. Morbidity and Mortality Weekly Report.* 68 (1): 11–13. doi:10.15585/mmwr.mm6801a3. PMC 6342547. PMID 30629573.
- Crump JA, Mintz ED (January 2010). "Global trends in typhoid and paratyphoid Fever". *Clinical Infectious Diseases.* 50 (2): 241–6. doi:10.1086/649541. PMC 2798017. PMID 20014951.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Elabd, F.M., Al-Ayed, M.S., Asaad, A.M., Alsareei, S.A., et al., 2015. Molecular characterization of oxacillinases among carbapenem-resistant *Acinetobacter baumannii* nosocomial isolates in a Saudi hospital. *J. Infect. Public Health* 8, 242–247.
- Fabio, A., Cermelli, C., Fabio, G., Nicoletti, P., Quaglio, P., 2007. Screening of the antibacterial effects of a variety of essential oils on microorganisms responsible for respiratory infection. *J. Phytother. Res.* 21, 374–377.
- Gulluce M, Sahin F, Sokmen M, Ozer H, Daferara D, Sokmen A, Polissiou M, Adiguzel A, Ozkan H (2007). Antimicrobial and antioxidant properties of the essential oils and methanol extract from *Mentha longifolia* L. ssp. *longifolia*. *Food Chem.*, 104(4): 1449-1456.
- Hamoud, R., Sporer, F., Reichling, J., Wink, M., 2012. Antimicrobial activity of a traditionally used complex essential oil distillate (OlbasTropfen) in comparison to its individual essential oil ingredients. *Phytomedicine* 19, 969–976.
- Hao, H., Cheng, G., Iqbal, Z., Hussain, H.I., Huang, L., Dai, M., et al., 2014. Benefits and risks of antimicrobial use in food-producing animals. *Front. Microbiol.* 5, 288–298.
- Jackson BR, Iqbal S, Mahon B (March 2015). "Updated recommendations for the use of typhoid vaccine--Advisory Committee on Immunization Practices, United States, 2015". *MMWR. Morbidity and Mortality Weekly Report.* 64 (11): 305–8. PMC 4584884. PMID 25811680.
- Jeyakumar, E., Lawrence, R., Pa, T., 2011. Comparative evaluation in the efficacy of peppermint (*Mentha piperita*) oil with standards antibiotics against selected bacterial pathogens. *Asia. Pac. J. Trop. Biomed.* S253–S257.
- Kumar P, Kumar R (March 2017). "Enteric Fever". *Indian Journal of Pediatrics.* 84 (3): 227–230. doi:10.1007/s12098-016-2246-4. PMID 27796818.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv. Drug Deliv.*, 46(1-3):3-26.
- Mohamed, H.S.A.A., Abdelgadir, W.S., Almagboul, A.Z.I., 2015. In vitro antimicrobial activity of Anise seed (*Pimpinellaanisum* L.). *Int. J. Adv. Res.* 3, 359–367.
- Milligan R, Paul M, Richardson M, Neuberger A (May 2018). "Vaccines for preventing typhoid fever". The Cochrane Database of Systematic Reviews. 5: CD001261. doi:10.1002/14651858.CD001261.pub4. PMC 6494485. PMID 29851031.



- Patil T, Ishiuji Y, Yosipovitch G (2007). Menthol: A refreshing look at this compound. *J. Am. Acad. Dermatol.*, 57: 873-878.
- Pitzer VE, Bowles CC, Baker S, et al. Predicting the impact of vaccination on the transmission dynamics of typhoid in South Asia: a mathematical modeling study. *PLoS Negl Trop Dis* 2014; 8:e2642.
- Rasooli I (2008). Dental Biofilm prevention by *Mentha spicata* and *Eucalyptus camaldulensis* essential oils. *Int. J. Infect. Dis.*, 12(1): 167.
- Singh, R., Shushni, M.A.M., Belkheir, A., 2011. Antibacterial and antioxidant activities of *Mentha piperita* L. *Arab. J. Chem.* 8, 322–328.
- Soper GA The work of a chronic typhoid germ distributor. *JAMA* 1907; 48:2019–22.
- Sosa, A., 2004. Antibiotic policies in developing countries. In: Gould, I.M., van der Meer, J.W.M. (Eds.), *Antibiotic Policies: Theory and Practice*. Springer, New York, pp. 766.
- Sosa, A., 2010. Containment of antimicrobial resistance in developing countries and lessons learned. In: Sosa, A., Byarugaba, D.K., Amabile-Cuevas, C.F., Hsueh, P., Kariuki, S., Okeke, I.N. (Eds.), *Antimicrobial Resistance in Developing Countries*. Springer, pp. 447–461.
- Sedgwick WT, MacNutt JS On the Mills-Reincke phenomenon and Hazen's theorem concerning the decrease in mortality from diseases other than typhoid fever following the purification of public water supplies. *J Infect Dis* 1910; 7:490–564.
- "Typhoid Fever". cdc.gov. May 14, 2013. Archived from the original on 6 June 2016. Retrieved 28 March 2015.
- "Typhoid vaccines: WHO position paper" (PDF). *Releve Epidemiologique Hebdomadaire*. 83 (6): 49–59. February 2008. PMID 18260212. Archived (PDF) from the original on April 2, 2015.
- "Typhoid Fever". cdc.gov. May 14, 2013. Archived from the original on 2 April 2015. Retrieved 28 March 2015.
- Vos, Theo; Allen, Christine; Arora, Megha; Barber, Ryan M.; et al. (October 2016). "Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015". *Lancet.* 388 (10053): 1545–1602. doi:10.1016/S0140-6736(16)31678-6. PMC 5055577. PMID 27733282.
- Wang, Haidong; Naghavi, Mohsen; Allen, Christine; Barber, et al. (October 2016). "Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015". *Lancet.* 388 (10053): 1459–1544. doi:10.1016/s0140-6736(16)31012-1. PMC 5388903. PMID 27733281.
- Wain J, Hendrik RS, Mikoleit ML, Keddy KH, Ochial RL (March 2015). "Typhoid fever". *Lancet.* 385 (9973): 1136–45. doi:10.1016/s0140-6736(13)62708-7. PMID 25458731.
- World Health Organization (WHO), 2015. Sixty-eight World Health Assembly. Agenda item 15.1. A68/A/CONF.1 Rev.1. Global action plan on antimicrobial resistance. 25 May 2015. http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_ACONF1Rev1-en.pdf?ua=1.
- World Health Organization. Meeting of the Strategic Advisory Group of Experts on Immunization, October 2017—conclusions and recommendations. *Wkly Epidemiol Rec* 2017; 92:729–47.
- W. Li, X. Xu, H. Zhang et al., "Secondary metabolites from *Andrographis paniculata*," *Chemical and Pharmaceutical Bulletin*, vol. 55, no. 3, pp. 455–458, 2007.
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.
- Xavier, K.B., Bassler, B.L., 2003. Lux Squorumsensing: more than just a numbers game. *Curr. Opin. Microbiol.* 6, 191–197.
- Yap KP, Ho WS, Gan HM, Chai LC, Thong KL (2016). "Global MLST of *Salmonella Typhi* Revisited in Post-genomic Era: Genetic Conservation, Population Structure, and Comparative Genomics of Rare Sequence Types". *Frontiers in Microbiology*. 7: 270. doi:10.3389/fmicb.2016.00270. PMC 4774407. PMID 26973639.
- Zeng, Z., Qian, L., Cao, L., Tan, H., Huang, Y., Xue, X., et al., 2008. Virtual screening for novel quorum sensing inhibitors to eradicate biofilm formation of *Pseudomonas aeruginosa*. *Appl. Microbiol. Biotechnol.* 79, 119–126.



THE STUDY ON THE INNOVATIVE LEARNING METHODS AND ITS RELATIONSHIP WITH STUDENT PRODUCTIVITY AMONG HIGH SCHOOL STUDENTS IN INDIAN SCHOOLS

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Abstract :

Indian schools in the present trend have mainly focused on innovative learning methods for classroom teaching. The process of monotonous lectures and content based exams are ruled out by these innovative learning methods. Various studies have enumerated that the traditional learning system has become obsolete in the recent years. On the other hand it could also be identified that there is a rapid use of innovative learning methods high school education and during the process it could also be identified that innovative learning method is also used for competition, Thus an ambiguity prevails whether there is any relationship between the innovative learning method and student productivity, hence by virtue of systematic stratified sampling it could found that The innovative learning methods used is smart board teaching and almost all students are aware of the learning method. The students also like the innovative learning method that is used for teaching, this signifies that there is an acceptance of the medium that is used for teaching and there is also relationship between the ability to be aware of medium and acceptance of the recognized medium of teaching that is in practice therefore the students are aware and accept the innovative learning methods and also there is a significant relationship between the awareness and acceptance and the students find the concept more simplified after the implementation of innovative learning methods. thus the study suggests that innovative learning systems shall be used in all schools for the purpose of improvement of student productivity and the innovation used should be based on the concept or the subject that taught and not based on competition

Key words: Relationship, Innovative Learning Systems, Indian Schools, Student Productivity, High School Education

Introduction

concepts and its application are generally educated in the most traditional manner, ignoring the impact that is to be or going to be created on the students . The educator in the typical course presents a theme by addressing on general standards, at that point utilizes the standards to infer its models, indicates illustrative applications of the models, gives students rehearse in comparable determinations and applications in homework, lastly tests their capacity to do similar sorts of things on exams(Committee on Defining Deeper Learning and 21st Century Skills, Center for Education, Board on Testing and Assessment, Division of Behavioral and Social Sciences and Education, &



National Research Council, 2013; Maleki & Prestage, 2005). Practically no consideration is at first paid to the inquiry on why any of that is being finished. What true wonders can the models clarify? What are the reasonable problems would they be able to be utilized to settle, and for what reason should the students think about any of it? The main inspiration that students get is that the material will be vital later in the educational modules or in their professions(National Research Council, Division of Behavioral and Social Sciences and Education, Board on Behavioral, Cognitive, and Sensory Sciences, & Committee on Developments in the Science of Learning with additional material from the Committee on Learning Research and Educational Practice, 2000). A settled statute of instructive brain science is that individuals are most unequivocally roused to learn things they obviously see a need to know Simply telling students that they will require certain information and aptitudes some time or another is definitely not an especially viable inspiration because of which there is no commitment towards productivity.

An ideal option is inventive learning. Rather than starting with general standards and in the end getting to applications, the showing starts with determining an arrangement of perceptions or test information to improve its understanding, a case concentrate to dissect, or a perplexing certifiable problem to understand(Doo Nam & Nam, n.d.). As the students endeavor to investigate the information or situation and take care of the problem, they create a requirement for certainties, tenets, methods, and controlling standards, and soon thereafter they are either given the required data or found it for themselves(Brian Arthur, 2009). Innovation in educating and learning is an umbrella term that incorporates a scope of instructional techniques, including request learning, problem-based learning, venture based learning, case based educating, revelation learning, and without a moment to spare educating(Brian Arthur, 2009; Taib, Restu, & Warokka, 2017). These strategies have numerous highlights in like manner, other than the way that they as qualify as inductive.

As they force greater obligation on students for their own learning than the customary address based deductive approach. They are altogether upheld by research discoveries that students learn by fitting new data into existing psychological structures and are probably not going to learn if the data has couple of evident associations with what they definitely know and accept(Gray, Williamson, Karp, & Dalphin, 2007). They would all be able to be portrayed as constructivist strategies, expanding on the broadly acknowledged rule that students develop their own renditions of reality as opposed to just engrossing variants introduced by their instructors(Woodruff, 1949)(Hart, Scriber, & Gray, 2013; Woodruff, 1949). The techniques quite often include students talking about inquiries and solving problems in class {active learning}, with a great part of the work all through class being finished by students working in bunches {collaborative or agreeable learning}("Chart 3.19. Students with light learning problems in compulsory education in all 3 locations as a percentage of all students," n.d.). The imaginative learning strategy is presently utilized in all schools to encourage students and to remain in standard with other contending schools, yet the real aftereffect of such usage is as yet obscure. This investigation intends and aims to discover the relationship with innovative



learning methods and student productivity by identifying various kinds of innovative learning methods used in Indian schools for high school students.

Review of Literature

Evolution of education in India

In ancient India, education was bestowed through the gurukul system. It was otherwise called the Guru-Shishya Parampara(Raina, 2002). The objectives of this type of education were:

1. Prudence
2. Change of character
3. Age of amicability or social care
4. Key identity advancement
5. Multiplication of prudence
6. Preservation of learning and culture once, when a male brahman child reaches seven or eight years old, he was sent to Gurukul where he focused on and lived with the teacher(Brooks, 1913; Raina, 2002). The time of going to Gurukul was chosen by the varna of the youth. The standard teachers were not designated by an outside power as educators. They granted the education since it was their dharma, the transcendent commitment of their life and there was no other ulterior aim included. The understudies had a tendency to a specific occupation, or varna character, which was trademark in their qualities (or nature). This tendency was not an outside weight on them, so along these lines it was to a great degree basic for them to take after this pre-orchestrated system.

However, In 1771, Charles Grant who is often alluded to as 'father of modern education in India' made proposals for introduction of English education in India and English to be official dialect of the organization for the neighborhood undertakings, however his intentions and strategies were not acknowledged by British Parliament, as he was a piece of the Evangelical Sect and needed Christian preachers to change over the religion of local people and show them English, yet British had effectively confronted enough revolts in the past in different settlements for tinkering with the religion and dialect of nearby individuals. Additionally, the then Governor General of Bengal, Warren Hastings, was a devotee to Oriental learning; he didn't give the proposition of Charles A chance to grant go through(Pollard, 2009).

Gradually the interest of the Colonial government in education began. The main the help from the administration came through in the type of setting up of Madrasa in Calcutta in 1781 by Warren Hastings, Asiatic Society for Oriental learning in 1784 by James Mill, and a Bengal Sanskrit College in 1791 Jonathan Duncan. They were adjusted on the lines of ancient Indian history.

Pervading highlights of the present system, including the centrality of the course book and examinations, and a very incorporated system of education organization (inside a government structure, unified at the level of each state), would all be able to be straightforwardly followed to the provincial institutional structures. Despite the fact that there was a boundless nearness of town instructors drew in with education and numeracy direction



Common Types of Innovation Learning Methods Used in Indian Schools for High school education

1. Case studies

Case-based instruction and problem-based learning involve extensive analyses of real or hypothetical scenarios while just-in-time teaching may simply call on students to answer questions about readings prior to hearing(Lemos, De Macedo Lemos, Rocha, & Menezes, 2016)

2. Activity based learning

Activity-based learning or ABL portrays a scope of instructive ways to deal with educating. Its center premises incorporate the prerequisite that learning ought to be based on doing a few hands-on trials and exercises(Campbell, 2013). The possibility of activity-based learning is established in the regular idea that youngsters are dynamic students instead of inactive beneficiaries of data. On the off chance that youngster is given the chance to investigate by their own particular and gave an ideal learning condition then the learning ends up blissful and durable(Campbell, 2013; Lancione & Secombe, 2014).

3. Technology

Computers, tablets, digital cameras, video conferencing technology, and GPS devices would all be able to upgrade an understudy's learning background(Hu, Sharpe, Wong, & Crawford, 2005; Mohamed & Althobiani, 2018). Conceivable employments of classroom technology incorporate utilizing video recreations to show math and remote dialects, utilizing Skype to speak with classrooms or visitor speakers from around the globe, or sight and sound activities that enable understudies to investigate topic utilizing film, sound, and even programming they make. The most common method is using smart boards(Reychav & Wu, 2015).

Problem of the study

Various studies have enumerated that the traditional learning system has become obsolete in the recent years(Lemos et al., 2016). On the other hand it could also be identified that there is a rapid use of innovative learning methods high school education and during the process it could also be identified that innovative learning method is also used for competition, Thus an ambiguity prevails whether there is any relationship between the innovative learning method and student productivity, This research attempts to identify the same.

Research Methodology and Materials

Study area

A. As the researcher intends to take an over view on the **learning system**, the study is compared into two categories –

1. Traditional learning

2. Innovative learning

B. As the researcher intends to take an over view on the **relationship between student productivity and innovative learning methods**, the study is divided into two categories –

1. Awareness and acceptance of the medium of teaching – impact

2. Simplification of the subject

**Methods of study**

1. Analytical Method
2. Quantitative method
3. Comparative method
4. Descriptive method

Type of research

1. Applied Research
2. Quantitative Research
3. Explorative Research
4. Comparative research
5. Descriptive research

Data collection

Present study is based on Primary as well as Secondary sources of data, which are as –

1. Primary Sources – Primary data is collected by collecting questionnaire from high school students
2. Secondary Sources – Secondary data is collected through literature of N.G.O. reports, Government Reports, Websites, Research Articles, Newspapers

Variables used in the study

1. independent variable: class studying
2. dependent variable: awareness, acceptance, student productivity

Sample size Calculation

A sample size of 220 is chosen by which 136 respondents are in tenth standard and 84 respondents are in ninth standard.

Tables and Calculation

In this study for each issue a survey is done where a sample size mentioned is taken and the percentage is also mentioned, to determine the validity and the determine the study results co relations, p tests and t test methods are used. when the value of ‘Asymp. Sig’ value is less than 0.05, the alternate hypothesis is considered and when the pearson value ‘Asymp. Sig’ value is greater than 0.05, the null hypothesis is accepted. for the determining the hypothesis the variables are cross tabulated.

frequencies and sample size

class					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	tenth	136	61.8	61.8	61.8
	ninth	84	38.2	38.2	100.0
	Total	220	100.0	100.0	

in the current study, the respondents targeted are high school students studying in Indian schools, so a survey is collected from 136 respondents studying in class 10 and 84 respondents studying in class 9 thereby having a total of 220 respondents. In the study it is mainly focused on high school students which consist of ninth and tenth



standard students so, the unequal distribution of frequencies do not influence the study

method of teaching					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	smart board	212	96.4	96.4	96.4
	black board and chalk	8	3.6	3.6	100.0
	Total	220	100.0	100.0	

in the current study, the respondents targeted are high school students studying in Indian schools, since the investigation is based on innovative learning methods, the method used for teaching is a main component in the study done. so a survey is collected from 136 respondents studying in class 10 and 84 respondents studying in class 9 thereby having a total of 220 respondents, on the method of teaching that is used in the schools for high school education. 212 respondents of the study are taught using smart board and only 8 respondents are taught using blackboard and chalk.

Concept Analysis

Determining Student Productivity

Generally productivity means the ability to or the cost that is produce in an hour, but student productivity means the ability of a student to understand, interpret, apply the concept that is been taught in a classroom and the medium in which it is taught. The main competent involved in student productivity is relationship between the ability to be aware of medium and acceptance of the recognized medium of teaching that is in practice, the impact that the student has gained and the simplification of the concept measures productivity in terms of concept as a result of such teaching or learning.

Teaching or learning

Know the concept

Be aware of medium and concept

Search the solution

Question

Analyse

Evaluate

Acceptance of medium and concept

Relation

Impact

Productivity of the medium

The diagram1 represents the process that determines the productivity in learning process with respect to the medium of teaching. When this diagram is carefully analyzed it could be understood that is mainly determining by the relationship between awareness



and the acceptance of medium in which the concept is taught because acceptance is related to awareness in this case, if acceptances stands alone without awareness then it can't be said as productivity. Therefore it could be stated that being aware, the acceptance and its impact covers one aspect determinants of student productivity.

Awareness and acceptance of the medium of teaching – impact

It could be understood that in most of the schools for high school teaching, the innovative learning methods used is smart board teaching and almost all students are aware of the learning method. The students also like the innovative learning method that is used for teaching, this signifies that there is an acceptance of the medium that is used for teaching therefore the students are aware and accept the innovative learning methods and also there is a significant relationship between the awareness and acceptance. Thus the first two determinants are satisfied for measuring the student's productivity. Every student has got an significant impact with respect to the awareness of the subject, therefore the three determinants are satisfied with reference to the medium

Hypothesis

H_0 : there is no significant relation between the awareness and the acceptance of innovative learning method

H_{11} : there is significant relation between the awareness and the acceptance of innovative learning method

Correlations

		awareness of the innovative learning	Accepting/like
awareness of the innovative learning	Pearson Correlation	1	.701**
	Sig. (2-tailed)		.000
	N	220	220
Accepting/like	Pearson Correlation	.701**	1
	Sig. (2-tailed)	.000	
	N	220	220

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation of the awareness and the acceptance ($r=0.701$), based on $n=220$ observations with pair wise non missing values. The correlations in the main diagonal (cells A (awareness) and D(acceptance) are all equal to 1. This is because a variable is always perfectly correlated with itself. (If you have opted to flag significant correlations, SPSS will mark a 0.05 significance level with one asterisk (*) and a 0.01 significance level with two asterisks (0.01). The Pearson correlation coefficient for the awareness and the acceptance ($r=0.701$, which is significant ($p < .001$ for a two-tailed



test), based on 220 complete observations (i.e., cases with non missing values for both the awareness and the acceptance).

H_{02} : there is no significant impact of awareness on acceptance of innovative learning method

H_{12} : there is significant impact of awareness on acceptance of innovative learning method

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701 ^a	.491	.488	.134
a. Predictors: (Constant), Are you aware of the the in2vation learning algorithm system being followed in your School ?				
b. Dependent Variable: Do you like this in2vative process in learning?				

The tables of bivariate result imply R and R^2 values. R value represents simple correlation and is a 0.701 (the "R" Column), which indicates an average degree of correlation. The R^2 value (the "R Square" column) indicates the contribution of total variation in the dependent variable (WLB) is being explained by the independent variable (awareness and acdeptance). In this case, 49.1% can be explained, which is down.

ANOVA ^b						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.783	1	3.783	210.073	.000 ^a
	Residual	3.926	218	.018		
	Total	7.709	219			
a. Predictors: (Constant), Are you aware of the innovation learning algorithm system being followed in your School ?						
b. Dependent Variable: Do you like this in2vative process in learning?						

The regression model predicts the dependent variable significantly well. This indicates statistical significance of the regression model that have done. Linear regression demonstrated a significant positive relationship $F= (1, 218) = \mathbf{210.073}$, $P<0.05$. Here, p value is less than 0.05, and denotes that the overall regression model statistically significant and predict outcome variable (i.e., it is a good fit for the data). Therefore, reject the null hypothesis.



Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.037	.070		.533	.595
	Are you aware of the the in2vation learning algorithm system being followed in your School ?	.981	.068	.701	14.494	.000

a. Dependent Variable: Do you like this innovative process in learning?

The **Coefficients** table provides us with the necessary information to predict awareness from acceptance, as well as determine whether awareness contributes statistically significantly to the model (by looking at the "**Significance**" column). Here the when the students having awareness of the innovative methods they could easily accept it. Therefore there is a significant impact of awareness and acceptance.

Simplification of the subject

The another perspective towards the student productivity is towards concept, when a student finds a concept to be more simplified and easy to understand then in that case it could be stated that the students are productive. From this study it could be understood that the students find the concept more simplified after the implementation of innovative learning methods.

H_0 : there is no significant relationship between innovative learning methods and student productivity
H_1 : there is significant relationship between innovative learning methods and student productivity

Group Statistics

	class	N	Mean	Std. Deviation	Std. Error Mean
After the implementation of innovative learning process examination learning process become more simplified	tenth	136	1.18	.515	.044
	ninth	84	1.00	.000	.000

The average mean for simplified learning process of tenth is 1.18 and the ninth is 1.00.



Simplified learning process	Levene's test for equality of variances		t-test for equality of means						
	F	Sig	t	df	Sig(2tailed)	Mean diff.	Std.error	95%Lower	(95%upper
	48.631	0.000	3.140	218	0.002	0.176	0.056	0.066	0.287
			3.998	135.000	0.000	0.176	0.044	0.089	0.264

The *p*-value of Levene's test is printed as ".000" (but should be read as $p < 0.001$ -- i.e., p very small), so we reject the null of Levene's test and conclude that the variance in learning process of class tenth is significantly different than that of class ninth.

The sign of the mean difference corresponds to the sign of the *t* value. The positive *t* value indicates that learning process of class tenth is significantly greater acceptance than the learning process of class ninth. Since $p < .0001$ is less than our chosen significance level $\alpha = 0.05$, we can reject the null hypothesis, and conclude that learning process of class tenth and ninth significantly differ.

Based on the results, we can state the following: There was a significant difference in the learning process of class tenth and ninth is ($t_{135.000} = 3.140$, $p < .000$). The average of learning process is more simplified for tenth than the ninth ($SD=0.515$)

Discussions

From this study it could be inferred that, In ancient India, education was bestowed through the gurukul system which was later influenced by the British and slowly let to the innovative learning methods. This method is mainly used in Indian school for the purpose of imparting quality education and competition. The innovative learning methods used is smart board teaching and almost all students are aware of the learning method. The students also like the innovative learning method that is used for teaching, this signifies that there is an acceptance of the medium that is used for teaching and there is also relationship between the ability to be aware of medium and acceptance of the recognized medium of teaching that is in practice therefore the students are aware and accept the innovative learning methods and also there is a significant relationship between the awareness and acceptance and the students find the concept more simplified after the implementation of innovative learning methods.

The study is influenced by psychology of the students because in a classroom, it could always be found that students are with different mentalities which tend to influence the study. Students who have suffered any kind of negative impact from the institution in which they are studying might leave a negative impact in this study and the vice versa.

When the current study is compared with the traditional learning system or method, it comprises mainly of using black boards and monotonous lecture, generally a student mind can be carefully mastered and tuned towards productivity when there is a continuous change in the medium in which the concept is conveyed to the students. Since the traditional method of teaching or learning uses monotonous lecture it could be stated that productivity of student under traditional learning methods is comparatively less than in case of students under innovative learning system.

Therefore from this study it is recommended that innovative learning systems shall be used in all schools for the purpose of improvement of student productivity and the



innovation used should be based on the concept or the subject that taught and not based on competition.

Findings

1. Overall student productivity can be measured on the basis of two aspects namely medium based aspect and concept based aspect.
2. There is a significant relationship between innovative learning methods and student productivity
3. There is a significant relationship between the awareness and acceptance and the students find the concept more simplified after the implementation of innovative learning methods.
4. The students also like the innovative learning method that is used for teaching.
5. Students are aware and accept the innovative learning methods
6. There is a significant relationship between the awareness and acceptance and the Students find the concept more simplified after the implementation of innovative learning methods.

Recommendations

1. Innovative learning systems shall be used in all schools for the purpose of improvement of student productivity
2. The innovation used should be based on the concept or the subject that taught and not based on competition
3. Field study can be a part of innovative learning methods.
4. Faculty development programs can be conducted for better implementation.
5. Social and psychological arousal can be used for teaching through innovative learning methods

Conclusion

The detailed study reveals that the overall student productivity can be measured on the basis of two aspects namely medium based aspect and concept based aspect. The medium based aspect includes acceptance, awareness and impact. The concept based aspect includes simplification. It could be inferred that The students like the inventive learning method that is utilized for instructing, this implies there is an acceptance of the medium that is utilized for educating accordingly the understudies know and acknowledge the imaginative learning methods and furthermore there is a noteworthy relationship between the awareness and acceptance the students find the concept more simplified after the implementation of innovative learning methods, thus it is stated that there is a significant relationship between innovative learning methods and student productivity. Therefore the study recommends that those innovative learning systems shall be used in all schools for the purpose of improvement of student productivity and the innovation used should be based on the concept or the subject that taught and not based on competition.



References

1. Brian Arthur, W. (2009). *The Nature of Technology: What It Is and How It Evolves*. Penguin UK.
2. Brooks, E. C. (1913). Seven, Eight, and Nine Years in the Elementary School. *The Elementary School Teacher*, 14(1), 20–28.
3. Campbell, K. (2013). Educating Health Professionals: New Ways of Learning, Knowing, and Doing. *Canadian Journal of University Continuing Education*, 32(1). <https://doi.org/10.21225/d5m88g>
4. Chart 3.19. Students with light learning problems in compulsory education in all 3 locations as a percentage of all students. (n.d.). <https://doi.org/10.1787/106260708432>
5. Committee on Defining Deeper Learning and 21st Century Skills, Center for Education, Board on Testing and Assessment, Division of Behavioral and Social Sciences and Education, & National Research Council. (2013). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. National Academies Press.
6. Doo Nam, H., & Nam, H. D. (n.d.). Ethics rather than rights: Reconsidering “transmit rather than create” – Toward a new understanding of Korea’s intellectual property rights tradition. *Legal Innovations in Asia*. <https://doi.org/10.4337/9781783472796.00028>
7. Gray, P. S., Williamson, J. B., Karp, D. A., & Dalphin, J. R. (2007). *The Research Imagination: An Introduction to Qualitative and Quantitative Methods*. Cambridge University Press.
8. Hart, J. M., Scriber, K., & Gray, C. (2013). Encouraging Students to Develop Their Own Learning Strategies. *Athletic Training & Sports Health Care*, 5(2), 57–58.
9. Hu, C., Sharpe, L., Wong, A. F. L., & Crawford, L. (2005). Conversational Learning via Video Conferencing and Video Clips: A Singapore Case. *Advanced Technology for Learning*, 2(2). <https://doi.org/10.2316/journal.208.2005.2.208-0845>
10. Lancione, C., & Secombe, M. (2014). Second Chance Learning in the Experience of Students in an Adelaide Adult Re-Entry Campus. *Learning and Teaching*, 7(1), 25–39.
11. Lemos, W. D. M., De Macedo Lemos, W., Rocha, H., & Menezes, C. (2016). ADOPTION OF JUST-IN-TIME TEACHING, PEER INSTRUCTION AND PROBLEM-BASED LEARNING – IMPACTS ON ENGINEERING STUDENTS PERFORMANCE. *International Journal on Active Learning*, 1(1). <https://doi.org/10.15202/2526-2254.2016v1n1p89>
12. Maleki, L., & Prestage, J. (2005). Applications of clocks and frequency standards: from the routine to tests of fundamental models. *Metrologia*, 42(3), S145–S153.
13. Mohamed, G. A.-N. I., & Althobiani, F. W. (2018). Integration of GPS with Digital devices and Interactive objects for public safety. *INTERNATIONAL JOURNAL OF COMPUTERS & TECHNOLOGY*, 17(1), 7146–7152.
14. National Research Council, Division of Behavioral and Social Sciences and Education, Board on Behavioral, Cognitive, and Sensory Sciences, & Committee on Developments in the Science of Learning with additional material from the Committee on Learning Research and Educational Practice. (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. National Academies Press.
15. Pollard, A. (2009). *The Representation of Business in English Literature*. Amagi.
16. Raina, M. K. (2002). Guru-Shishya Relationship in Indian Culture: The Possibility of a Creative Resilient Framework. *Psychology and Developing Societies*, 14(1), 167–198.
17. Reyhav, I., & Wu, D. (2015). Mobile collaborative learning: The role of individual learning in groups through text and video content delivery in tablets. *Computers in Human Behavior*, 50, 520–534.
18. Taib, C. A., Restu, R., & Warokka, A. (2017). QUALITY MANAGEMENT SYSTEM AND PROBLEM-BASED LEARNING: A CASE OF EDUCATING QUALITY STANDARDIZATION IN A STATE-OWNED UNIVERSITY. In *INTED2017 Proceedings*. <https://doi.org/10.21125/inted.2017.2404>
19. Woodruff, C. H. (1949). Caught Mapping: Students Making Their Own. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 24(1), 45–47.



AN ARGUMENT FOR MANDATORY CSR IN INDIA IN PUBLIC AND PRIVATE SECTOR COMPANIES WITH REFERENCE TO COIMBATORE DISTRICT

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Abstract:

The term CSR becoming famous and earning importance thought out the world. The companies is getting conscious of the advantages of adopting corporate social responsibility. The government has mentioned a percentage of net profit to be mandatory allocated for CSR activities for companies. With high population India faces huge challenges in the area of poverty eradication, disaster management, women trafficking, menace of child labor, infrastructure development, education, sanitation and healthcare. Many NGO's are tirelessly working towards making India a better place to live in. Corporate India must volunteer and involve in overall growth and development of India. Obviously, the amount of work done, in the field of CSR is proportionately very low to the requirement of the country. There is need to generate more awareness and knowledge on these questions and their importance on which presently there is a lack of adequate information and awareness in the Indian context. The main objective of the study is to study the present status of CSR policy in India with respect to Company's Act 2013 and to analyze the effects of mandatory CSR in companies. For this purpose a sample of 150 will be collected from the private and public companies in Coimbatore with convenience sampling as sampling technique and the primary data collected will be analysed using percentage analysis, descriptive statistics, multiple regression and oneway Anova. Based on the findings of the study the results will be concluded.

Keywords: CSR , Corporate India , Company's Act, Awareness.

I. INTRODUCTION:

The term CSR becoming famous and earning importance everywhere the planet. the company is getting tuned in to the advantages of adopting corporate social responsibility. These will be long-term and immediate in nature. the govt has mentioned a share/percentage of earnings to be mandatory allocated for CSR activities by the general public sector units. On the opposite



way, in camera sector there's no such mandatory requirement in India but the govt is about to make it mandatory to some extent.

Right to food, Right for Education, Right to information, and freedom of speech are many other policies that Govt. of India has looked into from time to time and made mandatory through statutory interventions. These statutory provisions definitely enhance the legal, ethical and moral conduct of all the tutorial institutions, public and personal organizations, print and electronic Media & generally people of India.

The present research could also be a comparative study to looking for the contribution by public and private companies to the socio-economic development and protection of environment through their CSR activities. In developing countries like India, where there are various socio-economic problems facing the people generally, the adoption of CSR policy through the new Companies Act in 2013 may be a significant step within the overall socio-economic development strategy. It's pertinent and important to work out how this new initiative of the govt is functioning and also the extent of its effect on business management practices and socioeconomic progress. It's also important to know to what extent the businesses are following the mandate of the Act for spending II Chronicles of their profits; how they're spending this mandatory amount, and whether or not they are following the particular provisions of the CSR policy. There's have to generate more awareness and knowledge on these questions and their importance on which presently there's an absence of adequate information and awareness within the Indian context.

II. REVIEW OF LITERATURE:

The collection of reviews has been made from various studies undertaken by academicians and scholars that are found in journals, magazines, publications, working papers books and the like.

Kyle Turner , T. Russell Crook , Alex Miller (2014), “Construct Measurement in Social Entrepreneurship” the aim is to assess current construct measurement in social entrepreneurship and supply recommendations for future construct measurement on the subject.

Orlitzky et al. (2003) reviewed the previous 52 studies on corporate social/environmental performance and company financial performance. This analysis exposed that corporate social performance and company financial performance has moderate positive relations

hip. He also specifies that the present evidence is just too fractured to draw generalised conclusions. The team conducted a rigorous methodological study



with the entire sample size of 33,878 sample observation **Friedman (1970)** quotation marks that only social responsibility of a corporation is to reinforce profit. The later 1/2 his definition support CSR as an initiative to motivate self interest and promoting the firms interest. **Hasan Fauzi (2009)** has observed that corporate social performance (CSP/CSR) has no effect on corporate financial performance under slack resource and good management theory in his study on Corporate Social and Financial Performance.

III.OBJECTIVES:

Following are the objectives of the study;

- To understand the essential idea of CSR
- To analyze the benefits of CSR to the Indian corporate sector.
- To analyze the affects of mandatory CSR in public companies.
- Arguments for and against making CSR mandatory for private companies.

IV. RESEARCH METHODOLOGY

Research methodology can be said as the procedure of understanding and solving the concept scientifically. For this study, the data's were taken from primary data sources such as asking in person and through goggle sheets. I have used percentage analysis and chi-square.

V. ANALYSIS AND INTERPRETATION:

Table 1 Gender

	Frequency	Percent
Male	90	60.0
Female	60	40.0
Total	150	100.0

Interpretation

The above table shows about the gender of the respondents were out of 150 respondents 60% are male and 40% are female which shows that most of the respondents are male in our study.

**Table 2 Previous professional experience of the leader**

	Frequency	Percent
Very important	3	2.0
Important	17	11.3
Relatively important	56	37.3
Minor importance	32	21.3
Not important at all	42	28.0
Total	150	100.0

Interpretation

The above table shows about importance on previous professional experience of the leader were out of 150 respondents 2% said as very important, 11.3% said as important, 37.3% said as relatively important, 21.3% said as minor important and 28% said that it is not at all important which shows that most of the respondents said that previous professional experience of the leader is relatively important towards implementing CSR.

Table 3 Business savvy of the leader and top managers

	Frequency	Percent
Very important	2	1.3
Important	13	8.7
Relatively important	47	31.3
Minor importance	66	44.0
Not important at all	22	14.7
Total	150	100.0

Interpretation

The above table shows about importance on business savvy of the leader and top managers were out of 150 respondents 1.3% said as very important, 8.7% said as important, 31.3% said as relatively important, 44% said as minor important and 14.7% said that it is not at all important which shows that most of the respondents said that business savvy of the leader and top managers can be given minor importance towards implementing CSR.

TABLE 4COMPARISON BETWEEN GENDER AND LEVELOF ACCEPTANCE TOWARDS CSR ACTIVITIES

H01: There is no significance relationship between gender and level of acceptance towards CSR activities



Particulars	P value	Significance level	Hypothesis
Acceptance on social enterprise is first of all business	9.163	0.057	Accepted
Acceptance on social enterprise and socially-responsible business	5.367	0.252	Accepted
Acceptance on occupancy of social enterprise	4.698	0.320	Accepted
Acceptance on conversion of business	2.486	0.6547	Accepted

Interpretation

The above table shows about the relationship between gender and level of acceptance were there is a significance relation between gender and all the factors as the significance level is greater than 0.05 and these factors need not be taken for the decision making process.

TABLE 5 COMPARISON BETWEEN AGE AND LEVEL OF ACCEPTANCE TOWARDS CSR ACTIVITIES

H02: There is no significance relationship between age and level of acceptance towards CSR activities

Particulars	P value	Significance level	Hypothesis
Acceptance on social enterprise is first of all business	7.249	0.510	Accepted
Acceptance on social enterprise and socially-responsible business	13.856	0.086	Accepted
Acceptance on occupancy of social enterprise	10.044	0.262	Accepted
Acceptance on conversion of business	4.954	0.762	Accepted

Interpretation

The above table shows about the relationship between age and level of acceptance were there is a significance relation between gender and all the factors as the significance level is greater than 0.05 and these factors need not be taken for the decision making process.



VI. CONCLUSION:

The main objective of the study is to study the present status of CSR policy in India with respect to Company's Act 2013 and to analyze the affects of mandatory CSR in public sector units. For this purpose a sample of 150 will be collected from the private and public companies in Coimbatore with convenience sampling as sampling technique and the primary data collected will be analysed using percentage analysis, chi-square analysis. The conclusion is that the companies has to implement CSR mandatory towards improvement of brand image and also to increase the social cause.



IN SILICO ANALYSIS OF THE GREEN CHIRETTA (*ANDROGRAPHIS PANICULATA*) AS TARGETED THERAPY FOR BREAST CANCER

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ABSTRACT

As aboriginal sources of medications, medicinal plants are used from the ancient times. *Andrographis paniculata* is one of the highly used potential medicinal plants in the world. This plant is traditionally used for the treatment of common cold, diarrhoea, fever due to several infective cause, jaundice, as a health tonic for the liver and cardiovascular health, and as an antioxidant. It is also used to improve sexual dysfunctions and serve as a contraceptive. All parts of this plant are used to extract the active phytochemicals, but the compositions of phytoconstituents widely differ from one part to another and with place, season, and time of harvest. We are using this property of Green Chiretta to get some new drugs for Breast Cancer. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. In-silico analysis has done using software and we further targeted some of the genes responsible for Breast Cancer and pharmacophores from Green Chiretta and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others. From this we can deduce that these two pharmacophores can be a solution to Lung Cancer in near future. Complementary and alternative medicine (CAM) is a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine. As cancer incidence rates and survival time increase, use of CAM will likely increase. However, little is known about the use of CAM in cancer patients, specifically in emerging countries.

KEY WORDS: Green Chiretta , Docking, In Silico Analysis, Breast Cancer, Pharmacophore

INTRODUCTION

Andrographis paniculata (Burm. F) Nees, commonly known as the “king of bitters,” is an herbaceous plant belonging to the *A.canthaceae* and is found throughout tropical and subtropical Asia, Southeast Asia, and India. In India, *A.paniculata* is known as “Kalmegh”; in China it is known as “Chuan-Xin-Lian”; in Thailand it is known as “Fah Tha Lai”; in Malaysia it is known as “Hempedu bumi”; in Japan it is known as “Senshinren”; and in Scandinavian countries it is known as “green chiretta” (**Chaudhary et. al, 2010**). Extracts of this plant and andrographolide exhibit pharmacological activities such as those that are immunostimulatory (**Joy et.al, 1998**,



Chaudhary et. Al, 2010), antiviral (**Burkhill et.al,1966**), and antibacterial (**Kavishankar et.al, 2011**). As major active constituent, andrographolide exhibits a broad range of biological activities, such as anti-inflammatory, antibacterial, antitumor, antidiabetic, antimalarial, and hepatoprotective (**Hajiaghae and Akhondzadeh, 2012**) Because of the impressive variety of these biological activities, researchers propose obtaining various leads by structurally modifying andrographolide. In recent decades, numerous andrographolide derivatives have emerged and their pharmacological activities have also been evaluated. However, studies that have comprehensively summarized or analyzed *A. paniculata* and its derivatives have been minimal. Therefore, to contribute to the advanced trends of research on andrographolide, this paper provides thorough information regarding the pharmacological activities of *A. paniculata* and its major compound andrographolide. Andrographolide is a major bioactive phytoconstituent found in various parts of *A. paniculata*, but particularly in the leaves. The chemical name of andrographolide is $3\alpha, 14, 15, 18$ -tetrahydroxy- $5\beta, 9\beta$ H, 10α -labda-8, 12-dien-16-oic acid γ -lactone, and its molecular formula and weight are C₂₀H₃₀O₅ and 350.4 (C 68.54%, H 8.63%, and O 22.83%), respectively. The structure of andrographolide has been analyzed by using X-ray, ¹H,¹³C-NMR, and ESI-MS (**Jarukamjorn and Nemoto 2008, Akbar 2011, Kabir et.al. 2014, Urbi et al. 2014, Duke 2017**). Although andrographolide is not very soluble in water, it is soluble in acetone, chloroform, ether, and hot ethanol. Crystalline andrographolide was reported to be highly stable, over a period of three months (**Kumar et.al 2008**). Some scientists reported a simple and rapid method for isolating andrographolide from the leaf of *A. paniculata*. Andrographolide has been reported to have a wide range of biological activities, such as those that are anti-inflammatory (**Rajagopal et.al 2003**), antiallergic (**Cheung et al. 2005**), antiplatelet aggregation (**Liet al.v2007, Harjotaruno et.al 2008**), hepatoprotective (**Zhou et.al 2006**). In addition to these activities, the ability of ethanol or an aqueous extract of *A. paniculata* to decrease bloodglucose levels innormal rats or streptozotocin diabetic rats has been documented.In biological systems, andrographolide can interact withmany inter- and intracellular constituents as a bipolar compound, thus ensuing inmany biological responses. A recent study demonstrated that *A. paniculata* polysaccharides combined with andrographolide can ease the recovery of diabetic nephropathy.

As per **WHO (2018)** Cancer starts when cells begin to grow out of control. Breast cancer cells usually form a tumor that can often be seen on an x-ray or felt as a lump. It's important to understand that most breast lumps are benign and not cancer (malignant). Non-cancerous breast tumors are abnormal growths, but they do not spread outside of the breast. They are not life threatening, but some types of benign breast lumps can increase a woman's risk of getting breast cancer (**NCI,2018**). Any breast lump or change needs to be checked by a health care professional to determine if it is benign or malignant (cancer) and if it might affect your future cancer risk. Most breast cancers begin in the ducts that carry milk to the nipple (ductal cancers).Some start in the glands that make breast milk (lobular cancers) (**Kayande et.al 2014**).There are also other types of breast cancer that are less common like phyllodes tumor and angiosarcoma.A small number of cancers start in other tissues in the breast. These



cancers are called sarcomas and lymphomas and are not really thought of as breast cancers.

Although many types of breast cancer can cause a lump in the breast, not all do. See Breast Cancer Signs and Symptoms to learn what you should watch for and report to a health care provider. Many breast cancers are also found on screening mammograms, which can detect cancers at an earlier stage, often before they can be felt, and before symptoms develop (**WHO, 2018**). Breast cancer is cancer that forms in the cells of the breasts. Doctors know that breast cancer occurs when some breast cells begin to grow abnormally. These cells divide more rapidly than healthy cells do and continue to accumulate, forming a lump or mass. Cells may spread (metastasize) through your breast to your lymph nodes or to other parts of your body. Breast cancer most often begins with cells in the milk-producing ducts (invasive ductal carcinoma). Breast cancer may also begin in the glandular tissue called lobules (invasive lobular carcinoma) or in other cells or tissue within the breast. Researchers have identified hormonal, lifestyle and environmental factors that may increase your risk of breast cancer. But it's not clear why some people who have no risk factors develop cancer, yet other people with risk factors never do. It's likely that breast cancer is caused by a complex interaction of your genetic makeup and your environment (**NCI,2019**). Doctors estimate that about 5 to 10 percent of breast cancers are linked to gene mutations passed through generations of a family. A number of inherited mutated genes that can increase the likelihood of breast cancer have been identified. The most well-known are breast cancer gene 1 (BRCA1) and breast cancer gene 2 (BRCA2), both of which significantly increase the risk of both breast and ovarian cancer.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Breast Cancer using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The In-silico analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

Table 1: The list of pharmacophores and the targeted genes from Breast Cancer

Sl.No	Pharmacophores from Green Chiretta	Targeted Genes from Breast Cancer	PDB No of the Genes
1	Andrographolide	Transcription	6vpk
2	Neoandrographolide	Cell Adhesion	6xvt
3	14-Deoxy-11,12-Didehydroandrographolide	Lyase/Lyase Inhibitor	6vj3
4	5,7,2',3'-Tetramethoxyflavanone	Oxidoreductase	6qgv



Protein identification and preparation

The reported molecular targets responsible for Breast cancer are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

Active site identification

The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

Ligand preparation and filtration

A collection of 5 phytocompounds from Green Chiretta were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al.,2001**). The filtered compounds were then used for docking analysis.

Docking

The anti-inflammatory activity of all the 4 phytochemicals reported from Green Chiretta was assessed by docking these compounds against the respective active sites of the target proteins. Discovery studio 4.0 was used in this study to find the interacting compounds of Green Chiretta with the selected targets of arthritis. Strategies of Discovery Studio 4.0 are to exhaustively dock or score possible positions of each ligand in the binding site of the proteins. Docking study of the target proteins was done with natural compounds derived from Green Chiretta to find the preferred orientation and binding affinity of the compounds with each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER



was used to score the interacting compounds. This method uses a gridbased representation of the protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness

Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

Protein preparation and active site identification

The three dimensional structures of the identified target proteins were retrieved from the protein data bank. PDB ID of the targeted protein structure are mentioned in Table 1.

Ramachandan Plot of the targeted gene

The Ramachandran plot is among the most central concepts in structural biology, seen in publications and textbooks alike. However, with the increasing numbers of known proteinstructures and greater accuracy of ultra-high resolution protein structures, we are still learning more about the basic principles of protein structure. The use of torsion angles to describe polypeptide and protein conformation was developed by Sasisekharan as part of his studies of the structure of collagen chains during his work as a graduate student in the research group of G.N. Ramachandran. The power of this approach was readily apparent and its use quickly became widespread. Using revised definitions, this

so-called Ramachandran plot or ϕ , ψ -plot has remained nearly unchanged in the ensuing fifty years and continues to be an integral tool for protein structure research and education.

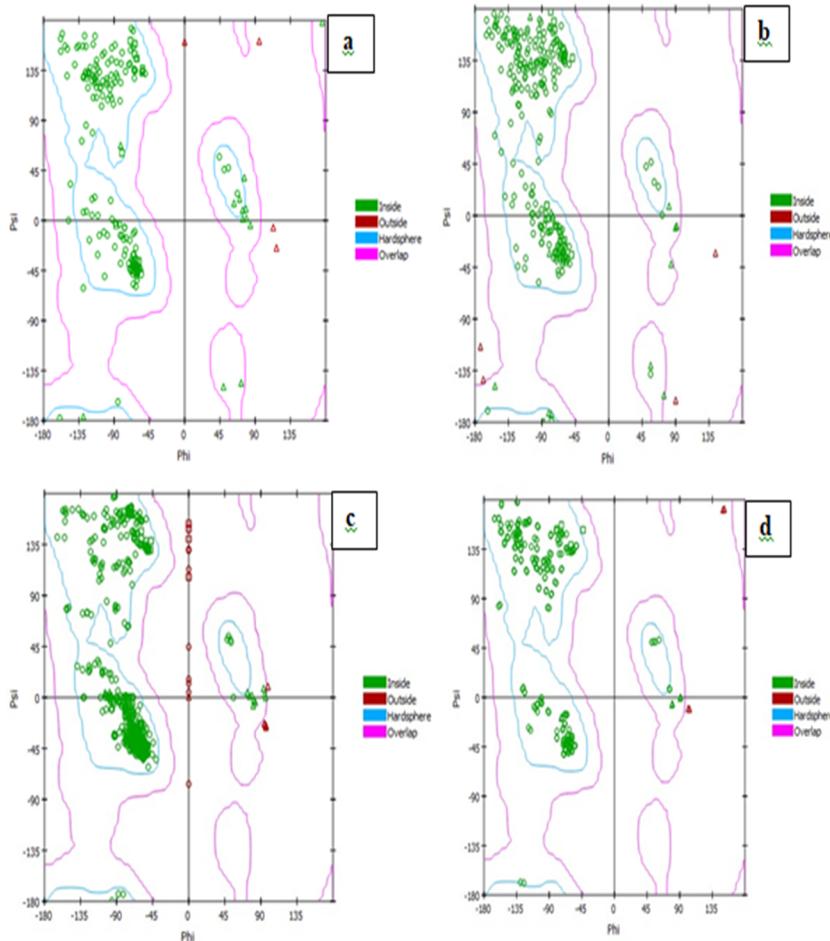


Fig 1: Ramachandran plot of (a) 6QGV(b) 6VJ3 (c) 6VPK (d) 6XVT
Hydrophobicity Plot of the Genes:

Protein–protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein–protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop hydrophobicity scales (for example, compatible with classical force fields (CFF) in calculating the energetics of protein folding) have encountered many difficulties.

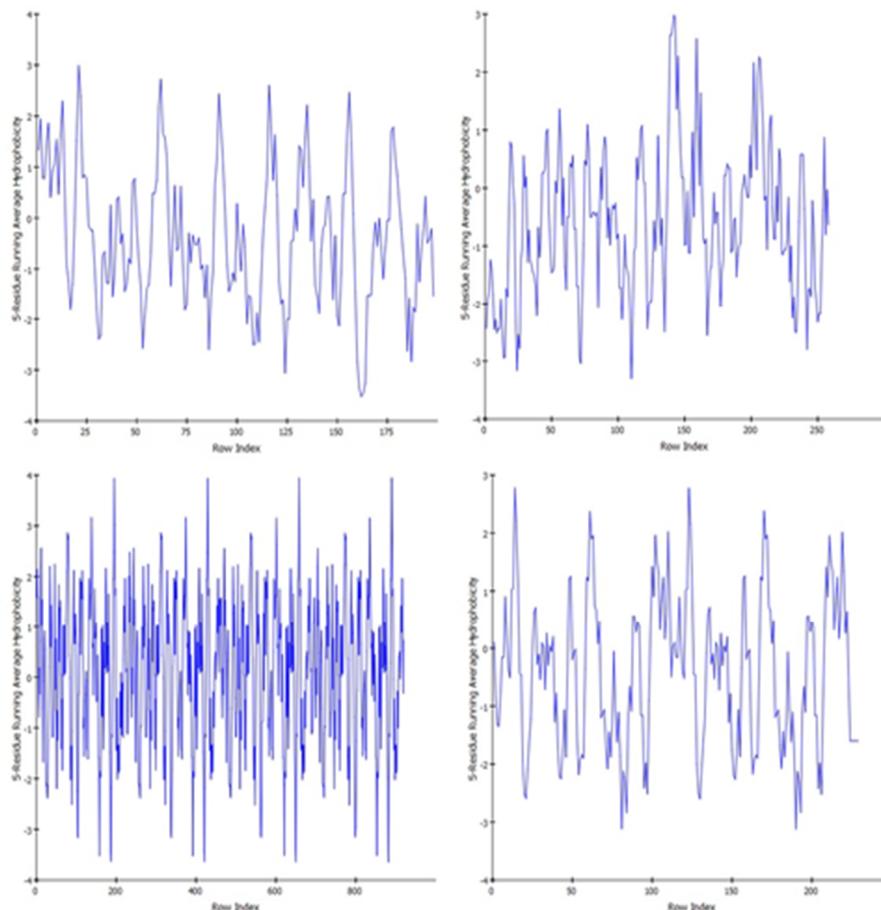


Fig 2: Hydrophobicity Plot of (a) 6QGV(b) 6VJ3 (c) 6VPK (d) 6XVT

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Breast administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between

CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.

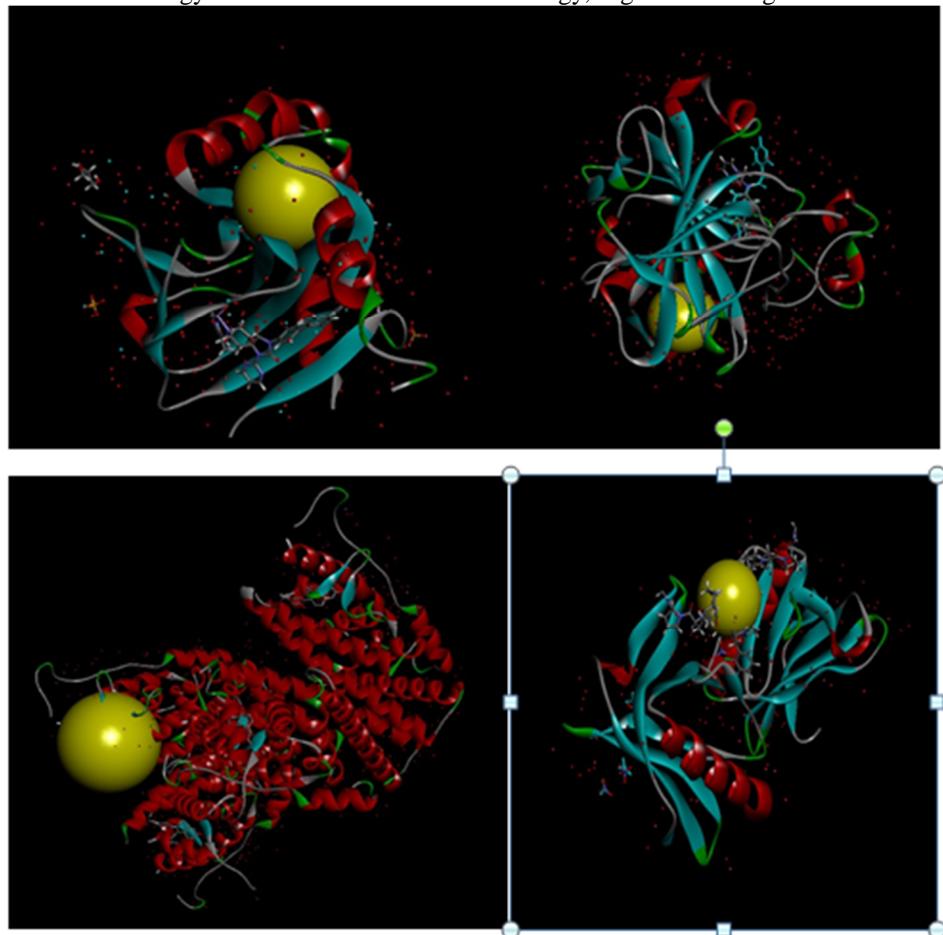


Fig 3: Docking Result of (a) 6QGV(b) 6VJ3 (c) 6VPK (d) 6XVT

ADMET Evaluation

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights into the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharmacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds



were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

CONCLUSION

CSCs typically exhibit three key characteristics, which are not mutually exclusive. Firstly, CSCs are highly tumorigenic and can form tumours in immune-deficient mice through xenotransplantation, which is not possible for non-CSCs. Secondly, CSCs that survive chemotherapy and radiotherapy generate resistance to such therapies through regulating intracellular stress; for example, regulating reactive oxygen species, which non-CSCs cannot. Thirdly, CSCs possess metastatic potential, illustrated by a report that CSCs have the ability to metastasize. The identified pharmacophores can be isolated from the Green Chiretta and can be commercialized as the natural drug for the Breast Cancer which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products.

The unique feature of the study is to targeted gene therapy for a particular cancer. This will help our future medicine to be completely allied to the Pharmacophores and the uses of synthetic and carcinogenic drug will reduce.

REFERENCES

- "Cancer". *World Health Organization*. 12 September 2018. Retrieved 19 December 2018.
- Chen P, Sun J and Ford P. J. Agric. Food Chem. 2014, 62, 2516–2521.
- "Defining Cancer". National Cancer Institute. 17 September 2007. Retrieved 28 March 2018.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Filho JR¹, de Sousa Falcão H, Batista LM, Filho /jm, Piuvezam MR. *Curr HIV Res*. 2010 Oct;8(7):531-44.
- G. Chaudhary, S. Goyal, and P. Poonia, "Lawsonia inermis Linnaeus: a phytopharmacological review," *International Journal of Pharmaceutical Sciences and Drug Research*, vol. 2, no. 2, pp. 91–98, 2010.
- G. Kavishankar, N. Lakshmidevi, S. M. Murthy, H. Prakash, and S. Niranjana, "Diabetes and medicinal plants—a review," *Journal of Pharmaceutical and Biomedical Sciences*, vol. 2, no. 3, pp. 65–80, 2011.
- Hire, KUSHAL, K. and Dhale, D. A. 2012. Antimicrobial Effect And Insilico Admet Prediction Of
- H.-Y. Cheung, S.-H. Cheung, J. Li et al., "Andrographolide isolated from *Andrographis paniculata* induces cell cycle arrest and mitochondrial-mediated apoptosis in human leukemic HL-60 cells," *Planta Medica*, vol. 71, no. 12, pp. 1106–1111, 2005.
- I. H. Burkhill, W. Birtwistle, F. Foxworthy, J. Scrivenor, and J. Watson, *A Dictionary of the Economic*
- J. A. Duke, *Duke's Handbook of Medicinal Plants of the Bible*, CRC Press, Taylor & Francis, 2007.
- Santalum Album L. *Int. J. Pharma and Bio Sci.*, 3(4): 727-734.



- J. Zhou, S. Zhang, O. Choon-Nam, and H.-M. Shen, "Critical role of pro-apoptotic Bcl-2 family members in andrographolide-induced apoptosis in human cancer cells," *Biochemical Pharmacology*, vol. 72, no. 2, pp. 132–144, 2006.
- K. Jarukamorn and N. Nemoto, "Pharmacological aspects of *Andrographis paniculata* on health and its major diterpenoid constituent andrographolide," *Journal of Health Science*, vol. 54, no. 4, pp. 370–381, 2008.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv. Drug Deliv.*, 46(1-3):3-26.
- M. H. Kabir, N. Hasan, M. M. Rahman et al., "A survey of medicinal plants used by the Deb barma clan of the Tripura tribe of Moulvibazar district, Bangladesh," *Journal of Ethnobiology and Ethnomedicine*, vol. 10, no. 1, article 19, 2014.
- Products of the Malay Peninsula, Ministry of Agriculture and Co-operatives, Kuala Lumpur, Malaysia, 1966.
- P. Joy, J. Thomas, S. Mathew, and B. P. Skaria, "Medicinal plants," *Tropical Horticulture*, vol. 2, pp. 449–632, 1998.
- R. Hajiaghaei and S. Akhondzadeh, "Herbal medicine in the treatment of Alzheimer's disease," *Journal of Medicinal Plants*, vol. 11, no. 41, pp. 1–7, 2012.
- R. Ajaya Kumar, K. Sridevi, N. Vijaya Kumar, S. Nanduri, and S. Rajagopal, "Anticancer and immunostimulatory compounds from *Andrographis paniculata*," *Journal of Ethnopharmacology*, vol. 92, no. 2-3, pp. 291–295, 2004.
- S. Akbar, "Andrographis paniculata: a review of pharmacological activities and clinical effects," *Alternative Medicine Review*, vol. 16, no. 1, pp. 66–77, 2011.
- S. Rajagopal, R. A. Kumar, D. S. Deevi, C. Satyanarayana, and R. Rajagopalan, "Andrographolide, a potential cancer therapeutic agent isolated from *Andrographis paniculata*," *Journal of Experimental Therapeutics and Oncology*, vol. 3, no. 3, pp. 147–158, 2003.
- S. Harjotaruno, A. Widywiaruyantil, and N. C. Zaini, "Apoptosis inducing effect of andrographolide on TD-47 human breast cancer cell line," *African Journal of Traditional, Complementary and Alternative Medicines*, vol. 4, no. 3, pp. 345–351, 2008.
- W. Li, X. Xu, H. Zhang et al., "Secondary metabolites from *Andrographis paniculata*," *Chemical and Pharmaceutical Bulletin*, vol. 55, no. 3, pp. 455–458, 2007.
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMm based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.
- Z. Urbi, S. Hossain, K. M. Hafizur Rahman, and T. M. Zayed, "Grape: a medicinal fruit species in the holy Qur'an and its ethnomedical importance," *World Applied Sciences Journal*, vol. 30, no. 3, pp. 253–265, 2014.



PEER PRESSURE IN ALCOHOL ABUSE OF ADOLESCENCE

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ABSTRACT

Alcohol is the drug of choice for most substance abusing adolescents, Alcohol use is typically initiated during adolescence and In adolescence age peer group is one of the most unavoidable thing has ascendancy in the behaviour of human beings and the perception of the adolescence about alcohol abuse is changed in recent years and now a day's adolescence presume the consumption of alcohol is a quality of superior and lead in front of everyone which is very dangerous. On entering college most adolescence begin to increase their amount of alcohol intake, especially who do not stay in home. This would be because they have shifted from being influenced by their parents to being influenced by their college peers. If we keen in this regards why adolescence consuming alcohol and which factor influencing on frequency of consumption of alcohol so many factors influencing like Family members, society, peer group, self interest. This research aims is to identify the factors influencing the adolescences on alcohol abuse. In this research researcher has taken 200 students studying higher education in salem district aging between 18 to 21 and used random sampling techniques, Questionnaire has been distributed and collected data. By this research it is identified that peer group has influenced the adolescence towards alcohol abuse.

KEY WORDS: Peer Pressure, Alcohol Abuse, Protective Behavioural Strategy, Social Anxiety

INTRODUCTION

Alcohol is the drug of choice for most substance abusing adolescents, Alcohol use is typically initiated during adolescence and In adolescence age peer group is one of the most unavoidable thing has ascendancy in the behaviour of human beings and the perception of the adolescence about alcohol



abuse is changed in recent years and now a day's adolescence presume the consumption of alcohol is a quality of superior and lead in front of everyone which is very dangerous. Peer pressure can change attitude and behaviour pattern of adolescences, the results can either positive or negative. Psychologically adolescence have been influenced by their peer groups in all aspects of lives and they blindly believed that their peers have suggest every things good as the way peers has influencing in alcohol abuse too. Alcohol is the drug of choice for most substance abusing adolescents and normally alcohol abuses have marked impact in family and personal lives. On entering college most adolescence begin to increase their amount of alcohol intake, especially who do not stay in home. This would be because they have shifted from being influenced by their parents to being influenced by their college peers.

Peer pressure and adolescence

Adolescence is the time when a person is most vulnerable to peer pressure because peers become a significant influence on behavior during adolescence, and peer pressure has been called a trait of adolescent experience. Children ingoing this period in life become aware for the first time of the other people around them and understand the importance of perception in their interactions. Peer conventionality in young people is most distinct with respect to style, taste, appearance, ideology, and values. Peer pressure is commonly associated with episodes of adolescent risk taking because these activities commonly occur in the friendship of peers.

Peer pressure and alcohol abuse

Peer pressure is widely recognized as a foremost contributor to the initiation of drug use, particularly in adolescence, the variety of substances, including nicotine and alcohol. While this link is well recognized, moderating factors do exist. For example, parental monitoring is negatively associated with substance use; yet when there is slight monitoring, adolescents are more possible to succumb to peer coercion during initiation to substance use, but not during the transition from investigational to regular use. Caldwell and colleagues extended this work by identifying that peer pressure was a factor important to heightened risk in the context of social gatherings with little parental monitoring, and if the individual reported themselves as vulnerable to peer pressure.

REVIEW OF LITERATURE

According to Joseph Studer, Stéphanie Baggio, Stéphane Deline, Alexandra A.N' Goran, Yves Henchoz, Meichun Mohler Kuo, Jean Bernard Daepen and Gerhard Gmel, Alcohol Treatment Centre, Lausanne University



Hospital, Switzerland. The Peer pressure plays a major role in the growth as well as continuation of alcohol use and misuse. The peer pressure to misconduct was connected with more alcohol use, whereas peer involvement and peer conformity were linked with less alcohol use. Associations of drinking outcomes with peer pressure to wrongdoing and peer involvement were partly mediated by enhancement and coping motives, while the association with peer conformity was partially mediated by enhancement and conformity motives and concludes that peer pressure linked with drinking motives which in turn were associated with alcohol use. The research paper of Rachel K. Leung, John W. Toumbourou and Sheryl A. Hemphill on the effect of peer influence and selection processes on adolescent alcohol use: a systematic review of longitudinal studies, the authors said Adolescent alcohol use remains an important public health concern. One of the most salient and consistent predictors for drinking behaviour among young people is peer pressure. The research findings revealed that existing longitudinal studies that have used multivariate analytic techniques to segregate peer pressure (whereby adolescents start consumption after exposure to alcohol-using friends) and peer selection (whereby adolescents that start consumption without alcohol-using friends subsequently seek out drinking peers) effects time after time report significant peer influence effects. The research entitled on Alcohol use among school-going adolescent boys and girls in an industrial town of Assam, India by Beauty Mahanta, P. K. Mohapatra,¹ N. Phukan, and J. Mahanta has done research with objectives of to estimate the occurrence of alcoholic drink user among school-going adolescent students in an industrial town of Assam and they high percentage of adolescents in the industrial town of Assam use alcoholic drinks with a male preponderance. They taste alcoholic drinks at a very young age. Parent's treat in taking tobacco, alcohol, or both was found to influence higher intake by their offspring. According to the Margo Villarosa, Saarah Kison, Michael Madson & Virgil Zeigler-Hill research on Everyone else is doing it: examining the role of peer pressure on the relationship between social anxiety and alcohol use behaviours, Social anxiety has been connected with harmful alcohol use, alcohol-related pessimistic consequences, and less use of protective behavioural strategies among college students. The inability to resist peer pressure has also been shown to be predictive of college student drinking behaviour. The current study examined the moderating role of resistance to peer pressure in the relationship between social anxiety, alcohol-related harmful consequences and protective behavioural strategies. Participants were 562 undergraduates who completed measures of social anxiety, resistance to peer pressure, harmful drinking patterns, alcohol-related negative consequences and protective behavioural strategy use. As predicted, students with higher levels of social anxiety who also expressed being more vulnerable



to peer influence reported more harmful drinking and alcohol-related negative consequences, and fewer protective behavioural strategies. Thus, students with more social anxiety who may have been drinking in order to be accepted by their peers were more likely than others to engage in more problematic and less safe drinking behaviours. Interventions that focus on harm reduction with college students who drink and experience social anxiety would benefit from addressing their need to be accepted by peers and how that relates to their use of protective behavioural strategies. According Linda patia spear & H.Scott swartzwelder research on Adolescent alcohol exposure and persistence of adolescent-typical phenotypes into adulthood: A mini-review, they said that Alcohol use is typically initiated during adolescence, which, along with adulthood, is a susceptible period for the onset of high-risk drinking and alcohol abuse. *Allen, Joseph P.; Porter, Maryfrances R.; McFarland, F. Christy; Marsh, Penny; McElhaney, Kathleen Boykin* researchers said that Even though socially accepted children often have the most opportunities and the most positive experiences, research shows that social acceptance (being in the popular crowd) may increase the likelihood of attractive in risky behavior, depending on the norms in the group. Groups of popular children showed a propensity to increase risky, drug-related and delinquent behavior when this behavior was likely to receive approval in their groups. Peer pressure was most among more popular children because they were the children most adjusted to the judgments of their peers, making them more susceptible to group pressures. According to Joseph p. Allen, maryfrances r. Porter, and f. Christy mcfarland, Peer pressure produces a wide array of negative outcomes. Allen and colleagues showed that susceptibility to peer pressure in 13- and 14-year-olds was predictive of not only future response to peer pressure, but also a wider array of functioning. For example, deep depression symptomatology, declining popularity, more sexual behavior, and externalizing behavior were greater for more susceptible adolescence. Of note, substance use was also predicted by peer pressure susceptibility such that greater susceptibility was predictive of larger alcohol and drug use.

RESEARCH METHODOLOGY

The main objective of this research is to find out cause and influencing factor of adolescence in alcohol abuse. The research was in descriptive in nature and convinient sampling techniques used to collect the data. Krejcie and morgan table has been used for finalizing the sample size. This study confined with the adolescence studying in higher education in around salem district. Primary and secondary data has been used for this research. The primary data ha collected with well structured questionnaire was framed with multiple choices and likert



scaling used and collected data among 200 college students and secondary data has collected from books and websites.

RESULTS AND DISCUSSION

From the table 1, the researcher identified that from the following factors like Family problem, love related issues and refreshement, the refreshement is the one of the major motive that motives the adolescence to the alcohol abuse, since the chi-square value is 45.880 and p value is 0.000.

Table 1- Motives to alcohol Abuse				
Particulars	Frequencies	Chi-Square	df	Asymp. Sig.
Family problem	34	45.880	2	.000
Love related issues	56			
Refreshment	110			
Total	200			

From the table 2, the researcher found that from the following factors like Family members, self interest, peer group, society, the peer group is highly influencing the adolescence to have alcohol abuse. since the chi-square value is 59.480 and p value is 0.000

Table 2-Factors influencing in alcoholism				
Particulars	Frequencies	Chi-Square	df	Asymp. Sig.
Family members	18	59.480	3	.000
Self interest	49			
Peer group	93			
Society	40			
Total	200			

FINDINGS & CONCLUSION

From research, the researcher identified that from the following factors like Family problem, love related issues and refreshement, the refreshement is the one of the major motive that motives the adolescence to the alcohol abuse and researcher has conclude that from the following factors like Family members, self interest, peer group, society, the peer group is highly influencing the adolescence to have alcohol abuse.



REFERENCE

1. Beauty Mahanta, P. K. Mohapatra, N. Phukan, and J. Mahanta, "Alcohol use among school-going adolescent boys and girls in an industrial town of Assam, India", Indian Journal of Psychiatry, Volume 58, Issue 2, Pages 157-163.
2. Caldwell, Linda; Darling, Nancy (1999). "Leisure Context, Parental Control, and Resistance to Peer Pressure as Predictors of Adolescent Partying and Substance Use: An Ecological Perspective". *Journal of Leisure Research, Volume 31, Issue 1, Pages 57-77.*
3. Joseph P. Allen, maryfrances R. Porter, and F.Christy Mcfarland, "Leaders and followers in adolescent close friendships: Susceptibility to peer influence as a predictor of risky behavior, friendship instability, and depression" . *journal of Development and psychopathology,Volume 18,issue 1, pages 155-172.*
4. Joseph Studer, Stéphanie Baggio, Stéphane Deline, Alexandra A.N'Goran, YvesHenchoz, MeichunMohler Kuo, Jean Bernard Daepen and Gerhard Gmel, "Peer pressure and alcohol use in young men: A mediation analysis of drinking motives", *International Journal of Drug Policy, Volume 25, Issue 4, Pages 700-708.*
5. Linda patia spear & H.Scott swartzwelder, "Adolescent alcohol exposure and persistence of adolescent-typical phenotypes into adulthood: A mini-review", *Journal of Neuroscience & Biobehavioral Reviews, Volume 45, September 2014, Pages 1-8.*
6. Margo Villarosa,Saarah Kison,Michael Madson &Virgil Zeigler-Hill, "Everyone else is doing it: examining the role of peer influence on the relationship between social anxiety and alcohol use behaviours", *journal of Addiction Research & Theory,Volume 24, 2016 - Issue 2,Pages 124-134.*
7. Rachel K. Leung, John W. Toumbourou and Sheryl A. Hemphill , "The effect of peer influence and selection processes on adolescent alcohol use: a systematic review of longitudinal studies", *Journal Health Psychology Review , Volume 8, Issue 4, Pages 426-457.*



DEVELOPMENT OF VERMICELLI INCORPORATED WITH VALUE ADDED FLOUR

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ABSTRACT

The present study highlights the importance of multigrains and herbs like pandan leaves in the formulation of value added vermicelli. Two variations of vermicelli was brought about by substituting pandan leaf extract (V1-120ml) and the basil leaf extract (V2-120ml) in addition with different proportions of multigrain and plantain flour (V1-62, 30g and V2-30, 62g) and functional ingredients like dill seed and oregano powder was added about 5g and 3g to both the variations respectively for the development of vermicelli. The control, variations I and II was standardised by the organoleptic evaluation (5 point hedonic scale) with trained panel members and the selected vermicelli out of the variations with greater sensory scores (control-4.42, V1-4.85, V2-3.51) was selected for further analysis. The physicochemical properties of the vermicelli were similar to the commercial vermicelli. Nutrient content of formulated vermicelli was enriched with the goodness of Protein (12.14%), Fibre , (4.19%) and Iron (6.51) which was comparatively greater than commercial vermicelli. The storage stability of vermicelli was assessed by the total microbial count and the sensory attributes showed that the vermicelli shelf life exceed about 30 days under room temperature 35°C.

1. INTRODUCTION

Vermicelli is a popular noodle type in Southeast Asian countries. Freshly extruded vermicelli are often then fully cooked and dried for packaging and marketing. Desirable qualities of vermicelli are similar to those of other styles of noodles and include low loss of solids in cooking and appealing texture. A number of physicochemical factors, as well as methods of processing, determining the final quality of the product (**Sacchetti et al., 2004**).

Vermicelli is mostly popular in India as the intermediate food product used in sweet and the savoury preparation like kheer and upma. It is also gaining popularity in India cuisine (**Malleshi, 2001**).

The present study aims at developing extruded product vermicelli with incorporation of functional ingredients like Dill seed, Pandan leaf, Basil seed, Oregano at varying proportions to determine the most acceptable one. With this view, the following objectives were framed:

- To formulate vermicelli with multigrain flour and plantain flour and making it nutrient rich by the addition of basil seed, dill seed, oregano and pandan leaf extract.
 - To determine the nutrient content of the formulated vermicelli.
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- To examine the antioxidant activity of the formulated vermicelli.

2. METHODOLOGY

The methodology is discussed under the following headings

Phase 1: Selection and Procurement of Ingredients

Selection of ingredients

The different ingredients used for the study includes multigrain flour, plantain flour, dill seed and basil leaf, pandan leaf and oregano. These ingredients tend to possess excellent functional properties and so they were selected in the present study to derive maximum therapeutic benefits.

Processing of ingredients

Multigrain flour, plantain flour, dill seed was procured from the local market for the study. Oregano leaf powder was prepared from the freshly processed leaves from the farm, after destalking, size reduction and blanching to remove insecticides, pesticide by washing well in hot water. Then oregano leaves were dried, ground , sieved and stored. Pandan leaf extract is being prepared from the fresh leaves of pandan is added to the hot water for few minutes, boiled and the leaf is strained and the water is alone extracted for the preparation of dough.



FIGURE 1. PREPARATION OF OREGANO LEAF POWDER

PHASE 2: STANDARDIZATION OF VERMICELLI

The vermicelli is prepared by using the traditional extruding technology. The

Proportions	water	Pandan leaf extract	Basil leaf extract	Maida	Multigrain flour	Plantain flour	Dill seed	Oregano
Control	120 ml	-	-	85 gm	-	-	-	-
Variation 1	-	120 ml	-	-	62 gm	30 gm	5 gm	3 gm
Variation 2	-	-	120 ml	-	30 gm	62 gm	5 gm	3 gm

ingredients like plantain flour ,multigrain flour , oregano, dill seed ,and the pandan leaf extract has been incorporated for the preparation of dough. It is then extruded in the term of vermicelli and steamed further it is uniformly dried in the hot air oven for 55° for about 5 hours .The vermicelli is completely dried and the formulations were packed in the tetra packets and stored at 25° C for further analysis. The variant proportions of vermicelli has been explained in the below figures.

Preparation of different variation of vermicelli

Table 1.Different Variations of Vermicelli

Variations of vermicelli were brought about by partially substituting pandan leaf and the basil leaf extract. Table 1 gives different variations of vermicelli.



Figure 2. Preparation of Extruded Vermicelli

Cooking quality of vermicelli

TABLE II. Cooking quality of vermicelli

Sample	Cooking time	Cooking weight
Variation 1	10 minutes	19.06 g
Variation 2	13 minutes	18.16 g
Control	20 minutes	15.20 g

Cooking time of all vermicelli was determined to evaluate the hydration properties of different formulation. Cooking time ranged between 15-20 minutes. The cooking time is significantly increased experimental samples compared to control. (Oliveria et al., 2004).

Texture analysis of vermicelli

TABLE III. Texture analysis of vermicelli

Texture	Control	Variation 1	Variation 2
Stickiness	62.9	13	28.3
Adhesiveness	16.534	3.794	4.585

The stickiness and adhesiveness component were found to be low in variation 1 when compared to control vermicelli. Sample 1and 2 had low texture component when compared to control. In order to obtain vermicelli of good quality, the product should exhibit low stickiness grades as well as good strength after cooking. Hence vermicelli prepared from pandan leaf extract is found to be a suitable for extrusion process.

2.4) Sensory analysis for the standardization of vermicelli

Subjective method are the method of evaluating food quality which have been developed scientifically through as understanding of the manner in which our sensory organ function to detect colour ,taste, flavour for the acceptability of the food. The sensory evaluation of the vermicelli was performed with an evaluation panel of 25 members (George et al .,2003). A five point score card was developed on the basis of numerical rating scale (5- very good to 1-poor) of the sample were assessed.

PHASE – 3 DETERMINATIONS OF CONSTITUENTS

3.2) Analysis of nutrient content of vermicelli

The selected sample is the form of duplicate were analysed for proximate principles.

TABLE VI. Methods for nutrient analysis

S.no	Nutrient analysis	Methodology	References
1.	Carbohydrate	Anthrone method	AOAC,1999
2.	Protein	Lowry' s method	Raguram et al,2003
3.	Fat	Soxhlet method	Ranganna ,2000
4.	Ash	AOAC	AOAC , 1995
5.	Moisture	AOAC	AOAC ,1995

The carbohydrate content was analysed by anthrone method, protein by using the Kjeldahl nitrogen analyser and fat by Soxhlet extraction method. Minerals like calcium and iron are analysed by calorimeter(AOAC, 2000).

Shelf life of selected vermicelli

The shelf life of selected vermicelli is assessed by two methods like Microbial Analysis and Sensory Evaluation.

Microbial Analysis

Microbial analysis is the term used to identify bacteria, fungi, and other microbial growth. Microbial testing is very essential in food processing to ensure safety and quality product to the consumer. Microbial analysis was carried out according to the method described by Harrigan and McCance . Total plate count, yeast, and mold were enumerated in the samples. The average number of colony forming units (cfu/g) from the duplicate plate of the same dilution were counted, multiplied with the dilution factor and expressed as cfu 9 10n/g of sample (n = dilution factor) (**Rekha et al., 2010**).

Sensory evaluation

To determine the shelf life the standardized vermicelli was subjected to sensory evaluation by panel of 10 members 5 days, 10 days and 15 days was evaluated by 5 head point score card.

Computation of Cost For The Standardised Vermicelli

The cost of 100 grams of formulated vermicelli was estimated by calculating the cost of raw ingredient.

PHASE – 4 POPULARIZATION OF VALUE ADDED VERMICELLI

4.1 Details regarding the frequent consumption of vermicelli

The formulated vermicelli were demonstrated to hostelates who where residing in Sitra, Civil Aerodrome, Coimbatore District, and to the beneficiaries (Women) to assess the details regarding the frequency consumption of vermicelli .And created an awareness among the students about the medicinal benefits of herbs.

4.2 Acceptability of Formulated Vermicelli Recipe

Popular recipe namely vermicelli vegetable upma is prepared as per routine practise is given with standardised vermicelli was organoleptic evaluation by 25 panel members to evaluate the sensory attributes.



PLATE 1. vermicelli upma for sensory evaluation

PHASE 5: STATISTICAL ANALYSIS OF SENSORY ATTRIBUTES OF VERMICELLI

Statistical analysis were done based on the organoleptic evaluation given to the panel members. Based on the appearance, colour, taste, and the overall acceptability the statistical analysis were procured. Certain statistical tools were involved in the appropriate values.

RESULT AND DISCUSSION

The results pertaining to the study is discussed under the following headings

1. STANDARDIZATION OF FORMULATED VERMICELLI

1.1 Organoleptic evaluation of vermicelli variation

The processed vermicelli upma were made ready to eat within 15 minutes of time. Then the vermicelli were subjected to organoleptic evaluation for its quality attributes like flavour ,appearance, taste , colour, texture and overall acceptability ,using five point score card by selected panel members.

TABLE VII

Organoleptic Evaluation of Value Added Vermicelli (mean ±standard deviation)

S.no	Criteria	Control	Variation 1	Variation 2
1.	Appearance	4±0	4.92±0.26	3.71±0.40
2.	Colour	4.5±0.51	4.64±0.49	3.42±0.51
3.	Taste	4.21±0.42	4.42±0.51	3.64±0.49
4.	Texture	4.35±0.49	4.92±0.26	4.35±0.49
5.	Flavour	4.21±0.57	4.82±0.36	4.42±0.64
6.	Overall acceptability	4.42±0.51	4.85±0.36	3.51±0.51

The sensory evaluation was done by 25 panel members, and the mean attributes were calculated. The highest score was given for appearance and texture and followed by overall acceptability. By comparing both the variations variation I had highest mean score due the incorporation of herbs that made the product as nutrient rich.



PLATE II. Sensory Evaluation of Vermicelli Upma

DETERMINATION OF CONSTITUENTS

The acceptable value added vermicelli was considered to be the standard and was used for further analysis.



Nutrient Analysis of Raw Vermicelli

The nutrient contents of the formulated control and dill seed pandan leaf incorporated vermicelli were analysed and compared. The analysis of nutrient was carried out by using standard procedure. The nutrient analysis like ash ,energy ,carbohydrate, protein and fat is given below in the table XII.

TABLE XII. COMPARISON BETWEEN VALUE ADDED VERMICELLI AND COMMERCIAL VERMICELLI

S.no	Nutrient Content	Commercial Vermicelli (100 g)	Value added Vermicelli (100g)	T test p value
1.	Ash (%)	5.18±0.02	5.89±0.10	0.001*
2.	Moisture (%)	2.88±0.11	3.87±0.88	0.003*
3.	Energy (kcal)	390.02±4.0	422.44±1.54	0.001*
4.	Protein (g)	8.94±0.62	12.14±0.60	0.004*
5.	Fat (g)	1.39±0.07	2.59±0.07	0.005*
6.	Carbohydrate (g)	60.67±0.45	71.92±0.36	0.003*
7.	Fibre (g)	8.83±0.05	8.19±0.54	0.003*
8.	Iron (mg)	1.89±0.08	6.51±0.21	0.000*

Values are mean±Std deviation, *-Significant at 5 % level

The comparison was done between the commercial available vermicelli and the value added vermicelli. The nutrients like Energy ,Protein ,Fat and Carbohydrate content are higher in pandan leaf vermicelli respectively higher than the commercial available vermicelli.

DETERMINATION OF SHELF LIFE

Microbial analysis of vermicelli

Microbial analysis to find the storage stability of formulated vermicelli the microbial count of microbial vermicelli was analysed for initial, 15 days, 30 days,

TABLE XIII. Microbial analysis of vermicelli

S.no	Criteria	Initial	15 days	30 days
1.	Bacterial count (cfu in grams)	Absent	6×10^3	25×10^3
2.	Fungal count(cfu in grams)	Absent	absent	2×10^3

When the vermicelli was observed for the storage study for the maximum about 30 days to analyse the shelf life of the product. Initially there was no growth observe



but when it was exceed about 15 days there was a slight .And their values were depicted in the above table .

4.2. Sensory attributes of vermicelli during storage period

TABLE XIV. Sensory attributes of vermicelli during storage period

S.no	Criteria	15 days of storage	30 days of storage
1.	Appearance	3.8±1.2	3.7±1.0
2.	Colour	3.6±1.2	2.9±1.3
3.	Flavour	4.0±0.0	3.8±1.2
4.	Taste	3.8±1.2	3.7±1.0
5.	Texture	4.2±1.3	4.7±1.3
6.	Overall acceptability	3.6±1.2	3.2±1.2

When the vermicelli was observed for the storage study for the maximum about 30 days to analyse the shelf life of the product. Sensory score were reduced slightly when it was exceed about 15 days and their values were depicted in the above table .

CONCLUSION

This study demonstrates the development and evaluation of value added vermicelli and is acceptable and had the high nutrient content when compared with the commercial available vermicelli. It was found that the vermicelli was rich in Protein, Iron and Fibre. The vermicelli vegetable upma recipe have shown higher acceptability in all aspects .The formulated vermicelli has a good characteristics of being nutrient rich and highly acceptable.

References

- CFTRI New letter VO1 -13no Volume 52 Jan 1998 .Indian food packer.
- Harper j.M(1981).Extrusion of food,Processing Technology.
- Malleshi (1991)Studies on the suitable of rоoler flour mill and plate grinder for obtaining a refined flour,New age International Publisher P34
- Oliverae A.A. and Aletr V.A., vela (1993). Functional properties of haemagglutinine (Lectins) extracted from three edible varieties of lima beans (phaseolus), Intern. J. FdSci and Nutri.,44, 133-136.
- Supriya S, Premakumari, S., Balasasirekha, R., Gomathi, K., Jagan Mohan, R., & Alagusundram, K. (2012). Development and acceptability of fibre enriched ready mixes. International Journal of Pure and Applied Science Technology, 9, 74-83.
- Rekha, M. N., Yadav, A. R., Dharmesh, S., Chauhan, A. S., & Ramteke, R. S. (2010). Evaluation of antioxidant properties of dry soup mix extracts containing dill (*Anethum sowa* L.) leaf. Food and Bioprocess Technology, 3(3), 441-449.
- Sacchetti, G., Pinnavaia, G. G., Guidolin, E., & Dalla Rosa, M. (2004). Effects of extrusion temperature and feed composition on the functional, physical and sensory properties of chestnut and rice flour-based snack-like products. Food Research International, 37(5), 527



POSITIVE WORD OF MOUTH INFLUENCE ON RESTURANTS IN COIMBATORE CITY

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ABSTRACT

A restaurant is a business which prepares and serves food and drinks to customers in exchange for money. Meals are generally served and eaten on the premises, but many restaurants also offer take-out and food delivery services, and some offer only take-out and delivery. Word-of-mouth (WOM) is the technique of promoting a product, service or business by soliciting positive comments from satisfied customers. Word of mouth marketing is an interactive process such that customers are collaborating with the business, product or service for which they have derived enough satisfaction that they are willing to speak out about it and even recommend it to others. This paper deals with the positive word – of – mouth impact among the customers. The study was conducted in Coimbatore city and convenient sampling technique is used for the study purpose.

Keyword: Advertisement, Positive Word-of-mouth, Restaurants, etc.

INTRODUCTION

A restaurant is a business which prepares and serves food and drinks to customers in exchange for money. Meals are generally served and eaten on the premises, but many restaurants also offer take-out and food delivery services, and some offer only take-out and delivery. Restaurants vary greatly in appearance and offerings, including a wide variety of cuisines and service models ranging from inexpensive fast food restaurants and cafeterias to mid-priced family restaurants, to high-priced luxury establishments.

Advertising is an audio or visual form of marketing communication that employs an openly sponsored, non-personal message to promote or sell a product, service or idea of their products or services. Advertising is differentiated from public relations in that an advertiser pays for and has control over the message. It differs from personal selling in that the message is non-personal, i.e., not directed to a particular individual. Advertising is communicated through various mass media, including traditional media such as newspapers, magazines, television, radio, outdoor advertising or direct mail; and new media such as search results, blogs, social media, websites or text



messages. The actual presentation of the message in a medium is referred to as an advertisement or "ad" for short.

Word of Mouth

Word-of-mouth (WOM) is the technique of promoting a product, service or business by soliciting positive comments from satisfied customers. Word of mouth marketing is an interactive process such that customers are collaborating with the business, product or service for which they have derived enough satisfaction that they are willing to speak out about it and even recommend it to others.

Features of word-of-mouth Advertisement

1. Free advertising

If you've checked ad rates for newspaper placements or web-based marketing you know that advertising can be expensive.

2. WOM is reliable

It comes from a trusted source – a friend, your spouse, a neighbour, co-worker or some other source in whom you have trust. You're much more likely to see a movie recommended by a friend than one that gets a glowing review online.

3. Word of mouth is viral

It spreads on its own as one person tells another and that person tells all of her friends. WOM can spread exponentially as more and more people hear about the latest and greatest from friends and family.

4. WOM is sticky

You're more likely to remember one recommendation from a neighbor than a TV ad that you've seen a dozen times. Because friends share good news. TV and print ads have a different agenda. They try to sell you something without knowing much about you.

5. Easy to create

Word of mouth advertising is easy to create IF you deliver the products or services that people expect. If you don't deliver to expectations, bad WOM spreads.

POSITIVE WORD OF MOUTH

- ❖ Encouraging communication
- ❖ Giving people something to talk about
- ❖ Creating communities and connecting people.
- ❖ Working with influential communities.

REVIEW OF LITERATURE

Singh, T.V (1975) In his study, has assessed hotels capacity at twelve different locations of tourist importance in the State of Uttar Pradesh. The main findings of the study were that the domestic tourists are neither choosey about accommodation nor they demand superior service. But the foreign tourists



demand better quality hotels. As such, there is a shortage of accommodation in relation to foreign tourist. **Guha (1981)** while highlighting the importance of the hotel industry in Indian tourism has suggested that the hotel has to provide basic hospitality services besides doing marketing (promotions) of rooms, supply of food, etc. He suggests ways of maximum utilization of the capacity and ways to increase tourist inflow. **Kachru, Arun (1981)** In his paper, concludes that each hotel room gives employment to 3 direct workers while indirectly 9 workers are employed. Further important role of hotel industry is the generation of employment and foreign exchange earnings. **Lim (2010)** Customers final pleasure may have significant affect connected with atmosphere. Bodily environment are useful to produce graphic within the mind connected with customer in order to affect their own behavior. Bodily atmosphere with the dining places have the significant has an effect on for the clients pleasure. Super, providing, routed, tunes and different various other atmospheric components included in this effect in customer satisfaction.

STATEMENT OF THE PROBLEM

This study focuses on fine dining restaurant upscale segment because it is differentiated by its name and presentation. The restaurants aim to create and reach customers' expectations. In the competitive fast-food industry, fast-food restaurants have to maintain efficiency in their standard operations and keep up with the quality of their products and services. However, we think that there are some issues concerning the traditional way to order food in fast-food restaurants. Not only this, the study focus on the impact of positive words of mouth advertisements on the restaurants.

OBJECTIVES OF THE STUDY

1. To study the reasons to choose a restaurant.
2. To find the effect of positive words of mouth influence towards restaurant.

RESEARCH METHODOLOGY

The research uses both primary and secondary data and the primary data was collected through questionnaire from the respondents in Coimbatore city. The Customers are met residing in various areas of Coimbatore city. Their responses and feedback is noted down in questionnaire. The secondary data were collected from magazines, articles, internet, etc. A well structured questionnaire was collected from a sample respondent of size 200 by adopting convenience simple method.

LIMITATIONS OF THE STUDY

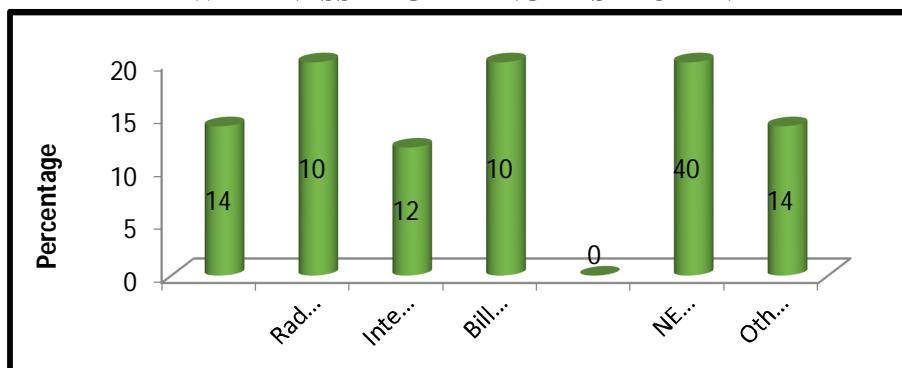
- ❖ This study was conducted only in Coimbatore city which not give a general conclusion.
-

- ❖ The sample size is limited to 200 due to time constrains.
- ❖ Only the consumers View point has been analyzed.

RESULTS AND DISCUSSION

SIMPLE PERCENTAGE ANALYSIS

CHART- 1
AWARENESS REGARDING RESTAURANT



Source: Primary Data

From the above table it is inferred that 10.0 per cent of the respondents receive awareness about the restaurants from Radio commercial, 10.0 per cent of the respondents through Billboards, 40.0 per cent of the respondents are aware from Newspaper or coupons. 14 per cent of the respondents through TV commercial, 14 per cent of the respondents are aware from Others sources, 12 per cent of the respondents are aware through Internet.

The most (40.0 per cent) of the respondents are aware of restaurants from Newspaper or Coupons.

WEIGHTED AVERAGE METHOD ANALYSIS

TABLE- 1
REASONS TO CHOOSE THE RESTAURANT

S.NO	REASON	TOTAL SCORE	RANK
1	Friendly service	580	9
2	Cleanliness	612	3
3	Price	576	10
4	Taste of food	604	4
5	Menu variety	660	1
6	Catering offer	596	5
7	Staff is willing to help guests	596	6
8	Attractive layout of restaurant /thematic layout	588	7
9	Quality of food	628	2
10	Organic food varieties in menu	584	8

Source: Primary Data



From the above table it is inferred that among the various reasons to choose the Restaurant's "Menu variety" ranks first with the scores of 660, "Quality of food" and "Cleanliness" places the 2nd and 3rd rank, "Catering offer" and "Taste of food" places the 4th and 5th rank, "Staff is willing to help guests" and "Attractive layout of restaurant /thematic layout" places the 6th and 7th ranks, "Organic food varieties in menu", "Friendly service" and "Price" places the 8th, 9th and 10th ranks. Thus most of the respondents prefer a restaurant for the "Menu Variety" offered it.

TABLE - 2
WORD OF MOUTH INFLUENCE TOWARDS RESTAURANT

S.NO	REASONS	TOTALSCORE	RANK
1	I think most people have a positive opinion about this restaurant.	748	1
2	The staff in the restaurant is friendly towards the guests.	680	2
3	This restaurant has a unique image.	616	5
4	I think this restaurant is popular.	660	3
5	The staff in this restaurant always put their guests first.	652	4

Source: Primary Data

The above table analysis the word-of-mouth influence towards the restaurants and it is inferred that "I think most people have a positive opinion about this restaurant" rank first the score of 728, "The staff in the restaurant is friendly towards the guests" and "I think this restaurant is popular" places the 2nd and 3rd ranks, "The staff in this restaurant always put their guests first" and "This restaurant has a unique image" places the 4th and 5th ranks.

Thus it can be inferred that there always an influence for the positive word-of-mouth advertisement and people still believe the positive opinion of the customers in choosing the restaurants.

CONCLUSION

Train employees in effective customer service techniques, not just in the legally-required food handling and safety procedures. Encourage them to think in terms of customer care, which goes beyond basic service. The care concept includes such simple steps as looking customers in the eye, smiling at them and greeting them promptly, as well as measures such as anticipating their needs: refilling water glasses before they're empty or bringing extra napkins for customers who order messy finger food.



There is always a great influence on the positive word of mouth advertisement among the customers. So the restaurants have to take at most care in protecting the image of the restaurants and customer service improvement is the key for improving the positive impact on the customers.

REFERENCE

- Singh T.V. (1975), “Tourism and Tourist Industry New Heights”, p.152-173.
- Guha, (1981), “Hotel Industry in Indian Tourism”, in: ‘Capital 21st’, September, pp.99- 104.
- Kachru, Arun (1981), “Role of Hotels in Tourism Industry”, in: ‘The Economic Times’, 4th July, 1981.
- Lim. H (2010) Understanding American customer perceptions on Japanese food and services in the U. S. UNLV Theses dissertations professional papers capstones.
- Jones and Kivela (2001), “ Perception of the first time restaurant customer”, Food servn , technology, 1,5-11.
- Jones and milif (2001) Menu development and analysis in restaurant chain, tourism Hosp Res 3 (1) 61-71.



IN SILICO ANALYSIS OF THE CINNAMON AS TARGETED BIOPESTISIDES HAVING NO SIDE EFFECT

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ABSTRACT

Ancient India is one of the pioneers of studies of plants as medicine, i.e. Ayurveda. In our social and economic life we hardly take care of our food we are taking. One such unique herb is Cinnamon which has often been regarded as a brain booster. The whole plant including the flowers can be used for medicinal purposes. It has a bitter and sweet taste and is known to impart a cooling energy. Cinnamon is full of antioxidants that are essential for living a healthy life. Antioxidants help in removing free radicals that can further mutate into cancer cells. We are using this property of Cinnamon to get some new drugs for Crown Gall. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. *In-silico* analysis has done using software and we further targeted some of the genes responsible for Crown Gall and pharmacophores from Cinnamon and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others. From this we can deduce that these two pharmacophores can be a solution to Lung Cancer in near future.

KEY WORDS: Cinnamon, Docking, *In Silico* Analysis, Crown Gall , Pharmacophore

INTRODUCTION

From ancient many herbs and spices are being used as medicine for many diseases. Cinnamon is a spice, made from inner bark of trees known as Cinnamomum. Once it was to be rare and valuable so it was regarded as a gift for kings but nowadays it is not only cheaper but also readily obtainable (**Chen et.al, 2014**). The medicinal use of this plant has been documented in Ayurveda (the Indian system of medicine), for over 6000 years. Cinnamomum comes from Greek word kinnamomon. Which means ‘sweet wood’. There are two types of cinnamon, true cinnamon (*Cinnamomum zeylanicum*, *C. verum*) and cassia (*Cinnamomum aromaticum*) (**Kayande et.al, 2014**). The bark of Cinnamon is an important spices used all over the world for cooking and medicine proposes (**Sangal, 2011**). The characteristic odour and flavour of cinnamon are due to the oils and other derivatives, like cinnamaldehyde, cinnamic acid and cinnamate. Cinnamon has some medicinal properties (**Torbatli et.al, 2014**). It contains polyphenols which act as antioxidants. From the study of antioxidant activity of 26 spices, Cinnamon was found out to be a clear winner (**Shan et.al, 2005**). Cinnamon is



also used for natural food preserver (**Nikos G. Tzortzakis, 2009**). It can also helpful for lowering blood sugar level because of its antidiabetic effect (**Kim et.al, 2006**). In addition to that it act as anti microbial (**Chan et.al, 2001**), anticancer (**Anderson et.al, 2010**) anti-inflammatory (**Tung et.al, 2010**), antifungal (**Wang et.al, 2010**) and also has been reported to have activities against neurological disorder (**Peterson et.al, 2009**). From some research it has been found that it can also fight with HIV-1 (common strain of HIV virus in humans) (**Filho et.al,2010**). From a research it was found cinnamon has most effective treatment on HIV-infected cells out of all 69 medicinal plants under research (**Premanathan et.al, 2009**).

Crown gall, plant disease, caused by the bacterium *Agrobacterium tumefaciens* (synonym *Rhizobium radiobacter*). Thousands of plant species are susceptible. They include especially grape, members of the rose family (Rosaceae), shade and nut trees, many shrubs and vines, and perennial garden plants. Symptoms include roundish rough-surfaced galls (woody tumourlike growths), several centimetres or more in diameter, usually at or near the soil line, on a graft site or bud union, or on roots and lower stems. The galls are at first cream-coloured or greenish and later turn brown or black. As the disease progresses, plants lose vigour and may eventually die. Crown gall can be avoided by using nursery stock free of suspicious bumps near the crown, former soil line, or graft union; practicing five-year rotation or avoiding replanting for that period; removing severely infected plants (including as many roots as possible); protecting against injury; keeping down weeds; controlling root-chewing insects and nematodes; cutting away large galls on trees; and disinfecting wounds. Rapid and accurate diagnosis of disease is necessary before proper control measures can be suggested. It is the first step in the study of any disease. Diagnosis is largely based on characteristic symptoms expressed by the diseased plant. Identification of the pathogen is also essential to diagnosis. Diagnosis is best done in the presence of the growing plant. Disease is suspected when, for example, part or all of a plant begins to die. Disease also is indicated when blossoms, leaves, stems, roots, or other plant parts appear abnormal—i.e., misshapen, curled, discoloured, overdeveloped, or underdeveloped. Diseased plants also often fail to respond normally to fertilizing, watering, pruning, insect and mite control, or other recommended practices.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Crown Gall using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The *In-silico* analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

**Table 1: The list of pharmacophores and the targeted genes from Crown Gall**

SL.No	Pharmacophores from Cinnamon	Targeted Genes from Crown Gall	PDB No of the Genes
1	Cinnamic Aldehyde	Agrobacterium Tumefaciens D-Psicose 3-Epimerase	2hk1
2	2'-Hydroxycinnamaldehyde	Protein-Secreting Atpase	4gzi
3	Polyphenol Type-A	Agrobacterium Tumefaciens D-Psicose 3-Epimerase	6j17
4	Cinnamic Acid		

Protein identification and preparation

The reported molecular targets responsible for Crown Gall are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

Active site identification

The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

Ligand preparation and filtration

A collection of 5 phytocompounds from Cinnamon were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al.,2001**). The filtered compounds were then used for docking analysis.



Docking

The anti-inflammatory activity of all the 4 phytochemicals reported from Cinnamon was assessed by docking these compounds against the respective active sites of the target proteins. Discovery studio 4.0 was used in this study to find the interacting compounds of Cinnamon with the selected targets of arthritis. Strategies of Discovery Studio 4.0 are to exhaustively dock or score possible positions of each ligand in the binding site of the proteins. Docking study of the target proteins was done with natural compounds derived from Cinnamon to find the preferred orientation and binding affinity of the compounds with each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER was used to score the interacting compounds. This method uses a gridbased representation of the protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness

Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

Protein preparation and active site identification

The three dimensional structures of the identified target proteins were retrieved from the protein data bank. PDB ID of the targeted protein structure are mentioned in Table 1.

Ramachandran Plot of the targeted gene

The Ramachandran plot is among the most central concepts in structural biology, seen in publications and textbooks alike. However, with the increasing numbers of known proteinstructures and greater accuracy of ultra-high resolution protein structures, we are

still learning more about the basic principles of protein structure. The use of torsion angles to describe polypeptide and protein conformation was developed by Sasisekharan as part of his studies of the structure of collagen chains during his work as a graduate student in the research group of G.N. Ramachandran. The power of this approach was readily apparent and its use quickly became widespread. Using revised definitions, this so-called Ramachandran plot or ϕ , ψ -plot has remained nearly unchanged in the ensuing fifty years and continues to be an integral tool for protein structure research and education.

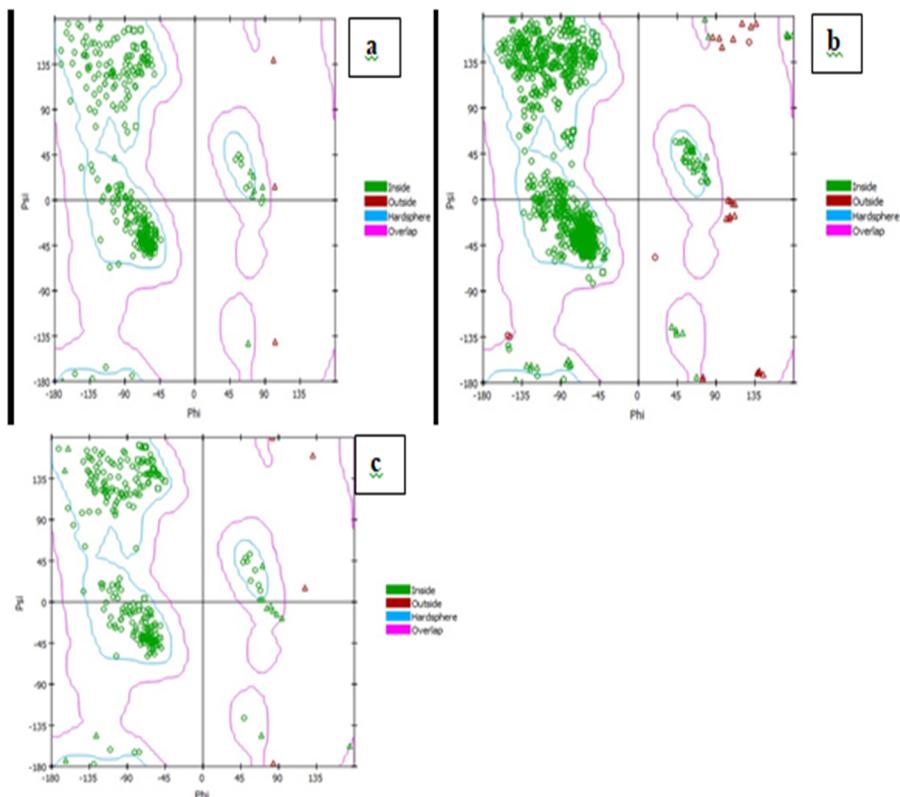


Fig 1: Ramachandran plot of (a) 4GZI (b) 2HK1 (c) 6J17

Hydrophobicity Plot of the Genes:

Protein–protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein–protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop hydrophobicity scales (for example, compatible with classical force fields (CFF) in calculating the energetics of protein folding) have encountered many difficulties.

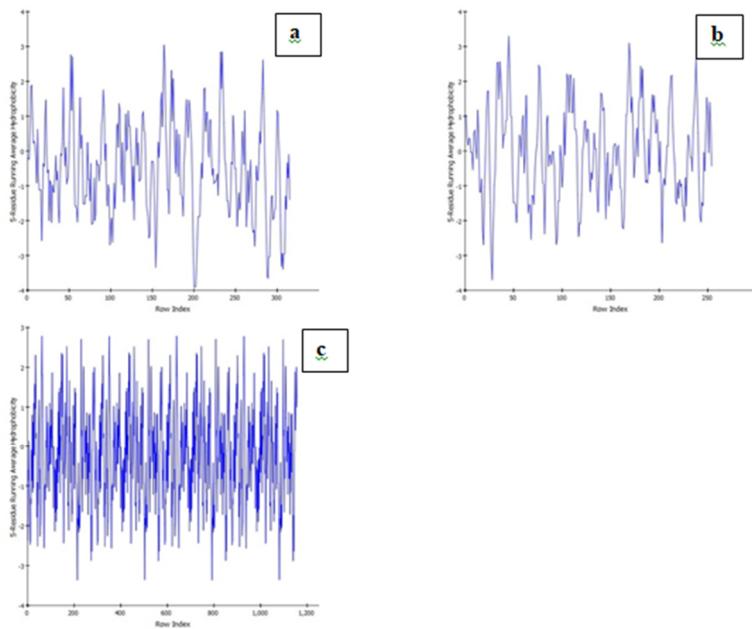


Fig 2: Hydrophobicity Plot of (a) 4GZI (b) 2HK1 (c) 6J17

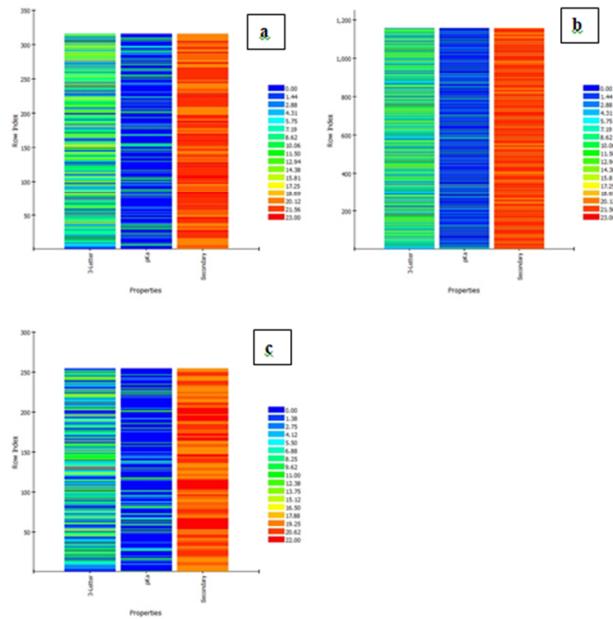


Fig 3: Heat Map Plot of (a) 4GZI (b) 2HK1 (c) 6J17

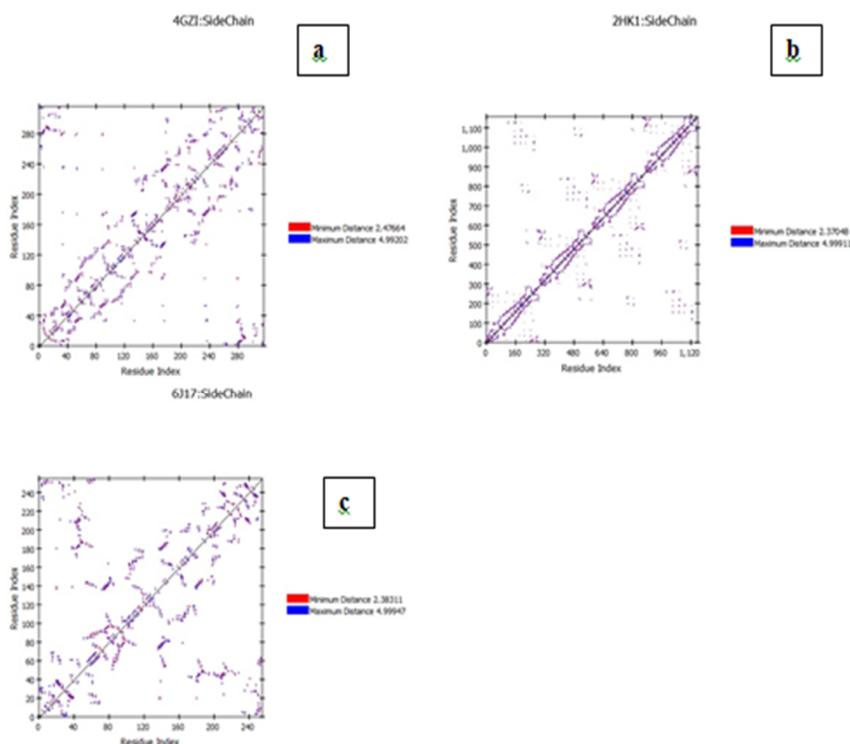


Fig 4: Side chain Plot of (a) 4GZI (b) 2HK1 (c) 6J17

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Gastric administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.

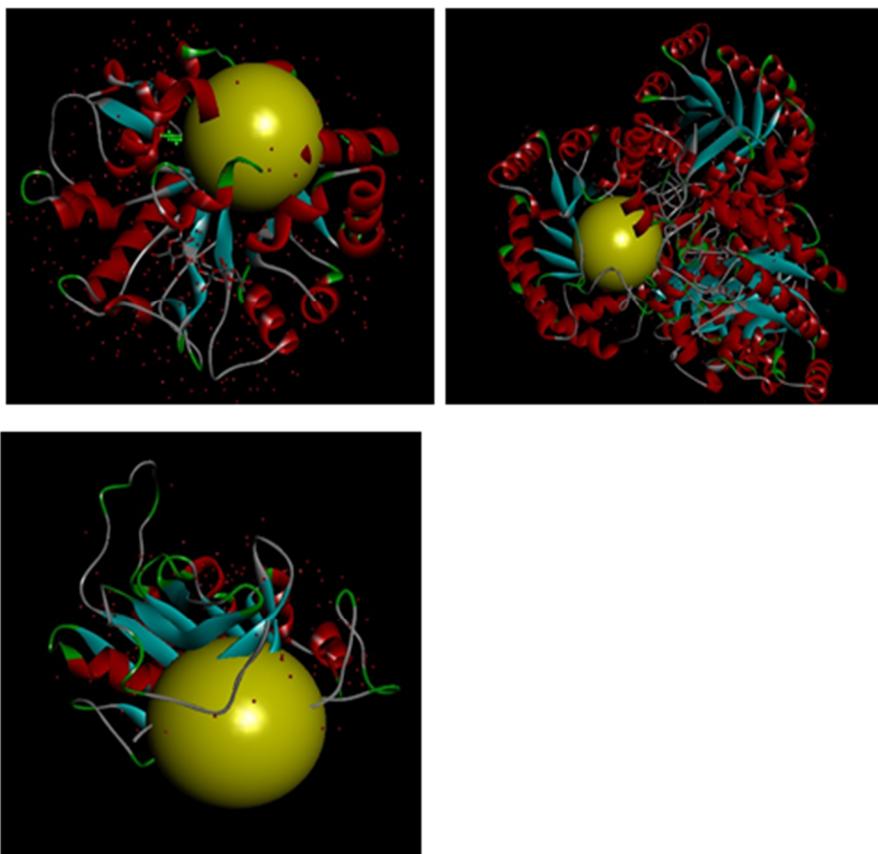


Fig 5: Docking Result of (a) 4GZI (b) 2HK1 (c) 6J17

ADMET Evaluation

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights into the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharmacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

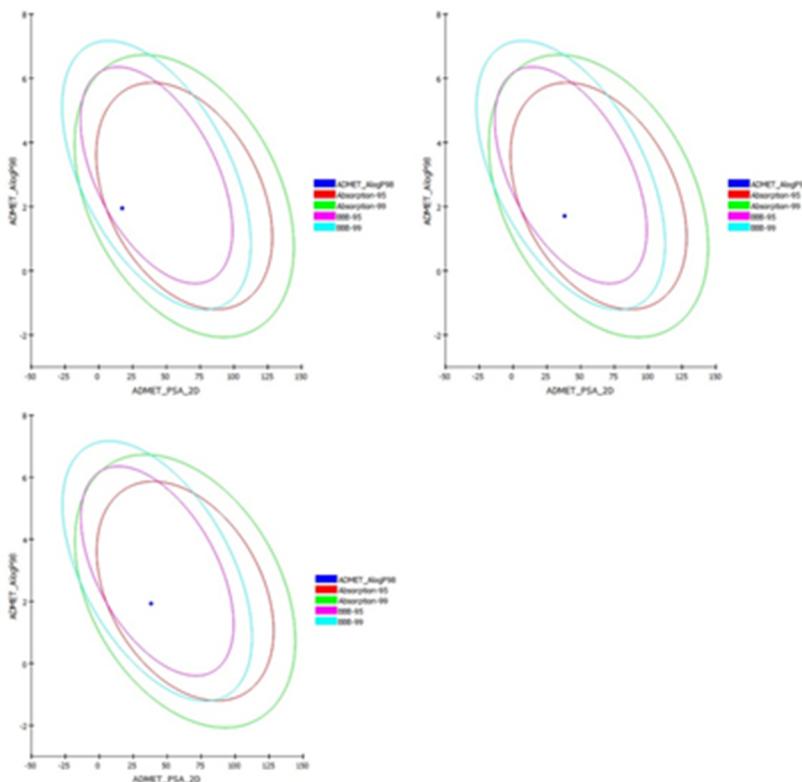


Fig 6: ADMET test analysis report

CONCLUSION

The identified pharmacophores can be isolated from the Cinnamon and can be commercialized as the natural drug for the Crown Gall which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products.

The unique feature of the study is to targeted gene therapy for a particular cancer. This will help our future medicine to be completely allied to the Pharmacophores and the uses of synthetic and carcinogenic drug will reduce.

REFERENCES

- Anderson RA, Lu J, Zhang K, Nam S, Jove R, Wen W. *Carcinogenesis*. 2010 Mar; 31(3):481-8. "Cancer". *World Health Organization*. 12 September 2018. Retrieved 19 December 2018.



- Chang ST, Chen PF, Chang SC. *J Ethnopharmacol* 2001 Sep; 77(1):123-7.
- Chen P, Sun J and Ford P. *J. Agric. Food Chem.* 2014, 62, 2516–2521.
- “Defining Cancer”. National Cancer Institute. 17 September 2007. Retrieved 28 March 2018.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Filho JR¹, de Sousa Falcão H, Batista LM, Filho /jm, Piuvezam MR. *Curr HIV Res.* 2010 Oct;8(7):531-44.
- Hire, KUSHAL, K. and Dhale, D. A. 2012. Antimicrobial Effect And Insilico Admet Prediction Of Santalum Album L. *Int. J. Pharma and Bio Sci.*, 3(4): 727-734.
- Holian O, Wahid S, Atten MJ, Attar BM *Am J Physiol Gastrointest Liver Physiol.* 2002;282:809–16.
- Kayande N, kushwah P and Vir DK. *PharmaTutor.*2014;2(5):124-127.
- Kim SH, Hyun SH, Choung SY. *J Ethnopharmacol.* 2006 mar 8, 104(1-2):119-23.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv.Drug Deliv.*, 46(1-3):3-26.
- Lindblad M, Rodriguez LA, Lagergren J. *Cancer Causes Control.* 2005;16:285–94.
- Merry AH, Schouten LJ, Goldbohm RA, van den Brandt PA. *Gut.* 2007;56:1503–11.
- Nikos G. Tzortzakis. *Innovative Food Science and Emerging Technologies* 10 (2009) 97–102.
- P, Barsouk A. *Gastroenterology Review* 2019; 14 (1).
- Peterson DW, George RC, Scaramozzino F, LaPointe NE, Anderson RA, Graves DJ, lew J. *J Alzheimers Dis.*2009;17(3):585-97.
- Premanathan M, Rajendean S, Ramanathan T, Kathiresan K, Nakashima H, Yamamoto N. *Indian J Med Res.* 2000 sep;112:73-7.
- Rawla Derakhshan MH, Yazdanbod A, Sadjadi AR, Shokoohi B, McColl KEL, Malekzadeh R. *Gut.* 2004;53:1262–66.
- Sangal A, *Advances in Applied Science Research.* 2011;2(4):440–450.
- Torbati M, Nazemiyeh H, Lotfipour F, Nemati M, Asnaashari S and Fathiazas F. *Bioimpact.* 2014; 4(2): 69–74.
- Tung YT, Yen PL, Lin CY, Chang ST. *Pharm Biol.* 2010 Oct; 48(10):1130-6.
- Wang SY, Chen PF, Chang ST. *J Ethnopharmacol.* 2001 Sep; 77(1):123-7..
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.



IN SILICO ANALYSIS OF THE CUMIN AS TARGETED THERAPY FOR DIARRHOEA

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ABSTRACT

Ancient India is one of the pioneers of studies of plants as medicine, i.e. Ayurveda. In our social and economic life we hardly take care of our food we are taking. Cumin (*Cuminum cyminum* Linn.) is an important seed spice and one of the earliest known minor spices used by mankind. It is believed to be native of Egypt and Syria, Turkestan and the Eastern Mediterranean region. The typical pleasant aroma of the seeds is due to their volatile oil content, the principal constituent of which is cuminol (cumarinaldehyde). Antioxidants help in removing free radicals that can further mutate into cancer cells. We are using this property of Cumin to get some new drugs for Diarrhoea. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. *In-silico* analysis has done using software and we further targeted some of the genes responsible for Diarrhoea and pharmacophores from Cumin and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others.

KEY WORDS: Cumin, Docking, *In Silico* Analysis, Diarrhoea, Pharmacophore

INTRODUCTION

Ayurveda, the science of life, which is the ancient traditional system of Indian medicine, is believed to be well over 5,000 years old. Ayurveda has particularly emphasized the subtle yet incredible healing properties of herbs and spices, and among these cumin plays an important part, which is used both as an ayurvedic medicine and as well as the main spice in Indian food recipes. Cumin (*Cuminum cyminum*) is one of the most valuable medicinal herbs and spice in the world. This plant belongs to the *Apiaceae* family and is geographically distributed in south Mediterranean and West Asia (latitudes 20°-38° N and longitudes 30°- 80° E) (**Zargari 1988, Balandary, 1992, katzer**). There are different theories about the origin of cumin. However, based on documented evidences, it either originated in northern Egypt, in the south Mediterranean climate or in the Middle East (**Wu et.al,1982, Chaudhari, 1992, Heravi 1962, Heravi 1977**). The presence of wild cumin plants in vast areas of south Mediterranean, Saudi Arabia, Iran, Central Asia, Sahara and south Pakistan indicate that these areas could be the origin of domestication of cumin. Based on the background of



cultivation, variation of wild types, particularly other species of cumin (*Cuminum setifolium*) and wide distribution of semi-wild races of cumin, the Iranian plateau and Middle East could also be the center of evolution of cumin. Cumin, as one of these medicinal plants, contains more than 100 different chemicals, including essential fatty acids and volatile oils (Mohiti et al., 2011). In recent years, herbal supplements have been used instead of chemical applications in aquaculture because they are more consumer acceptance and ecofriendly approach in disease management (Raa, 1996). Medicinal herbs or spices are able to enhance immunity and generate more pathogen resistance (Harikrishnan et al., 2011a). Several studies have also reported that the spices like garlic, ginger, thyme, rosemary and fenugreek improved health status, growth performance and/or disease resistance in *Dicentrarchus labrax* and *O. mossambicus* (Yilmaz & Ergün, 2012; Yilmaz et al., 2012; Yilmaz et al., 2013). Varieties of spices have been used traditionally to prevent and treat diseases and are known to improve the immune system (Chauhan et al., 2010). Allspice (*Cuminum cyminum*, Apiaceae) has been used as a spice since ancient times (Azeez, 2008). It is cultivated in the Mediterranean countries (Amin, 2001), especially in India, the world's largest producer and consumer of cumin, with annual production ranging between 0.1 and 0.2 million tonnes (Azeez, 2008). It has been used in medicines as a stimulant of the immune system, tyrosinase inhibitor activity and also as a hypoglycaemic, hypolipidaemic, chemoprotective and relaxant compound in animals and human beings (Boskabady et al., 2005; Azeez, 2008).

Diarrhea poses a diagnostic and therapeutic challenge to clinicians, in part, because it has diverse etiologies. Diagnostic tests may be difficult or not readily available, a specific diagnosis may be elusive, and targeted treatment may be unavailable, leading to the need for trials of empiric therapy. Although diarrhea may be obvious to the patient, it is important to define the basic characteristics of the diarrhea: frequency and consistency. A more quantitative approach is to determine stool weight/24 hrs in a timed collection. A rational classification for evaluation of diarrhea considers acute and chronic (more than 4 weeks) forms. This approach emphasizes the likelihood of an infectious etiology for acute conditions, whereas chronic diarrhea is much less likely to be infectious, and other causes should be considered. An alternative classification for diarrhea is based on the appearance of the stool: fatty, inflammatory (associated with blood in the stool) or watery, as detailed elsewhere.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Diarrhoea using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The *In-silico* analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

**Table 1: The list of pharmacophores and the targeted genes from Diarrhoea**

Sl.No	Pharmacophores from Cumin	Targeted Genes from Diarrhoea	PDB No of the Genes
1	Berberine	Forkhead Box P3	4WK8
2	P-Coumaric	Guanylate Cyclase 2c	6JT2
3	Saponins	Apolipoprotein E	6V7M
4	4-Isopropylbenzoic Acid	Guanylate Cyclase 2c	6JT0

Protein identification and preparation

The reported molecular targets responsible for Diarrhoea are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

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The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

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A collection of 5 phytocompounds from Cumin were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al.,2001**). The filtered compounds were then used for docking analysis.

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from Cumin to find the preferred orientation and binding affinity of the compounds with each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER was used to score the interacting compounds. This method uses a gridbased representation of the protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness

Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily Gastrically absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

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Ramachandan Plot of the targeted gene

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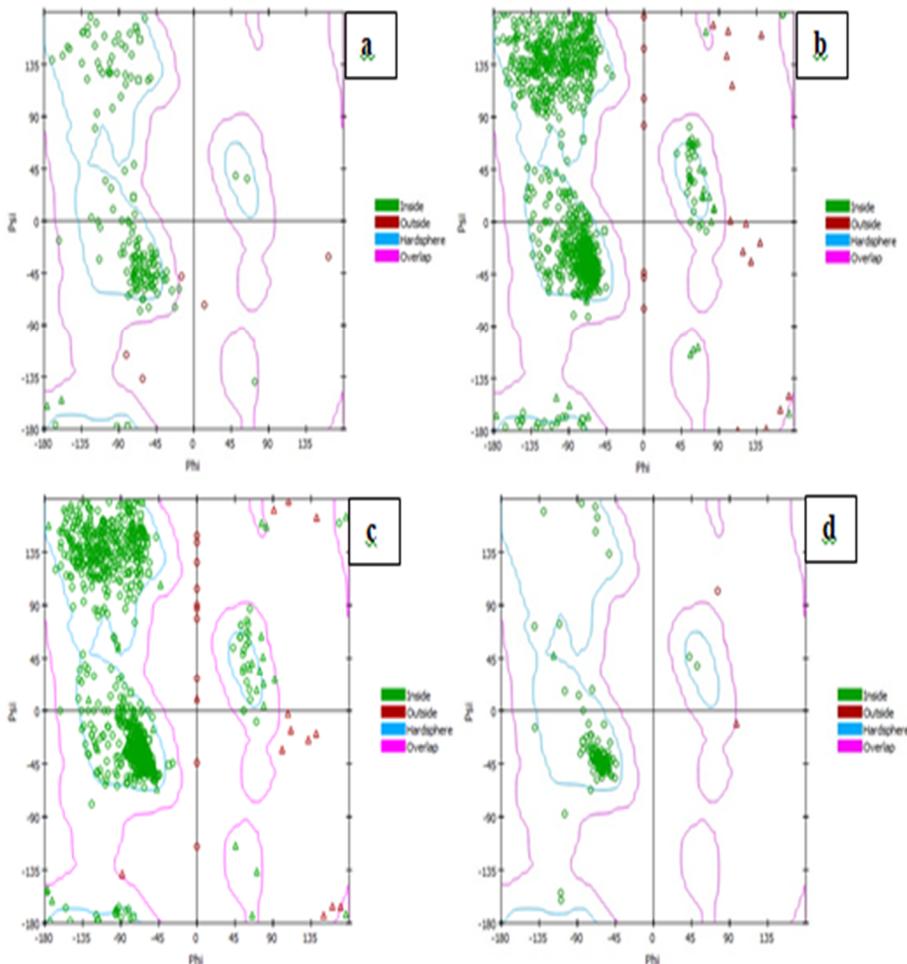


Fig 1: Ramachandran plot of (a) 4WK8 (b) 6JT0 (c) 6JT2 (d) 6V7M

Hydrophobicity Plot of the Genes:

Protein–protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein–protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop hydrophobicity scales (for example, compatible with classical force fields (CFF) in

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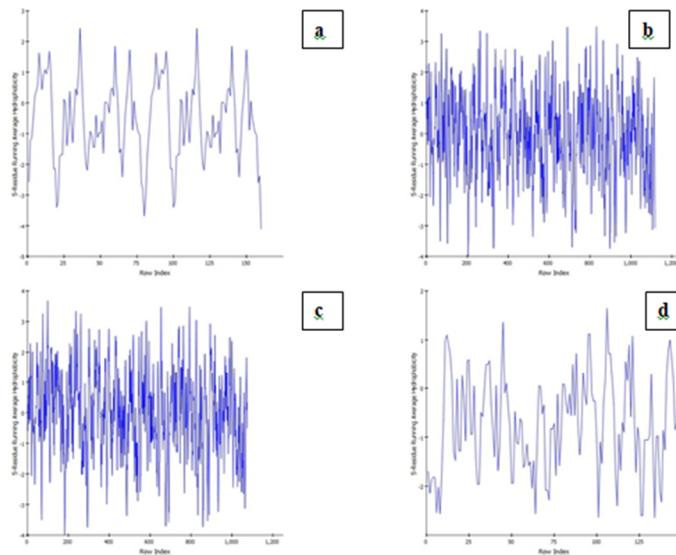


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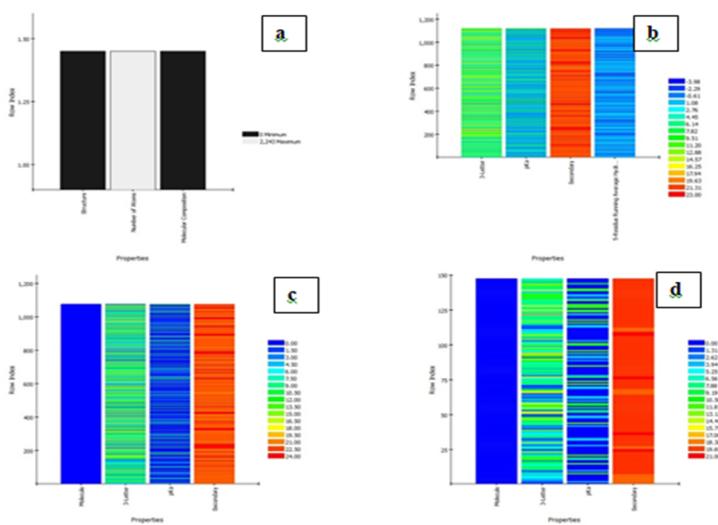


Fig 3: Heat Map Plot of (a) 4WK8 (b) 6JT0 (c) 6JT2 (d) 6V7M

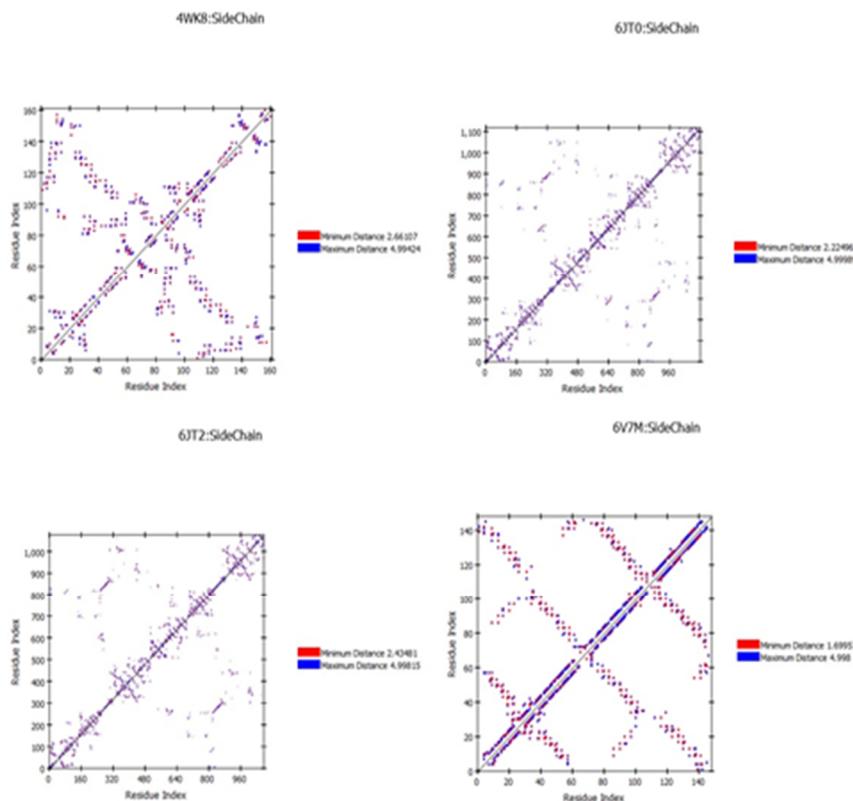
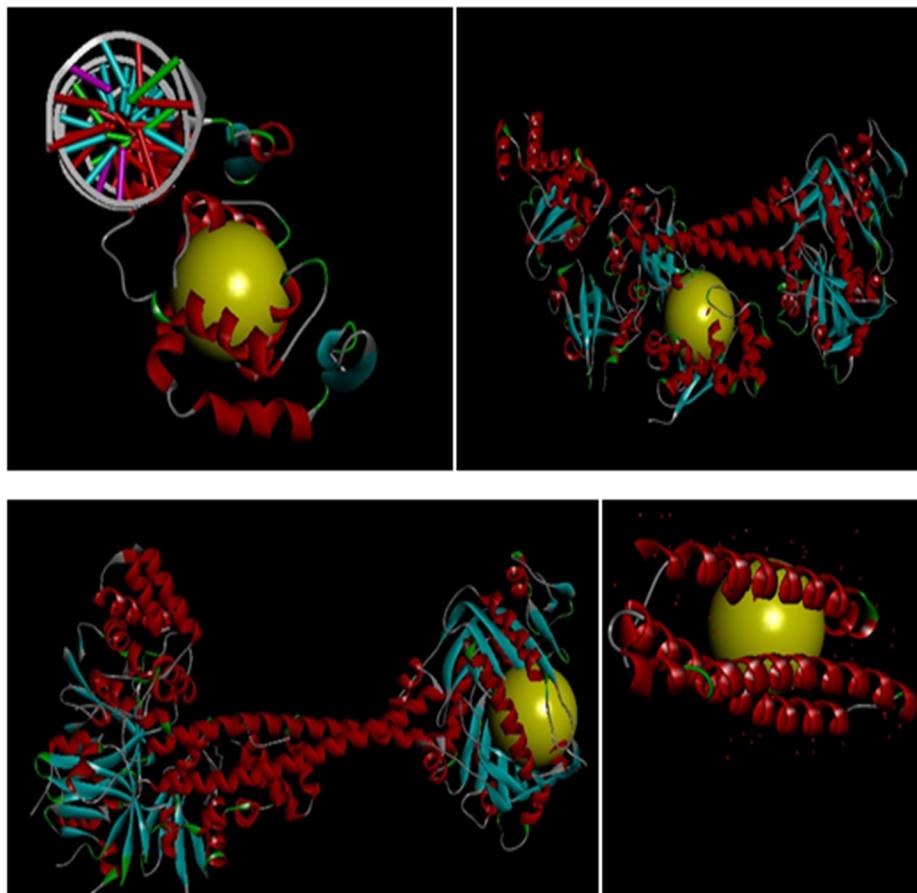


Fig 4: Side chain Plot of (a) 4WK8 (b) 6JT0 (c) 6JT2 (d) 6V7M

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Gastric administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.



**Fig 5: Docking Result of (a) 4WK8 (b) 6JT0 (c) 6JT2 (d) 6V7M
ADMET Evaluation**

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights in to the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharmacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

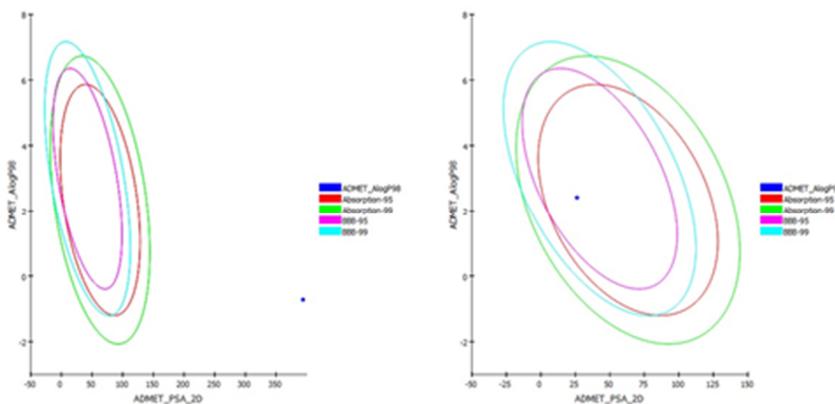


Fig 6: ADMET test analysis report

CONCLUSION

CSCs typically exhibit three key characteristics, which are not mutually exclusive. Firstly, CSCs are highly tumorigenic and can form tumours in immune-deficient mice through xenotransplantation, which is not possible for non-CSCs. Secondly, CSCs that survive chemotherapy and radiotherapy generate resistance to such therapies through regulating intracellular stress; for example, regulating reactive oxygen species, which non-CSCs cannot. Thirdly, CSCs possess metastatic potential, illustrated by a report that CSCs have the ability to metastasize. The identified pharmacophores can be isolated from the Cumin and can be commercialized as the natural drug for the Diarrhoea which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products.

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REFERENCES

- Amin Gh. 2001. Cumin. – In: Peter KV (ed), Handbook of Herbs and Spices. Woodhead Publishing, Boca Raton, p. 164–167.
- Azees S. 2008. Cumin. – In: Parthasarathy VA, Chempakam B, & Zachariah TJ. (eds.), Chemistry of Spices. CAB International, Oxfordshire, p. 242–259.
- Balandary, A. 1992. Collection and survey of botanical characteristics of land races of Iranian cumin. Iranian Research Organisation for Science & Technology, Khorasan Centre.
- Boskabady M, Kiani S, Azizi H. 2005. Relaxant effect of Cuminum cyminum on guinea pig tracheal chains and its possible mechanism. Indian J. Pharmacol., 37(2): 111-115.



- Chauhan PS, Satti NK, Suri KA, Amina M, Bani S. 2010. Stimulatory effects of Cuminum cyminum and flavonoid glycoside on Cyclosporine-A and restraint stress induced immune-suppression in Swiss albino mice. *Chem-Biol. Interac.*, 185(1): 66-72.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Dube S., E D. Upadhyay and S.C. Tripathi 1991. Fungitoxic and insect repellent efficacy of some spices. *Indian Phytopathology*. 44 (1): 101' 105.
- El Sawi, S.A. and M.A. Mohamed. 2002. Cumin herbs as a new source of essential oils and its response to foliar spray with some micro elements. *Food Chem.* 77:75-80.
- Harikrishnan R, Balasundaram C, Heo MS. 2011a. Impact of plant products on innate and adaptive immune system of cultured finfish and shellfish. *Aquaculture*, 317(1-4): 1-15.
- Heravi, A. (971 A.D.) 1967. Alabnia Anel haghayegh el Adviah (by the efforts of Bahmanyar A.). Tehran University press. Tehran, Iran.
- Heravi Abu Nasr, Gh. (1542 A.D.) 1977. Ershado Zerah. Amir Kabir Publishers. Tehran, Iran.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv.Drug Deliv.*, 46(1-3):3-26.
- Mohiti-Ardekani J, Akbarian Z, Nazarian A. Effects of Cumin (cuminum cyminum) oil on serum glucose and lipid levels of rats. *J Shahid Sadoughi Univ Med Sci* 2011;19(3):387e97 [in Persian].
- Ray Chaudhari, S.R 1992. Recent advances in medicinal aromatic and spice crops (Vol. 1). Today and Tomorrows Printer Publishers, New Delhi, India.
- Sangal A, *Advances in Applied Science Research*. 2011;2(4):440–450.
- Torbati M, Nazemiyeh H, Lotfipour F, Nemati M, Asnaashari S and Fathiazas F. *Bioimpact*. 2014; 4(2): 69–74.
- Tung YT, Yen PL, Lin CY, Chang ST. *Pharm Biol*. 2010 Oct; 48(10):1130-6.
- Wang SY, Chen PF, Chang ST. *J Ethnopharmacol*. 2001 Sep; 77(1):123-7..
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.
- Wu, J.W., M.H. Lee, Ho. Ct, S.S. Chang, 1982. Elucidation of the chemical structures of natural antioxidants isolated from rosemary. *J. Am. Oil Chem. Soc.* 59: 339-345.
- www.uni-graz.at/~katzer/engl/cumi_cvm.html
- Yilmaz S, Ergün S, Soytaş N. 2013. Herbal supplements are useful for preventing streptococcal disease during first-feeding of tilapia fry, *Oreochromis mossambicus*. *The Israeli Journal of Aquaculture – Bamidgeh*, IJA_64.2013.833.
- Yilmaz S, Ergün S, Çelik EŞ. 2012. Effects of herbal supplements on growth performance of sea bass (*Dicentrarchus labrax*): Change in body composition and some blood parameters. *J. BioSci. Biotech.*, 1(3): 217-222.
- Yilmaz S, Ergün S. 2012. Effects of garlic and ginger oils on hematological and biochemical parameters of sea bass, *Dicentrarchus labrax*. *J. Aquat. Anim. Health*, 24(4): 219-224.
- Zargari, A. 1988. Medicinal plants. University of Tehran Press. Tehran, Iran.



IN SILICO ANALYSIS OF THE CINNAMOMUM AS TARGETED THERAPY FOR GASTRIC CANCER

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ABSTRACT

Ancient India is one of the pioneers of studies of plants as medicine, i.e. Ayurveda. In our social and economic life we hardly take care of our food we are taking. One such unique herb is Cinnamon which has often been regarded as a brain booster. The whole plant including the flowers can be used for medicinal purposes. It has a bitter and sweet taste and is known to impart a cooling energy. Cinnamon is full of antioxidants that are essential for living a healthy life. Antioxidants help in removing free radicals that can further mutate into cancer cells. We are using this property of Cinnamon to get some new drugs for Gastric Cancer. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. *In-silico* analysis has done using software and we further targeted some of the genes responsible for Gastric Cancer and pharmacophores from Cinnamon and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others. From this we can deduce that these two pharmacophores can be a solution to Lung Cancer in near future. Complementary and alternative medicine (CAM) is a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine. As cancer incidence rates and survival time increase, use of CAM will likely increase. However, little is known about the use of CAM in cancer patients, specifically in emerging countries.

KEY WORDS: Cinnamon, Docking, *In Silico* Analysis, Gastric Cancer, Pharmacophore

INTRODUCTION

From ancient many herbs and spices are being used as medicine for many diseases. Cinnamon is a spice, made from inner bark of trees known as Cinnamomum. Once it was to be rare and valuable so it was regarded as a gift for kings but nowadays it is not only cheaper but also readily obtainable (**Chen et.al, 2014**). The medicinal use of this plant has been documented in Ayurveda (the Indian system of medicine), for over 6000 years. Cinnamomum comes from Greek word kinnamomon. Which means ‘sweet wood’. There are two types of cinnamon, true cinnamon (*Cinnamomum zeylanicum*, C.



verum) and cassia (*Cinnamomum aromaticum*) (**Kayande et.al, 2014**). The bark of Cinnamon is an important spices used all over the world for cooking and medicine proposes (**Sangal, 2011**). The characteristic odour and flavour of cinnamon are due to the oils and other derivatives, like cinnamaldehyde, cinnamic acid and cinnamate. Cinnamon has some meditational properties (**Torbatı et.al, 2014**). It contains polyphenols which act as antioxidants. From the study of antioxidant activity of 26 spices, Cinnamon was found out to be a clear winner (**Shan et.al, 2005**). Cinnamon is also used for natural food preserver (**Nikos G. Tzortzakis, 2009**). It can also helpful for lowering blood sugar level because of its antidiabetic effect (**Kim et.al, 2006**). In addition to that it act as anti microbial (**Chan et.al, 2001**), anticancer (**Anderson et.al, 2010**) anti-inflammatory (**Tung et.al, 2010**), antifungal (**Wang et.al, 2010**) and also has been reported to have activities against neurological disorder (**Peterson et.al, 2009**). From some research it has been found that it can also fight with HIV-1 (common strain of HIV virus in humans) (**Filho et.al,2010**). From a research it was found cinnamon has most effective treatment on HIV-infected cells out of all 69 medicinal plants under research (**Premanathan et.al, 2009**).

Cancer is the most notorious disease. Cancer is mainly due to abnormal growth of cell in our body. Cancer is not a single disease ¹⁵. There are many types of Cancer, distinguished according to which cell it occurs. Most common cancers are Lung cancer, breast cancer, colorectal cancer, prostate cancer, skin cancer, gastric / stomach cancer. Stomach cancer is the second most common cancer worldwide (Derakhshan et.al, 2004). The carcinogenesis of Gastric cancer refers to accumulation of genetic alteration of multiple genes such as oncogenes, tumour suppressor and mismatch repair genes (**Holian et.al, 2002**). From the GLOBOCAN 2018 data, stomach cancer is found in 1.03 million people and 783000 people are death due to this Gastric cancer. Gastric cancer is caused due to many reasons. The most important factors responsible for gastric cancer are *Helicobacter pylori*, alcohol, smoking, redmeat, obesity (**Rawla and Barsouk, 2019**), (**Lindblad et.al, 2005**), (**Merry et.al, 2007**).

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Gastric Cancer using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The *In-silico* analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

Table 1: The list of pharmacophores and the targeted genes from Gastric Cancer

SL.No	Pharmacophores from Cinnamom	Targeted Genes from Gastric Cancer	PDB No of the Genes
1	Cinnamic Aldehyde	Lymphoid myeloid protein leukaemia	1HFA
2	2'-Hydroxycinnamaldehyde	Oxidoreductase	2J5W
3	Polyphenol Type-A	NF-kappa B binding site	2KBD
4	Cinnamic Acid	Porcine Pepsinogen	3PSG



Protein identification and preparation

The reported molecular targets responsible for Gastric cancer are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

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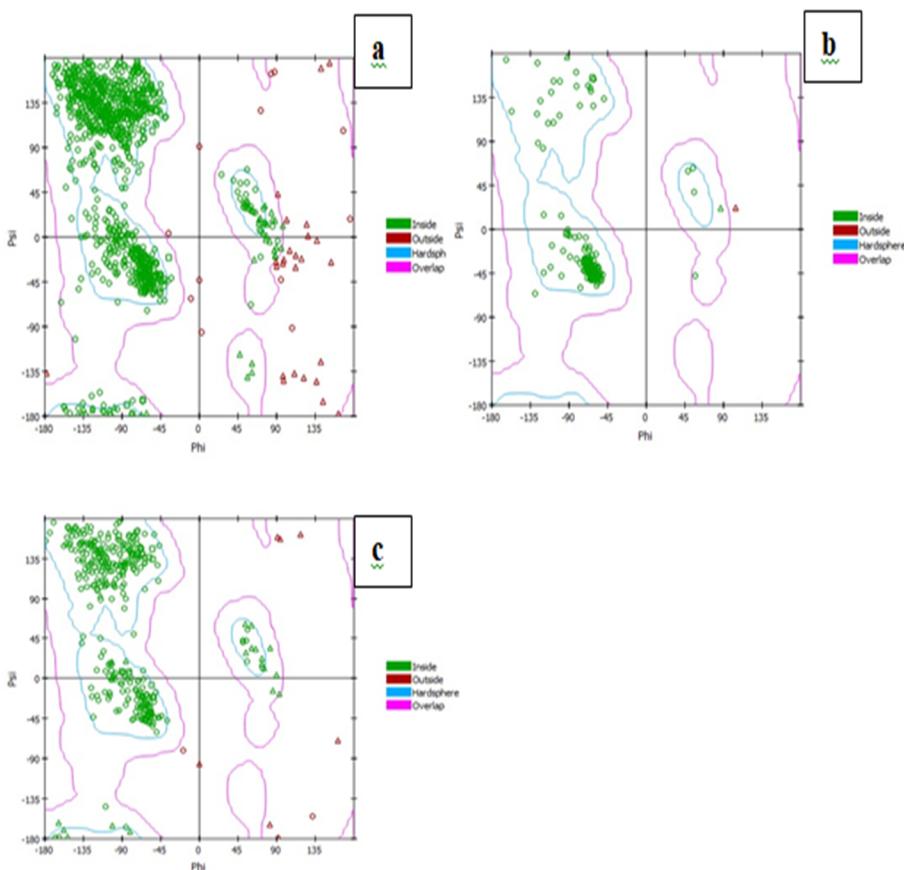


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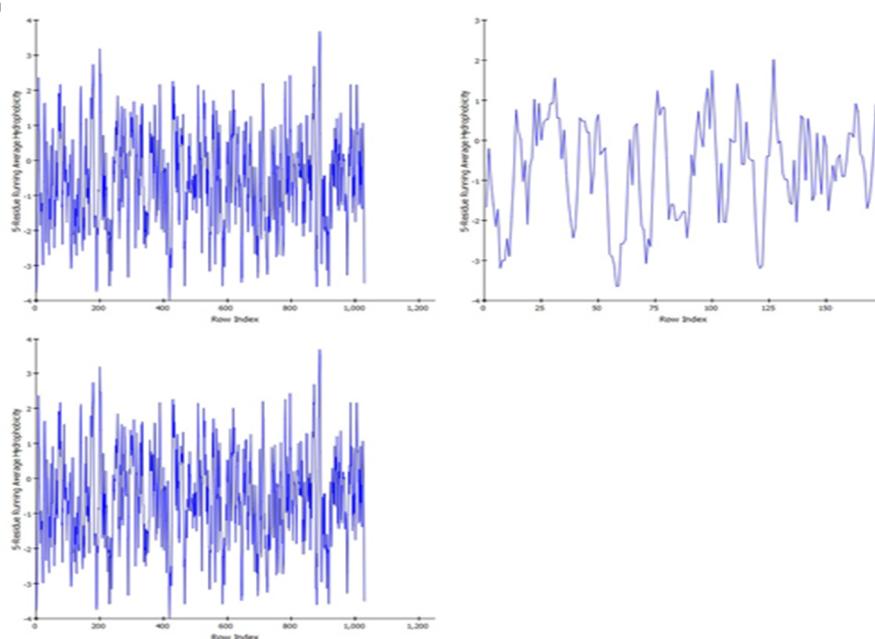


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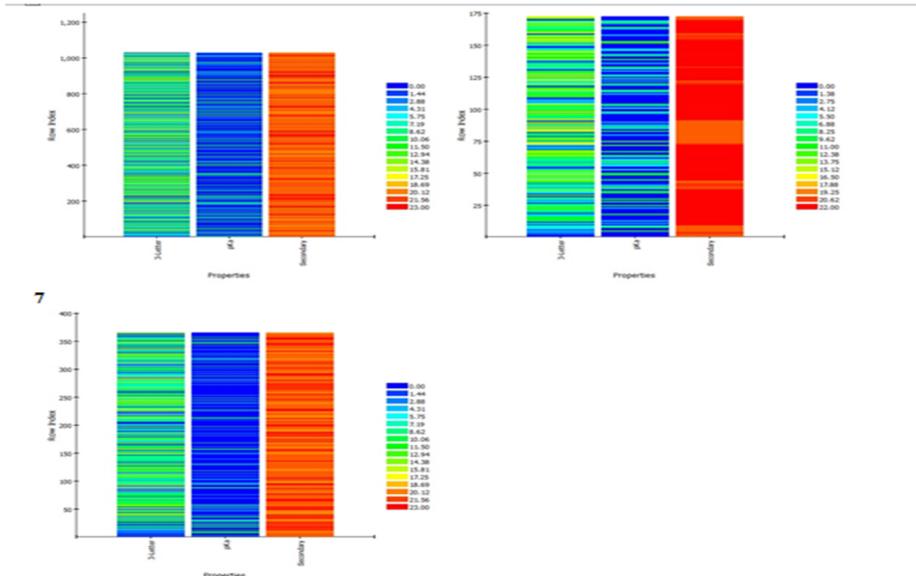


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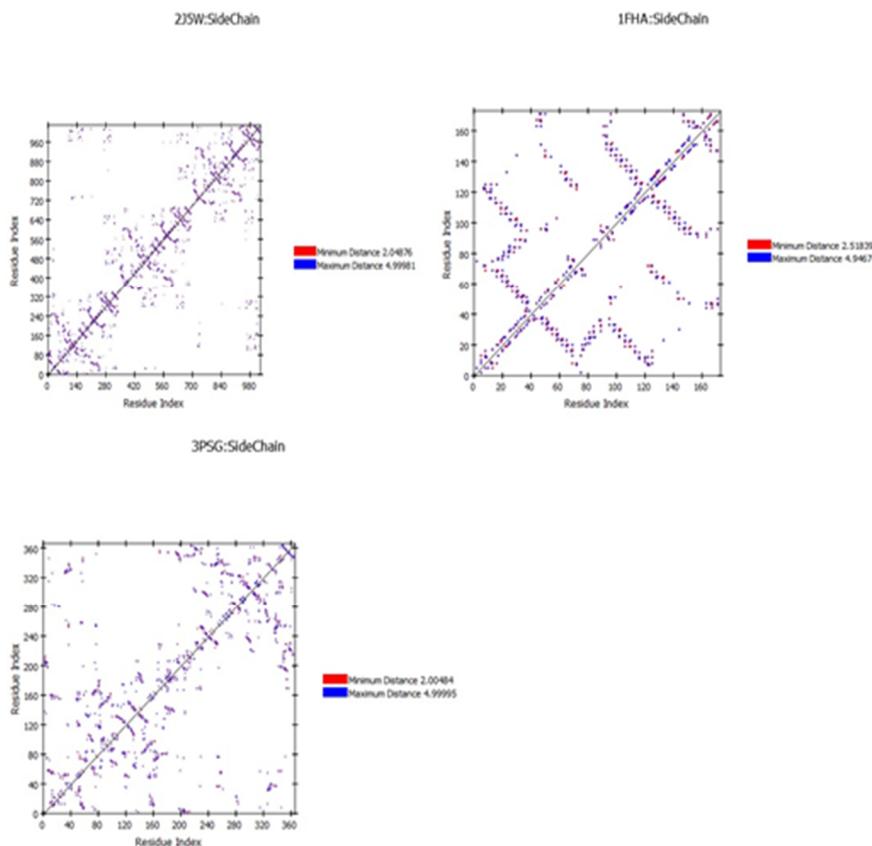


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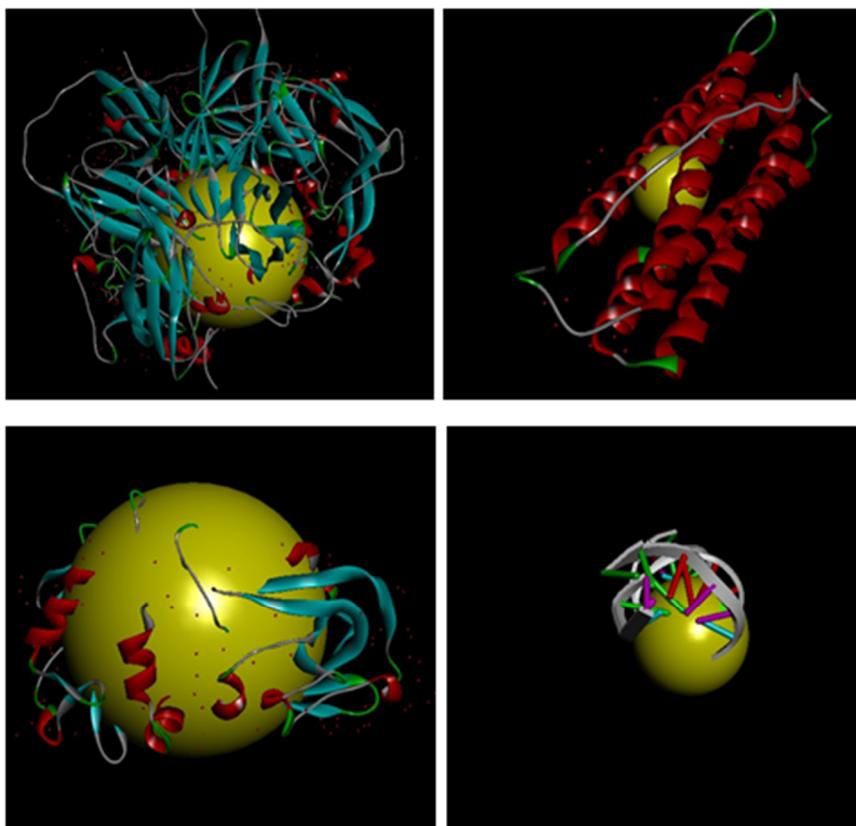


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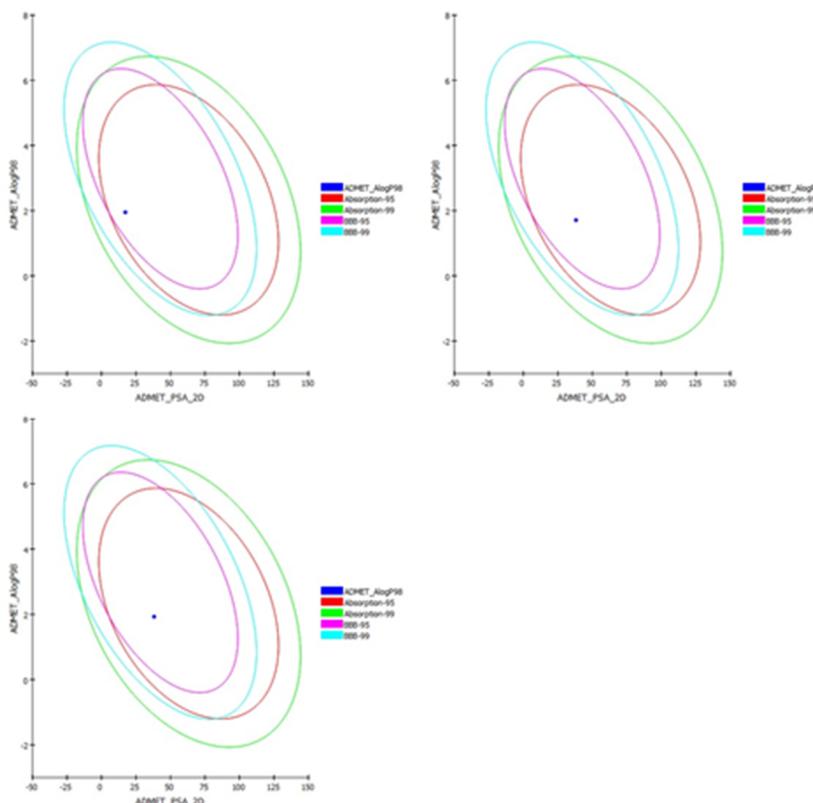


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REFERENCES

- Anderson RA, Lu J, Zhang K, Nam S, Jove R, Wen W. *Carcinogenesis*. 2010 Mar; 31(3):481-8.
- "Cancer". World Health Organization. 12 September 2018. Retrieved 19 December 2018.
- Chang ST, Chen PF, Chang SC. *J Ethnopharmacol* 2001 Sep; 77(1):123-7.
- Chen P, Sun J and Ford P. *J. Agric. Food Chem.* 2014, 62, 2516–2521.
- "Defining Cancer". National Cancer Institute. 17 September 2007. Retrieved 28 March 2018.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. *Acta. Pharm. Sin.B.*, 2 (6):549-561.
- Filho JR¹, de Sousa Falcão H, Batista LM, Filho /jm, Piuvezam MR. *Curr HIV Res.* 2010 Oct;8(7):531-44.
- Hire, KUSHAL, K. and Dhaled, D. A. 2012. Antimicrobial Effect And Insilico Admet Prediction Of Santalum Album L. *Int. J. Pharma and Bio Sci.*, 3(4): 727-734.
- Holian O, Wahid S, Atten MJ, Attar BM *Am J Physiol Gastrointest Liver Physiol.* 2002;282:809–16.
- Kayande N, kushwah P and Vir DK. *PharmaTutor*.2014;2(5):124-127.
- Kim SH, Hyun SH, Choung SY. *J Ethnopharmacol.* 2006 mar 8, 104(1-2):119-23.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv.Drug Deliv.*, 46(1-3):3-26.
- Lindblad M, Rodriguez LA, Lagergren J. *Cancer Causes Control.* 2005;16:285–94.
- Merry AH, Schouten LJ, Goldbohm RA, van den Brandt PA. *Gut.* 2007;56:1503–11.
- Nikos G. Tzortzakis. *Innovative Food Science and Emerging Technologies* 10 (2009) 97–102.
- P, Barsouk A. *Gastroenterology Review* 2019; 14 (1).
- Peterson DW, George RC, Scaramozzino F, LaPointe NE, Anderson RA, Graves DJ, Lew J. *J Alzheimers Dis.* 2009;17(3):585-97.
- Premanathan M, Rajendean S, Ramanathan T, Kathiresan K, Nakashima H, Yamamoto N. *Indian J Med Res.* 2000 sep;112:73-7.
- Rawla Derakhshan MH, Yazdanbod A, Sadjadi AR, Shokoohi B, McColl KEL, Malekzadeh R. *Gut.* 2004;53:1262–66.
- Sangal A, *Advances in Applied Science Research.* 2011;2(4):440–450.
- Torbati M, Nazemiyeh H, Lotfipour F, Nemati M, Asnaashari S and Fathiazas F. *Bioimpact.* 2014; 4(2): 69–74.
- Tung YT, Yen PL, Lin CY, Chang ST. *Pharm Biol.* 2010 Oct; 48(10):1130-6.
- Wang SY, Chen PF, Chang ST. *J Ethnopharmacol.* 2001 Sep; 77(1):123-7..
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.



IN SILICO ANALYSIS OF THE CUMIN AS TARGETED BIOPESTISIDES

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ABSTRACT

Ancient India is one of the pioneers of studies of plants as medicine, i.e. Ayurveda. In our social and economic life we hardly take care of our food we are taking. One such unique herb is Cumin which has often been regarded as a brain booster. The whole plant including the flowers can be used for medicinal purposes. It has a bitter and sweet taste and is known to impart a cooling energy. Cumin is full of antioxidants that are essential for living a healthy life. We are using this property of Cumin to get some new drugs for Rice Tungro Gene. The uses of various pesticides, preservatives, etc. turn the foods into poison. Moreover the side effects of these pesticides and preservatives, etc. are dangerous as because it leads to initiation of different cancer. In this whole world, the number of patients dying from cancer is increasing in a very threatening way. *In-silico* analysis has done using software and we further targeted some of the genes responsible for Rice Tungro Gene and pharmacophores from Cumin and did some in silico analysis. In this we have found that these two pharmacophores are having better Mol Doc score from any others.

KEY WORDS: Cumin, Docking, *In Silico* Analysis, Rice Tungro Gene, Pharmacophore

INTRODUCTION

Ayurveda, the science of life, which is the ancient traditional system of Indian medicine, is believed to be well over 5,000 years old. Ayurveda has particularly emphasized the subtle yet incredible healing properties of herbs and spices, and among these cumin plays an important part, which is used both as an ayurvedic medicine and as well as the main spice in Indian food recipes. Cumin (*Cuminum cyminum*) is one of the most valuable medicinal herbs and spice in the world. This plant belongs to the *Apiaceae* family and is geographically distributed in south Mediterranean and West Asia (latitudes 20-38° N and longitudes 30°- 80° E) (**Zargari 1988, Balandary, 1992, katzer**). There are different theories about the origin of cumin. However, based on documented evidences, it either originated in northern Egypt, in the south Mediterranean climate or in the Middle East (**Wu et.al,1982, Chaudhari, 1992, Heravi 1962, Heravi 1977**). The presence of wild cumin plants in vast areas of south Mediterranean, Saudi Arabia, Iran, Central Asia, Sahara and south Pakistan indicate that these areas could be the origin of domestication of cumin. Based on the background of cultivation, variation of wild types, particularly other species of cumin (*Cuminum*



setifolium) and wide distribution of semi-wild races of cumin, the Iranian plateau and Middle East could also be the center of evolution of cumin. Cumin, as one of these medicinal plants, contains more than 100 different chemicals, including essential fatty acids and volatile oils (**Mohiti et al., 2011**). In recent years, herbal supplements have been used instead of chemical applications in aquaculture because they are more consumer acceptance and ecofriendly approach in disease management (Raa, 1996). Medicinal herbs or spices are able to enhance immunity and generate more pathogen resistance (**Harikrishnan et al., 2011a**). Several studies have also reported that the spices like garlic, ginger, thyme, rosemary and fenugreek improved health status, growth performance and/or disease resistance in *Dicentrarchus labrax* and *O. mossambicus* (**Yilmaz & Ergün, 2012; Yilmaz et al., 2012; Yilmaz et al., 2013**). Varieties of spices have been used traditionally to prevent and treat diseases and are known to improve the immune system (**Chauhan et al., 2010**). Allspice (*Cuminum cyminum, Apiaceae*) has been used as a spice since ancient times (**Azeez, 2008**). It is cultivated in the Mediterranean countries (**Amin, 2001**), especially in India, the world's largest producer and consumer of cumin, with annual production ranging between 0.1 and 0.2 million tonnes (**Azeez, 2008**). It has been used in medicines as a stimulant of the immune system, tyrosinase inhibitor activity and also as a hypoglycaemic, hypolipidaemic, chemoprotective and relaxant compound in animals and human beings (**Boskabady et al., 2005; Azeez, 2008**).

As the most important of the 14 rice viral diseases, tungro was first recognized as a leafhopper-transmitted virus disease in 1963. However, tungro, which means “degenerated growth” in a Filipino dialect, has a much longer history. It is almost certain that tungro was responsible for a disease outbreak that occurred in 1859 in Indonesia, which was referred to at the time as mentek. In the past, a variety of names has been given to tungro, including *accep na pula* in the Philippines, penyakit merah in Malaysia, and yellow-orange leaf in Thailand. The difficulty in forecasting outbreaks and the rapidity of disease spread as epidemics developed created a problem of alarming dimensions. The development of appropriate methods to manage tungro was constrained for a long time by a limited knowledge of the epidemiology of the disease and the ecology of its leafhopper vectors.

MATERIAL AND METHODS

Phytochemicals of Ashwagandha have been listed with their structure data files which are taken from pubchem ChEBI. Genes has been taken randomly for Rice Tungro Gene using NCBI database. Table 1 has been showing the enlisted pharmacophores and the targeted genes. The PDB numbers of enzymes are taken from RCSB. The *In-silico* analysis has been done using BIOVIA –Discovery studio. We have performed various docking and used the Ramachandan plot and others.

**Table 1: The list of pharmacophores and the targeted genes from Rice Tungro Gene**

Sl.N o	Pharmacophores from Cumin	Targeted Genes from Rice Tungro Gene	PDB No of the Genes
1	Berberine	Oxidoreductase,	6H08
2	P-Coumaric	L-Ornithine,	6JKI
3	Saponins	N5-Monoxygenase	6FOQ
4	4-Isopropylbenzoic Acid		

Protein identification and preparation

The reported molecular targets responsible for Rice Tungro Gene are taken (Table 1) and the X-ray crystallographic structures of these target proteins were retrieved from protein data bank (PDB). The retrieved PDB structures contain water molecules, heavy atoms, cofactors, metal ions etc. and these structures do not have information about topologies, bond orders and formal atomic charges. Hence the downloaded PDB structures were prepared using ‘prepare protein’ protocol of Discovery Studio 4.0. The target proteins were prepared by removing all water molecules, ligands and other hetero atoms from the structures. Hydrogen atoms were added to the atoms to satisfy their valencies. The structures were then energy minimized by applying CHARM force field to remove the steric clashes between the atoms in order to get stable conformation.

Active site identification

The binding sites of the receptor proteins were predicted based on ‘receptor cavity method’ using Accelry’s Discovery Studio 4.0. Using this protocol, active sites of the target receptor were identified based upon the inhibitory property of the amino acid residues present in the binding sites.

Ligand preparation and filtration

A collection of 5 phytocompounds from Cumin were taken as ligands for docking analysis. The 3D structures of these compounds were downloaded from PubChem database. These ligands were then cleaned up, calculated 3D coordinates and generated ligand conformations by applying ‘prepare ligand protocol’ of Discovery Studio 4.0. After preparation, the compounds were filtered based on the molecular properties for predicting their solubility and permeability in drug discovery. The best known of the physical property filters is Lipinski’s “rule-of-five”, which focuses on bioavailability. The rule states that the compounds have molecular mass less than 500 daltons, not more than 5 hydrogen bond donors, not more than 10 hydrogen bond acceptors and an octanol-water partition coefficient log P not greater than 5 (**Lipinski et al.,2001**). The filtered compounds were then used for docking analysis.

Docking

The anti-inflammatory activity of all the 4 phytochemicals reported from Cumin was assessed by docking these compounds against the respective active sites of the target proteins. Discovery studio 4.0 was used in this study to find the interacting compounds of Cumin with the selected targets of arthritis. Strategies of Discovery Studio 4.0 are to exhaustively dock or score possible positions of each ligand in the binding site of the proteins. Docking study of the target proteins was done with natural compounds derived from Cumin to find the preferred orientation and binding affinity of the compounds with



each target protein using scoring functions. A molecular dynamics (MD) simulated-annealing-based algorithm, namely, CDOCKER was used to score the interacting compounds. This method uses a gridbased representation of the protein-ligand potential interactions to calculate the binding affinity (**Wu et al., 2003**). CDOCKER uses soft-core potentials, which are found to be effective in the generation of several random conformations of small organics and macromolecules inside the active site of the target protein. Ligands were docked to the proteins followed by scoring them for their relative strength of interaction to identify candidates for drug development. The final poses were then scored based on the total docking energy, which is composed of intramolecular energy of ligand and the ligand-protein interaction. The lowest energy structure was taken as the best fit. Interpretation of the values was done using standards provided by Discovery Studio such as CDOCKER energy, CDOCKER interaction energy, hydrogen bonds, binding energy etc.

Drug likeliness

Drug-likeness is a qualitative concept used in drug design to evaluate how the substance acts like drug with respect to factors like bioavailability. The molecular properties which influence absorption, distribution, metabolism, excretion and toxicity are recognized as a long side therapeutic potency as key determinants of whether a molecule can be successfully developed as a drug (**Zhang et al., 2012**). These parameters are responsible for about 60 percent failures of all drugs in the clinical phases and so the prediction of ADMET properties plays a significant role in new drug discovery process (**Hire et al., 2012**). Thus, it has become imperative to design lead compounds which would be easily Gastrically absorbed, easily transported to their targeted site of action, not easily converted into toxic metabolic products and easily eliminated from the body before accumulating in sufficient amounts. The ADMET properties of the compounds were analyzed for drug like candidates.

RESULT AND DISCUSSION

Protein preparation and active site identification

The three dimensional structures of the identified target proteins were retrieved from the protein data bank. PDB ID of the targeted protein structure are mentioned in Table 1.

Ramachandan Plot of the targeted gene

The Ramachandran plot is among the most central concepts in structural biology, seen in publications and textbooks alike. However, with the increasing numbers of known proteinstructures and greater accuracy of ultra-high resolution protein structures, we are still learning more about the basic principles of protein structure. The use of torsion angles to describe polypeptide and protein conformation was developed by Sasisekharan as part of his studies of the structure of collagen chains during his work as a graduate student in the research group of G.N. Ramachandran. The power of this approach was readily apparent and its use quickly became widespread. Using revised definitions, this so-called Ramachandran plot or ϕ , ψ -plot has remained nearly unchanged in the ensuing

fifty years and continues to be an integral tool for protein structure research and education.

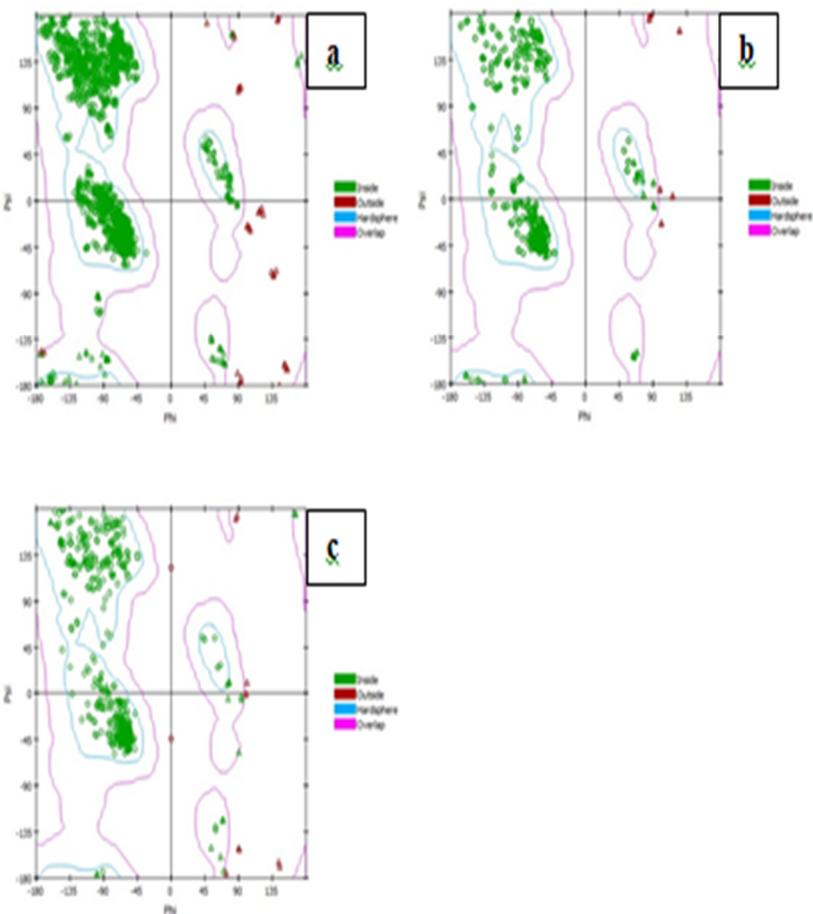


Fig 1: Ramachandran plot of (a) 6FOQ (b) 6H08 (c) 6JKI

Hydrophobicity Plot of the Genes:

Protein–protein interactions (protein functionalities) are mediated by water, which compacts individual proteins and promotes close and temporarily stable large-area protein–protein interfaces. In their classic article, Kyte and Doolittle (KD) concluded that the “simplicity and graphic nature of hydrophobicity scales make them very useful tools for the evaluation of protein structures.” In practice, however, attempts to develop hydrophobicity scales (for example, compatible with classical force fields (CFF) in calculating the energetics of protein folding) have encountered many difficulties.

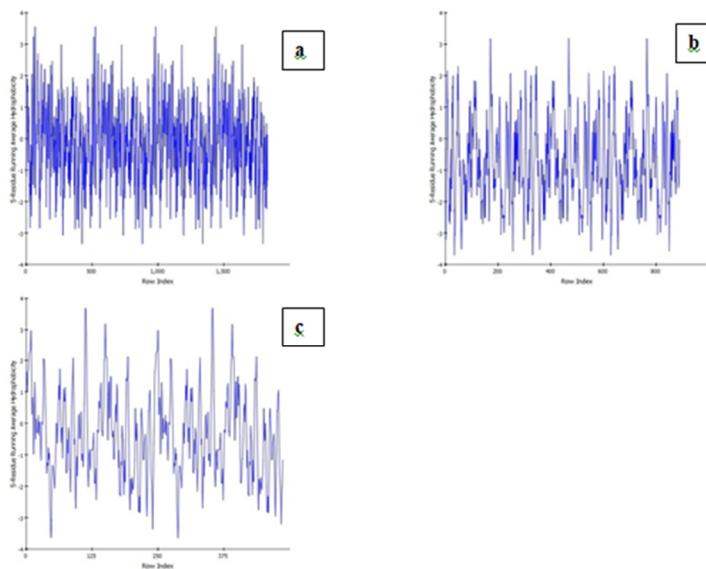


Fig 2: Hydrophobicity Plot of (a) 6FOQ (b) 6H08 (c) 6JKI

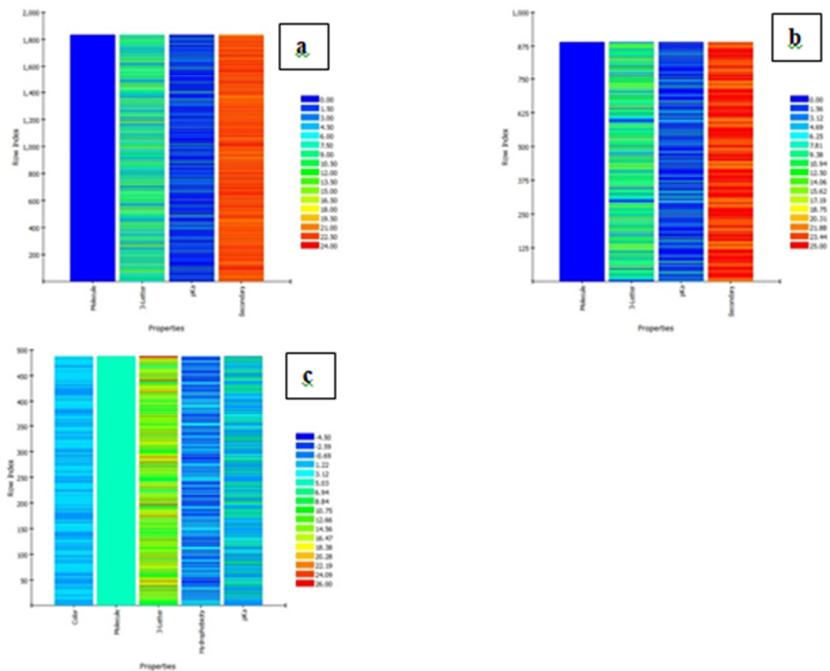


Fig 3: Heat Map Plot of (a) 6FOQ (b) 6H08 (c) 6JKI

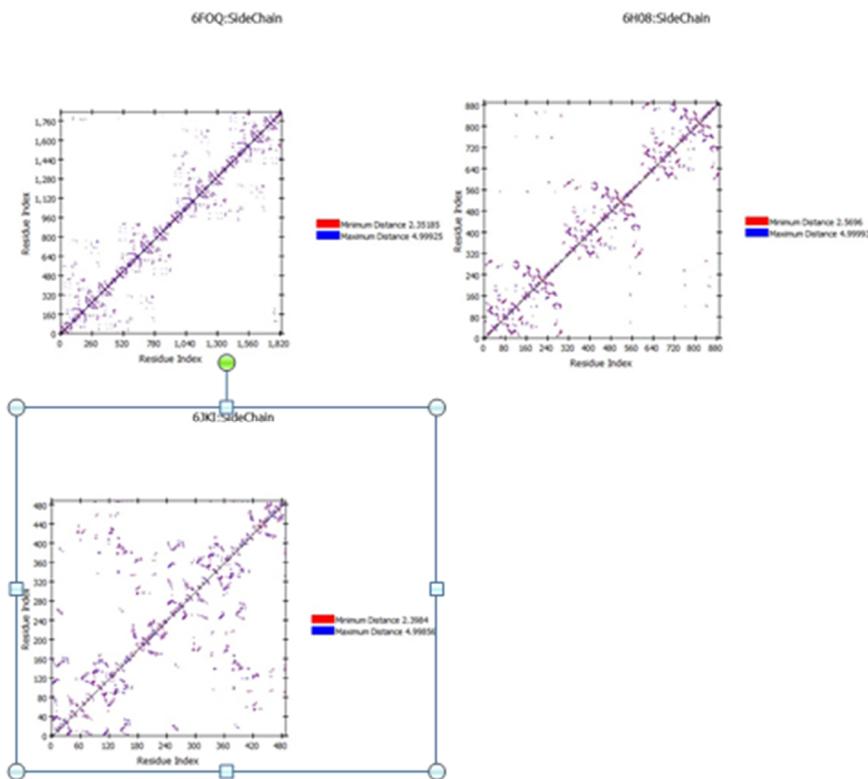
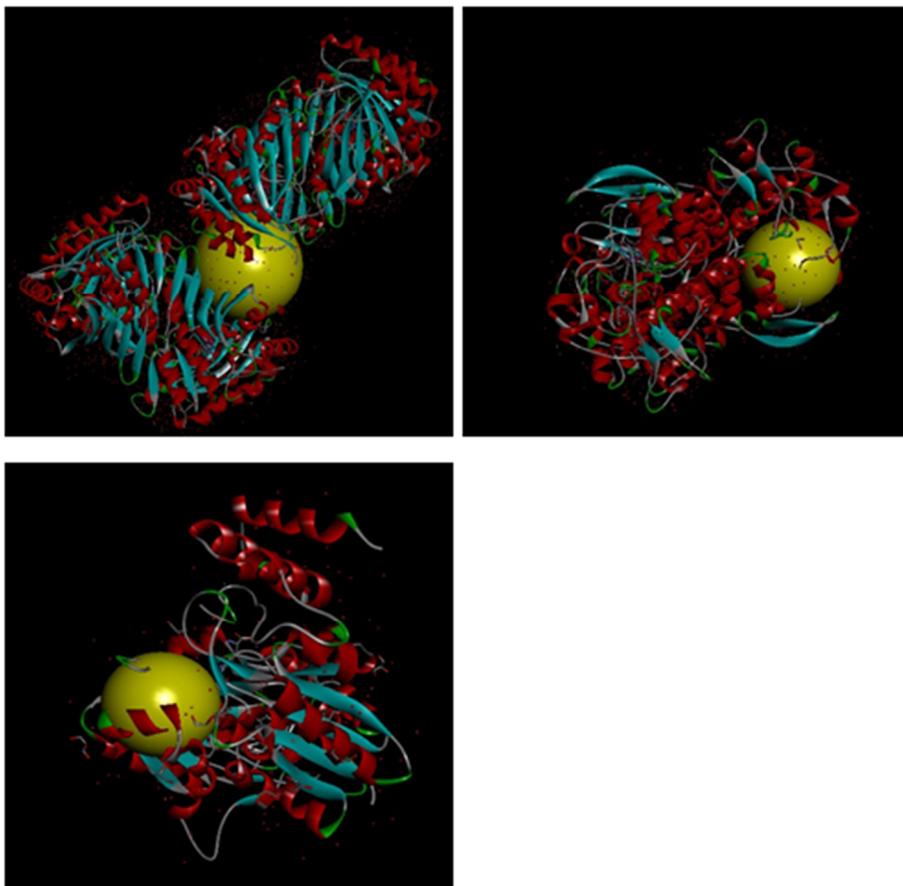


Fig 4: Side chain Plot of (a) 6FOQ (b) 6H08 (c) 6JKI

Ligand preparation

4 of the pharmacophores are satisfied Lipinski rule and are expected to be active compounds after Gastric administration. The ligand molecules with least binding energy are considered as compounds with highest binding affinity. This binding affinity indicated a focused interaction between the above compounds with the targets compared to others. The parameters for finding the best inhibitors such as CDOCKER energy, CDOCKER interaction energy and number of hydrogen bonds were also evaluated. CDOCKER energy is the combined energy produced by the sum of internal ligand strain energy and receptor-ligand interaction energy where, CDOCKER interaction energy is the interaction energy between the protein and ligand and the values of these two parameters indicate the strength of interaction between the proteins and the ligands. Besides least binding energy, compounds with least atomic energy difference between CDOCKER energy and CDOCKER interaction energy were analyzed. Based on CDOCKER energy and CDOCKER interaction energy, Fig 4 is showing the result.



**Fig 5: Docking Result of (a) 6FOQ (b) 6H08 (c) 6JKI
ADMET Evaluation**

Considering the comparable CDOCKER energy, interaction energy and binding energy, three compounds were forwarded for ADMET analysis. These studies are based on the ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) properties of the compounds. These properties provide insights in to the pharmacokinetic properties of the compounds and were checked using Discovery Studio's built in ADMET protocol. The various parameters tested in this study were aqueous solubility, Blood Brain Barrier (BBB) level, Hepatotoxicity, Absorption level, AlogP and CYPD26. Pharmacokinetic properties of the best fit phytochemicals showed that two of the compounds had passed all the pharamacokinetic parameters. The compounds that passed the parameters were N-methyltyramine and dalbergioidin. These compounds were thus selected as the best compounds in this study as they had good interaction scores along with ADMET properties.

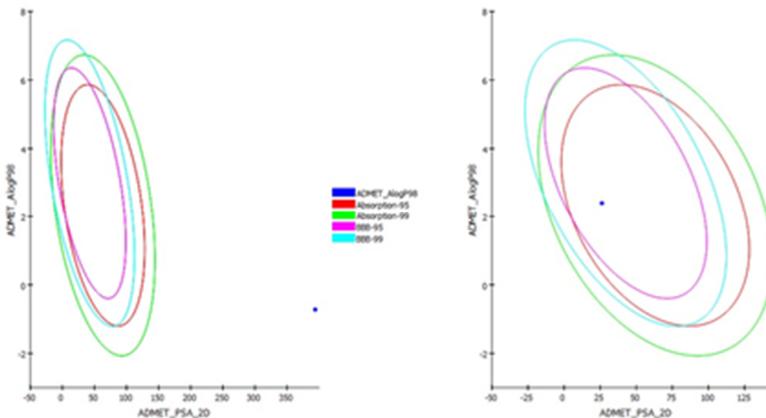


Fig 6: ADMET test analysis report

CONCLUSION

The identified pharmacophores can be isolated from the Cumin and can be commercialized as the natural drug for the Rice Tungro Gene which is having lesser harmful side effect from the chemotherapeutic drug available in the market. This drug will also be very cheaper from the available drugs and these drugs are also not harmful for the normal cells as they are derived from the natural products.

The unique feature of the study is to targeted gene therapy for a particular cancer. This will help our future medicine to be completely allied to the Pharmacophores and the uses of synthetic and carcinogenic drug will reduce.

REFERENCES

- Amin Gh. 2001. Cumin. – In: Peter KV (ed), Handbook of Herbs and Spices. Woodhead Publishing, Boca Raton, p. 164–167.
- Azees S. 2008. Cumin. – In: Parthasarathy VA, Chempakam B, & Zachariah TJ. (eds.), Chemistry of Spices. CAB International, Oxfordshire, p. 242–259.
- Balandary, A. 1992. Collection and survey of botanical characteristics of land races of Iranian cumin. Iranian Research Organisation for Science & Technology, Khorasan Centre.
- Boskabady M, Kiani S, Azizi H. 2005. Relaxant effect of Cuminum cyminum on guinea pig tracheal chains and its possible mechanism. Indian J. Pharmacol., 37(2): 111-115.
- Chauhan PS, Satti NK, Suri KA, Amina M, Bani S. 2010. Stimulatory effects of Cuminum cyminum and flavonoid glycoside on Cyclosporine-A and restraint stress induced immune-suppression in Swiss albino mice. Chem-Biol. Interac., 185(1): 66-72.
- Donglu, Zhang, Gang, Luo, Xinxin, Ding and Chuang, Lu. 2012. Preclinical experimental models of drug metabolism and disposition in drug discovery and development. Acta. Pharm. Sin.B., 2 (6):549-561.



- Dube S., E D. Upadhyay and S.C. Tripathi 1991. Fungitoxic and insect repellent efficacy of some spices. Indian Phytopathology. 44 (1): 101' 105.
- El Sawi, S.A. and M.A. Mohamed. 2002. Cumin herbs as a new source of essential oils and its response to foliar spray with some micro elements. Food Chem. 77:75-80.
- Harikrishnan R, Balasundaram C, Heo MS. 2011a. Impact of plant products on innate and adaptive immune system of cultured finfish and shellfish. Aquaculture, 317(1-4): 1-15.
- Heravi, A. (971 A.D.) 1967. Alabnia Anel haghayegh el Adviah (by the efforts of Bahmanyar A.). Tehran University press. Tehran, Iran.
- Heravi Abu Nasr, Gh. (1542 A.D.) 1977. Ershado Zerah. Amir Kabir Publishers. Tehran, Iran.
- Lipinski, C.A., Lombardo, F., Dominy, B.W. and Feeney, P.J. 2001. Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. *Adv.Drug Deliv.*, 46(1-3):3-26.
- Mohiti-Ardekani J, Akbarian Z, Nazarian A. Effects of Cumin (cuminum cyminum) oil on serum glucose and lipid levels of rats. *J Shahid Sadoughi Univ Med Sci* 2011;19(3):387e97 [in Persian].
- Ray Chaudhari, S.R 1992. Recent advances in medicinal aromatic and spice crops (Vol. 1). Today and Tomorrows Printer Publishers, New Delhi, India.
- Sangal A, *Advances in Applied Science Research*. 2011;2(4):440–450.
- Torbati M, Nazemiyeh H, Lotfipour F, Nemati M, Asnaashari S and Fathiazas F. *Bioimpact*. 2014; 4(2): 69–74.
- Tung YT, Yen PL, Lin CY, Chang ST. *Pharm Biol*. 2010 Oct; 48(10):1130-6.
- Wang SY, Chen PF, Chang ST. *J Ethnopharmacol*. 2001 Sep; 77(1):123-7..
- Wu, G., Robertson D.H., Brooks C.L. and Vieth, M. 2003. Detailed analysis of grid based molecular docking: A case study of CDOCKER—A CHARMM based MD docking algorithm. *J. Compt. Chem.*, 24(13): 1549-1562.
- Wu, J.W., M.H. Lee, Ho. Ct, S.S. Chang, 1982. Elucidation of the chemical structures of natural antioxidants isolated from rosemary. *J. Am. Oil Chem. Soc.* 59: 339-345.
- www.uni-graz.at/~katzer/engl/cumi_cvm.html
- Yılmaz S, Ergün S, Soytaş N. 2013. Herbal supplements are useful for preventing streptococcal disease during first-feeding of tilapia fry, Oreochromis mossambicus. *The Israeli Journal of Aquaculture – Bamidgeh*, IJA_64.2013.833.
- Yılmaz S, Ergün S, Çelik EŞ. 2012. Effects of herbal supplements on growth performance of sea bass (*Dicentrarchus labrax*): Change in body composition and some blood parameters. *J. BioSci. Biotech.*, 1(3): 217-222.
- Yılmaz S, Ergün S. 2012. Effects of garlic and ginger oils on hematological and biochemical parameters of sea bass, *Dicentrarchus labrax*. *J. Aquat. Anim. Health*, 24(4): 219-224.
- Zargari, A. 1988. Medicinal plants. University of Tehran Press. Tehran, Iran.



PATIENT MONITORING SYSTEM USING CLOUD TELEMETRY

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ABSTRACT:

Health plays a crucial role in everyday life. Hence day to day monitoring is majorly concerned. This project develops a system which measures various parameters like body temperature, heart beat rate using temperature and heart beat sensors. These sensors are interfaced with Raspberry Pi Microcontroller board. On the whole, it will provide a device that will continuously monitor the vital parameters of a patient. If there is any critical condition, it raises an alarm and also a GPS is used here for finding the location of near-by health centers for transmission of acquired data immediately through the cloud telemetry. For more advanced applications, this project can be improvised by incorporating dental sensors and annunciation systems thereby making it an efficient and dedicated patient care system.

KEYWORDS: Patient monitoring system, Raspberry Pi Microcontroller board, temperature sensor, heart beat sensor, GPS.

INTRODUCTION:

Nowadays, the usage of wireless technology is becoming more advantageous for many applications especially in the medical sector. Cloud telemetry is of immense importance where each person monitored is given a unique address which is very useful in authentication. This telemetry system collects the data acquired from the incorporated sensors and stores the output which are then sent to the nearby health care centers recognized by the GPS when an emergency situation arises.

Biomedical serves to provide efficient and better health care especially in personal health care fields.

Biomedical devices such as patient monitoring system can monitor various parameters in a human body such as blood pressure, pulse rate, oxygen saturation, respiration rate, temperature, ECG, etc. Here in this project using Raspberry Pi, body temperature and heart beat rate are measured. Early and efficient detection of health conditions are made easy by this technology.

BACKGROUND:

In recent years, the number of elderly and the old age homes are increasing at a higher rate. The facilities of hospitals in rural areas are bounded and the quality of health care creates issues in health sectors. Hence monitoring the self health and updates of day to day conditions of themselves is more profitable for all age groups and for the ill people.

In India, the WHO's definition of doctor patient ratio has also not up to the level. In order to reach out the problems of persons in the nation and to give daily care to the patients, this project will be more supportive. This will also help the unaffordable persons who cannot invest his/her incomes on frequent health check-ups. It even consumes less time and do not affect the daily routine.

OBJECTIVE

- To reduce the delay in taking the patient to the hospital.
- To find out the diseases of patients earlier and provide immediate treatments.



- To reduce the frequent visits to hospitals and to reduce the time consumption and costs.

EXISTING SYSTEMS:

- Manual monitoring of patient conditions.
- In the existing system, IOT, microcontroller, GSM, Zig bee modules are used.
- Distance coverage is minimum.

IOT BASED SYSTEM:

Here, a health monitoring system is designed using IOT which measures the parameters such as temperature, pulse rate can be measured and later an IOT is combined with cloud computing to transfer the patient data to the hospitals for treatment. The distance coverage is very limited here.

ARDUINO AND IOT BASED SYSTEM:

Here, a health monitoring system is designed using an IOT and Arduino UNO board where the patient data transmission occurs wirelessly here using ESP8266 on IOT platform. All the data here are stored in a web server which can be logged in during the needed times and the data are transmitted then which is a disadvantage here.

GSM AND MICROCONTROLLER BASED SYSTEM:

Here, a health monitoring system is designed using Arduino, GSM module and microcontroller board where the vital parameters taken are transmitted to the microcontroller and if the values exceed the fixed range they are transmitted to the hospital for treatment but the distance factor is a restriction here too.

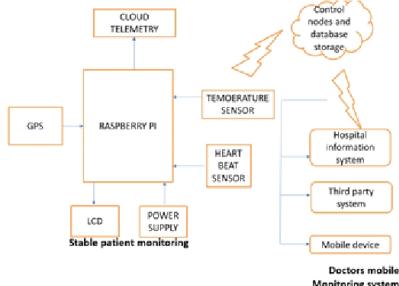
SYSTEM USING WIFI:

Here, a health monitoring system is designed in such a way using IOT device where the patient parameters taken are transmitted through wifi network which will be mesh type for establishing remote monitoring but the internet connection availability is a major concern here.

PROPOSED SYSTEM:

The proposed system majorly focusses on reducing the delay in taking the patient to the hospital and to give daily care to the patients which can help in finding out the diseases earlier and helps in providing immediate treatments. In this project, the vital parameters such as body temperature and heart beat rate are measured using temperature and heart beat sensors. These parameters can be daily monitored for ill patients and if any serious condition arises, an alarm alerts and the data acquired from the sensors are transmitted to the nearby health care center recognized by the Global Positioning System through the cloud telemetry system. Raspberry Pi microcontroller board reads the input from the sensors and sends to the cloud where for each of the data a unique address will be generated and stored and this action happens after regular intervals of time for each new data. This makes the patient data access very easier at the needed time for further procedures. This method can be further advanced or enhanced by incorporating more sensors like blood pressure sensor, spo2 monitoring, ECG, respiration rates, etc. So this will be much more helpful for the elderly who are unable to move and for the disabled persons too. It will reduce the frequent visits to hospitals, time consumption, cost of monitoring, etc. Since it makes use of GPS, very long distances can be covered making it flexible and efficient in emergency situations. Cloud can also store much of the data which is a major advantage here. From cloud the data will be sent to the hospital information system and even directly to the physicians when an emergency condition arises and the physician arrives at the spot immediately for giving necessary treatments to the ill people. This system is also mobile patient monitoring system which can be carried anywhere to patient's convenience and the patients can use it themselves once educated which is even more beneficial.

BLOCK DIAGRAM:



FUNCTIONS:

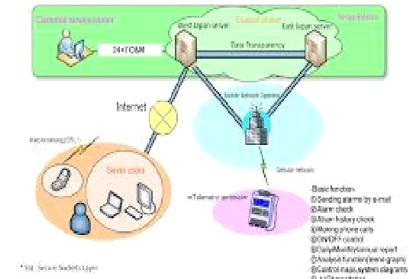
- **Raspberry Pi 3(B+)** is used which has 1 GB SRAM and bluetooth 4.2. The CPU type is ARM CORTEX A53 and its speed is 1.4GHZ.



- **GPS** is a radio navigation system that allows land, sea, and airborne users to determine **the exact location** of the hospital.



- **Cloud Telemetry** is the collection of measurements or other data at remote or inaccessible points and their **automatic transmission to receiving equipment for monitoring**.



- **DS18B20**, a programmable digital temperature is used which has alarm options and operates at 3v-5v. Its temperature range is -55C to 125C.



- **Pulse rate sensor** which operates at 3.3v-5v is used here. It has a light sensory circuit which itself adjusts the LED brightness according to the atmosphere.



PRINCIPLE:

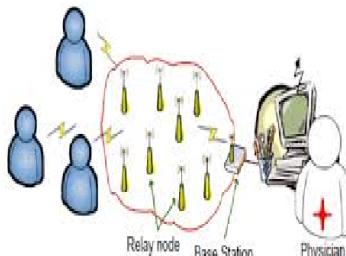


Figure 1: Architecture for proposed healthcare system in hospital.

a. Sample of a Table footnote. (Table footnote)

The motive of our project is to transmit emergency signal through cloud telemetry to the clinic or health center recognized by the GPS. This system enables to diagnose multiple patients simultaneously and helps to recognise the patient who needs the fastest treatment.

CONCLUSION:

This system reduces the time delay in taking the patient to the hospital and helps in earlier diagnosis of abnormalities. It makes use of various sensors for monitoring vital parameters of an individual such as temperature, heart beat, etc. As this is a non invasive system, it does not provoke any harmful reactions to the patient. Cloud telemetry enables effective storage and transmission of patient data even from remote areas. GPS module recognises hospital nearby and connects the device quickly once after installation of the system. GSM module works on 2G transmission which takes more time and covers minimal distance, whereas our proposed system replaces GSM with cloud for fastest transmission and covers large area with improved efficacy. Automatic identification, tracking of people, usage of biomedical devices, correct drug patient association and real time monitoring of patient's physiological parameters for early detection of clinical deterioration are the advancements in the patient monitoring system.

REFERENCES:

- [1] <http://www.instructables.com/id/HealthBand>
- [2] Temitope O. Takpor and Adememi A. Atayero, "Integrating Internet of Things and eHealth Solutions for Students' Healthcare", WCE 2015, July.
- [3] <https://pulsesensor.com/products>
- [4] <https://www.sparkfun.com/products/11574>
- [5] <https://www.elprocus.com/heartbeat-sensor-workinapplicat>
- [6] <https://www.sparkfun.com/products/8777>
- [7] Khuzadi, M., "On health monitoring", Aerospace Conference, 2008 IEEE, 1-8 March 2008, pp 1 - 8.
- [8] Hata, Y.; Yamaguchi, H.; Kobashi, S.; Taniguchi, K.; Nakajima, H, "A human health monitoring system of systems in bed", System of Systems Engineering, 2008. SoSE '08. IEEE International Conference on 2-4 June 2008, pp 1 - 6.
- [9] Hoang, D.B, "Wireless technologies and architectures for health monitoring systems", Digital Society, 2007. ICDS '07, First International Conference on the 2-6 Jan. 2007 pp 6 - 6
- [10] Nambu, M.; Nakajima, K.; Kawarada, A.; Tamura, T, "The automatic health monitoring system for home health care", Information Technology Applications in Biomedicine, 2000. Proceedings. 2000 IEEE EMBS International Conference on 9-10 Nov. 2000 pp 79 - 82
- [11] <http://www.eternalsolutions.com>
- [13] Cristian Rotariu, Hariton Costin, Dragos Araratel, Bogdan Dionisie, "A WIRELESS ECG MODULE FOR PATIENT MONITORING NETWORK", 2008 .
- [14] P. Binkley, "An Advanced Wireless Sensor Network for Health Monitoring", IEEE Engineering in Medicine and Biology Magazine 22 (3) (2003) 23–24.
- [15] Philippe Bonnet, Johannes Gaehrke and Praveen Sephardic, "Real-Time Multi-Patient Monitoring System on Wireless Sensor Network", IEEE Personal Communications (2005), Vol. 9.
- [16]. Zigbee and GSM Based Patient Health Monitoring System, 2014 International Conference on Electronics and Communication System (ICECS-2014), Purnima, Puneet Singh
- [17]. Alexandros Pantelopoulos, Nikolaos G. Bourbakis , "A Survey on Wearable Sensor-Based Systems for Health Monitoring and Prognosis", Publisher: IEEE DOI: 10.1109/TSMCC.2009.2032660.
- [18]. Ebrahim Al Alkeem1, Dina Shehad1, Chan Yeob Yeun1,M. Jamal Zemerly,Jiankun Hu "New secure healthcare system using cloud of things", Springer Science+Business Media New York 2017



I kozfud miØekeasif'k.k rFkk fodkl dh Hfedk dk विश्लेषणात्मक अध्ययन

MW ioufeJk

iQj एवं विभागाध्यक्ष

वाणिज्य विभाग

cjdrmYyko'ofo | ky;] Hky

सारांश

vkt ge I puk ; k eajgrs g] tgkagj I Fkk dh i th c] drk ij fu0j djrh gA vr% c] d i th d" cuk, j [kus v] I qkjus Áefk rjhda ea s, d g] bl fyk, miØe a }jk Ánuk Áf'k{k.k dh xqkoUk mI ds eW; d" ÁOkfor djrh gA I f]kr depljh ds fodkl ea Ykkxr de jgrh gS rFkk Áf'k{k.k depljh Áfr/kjd d" ÁOkfor djrk gS v] 0; ds ctk; fuosk ds #i ea n[kk tkrk gS o mpp fjVuZ i hik dj I drk gA Áf'k{k.k dk mls; I xBuLRed Á; kl gS ftl dk mls; deplfj; a d" mu dk; ± ds d]yk fu"iknu ds fyk, vko'; d cju; knhd^kyk ÁkIr djus ea enn djuk gS ftl ds fyk, os dke ij j[x; s gA n[jh rjQ fodkl deplfj; a d" vfrfjä dr; a dk i kyku djus v] I xBuLRed i nkuØe eaegRo ds i n a d" I Økykus ds fyk, fd, x, dk; ± l s I EcflUkr gA iLrkfor 'k[k e/; Ánsk ds p; fur I kozfud miØe a ea dkfed a dh dk; z d]kykrk ea Áf'k{k.k rFkk fodkl dh Øfedk dk v/; u e I fopkj fun'ku fo/fk vi ukbz xbz , oa I pukvka dks , df=r dj ifj. kke rd igpk x; k gA iLrp 'k[k i dk i kf fed , oa f}rh; d nkukadh i dkj ds I edka ij vkkfjr gA

संकेतशब्द:-I kozfud miØe, Áf'k{k.k, fodkl , dk; Zd]kykrk, Øfedk, eW; kdu, fo/Y"k.k

Hkjr , d fodkl 'khy nsk gA Hkjr dks fo'o dk , d I e) 'kkyh jk"V" cokus ds fy, ; g vko'; d gS fd jk"V" dk I o]dekh fodkl fd; k tk; sA foxr , d n'kd I s v] "fxd { "k ea rsh I s fodkl g]k gS rFkk I kozfud { "k ds miØe a dk v] xhdj.k ea fo" "k #i I s mYY [kuh; ; xnku fn; k gA vkkfkl #i I s I kozfud miØe a us nsk ds det"j { "ad" etc" fd; k g] j"txkj ds vol j d" c<k; k gS rFkk vkkfkl I kekftd igYk ea vkkrefu0j rk ÁkIr djus ea I gk; rk Ánku dh gA ; s I kozfud miØe I dYk jk"V"; mRi kn 1/4th, ui 1/2 d" mij mBks ds fyk, rFkk mRi knu ea I qkj grq I d k/ku a dk I o]dkh mi ; x djus ea I [ke gA bl fyk, fd I h Øh m| x dk fodkl I a/kr I H; rk ds fodkl dk i; k cu x; k gA ; g Øh I R; gS fd I xBu a ds LokLF; ds fyk, Kku v] d"kyk fodkl egRoi wkl gA

rsth I s cnYkrh g] Á" fxdh uohu eW; rFkk i fjozU'khy okrkoj.k ea deplfj; a ds fyk, Áf'k{k.k, oa fodkl dk; Øe n'u a gh vko'; d g" x; s gA Áf'k{k.k, oa fodkl d" , d gh vFk ea Á; x fd; k tkrk gS i jUrq vlrj fl QZ; g gS fd fodkl 'khn dk Á; x Ácl/kdh; deplfj; a ds I EcU/k ea fd; k tkrk gS i jUrq vlrj fl QZ; g gS fd fodkl 'khn dk Á; x Ácl/kdh; deplfj; a ds I EcU/k ea fd; k tkrk gS tcfd Áf'k{k.k 'khn dk; Zlkh deplfj; a ds fyk, Á; a fd; k tkrk gA fodkl ea os I Øh dk; z I fefYkr dj fyk, tkrs g] ftuds }jk depljh ds 0; fäRo dk I exz fodkl fd; k tk I drk gA I kekU; r% bl ea vxftYkf[kr

fØ; k, a I fEfYkr g"rh gA dk; Z fu"iknu dh ; "X; rk ea of) djuk] ekuoh; xqk'a dk fodkl djuk] fofoé {«kaeaKku c<kuk] vi uh Øiedkvads Afr vPNh I e> iñk djukA

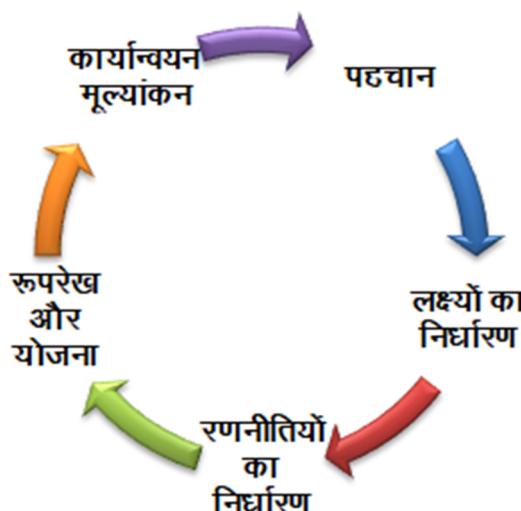
I koñfud mi Øe"ad" I cl s igY" 1948 dh vØj fxd ulfr ea fodfl r fd; k x; k FkkA 1956] 1977 rFkk 1980 dh vØj fxd ulfr; "a ea I koñfud mi Øe"ad dh dk; Z l hekv'a d" vØj foLrr fd; k x; kA nsk ds dYk mRiknu ea I koñfud mi Øe"ad dk Økx o"kl 2007-08 ea 20-5 Afr'kr j [kka nl oë ; "tuk ea iñth fuekZk ea I koñfud mi Øe"ad dk Økx 24 Afr'kr jgk ogé vØj c<rk gyk o"kl 2016-17 ea 59 Afr'kr gyk gA 2018 – 2019 में सार्वजनिक उपकरणों के लिए कुल पूंजीगत व्यय 163 प्रतिशत बढ़कर 8.74 ट्रिलियन हो गया है और इस वर्ष कुल सरकारी व्यय का लगभग 36 प्रतिशत है

"Msk v/; u dsrnas";

- 1- I koñfud {«k ds mi Øe"ad Áf'k{k.k vØj fodkl ds eCtink 0; oLFkk dk v/; ; u djukA
- 2- Áf'k{k.k ds igY" o mi jkUr dk; BkYkrk ea of) dk foY"k.k Red v/; ; u djukA
- 3- Áf'k{k.k vØj fodkl ds I nOZ ea I koñfud {«k ds mi Øe"ad ds fyk, I dkjRed I pko Ánku djukA
- 4- I koñfud mi Øe"ad Áf'k{k.k ,oa fodkl ds I \$ kird ,oa 0; kogkjfd igYkw'a dk v/; ; u djukA

I koñfud {«k ds mi Øe"ad Áf'k{k.k ,oa fodkl dh fLFkr

ÁLrT 'k/k ea p; fur rhu I koñfud mi Øe"ad i j v{k/kfjr Áf'k{k.k dh Øiedk dk v/; ; u fdI k x; k gß p; fur rhu mi Øe fuEufYkfkr gß
 1- e/; Ánsk LVV fl foYk I IYkbZt dkj Jsku fykfeVM
 2- e/; Ánsk LVV ,xi bMLVht MoYki eV dkj Jsku fykfeVM
 3- e/; Ánsk LVV gLrf'Yi ,oagkFkdj?kk fuxe fykfeVM
 ; "tukc) Áf'k{k.k e,MYk





bl अध्ययन ds vUrxt p; fur I koitfud mi Øe a ea dkfebd a ds Áf'k{k.k dh vko'; drk ,oa ml dk ÁOkø dkfebd a dh dk; ZdjkYkrk ij fdruk 0; kogfkjd gS fo'Y"k.kRed v/; u fd; k x; k gA ÁLrj अध्ययन ea I Óh Á'u a ij dkfebd a dh I rjV o vI rjV dk eki u fd; k x; k t\$ Áf'k{k.k vof/k d©kYkrk ,oa ; 'X; rk dk fodkl] dk; ZdjkYkrk] Áf'k{k.k] fof/k o ÁfØ; k] usRo xqk'a dk fodkl] vUrfulgr {kerv'a dk fodkl] vUrfo'okl ea of)] Án'klu ekud] I d kku'a dk mfpr mi ; 'x] rduhd dk mi ; 'x bR; kfnA

bl अध्ययन ea ÁkFfed MkVk ds vk/kj ij ÁukoYkh dk fuekZk fd; k x; k rFkk e/; Ánsk ds p; fur I koitfud mi Øe a ea dkfebd a dh dk; Z dkYkrk ea Áf'k{k.k rFkk fodkl dh Øfek dk v/; u fd; k x; kA ÁukoYkh ea iNs x, Á'u& vko'; drk vu#i Áf'k{k.k] Áf'k{k.k dk; Øe ds fo"k; dh Ák fixdrk] Áf'k{k.k fof/k ea fo"k; dh Ák; fxdrk] AfrLi/kz dh Ókoukj vkrE Lorakrk dh Ókoukj Án'klu dk eV; kdu] vkbZ/h I eFlu dk mfpr mi ; 'x] Áf'k{k.k ea I a ak o e'khujh dk mfpr mi ; 'x rFkk rduhdh Kku I s I e/kr FA I UrjV Lrj dk eki u fykdVz LdV 1 I s 5 ds iEkus ij vk/kfj r FkkA uhps nh xbZ rkfYkdk ds MkVk d" rkfYkdk , oapkVz ds }kjk Ánf'k' fd; k x; k gA

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.947
Bartlett's Test of Sphericity	Approx. Chi-Square	9889.454
	Df	210
	Sig.	.000

FACTOR ANALYSIS व्युत्पन्न%

I oFke itukoyh ea 36 ituka dks fydVz rkfydk ds ek/; e I s SPSS-20.0 I mVos j eaV/; u grqj [k x; kA bl ds vUrxt pj fo'Ysk.k ds ek/; e I s dN egRoiwkl dkj dk QDvj ykMak ds vk/kj ij eku Kkr fd; k x; kA , d sdku I s dkjd egRoiwkl g;tks Áf'k{k.k rFkk fodkl ds iFr dkfebd a ds fopkjck dk iLrj djuseal ek gA

KMO o Bartlett's VtV dk iZkx djus dk mÍs ; g Kkr djuk gk dk gS fd 'kdk v/; u ea iZDr vkdM o iZu fo'Ysk.k ds fy, mi ; Dr gS; k ugta\ I kFk gh ; g pj ds Lrj dh fo'ol uh; rk dh tkp Hk djrk gA KMO dk eku 0.6 I svf/kd vkus ij gh 'kdk&v/; u dks vlxsc<k; k tk I drk gA DF (Degree of Freedom) dk eku 0.6 I smij gkuk pkfg, o Significance, 0.05 I s de gkuk pkfg, A , d itu dk eku 0.6 I svf/kd gkuk ij gh v/; u fd; k tkuk I klo gkuk gA

v/; u I s Li"V gkuk gS fd KMO VtV dk eku 0.947 g;tks 0.6 I svf/kd gS tks mPp Lrjh; I cdk dks iZV djrk gA Bartlett's VtV dk eku 9889.454 g;tks 30 ituka ds vk/kj ij Kkr gyk gA bl ds vUrxt iR; d itu dk eku .5 I svf/kd gkuk pkfg,] tks fd vf/kd gS o Model of fitness ea vkdM dh I eFlk dk iinf'k' djrk gA Significance dk ikr eku 0.000 g;tks fd 0.05 I s de gA mijkDr foopuk I s Li"V gS fd ikr vkdM dseku ds ek/; e I s 'kdk v/; u dks vlxsc<k; k tk I drk gA



Rotated Factor Matrix

Rotated Factor Matrix

VarNo.	F1	F2	F3	F4	F5	F6	F7	Communalities
1	.589							.716
2			.657					.612
3	.524							.559
4				.790				.670
5	.663							.720
6					.890			.683
7		.682						.566
8		.807						.638
9		.573						.511
10			.637					.562
11					.670			.627
12			.810					.679
13				.678				.718
14				.780				.823
15				.731				.643
16	.866							.516
17					.875			.582
18	.532							.768
19					.701			.569
20			.645					.627
21				.879				.670
22				.800				.718
23					.670			.843
24			.818					.627
25					.789			.620
26					.803			.699
27						.789		.710
28						.799		.823
29						.802		.711
30						.806		.803
31						.834		.679
32						.867		.890
33						.888		.765
34						.890		.666
35						.891		.876
36						.895		.678
EV	4.56	3.21	3.01	2.13	1.78	1.34	1.01	
CV%	18.6	26.9	44.7	61.9	65.7	70.1	76.9	

Note: Seven Factors are derived factors.

fuþpu % fooj. kRed l k[; dh; ds vkkj i j v/; u fd; k x; k gA bl ds vrxk ek/; ft l dk eku 3 l s 4 ds e/; gkuk vko'; d gS rFkk bl grq dly 300 fgrxtkg; "a l s i ukoyh ds ek/; e l s tkudkjh ikr dh xbz gS rFkk ieki fopyu Hkh Kkr fd; k x; k gA

VAR00001 l s VAR00036 pjk dk fo'y. kRed v/; u dj ek/; Kkr fd; k x; k o ikr eku vf/kdkkr%3 l s 4 ds e/; gS fdUrq VAR00023 dk eku 4.2 gS tks l okt/kd gS rFkk VAR0016 dk eku 3.1 gS tks U; ure gA bl l s ; g nf"Vxkpj gkrk gS fd mÙkjnkrkvla }kjk nh xbz tkudkjh gekjs'kks v/; u dks l kFkdrk iku djrh



gA v/; u l s Li "V gkrk gSfd rkfydk e Communalities dks ysdj 'kkk ds v/; ; u dks c<k; k x; k gA ; g gj pj dk Extraction 1/dy eku% crkrk gS tks 0-05 l svf/kd vkuk pkfg, A ; g Loaded eku gkrk gA bl dk Initial eku 1-000 gkrk gA mDr rkfydk l s Li "V gkrk gSfd l Hkh pjka dk eku 0-05 l smij gS rFkk vf/kdre pj Ø- 36 dk eku 0-895 gA l Hkh pj dk Communalities eku vuqfur eku l smij gA vr% l Hkh pjka dks v/; ; u eafy; k tkrk gA Standard Value tksfd 100 ifr'kr ekuh tkrh gA

; fn fdI h pj dk eku vuqfur eku l s de gkrk gS rks ml pj dks Ldy l s fudky fn; k tkrk gS D; kif os pj 'kkk v/; ; u e viuk dk; kxnu ugh ns jgk gA bl Communalities rkfydk e i gys pj dk eku 0-716 gS ftI dk ; g rkri ; Z gS fd ; kxnu 71-6 ifr'kr gA nijjs pj dk eku 0-612 gS bl dk ; kxnu 61 ifr'kr gA rhl js pj dk ; kxnu .559 ifr'kr gA Øe'k%bl h rjg l Hkh pj viuk ifr'kr ; kxnu ns jgs gA mfpr : i l s pj fo'ykk foHkklu dkj dk dks foHkkftr dj foHkkftr djk gS ftI l s v/; ; u l jy gks tkrk gA vkbku eku] dy pjka ds ifr'kr dks bixr djrk gS rFkk iR; d pj viuk 0; fDrxr ; kxnu n'kkk gA

Rotated Component Matrix^a ds v/; ; u l s Li "V gkrk gSfd iR; d iDr o LrHk e l g l cdk gA iR; d pj ; g n'kkk gS fd bu dkj dk e l s l cl s vf/kd l g l cdk fdI dk etar gA bueftudk mPp l g l cdk gS ml s ckM dj n'kkk k x; k gS vkJ Rotated dj vire eku ds : i e Kkr fd; k x; k gA bl vkkj ij 36 izuk dks 7 dEikujV e l ek; kftr fd; k x; kA

FACTOR ANALYSIS (LOADINGS WITH VARIABLES)

Factors	Variables
FACTOR 1 vlo'; drk vuqfur Af'kk.k	Af'kk.k ds }ijk efsu; sd®Yk d' l h[us dk vol j Ákkr g'rk gA (.589) Af'kk.k dk efs egh vlo'; drk vuqfur Af'kk.k fn; k tkrk gA (.524) Af'kk.k dseki; e l sepsviuh d®Ykrk dk vuqfur grykA (.663) Af'kk.k e Á; p l l kku l r'''ktud gA (.532) Af'kk.k dk; Øe m x adfodkl dsfYk, dYk eut; 'krä dh vlo'; drkvad iwlz djus ds fYk, fMtkbu fd; k x; k gA (.866)
FACTOR 2 Af'kk.k fo'k; dh Ák fcdrk	Af'kk.k dk; Øe dsfo'k; dh Ák fcdrk l se s l rV gA (.682) Af'kk.k ÁfØ; k cgr gh l jYk gA (.807) Af'kk.k fo'k eaf'k; dh Ák; fcdrk ij cYk fn; k tkrk gA (.573)
FACTOR 3 l exzfodkl	Af'kk.k ej s vkrfo'okl e l gk; d gA (.657) Af'kk.k l s ÁfrLi /kZ dh Økouk tkxr g'rk gA (.653) Af'kk.k ejk l exzfodkl djuseal gk; d g'rk gA (.810)



	Áf'k{k.k dk; ðe dse/k; e l sejh vrfuifgr n{krkvadk irk Ykxk; k t" epi gY" lsugé irk FKA (.645)
FACTOR 4 vilem; of)	es Áf'k{k.k dh vof/k ls l rjV gA (.790) Áf'k{k.k vrRe eV; of) dsfodkl eal gk; rk djrk gA (.780) es vrRe Lorakrk dh Ökok a" egl i" djrk gA (.731) es viuk vrfuifgr {lerkvad" c<kok nuseal {ke g] rfd usRo xqka/dk fodkl g" l dA (.678) Áf'k{k.k epi segrokdklh g"us dk vol j Ánku djrk gA (.818)
FACTOR 5 usRo xqka dk fodkl	es l eg dk mi ; p rjhdls surRo djuseal {ke gA (.670) ep s l e; & l e; ij ej s vf/kdkfj; a }ijk Áf'k{k.k es Ölkx Yus ds fYk, Áfj r fd; k tkrk gA (.890) Áf'k{k.k us ep s t f[ke Y" mBkus ds fYk, rs kj fd; lA (.879) ge okLrfod l e; kvad" gYk djus ds fYk, l engaeadek djus dh vkk j fkrsgA (.800)
FACTOR 6 Án'lü dk eV; kdu	Áf'k{k.k l a" d" iwl djus ds cln geljs Án'lü dk eV; kdu fd; k tkrk gA (.875) Áf'k{k.k ; "tulc) rjhdls l ipkYkr fd; k tkrk gS rFk l Oh ÁfrÖkfx; a d" 0; fäxr egRo fn; k tkrk gA (.789) Vuj vius Kku d" l k>k djuseal {ke g"rs gA (.803) es igY" l sT; knk vius dk; l d" cgrj cuk l drk gA (.701) ge viuh xYkr; a l s l h[fkrsgA vj g j e; fo;"KK }ijk funfkr g"rs gA (.670)
FACTOR 7 rduhdh Klu	Áf'k{k.k ds nqk u dk; l d" l e; ij iwl djus grq vkbVt l efk u dk mfpr mi ; x ds fYk, Áf'k{kkr fd; k tkrk gA (.789) Áf'k{k.k dk; ðe epi sifj; "tulvad" de Ykxk ij iwl djus ds fYk, rs kj djrk gA (.799) Áf'k{k.k rduhdh "lV; "ad" de djusealenn djrk gA (.802) ep s Áf'k{k.k }ijk vius l aBu dh Li"V ifjÖk"kr l puk Ácalu utfr d" l e>us eal gk; rk feYkrh gA (.806) rduhdh Áf'k{k.k dse/k; e l sejh dk; l dYkrk rFk mRikndrk eal }ijk fd; k gA (.834) Áf'k{k.k ds nqk u Á"fxdh ij T; knk /; ku fn; k tkrk gA (.867) Áf'k{k.k l Eiwz mje ds fYk, ep s rduhdh #i l s; X; cokus eal gk; d g"rk gA (.888) Áf'k{k.k eal a"ak o e"kujh dk mfpr mi ; x crk; k tkrk gA (.890) Áf'k{k.k dkQhi gn rd rduhdh dk; l dYkrk Ánku djuseal gk; d g"rk gA (.891) rduhdh Klu ej s l Eiwz fodkl eal gk; d gA (.895)



ifjdYiuk'adk fu'd'l

Áfke ifjdYiuk ds fu'd'l : i eadgk tk l drk gsf fd e/; Ánsk LVV glrf'kyi , oafkfdj?kk fuxe dskfebd'adk ekuuk gsf fd mlg mudh d'kyk rFkk ; X; rk d' n'kr s gq Áf'k{k.k fn; k tkrk gsf rFkk l e; &l e; ij mud" vol j fn; k x; k gsf rksd og dñ u; k l h[A bl ds vfrfjä Áf'k{k.k ea Á; q l d kku l r"ktud gsf bl l s òh og l Urly ik; s x; A

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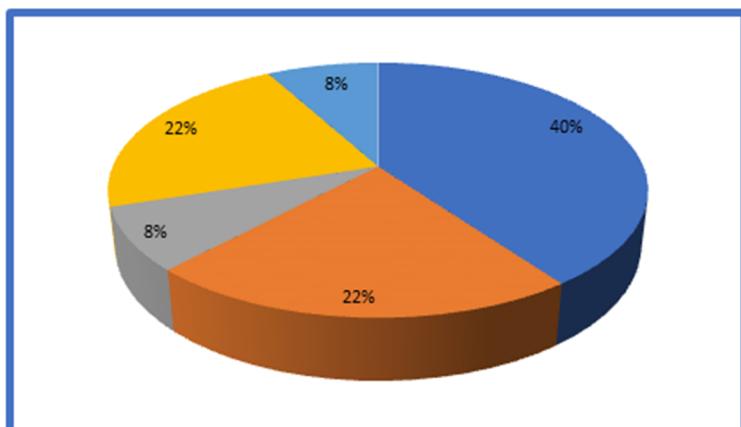
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rVLfk	8	8%
vI rV	22	22%
i wkl% vI rV	08	08%
	100	100%

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- ❖ dkfeð'a d l eg es dk; Z djus dh f'kñk Ánku dh tkuk pkfg, rkfd os t'f[ke d mBkuseal {ke g" o l eL; kvñdk gñk fudkyk l dñ
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1. Pallavi P. Kulkarni (2013)A Literature Review on Training & Development and Quality of Work Life. Journal of Arts, Science & Commerce. Vol.–IV, Issue–2, pp, 136-143.
2. Prasad A and Reddy Ch Panduranga (2008) Challenges in India's Public sector Southern Economist. Volume 47, No 9, pp 53- 54.
3. Punia B.K. (2002) Training needs Identification in Indian Organizations, Indian Journal of Training & Development32(1), Jan-Mar.
4. Purohit, M., (2012) "An Evaluation of HRD Practices Followed in M.P. State Agro Industry". Academica: An International Multidisciplinary Research Journal, Vol. 2, Issue 2, pp. 186-195.
5. Rahim, S.A.(2012) "Performance Appraisal Systems in PSUs: A Study on the Mercantile Limited". The Business & Management Review, Vol. 3, Issue 1, pp. 385-392.
6. Rakesh Gupta, (1997). "What Ails HRD in Public Sector".Indian Journal of Commerce, 22(8), PP: 12-13.
7. Ramakrishna et al. (2012) Effectiveness of Training And Development Programmes. International Journal of Multidisciplinary Research. Vol.2 Issue 4, Pp 149-161.
8. Ramanathan G. (2014) Factors influencing job satisfaction of employees in public sector. Tactful Management Research Journal, Volume 2, Issue 9, pp. 41-52.
9. Rani, K., Garg, D., (2014) "A Study on Training and Development in Public Sector", International Journal of Management and Social Sciences Research (IJMSSR) Vol. 3, Issue 1.
10. Rao, C.R., (1982). Training and New Era. State Bank of India Monthly Review. 21(11), PP: 175-179.
11. S. Shahul Hameed, J. Rajnikant and P. Mohanraj (2014) A Conceptual Study on Training and Development Program. International Journal of Advance Research in Computer Science and Management Studies. Volume 2, Issue 5, pp 80-85.
12. Sharma R.D., (1987), "Financial Working of PSUs", Delhi: Mittal Publications, pp. 1.
13. Singh, P. (2016) Training and Performance Appraisal Practices. International Journal of Management & Business Studies. Vol. 6 (3), pp. 44-49.
14. Singh et, al. (2014) Training and Development scenario in Public and Private sector banks. Indian Journal of Health & Wellbeing. Vol. 5 Issue 10, p1236.



15. Shankar.K. (1992) 'Training in Banks: Need for Innovation.' The Banker, July, pp 31-33.
16. Sundararajan S. (2007) 'Employees Attitude towards Training and Development in Private sector Industries'. Journal of Training & Development Vol 37, pp 45-50.

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GANDHI'S RECONSTITUTION OF CIVIC COMMUNITY: WOMEN AND DALITS

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Abstract

One of the key questions of nationalism was integration of women and dalits within its fold. The formation of community was subject of endless debates within the times of nationalism. Gandhi has been subjected to intense scrutiny both from anti caste activists and women activists regarding Gandhi's approach to resolution of this question. He did not have any comrades on this issue. He had to take immense pain in putting across his views. The contention here is that Gandhi stands on a different ground from all those who were inspired by rationalist epistemology. He differed from nationalist to feminists to anti caste activists. The specificity of his view emanates from his concern to sustain a form of life in which each individual retains his capacity to morally influence others which is in contrast to individual being automated to respond in ways he is expected to respond. He is programmed to respond the way system desires him. In contrast to this, he is an autonomous individual. He is autonomous from incipient forms of power - money, politics and knowledge. The power of money and politics distorts society in such a way that people would abandon their project of self-reliance and get wedded to those who pursue power and money.

Keywords: Gandhi, Civic Community, Women and Dalits

Introduction

Modern knowledge distorts society in mere fundamental way by altering one's self-image via production of rational knowledge. Rational knowledge would eventually become rational self-knowledge, thereby transforming one's self-image and image of others. Gandhi's main concern had been to sustain a form of life where individual would be able to influence others. This is clear in addressing the question of integration of woman and Dalits into the civic community.

Along with colonialism, scientific knowledge of society had taken hold over educated elite. They were influenced by early positivists. Educated elite started a new comprehension of society. They understood society either as a



machine or an organism, the two different metaphors for conceptualizing society. This brings an end to subject-centric perspective or social knowledge as produced by subject himself. It brought into existence objective knowledge of society produced via scientific study and the disciplines like Colonial Anthropology. This colonial knowledge produced an image of society as consisting of variety of social groups and racial groups. This knowledge refashioned the self of the individuals as they view themselves in increasingly according to the perceptual images shaped by such knowledge. Such knowledge also carried into native societies theories of liberation. Theories of liberation had inevitable structure of constituting society as victors and victims or dominant and the dominated. It altered experiential realm of public politics. People increasingly started viewing themselves victims of oppression or persecution. For instance, Hindus, of late, view themselves as victims of appeasement of Muslims by secular state. Similarly, Dalits view themselves as victims of upper-caste domination.

These are in one sense, theoretical ideas. These ideas percolated themselves down to the way structure of public experience is constituted. These imaginations radically alter the moral economy of society. Imagination itself is power. Imagining oneself as a victim radically weakens his/her moral strength. These structures of imagination were purchased and inculcated in native society. Being a victim in one's self-image inflicts fractures at the centre of one's vision. It affects significant others as well. The others will be forced to alter their self-image because they had to buy the images mocked at them. It alters their self-image and distorts it by bringing guilt in it. Thus, colonialism undermines the self-confidence of a society by altering itself via rational production of knowledge. Otherwise, one would be secure in one's identity and be tolerant towards others if one is strongly situated. Gandhi's negotiation with Dalit and women's questions is to precisely resist the self-images of society conditioned by colonialism and sustain a form of society in which one is secure and one is guided by Truth.

Gandhi and the Women Question

Gandhi rejects objectification of women in sexual terms. That is to imagine a woman as an object of sex is the shortest route to degradation. Western societies produced an imagination of women as sexual objects or as victims of sexual oppression. On the other hand Gandhi considers them as source of strength and moral character. "Gandhi saw women not as objects of reform and humanitarianism but as self-conscious subjects who could, if they choose, become arbiters of their own destiny" (Kishwar, 1985, p. 1691).



Sita, Draupadi and Damayanthi are three ideals of Indian womanhood that Gandhi repeatedly invoked to talk about the strength of women in India.

“They were not to consider themselves abalas but rather to be like Draupadhi a symbol of robust independence who could bend even mighty Bhima himself to her imperious will form Sita who was “gentleness incarnate..... a delicate flower”, to Draupadi, a gaint oak in her strength and resoluteness, to Olive Doke (a young girl who had worked among the unclad primitive Negro tribes of Africa) a symbol of absolute fearlessness, courage and will to serve a cause” (Kishwar, 1985, p. 1691).

Gandhi advocates psychological fearlessness courage and valour for women. Gandhi thought it was more a matter of psychological fear than physical weakness.

“Let no one dismiss the example of Sita as legendary... it was that higher type of valour which he wanted Indian womanhood to cultivate”..... The real strength of a woman was her consciousness of her purity and chastity. In any case she should prefer to give up her life rather than her virtue. Women should be self reliant as Draupahi was “who will call Draupadhi dependent, Draupadhi who, when the pandavas failed to protect her saved herself by an appeal to lord Krishna” (Kishwar, 1985, p. 1691).

Gandhi preferred femininity over masculinity in public life. He preferred feminine courage to certain kind of manly aggression because he primarily saw women as moral force in public life. His vision stressed the superiority of women’s suffering and self sacrifice rather than aggressive assertion and forceful intervention to protect their interests and to gain political power.

His perspective is unique because he viewed women as a person with moral character not merely as object of sex. The extremity that one encounters is his defense of chastity. This is basically to drive home point that there is a sharp line between sexual licentiousness and the moral strength that one gains from chaste behaviour. Chaste behavior unfolds immense courage and strength which is being destroyed by sexual licentiousness. In other words, for Gandhi, the non-sexual touch and love is the core for sustenance of civilization conduct. Non-sexual love and friendship is the source of creativity and joy which is being destroyed by sexual motivations. Many critics did not get it right. For Gandhi, it is important for him to retain women’s way of seeing or women’s epistemic perspective. Under colonialism, masculinity is privileged and women had been encouraged to model themselves on masculine line. Gandhi wanted to retain women way of seeing.



Gandhi on Dalit Question:

Gandhi's approach to the question of untouchability and caste has been most widely criticized. Very articulate voice among all of them is Dr. B.R. Ambedkar. Ambedkar's disillusionment with Gandhian politics was due to the latter's outwardly progressive appearance although it remained status quo ist on caste disabilities in its entirety. "A vocal critic of untouchability Gandhi was equally emphatic in defending the institution of caste. This can be attributed to two important things. Here one has to bear in mind Gandhi's own commitment to the institutions of caste varnashrama dharma (Rao, 2009, p. 64).

Gandhi's approach to caste needs to be looked at from the perspective that has been unfolding in the previous sections. Over the last half a century the discourse of discrimination against untouchability took a turn and it is increasingly being articulated in caste-wars. The language of caste wars that Gandhi strongly detested, because it is a question of epistemic and moral perceptions. The inhumanity of the practice of untouchability can be articulated very well in the traditional language of humiliation. When this language gets transformed into caste wars, it merely refers to the power of the hegemonic without actually articulating a moral critique of it. Thus, Gandhi's central concern was that he did not want the traditional language of moral critique to degenerate into a mechanical language of battle between forces. He wanted to retain a frame of moral critique to question inhuman practice. He didn't want that frame to degenerate into a language of power. Hence, he defended the Varnashrama Dharma while strongly criticizing the practice of untouchability.

"Hinduism will once again shine forth if such senseless restrictions are abolished, the pristine varna system is resurrected and the distinction of high and low are banished" (Chakrabarty, 2006, p. 155).

"At one time in India people used to consciously follow this law and thus lived in peace. One accepted the calling of one's varna and was satisfied in its pursuit of general welfare." (Chakrabarty, 2006, pp. 155-156).

Thus, varna system is not about high and low in social hierarchy. It is about doing one's profession and living in peace. One's profession is what gives raise to an ethic. But due to spread of modern competition based on selfishness, varnashrama dharma has been coming to an end. Gandhi argues for its revival. Because, the end of varnashrama dharma means the end of a society based on ethical reflection and consequent emergence of a mechanical modern society. That is why he pleaded for its retention.

"But if you discover that you will not be allowed into the temple along with your Harijan Companions, then if you have the living belief that I have that untouchability is wrong you will shun that temple as you shun a scorpions of fire. You will then believe with me that such a temple is not inhabited by God" (Chakrabarty, 2006, p. 157).



He denounced untouchability and invoked the authority of God against it. He questions the idea of pollution of human birth. He questions the idea of pollution, but he did not argue for the erasure of the identity of the caste. He would want that they should retain their identity, while at the same time, should reform some aspects of their culture. It was based on the principle that there is God residing in everyone.

Thus, Gandhi's resolution of the question of women and dalits vividly brings to the fore his basic perspective. It makes possible autonomous moral reflection of each individual without turning him into an object of control by systemic forces. It is also essential that environment for such idea of moral critique to be possible must be created. The sharp contrast to this is an automated society. Gandhi did not go with rationalists whose foot steps are unconsciously followed by contemporary anti caste activists and feminists.

Theorizing Gandhian Ideas:

In the previous sections, it has been attempted to argue for availability of ideas of certain traditional social order, the centre of which is a traditional moral critique of social institution and alien tendencies in political field. The availability of moral critique is crucial to the critique of oppressive institution. The other aspect of it is that it sustains traditional social order as moral critique includes everyone part of the community. Here, there are different kinds of articulations of Gandhian ideas in theoretical terms. Some would articulate him as an anti-modernist others would look at him as critical modernist. Still others would redescribe him as having resources to replenish liberalism. Influential stream of thinking in philosophy had interpreted him as a sort of communitarian. However, neither of the interpretations are exclusivist in the sense that same concerns are shared by different streams. The moulding of concerns vary on the basis of futures that each stream imagines. However, the discussion in the following focuses on one such stream which is loosely called communitarian interpretation of Gandhi. Mac Intyre interprets Aristotle to remould western tradition in communitarian fashion. Some thinkers (Miri, 2003; Puri, 2011 & Gier, 2003) availed the resources of this tradition to interpret Gandhi. In the following key postulates of this tradition will be discussed with relevance to Gandhi.

Miri Puts Gandhian view of politics as following:-

- i. The fulfillment of a human life lies in the achievement of the higher degree of integrity or swaraj.



- ii. Such achievement can only be the result of a common pursuit in which the community as a whole is engaged in setting goals which are seen not just as satisfying the selfish desires and interests of individuals or groups constituting the community, but as embodying common good which enhance, as it were, the life of the community.
- (iii) Such a common pursuit requires a vigorous exercise of the virtues, for example honesty, courage, intelligence, temperance, patience and so on.
- (iv) But the virtues are not just means (in the utilitarian sense) to the achievement of the common good in so far the pursuit of the good for man, for what constitutes the good for man is a complete human life lived at its best, and the exercise of the virtues is a necessary and central part of such a life, not just preparatory exercise to secure such a life.
- (v) An ideal political community is one which is engaged in the common pursuit of such common goods.
- (vi) Finally, such a community will naturally be characterized by harmony, rather than conflict and thus violence will not be a natural part of such a community's life (Miri, 2003, pp. 101-102).

This is a specific rendering of Gandhi's ideas in communitarians fashion by Mini. The role of community in the pursuit of common goals is very crucial. Pursuit of such common goals itself constitutes the objective of political life. Virtues are not merely for the purpose of realizing common good, but exercise of virtues itself is an eliminable part of good life. Life led without virtue is not a good life at all.

Gier (2003) calls him a communitarian liberal. Gandhi called procedural liberalism a nominal democracy and replaces its social atomism with a concept of situated autonomy. Gandhi calls procedural liberalism as a nominal democracy and expresses reformed liberalism as either Purna Swaraj (integral) democracy or Ramarajya (sovereignty of the people based on pure moral authority). Gier calls that Gandhi fits into what Macedo has called situated autonomy that is one being thoroughly sensitive to social context (Gier, 2003). Macedo states "the autonomous individual is a socially embedded individual one who understands his intellectual and cultural inheritance but is determined to make that inheritance his own by fashioning an individual character and life plan, and turning his participation in social practices into performances expressive of his individuality" (Macedo, 2009, as cited in Gier, 2003).

References

- Miri, Mrinal, *Identity and the moral life*, New Delhi, Oxford University Press (hereafter OUP), 2003.



- Kishwar Madhu, “Gandhi on Women,” *Economic and Political weekly*, Vol. 20, No. 40 (Oct. 5, 1985).
- Rao, Parimala. V, “Gandhi, untouchability and the post-colonial predicament: A Note,” *Social Scientist*, Vol. 37, No. ½, Jan-Feb -2009.
- Chakrabarty Bidyut, *Social and Political Thought of Mahatma Gandhi*, Milton Park, Routledge, USA 2006.
- Puri, Bindu, Gandhi and the Moral life, The Self and the Other: Liberalism and Gandhi, *Philosophia*, 39, 2011, published online, 20th July 2011.
- Gier, Nicholas F., “Non-Violence as a Civic virtue: Gandhi and Reformed liberalism,” *International Journal of Hindu Studies*, Vol. 7, No, 1/3 Feb, 2003.