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AN INNOVATORY AND SUSTAINABLE APPROACH FOR GREEN SYNTHESIS OF BIOPLASTIC

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ABSTRACT
A plastic pollution is one of the century's key challenges affecting our planet's environmental health. Plastic has evolved into a human requirement. The threat to our ecosystem and food sources is growing rapidly as more plastic is thrown in nature and the oceans. The principal environmental issues associated with the widespread use of synthetic plastics are their biodegradability and the creation of toxins when they degrade. Bioplastics are environmentally benign and biodegradable, making them an effective alternative to traditional plastics. Some stakeholders advocate for the utilization of waste feedstock to reduce the amount of virgin land-based resources used to make bio-based polymers. This is concerning because it puts pressure on residual waste streams, incentivizing and establishing markets around them, when trash should be eliminated in the first place, in accordance with the international waste hierarchy. Toaddress these issues, the proposed work aims at the synthesis of completely biodegradable materials, by using sericin and starch synthesized from cocoon waste and curcuma angustifolia respectively with poly vinyl alcohol. The product as such can find its place as a strong replacement of packaging, holding, singleuse plastic goods and medical applications. Besides waste reduction in terms of use of cocoon waste as a source of sericin also gains significance in terms of well-being of the environment. To best of our knowledge this is the first report of biodegradable plastic film from Curcuma angustifolia starch and sericin.

Keywords: Cocoon waste, Sericin, Curcuma starch, bioplastic film, PVA.

1. INTRODUCTION
Plastic pollution is one among this century's major issues impacting the environmental health of our planet. Plastic has become a personality's necessity. With the rising amount of plastic being discarded in nature and within the oceans, the threat towards our eco system and food supplies increases rapidly. per UN Environmental Programme, UNEP, a staggering 6.5 million loads of plastic are being dumped alone in our oceans every year. the main environment concerns behind extensive synthetic plastics usage are its biodegradability, and production of poisons while its degradation. In recent years, there has been an increasing trend towards replacing conventional fossil-based plastics with bioplastics i.e., plastics derived partly or fully from biomass or that are biodegradable. The bioplastics industry uses their green- sounding credentials to position themselves as helping to hurry the reduction in fuel use and solving the ever-growing plastic pollution and marine litter issues (Jafari et al.,2020). Under this context there arises a lack must find a promising viable alternative for producing biodegradable plastics to switch existing conventional plastics (Zhao et al., 2020.

To address these issues, the proposed work aims at the synthesis of completely biodegradable materials, by using sericin synthesized from cocoon waste with starch from Curcuma angustifolia. The product as such can find its place as a strong replacement of packaging, holding and single use plastic goods. Besideswaste reduction in terms of use of cocoon wastes as a source of sericin also gains significance in terms of wellbeing of the environment (Wang et al., 2021).

2. MATERIALS AND METHODS
Demand for bioplastics is increasing since past decade because of growing awareness concerning environmental conservation, use of bio-based or natural resources for manufacturing materials and formulation of varied regulations across countries for effective use of natural resources and waste management. Products and solutions supported bioplastics/biopolymers present interesting opportunities globally. Opportunities are present across a range of business sectors that include packaging, water, beverages, insulation materials, specialty materials and more. The key factor driving the bioplastics market is that the need for more eco-friendly and fewer polluting materials. Other drivers include volatile fuel prices and therefore the need for companies to decrease their carbon footprint across their entire business value chain. The demand for bioplastics has been gradually increasing because of its renewability and availability of staple, advanced functionality and technical properties, and also the recycling options a minimum of a number of them present.

2.1 Conceptional Framework
The purpose of this methodology is to present the technical study in which raw materials, tools andequipment and processes are included. To accomplish the study objectives, the following methods were used to obtain the

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information. The selected and relevant literature was reviewed to obtain current information pertaining to biodegradable plastic film made of sericin.

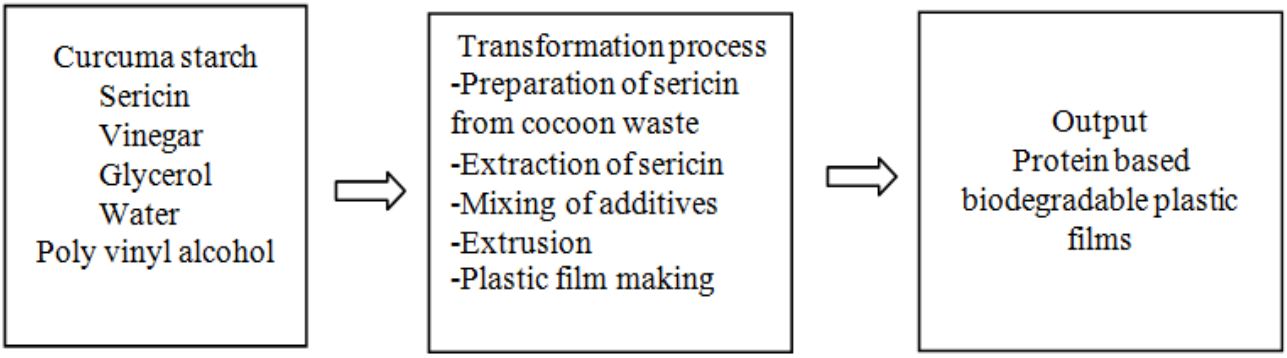

Fig: 1 Conceptional framework

2.2 Research Design

To arrive with the final product of biodegradable plastic film made of Sericin and Curcuma angustifolia a effective starch binder the process should be completed. The breakdown of information about the raw materials, tools and equipment and processes involved in making this product are to beidentifyingtogiveyouanideaonhowthefinalproductwillbecompleted.

2.3 Raw Materials Used in Biodegradable Plastic Film

Curcuma Starch

A white, tasteless and odorless powder that can be used as a thickening, stiffening or gluing agent when dissolved in warm water, giving wheat paste. It will be used as an additive for the decomposition ofthe product. In the study, the mixing of additives such as glycerol, sodium hydroxide and polyvinyl alcoholwere used. This starch contains amylopectin that decreases the strength of the plastic, addition of hydrochloric acid was used to break down amylopectin. The raw materials are mixed and extrusion was done make plastic films (Ordonio, Perez & Roque, 2009).

Sericin

Sericin may be a protein created by Bombyx mori(silkworms) in the production of silk. Silk could be a fiber produced by the silkworm in production of its cocoon. It consists mainly of two proteins, fibroin and sericin. Silk consists of 70–80% fibroin and 20–30% sericin; fibroin being the structural center of the silk, and sericin being the gum coating the fibers and allowing them to stay to every other.

Glycerol

A chemical compound, also commonly called glycerin or glycerin. it's a colorless, odorless, viscous liquid that's widely employed in pharmaceutical formulations. It is sweet tasting and of low toxicity. it's used as plasticizer to enhance the flexibleness and softness of the plastic.

Vinegar

Vinegar is a solution of ethanoic acid and trace chemicals that will include flavorings. Vinegar typically contains 5–8% carboxylic acid by volume. Usually, the ethanoic acid is produced by the fermentation of ethanol or sugars by ethanoic acid bacteria. There are many varieties of vinegar, reckoningon source. Vinegar is now mainly utilized in the culinary arts: as a flavorful, acidic cooking ingredient, or in pickling.

Water

It is commonly mentioned because the alkahest1. it's wont to dilute all the raw materials to return upwith the mixture.

Color Pigment

Pigments are used for coloring paint, ink, plastic, fabric, cosmetics, food and other materials. Most pigments utilized in manufacturing and therefore the visual arts are dry colorants, usually ground into a fine powder.

Ethanol

Ethanol has widespread use as a solvent of substances intended for human contactor consumption, including scents, flavorings, colorings, and medicines. It is used to form precipitate of sericin.

The amounts of the raw materials are based on the amount of the biodegradable plastic film from Sericinand the researchers added more of the glycerol and starch so that the product will be thick.

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Table 1: Amount of the Additives in the mixture

S.No	Rawmaterials	Amount
1	Sericin	500 g
2	Glycerol	0.07ml
3	Vinegar	0.5ml
4	Curcuma Starch	0.5 g
5	Water	0.07ml
6	Sodium hydroxide	0.10ml
7	Color pigment	0.05 g

2.4 Sample Collection

Silk cocoons were collected from the silk industry waste in and around Salem district. This materialwas washed thrice with distilled water to remove all dirt and then drained. After drying it completely in anoven, it was used as raw material for further studies.

2.5 Extraction of Silk Sericin from Cocoon Waste

Sericin was extracted from silk cocoons using the protocol described by Yang et al. (2013) with a slight adaptation. In brief, the well-dehydrated silk cocoon peduncles were finely cut into pieces, weighed,and soaked in an extraction solution containing urea (8 M), Sodium dodecyl-sulfate (SDS) (1%) and β- mercaptoethanol (2%) for 30 min at room temperature and moved to the oven at 80 ºC for 5 min. After removing the remaining fiber, the supernatant was vortexed to obtain the sericin solution. The sericin- containing fluid was mixed with 70% ethanol at a 1:3 ratio and stored at -20 ºC for 1 h, obtaining sericin as a precipitate. This sericin residue was dissolved by adding the required volume of Tris–HCl (20 mM).

2.6 Biuret Test

1% copper sulphate solution and 1% potassium hydroxide solution are prepared. The 5ml of the solution collected is mixed with potassium hydroxide solution with 1:1ratio. Three drops of copper sulphate solution are added to the mixture solution. Changesin the solution observed and recorded. The solution is analyzed under uv-vis to obtain its absorbance.

2.7 Analysis of the Sample

The solution collected after purification is analyzed in FTIR and its wavelength graph obtained andcompared with the standard graph. The solution fully precipitated using ammonium sulfate, the solids are separated weighed and its weight recorded.

2.8 Method of Extraction of Starch from Curcuma Angustifolia

The method of extraction of starch from the Curcuma angustifolia powder is reported in literature (Kokate C.K.,1994), but in order to improve the quality of starch the method was modified as follows: i)Fresh Curcuma angustifolia bulbs were collected and washed it thoroughly with water and scrapped of theouter layer and kept in sufficient amount of water overnight, followed by milling to get smooth paste. ii) Purification: This paste was transferred into a beaker, stirred well and allowed to settle. The supernatant liquid was decanted and washed the residue. iii) The residue is washed repeatedly until the colour of the residue becomes pure white. The residual water was filtered of completely using a vacuum filter. iv) Drying: The pure white starch (residue) was dried at 80°C till it was completely dry. v) Pulverizing and screening: The dried powder (starch) was pulverized and passed through a 100 mesh sieve and stored in an airtight container.

2.9 Preparation of Bioplastic Film

The precipitated sericin are isolated by filtration and dried under vacuum. The sericin is ground into a fine powder using a mortar and pestle. The sericin from cocoons is mixed with the additives which are poly vinyl alcohol, glycerol, wood glue, starch, color pigment and water in the mixer machine. The additives that are added to the mixture increase the chemical properties of the biodegradable plastic bag. The starch is used to increase the degrading effects of light, heat or bacteria. The mixture is fed in a hopperthen fed into an extruder, which is a long heated chamber. The mixture is moved by the action of a Continuously revolving screw. The rotating screw continues to act as a pump and forces the molten plasticthrough a die.

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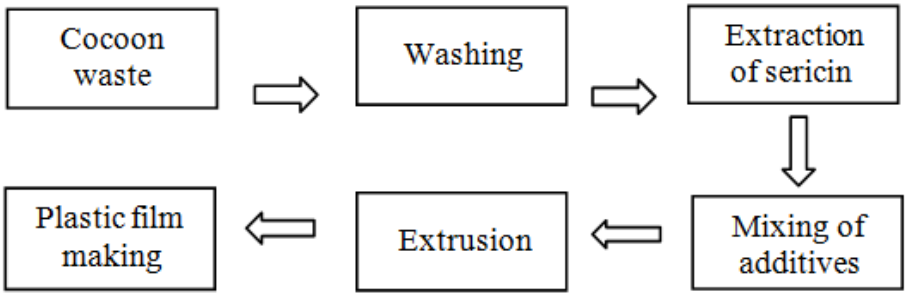

Fig: 2 Preparation of bioplastic film

3. RESULT AND DISCUSSION

Research interest has especially been intensified in exploring biopolymers from waste resources or industrial byproducts. Sericin from cocoon wastes are the abundant, hidden biopolymers to be exploited. Sericins, being the foremost component of cocoons respectively, are the nonfood protein featuring excellent biocompatible and biodegradable properties.

It is been a protracted time ago since artificial polymers happens to interchange natural materials in mostly everyday appliance and nowadays plastics became an important a part of our life. because the time goes by, the soundness and sturdiness of plastics are improved constantly, and hence this group of materials is now considered as a synonym for materials being proof against many environmental influences. The plastics uses today are made up of inorganic and organic raw materials, like carbon, silicon, hydrogen, nitrogen, oxygen and chloride. the fundamental materials used for creating plastics are extracted from oil, coal and gas.

Recently, the event of bio composites from biodegradable polymers and natural fibers has attracted great interests among researcher within the worldwide. this is often because, bio composite may have complete degradation in soil or by composting process similarly as don't emit any toxic substance during production and disposal process. By successfully producing bio composite, we is also able to substitute the traditional petro-based plastic in various applications. This finding will contribute plenty in environmental concern furthermore as in industry. The conceptual paradigm of the method in making a biodegradable bag made by sericin from silk industry waste.

Extraction, Purification, Isolation and Characterization of Sericin from Silk Waste Cocoons

The sericin was isolated from cocoons by the method described by Takasu et al.2002 with a slightmodification. In brief, the finely cut peduncle pieces were weighed and soaked in a solution containing 8M urea, 1% SDS and 2% β-mercaptoethanol for 30 min at room temperature and then kept at 80 $^{\circ C}$ for 5 min. After the removal of residual fiber, the supernatant was centrifuged to get sericin solution. The sericin

Was collected as precipitate by adding three volumes of ethanol followed by storing at −20$^{\circ C}$ for an hour.20mM Tris–HCl was added to dissolve the precipitate. The protein concentration was determined by Lowry protein assay method, 8% SDS-PAGE was performed under reducing -condition.

Fig: 3 Diagrammatic representation of extraction, purification, isolation and characterization ofSericin from silk waste cocoons

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Fig: 4 Final yield of starch from Curcuma angustifolia

Fig: 5 Transparency of bioplastic film

Fig-6 Lab level preliminary output – biodegradable bag- product development

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Knowledge of biochemical properties improves the knowledge that is needed to discover theircost. Applications of sericin is a growing fashion which traverses commercial biotechnology, with packages in bioenergy, nano-biotechnology, waste recycling and control, bioremediation, leather, and fabric industries, food and feed era, personal care merchandise, scientific and pharmaceutical applications, agriculture, bio-catalysis amongst others. Extraction of sericin from waste biomass and its production into novel biosynthesis has boosted up the biopolymer plastics as well as the cosmeticindustry.

Fabrication of Bioplastics

The bio composite film material is successfully facilitated by the optimal quantities of additives such as glycerol, vinegar, starch, sodium hydroxide, color pigment, and sericin and gelatin.The produced bio composite mix under the heated chamber of an extruder's hopper yielded fine bio composite bioplastic film material under this ideal combination. At room temperature, the bio composite material was molded into the desired shape and thickness. It can connect to form a triple helix structure in response to environmental circumstances, particularly temperature (Rglová et al., 2017). The starch in this bio composite material for bioplastic manufacturing could give sericin strength and aid in its quick decomposition by soil bacteria (Verma et al., 2020). Apart from evaluating the physical, chemical, and mechanical properties of sericin the additives used in the bio composite production process also influence the thickness of the bio composite as well as its transparency, tensile strength, and biodegradable properties (Kwak et al., 2020).

Characterization of Fabricated Bioplastic Material

Investigating the physicochemical features of manufactured bioplastic materials, such as thickness, transparency, tensile strength, and biodegradability, is crucial in determining the quality of the synthesized bioplastic and its environmental friendliness (Zhao et al., 2020).

Biofilm Thickness

One of the physical criteria that may influence the quality of bioplastic character features is the thickness of the biofilm (Shen et al., 2020). The consistency of the packaged things should be modified. Thick coatings boost strength while decreasing elastic modulus (Liuet al.,2019). The test was used to confirm the thickness of bioplastics containing sericin and gelatin. The thicknesses of four biofilms were determined based on the thickness testing findings of bioplastics in each treatment: 0.068 mm, 0.183 mm, 0.210 mm, and 0.305 mm, respectively.

BIODEGRADABILITY

Biodegradation is the process of organic matter broken down by microorganisms such as bacteria and fungi that are live in the soil. Tests for degradation of bioplastic packaging were carried out using a soil burial test method. The higher concentration of sericin and Starch, the longer bioplastic will be degraded bioplastics. The results of the biodegradability percentage of this researchafter 1 day burial ranged from 6.90-14.58%. These results are greater than the results of Ratri (2018) which have a percentage of biodegradability on the first day ranging from 5-6%. The results of the biodegradability percentage of this research after 120 days burial ranged from 98.31%-99.02%. Hydrophilic properties make it easier for microorganisms to absorb nutrients from bioplastics so thatbioplastics can be degraded. Overall, bioplastics in this research tend to be rapidly degraded by soil.

CONCLUSION

India is the third largest plastic consumer in the world, with a total consumption of plastics ofabout four million tons and a resulting waste production of about two million tons. Bioplastics are those plastic materials that are manufactured by using natural resources. There are two categories of these plastics available in the market-biodegradable bioplastics and non-biodegradable bioplastics. In Conclusion the present study of sericin were supported by the presence of the above-mentioned Isolation of sericin from silk waste and bioinformatics activities. Recently, research interest has especially been intensified in exploring biopolymers from waste resources or industrialbyproducts. Sericin a promising natural protein that could be extracted from cocoon wastes is an abundant, hidden biopolymer to be exploited. This protein is an abundant nonfood protein featuring excellent biocompatible and biodegradable properties. Under this context, the proposed project addresses the wealth from waste technology aiming towards the production of ecofriendly bioplastics. The produced bio material is expected to revolutionize the bioplastic market with its versatile biodegradable plastic properties. Preliminary synthesis of the biomaterials showed promising resultsthat it can also be further adopted to scale up process towards large scale production.

“The Beginning of the end for Plastic Bags/ Zero Waste”

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STUDY OF BIO INDICTORS PLANTS OF MAUSAM RIVER MALEGAON

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ABSTRACT
Environment means our surrounding i.e. everything around us that includes biotic and abiotic components with which we are always in contact. Land, surface waters, and ground water worldwide, are increasingly affected by contaminations from industrial, research experiments, military, and agricultural activities either due to ignorance, lack of vision, carelessness, or high cost of waste disposal and treatment. The rapid build-up of toxic pollutants (metals, radionuclide, and organic contaminants in soil, surface water, and ground water) not only affects natural resources, but also causes major strains on ecosystems. Malegaon is located at the confluence of Girna and Mausam rivers, at elevation of 438 metres (1437 feet) at 18.42°N 77.53°E.It is located at around 280 km northeast of state capital Mumbai. It has good connectivity with nearby cities like Nashik, Manmad,Mumbai and Dhule. Power looms, the cloth industry in Malegaon flourished due to increased productivity. Malegaon is well-known city for Handloom and power loom. Malegaon is second largest city in respect of population in Nasik district of Maharashtra. Mostly Mausam River is most polluted river due to discharge of waste water for mills industries. This river downstream of river channel has naturally vegetation cover of some plants .this plants are pollution indicator.

Keywords: Malegaon, Pollution, Plants.

INTRODUCTION
The city is situated on the 20°32' North latitude & 74°35' East longitude .The average height of city area is 429.4 Mts. above the mean sea level. Malegaon city has an area of 12.95 sq. km. Malegaon city lies on the National Highway No.3. Railway junction Manmad lies at the distance on 36 km to the south of Malegaon the city of Malegaon. The city of Malegaon is on the bank of the river Mausam, which joins the Girna River further to the south .It is a part of Western Ghat which is known as Sahyadri Mountain in this area .Naturally the city lies on the lee-ward side & therefore this area suffers from low rainfall.

The textile industry uses high volumes of water throughout its operations, from the washing of fibers to bleaching, dyeing and washing of finished products. On average, approximately 200 liters of water are required to produce l kg of textiles (Table 1). The large volumes of wastewater generated also contain a wide variety of chemicals, used throughout processing. These can cause damage if not properly treated before being discharged into the environment. Of all the steps involved in textiles processing, wet processing creates the highest volume of wastewater. Following table shows textile industries different process, sources and releases of in river Mausam and Girna

Process	Source	Pollutants
Energy production	Emissions from boiler	Particulates, nitrous oxides (Nox) sulphur dioxide (So_2)
Coating, drying and curing	Emission from high temperature ovens	Volatile organic components (VOCs)
Cotton handling activities	Emission from preparation, Carding, combing and fabrics manufacturing	Particulates
Sizing	Emission from using sizing compound (gum, PVA)	Nitrogen oxides, sulphur oxide, carbon monoxide
Bleaching	Emission from using chlorine compound	Chlorine, chlorine dioxide
Dyeing	Disperse dyeing using carriers Sulphur dyeing , Aniline dyeing	Carriers H_2S
Printing	Emission	Hydrocarbon, ammonia
finishing	Resin finishing, heat setting of synthetic fabric	Formaldehyde carrier- low molecular weight polymer- lubricating oils
Chemical storage	Emissions from storage tanks for commodity and chemical	Volatile organic components(VOCs)
Wastewater treatment	Emission from treatment tanks and vessels	Volatile organic components toxic emissions

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MATERIALS AND METHODS

At present studies we observe that Mausam River downstream of river channel have naturally vegetation cover of some plants, like Eichhornia species, Azolla species, Salvia species Typha latifolia, duck weed this plants are pollution indicator also they control the pollution through the process of phytoremediation.

According to yang etal (1) phytoremediation is also consider a type of bioremediation which offers the possibility of bio recovery of heavy metals using plants. These plants have constructive and adaptive mechanism for accumulating or tolerating high contaminants in their rhizosphere, plants acts as a solar driven pump, which can extract and concentrate certain heavy metals from the environment .This remediation methods maintains the biological properties and physical properties of the soil, water and air.

Table 2 . Phytoremediation methods and its description and plant used for techniques

Sr.No	Phytoremediation methods	Description	Plants used
1	Phytoextraction	Plants absorb contaminants and store in above-ground shoots and the harvestable parts of roots.	Brassica juncea, Typha latifolia, Azolla filiculoides, (Brassicaceae,Euphorbiaceae, Asteraceae, Laminceae plant families)
2	Phytostabilization	Roots and their exudates immobilize contaminants through adsorption, accumulation, precipitation within the root zone, and thus prevent the spreading of contaminants.	Brassica juncea, Glycine max L.
3	Phytodegradation	Plant enzymatic breakdown of organic contaminants, both internally and through secreted enzymes.	Myriophyyllum aquaticum, Salix nigra, Taxodium distichum, betula nigra
4	Phytovolatilization	Plant roots stimulate soil microbial communities in plant root zones to break down contaminants	Arabidopsis thaliana, Brassica juncea, Brassica napue
5	Rhizofiltration	Contaminants taken up by the roots through the plants to the leaves and are volatized through stomata where gas exchange occurs.	Helianthus annuus.L, Hydrocotyle umbellate, Lemna minor, Azolla pinnata

Phytoremediation of various inorganic pollutants such as Cd, Cr, Pb, Cu, Zn, Co, Ni, Se, Cs and as has been extensively studied. This is mainly based on the use of natural hyperaccumulator plants with exceptional metal-accumulating capacity, which can take up metals to concentrations at least an order of magnitude greater than the normal plants growing in the same environment. These plants have several beneficial characteristics such as the ability to accumulate metals in their shoots and an exceptionally high tolerance to heavy metals (2), (3). At present, there are totally more than 400 species of hyperaccumulator plants for As, Cd, Mn, Ni, Zn etc. have been found.

RESULTS AND DISCUSSION

Mausam River downstream of river channel shows luxuriant growth of Eichhornia species as compare to Azolla species, Salvia species Typha latifolia, duck weed etc. These plant work as phytoremediation mechanisms through phytoextraction, phytostabilization, phytodegradation, phytovolatilization, rhizofiltration and rhizodegradation which helps to control or minimize the all kinds of pollution.

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CHITOSAN APPLICATION IN AGRICULTURE

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ABSTRACT
Chitin, a polysaccharide which is present in the exoskeleton of crustaceans, arthropods and molluscs. It is also found in cell wall of fungi. Chitin act as a derivative for chitosan. Chitosan is an excellent biopolymer which is used in many fields. It is utilized for the production of commercially important products. Chitosan can be extracted from many sources such as shrimp, crab shells and seafood waste. Chitosan is used for several purposes in the field of agriculture. It exhibits powerful properties like antimicrobial and antioxidant activity. Chitosan nanocomposites are made into sprays to boost immunity against fungal pathogens. Chitosan based nanoparticles play a role as fertilizers. This may reduce the use of chemical fertilizers. Soil is not affected since chitosan is biodegradable substance. It can be used as pesticides and herbicides. Chitosan elicits immune response of plants. It increases yield and quality of food products. Chitosan performs the function of plant growth regulators when given appropriately. It is used to control postharvest diseases in crops. Chitosan nanoparticles help plants to overcome abiotic stress. Saline stress is one of the harmful types of stress. Exogenous chitosan treatment enhances plants' tolerance to saline stress. The extraction of chitosan from crustaceans is discussed in this review. Some common applications of chitosan in agriculture are included in this review paper.

Keywords: Chitin, Chitosan, Nanoparticles, Agriculture

INTRODUCTION
Chitin, regarded to be the second most prevalent naturally occurring polysaccharide on the world after cellulose, is the source of chitosan. Significant biochemical parallels between chitin and cellulose can be seen in plant cell walls, which include neutrally charged linear polysaccharide chains [1]. The N-acetyl-D-glucosamine units joined by glycosidic (1,4) bonds produce chitin, a linear biopolymer. The exoskeletons of crustaceans and molluscs as well as the cuticles of insects contain chitin, which is the second most prevalent polysaccharide in nature after cellulose. Chitosan can be made from a variety of sources. Crab and shrimp shells, as well as other waste crustacean shells from the seafood processing sector, are the most typical sources of chitosan. Another source is the exoskeleton of insects like beetles. The fungus kingdom of moulds and macro-mushrooms is another natural source gaining interest and popularity [2]. Chitosan nanoparticles have been researched as a vehicle for the delivery of active ingredients due to their high permeability, cost effectiveness, and great film forming ability for a variety of applications. Additionally, chitosan is well known for its powerful antibacterial and insecticidal properties [3]. Chitosan may easily pass through tight intercellular connections in epithelial cells and across cellular barriers, making it an effective carrier for chitosan nanoparticles. Many of these uses of chitosan have been well examined in the literature. Chitosan-based nanoparticles (CNPs) have been used in agriculture as pesticides, herbicides, insecticides, and to achieve better quality food products with a greater yield. Fresh fruits like strawberries, jujubes, loquats, and longans were preserved during storage using nano-chitosan-based compounds or chitosan mixed with other nanoparticles. Additionally, because to its cationic nature, biodegradability, non-toxicity, and adsorption capabilities, chitosan can be used alone or in conjunction with other substances to function as an encapsulating agent in the creation of slow-release fertilisers [4]. The growing population, shrinking amount of arable land, and rise in plant diseases brought on by pathogens provide significant issues for the agricultural sector. Plant infections produce toxic by-products that delay crop growth and lower yields, which can result in large financial losses. However, relying too heavily on currently available fungicides to address this issue will inevitably have an effect on ecological variety and the security of the general people. Therefore, it is crucial to create antimicrobial medications with fresh targets. The broad-spectrum resistance to bacteria and fungi, biodegradability, biocompatibility, and plant growth-stimulating characteristics of chitosan and its derivatives have made them a research hotspot in the domains of plant growth stimulants and biological antimicrobial insecticides [5].

Extraction of Chitosan:
The cuticles of various crustaceans, primarily crabs and shrimp, are the major source of raw material for the synthesis of chitin. Chitin is a component of a complex protein network found in crustaceans, or more precisely shellfish, on which calcium carbonate accumulates to produce the rigid shell. A polysaccharide-protein complex has a modest amount of protein and involves a very close connection between chitin and protein. The removal

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of the two main components of the shell, proteins by deproteinization and inorganic calcium carbonate by demineralization, as well as tiny amounts of pigments and lipids that are typically eliminated, are therefore necessary for chitin extraction from shellfish. In rare situations, an extra decolorization phase is used to get rid of any remaining pigments. Pure chitin has been prepared using a variety of techniques over the years, but there is no accepted standard procedure. Chemical or enzymatic treatments could be used to perform demineralization and deproteinization [6].

Deproteinization: To begin with, dried shrimp and crab shell waste was treated with a 4% (w/v) solution of sodium hydroxide at 45°C for 24 hours to remove the protein. The alkaline soluble fraction was then separated using centrifugation at 4000 rpm for 15 minutes, and subsequent washings with distilled water were carried out until the pH reached a neutral level.

Demineralization: To remove minerals and separate acid-insoluble fraction, deproteinized shells were treated with a 4% (v/v) HCl solution at 30°C for 12 hours. The separated fraction was then thoroughly rinsed with distilled water to remove any traces of acid before being allowed to dry at 40°C overnight to produce chitin. Before beginning the process of chitosan preparation, the acquired chitin underwent a decolorization step because it had a faint pink tint.

Decolorization: After soaking the obtained chitin in 1% potassium permanganate for 30 minutes, it was then treated with 1% oxalic acid for 30 minutes to two hours. The finished product was referred to as pure crab and shrimp shell chitin.

Deacetylation: To transform the decolorized chitin into chitosan, the chitin was treated with 65% (w/v) NaOH for three days at 30°C. Centrifugation was used to remove the alkali fraction present in chitosan for 15 minutes at 4000 rpm. Excess alkali was drained off and rinsed with distilled water until pH was neutral. The obtained chitosan portion was held at room temperature pending further investigation after being dried at 40oC for an overnight period [7].

APPLICATIONS IN AGRICULTURE:

Antimicrobial Activity

The main environmental sources of infection for vegetables include the soil, air, and water as well as some plant infections. Due to the presence of air, high humidity, and increased temperatures during storage, microorganisms can grow more readily in vegetables that are damaged or sliced. Moulds, yeasts, and aciduric bacteria like lactic acid bacteria are easily attracted to vegetables with high carbohydrate content and extremely low protein content. The antibacterial properties of films composed of chitosan and its derivatives are supported by a number of research. Such films demonstrate the effectiveness of chitosan-based materials on bactericidal activity by providing substantial evidence of antibacterial activity against a variety of spoilage and pathogenic microorganisms from the food sectors. The type, MW, DD, viscosity, solvent, and other intrinsic and extrinsic properties of chitosan have a significant impact on its antimicrobial efficacy [8].

The most harmful pathogens for agricultural products are fungi, which are regarded as one of the most common. By creating mycotoxins, it seriously harms fruits, cereals, and other food products before and after harvest. Due to fungal infections, a sizable amount of the world's agricultural products goes to waste in the current food emergency. Chitosan -silver (Ch-Ag) nanocomposites have been created and used as foliar sprays or seed primers to suppress fungal infections. Numerous biological activities resulting from altered physico - chemical properties like size, surface area, cationic nature, active functional groups, and better encapsulation efficiency are the main benefits of composing Ag nanoparticles in the chitosan matrix. Chitosan serves the function of an elicitor, eliciting the defence mechanisms of the plant by increasing the production of pathogen-related proteins, secondary metabolites, and re-enforcing the plant cell wall against the pathogen attack. This enhances the defence mechanism of plants at the cellular level. For the eradication and prevention of bacterial infections in several crops, Ch-NCs have been used. A harmful pathogen for tomatoes known to cause bacterial wilt is Ralstonia solanacearum. It adversely affects the productivity of the tomato crop and significantly reduces farmers' incomes, both in greenhouses and open fields [9].

Fertilizer

There are several different physical forms of chitosan and its composites, including resins, microspheres, hydrogels, membranes, and fibre. Chitosan mixtures are first converted into the desired physical shape by combining the blend's component liquids and using the proper shaping techniques. Understanding the controlled release procedure, which would serve as a direct evaluation of a Controlled Release Fertilizer (CRF) performance, is crucial. In a general sense, it is difficult to imagine a controlled release system because it

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depends on a number of variables, including the composition of the coating materials, the type of CRF, farming circumstances, and more. CRF made of chitosan hydrogel can increase soil water retention. Chitosan releases active components by breakdown and diffusion, in contrast to hydrophilic polymers, which make up hydrogels (such as polyvinyl alcohol), which release active chemical compounds by diffusion [10].

Saline Stress

Saline stress is a detrimental type of abiotic stress that inhibits plant growth and function and can reduce crop yields by 10% to 25% in many agricultural crops. Because plants are sessile, they must have developed a number of mechanisms to cope with high salinity conditions. These mechanisms include ion toxicity, hyperosmotic stress, nutritional imbalance, oxidative damage, metabolic abnormalities, and photoinhibition. Chitosan has three different functional groups on its backbone: the primary and secondary hydroxyl groups, the amino/acetamido group, and others that increase its affinity for ions and many contaminants. Since Rouget's discovery of chitosan in 1859, numerous research on rice, maize, safflower, sunflower, and creeping bent grass have demonstrated its involvement in promoting plant development and raising plants' resistance to abiotic stress. The reduction of oxidative stress and the chitosan-induced increases in water use efficiency, mineral nutrient uptake, chlorophyll content, and photosynthesis are largely responsible for chitosan's positive role in stress mitigation. Exogenous chitosan treatment boosts plants' resistance to several stresses, including drought, salt, osmotic, and low-temperature stress. Exogenous chitosan at certain concentrations has been utilized to improve plant tolerance to a variety of biotic and abiotic stressors by promoting antioxidant activity, enhancing water usage efficiency, and controlling the concentration of osmotic regulatory compounds.

The leafy vegetable lettuce (Lactuca sativa L.) is typically eaten fresh or in salad dressings. The top three lettuce-producing countries in the world—China, the United States, and India—produce the majority of the world's lettuce. Lettuce is a vegetable with a moderate to high sensitivity to salt. Salinity lowers the rate of seed germination, the number of leaves, photosynthesis, and cell proliferation while increasing the formation of ROS, all of which are detrimental to the growth and yield of lettuce. Although the detrimental effects of salinity on lettuce have been researched, data on the impact of chitosan on lettuce production and growth in saline environments is sparse. As a result, the current study assessed the efficacy of exogenous CTS in reducing the negative effects of salt on the physiological characteristics and growth of lettuce plant [11].

Pesticide Delivery

Recent research addresses the creation and application of chitosan nanoparticles as a pesticide delivery mechanism. Furthermore, the encapsulation in chitosan nanoparticles aids in resolving solubility issues. Brassinosteroids and diosgenin derivatives, for instance, were enclosed in chitosan microspheres. Rotenone, a naturally occurring insecticide which is not water soluble, was made more soluble by being enclosed in nano-micelles made of an amphiphilic chitosan derivative, and azadirachtin, a biopesticide, was made more water soluble by using a material made of carboxymethyl chitosan and ricinoleic acid. These in vitro outcomes sparked interest in in vivo research. For instance, microcapsules of chitosan and sodium alginate were prepared and used for efficient imidacloprid release against the coleopteron Martianus dermestoides. Microspheres made of chitosan and cashew tree gum were also used to carry the essential oil of Lippia sidoides, an effective insecticide against A. aegypti larvae[12].

More recently, oleoyl-chitosan nanoparticles and sodium tripolyphosphate nanoparticles were synthesised and effectively tested for the inhibition of rice blast fungus (Pyricularia grisea) were created and employed to spread antifungal medications.

CONCLUSION

Chitosan play a vital role in various aspects of agriculture. Several studies demonstrated the characteristics of chitosan. Chitosan based nanoparticles developed as fertilizers , insecticides help to reduce the harmful effects caused by inorganic chemicals. It is the second abundant biopolymer. So it can be further studied to replace non biodegradable ,toxic substances used in agriculture. Increase in chitosan production will provide ways to bring additional new products and technology. The chitosan nanoparticles should be easily accessible by farmers across the country.

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CLINICAL PHARMACY

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ABSTRACT
Clinical pharmacy is the branch of pharmacy in which clinical pharmacists deliver direct patient care that enhances the use of rational medication and promotes health, wellness, and disease prevention. Clinical pharmacists care for patients in all health care sceneries but the clinical pharmacy movement initially commenced inside hospitals and clinics. Clinical pharmacists bridge the gap between patients and physicians. Clinical pharmacists often work in collaboration with physicians, physician assistants, nurse practitioners and other healthcare professionals. Clinical pharmacists can enter into a formal collective practice agreement with another healthcare provider, generally one or more physicians, that allows pharmacists to prescribe medications and order laboratory tests.Clinical pharmacy may be defined as the health science discipline in which pharmacists are more toward patient care rationalizing medication therapy promoting the health and wellness of people. It is the modern and extended field of pharmacy.

Keywords: Clinical pharmacists, Patient care

INTRODUCTION
The clinical pharmacy has spread out radically in terms of its professional services throughout the past few years. Now the clinical pharmacy profession has been renowned as an important profession in the multidisciplinary setup of health care. The clinical pharmacist becomes a crucial element of the healthcare team and promotes patient care by interacting with wphysicianscianpatientstient. As clinical pharmacists the precise knowledge about therapeutics and regular interaction with prescribers, they are ideally placed to bridge the gap between patients and physicians The Association of clinical pharmacistscist can provide a strong base for quality assured patient care. The presence of a clinical pharmacist on the ward was a revolutionary feature of developments in the pharmacy.The discipline that symbolizes the application and development by a pharmacist of scientific principles of pharmacology, toxicology, therapeutics and clinical pharmacokinetics, pharmacoeconomics, pharmacogenomics and other allied sciences for the care of patients.

The American College of Clinical Pharmacy (ACCP) defines clinical pharmacy as an area of pharmacy concerned with the science unpracticed of rational meuse then use the term clinical pharmacy was first used in 1953. The concept of clinical pharmacology started in the n 1960s with two inside fences. First, in 1962 "The Thalidomide Tragedy", wherein it was found that consumption of popular sedative thalidomide resulted in the birth of babies with sealed limbs. Second, in 1968 Phenytoin toxicity was reported in Australia which was because of change in formulation i.e. switching over from calcium sulphate to lactose as an inert excipient in the tablets.

Clinical Pharmacy Practice Areas
- Ambulatory care
- Critical care
- Drug Information
- Geriatrics and long-term care
- Internalmedicine and subspecialties
- Cardiology
- Endocrinology
- Gastroenterology
- Infectious disease
- Neurology
- Nutrition Support
- ADR
- Transplant

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- Investigational Drugs
- Pharmacoeconomics
- Nephrology
- Obstetrics and Gynecology
- Pulmonary disease
- Psychiatry
- Rheumatology
- Nuclear pharmacy
- Pediatrics
- Pharmacokinetics Surgery

Functions of Clinical Pharmacy

- Taking the medical history of the patient
- Patient Education
- Patient care
- Formulation and management of drug policies
- Drug information
- Teaching & training medical and paramedical staff
- Research and development
- Participation in drug utilization studies
- Patient counselling
- Therapeutic drug monitoring
- Drug interaction surveillance
- Adverse drug reaction reporting
- Safe use of drugs
- Disease management cases
- Pharmacoeconomics

Level of Action

Clinical Pharmacy activities may influence the appropriate and correct use of medicines at three different levels: before, during and after the prescription is written.

Responsibilities of Clinical Pharmacy Requirements [2, 3, 4]

Clinical pharmacy activities may influence the correct use of medicines at three different levels:

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Before The Prescription

- Clinical trials on healthy volunteers.
- Formularies development.
- Drug information & surveys.
- Clinical Pharmacists have the potential to implement and influence drug-related information, i.e., making decisions on which drugs deserve to be marketed.which drugs should be included in national and local formularies and which prescribing trends and treatment guidelines should be implemented.

Clinical Pharmacists are also actively involved in clinical trials at different levels: participating in ethical committees; study monitoring; dispensation and preparation of investigational drugs.

- Drug related policies

During The Prescription

- Counseling activity.
- Clinical Pharmacists may follow the attitudes and priorities of prescribers in their choice of better and correctct treatments.
- The Clinical Pharmacist monitors, detects and prevents harmful drug interaction, ADR (adverse drug reactions) additional medication errors through evaluation of prescriptions' profiles.
- The Clinical Pharmacist pays special attention to the dosage of drugs that need TDM (therapeutic drug monitoring).
- Community Pharmacists can also make prescription decisions directly; when OTC (over-the-counter) drugs are counselled.

After the Prescription

- Counseling to the patients.
- Preparation of the personalized formulation.
- Drug use evaluation as prescribed.
- Outcome of research conducted.
- Pharmaco-economic factors.
- After the prescription is written, Clinical Pharmacists play a key role in communicating and counselling patients.

Pharmacists can improve patients' awareness of their treatments, monitor treatment response, check and improve patients' compliance with their medications.

As members of a multidisciplinary team, Clinical Pharmacists also provide integrated patients care from 'hospital to the community and vice versa, assuring a continuity of information on risks and benefits of the drug treatment.

Future of Clinical Pharmacy

While clinical pharmacy programs are in various stages of development globally, the need for specialists with a broad focus on medications and their optimal use is universal. The American College of Clinical Pharmacists has supported these training programs and provided education to individuals and groups. Their publications are used for the preparation and maintenance of board certification by pharmacists worldwide. This outreach is expected of me to continue, as more partners are engaged and more pharmacists and their multi professional teams recognize the opportunities for clinical pharmacists to improve patients.

Scope of Clinical Pharmacy [5, 6, 7]

1. **Preparation of Patient Medication Histories:**

In any hypersensitivity or allergies to specific drugs observed in the past, any particular drug or food habits, drug dependence or intoxication with chemicals due to occupational hazards, all of which are likely to interfere with the therapy.

This will help in saving physicians time and effort and thus will result in a faster and more accurate selection of drug therapy.

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2. Rational Prescription
The clinical pharmacist can suggest the physician and help him in selecting the right drug. Some of the examples of irrational combinations identified by a pharmacists are:

Haloperidol + Diazepam + Amitriptiline

Reserpine + Sintamil

3. Bioequivalence and Generic Equivalence of Pharmaceutical Formulations
The number of factors influence the bioavailability of drugs from dosage forms.selection of proper drug therapy based on bioequivalenc different dosage forms of the same drug moiety.

Patient Monitoring
Observe the signs and symptoms that indicate the need for or reaction to drugs.

Clinical pharmacist who knows correct route of administration, the signs and symptoms of overdosages, contraindications, desired effects, undesired effects and side effects can help in monitoring the drug therapy for safety and efficiency, a necessity with the increasing applications of potent and toxic chemicals and drugs.

Drugs with narrow therapeutic index, or administered in patients who are critically ill or are suffering from chronic diseases.

5. Adverse Drug Reactions and Drug Interactions
The clinical pharmacist can compile and process data using computers and make it available to the medical staff. Identify drug effect modifications due to interactions with several foods, alcohol, smoking environmental chemical

6. Drug diagnostic test inferences

7. Intravenous admixtures:

8. Drug Information Specialist

A clinical pharmacist being an expert on drugs may operate a drug information service.

9. Retail Pharmacy Stores
A clinical pharmacist at retail drug stores can maintain patient drug profiles, family drug profiles and family records based upon which the pharmacist can counsel the patient each time while filling the prescription.

10. Discharge Counselling and Patient Compliance
Compliance with drug therapy can be improved several times, by educating and counselling the patient at the time of discharge from the hospital or while dispensing the prescription at the retail counter.

11. Clinical Research and Continuing Education Program
The clinical pharmacist can participate in an evaluation program on investigational drugs.He can help in conducting clinical trials based on sound principles of biostatistical methods of evaluation.He can also develop training programs for pharmacists, nurses and interns.

12. Medical Audit
The medical audit is a logical and necessary procedure within organized teamwork. The clinical pharmacist is either the initiator or a very active member of a functioning committee.

CONCLUSION
Clinical pharmacy is a vital piller of health care system clinical pharmacy has developed as one of the modern and uncharted discipline of pharmacy in the 21st century.Clinical pharmacy will emphasize to raise the standard of health care delivery to human life. It will promote the rationale use of medicine including allopathy and traditional medicine.

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EFFECT OF DIFFERENTIATED APPROACH OF TEACHING BIOLOGY TO CLASS XI STUDENTS WITH SPECIAL FOCUS ON SPATIAL THINKING SKILLS

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ABSTRACT
The researcher made an initiative on trying out this Action Research using GCAT4 tools to experiment implementing new teaching strategies and bring in freshness into classroom transaction. It was decided to experiment it out with a subject of the researcher's choice and interest, that is Biology and wanted to try out the interpretations of assessment tools in relation to the National Curriculum. Performance of seven students of Grade XI ISC (Indian School Certificate) in the subject Biology, was analysed through their school exams and a specially developed pre-test followed by the administration of assessment tools of GCAT4. The findings provided an opportunity to discuss with teachers and students to understand the preferred pattern of learning style of each student and then evolved a plan using differentiated approaches with reference to spatial skills and try out whether it really had any effect on their enhanced performance in Biology. This also gave an opportunity to choose on fundamental concepts and give a differentiated approach to cater to the type of learning profile generated using the GCAT4 tools.

Keywords: Differentiation, Spatial Thinking, Cognitive ability, Biology, differentiated strategies, Verbal Reasoning

INTRODUCTION

The Cognitive Abilities Test (CAT) of British Council, UK is a suite of tests that assesses a student's reasoning (thinking) abilities in key areas that support educational development and academic attainment. CAT4 is the fourth edition of the test and comprises the following sections or batteries which assess different aspects of ability: Verbal Reasoning Battery – thinking with words; Quantitative (or Numerical) Reasoning Battery – thinking with numbers; Non-verbal Reasoning Battery – thinking with shapes; Spatial Ability Battery – thinking with shape and space. CAT4 is a comprehensive and objective test designed for testing students' developed abilities to determine attainment and can be built upon and be developed to improve outcomes. For example, verbal reasoning can be developed by supporting students' reading, comprehension and vocabulary. The teacher guide kit that was given by GL assessment firm also gave scope for the researcher to look into the case studies, reference books and thus could bring in a variety in designing differentiated Formative question papers.

As a teacher trainer and a student of Biology, the researcher was always interested in knowing about providing differentiated instruction based on different levels of learning and learning style of students. As a teacher of Biology, the researcher has always used gestures while explaining spatial concepts like anterior, posterior, lateral, horizontal, into, next to, etc. By performing these gestures, teaching students to develop drawing skills and interpretation and placement of components in it was always a challenge.

Theoretical Background

Inspired by Kolb's Reflective teaching –learning cycle, the researcher wanted to try out on the possibilities of constant acquisition of new Skills, Knowledge and Understanding, and this was materialised when an intimation was received from the British council to try out something new on assessment tools to assess both for and of learning. Using the assessment tools provided by GL and to choose on fundamental concepts and give a differentiated approach to cater to the type of learning profiles. GCAT4 tools helped to get the possible strategies that were worth trying out with the students who were not exposed to this kind of learning in a normal classroom learning.

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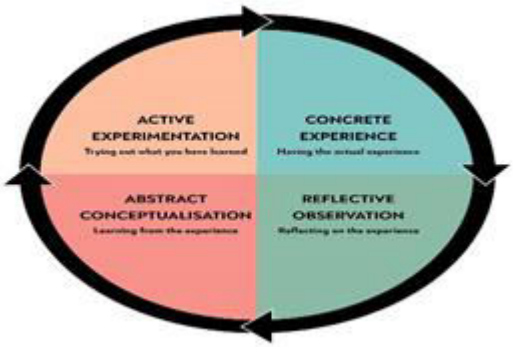

Fig.1 David Kolb's Experiential Cycle

An Operational Definition:
Spatial ability is the capacity to understand, reason and remember the visual and spatial relations among objects or space. Spatial working memory is the ability to temporarily store a certain amount of visual-spatial memories under attentional control in order to complete a task. This cognitive ability mediates individual differences in the capacity for higher level spatial abilities such as mental rotation.

Purpose of the Study
To incorporate questions which would stimulate the students' thinking ability on Mechanical reasoning, Verbal reasoning, Quantitative reasoning and 2D -3D visualization better. This was also planned to take it as a further research technique under the Professional Development practice to help the teacher candidates to come out with effective Professional Development plan under Cambridge Teacher Training program headed by the researcher. This has also given a clue and lead for the STEM studies which is finding a new place in our country's current studies.

Components of Attitude towards Spatial Thinking
Study of Watson and Crick's 3D model of DNA, concepts in molecular biology, cellular functions, anatomy of the body etc. Stimulated to understand and study about the following questions:

a) What is spatial thinking?

b) What assessment tools can be used to study students' spatial thinking skills?

c) Is spatial thinking really important for learning Biology?

d) Is it important to recognize spatial intelligence?

e) Would early attention to developing spatial thinking skills increase the students' achievements in biology?

f) Should our schools and our society do more to recognize spatial reasoning as a new kind of intelligence?

g) Is there a relationship between achievable learning outcomes in Biology for grade XI and the related spatial thinking skills? If so, is the grouping as per the intelligence level and school based assessment result in better and enhance performance in Biology?

h) How to bring in differentiated instruction to cater to the slow learners in relation to the spatial thinking skills?

Based on the above questions the researcher wanted to find out whether assessing students' spatial intelligence and grouping them accordingly would help any teacher to adopt different teaching techniques and help them learn better.

OBJECTIVES
How a differentiated approach of teaching Biology focused on spatial thinking skills will have an effect on grade XI students' learning & improvement of academic scores?

The focus was to find out the possibility of enhancing spatial thinking skills by adapting intervention strategies mentioned in the action plan that was submitted by British Council for their purview and approval to take up the research and simultaneously ensuring that the students actively participate and work in effective collaboration.

METHODOLOGY
This study is aimed at introducing the different types of approach in classrooms through the intervention strategies to benefit class XI students and bring about a change for the better in their skills, attitudes and interest

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thereby leading to practice. The Study of Watson and Crick's 3D model of DNA, was taken to test whether it had a positive influence on the attitude and learning experiences of students in Biology. They were assigned to one of seven broad descriptions (Extreme verbal bias; moderate verbal bias; mild verbal bias; no bias; mild spatial bias; moderate spatial bias; extreme spatial bias).

FINDINGS AND DISCUSSION

The GL assessment tool provided an individual report for each child and with profile score of verbal, non-verbal and spatial and the ST (STANINE& Performance Indicator) score helped to understand each student's learning style and needs. This analysis helped to formulate a plan with differentiated teaching methods with extended active learning techniques such as mind mapping, model making, demonstration, video games etc.

The key learning outcomes were: A deeper understanding of what and how effective spatial thinking skills can be in learning Biology as a subject. For students it has been a great understanding through reports generated by GCAT4 assessment tool and this has helped them to understand their own preferential style of learning. The impact of this learning as a practitioner has been to recognize and explore the possibilities of giving better scope for students for enhanced performance not only in Biology but also in other science subjects by different strategies to hone spatial thinking skills. Overall, it definitely had an impact in enhancing learning, highlighting the importance of recognition and testing of spatial intelligence in assessing students' development.

Table 1

Scores for the group (by forename)

		Verbal			Quantitative			Non-verbal			Spatial			Overall	
Student name	Tutor group	No. attempted (/48)	SAS	GR (/7)	No. attempted (/36)	SAS	GR (/7)	No. attempted (/48)	SAS	GR (/7)	No. attempted (/36)	SAS	GR (/7)	Mean SAS	GR (/7)
Akash JS	XiA	47	72	7	31	75	7	42	87	7	36	102	3	84	7
Akhil Anand	XiA	48	91	=5	34	87	=5	48	91	5	36	91	5	90	6
Anirudh Praceep	XiA	48	111	1	35	109	1	47	100	2	36	113	1	108	1
Avani Acharya Chowdhury	XiA	48	106	2	34	104	3	48	89	6	36	88	6	97	=2
Pooja Prem Shankar	XiA	47	98	4	26	91	4	37	92	4	33	107	2	97	=2
Rana Fathima Modeen	XiA	48	91	=5	27	87	=5	48	103	1	32	101	4	96	=4
Varshini Mageish	XiA	35	100	3	26	107	2	26	93	3	17	83	7	96	=4

SUMMARY OF FINDINGS

The inputs from case studies published by GL Education helped the researcher to formulate methods involving spatial thinking skills in teaching learning strategy. The reports generated helped to summarize the learning differences of the students on spatial abilities taken for research. An analysis of scores for each student based on Stanine's group ranking approach helped in taking up differentiated approach to teach Biology with reference to spatial skills that helped to cater to the expectations of the pupil with appropriate learning materials pitched at the right time.

The reports generated showed that the plan had effective learning strategies for the topic chosen to enhance the students learning based on the preferences shown for their style done through the GL assessment CAT4 done. As an effort to understand as what can be continued and conveyed to all the colleagues at school, a post test was conducted using a copy of the test to project their talent in spatial thinking (Copy Right American Psychological Association) spatial ability for STEM domain was given where the performance was not up to the mark and there needs to be enough research, practice and inclusions done in the curriculum in Maths and science on teaching spatial thinking in the school level. A relation is found between spatial thinking and STEM education and enthusing the researcher to be taken as extended research at school level too. This paves way for one to think on introducing different strategies for helping a child to learn with a preferred learning style with a precision either on verbal, non-verbal, quantitative and spatial skill irrespective of the curriculum.

The rubrics used for poster making on Blood (qualitative analysis) were: 1) Depiction of blood components in the right proportion 2) Creativity in depiction with a slogan on the value of a drop of blood as a life saver Quantitative analysis 1) How do you think that the components of a blood affect the blood flow velocity? 2) Do you think that the blood cell and the other constituents of the blood are assigned their due positions in the blood stream? An overall summary of my findings attached as an annexure.

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DISCUSSION

Of the 7 members in the group, a student who had no interest in Biology, after attending my sessions, the student started showing some interest in Biology, and this was because of the differentiated approach and the variety in learning. Having understood this, use of Vygotsky's1 Theory of pushing him to one level above was a challenging task ,and now the student has started showing interest in attending exams irrespective of the marks scored. For one more student an opportunity was given during the mind mapping session to express verbally, the consequences of his learning. This helped him to share his views with other members in the group with more verbal expressions which was taken as an extra effort to give him additional push in verbal skills. The students had to be given few links as follow up activity and research work which yielded as effect of designing their own 3D diagrams, andjavagami1and jig saw puzzleshttp://www.simplypsychology.org/Zone-of-Proximal-Development.html

Analysis of Cat4 Scores

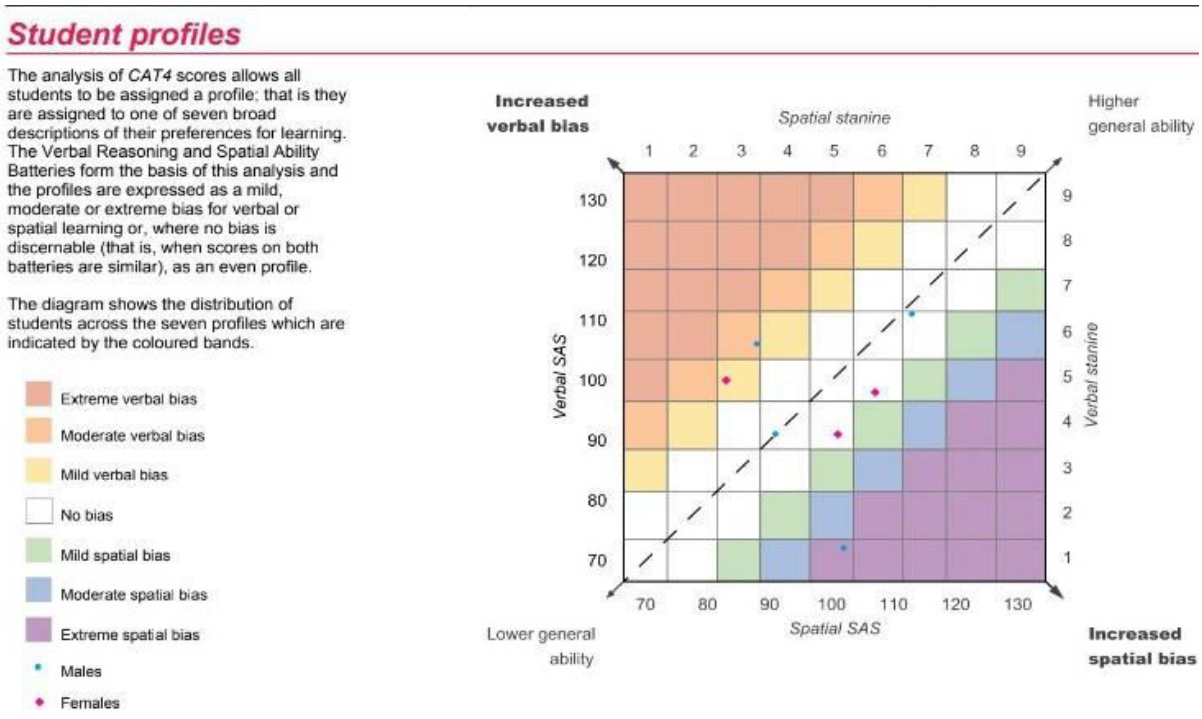

Table 2: Indicators on the Preferences for Learning:

	National	Group	
	%	%	No. of students
Extreme verbal bias	2%	0%	0
Moderate verbal bias	4%	14%	1
Mild verbal bias	11%	14%	1
No bias or even profile	66%	57%	4
Mild spatial bias	11%	0%	0
Moderate spatial bias	4%	0%	0
Extreme spatial bias	2%	14%	1

Extreme Verbal Bias

These students should excel in written work and should enjoy discussion and debate. They should prefer to learn through reading, writing and may be very competent independent learners. They are likely to be high achievers in subjects that require good verbal skills such as English, modern foreign languages and humanities. They may prefer to learn step-by-step, building on prior knowledge, as their spatial skills are relatively weaker, being in the low average or below average range.

Moderate Verbal Bias

Students in this group will have average to high scores for Verbal Reasoning and relatively weaker Spatial Ability with scores in the average range. These students are likely to prefer to learn through reading, writing and discussion. Step-by-step learning, which builds on prior knowledge incrementally, is likely to suit these students.

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Mild Verbal Bias
Some students with this profile will have low average or below average scores for Verbal Reasoning and relatively weaker Spatial Ability, but the gap between scores will be narrow. A slight bias for learning through reading, writing and discussion may be discerned in the students in this group.

No Bias or Even Profile
Scores for students with this profile will be very similar for both Verbal Reasoning and Spatial Ability but will be across the range from low to high. Students with high even scores will excel across the curriculum and will learn through the range of media and methods. Students with low even scores, conversely, may require significant levels of support to access the curriculum but will be open to a range of teaching and learning methods.

Mild Spatial Bias
Some students with this profile will have low average or below average scores for Spatial Ability and relatively weaker Verbal Reasoning skills, but the gap between scores will be narrow. A slight bias for learning through visual media may be discerned in the students in this group.

Moderate Spatial Bias
Students in this group will have average to high scores for Spatial Ability and relatively weaker Verbal Reasoning with scores in the average range. These students are likely to prefer to learn through visual and kinaesthetic media and will need to use diagrams, pictures, videos and objects to learn best. Students with above average or high Spatial Ability are often characterised as ‘intuitive’ or ‘big picture’ learners: attention to detail may be a weakness. Owing to a relative weakness in verbal skills, attainment may be uneven and they are likely to need support in subjects where the emphasis is on the written word.

Extreme Spatial Bias
These students should excel in problem solving and will grasp concepts quickly and intuitively. They will not enjoy rote learning and may arrive at a correct solution to a task without demonstrating the steps along the way. They are likely to be high achievers in subjects that require good visual-spatial skills such as maths, physics and technology. Owing to a relative weakness in verbal skills, attainment may be uneven and they may need support in subjects where the emphasis is on the written word.

CONCLUSION

On reflecting the researcher felt that apart from the GL tools administered, GCAT 4 the candidates should be tested on Tests of some kind of spatial thinking. The researcher has come to a conclusion that effect of differentiated approach of teaching Biology to class XI with special focus on Spatial thinking skills has definitely shown deep involvement in learning the subject and understanding of the subject have shown a progress to a considerable extent. The summary of the overall results can be found on clicking the link :

https://drive.google.com/drive/folders/1Y6Td_EhpjIodQxdTNysTLGU8ZAFudXVS?usp=sharing

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APPLICATIONS OF CLOUD COMPUTING FOR BOTH IT AND THE BUSINESS

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ABSTRACT
Cloud computing has been credited with increasing competitiveness through cost reduction, greater flexibility, elasticity and optimal resource utilization. Here are a few situations where cloud computing is used to enhance the ability to achieve business goals.

In this paper we have studied on applications of cloud computing in E-Business. Cloud computing is the latest blip -- albeit a big one -- in a trend that included the ill-fated NetPC backed by Oracle CEO Larry Ellison in the 1980s, and more recently by ever more powerful cell phones and mobile devices that combine local storage and smarts with an array of powerful capabilities served up from outside.

INTRODUCTION
Information technology is changing rapidly, and now forms an invisible layer that increasingly touches every aspect of our lives. Power grids, Traffic control, Healthcare, Water supplies, Food and Energy, along with most of the world's financial transactions, now depends on information technology. An emerging IT delivery model-cloud computing-can significantly reduce IT costs & complexities while improving workload optimization and service delivery. Cloud computing is massively scalable, provides a superior user experience, and is characterized by new, internet-driven economics [3].

DEFINITION OF CLOUD COMPUTING
1. Cloud computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth.
2. Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.
3. Cloud computing describes a new supplement, consumption, and delivery model for IT services based on the Internet, and it typically involves over-the-Internet provision of dynamically scalable and often virtualized resources.

CLOUD COMPUTING NEW OPPORTUNITIES FOR BUSINESS
IT is an integral component of today's businesses and is frequently a company's single biggest capital cost, this paradigm shift in IT provision is having an increasingly disruptive impact on the way that organizations are designed, deployed and managed. We believe every business should explore the opportunities that cloud computing offers [1].

The most important value the cloud brings is not lower costs. It is improved agility, not just for IT, but for the business as a whole. Cloud computing is already helping world-class organizations operate faster, more flexibly and effectively, as well as at a substantially lower cost.

It is difficult to overstate the significance of the cloud's ability to enable systems and even entire business infrastructures to be built, expanded, reduced, modified or shut down entirely without the lag times and fixed costs we have all become so used to. Consequently, the biggest cloud computing benefits are being gained in business effectiveness areas such as speed, availability, responsiveness and innovation. This is the main cloud computing opportunity today. Quantifying these benefits is not always as easy as demonstrating lower costs, but the workshop suggested in this Workbook will help us to consider issues such as quality, cycle time and customer/employee satisfaction, and discover where our organization will most benefit from cloud computing [2].

The cloud offers the efficiencies of just-in-time computing. For a variety of historical, political and practical reasons, server utilization in many enterprise data centers is as low as 10 percent, a level that would not be tolerated in any other expensive capital asset. Cloud computing enables a range of possible solutions to this long-intractable industry problem. It can provide the IT 'safety stock' of the future, reducing computer capacity inventories, smoothing out peak load requirements over many customers, and enabling each individual enterprise to run at much higher rates of utilization, paying for extra capacity only when needed.

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FOUR LAYERS OF ARCHITECTURE OF THE CLOUD

When taking our first steps towards cloud computing, one of the most difficult questions is which applications we can move to the cloud [2]. We see the architecture of the cloud as a stack of four layers, as shown in Figure 1. :

I. **Infrastructure-as-a-Service:-**It is the lowest layer which is used to access hardware resources, but little software support.

II. **Platform-as-a-Service:-**It is the next layer provides the cloud development platforms enable application authoring and provide runtime environments.

III. **Software as-a-Service: -** Provides a wide range of business-level services and information to end users which is used to access software resources.

IV. **Business-Process-as-a-Service: -** It is use of the process outcomes without either staff or capital investment.

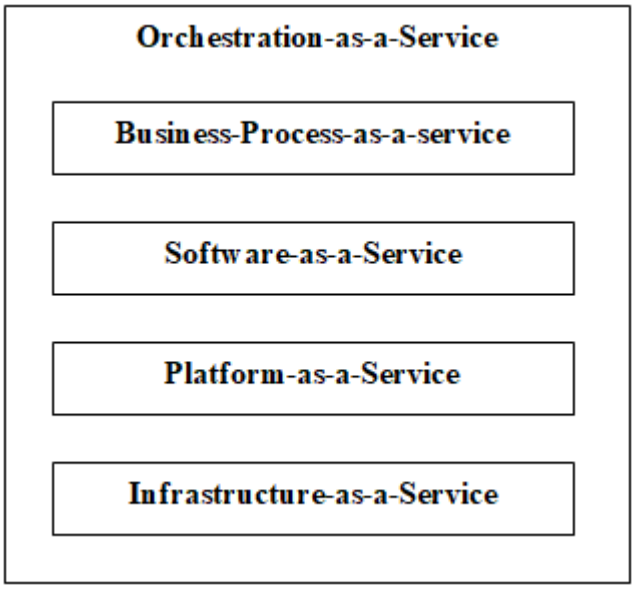

Figure 1

ADVANTAGES OF CLOUD COMPUTING IN E-BUSINESS

Through cloud computing, enterprises we can:

1) Easily expand scalability and enhance elasticity
2) Reduce capital expenditure
3) Save energy
4) Increase end-user productivity
5) Improve reliability
6) Free up capacity to invest in new projects

CONCLUSION

Cloud computing is providing enterprises with a fundamentally new way to cost-effectively and quickly deploy services and capabilities. It enables IT organizations to transform the way they operate and dramatically improve how consumers access their information and experience applications.

Enterprises that are looking for ways to streamline internal IT operations and to expand on-premise infrastructure to add capacity on demand, as well as organizations wanting a fully outsourced infrastructure, are investigating the many advantages of cloud computing.

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EFFECT OF DIFFERENT CROP ESTABLISHMENT TECHNIQUES AND TREND IN RICE PRODCUTIVITY

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ABSTRACT
Rice (Oryza sativa L.) is the most important staple food crop for more than half of the world's population, including regions of high population density and rapid growth. It provides about 21 per cent of the total calorie intake of the world population. In India rice is mostly cultivated through transplanting, in spite of the fact that transplanting is cumbersome practice and requires more labour. The inadequacy of irrigation water and scarce labour coupled with higher wages during the peak period of farm operations, invariably lead to delay in transplanting. To overcome this problem, farmers are gradually switching over to direct seeding under puddle condition. Wet seeding (Sowing pre-germinated seed on to puddle soil) reduces substantially the amount of labour needed for growing of rice crop. The wet seeding also helps to harvest the crop by 8- 10 days earlier than transplanting. It eliminates the use of seedlings and operations such as nursery preparation care of seedlings, pulling, bundling, transporting and transplanting .The demand for more irrigation water and seed rate with transplanting and direct sowing methods signifies the importance of the other methods of rice crop establishment such as system of rice intensification (SRI) to save water. Experiment was conducted during Kharif 2019 in sodic soil comparing different methods of crop establishment techniques. The results revealed that with proper water and weed management under SRI and wet sowing farmers can get similar yields as that of transplanted rice.

Keywords: Rice, wet seeding, transplanting, SRI, prodcutivity

INTRODUCTION
Rice is the most important human food crop in the world, directly feeding more people than any other crop. Rice is the staple food of more than half of the world's population – more than 3.5 billion people depend on rice for more than 20% of their daily calories. Based on population projections from the United Nations and income projections from the Food and Agricultural Policy Research Institute (FAPRI), global rice demand is expected to rise to 555 million tons in 2035. Worldwide, there are more than 150 million hectares of rice fields. Irrigated lowland fields make up over half of this area and produce 75% of the world's rice. These remain the most important rice production systems for food security – especially in Asian countries. India is an important centre of rice cultivation. The vital role played by rice in the agriculture system and in the diets of people makes it an ideal crop for achieving food and nutritional security, reducing poverty and hunger.

During 1962 the rice area was 357 lakh hectares in India and in 2018 it was around 438 lakh hectares. Though rice is an important food crop, the area under rice cultivation less in India, while compare to the population. The production of rice in 1962 was 332.1 lakh tonnes and in 2018 it was 1127.6 lakh tonnes. The productivity of the rice in India during 1962 was 931 kg/ha and in 2018 it was 2576 kg/ha. Compare the increase in area, the production and productivity of rice in increased.

Climatic Requirements
In India rice is grown under widely varying conditions of altitude and climate. Rice cultivation in India extends from 8 to35ºN latitude and from sea level to as high as 3000 meters. Rice crop needs a hot and humid climate. It is best suited to regions which have high humidity, prolonged sunshine and an assured supply of water. The average temperature required throughout the life period of the crop ranges from 21 to 37º C. Maximum temp which the crop can tolerate 400C to 42 0C. West Bengal is the largest rice producing state in India. Almost half of its arable land is under rice cultivation. Uttar Pradesh is the second largest rice producing state and Punjab is the third largest rice producing state in India. Tamil Nadu stands in fourth place in rice production.

Crop Establishment Techniques in Rice

Transplanting	1. Manual 2. Mechanical 3.System of Rice Intensification
Direct seeded rice	1. Drum seeding 2. Broadcasting

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Challenges in Rice Production

Rice is going to suffer the most due to these changes, because of its high water and labour requirements. The development of high-yielding varieties/hybrids of rice and concomitant use of high levels of fertilizer, specially nitrogen, have been the two major drivers of increased rice production in the last four decades. Today, as populations grow, land and water resources for rice production are diminishing. To head off a crisis, governments should promote better crop management techniques and higher-yielding hybrid seeds to reap more from already irrigated lands. Excessive use of pesticides in rice farming pollutes water and creates health hazards. Intensive irrigation can cause salinization and water logging. Small-scale rice farmers will never be rich, but they too can benefit from improved technologies and methods -- if the improvements are designed with small-scale needs in mind. The vast majority of climate change impacts and the overall impact of climate change on rice production are likely to be negative. The rice cultivation faces challenges across the world and India is no exception, with a reduction in area in most of the regions, fluctuation in production and productivity, stagnating yields and ever increasing input costs. The cost of cultivation of paddy has consistently been increasing owing to the increased costs of seeds, fertilisers and labour. With increasing labour scarcity due to urbanisation, sustaining the interest of farmers in rice cultivation has become a challenge. This study analyzes the trend in rice productivity and different crop establishment method for rice under sodic soil condition.

OBJECTIVES

i) To find analyze the trend in rice productivity in India and

ii) To find out the suitable crop establishment method for rice under sodic soil condition

MATERIALS AND METHODS

The study was conducted at Anbil Dhamalingam Agricultural College & Research Institute, Trichy district of Tamil Nadu. TRY 3 rice variety has been purposely selected for the study and the crop was sown during the kharif season of 2019 under sodic soil condition.

Different Crop Establishment Methods Used Under Study

No	Crop establishment Techniques	Parameters analyzed
E_1	Line Transplanting	Plant height (cm) No. of tillers (No's) Leaf Area Index Dry matter production (Kg/ha) Grain yield (Kg/Ha)
E_2	Machine Transplanting	
E_3	System of Rice Intensification	
E_4	Drum seeded Rice	

DATA

Besides that, to analyze the trend in rice productivity the secondary data was collected from the Reserve Bank of India website. The data was collected from the year 1962 to 2018. For analysis the entire date has divided into Period I, Period II and Period III. The period I consists the year 1962 to 2018. The period II and period III consists of the year 1962 to 1990 and 1991 to 2018 respectively. Period I denotes the green revolution period and the period II denotes the post green revolution period. The green revolution in India was started during 1980's whereas it leads to high growth in the agricultural sector.

The conventional methods of analysis viz., percentages and averages were carried out to estimate the performance of rice production in India.

RESULTS

Table.1 shows the results of the effect of different crop establishment techniques of rice under sodic soil condition.

Methods	Plant height (cm)	No.of tillers	Leaf Area Index	Dry Matter Production (Kg/ha)	Grain Yield (Kg/ha)	Benefit Cost ratio
Line transplanting (Check)	117	16	3.51	4024	3875	1.7
Machine Transplanting	131	22	3.64	5916	4048	2.1
SRI	138	26	3.82	6325	4563	2.4
Drum seeding	126	18	3.59	4156	3912	1.9

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From table.1, all the parameters viz., plant height, No. of tillers, LAI, Dry matter production, grain yield and BC ratio are highest in SRI method of crop establishment followed by machine transplanting.

2. Trend in Rice Productivity

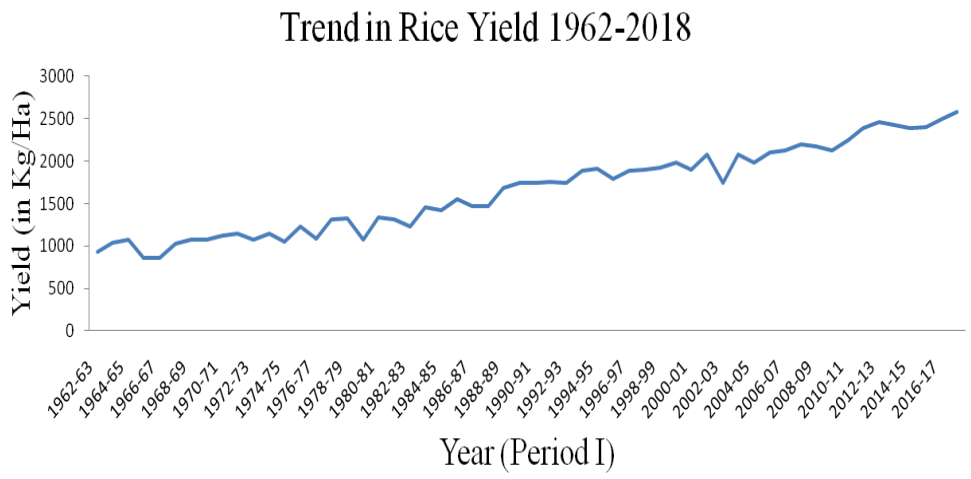

Fig.1 Trend in Rice Productivity

Fig. 1 explains the trend in the productivity of rice over the years from 1962 to 2018 and it is gradually increasing over the years.

CONCLUSION

The study scrutinized the effect of different crop establishment techniques of rice under sodic soil condition. The results showed that the transplanting is better option under sufficient water and labour availability. Direct seeded rice is an alternate production system with increased use efficiency and profitability with efficient water and weed management. The trend in rice productivity gradually increasing over the years and it is because of introduction of new varieties, hybrids, new methods of production, farm mechanizations etc.

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EVALUATING THE FEASIBILITY OF SELF-SUSTAINING SETTLEMENT IN CENTRAL INDIA CONCERNING SUSTAINABLE DEVELOPMENT: CASE STUDY OF NAGPUR

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ABSTRACT
The majority of the developing world saw tremendous industrial expansion and progressive wealth creation throughout the second half of the 20th century. In developing cities compared to developed ones, this recurrent urbanization resulted in an unstable population explosion. This study intends to determine and analyze various aspects of self-sustaining settlements and also derive relevant indicators to find out whether the current self-sustaining communities of the selected region are favorable for achieving sustainability. The goal of this article is to gather information and discuss issues associated with unauthorized settlements thereby implementing sustainable development strategies so that resource consumption is reduced.

Keywords: sustainability, self-sustaining, community, population

INTRODUCTION
The concept of a self-sufficient community is seen as a solution for protecting the environment and ecological systems in the future[1]. As the human population rises, consumption and demand for natural resources will inevitably increase. Population growth and sociocultural issues coexist. Due to cultural conflicts and diverse customs, social cohesion tends to decline. Besides being self-sufficient, a community should also be unified. By addressing the community's wellness, a more desirable living environment can be established [2]. Finding viable sustainable initiatives that promote communal living could become a daily ritual for a community. This will develop a sense of belonging while promoting the notion that environmental protection is a common goal.

Collective Living and Self-Sufficient Communities
Self-sufficiency is the capacity to fulfill one's requirements without outside assistance. Community refers to people residing in a particular location, such as a city or neighborhood, and considered as a whole [3]. Total independence is difficult to obtain due to the limited land available for agriculture, particularly in urban districts compared to rural ones. Yet, it is an appropriate step towards an interest in the environment and a desire to maintain its sustainability. For instance, a self-sufficient urban home could establish a small-scale self-sufficient community.

Today, we confront the challenge of creating a self-sufficient dwelling, which is a living entity that interacts with its surroundings, have exchange of resources, and functions totally on its own, like a tree in a field. To balance the excess and insufficient connection, a self-sufficient dwelling project should be linked to surrounding structures [4]. Research studies have highlighted that any part of a city is self-sufficient when it comprises a diversity of activities and that its design should prioritize the density, collective, and complexity of activities. This study examines the characteristics of self-sufficient housing as an independent entity that promotes communal life while also relating to the surroundings and the city as a whole.

Issues
Our predecessors used self-sufficiency to live sustainably. The culture has long maintained a back-to-the-land philosophy in which "you harvest what you sow" from the earth. Regarding the environment, the land was utilized for cultivation as needed. This style of life emphasizes the importance of communal living. The kampung or village model served as the foundation for the political structure of the society[5]. Collectively, the people grew their crops, reared their livestock, and developed their food supply by utilizing basic but effective ways and engaging in hands-on everyday activities.

Future societies should achieve self-sufficiency via communal life, as did our ancestors. Through community-oriented projects and activities centered on green initiatives, the cohesiveness of a community increases when people live together. Creating a "space collective" from a design perspective enables the achievement of communal living through the use of a spatial approach. "Space collective" refers to common spaces inside housing complexes that aim to revive the neighborhood by implementing innovative architectural and urban interventions that are beneficial to the community. For a wide range of activities, communal spaces are built within the community. Human-centered activities might reestablish community spirit as a means to enhance society from a sociocultural perspective.

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Scope

This paper discusses a community's environmental sustainability. Components and case studies are thus defined following resource management and its impact on the environment. Only settlements are discussed in the research with major emphasis on communities in rural or semi-urban areas. Consideration is given to communities that aim to become self-sufficient. It is the purpose of this study to establish the scope of sustainable communities.

Community's Contribution to the Sustainability of Community-Based Projects

Sustainable community development at the local level requires that local economic growth supports community life by using the local community's resources and abilities. It also imposes additional pressure to make sure that the advantages of development are distributed more fairly and transparently. The majority of the communities where community-based projects are implemented are affected by societal issues including poverty, unemployment, and other forms of social injustice. Individuals living in these communities have few alternatives for their development needs as a result of the predominance of socioeconomic issues and geophysical characteristics. As a consequence, these people continue to live in a backward state, which has negative social and physical effects on the wider population. This has caused them to adapt their behavior to the present circumstances.

Researchers have developed a variety of indicators on community settlement, including tools for identifying urban sprawl. Understanding the impact of urban slums on transportation behavior and environmental, social, and economic factors would be a major goal of the study. Those indicators include:

(i) Density distribution of commercial and recreational activities, services, jobs, etc. within the city in relation to the site of residence; measured by diversity, mixed use; accessibility, composition, size, and form determines the resident population distribution across the urban area.

(ii) The characteristics of the transportation network and the modes through which people travel.

(iii) The built environment's design quality either encourages or discourages certain behaviours. Settlements may thus be researched and evaluated using data analysis related to the identified aspects.

Case Study: Nagpur, Maharashtra, India

Since Nagpur is an example of a typical mid-level growing urban Center in India, it was selected as the research region. The city is the third biggest in the state of Maharashtra and the thirteenth largest urban agglomeration in the whole nation. It has a 2.4 million inhabitants and a land area of 217.65 square kilometres (as of the 2011 census). The city has a tropical savannah climate with 1161.54 mm of annual rainfall on average, hot, dry, and tropical weather that reaches 48 degrees Celsius in the summer and 10 to 12 degrees Celsius in the winter. Administrative borders are expanding geographically as a result of recent socioeconomic developments, population expansion, and urbanization of the city, and the natural environment that formerly marked the city's perimeter is now within the municipal limits. The natural and maintained public UGS, including lakes, the Nag and Pili River's drainage basins, urban forests, institutional green spaces, parks, playgrounds, and gardens, are under extreme pressure to be destroyed or degraded in this fast urban transformation scenario that Nagpur is experiencing. Urban inhabitants are experiencing worsening air and water pollution, dwindling green space, more flash floods as a result of expanded build-up areas, and the creation of urban heat islands as a result of urban sprawl and consequent land use changes.

Population

The current projection for Nagpur's population in 2020 is 2,893,455. There were 472,859 people living in Nagpur in 1950. Since 2015, Nagpur has expanded by 216,735 people, or 1.57% annually. These population predictions and estimates are based on the most recent UN World Urbanization Prospects report. These figures refer to Nagpur's urban agglomeration, which often includes the city's population as well as those living in nearby suburban regions. It is the 13th most populous city in the nation and the third biggest in the state. Estimates put the population of metro region at 3.6 million. The precise figures, however, will come from the next census. One of the cleanest cities in India is this one, according to legend. Due to its excellence in public transit, healthcare, and green areas, it is also one of the most livable cities. This results in a population density of 30,000 persons per square mile for Nagpur, which is dispersed over a total surface area of slightly over 84 miles. A deeper examination of Nagpur's population statistics reveals that there are more men than women living there. Children make up a large portion of the city's population—more than 10%. More than 859,000 people, or more than 35% of the population, live in slums. Nearly 92% of people are literate, with men being more literate than women.

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Solid Waste

The average amount of waste produced daily in Nagpur is between 1150 and 1200 tonnes (TPD), with a per-person average of 4.46 kg. Only 150 to 200 TPD of this waste gets treated. NMC has started biomining at garbage sites. Although segregation procedures have been started, they are not being used at the household level. To control solid waste, residents' awareness must be raised. At disposal sites, buffer zones are essential.

Problems and Present Scenario

The over population is exerting an ill impact on the growth of the society and nation with an increasing trend of unemployment, overcrowding and depletion of the natural and manmade resources. There is a need for social awareness in the country. Population is rising at an alarming rate in unauthorized settlements near railway tracks an urgent and important issue.

A slum study was carried out in Nagpur in 2018 and the results were released as Slum Atlas for Nagpur. The survey estimates that 8.58 124 lakh (0,86 million) people, or around 36% of the whole population, live in slums in the city. As of right now, there are 446 slums distributed around the city area, both notified and unnotified. In addition, 13 additional slum areas have just been discovered but have not yet been mapped. An investigation of spatial inequality revealed that Nagpur's low-lying regions experienced the maximum spatial expansion, raising environmental concerns. The periphery of the railways, on the other hand, was observed to have the most unapproved or unlawful layout developments and the least access to infrastructure. These unapproved or unlawful schemes provide enough homes for the growing number of homeless people in the neighborhood, despite being seen as an unavoidable part of the development process.

Strategies: Self-Sustaining Settlements

Active Design Strategies Catering Both Physical and Social Infrastructures:

Water Management: In order to secure the long-term usage and availability of the resources in the field of basic needs like water resources, energy, foods, construction materials, and other essentials, etc., energy-saving and recycling technologies must be used. The idea encourages people to live independently while also having the least negative influence on the environment.

1. **Economy:** Utilizing local resources, a vibrant and diverse local economy, use of information technology to transportation management, energy, and water consumption, among other things are important things to be considered. Connecting a settlement to the global communications networks is necessary.
2. **Water, Sewage Treatment, Waste:** Utilize natural rainwater drainage, including infiltration over surfaces, basins, and hollows, to maintain the equilibrium of the water cycle. Water should be provided with multiple purposes in mind, with rainwater or grey water contributing to partially replacing drinking water. Use water as a sensory element of city greening to improve the quality of public spaces and promote comfort and wellbeing. Utilize wastewater sewage wetland treatment systems to clean black and grey water. Reduce the amount of garbage produced in settlements and provide ideal circumstances for recycling and resource reuse. Favor consumption patterns that generate less waste, helping to advance efforts to reduce and reuse materials across the manufacturing and supply chain (less wrappings and packs, refillable containers, etc.) Encourage the idea that garbage is a precious resource that can be recycled and used again to create local employment. Minimize the adverse affects of waste on the welfare, comfort, and health of users. Make an effort to meet everyone's demands for potable water. Strive towards closed production cycles in terms of technology.
3. **Energy:** Efficient energy use (low energy buildings, solar architecture, equipment), long-term usage of renewable energy sources, reduced energy consumption and the energy cycle's negative environmental effect while maintaining or improving comfort levels compared to industry standards are important to be considered. In order to improve energy efficiency, it is better to take into consideration building layout, street orientation, and density. Prefer compact structure designs with minimal roof and outside wall space. Building layouts that make use of passive cooling/heating and natural daylighting reduce the energy consumption of buildings and therefore shall be considered. Use renewable energy wherever feasible (solar, wind, biomass). Favour centralized, effective energy supply systems, assemble the necessary infrastructure, even in the settlements' farthest regions. Utilize information technology to control energy.

CONCLUSION

With worse urban-core densities and a widespread urban sprawl situation, Indian cities lead in unauthorized settlement. In this case, UGS are acknowledged as important components in sustaining and generating ecosystem services for these areas. As per Government Notification of the new Land Acquisition Act (Dist Nagpur Case No.12/A-65/2021-2022) they have provided the land for rehabilitation for these encroach

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settlements. Few important and vital strategies for the community include water management, in the field of energy, sustainable building practices, economical rejuvenation etc. Retrofitting sustainable practices in existing unauthorized areas along with the identified strategies of self-sustaining community shall be adopted for ultimately making the selected community self-reliable.

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COMPARATIVE ANALYSIS OF CONVENTIONAL BUILDING AND GREEN BUILDING BY USING BUILDING INFORMATION MODELING (BIM) TOOLS

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ABSTRACT
The scope of sustainability in every industry is rapidly increasing nowadays. Similarly, the construction industry is also demanding changes in planning and construction of projects in order to bring in sustainability. 40% of energy consumed worldwide is used for the usage and operation of buildings. Global concern for the environment has necessitated reduction in energy demand and consumption for buildings. BIM tools such as Autodesk Revit, Green Building Studio (GBS) and Insight 360 can be utilized to analyze the building performance in terms of various parameters such as energy use intensity, life cycle energy use/cost, annual carbon emissions, monthly heating and cooling loads, monthly peak demand and monthly electricity and fuel consumption. By employing green materials in the conventional building model, the conventional building model is modified into a green building model. Using BIM, the use of artificial resources can be greatly reduced by replacing them with the use of renewable energy resources thereby saving energy. To show how efficient BIM is, the results of the performance of the conventional and green building models are compared. The present work attempts to compare the changes in operational and life cycle cost of a building through modification of various parameters including the use of green materials, green roof, energy efficient structures and alternative energy sources like solar panels. It is also discussed how to employ building information modeling (BIM) to effectively comprehend various cost management. The findings of this study indicate that the life cycle cost of energy efficient buildings can be significantly lower compared to conventional buildings. The study emphasizes the usefulness of BIM in estimating the main factors that affect building cost.

Keywords: BIM, Energy Efficient, Green Building Studio (GBS), Insight 360, Sustainability.

1. INTRODUCTION
The Energy Crises are increasing day by day in the world. The Construction industry require much more energy such as Fuel, Electricity etc. in life cycle and in operation some efforts are taken by some agencies i.e. Green Building Councils such as UGBC IGBC.

The Sustainability should be in front of eye while work in construction industry Green Buildings playing important role to reduce energy consumption, CO2 emission, life cycle cost and corresponding cost. BIM (Building Information Modelling) industry in collaboration with construction industry will help to achieve such sustainable goal like reduction in energy consumption and CO2 emission making building green with BIM calculation and analysis can be done with accuracy and faster. In the project by using BIM the analysis is done on buildings with various materials to concluding the energy consumptions and life cycle cost.

2. BACKGROUND
In the project energy simulation and building analysis done on the basis of material in the model. The Building analysis and energy simulations require calculation and Automation it can be done with BIM tools with accuracy in lesser time. The types of models prepared in Autodesk Revit Architecture and it analyze with the help of Autodesk GBS and Insight 360.The various materials are used in same model with no of trials and results is concluded

3. METHODOLOGY
The building model prepared by using Autodesk Revit which can create analytical model for energy analysis in GBS the models can compare in Insight 360 on the basis of life cycle cost , annual energy cost by using analyze tab peak heating and cooling load can be obtained. The materials are to be place in these model and trial to be taken with the help of Green building studio.

4. Building Modelling an Energy Analysis
Name of the project: Multi Family Residential buildings

G+2 Building

Project location: Pune

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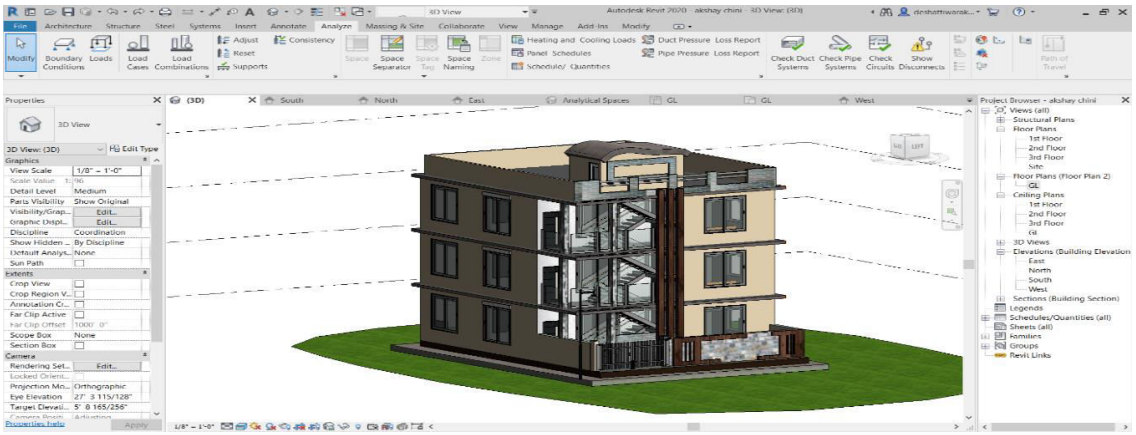
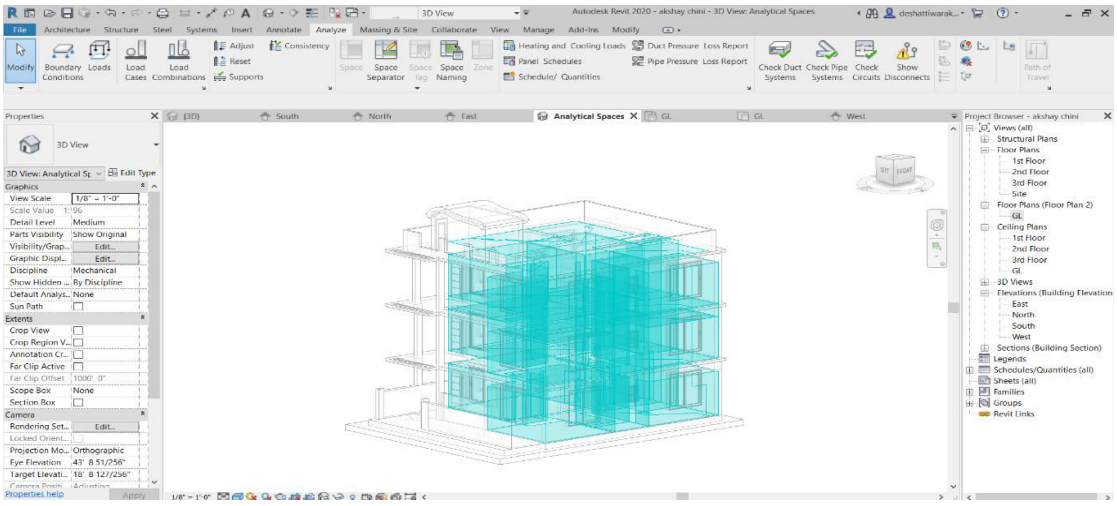
3D Modelling Using Autodesk Revit Architect

A 3D building model is created by using BIM Tools Autodesk Revit architechture.it started with ground plan of building then above story. The various details like door windows, panels etc. In putted on the model and materials are selected. Finishing is done on the surfaces of building. To analyses the models the materials are replaced by green materials such as wood wool, AAC block, Green roof etc. which can be easily possible in Revit.



Energy analysis the building model which is obtained from Autodesk Revit Architecture requires energy setting which as to be done. From this energy setting the energy model of existing building can be obtained and this model use for energy analysis and also to conclude peak heating and cooling load. Before analyze the model in GBS some setting to be done i.e. location of building type of building etc. by using GBS the building energy performance is calculated.



5. Ecofriendly Materials Used

Table No. 1. Materials used and their green benefits

Elements of Buildings	Materials used in the Green building	Green building
Wall	Autoclaved aerated concrete block	Thermal protection and reducing heating and cooling load
Flooring	Cork	Reducing heat losses
Ceiling	Gypsum	Thermal Isolation
Roofing	Green roofing & roofing w	Improve Air Quality
Roof top	Solar panels	Electricity consumption and Co2 emission

Table No. 2. Parameters are used in Project

Annual energy cost	Fuel consumption
Life cycle energy cost	Annual peak demand
Electric use intensity	Peak heating load
Electricity consumption	Peak cooling load

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6. RESULT

The energy use intensity and life cycle cost is the energy require per unit area and its corresponding cost. Peak cooling and heating loads is the energy required to maintained temperature inside the building with green materials. Energy/fuel consumption and its cost reduced.

Table No 3. Comparisons between Convention Building and Green Building

Parameters	Conventional building	Green building
Annual energy cost	167454Rs.	148630Rs.
Life cycle cost	2280719Rs.	2024337Rs.
Electricity consumption	25342kwh	22487kwh
Fuel	29297MJ	26486MJ
Annual peak demand	6.9kw	6.3kw
Energy use intensity	1413MJ/m3/year	1341MJ/m3/year

7. CONCLUSION

The building performance compare between the building models based on result obtained. The life cycle cost and annual energy cost reduced by 11.2% and 11.24% respectively from conventional to green building. The Electricity consumption also reduce by 11.26%.The fuel Consumption also reduce by 9.59%. Annual peak demand is 8.7% reduce. The use of green building materials improves the energy efficiency of building while also providing environmental benefits. In overall analysis is done on the basis of various parameters results the building performance has improved by making it green building. From the project it can be concluded that BIM has in significance importance to make building green and that are

- By using BIM tools calculation process makes faster and with accuracy
- Building performance can analyse easily with practical condition without any errors.
- The compression and detailed results can obtain with using BIM tools.

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INFLUENCE OF pH IN ELECTROKINETIC TREATMENT OF COMPOST

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ABSTRACT
It is estimated that about 65 million tons of waste is generated annually in India, out of which about 62 million tons is Municipal Solid Waste (MSW). Only about 75-80% of the municipal waste gets collected and out of this only 22- 28% is processed and treated and remaining is deposited indiscriminately at dump yards. Hyderabad city generates around 5500MT of waste every day. And only 20% of the waste is used for composting using windrow composting process. Municipal Solid Waste composting is a rapid growing method of solid waste management in Hyderabad and In-Vessel composting is the recent initiative by the Govt. to reduce the Organic Solid Waste generated at the source. As per the Solid Waste Management Rules, 2016, all establishments generating bulk garbage of 100 kg and above every day have to install composting machines on their premises to process the waste. Though there is significant demand for quality compost, presence of trace metals has raised question on its application to agriculture practice. Various remediation technologies have been used to treat the soils contaminated with trace elements. Remediation is also essential for compost which may contain contaminants before applying it as a soil amendment. One such technique which was applied for this study is Electrokinetic remediation. This study was conducted to assess the influence of pH in electrokinetic treatment of compost from Municipal solid waste and Vessel composter. At the end of the experiment, it was found that pH has decreased and created an Acidic front at the Anode end. Accumulation of Metal like Chromium, Copper, Nickel, Lead and Zinc have substantially increased during the course if this experiment at the acidic front.

INTRODUCTION
One of the most concerning global issues is Waste, which poses a threat to environment and health. According to world bank reports annually 7-9 billion tons of waste is generated globally, and municipal solid waste (MSW) constitutes around 2.01 billion tons, and this is expected to grow to 3.4 tons by 2050. In this context, the resolution adapted in United Nations (UN) assembly on September 25, 2015, by the name "Transforming our world: the 2030 Agenda for Sustainable Development", is remarkable. It has resolved to take an audacious and transformative path to change the world in a sustainable and sturdy way. 17 interlinked Sustainable Development Goals (SGDs) were set to achieve this. Goal 12 talks about "To ensure Responsible Consumption and Production patterns" with 11 targets, one among them is Target 12.5 ", It says that substantially, reduce waste generation through prevention, reduction, recycling and reuse" to be achieved by 2030 (UN, 2015).

MSW constitutes Organic fraction (biodegradable), Inorganic fraction (Dry Waste including recyclable), Inert (including Construction & Demolition fraction) waste. The Organic fraction of waste contributes to the largest share of MSW. If the waste is properly used it can be a source of nutrient to soil. There are varied forms of waste management options available for waste treatment to recover materials or generate energy from waste which can be classified into three main categories based on their technology and treatment. Mechanical Heat Treatment (MHT), Advanced Thermal Treatment (ATT), Mechanical and Biological Treatment (MBT). MBT systems can be described as two simple concepts: either to separate the waste and then treat; or to treat the waste and then separate (DEFRA,2013). Although with many technologies in place for waste treatment, landfills are the most used of all the technologies. Owing to cost factors and more minor adaptation of newer technologies, landfills top the chart in waste treatment methods. Composting is a suitable technology with various advantages over other waste management techniques. Technology with a low operational cost is advantageous to the environment with low pollution while operating and production of biofertilizers, which is also a source of income. Apart from waste management, compost also plays a crucial role as an amendment in the bioremediation of contaminated soils. Though there are many composting technologies like windrow, aerated static pile, In-Vessel and Vermi-composting, windrow composting is done on a large scale. This is the most common practice used in converting large volumes of waste. Large parts organic portion of MSW is treated using this method, which generates larger quantities of compost. The other alternative method that has been employed recently for conversion of the organic portion of kitchen or food was in-vessel composting. Where organic waste is processed in a closed container or vessel in which airflow and temperature can be controlled, using the principle of the bioreactor. Though compost can be used as organic manure, there are limitations, including detection of the pathogen, low nutrient availability, and detection of trace metals due to cross-contamination from mixed waste. Metals are essential to living form to maintain a healthy life, but when the concentration increase in nature, the tolerable levels become toxic (Elicker et al., 2014). This would

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ultimately reach the human population through bioaccumulation when the compost is applied as an amendment to the soil. When human health or ecology is at risk due to contamination, it is believed remediation is necessary. A remediation is an act by which contamination is reduced, isolated, or removed from the environment with a motive to prevent contact with people and animals. Remediation can be done by Biological, Physical, Chemical means, which can further be classified into six techniques, including electro-kinetic extraction, thermal desorption, soil washing, chemical stabilization, phytoremediation, and microbial technology. Remediation is essential for removing the contaminants and restoring the compost to a clean and safe condition. One such technique which was applied for this study is Electrokinetic remediation and the role of pH in the treatment process.

Electrokinetic Remediation

Electrokinetic remediation is a process by which low voltage direct current is induced to the earth material matrix through electrodes is called Electrokinetic remediation. Due to the electric field that is generated, heavy metal contaminants may be mobilized and concentrated at the electrodes (Anode & Cathode). Electrokinetic remediation uses the three principles of electromigration, electroosmosis, and electrophoresis, Fig 1 presents the electrokinetic process.

Electromigration is the movement of ionic species in the electric field towards the electrode of opposite charges in an aqueous medium (Yuchen, 2021). The positively charged cations would move towards the Cathode, and the negatively charged anions towards Anode.

Electroosmosis is the net flux of water and dissolved constituents induced by the electric field through the porous structure of the soil. As the flow of current is towards the negative cathode from Anode, the pore fluid moves towards the cathode. The ionic movement of anions is towards the cathode and the cations to cathode. Due to more generation of more cation in the electrolyte the moment of the ions is more towards cathode (Yeung, 1994).

Electrophoresis is the transport of charged particles of colloidal size like soil organic matter (SOM), tiny particles of soil. Metals adsorbed to these charged particles move together. However, the migration of colloidal is very negligible due to slow mobility (Han et al., 2021). Tamping of metals with soil/sediment may restrict the movement of colloidal particles; hence, electrophoresis contribution in EK remediation is very limited when compared to electromigration and electroosmosis (Reddy & Saichek, 2003)

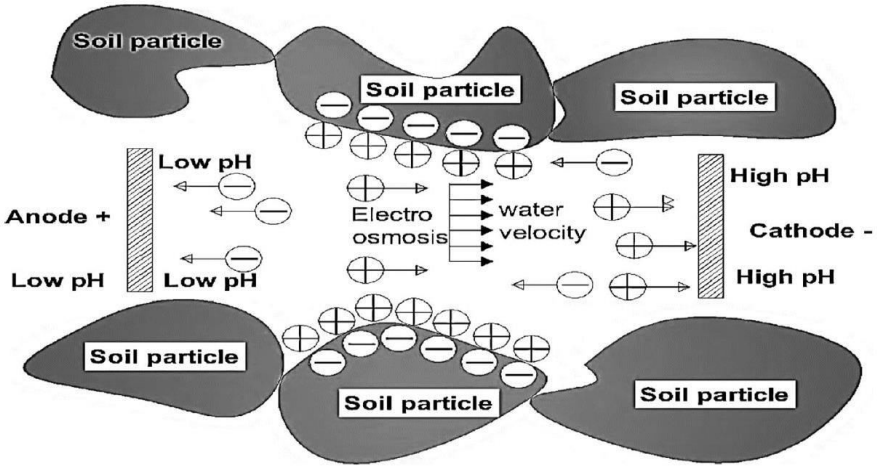

Figure 1: Electrokinetic Remediation Process

Basic Principle

When water is used as an electrolyte, the electrodes experience a chemical reaction brought on by the electric field. The water surrounding the electrodes hydrolyses under the influence of the electric field to produce

Anode: $H_2O \leftrightarrow ½\ O_2 + 2H^+ + 2e^-$

Cathode: $2H_2O + 2e^- \leftrightarrow H_2 + 2OH^-$

Water loses an electron and forms O^2 and H^+, which decreases the pH concentration at Anode. This would help the metal in soil/sediments to dissolve in the pore water for easy movement of heavy metals. When the excess number of H^+ are released, this might lead to a directional change in the electro-osmosis flow. (Yuchen, 2021). H^2 and OH^- are produced due to reduction reaction at the cathode; the movement of heavy metals sometimes get hindered due to precipitation with OH^- ions.

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MATERIALS & METHODS

For the purpose of this study, compost samples from two different sources in the city of Hyderabad are identified. To assess the influence of pH in electrokinetic treatment of compost samples, compost having raw material from distinct source is chosen. Compost derived from windrow composting of Municipal solid waste, where the raw material is mixed waste is taken as Sample 01. And Sample 2 is compost derived from Vessel composter, where the raw material is organic waste kitchen waste.

Experimental Setup

A rectangular glass reactor is used as an apparatus to hold the specimen. 10 kgs of compost sample was taken and mixed with 10 litres of water in 1:1 ratio. The sample is thoroughly mixed before incorporating the stainless-steel electrodes into the setup. For Anode and cathode electrode made of stainless-steel is used. A regulated power supply was introduced to the steel plate electrode at Anode and Cathode. Voltage (potential difference) is maintained at 10V throughout the experiment period.

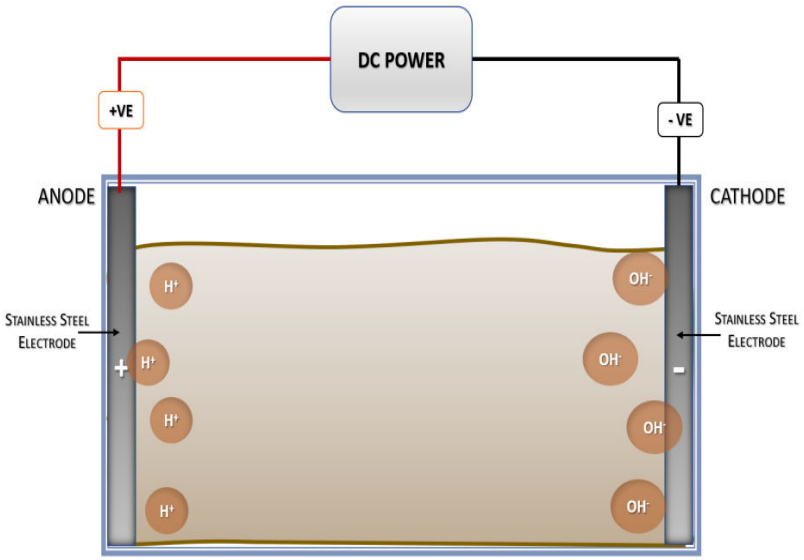

Figure 2: Electrokinetic experiment setup

Total of two sets of experimental setups were made, one for **MSW compost** and other for **Vessel compost** samples. Each set consist of experimental setup with treated and untreated samples. For treated samples regulated direct current is introduced to initiate the electrokinetic treatment. The experiment program lasted for 11 continuous days with 8 hours of electrokinetic treatment runtime on each day for treated samples. Experiment samples were collected every alternate day on Days 01, 03, 05, 07, 09 and 11 from both sets. And the compost samples were analysed for physicochemical parameters. A major part of this study is to analyze the presence of heavy metal composition on the treated compost samples. Samples are first sun-dried, followed by drying them in hot air oven at 110^{o} C. The samples are then grinded using mortar and pestle homogeneously to avoid any oversized particles.

Physico-Chemical Analysis

Physico-chemical parameters such as pH was done by mixing treated compost sample with deionised water at a ratio of 1 part of compost to 5 parts of deionised water. The mixture is thoroughly missed and left for 1 hour before measuring it for pH. For Trace metals, samples are subjected to acid digestion as per EPA method 3050B. The digested are then analysed using High-resolution Inductive coupled plasma mass spectrometry (HR-ICPMS).

RESULTS AND DISCUSSIONS

Variation in Ph with Time pH is a measure of hydrogen ions concentration in a solution. If the amount of hydrogen ions increases in the sample, the pH decreases and vice versa. In our samples' measured pH has varied from the control samples to that of the samples collected at Anode to Cathode on day 1 to day 11. The pH of the control sample or untreated sample was 8 for MSW compost and 7 Vessel Compost.

It is observed that the pH in MSW compost samples has decreased from 8.4 to 6.6 at Anode and increased from 8.7 to 13.3 at Cathode. For Vessel compost samples it has decreased from 5.8 to 4,1 at Anode and increased from 5.2 to 12.1 at Cathode. Fig 3 and 4 present the pH of MSW and Vessel Compost samples from Day 1 to Day 11.

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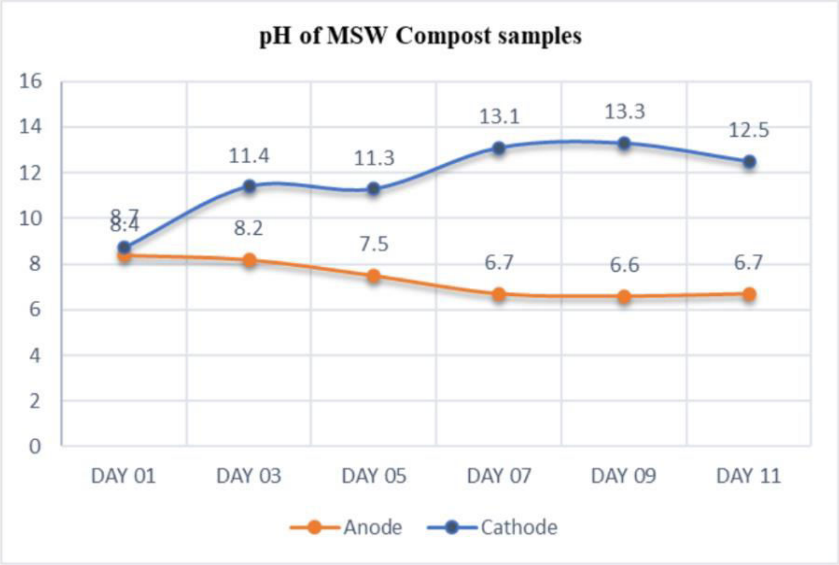

Figure 3: pH of MSW Compost samples at Anode and Cathode

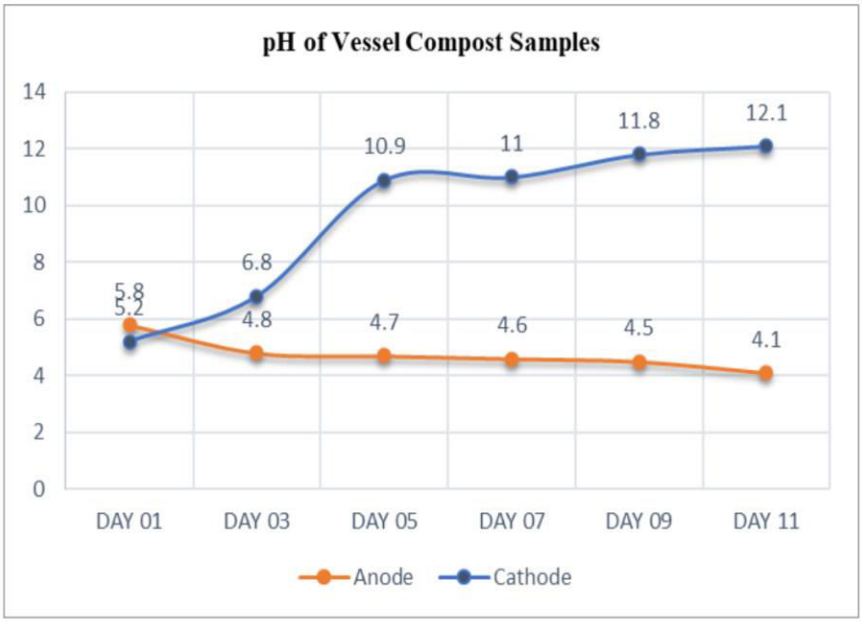

Figure 4: pH of Vessel Compost samples at Anode and Cathode

It is observed due to reduction at the Cathode and oxidation at Anode, pH changes have been observed in the compost samples. MSW compost has shown decreasing concentration of pH at Anode when compared .The pH at Anode on Day 01 was slightly towards alkaline but decreased over time to 6.7, which is Acidic at the end of Day 11. This is due to more H^+ ions that were released by the Anode electrode due to electrolysis reaction. Day 09 has seen the highest number of H^+ ions released changing the pH to 6.6. In the case of the Vessel Compost samples the pH on Day 01 was 5.8 at Anode, which was acidic and gradually decreased to stronger acidic front having pH 4.1 on Day 11. A gradual increase was observed in Vessel Compost cathode samples from Acidic to very strong alkaline with pH 5.2 to 12.1. Both the compost samples have demonstrated that due to the charge and variation in time, there is a polarization of pH at Anode and Cathode, where Anode has shown acidic conditions and cathode alkaline.

Trace Metals Concentrations Compost is the means of adding organic matter and suitable structure to the Soil, which is lost during intense agriculture practice. Soil organic matter is managed by using Compost which is a key for sustainable agriculture (Mohammad et al., 2004). A possible drawback in the application of compost to soil could be the release of toxic metal and their distribution to the food chain (Petruzzelli, 1996). The source of low concentrations of toxic metals which might adversely affect the growth of plant and animal health is Compost from MSW. The metal concentrations of 10 elements Zinc (Zn), Nickel (Ni), Lead (Pb), Copper (Cu), Chromium (Cr), from MSW Compost and Vessel compost samples are measured as part of the electrokinetic experiment.

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Table 1.0 Concentration of Metals on Day1 and Day 11 of the experiment

	MSW Compost				Vessel Compost			
	Anode		Cathode		Anode		Cathode	
	Day 1	Day 11	Day 1	Day 11	Day 1	Day 11	Day 1	Day 11
Chromium (Cr)	79.74	938.19	42.7	39.58	202.91	1543.10	34.51	15.46
Copper (Cu)	123.11	220.87	154.23	108.39	11.91	41.19	13.54	38.87
Nickel(Ni)	11.13	20.60	10.26	13.14	10.09	26.689	5.07	6.12
Lead (Pb)	37.52	45.52	48.60	39.45	5.97	5.54	3.90	3.25
Zinc(Zn)	156.31	218.10	193.86	147.88	29.83	70.28	25.35	27.12

Accumulation of metal was found to be more on Day 11 at Anode end of both MSW and Vessel compost samples, this is due to the decrease of pH on Day 11 from Day 1. When the pH has decrease from Day 1 to Day 11, the accumulation percentage has increased at the Anode end. Table 1.0 presents the concentrations of metals on Day 1 and Day 11 of the experiment.

Chromium accumulation at cathode was lesser than Anode. This could be due to precipitation of Cr^{3+} at Anode. The redox potential and pH might have affected the speciation of Chromium, which is predominantly present in the oxidation state of Cr^{3+} and Cr^{6+}. Concentration of Cr on Day 11 is 938 mg/kg and 1543 mg/kg in MSW and Vessel compost respectively. Copper concentrations were at their highest at the Anode and at their lowest at the Cathode due to the low pH near the Anode this could be due to negative complexation or precipitation. Cu concentration are at 220 mg/kg and 41.19 mg/kg respectively at acidic front of both the samples. Nickel concentration behavior could be due to the formation of non-conductive precipitates which retard the migration of ions that ultimately would reduce the mobilization. Though the accumulation of Lead is very minimal when compared to control sample, due to low pH the overall solubility of Pb has increased which shows significant concentration of Pb at the Anode with concentration reaching 45.52 mg/kg. Same is the case with Zinc which may yield soluble zinc compounds at the acidic anode front. Zn Concentration on Day 11 was 218 mg/kg on final day. The highest concentrations of Zn, Cu, Cd, Pb, Ni and Cr were observed in acidic conditions, when evaluating the influence of pH on the release of metals from metallurgical slag. This could be due to dissolution/precipitation of mineral phases and sorption/desorption (Król et al., 2020)

CONCLUSION

The study concluded that pH please a crucial role in the enhancing the availability of trace metal. This is due to electrolysis of water which released H^+ ions at Anode due to oxidation resulting in formation of acidic front at the Anode. Due to influence of pH in the electrokinetic treatment the concentration of Chromium, Copper, Nickel, Lead and Zinc has substantially increased after the Electrokinetic treatment on compost.

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MEDICAL STUDENTS AND ENGLISH FOR MEDICAL PURPOSES

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ABSTRACT
The main objective of the research is to investigate attitudes of medical students of India towards English language communication skills as well as the effect of socio-demographic factors on attitudes toward acquiring these skills. In several non-English-speaking nations, disagreements have erupted over the medium of instruction in medical schools. Due to the predominance of English in medical science, a new ESP branch (English for Specific Purposes) known as EMP is being developed (English for Medical Purposes). Although the importance of doctor-patient communication is now recognized in India, the problem of language barriers in healthcare has gained very little attention in the country. As a result of the adoption of English as an international language of science and medicine throughout the past few years, a significant amount of medical research and literature has been created in English. The ability to communicate effectively (CS) is essential for physicians. Patients, after all, place a high value on consultations because they are the most important component of their treatment. CS is an essential and teachable ability; yet, in contrast to their western counterparts, it is not extensively taught in Indian medical colleges.

It is felt that future generations of doctors will be faced with professional demands that can only be handled by taking an approach to the acquisition of competencies that is multidisciplinary in their field. The mobility of the workforce and the continual advancement of information and communication technology are just a few of the reasons why communication skills in foreign languages, particularly English as a global lingua franca in business and science, must be included in doctors' competencies. A survey of students and teachers about the importance of communication skills in English was conducted to determine the attitudes of future professional doctors towards the importance of communication skills in English. The descriptive statistics approaches have been used to describe the outcomes of the study.

Keywords: Communication skills; English for specific purposes; English for medical purposes; language needs; needs analysis.

INTRODUCTION
In India, the field of biomedicine is virtually entirely confined to English-speaking countries. A legacy of British colonial authority in India has left this situation in its current state. To be admitted to medical school, the Medical Council of India assumes that applicants have knowledge of the English language. For this reason, reading medical textbooks that are published in English is mandatory and students are expected to take their tests and examination in English. Other health-care professions, such as nurses and paramedical workers, face a similar scenario, but within these fields, certain training materials and a few basic textbooks are accessible in other Indian languages as well as English. Patients who do not speak English frequently receive simplistic messages or primitive translations that are completely void of the subtlety that is necessary for them to make a truly informed decision about their health. This is because most indian languages do not have an adequate vocabulary for technical terms; also, because health workers are not completely fluent in languages that are not their mother tongue.

The fact that English is the primary language of communication across the globe is now unquestionable. According to Albakrawi& Almutairi (2003), English is considered a medium that allows students to make advancements in other disciplines [1]. Hence, it has been observed that English is very important in medical studies since medical students are required to study medical textbooks and professional publications that are almost exclusively published in the English language. As a result, medical students must learn English to understand their subject matter in a better way and to prepare themselves for their future professions. Most medical students at government universities still have difficulties using English for academic purposes. Most of them, however, lack language proficiency. This means that more English courses should be offered to this group of students. The English classes should include more specialized and relevant materials to their academic requirements, as well as more time for discussion. An effort was made in the current research to analyze the demands of medical students.

According to the findings of this research, instructors may design in-class activities in which students can use their newly acquired skills and knowledge as tools to fulfill their real-world requirements in relevant ways. Also, the aim was to throw more light on students' needs from their perspectives, as well as to assist teachers in

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recognizing and understanding possible gaps in learning expectations between themselves and the students in their classes.

English for Specific Purposes and English for Medical Purposes

A mastery of the English language, according to Kurfurst (2004), is required for medical practitioners since most of the material included in medical textbooks, articles, papers, and journals is written in the English language. Additionally, it is essential for their medical studies and future medical jobs as well hence English for medical purposes (EMP) becomes mandatory for medical students. The medical professional, according to Kang (2004), must be fluent in the English language since all medical information for medical professionals is accessible in the English language.

English for Specific Purposes (ESP) courses are language programs intended for individuals who want to learn English for a specific reason and have an identifiable need that can be identified and satisfied. (Dudley-Evans & St Johns, 1998). Smoak (2003) said, “ESP is English instruction based on the actual and immediate needs of learners. ESP is needs- based and task-oriented” (p. 27). Frinculescu (2009) puts it, “English has gained the status of Lingua Franca” because of its wider significance and use across the globe. Many medical journals and research are published in English. Along with the existence of conventional communication systems in English, there is also the presence of the World Wide Web and computer networking systems that function in the English language. Specialists believe that a significant presence of EMP may be detected throughout a broad range of countries globally during the last several years. During the last decade, English has climbed to the top of the list of medical research languages, gaining the title of "premier research language" (Swales, 2004). Medical English is highly based on technical and contextual aspects. Doctors communicate in jargon and everyday language as well as technical and academic terminology at the workplace. Medical English is a more specialized form of English, and as such, it cannot be taught using the same methods as basic English language instruction. The goal of EMP learning is not to learn basic grammar and structure, but rather to learn how to utilize language in social and professional situations (Niazi, 2012, p.51). EMP courses, similar to ESP courses, should be developed following the requirements and objectives of the learners. It is built on teaching strategies such as content-based learning and problem-based learning to achieve its goals. Medical terminology is also covered in

depth in the Medical English course. It has also been discovered that traditional techniques such as the grammar- translation method and the vocabulary teaching method still exist (Maher, 1986) but do not provide satisfactory results. It is the needs analysis, according to Robinson (1991) which is the most essential and critical element in ESP. Different assessment methods are used to determine the educational demands of learners as well as their learning requirements. When determining the communication requirements of learners in certain areas, several assessment methods are used (Brown, 1995). As a result of the information gathered during the demand analysis process, new courses are developed, or current courses are changed as appropriate. Keeping these things in mind in the present paper following research questions and research objectives have been addressed:

RESEARCH QUESTIONS

1) To what extent are English communication skills needed by medical students to be successful in their academic and professional lives?
2) What language skills (reading, writing, listening, and speaking) are valued by students and professors at medical colleges?

RESEARCH OBJECTIVES

1) To identify the English communication requirements of physicians in their academic and professional environments.
2) To determine the most important English language skills for doctors throughout their professional careers.

METHODOLOGY

Setting and Participants

The researcher has taken two types of participants: medical students and academicians. The opinions of academicians are very important since they may be more informed than other individuals about students' English language needs than they are. Students themselves are excellent sources of information about their own needs since they are the ones who have the most need for English competence. In this study, questionnaires were administered to students. The total number of students was 40 and the number of teachers was 15.

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Instruments

It was decided that questionnaires would be used as data collection tools. When it comes to gathering information from large groups of people, questionnaires are the most cost-and time-effective method available (Drnyei, 2003). In addition, questionnaires allow for comparisons of views across different groups. There were four different kinds of questions in the questionnaires: questions about demographic information, Likert-scale questions, ranking questions, and multiple-answer questions.

Data Analysis

A total of two groups of people from the medical discourse community were interviewed: medical students and professors teaching at medical schools. When collecting data from medical students, the first questionnaire was utilized, and when collecting data from physicians, the second questionnaire was used. Different statistics, including mean and standard deviations, were utilized for different question types in the questionnaires.

An Assessment of the Responses Received From the Participants

Descriptive statistics were employed to identify participants' attitudes regarding language abilities and requirementsin their academic and professional lives.

The questionnaire had a Cronbach score of 0.4, which can be interpreted as the value was low because of the smaller number of participants.

The Findings of the Research Questions

RQ1: To what extent are English communication skills needed by medical students to be successful in their academic and professional lives? Table 1 displays the frequency percentage.

Table 1: Importance of English

How often do you think healthcare students need English communication?			
equency			
Always	Often	Rarely	Never
2.50%	5.00%	50%	00%

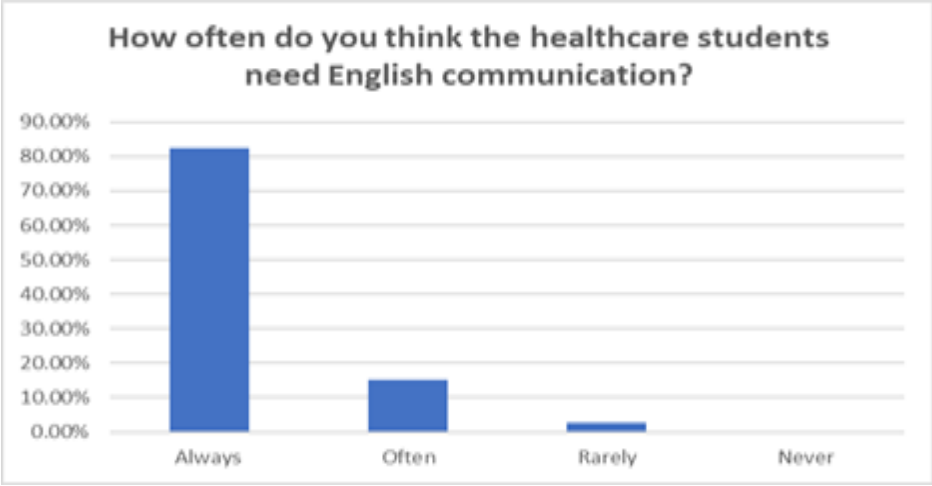

Figure 1: Importance of English

According to the survey, 82.50% (X = 1.2) believed that healthcare students need English communication skills. (Kindly refer to table 2)

Table 2: Descriptive Statistics of Importance of English

How often do you think the healthcare students need English communication?

Mean	1.2
Standard Error	0.07338
Median	1
Mode	1
Standard Deviation	0.464095
Sample Variance	0.215385
Kurtosis	5.141014
Skewness	2.33294

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Range	2
Minimum	1
Maximum	3
Sum	48
Count	40

This part also dealt with the need for English communication skills among medical students.

Table 3: Descriptive Statistics of attitudes towards language needs of medical students: students' perspective

	Ability to write laboratory reports	Ability to write term papers / research papers	Ability to communicate with the local patients/ staff	Ability to take notes during lectures	Ability to raise and answer questions in the classroom	Ability to speak to lecturers after the class	Ability to carry on discussion s in the classroom	Ability to raise and answer questions in the classroom	Ability to understand lectures in order to take notes	Ability to follow and understand class lectures	Ability to understand questions raised by other colleagues and follow class discussion	Ability to understand lectures in order to take notes	Ability to present oral reports	Ability to talk to foreign patients	Ability to present oral reports
Mean	1.225	1.425	1.900	1.250	1.275	1.325	1.375	1.300	1.350	1.375	1.300	1.450	1.350	1.275	1.475
Standard Error	0.091	0.113	0.151	0.093	0.119	0.097	0.122	0.109	0.122	0.117	0.109	0.124	0.122	0.095	0.134
Median	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Mode	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Standard Deviation	0.577	0.712	0.955	0.588	0.751	0.616	0.774	0.687	0.770	0.740	0.687	0.783	0.770	0.599	0.847
Sample Variance	0.333	0.507	0.913	0.346	0.563	0.379	0.599	0.472	0.592	0.548	0.472	0.613	0.592	0.358	0.717
Kurtosis	5.117	0.529	-0.900	4.126	8.074	2.048	3.132	6.336	3.573	3.715	6.336	2.103	5.926	3.306	1.107
Skewness	2.502	1.399	0.579	2.286	2.938	1.762	2.012	2.529	2.133	2.052	2.529	1.693	2.489	2.094	1.548
Range	2	2	3	2	3	2	3	3	3	3	3	3	3	2	3
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	3	3	4	3	4	3	4	4	4	4	4	4	4	3	4
Sum	49	57	76	50	51	53	55	52	54	55	52	58	54	51	59
Count	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40

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According to the medical students, "ability to write laboratory reports" (x=1.225) and "ability to raise and answer in the classroom" (1.275) were the two concerns where English communication was needed most (as indicated in Table3).

Table 4: Descriptive Statistics attitudes towards language needs of medical students: teachers' perspective

	Ability to write laboratory reports	*Ability to write term projects / research papers*	*Ability to communicate with the local patients/ staff*	*Ability to take notes during lectures*	*Ability to raise and answer questions in the classroom*	*Ability to ask questions to the lecturers after the class*	*Ability to carry on discussions in the classroom*	*Ability to raise and answer questions in the classroom*	*Ability to understand lectures in order to take notes*	*Ability to follow and understand class lectures*	*Ability to understand questions raised by other colleagues and follow class discussion*	*Ability to understand lectures in order to take notes*	*Ability to present oral reports*	*Ability to talk to foreign patients*
Mean	1.533333	1.133333	2	1.4	1.533333	1.733333	1.466667	1.6	1.466667	1.133333	1.733333	1.266667	1.666667	1.8
Standard Error	0.215289	0.090851	0.29277	0.272554	0.215289	0.228174	0.191899	0.213809	0.191899	0.090851	0.153271	0.181703	0.30342	0.311677
Median	1	1	1	1	1	1	1	1	1	1	2	1	1	1
Mode	1	1	1	1	1	1	1	1	1	1	2	1	1	1
Standard Deviation	0.833809	0.351866	1.133893	1.055597	0.833809	0.883715	0.743223	0.828079	0.743223	0.351866	0.593617	0.703732	1.175139	1.207122
Sample Variance	0.695238	0.12381	1.285714	1.114286	0.695238	0.780952	0.552381	0.685714	0.552381	0.12381	0.352381	0.495238	1.380952	1.457143
Kurtosis	-0.40771	4.349112	-1.77493	4.349112	-0.40771	-1.4943	0.470594	-0.78526	0.470594	4.349112	-0.1711	4.349112	0.136376	0.059001
Skewness	1.158874	2.404763	0.339199	2.404763	1.158874	0.600824	1.334784	0.940546	1.334784	2.404763	0.091059	2.404763	1.365604	1.281984
Range	2	1	3	3	2	2	2	2	2	1	2	2	3	3
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	3	2	4	4	3	3	3	3	3	2	3	3	4	4
Sum	23	17	30	21	23	26	22	24	22	17	26	19	25	27
Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15

However, teachers strongly agreed that the ability to write term projects/research papers (X= 1.13), the ability to take notes during lectures (X= 1.4), the ability to follow and understand class lectures (X=1.13), and the ability to understand lectures to take notes (X= 1.26) were the areas students strongly needed English communication skills the most. (Refer to table 4).

RQ2: What language skills (reading, writing, listening, and speaking) are prioritized by medical students?

Table 5: Descriptive Statistics: language skills need- students' perspective

Listening skills		**Speaking skills**	**Writing skills**	**Reading skills**
N	40	40	40	40
Mean	1.175	1.225	1.4	1.225
Standard Error	0.070597	0.07585	0.1	0.066867
Median	1	1	1	1
Mode	1	1	1	1
Standard Deviation	0.446496	0.479717	0.632456	0.422902
Sample Variance	0.199359	0.230128	0.4	0.178846
Kurtosis	6.869497	3.832999	0.801236	-0.13521
Skewness	2.639153	2.074784	1.357091	1.368987
Range	2	2	2	1
Minimum	1	1	1	1
Maximum	3	3	3	2
Sum	47	49	56	49

In general, 85.00% of the students appreciated listening skills (X = 1.175) higher than the other skills, followed by speaking skills at 80.00%. (As illustrated in Table 5 and figure 2.)

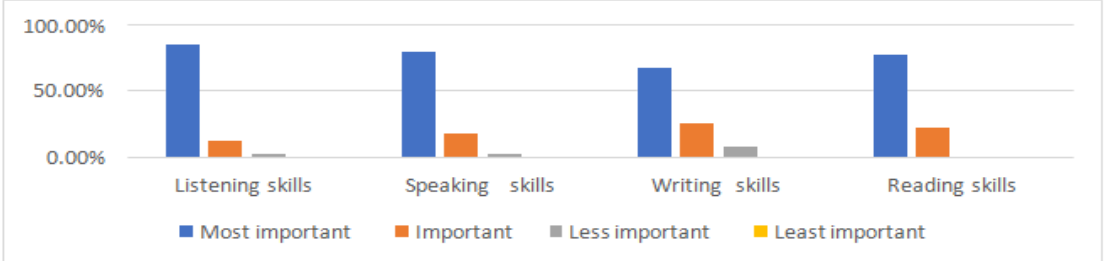

Figure 2: Students: Which of the following English language skills do you think are the most important for healthcare students?

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It was observed that according to the teachers, listening skills (X= 1,20) were the most important skill required, followed by speaking skills (1.27), whereas reading (X= 2.40) was the least required skill for medical students, as illustrated in Table 6 and figure 3.

Table 6: Descriptive Statistics: language skills need- Teachers'' perspective

	Writing	Speaking	Reading	Listening
Mean	1.60	1.27	2.40	1.20
Standard Error	0.13	0.12	0.25	0.11
Median	2.00	1.00	2.00	1.00
Mode	2.00	1.00	2.00	1.00
Standard Deviation	0.51	0.46	0.99	0.41
Sample Variance	0.26	0.21	0.97	0.17
Kurtosis	-2.09	-0.73	-0.81	0.90
Skewness	-0.46	1.18	0.06	1.67
Range	1	1	3	1
Minimum	1	1	1	1
Maximum	2	2	4	2
Sum	24	19	36	18
Count	15	15	15	15

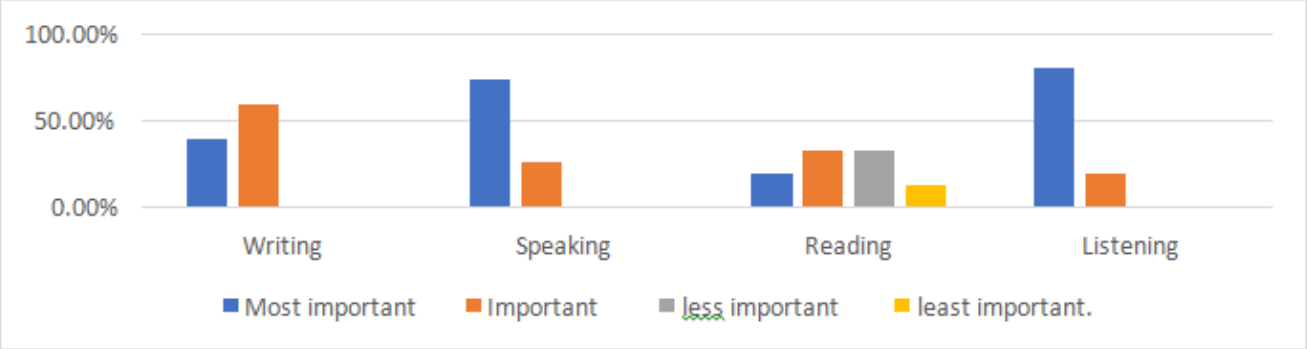

Figure 3: Teachers: Which of the following English language skills do you think are the most important for healthcare students?

SUMMARY OF THE FINDINGS

Table 7 illustrates the comparative study of attitude towards language needs of students and teachers. Discussion of the First Research Question

Table 7: Descriptive Statistics: Comparative study of attitude towards language needs (teachers and students)

Sub question		*Ability to write laboratory reports*	*Ability to write term papers / research papers*	*Ability to communicate with the local patients/ staff*	*Ability to take notes during lectures*	*Ability to raise and answer questions in the classroom*	*Ability to speak to lecturers after the class*	*Ability to carry on discussions in the classroom*	*Ability to raise and answer questions in the classroom*	*Ability to understand lectures in order to take notes*	*Ability to follow and understand class lectures*	*Ability to understand questions raised by other colleagues and follow class discussion*	*Ability to understand lectures in order to take notes*	*Ability to present oral reports*	*Ability to talk to foreign patients*	*Ability to present oral reports*
Strongly agree	Med Studs	85.00%	70.00%	45.00%	82.50%	85.00%	75.00%	77.50%	80.00%	80.00%	75.00%	80.00%	70.00%	77.50%	80.00%	72.50%
	Teachers	66.67%	86.67%	53.33%	86.67%	66.67%	53.33%	66.67%	60.00%	66.67%	86.67%	33.33%	86.67%	73.33%	60.00%	
not sure	Med Studs	7.50%	17.50%	25.00%	10.00%	7.50%	17.50%	10.00%	12.50%	7.50%	15.00%	12.50%	17.50%	15.00%	12.50%	10.00%
	Teachers	13.33%	13.33%	0.00%	0.00%	13.33%	20.00%	20.00%	20.00%	20.00%	13.33%	60.00%	0.00%	0.00%	20.00%	
disagree	Med Studs	7.50%	12.50%	25.00%	7.50%	2.50%	7.50%	10.00%	5.00%	10.00%	7.50%	5.00%	10.00%	2.50%	7.50%	15.00%
	Teachers	20.00%	0.00%	40.00%	0.00%	20.00%	26.67%	13.33%	20.00%	13.33%	0.00%	6.67%	13.33%	13.33%	0.00%	
strongly disagree	Med Studs	0.00%	0.00%	5.00%	0.00%	5.00%	0.00%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	5.00%	0.00%	2.50%
	Teachers	0.00%	0.00%	6.67%	13.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	13.33%	20.00%	

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According to the English instructors, " ability to write term papers/research papers, “ability to take notes during lectures”, “ability to follow and understand class lectures”, and “ability to understand lectures to take notes”were significantly required English communication skills amid medical students. The explanation might be the fact that most medical terminology and study materials are in the English language; therefore, they need to use English words in their works. On the contrary, students evaluated “ability to write laboratory reports”, “ability to raise an answer question in the classroom” as strongly required English communication skills.

(Refer to table 7 and figure 4.)

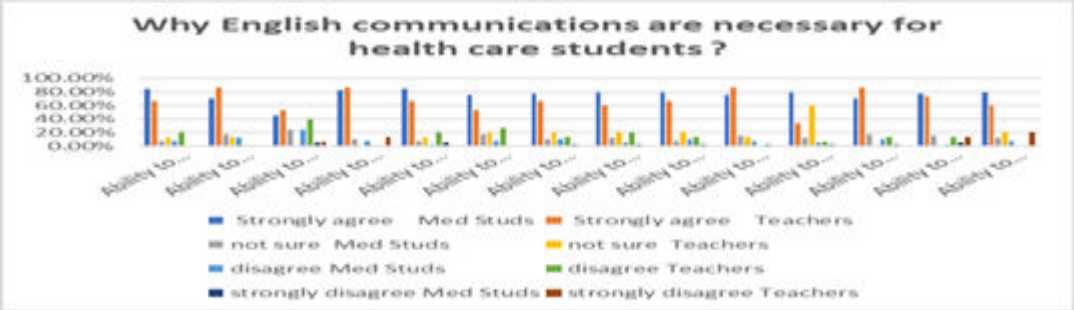

Figure 4: Comparative study of attitude towards language needs (teachers and students)

Need of English Skills (Reading, Writing, Listening, and Speaking)

As medical students need to obtain knowledge about current research and information about the medical sector, and they are generally present in English, teachers claim the highest significance for the role of listening skills for medical students.

Generally, medical students recognize the need for all the English skills essential for their academic and professional life. However, they strongly feel the need for listening skills (85.00%) and speaking skills (80.00%) more than reading and writing skills (77.50% and 67.00% respectively). To be on the same line, educators too, realized the necessity for listening skills and speaking skills more than reading skills and writing skills for their students. It was also noticed that

students considered writing skills as not a very significant skill required by them. However, instructors believed reading skills were of lesser significance than the other three skills for their students. (kindly refer to table 8 and figure 5.)

Table 8: Which of the following English language skills do you think are the most important for healthcare students?

	Listening skills		**Speaking skills**		**Writing skills**		**Reading skills**	
	Med Studs	Teachers	Med Studs	Teachers	Med Studs	Teachers	Med Studs	Teachers
Most important	85.00%	80.00%	80.00%	73.33%	67.50%	40.00%	77.50%	20.00%
Important	12.50%	20.00%	17.50%	26.67%	25.00%	60.00%	22.50%	33.33%
Less important	2.50%	0.00%	2.50%	0.00%	7.50%	0.00%	0.00%	33.33%
Least important	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	13.33%

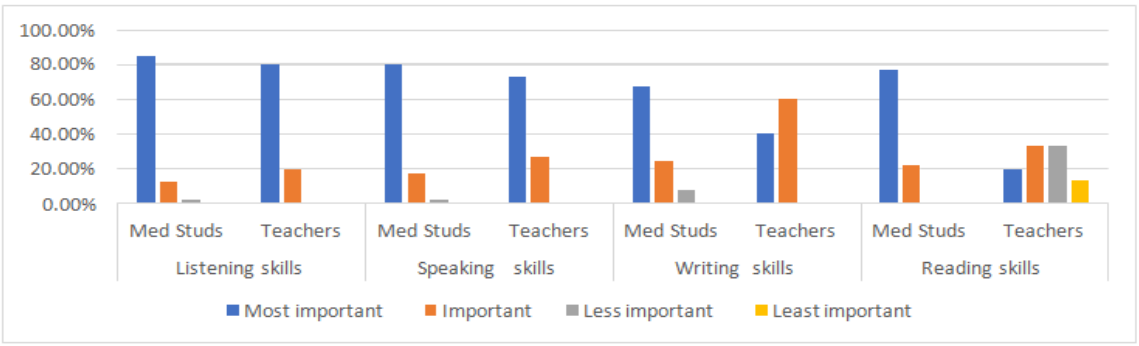

Figure 5: Which of the following English language skills do you think are the most important for healthcare students?

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CONCLUSION AND RECOMMENDATIONS

As a part of the needs analysis process, the present study intends to find out the academic English language requirements of medical students. The outcomes of the study underlined the significance of the last item in the questionnaire, which was the requirement for EMP in healthcare investigations. To satisfy the academic-related and job-related language needs of students, more English language programs are advised to be offered to students of medicine, especially those who do not have formal English language learning at the upper secondary level.They appear to be conscious of the importance of English communication skills in their academic and professional life. Therefore, it is worth responding to the need for English language communication skills in the present curriculum as it does not fulfill the English expectations of medical students. (kindly refer to table 9 and figure 6)

Table 9: Do you think that English should be taught beyond the premedical / pre-healthcare curriculum.

Sub Question	Teachers	Med Studs
Yes, at least with the basic medical/ healthcare subjects (1st year)	40.00%	45.00%
Yes, up to the last year	33.33%	25.00%
Yes, at least with the basic medical/ healthcare subjects (1st, 2nd& 3rd year)	26.67%	30.00%
No, the current situation is enough	0.00%	0.00%

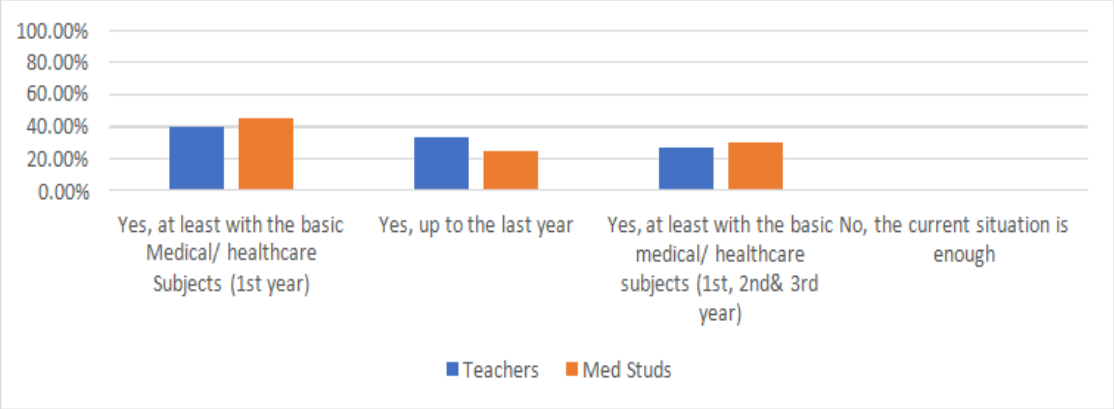

Figure 6: Do you think that English should be taught beyond the premedical / pre-healthcare curriculum.

The results show that educators and medical students require English communication skills for basic medical courses in the first year of medical college. Both general and medical English should start in the first year of medical college. Some students recognized the need for English communication skills in their last year too. The learners belong to diverse languages, geographical and cultural backgrounds, therefore the requirement of English education in medical institutions may play a key role in developing common understanding. EMP programs should be specifically developed as medical students should learn them readily. However, the students and professors strongly feel that the integrated system is still not enough to fulfill their occupational and academic needs.

A future thorough and detailed investigation should be done at a different level of medical education to implement the required changes. The course of EMP should be structured and split according to preclinical and clinical requirements. Furthermore, many disciplines of the medical profession including nursing, inpatient care, pharmacy, and healthcare communication might be covered. English language training programs and seminars should be established for continuing the professional growth of future doctors.

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POTENTIAL IMPLICATION OF AYURVEDA FOR THE MANAGEMENT OF DERMATOLOGIC DISORDER: PSORIASIS

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ABSTRACT
An inflammatory T-cell immune-mediated condition known as Psoriasis, recognized by epidermal hyperplasia, proliferation of keratinocyte and has no known long-term treatment. Although there are several ways to cure psoriasis, no single medicine makes an acceptable and comprehensive claim. There are many well-established conventional medical treatments for psoriasis have also been reported, ranging from topical medicines and systemic treatments to phototherapy or combinations of those but the majority of these treatments are ineffective and have a variety of side effects that limit their long-term usage. Due to their safety and accessibility, ayurvedic or herbal medications may hold promise as possible anti-psoriatic molecules. There are numerous medicinal plants in nature that are used to heal skin conditions. In order to raise public awareness of the efficacy of some medicinal plants in the treatment of psoriasis, the purpose of this paper is to highlight the positive benefits of these plants. The plants selected have great medical potential; several of them have active phytochemical components and are referred to as anti-psoriatic herbs.

Keywords: Psoriasis, Inflammation reaction, Ayurveda herbs

INTRODUCTION
Psoriasis is a chronic autoimmune human skin disorder that causes excessive proliferation of keratinocytes, scaly plaques, severe inflammatory cell infiltration, erythema, and vascular modelling (Zhou et al., 2009). A wide range of conventional medical therapies to treat psoriasis is established, from topical therapies, systematic therapies to photo therapies and other biologic response modifiers. However, most of these therapies cause a number of side effects, limited in efficacy and short-term treatment of psoriasis causes its remission after finishing the treatment or only relieves the patient's condition. Therefore, the development of new alternative treatments for psoriasis causing fewer side effects would be desirable. Herbal medicines are greatly accepted by patients because they are believed to be safer than conventional therapeutics. Herbal drugs may become an effective treatment for psoriasis, causing lower costs and less side- or toxic effects in comparison to other therapies. Therefore, the goal of this review is to highlight the various ayurveda plants used for the management of psoriasis.

Psoriasis
Psoriasis is a chronic inflammatory skin disease with a strong genetic predisposition and autoimmune pathogenic traits. The word "psoriasis" is Greek in origin and means "roughly itching condition" (psora: "itch", sis: "action"). It occurs when skin cells suddenly rises from below the surface of the skin and pile up on the surface before they can mature. Generally this process (also called turnover) takes about a month, however in psoriasis it may occur in only a few days (Kumar, 2016).

There are five main types of psoriasis, namely; Plaque psoriasis, Guttate psoriasis, Inverse (Flexural) psoriasis, Pustular psoriasis and Erythrodermic psoriasis. Apart from these nail psoriasis is there, which is localized to the nails only and psoriatic arthritis is limited to joint and connective tissue inflammation. The main symptoms of psoriasis are irritation, red and flaky patches of skin. Patches are mostly appears on the elbows, knees and trunk of the body, but can appear on scalp and elsewhere in the body as shown in Fig 1. The skin may be itchy, dry and covered with raised thick silvery flaky skin pink red in color (Jobling et al., 2007). It is a chronic condition that affects individuals physically, intellectually, and socially and has unpredictable remissions.

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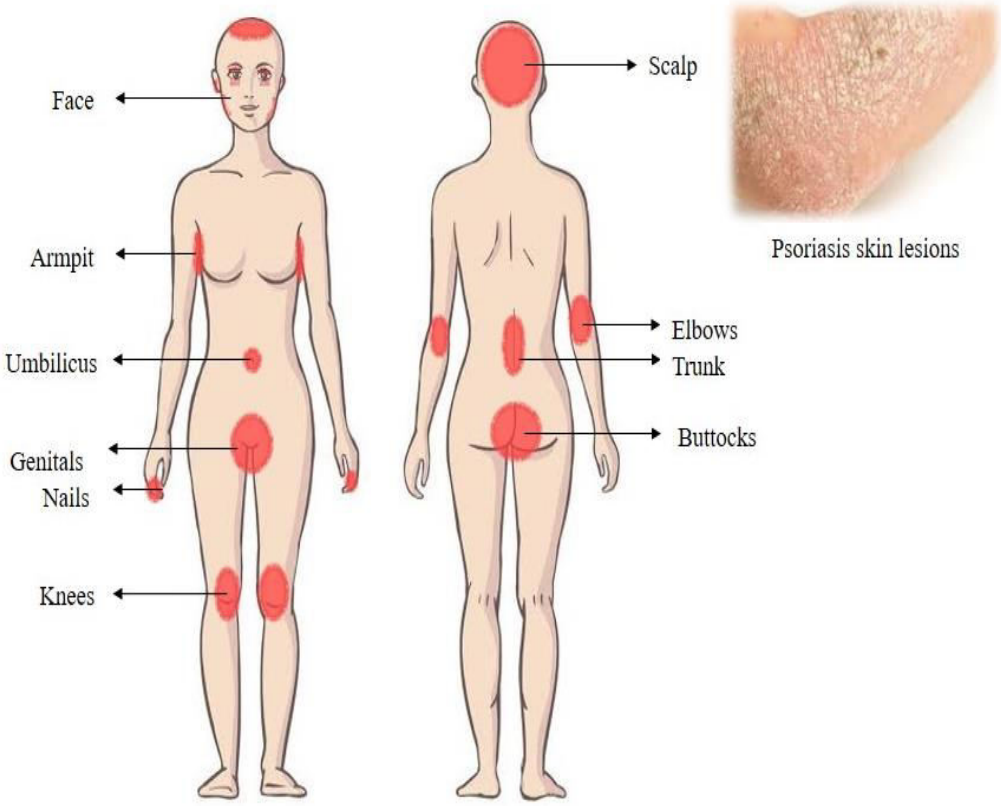

Figure 1: Common sites of psoriatic lesions

Pathophysiology of psoriasis

The multifactorial pathophysiology of psoriasis includes epidermal hyperproliferation, irregular epidermal keratinocyte differentiation, and inflammation with immunologic changes in the skin (Brian, 2007). Increased DNA synthesis and a significantly slower rate of epidermal turnover are features of the hyperproliferation. Two signals are required for cutaneous immune T-cell-mediated activation, which are transmitted between cells via surface proteins and antigen-presenting cells such dendritic cells or macrophages: First, there is the connection between the T-cell receptor and the antigen, and second, there is co-stimulation, which is mediated by numerous surface interactions. Studies of histocompatibility antigens illustrate associations with human leukocyte antigens (HLA) Cω6, TNF-α and IL-3 (Dipero, 2015). The pathophysiology of psoriasis as shown in Fig 2.

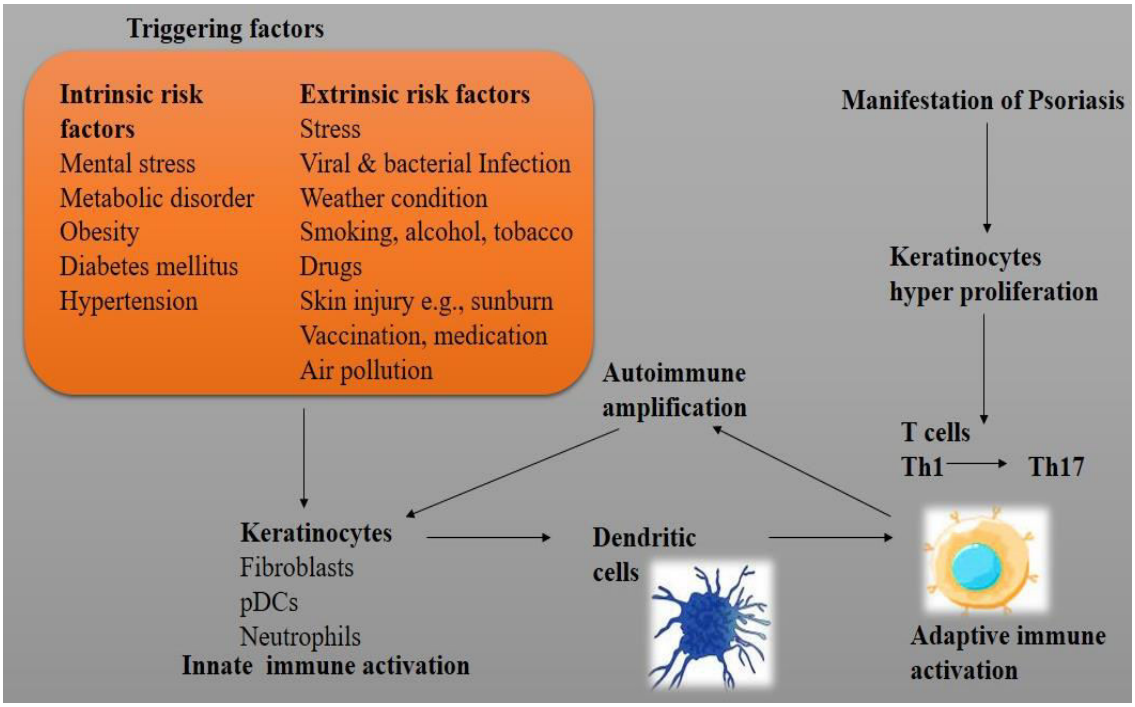

Figure 2: Pathophysiology of Psoriasis

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Epidemiology

The epidemiology of psoriasis is well defined, and there has been substantial research on the prevalence of the condition, the severity of its symptoms, and healthcare costs. Over 125 million people (2.2% of the population) worldwide suffer with psoriasis has been identified by psoriasis according to the World psoriasis day consortium. Although the frequency varies by geographical region, rich nation's house 4.6% of the world's population have been reported to have higher rates.

Regionally, the occurrence of the disease for the overall population varied from 0.11% in East Asia to 1.58% in Australasia, and 1.52% in Western Europe. Considering the estimate for the overall population, Australia (1.88%, 0.59% to 6.10%), Norway (1.86%, 0.94% to 3.97%), Israel (1.81%, 0.83% to 4.44%), and Denmark (1.79%, 0.91% to 3.61%) had the highest estimates of the prevalence of psoriasis (Parisi et al., 2020). Psoriasis can occur at any age; however a study has reported 33 years as the onset age for psoriasis, whereas 75% of the cases developed before 46 years of age, according to WHO global report.

Ayurveda

Ayurveda is a Sanskrit word originated from "Ayus" meaning life and "Veda" meaning knowledge or science. Hence the term Ayurveda means "The knowledge of Life. The use of Ayurvedic medicines have been increasing for skin diseases. Studies have been conducted to understand the view point of dermatologists concerning the effect of Ayurvedic therapy for psoriasis. They perceived that the impact of the Indian culture and the need for an improved outcome were the primary reasons for the use of Ayurvedic medicines by the patients (Kulkarni, 2018).

Ayurvedic Treatment for Psoriasis

There are numerous established conventional medical treatments for psoriasis, including topical treatments like corticosteroids, tazarotene, vit D3 analogue, anthralins (dithranol), tacrolimus, fumaric acid esters, salicylates, systemic treatments like methotrexate, cyclosporine, and acitretin, as well as phototherapy like ultraviolet (UV) light, Ultraviolet B (UVB) phototherapy, Psoralen and ultraviolet a phototherapy (PUVA) and new biologic agents like Adalimumab, Etanercept, Infl iximab, Alefacept, and many more are available in the market but due to their adverse side-effects, the majority of these medicines are restricting their long-term usage. A number of side effects these synthetic drugs can causes such as acne, contact dermatitis, burning, stinging, stains skin, erythema or adverse effects include dryness of the eyes, cheilitis, brittle nails, epistaxis, xereosis, hyperkalemia, hypertension, hypertriglyceridemia, hepatic and pulmonary toxicity. Therefore, ayurvedic natural medicines have attracted much attention as alternative medicines. The natural medicines are safer, more effective, less side- or toxic effects and play a very important role in the management of the skin and inflammatory diseases. The list of various ayurvedic plants used in the treatment of psoriasis are shown in Table 1.

Table 1. Ayurvedic plants used in the psoriasis

Sl. No.	Scientific Name	Family Name	Common Name/ Local Name	Parts Used
1.	Aloe vera	Liliaceae Aloes	Kathalai	Leaf
2.	Calendula officinalis	Compositae	Marigold, ThulukkaSaamanthi	Flowers
3.	Curcuma longa L.	Zingiberaceae	Turmeric, Manjal	Rhizome
4.	Capsicum annum	Solaneceae	Cayenne, Milagai	Leaves
5.	AzadirachtaindicaA. Juss.A. Juss.	Meliaceae	Neem, Veppam	Leaves, bark and stemstem
6.	Silybum marianum	Asteraceae	Milk thistle	Seeds
7.	Smilax china	Smilacaceae	China Root	Rhizome
8.	Nigella sativa	Ranunculaceae	Black cumin, Karunjiragam	Seeds
9.	Origanum jordanicum	Lamiaceace	Thyme	Leaves
10.	Indigo naturalis	Acanthaceae	Qing dai, indigo	Leaves
11.	Mahonia aquifolium	Berberidaceae	Oregon grape	Fruits
12.	Olea europaea	Oleaceae	Olive	Fruits oil
13.	Persea americana	Lauraceae	Avocado	Fruits
14.	Alpiniagalanga	Zingiberaceae	Thai Ginger, akkulati	Rhizome
15.	WrightiatinctoriaL.	Apocynaceae	Sweet Indrajao, Paalai	Leaves

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Aloe Vera

Aloe Vera is an effective treatment for psoriasis because the active ingredients have demonstrated significant properties such as antipruritic, analgesic, anti-inflammatory, and wound healing capabilities. Nearly all patients in the aloe group had much higher rates of eliminating their psoriatic plaques due to their grease-free penetrant that is easily absorbed deeper into the tissues. The occlusive effect of aloe vera extract, helps to keep the skin moisturized while also directly limiting the development of psoriatic plaques by reducing cell proliferation and stimulatory differentiation in the epidermis (Syed et al., 1996). The primary active ingredients in aloe vera are anthraquinone and acemannan that exhibit antibacterial activity against Staphylococcus and Streptococcus species which contributes to its effective therapeutic treatment as anti-psoriatic activity (Singh et al., 2014).

Calendula Officinalis

Calendula officinalis, a member of the Compositae family, is one of the most widely used Indian herbs with a variety of therapeutic benefits for the treatment of many diseases, including antifungal, wound-healing, and anti-diabetic compounds, respectively. Calendula oil is useful in providing soothing properties and the treatment of injured skin, or for conditions or such as irritative and allergic contact dermatitis, vitiligo, rosacea, melasma, psoriasis and cutaneous toxicities derived from cancer treatment (Silvaet al., 2021).

Curcuma Longa L

Curcuminoids and volatile oils are thought to include anti-inflammatory compounds that work by specifically inhibiting phosphorylase kinase (PhK). The epidermis contains the enzyme PhK.

Significantly greater levels have been found to be associated with psoriasis clinical activity. The degree of parakeratosis, changes in keratinocyte transferrin receptor expression, and densities of epidermal CD8 + T cells were all shown to correlate with lower PhK activity in the curcumin and calcipotriol treated groups (Joe et al., 1997). HaCaT cells have demonstrated that it can suppress the expression of IL-17, IL-6, TNF-α, and IFN-γ.

Capsicum Annum

Its primary active component is capsaicin, depletes the vanilloid receptor by attaching to it and releasing substance-P. Additionally, it results in substance-P (SP) activity being less active, which affects a number of psoriasis-related processes like the activation of inflammatory cells, keratinocyte hyperproliferation, vasodilation, and angiogenesis. It showed high skin permeation through the hyper-proliferative skin ((Joe et al., 1997). Additionally, increased patient compliance would result in improved deposition at the skin's target region, which would be extremely advantageous and more effective (Agrawal et al., 2015).

Azadirachta Indica A. (Neem)

Organic neem oil has also been used to treat other skin conditions like eczema, psoriasis, acne warts, and mycosis. Neem oil and leaves have been used by Indian Siddha medicine to treat skin conditions, primarily psoriasis, since ancient times. Interestingly, A. indica is high in nimbidin (Nimbolide phytochemical), a recent study suggested using it as a dietary treatment for psoriasis. In an RCT (randomised controlled trial) of 50 patients, three capsules of A. indica were taken daily for 12 weeks, and the PASI (psoriasis area and severity index) score significantly decreased. The reason may be speculate by authors is due to the inhibition of prostaglandin synthetase by nimbidin, which is a secondary metabolite found in the A. indica essential oil (Baby et al., 2022).

Milk Thistle

Silibum marianum commonly known as Milk thistle or vishnukranti, proposed by practitioners of alternative medicine to boost the liver's production of bile and to control the immunological system. This herb is a potent treatment for psoriasis because it protects the liver and keeps the blood clean & healthy. This plant is very well known for its hepatoprotective activity. In psoriatic patients, abnormally high levels of cAMP and leukotrienes have been developed. To normalization of these levels, silymarin plays important role in the management of psoriasis due to its ability to improve endotoxin removal by the liver, suppress cAMP phosphodiesterase and leukotriene synthesis (Sabir et al., 2014).

Smilax China

S. china L. known as Jin Gang Ten, has been widely used as a traditional herbal medicine for the treatment of rheumatism, diabetes, gout, skin diseases, psoriasis, obesity, chronic nervous diseases, epilepsy, and other diseases. Smilax china possesses antibacterial, antimutagenic, antioxidant, anti-inflammatory, anti-cancer, and neuroprotective properties. Vijayalakhsmi et al., 2012 reported Smilax China's anti-psoriatic properties. They separated the flavonoid quercetin from the rhizome's methanolic extract. They performed anti-psoriatic effect on HaCaT cell lines showed significant ($p<0.01$). They reported a considerable reduction in leucocyte migration and epidermal thickness. It was the first time flavonoid quercetin's anti-psoriatic properties had been reported.

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Nigella Sativa
The in-vitro anti-psoriatic activity of Nigella sativa seeds has been demonstrated in HaCaT human keratinocyte cell lines by using Sulphorhodamine B (SRB) assay. The epidermal layer's thickness increased and epidermal differentiation occurred at significant levels ($p<0.05$) in response to a 95% ethanolic extract of Nigella sativa seeds (commonly known as Black cumin), as comparable to the impact of tazarotene (0.1%) gel (positive standard control) which supported its use as an anti-psoriatic medication (Dwarampudi et al., 2012).

Thymus Vulgaris
Thymus vulgaris, a member of the Lamiaceae family of flowering plants, is more generally known as thyme. Thymus vulgaris is used for skin problems such as oily skin, psoriasis, acne, dermatitis, eczema, and insect bites. Thyme contains a natural flavonoid called apigenin. Antibacterial, anti-inflammatory, and antioxidant activities are all present in this flavonoid. The plant flavone apigenin, is non-mutagenic, is a potent inhibitor of NF-B activation in autoimmune cells. The in-vivo study was conducted that showed the IL-6 and IL-12 levels decreased after apigenin stimulation in mice. These cytokines are present in significant amounts in psoriasis, thus this plant act as anti-psoriatic drug (Nowak-Perlak, et al., 2022).

Mahonia Aquifolium
M. aquifolium plant used widely to treat skin conditions, particularly psoriatic plaques. The plant is a member of the Berberidaceae family, and its bark extract contains the compounds berberine, berbamine, and oxyacanthine, which inhibit 5-lipoxygenase and lipid peroxidation, respectively. Thus, it have an anti-inflammatory effects and inhibits the keratinocytes growth (Muller et al., 1994). Gulliver et al. reported that after a month of treatment on psoriasis patients, this plant showed significantly improvement in both PASI (Psoriasis area severity index) score and dermatology life quality index.

Olive Oil
Olive oil is an effective treatment for mild cases of plaque psoriasis. To lessen dryness and irritation and to speed up healing, it can be massaged directly into the skin's affected regions. Olive oil is stated to have antioxidant characteristics (vitamin E), which will be of use in the case of psoriasis, since free radicals have been associated with psoriasis outbreaks. It is anticipated that more patient compliance and decreased systemic toxicity will result from topical application because of its superior anti-psoriatic activity and decreased serum accumulation (Rashid et al., 2021). In vivo antipsoriatic studies revealed the greater reduction in PASI score and the remission of psoriasis-like symptoms.

Persea Americana (Avocado)
Avocado oil is extracted from the plant i.e. used in the management of psoriasis. Numerous components, including polyunsaturated fatty acids (PUFAs), monounsaturated fatty acids, linolenic acids, and linoleic acids, are present in the oil (De Oliveira et al., 2013).They possess an anti-inflammatory effect by a catabolic activity on collagen that can scavenge the free radicals that cause cytotoxicity. It may result in a decrease in the quantity of fibroblast and inflammatory cells. In a randomized prospective clinical trial with the substance, Stucker et al., (2001) found that patients' tolerability and the PASI score both significantly improved.

Alpiniagalanga (Thai Ginger)
Chanachai et al (2009) reported that these plants have anti-psoriatic effects such as Alpinia galanga, Curcuma longa, and Annona squamosa. They described how the extracts controlled NF-kB signaling biomarkers to suppress psoriasis on a molecular level. They reported gene assay in ten different NF-kB signaling network genes in HaCaT cells using semi-quantitative RT-PCR. The studies reported on HaCaT cell lines demonstrated effective NF-B regulation, which resulted in decreased expression of CSF-1 and NF-B2 and increased expression of TNFAIP3 (Saelee et al., 2011).

Wrightiatinctoria
Wrightia tinctoria hydroalcoholic leaves extract reportedly had a strong antipsoriatic impact on a mouse test model when compared to isoretinoic acid as the reference standard. Dhanabal et al., (2012) discovered that the extract significantly increased orthokeratosis and had strong antioxidant activity in tests for DPPH, nitric oxide, and hydrogen peroxide.

CONCLUSION
An intricate, multifaceted inflammatory skin condition called psoriasis is characterized by localized vascular alterations, aberrant keratinocyte growth, and neutrophil activation. The synthetic medications used to treat it have negative effects, and it has been observed that some of them can cause psoriasis. Skin conditions like psoriasis are increasingly being treated using herbal products. Some of them, which can be used to effectively treat psoriasis, specifically block epidermal hyperplasia and/or inflammation. In this article, a number of plant

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sources have been highlighted using both traditional wisdom and research reports. However, to make the ayurvedic treatment more effective, potential herbal drug delivery system is required. The majority of antipsoriatic medications have been successfully transported by nanodrug carriers like liposomes, ethosomes, niosomes, lipid nanoparticles, metallic nanoparticles and others, and these carriers have the potential to enhance these medications' therapeutic potential. By reducing overall dose, localising the drug, and targeting it specifically, nanomedicines as drug carriers offer a stunning effect that includes improved therapeutic efficacy with decreased toxicity.

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RHEUMATOID ARTHRITIS: A REVIEW OF DIAGNOSIS AND TREATMENT

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ABSTRACT

Rheumatoid arthritis (RA) is a chronic inflammatory systemic autoimmune disease that affects the joints differently in different persons. RA primarily affects the synovial joint lining and is associated with progressive disability, premature death, and significant socioeconomic burdens. Age, gender, genetics, and environmental exposure are all risk factors (cigarette smoking, air pollutants and occupational).

A greater knowledge of how pathogenic mechanisms cause the worsening of RA progression in individuals is critically needed in order to create medicines that will successfully treat patients at each stage of disease progression. We examine the etiology and pathophysiology at four stages: (i) triggering, (ii) maturation, (iii) targeting, and (iv) fulminant stage, which is accompanied by hyperplastic synovium, cartilage destruction, bone erosion, and systemic effects. Modern pharmacologic therapies (including conventional, biological, and alternative remedies).

Novel prospective small molecule disease-modifying anti-rheumatic medicines) continue to be the mainstay of RA treatment, and there has been significant progress. Significant progress has been made toward disease remission without joint deformity. As there is no cure for RA, thetreatment goals are to reduce the pain and stop/slow the further damage.

Here we present a brief summary of various past and present treatment modalities to address complications associated with rheumatoid arthritis. This review discusses recent advances of our understanding of RA pathogenesis, disease modifying drugs and provides perspectives on next generation therapeutics for RA.

Keywords: Rheumatoid arthritis (RA), Novel prospective, diagnosis, treatment.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease that affects women more than men and is most common in the elderly.It begins with tiny joints and progresses to larger joints before affecting the skin, eyes, heart, kidneys, and lungs. Joint bone and cartilage are frequently damaged, and tendons and ligaments become weak.

Rheumatoid arthritis symptoms include morning stiffness of the affected joints for more than 30 minutes, weariness, fever, weight loss, sensitive, swollen, and heated joints, and rheumatoid nodules under the skin. This condition usually appears between the ages of 35 and 60, with periods of remission and exacerbation. It can also affect young children before the age of 16, and is known as juvenile rheumatoid arthritis (JRA), which is similar to RA except that no rheumatoid factor is present. The prevalence of RA in the West is estimated to be 1-2%, with a global prevalence of 1%.Treatment for RA aims to minimise joint inflammation and pain, improve joint function, and avoid joint deterioration and deformity. Treatment approaches include a combination of medications, weight-bearing exercise, illness education, and rest.

Clinically, rheumatoid arthritis (RA) can be distinguished from osteoarthritis (OA) because the afflicted sites in RA are the proximal interphalangeal (PIP) and metacarpophalangeal (MCP) (MP). In contrast to osteoarthritis, which primarily affects the distal interphalangeal (DIP) joints the most prevalent type of arthritis is osteoarthritis, which is caused by wear and tear rather than an injury. Autoimmune disease it is not harmful to the lungs, heart, or immune system. In addition, osteoarthritis, In contrast to rheumatoid arthritis, which is symmetrical, normally affects only one side of the body. Another distinguishing feature is that the patient has continuous morning stiffness, for at least one hour, preferably longer Morning stiffness is common with osteoarthritis, but it usually goes away or falls within 20-30 minutes.

Epidemiology

The goal is to use population-based studies to quantify the global population prevalence of rheumatoid arthritis (RA) and to examine factors that influence RA prevalence estimates. With a 95% prediction interval, the global RA prevalence estimate was 0.46% (95% CI 0.39-0.54; I2 = 99.9%). (0.06 - 1.27).

Between 1986 and 2014, the RA point-prevalence was 0.45% (95% CI 0.38-0.53%), whereas the pooled period-prevalence was 0.46% (95% CI 0.36% and 0.57%) from 1955 to 2015. The linked data source studies had the highest RA pooled prevalence (0.69%; 95% CI 0.47-0.95).

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Pathophysiology

T-lymphocytes, B cells, and monocytes infiltrate the synovial membrane in many joints, causing RA. This process is preceded by endothelial cell activation; neovascularization(the formation of new blood vessels) is another feature of RA synovitis. Synovial fibroblast-like and macrophage-like cell expansion results in a hyperplastic synovial lining layer.

According to the presence or lack of anti-citrullinated protein antibodies, there are two primary subtypes of RA (ACPAs). Citrullination Peptidylarginine-dependent enzyme catalyses this reaction & PAD, which converts a positively charged arginine as a result of a post-translational modification to a polar but neutral citrulline modification. ACPAs are seen in roughly 67% of RA patients.

Patients and act as a valuable diagnostic resource for patients accompany early, unexplained arthritis and offer evidence of the condition is most likely progressing to RA.

The ACPA- favourable.A subset of RA has a more aggressive clinical profile as compared to others. To the ACPA-negative subset of RA According to reports, ACPA-negative Different genetic association patterns exist for RA, and these patterns differ. Reactions of immune cell to citrullinated antigens from those a subpopulation of ACPA-positive individuals.

Molecules such as receptor activator of nuclear factor κB ligand(RANKL), prostaglandins, and matrix metalloproteinase areinduced by pro-inflammatory cytokines, including tumor necrosisfactor (TNF) and interleukin (IL)-6, and mediate signs and symptomsof the disease, including pain and swelling, and degradationof cartilage and bone.6 Stimulation by RANKL, TNF, and IL-6 generates osteoclasts within the synovial membrane and promotes bony damage. These molecular and cellular events result in the clinicaldisease expression. Progression of joint damage is intrinsicallyassociated with joint swelling.

The cause of RA is unknown. However, both hereditary and environmental factors contribute to RA. There are numerous gene loci that are linked. with RA (Box) related with RA.

Auto antibodies form before signs and symptoms appear. This stage is known as "pre-RA" and can last anywhere from one to ten years. The autoantibody profile influences the time it takes for RA symptoms to manifest. Individuals who solely express ACPAs acquire symptoms 5 to 10 years after the development of the autoantibody, but persons who develop ACPAs, RF, and high C-reactive protein (CRP) levels show symptoms within a few months of the presence of the third of these variables. Subtle inflammatory alterations in the synovium have been observed in certain pre-RA patients. Overt inflammatory alterations observed by histology in established RA are not usually accompanied by clinical signs and symptoms. 28 Early signs of RA range from mild arthritis with few affected joints to severe polyarticular disease, with autoantibodies ranging from negative to multiple positive. Early illness does not show structural damage, however later stages show erosive disease or joint space narrowing as an evidence of cartilage degradation. If not properly managed, RA develops into a more homogenous, devastating disease.

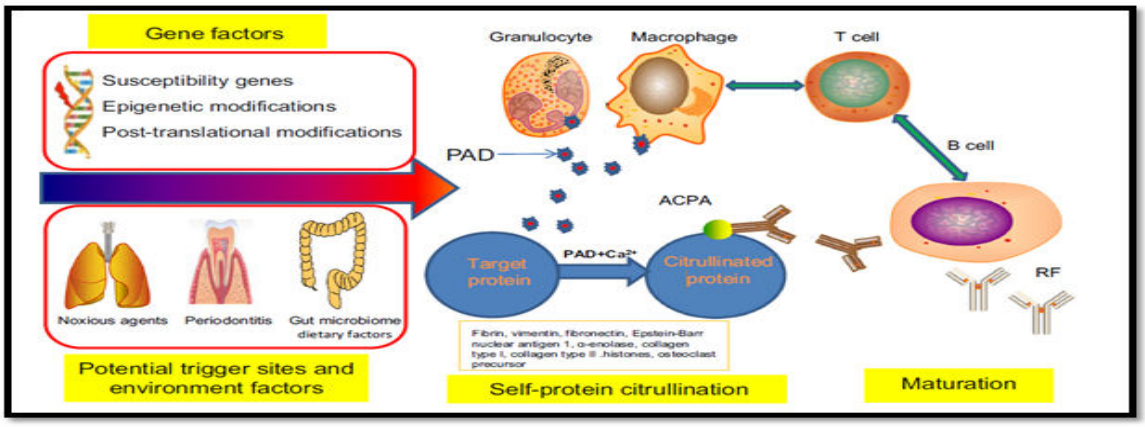

Fig: 1 Pathogenesis of RA.

Clinical Display

RA is a polyarticular symmetric illness that affects several joints on both sides. Pain and swelling in the joints of the hands and feet are characteristic symptoms of RA. Wrists, metacarpophalangeal, metatarsophalangeal, and proximal interphalangeal joints are the most swollen. This is accompanied with morning joint stiffness that lasts longer than 30 minutes and can last for many hours. Because to synovitis and effusion, the swelling is often "soft," as opposed to the "hard" (bony) swellings of osteoarthritis.

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When the fingers are affected, the swelling is centred around the joint (fusiform) rather than encompassing the entire digit ("sausage digit"), as observed in psoriatic arthritis. Although the distal interphalangeal joints are rarely impacted, both small and big joints can be affected.If RA is insufficiently treated, extra-articular manifestations maydevelop. The most frequent are rheumatoid nodules (firm subcutaneous lumps near bony prominences such as the elbow).

A more serious manifestation is rheumatoid vacuities, a necrotizing inflammation of small or medium-sized arteries, mostly involving the skin, vasa nervorum, and occasionally arteries in other organs. Patients with RA may be affected by multiple comorbidities. Cardiovascular disease is a common consequence of chronic inflammation and the primary cause of death in people with RA. In patients with RA, cardiovascular disease is more closely associated with disease activity than with traditional cardiovascularrisk factors. Extra-articular symptoms may occur if RA is not well treated. Rheumatoid nodules (hard subcutaneous lumps around bony prominences such as the elbow) are the most common. Rheumatoid vasculitis, a necrotizing inflammation of small or medium-sized arteries, primarily involving the skin, vasa nervorum, and occasionally arteries in other organs, is a more significant symptom.

Patients with RA may beaffected by multiple comorbidities.Cardiovascular disease is a common consequence of chronicinflammation and the primary cause of death in people with RA.In patients with RA, cardiovascular disease is more closely associatedwith disease activity than with traditional cardiovascularrisk factors.

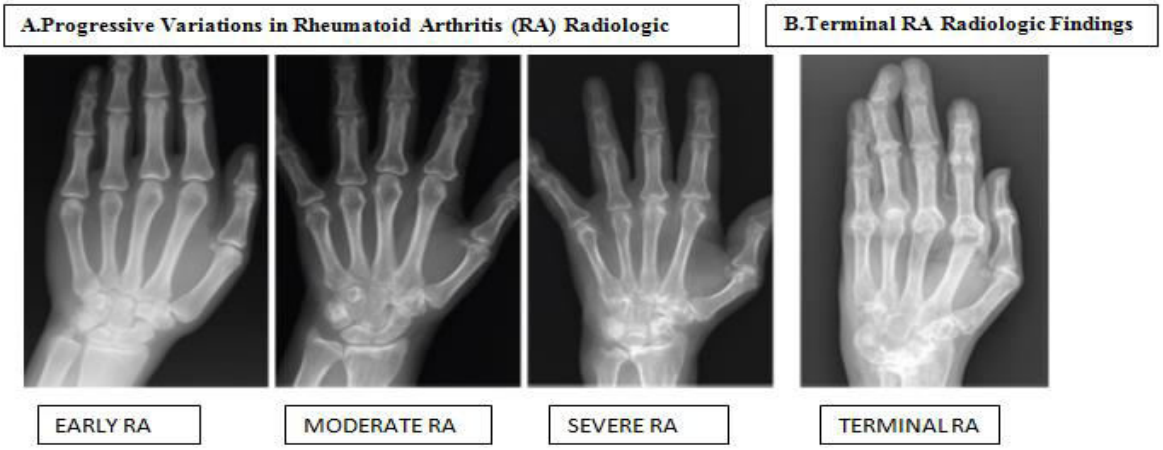

Figure 2: Structural Phenotypes of Rheumatoid Arthritis:

Diagnosis and Assessment

In early disease, RA may involve just 1 or a few joints. Simultaneouslyor even earlier, tendon inflammation (tenosynovitis) develops Thepresence of tenosynovitis, eg. at the flexor carpiulnaris tendon, and subclinical synovial inflammation can be detected by imaging withcolor Doppler sonography or gadolinium-enhanced magnetic resonanceimaging, which demonstrate expansion of intra-articular soft tissue or hypervascularization of the synovial membrane. No diagnostic criteria exist for RA. However, the 2010 classificationcriteria, although primarily developed for identification ofhomogenous patient populations in clinical studies of RA, may help physicians establish a diagnosis; differences between classification and diagnosis have been summarized in a recent report.

Physical examination or ultrasound or magnetic resonance imaging imaging of the joint adds up to 5 points; elevated levels of RF, ACPAs, or both contribute 2 points (or 3 points with levels >3 times the upper limit of normal); and length of symptoms (6 weeks) contribute 1 point each. These 2010 criteria have an 82% sensitivity and a 61% specificity. When compared to the 1987 criteria, the new classification criteria had an 11% higher sensitivity and a 4% lower specificity. Initial assessment requires examination of the joints as wellas serologic testing for autoantibodies and APRs. For follow-up, joint assessment, evaluation of APRs, and evaluation of patient reportedoutcomes such as patient global assessment of diseaseactivity and evaluation of physical function are important.

Compositemeasures that include joint counts, i.e. number of tender and swollen joints, constitute the best way to evaluate RA disease activity in practice (and in trials), since they capture the mostimportant disease aspects in a single score. These scores, namely the clinical disease activity index (CDAI), the disease activity scoreusing 28 joint counts (DAS28), or the simplified disease activityindex (SDAI), correlate with outcomes such as damage progressionand functional impairment. These measures allow quantificationof disease activity, and disease activity states based onspecific cut points of these indices have been defined to helpguide treatment.

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TREATMENT

Nsaids and Corticosteroids are used as first-Line Treatments

The primary goals of first-line treatment are to alleviate pain and reduce inflammation. Non-steroidal anti-inflammatory medications (NSAIDs) such as acetylsalicylate (Aspirin), naproxen (Naprosyn), ibuprofen (Advil and Motrin), and etodolac are examples of fast-acting pharmaceuticals (Lodine). Because of the suppression of prostaglandins, aspirin is an effective anti-inflammatory for rheumatoid arthritis when given at higher doses.

This is one of the first NSAIDs to be used to treat joint pain. Tinnitus, hearing loss, and gastrointestinal intolerance are all side effects of aspirin at high doses.

Other NSAIDs that are newer on the market than aspirin yet equally effective furthermore, these medications necessitate fewer dosages every day.

NSAIDs prevent the formation of prostaglandins, prostacyclin, and thromboxanes by inhibiting cyclooxygenase. Nausea, abdominal pain, ulcers, and gastrointestinal (GI) bleeding are common adverse effects. These symptoms can be alleviated by taking the medication with meals or with antacids, proton pump inhibitors, or misoprostol (Cytotec) Celecoxib (Celebrex), a more recent NSAID, is a selective Cox-2 inhibitor with a lower risk of GI side effects.

Corticosteroids are more potent anti-inflammatory drugs than NSAIDs, but they have more negative effects. As a result, they are only prescribed at modest doses for a brief length of time during rheumatoid arthritis exacerbations or flares. Corticosteroid injections intra-articular (IA) can be utilised to treat local inflammatory symptoms. They function by limiting phospholipid release and decreasing eosinophil activity, hence reducing inflammation.

Side effects of these medications include bone weakening, weight gain, diabetes, and immunosuppressant. Advising the patient to take calcium and vitamin D supplements can help avoid bone weakening. Side effects can be decreased by progressively reducing doses as the patient improves. It is critical not to abruptly quit injectable or oral corticosteroids because this can result in hypothalamic-pituitary-adrenal axis suppression (HPA) or rheumatoid arthritis flares.

Opoid Analgesics

Whittle et al. investigated the usage of opioid analgesics in patients suffering from rheumatoid arthritis discomfort. According to their findings, mild opioids such as codeine, dextropropoxyphene, and tramadol may be beneficial in the short term management of pain caused by rheumatoid arthritis, but the risks exceed the benefits. They advise that other analgesics be tried first.

Second-Line Therapy Includes Disease-Modifying Anti-Rheumatic Drugs (Dmards)

Second-line therapy aims to promote remission by slowing or preventing the progression of joint deterioration and deformity. These medications are classified as slow acting because they take weeks or months to become effective. DMARDs can also lower the risk of getting lymphoma, which is linked to rheumatoid arthritis.

Methotrexate (MTX) is the first-line treatment (also considered as an anchor drug). It is a folic acid analogue that inhibits the binding of dihydrofolic acid (FH2) to the enzyme responsible for converting FH2 to folinic acid (FH4). Purine and pyrimidine metabolism is hampered in the absence of FH4, and amino acid and polyamine production is impaired. Because of the side effects of liver issues, cirrhosis, and bone marrow degradation, MTX is an immunosuppressive medicine that requires regular blood tests.

Side effects can be reduced by taking folic acid supplements. It is an effective DMARD with a lower frequency of side effects than other DMARDs and dose flexibility, which means dosages can be modified as needed .Until present, there is no convincing evidence demonstrating the advantages of combining conventional synthetic DMARDs (csDMARDs) over MTX monotherapy. However, biological DMARDs (bDMARDs) paired with csDMARDs are said to be better than MTX but have more side effects and are more expensive.

Hydroxychloroqyine (Plaquenil) is an antimalarial medication that can be used long-term to treat rheumatoid arthritis. This medication reduces the release of proinflammatory cytokines from monocytes. Common adverse effects include gastrointestinal, cutaneous, and central nervous system issues. When used in greater doses, it can have an effect on the eye in particular. Patients taking this drug must see an ophthalmologist on a regular basis.

Sulfasalazine (Azulfidine) is a DMARD that is commonly used to treat irritable bowel syndrome. This DMARD, when combined with anti-inflammatory medicines, can be used to treat rheumatoid arthritis. This drug's mechanism of action in the treatment of rheumatoid arthritis has not been determined. Sulfapyridine, a decreased version of the medicine after delivery, is hypothesised to inhibit interleukin 8 (IL-8) and monocyte chemoattractant protein secretions (MCP). This medication has gastrointestinal and central nervous system adverse effects, as well as a rash.

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It is generally well tolerated by patients, however it should be avoided by those who have sulfa allergies because it includes sulfa and salicylate chemicals.

Aurothioglucose (Solganal), auranofin (Ridaura), gold sodium thiomalate (Myochrysine), and D-penicillamine (Depen, Cuprimine) have all been used to treat rheumatoid arthritis. Due to bone marrow and kidney damage, many DMARDs necessitate periodic blood and urine tests. Because of more effective therapies, particularly methotrexate, these drugs have not been utilised recently. Other immunosuppressive drugs, such as azathioprine (Imuran), cyclophsphamide (Cytoxan), chlorambucil (Leukeran), and cyclosporine (Sandimmune), can be used, but are normally reserved for individuals with highly active rheumatoid arthritis or illness consequences.

Novel Pharmaceuticals

Leflunomide is an oral drug that is metabolised to malononitrilamide, which inhibits ribonucleotide uridine monophosphate pyrimidine production (rUMP). It alleviates symptoms while slowing the course of rheumatoid arthritis. It is usually used in conjunction with methotrexate, but it can be used alone if patients do not respond to methotrexate. Hypertension, gastrointestinal disturbance, liver damage, leukopenia, interstitial lung disease, neuropathy, dermatitis, and bone marrow destruction are all possible side effects.

Biologics, also known as biological disease-modifying anti-rheumatic medicines (bDMARDs), are highly effective in slowing the course of rheumatoid arthritis-related joint deterioration. They are thought to offer a more "direct, defined, and targeted" therapy strategy. Nonetheless, biologics can have substantial side effects, such as an increased risk of infection. Other common side effects include multiple sclerosis-like neurologic illness and lymphoma. Tumor necrosis factor (TNF) is a messenger protein that causes joint inflammation. Etanercept (Enbrel), infliximab (Remicade), and adalimumab are examples of biologic drugs (Humira),

TNF inhibitors include golimumab (Simponi) and certolizumabpegol (Cimzia). These inhibitors block the recruitment of inflammatory cells, resulting in quick symptom alleviation. If other second-line drugs are ineffective, they are recommended. Unfortunately, these drugs are quite expensive, and their significance in treating individuals at various stages of rheumatoid arthritis, as well as their mechanism of action, is still being researched. These drugs are frequently used in conjunction with other DMARDs, particularly methotrexate. TNF inhibitors are not recommended for people suffering from congestive heart failure or demyelinating disorders.

Other Treatments

Contrary to prior ideas, it has been discovered that there are no specific foods that patients with rheumatoid arthritis should avoid. The notion that nutrition might "exacerbate" symptoms is no longer supported. Although not as efficient as DMARDs, home treatments have been shown to be beneficial for patients suffering with rheumatoid arthritis. Fish oils and omega-3 fatty acid supplements have been shown to help with rheumatoid arthritis symptoms in the short run.

Cumin has been proven to have anti-inflammatory properties in patients suffering from this condition. Calcium and vitamin D supplements may be beneficial in the prevention of osteoporosis. Finally, folic acid can help prevent methotrexate adverse effects.

Physical and occupational therapy are also beneficial to rheumatoid arthritis patients. Patients should exercise on a regular basis to keep their joints mobile and to strengthen the muscles around their joints. Swimming and other joint-friendly movement routines that improve muscle strength include: Yoga, and tai chi are examples of movement exercises that are gentler on the joints while increasing muscle strength. Applying heat and cold packs before and after exercise helps to reduce pain, symptoms. Different forms of connective tissue collagen are being studied in attempt to better understand and minimise the activity of the rheumatoid arthritis condition. Finally, in terms of science, newer and better molecular mechanisms, improvements and improved understanding of molecular mechanisms In the near future, treatment alternatives will be available.

CONCLUSION

Rheumatoid arthritis is a crippling chronic inflammatory disease that can cause joint damage and long-term disability. Early detection and intervention are critical for avoiding serious injury and the loss of vital physiological functions. The treating physician might consider following T2T recommendations by first identifying the goals and then implementing protocols for achieving and assessing them. Additionally, early referral to a professional can assist ensure better treatment outcomes. We now have a greater knowledge of disease pathways because to breakthroughs in molecular medicine, which aids in the development of more effective medicines. Old therapeutic modalities have been improved, while new ones have been developed. Gene array analysis is becoming useful in determining which patients will be more responsive to specific medications.

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TO COMBAT ANTIBIOTIC RESISTANCE – BY EXPLORING NATURAL ANTIBIOTICS

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ABSTRACT
Antibiotic resistance develops in no time and is a big matter to concern, it possess a serious global threat of growing concern to human, animal and environmental health. The main reason of antibiotic resistance is emergence, spread and persistence of multi-drug resistant. Once resistance developed, the usage of antibiotics will no longer has effect on our body and leads to serious complications like toxicity, dose dumping etc., so the different strategies to combat the antibiotic resistance are establishing natural antibiotic resources. Nature is a generous source of compounds which is having the potential to treat diseases including infectious diseases. Spices like turmeric, ginger, alliums are indispensable for the preparation of our daily food and are reported to possess compounds, which have varied beneficial biological effects and also prevent the microbial spoilage of food. The present research work was aimed to take different natural resources and the chosen resources are turmeric, garlic and ginger. Different extraction processes are performed and the obtained extract of pure natural polymers and also evaluated for antibiotic activity. The antibiotic activity of all the species were found to be in the order of garlic, ginger and turmeric. The study indicates that the selected species have antibiotic activity. The further studies are needed to study the activity with different concentrations of the selected polymer and hence, suitability can be a hope in replacing the synthetic antibiotics, which will be very much useful for combating antibiotic resistance.

Keywords: Antibiotics, Natural antibiotics, Ginger, Garlic, Turmeric, Resistance.

INTRODUCTION
The ability of the microorganisms to resist the effect of an antibiotic to which once they are sensitive is called antibiotic resistance. It is also known as drug resistance. Resistance to antibiotics develops in no time and it is a big matter to concern. This poses a serious global threat of growing concern to human, animal and environmental health. This is due to the emergence, spread, and persistence of multidrug- resistant. This global antibiotic resistance shows no signs of decline[1], though it may perhaps shift direction. Once if the resistance is developed the usage of the antibiotic has no further effect on the body and this will lead to dose dumping, toxicity, etc. Antibiotic resistance is increasing at an alarming[2] rate. Non-judicial use of antibiotics is mostly responsible for making the microbes resistant. A growing list of infections like pneumonia, tuberculosis, and gonorrhea are becoming harder and at times impossible to treat while antibiotics are becoming less effective. Antibiotic- resistant infections correlate with the level of antibiotic consumption. The effective use of an antimicrobial agent is undermined due to the possible tolerance or resistance developed from the very initial time the compound is used. This is true for the antimicrobial agents used to treat bacterial, viral, fungal and parasitic infections. The defining moment in the history of mankind that revolutionized medicine and saved countless lives, is the discovery of the antibiotics. Unfortunately these magic bullets have been a global concern due to the increasing resistance on the long term usage of them.

Origin of Antibiotic Resistance: It occurs when drug molecule loses its ability to inhibit the bacterial growth. This will lead to multiplying of the bacteria even in the presence of the antibiotics. Such bacteria which replicates even in the presence of the antibiotics are called as resistant bacteria.

Strategies to Combat Antibiotic Resistance: The different strategies to combat antibiotic resistance and also to minimise the inappropriate use of antibiotics. Prevent the usage of multiple antibiotics at a time. Implementation of natural antibiotics will pave way for overcoming the antibiotic resistance and also will improve the wellbeing of human's. In our present research work different natural resources are taken and studied for the presence of the antibiotic activity, and ciprofloxacin antibiotic is taken as a standard in order to observe the antibiotic activity of the natural resources.

MATERIAL AND METHODS
The natural resources which are taken for this study are turmeric, ginger and garlic. Various extraction processes are performed and the obtained extract is evaluated for the presence of the antibiotic activity, by performing antibiotic sensitivity test. Turmeric, ginger and garlic are purchased from the local market.

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Method of Extraction

Extraction process of turmeric: About 100 gm of dry spices were crushed and sieved to get fine powder, powdered spices are soaked in 200 mL distilled water and kept at room temperature for 24 hours, after 24 hours it was filtered using whatman No. 1 filter paper, filtrate was heated at 40-50 ºC using water bath, until thick paste is formed, the thick paste was considered as 100 % concentration of the extract[3]. The extract is stored at 4 ºC in refrigerator. Extracts were diluted to make different concentrations such as 80 %, 60 %. 40 %, 20 % and 10 %, by mixing with appropriate volumes of distilled water. The extraction process of turmeric is represented in Fig.No.1.

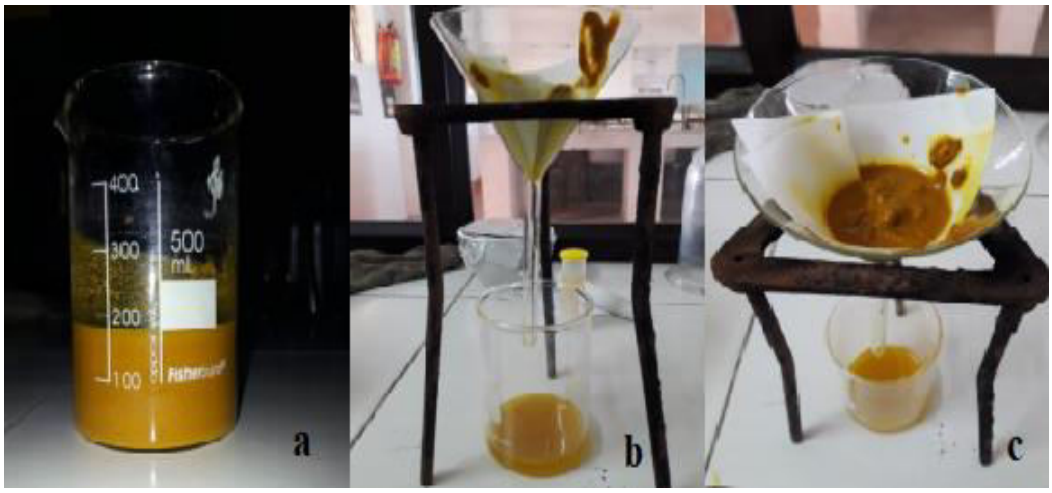

Fig. No. 1: Extraction process of turmeric (a) Maceration of turmeric, (b) Filtration, (c) Obtained turmeric paste.

Extraction Process of Garlic: Plant material was washed with clean water and allowed to air dry, outer covering is manually peeled off and materials are sliced into cutlets, materials are placed in hot air oven for drying at 65 °C for 72 hours, using blender the plant cutlets were pulverised into powder. The obtained powder is passed through sieve number # 60 and stored for future use, 25 gm of powdered plant material was dissolved in enough sterilized 95 % ethanol to make 100 mL of ethanol extract, the mixture is kept undisturbed at room temperature for 24 hours in flask and covered with aluminium foil, subjected to filtration through whattman No.1 filter paper, after filtration the extract was evaporated in water bath until 25 mL extract was left in the container[4]. Obtained extract is 100 % concentrate and further concentrations are prepared by diluting with 95 % ethanol. The extraction process of garlic is represented in the Fig.No.2.

Fig. No. 2: Extraction process of garlic (a) Garlic bulbs, (b) Obtained garlic powder.

Extraction process of ginger: Plant material was washed with water and allowed to air dry, outer covering is manually peeled off and materials are sliced into cutlets, Material is placed in hot air oven for drying at 65 °C for 48 hours. Using blender the plant cutlets were pulverised into powder.The obtained powder is passed through sieve number #60 and stored for future use. About 12.5 gm of powdered material is soaked with 50 mL ethanol for 24 hours at room temperature, resulting extract was filtered through whattman No.1 filter paper[5]. The filtrate obtained was evaporated to dryness by placing in hot air oven at 40 °C for 24 hours. The precipitate that is obtained is made to 1000 mg/mL concentration.Then diluted in ethanol in different concentrations 10, 20, 30, 40, 50, 60 µg/mL. The extraction process of ginger is represented in the Fig.No.3.

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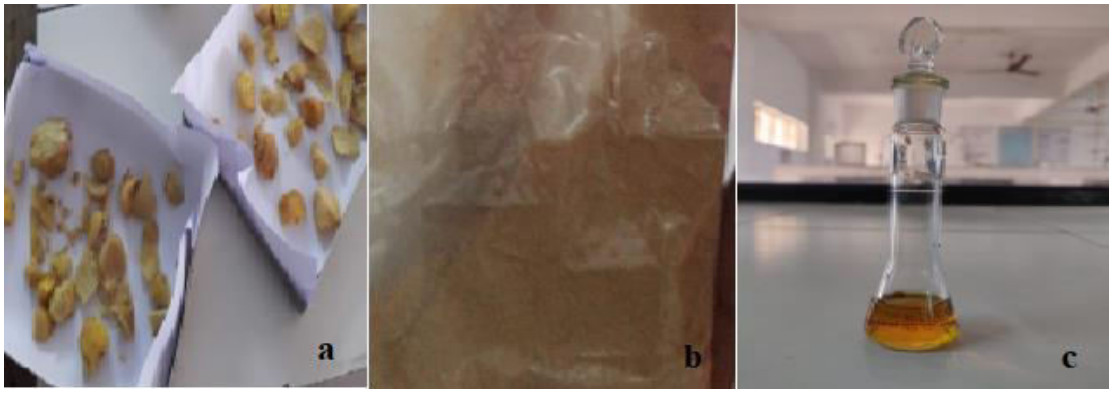

Fig. No. 3: Extraction process of ginger (a) Ginger cutlets, (b) Obtained ginger powder, (c) Extract obtained.

Antibiotic Sensitivity Test: It is a laboratory procedure which is performed to identify which Antimicrobial regimen is specifically effective over microorganisms. This includes disk-diffusion and minimum inhibitory concentration (MIC) methods. The antibiotic sensitivity test is performed on Escherichia. coli (E. coli) and Pseudomonas. aeruginosa (PAE) species by using ginger, turmeric and garlic along with ciprofloxacin antibiotic. This test confirms the antibacterial activity of the natural source[4-6].

Procedure: Standardized innoculum is prepared from a bacterial culture. Nutrient agar medium is prepared and sterilized in the autoclave, once it attains room temperature innoculum is taken and inoculated in it and it is poured into the petri plate and once it is well settled, with a cork borer holes are punched in order to fill with antibacterial solution. Under sterilisation area, one drop of solution of different natural sources and ciprofloxacin antibiotic are filled and kept undisturbed in incubator for about 24 hours.

Results and Discussion

The selected natural sources, showed their effect against bacteria providing antibacterial effect against Escherichia. coli (E. coli) and Pseudomonas. aeruginosa (PAE) species were carried in this present research work and the results were discussed below:

Antibiotic sensitivity test: In the present investigation, the antibiotic chosen is ciprofloxacin and the natural sources that are chosen are garlic, turmeric and ginger which are extracted and performed antibiotic sensitivity test to confirm the antibiotic activity of the natural source. The natural source that is having the antibiotic activity will be considered and the formulation of the ciprofloxacin with the natural source will be performed and evaluated. The antibiotic sensitivity test was performed for all the three extracted natural sources that are garlic, turmeric and ginger, against E.coli and PAE species and evaluated for the antibiotic activity. The antibiotic activity of the garlic, ginger and turmeric are compared with that of ciprofloxacin. The minimum inhibitory concentration of the three natural sources, along with ciprofloxacin in different concentrations is given in the **Table No.1.**

Table No. 1: Minimum inhibitory concentration values.

Specimen	Concentration (µg/ml)	E.coli (mm)	PAE (mm)
Garlic	10	15	17
	20	18	18
	40	22	22
Ginger	10	10	12
	20	11	14
	40	11	14
Turmeric	100	10	10
	200	10	10
	400	10	11
Ciprofloxacin	10	21	24
	20	25	26
	40	28	30

Antibiotic Sensitivity Test Results: The pictorial representation of the inhibition zones of ginger, turmeric, garlic and ciprofloxacin against E.Coli organism are represented in the **Fig.No.4.**

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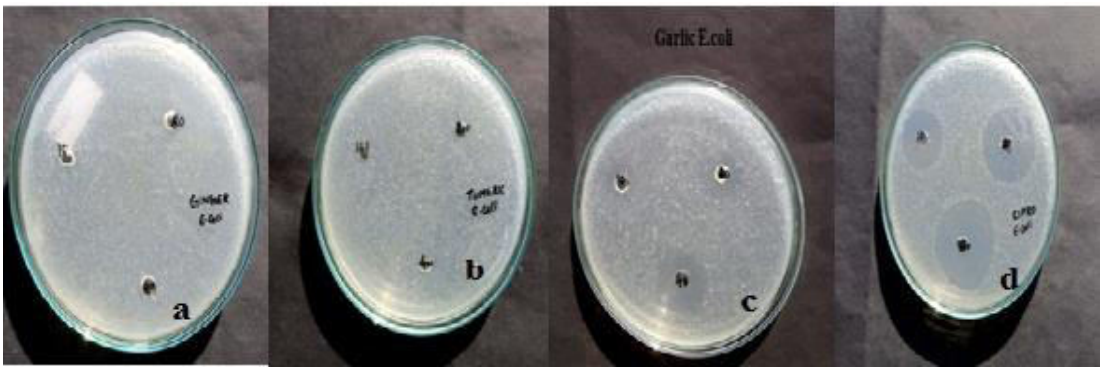

Fig. No. 4: Antibiotic sensitivity results of a) Ginger against E.Coli, b) Tumeric against E.Coli, c) Garlic against E.Coli and d) Ciprofloxacin against E.Coli.

CONCLUSION

From the above results, garlic has shown antibiotic activity and it is almost similar to that of ciprofloxacin. So as it is a natural resource, there is a possibility in incorporating with synthetic antibiotic in order to reduce the dose and also to prevent the antibiotic resistance. So further studies are required in developing a new formulation, which involves incorporation of natural antibiotic with the synthetic antibiotic.

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NEURAL NETWORK APPROACH FOR ESTIMATION OF LACTATE

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Abstract

Lactate is cleared from the body by transporting it to the liver. This process of the body requires adequate amounts of oxygen. Due to certain ailments such as heart failure, respiratory dysfunctions,or severe infection, there is a shortage of oxygen supply. This leads to inefficient elimination of lactate and hence abnormal accumulation of lactate in the blood. To provide timely intervention, lactate needs to be monitored in a non-invasive manner in a critical care scenario. This manuscript describes a method of predicting lactate using fixed wavelength in the near-infrared region. We have selected wavelengths namely 2299, 2285, 2259, 2225, and 2129nm which correspond to theabsorption peaks and valleys of lactate.We have performed a comparative analysis of partial least square regression and principal component analysis-artificial neural network for regression analysis. We obtained a root mean square error of 2.02 mg/dL with partial least square regression and aroot mean square error of 0.15 mg/dL with principal component analysis-artificial neural network. Hence, theartificial neural network can be employed to predate lactate for medical applications.

There is a buildup of lactate in the body when it generates the required energy by the anaerobic pathway. The body clears the tissue lactate by carrying it tothe liver where it either gets oxidized to carbon dioxide or transformed to glucose through cyclic process. This process requires adequate amounts of oxygensupply. However in conditions such as hypoxia where there is a shortage of oxygen due to underlying conditions such as heart failure, respiratory dysfunctions, or severe infection. In such conditions, lactate elimination is hindered. This leads to the accumulationof lactate in the blood beyond normal allowable levels. The normal levels in the human blood of lactate are less than 2mmol/L(18.02mg/dL). The above conditioncan lead to lactic acidosis due to altered pH levels as a result of high lactate concentrations in the blood. There can be other life-threateningconditions such as difficulty in breathing, confusion, and even coma [1]. Lactate concentrations higher than 4 mmol/L have been found in myocardial infarction [2], cardiac arrest [3], circulatory failure [4,5] ,and emergency traumasituations [6,7]. Hence a robust, continuous and non invasive method is of paramount importance in critical care scenarios.

Earlier investigations have shown the viability of Near Infrared (NIR) radiation for in-vitro lactate prediction [8,9]. In one study, ultraviolet(UV)/visible,NIR and Mid Infrared (MIR) radiation were used to estimate lactate contained in phosphate-buffered saline (PBS) in the concentration range of 0 to 20 mmol/L. Regression analysis were done using Partial Least Squares Regression (PLSR) and leave-one-out cross-validation gave a root mean squareerror of cross- validation of 1.59, 0.89, and 0.49 mmol/L for UV/visible, NIR,and MIR region respectively [10]. In this work we are attempting to bring out theefficacy near infrared region for lactate estimation by using reduced wavelengthsinstead of the entire absorption spectra. Earlier research works have reportedabsorption signature of lactate in combination band [11,12]. This workcarefullyselects wavelengths at the reported absorption peaks and valleys which lactatehas. These wavelengths are found to correlate with concentration changes inlactate in the sample. The selected wavelengths are 2299, 2285, 2259, 2225,2129nm. Reduction of wavelengths points reduces the computing and memoryresources required to build estimation models.

Near infrared spectra were recorded of 64 laboratory samples in the rangeof 2050-2350nm using spectrophotometer (Model V-770 by Jasco, Japan). Thelaboratory samples contained glucose, ascorbate, urea, lactate, and alanine inaqueous solution. These above compounds were used as they resemble the bloodtissue. The concentration of alanine was made to vary from 10 to 28 mg/dL,concentration of urea was made to vary from 11 to 20 mg/dL, concentration oflactate was made to vary from 12 to 22 mg/dL, concentration of glucose wasmade to vary from 70 to 280 mg/dL and concentration of ascorbate was madeto vary from 2 to 5 mg/dL. All the compounds used were of analytical grade(Sigma Aldrich Ltd.). A quartz cuvette was used as a sample holder which hada path length of 1mm.

Partial least square regression (PLSR) and Principal Component AnalysisArtifcial Neural Network (PCA-ANN) were used for regression analysis. Forthe first regression analysis PLSR was implemented on the recorded data usingParLeS 3.1 software[13], which uses orthogonalizedPLSR algorithm. The second regression analysis PCA-ANN, needs PCA algorithm to be applied on theinput data which is done using MATLAB R2021b. The data is centered beforepassing through PCA algorithm. The Statistics and Machine Learning Toolboxis necessary to run the PCA in MATLAB R2021b. The toolbox leverages theSingular value decomposition (SVD)

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algorithm to implement the PCA. The preprocessed data by PCA is fed as input to the ANN for the purpose of machinelearning. The algorithm used to train the network is Levenberg-Marquardtback propagation algorithm. This is a part of the neural network fitting application which is bundled along with MATLAB R2021b. The tan-sigmoid transferfunction is used as an activation function for the hidden layer and the linearactivation function is used in the output layer. The created ANN is a shallownetwork, as it contains only one hidden layer, an input layer and an output layer.The scores on the principal components are given as input to the neural network. The input layer contains 3 neurons, hidden layer contains 5 neurons andthe output layer contains one neuron. For Both the Regression analysis, 57 ofthe 64 samples were used as calibration/training dataset. The rest 7 sampleswere used for validation of the created models where lactate was estimated inthe unknown samples.

The table 1 shows the analysis done using the above outlined methods. Thefrst approach using PLSR we extracted 4 factors to model the data. TheRoot Mean Square Error(RMSE) for prediction of lactate on the 7 validationsamples was 2.02 mg/dL. In the second approach, namely PCA-ANN 3 principalcomponents were extracted from the input spectral data which explained 99.97%of variance. These were then fed as input to the ANN. The lactate estimationon the validation set gave a RMSE of 0.15 mg/dL.Table 1: Estimation of lactate using the PLSR and PCA-ANN The PLSR method employed above is a multivariate method which models the linear relationships between the block of predictor variables (absorption signatures) andthe block of response variables (sample concentrations). However, there maybe many underlying non-linear effects occurring in the sample such as nonlineardetector response, stray light, sample turbidity, and multiple scattering due toin homogeneities in the sample, shifts in the width and positions the absorption bands due to variations in sample temperature and composition [14]. ThePCA-ANN is able to model the linear as well as the non-linear relationshipbetween predictor variables and response variables. The above results indicatethat PCA-ANN approach enhances the accuracy of estimation methodology andis a superior method as compared to PLSR.

Sr. no.	Actual Concentration in mg/dL					**Estimated lactate by PCA-ANN in mg/dL**	**Estimated lactate by PLSR in mg/dL**
	Urea	**Glucose**	**Ascorbate**	**Analine**	**Lactate**		
1	20	70	5	28	12	11.93	13.96
2	20	100	5	10	12	12.09	14.27
3	11	200	2	10	22	22.12	20.12
4	11	280	5	28	12	11.94	14.76
5	20	280	5	28	22	21.69	22.93
6	20	200	2	28	12	12.16	11.46
7	11	100	5	10	12	12.08	14.68

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IMPACT OF MINING ACTIVITIES ON DIVERSITY OF ACULEATA (BEES, ANTS & WASPS) UNDER ORDER HYMENOPTERA IN PROVINCES ADJOINING HINGULA OPEN CAST PROJECT, TALCHER, ANGUL, ODISHA, INDIA

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ABSTRACT
The present study was conducted in provinces adjoining to Hingula Open Cast project of Talcher to document the baseline data of aculeate fauna.The study area was regulated at the elvevation between Lat - 20^o 55'51" North & 20^o 57'24" North and Long-85^o 08'13" East & 85^o 11'14"East.A thorough review was completed during January – 2021 to December – 2021. Aculeata being organic pointers of natural quality assumes a significant part in the genuine working of the biological system. These predacious insects are dynamic during the daytime. Much has been said and done about the deficiency of biodiversity in the mining pockets of Talcher, however very little information is available about the variety and variability of Aculeata. Because of this, the current investigation is a fundamental endeavor to consider the Aculeata in periphery of Hingula Open Cast Project (OCP), Talcher, Angul, Odisha. A complete number of 2239 Aculeata with 5 families and 36 species were recorded during the whole investigation time frame.Shannon – Weiner index (H') was 3.40 in Mallibandha village, followed by 3.41 in Chitalpur village, 3.43 in Kumunda village, and 3.39 in Banbaspur village. Margalef's richness (Dmg) index was found to be 5.25 in Mallibandha, 4.99 in Chitalpur, 5.21 in Kumunda, and 5.09 in Banbaspur village. Other than this, it was noticed that individuals from the family Formicidae were observed to be 52.16% followed by Apidae 39.25%. The most minimal population was foound in Vespidae 0.80%, Sphecidae 0.75%, and Megachilidae with 0.13%. separately. Sweepy net & colored pantraps were used for collection of species.

Keywords: Indicators, Regimen, Biodiversity, Hingula, Aculeata.

INTRODUCTION
Aculeata is viewed as the main fauna of the terrestrial environment. These are most adaptive insects in ecological conditions. Every one of the Aculeata is viewed as the eusocial group of creatures [1]. Aculeata plays a significant role in the modification of soil ecosystem diversity.It takes part in underground natural process and modify the physical, chemical & biological environment leading to an effect on plants, soil micro- and macro-organisms. The abundance and varied ecological role of Aculeata make them influential in the agro-biological system [1].In this way, the investigation of insect diversity in four surrounding areas of Hingula Open Cast Project shows some ecological importance of the niche. The current study is a documentation of the Aculeata fauna variety of the investigated areas.The worldwide record of Aculeata species is around 13,255 [3]. All insects are classified into 21 subfamilies [4]. Sub-family Martialinae has been converged with the family Formicidae [5]. All types of ants fall into the family Formicidae. Family Formicidae is the part of superfamily Vespidae under the order Hymenoptera of class Insecta. Subfamily Myrmicidae is the biggest under the family Formicidae, having 138 genera followed by subfamily Formicinae with 39 genera and Ponerinae with 25 genera.In India, insects possess differentiated environments like leaf litters, trees, soil, and deadwood logs, though tramp species incline toward man-made natural surroundings. Myrmicinae addresses most extreme subterranean insect variety (45%) having genera Pheidole and Crematogaster. Formicinae is the second-biggest subfamily with 25% species variety under genera Camponotus and Polyrhachis. Subfamily Ponerinae involves 14% of species variety having greatest variety in sort Leptogenys [4]. In India, the work on insect diversity is exceptionally poor and discourged. Gunawardene et al. [6] have distributed their work on subterranean insects of the Western Ghat – Sri Lanka area of interest. Sunil Kumar et al. [7] revealed insect fauna of Bangalore City. As of late, Tiwary et al. [8] distributed a rundown of 591 types of subterranean insect from India. As of late Bharati et al. [9, 10] recorded 828 types of subterranean insect in India and the territory of West Bengal has the most elevated number of subterranean insect species (382) under 65 genera among the 30 Indian States. Notwithstanding these investigations, there is still a ton about subterranean insect variety that merits further examination around here, and in this way more examinations are required. The target of this investigation was to discover Aculeata variety and conveyance in fringe towns of the Hingula Open Cast Project. Until now, no examination on Aculeata variety has been done around here. This is the starter endeavor to endeavor to discover the Aculeata dissemination and wealth of subterranean insect species in and around towns of the Hingula Open Cast Project. The current examination will surely be the benchmark for additional investigation on the gathering from the examination region for future scientists.

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Aculeata is one of the little to medium-sized creepy crawlies. They have four membranous wings with a limited midsection. Their mouthparts might be either gnawing type or gnawing sucking type. Transformation is finished ie. They are separated into two suborders ie, Symphyta and Apocrita. Symphyta incorporates sawflies and horntails while Apocrita separates into two sub-divisions, the stinging structure Aculeata incorporates wasp, honey bees, subterranean insects and parasitic incorporates most parasitic structures.

These bugs total their life cycle in 4 stages viz. egg, hatchling, pupa, and grown-up. They are huge spineless creatures in earthbound biological systems and are credited for being a significant food hotspot for some rodents. Their sex assurance is normally controlled by whether an egg is prepared. Treated eggs form into females while unfertilized eggs form into guys.

In the former days, Talcher was known for its extraordinary and splendidly rich biodiversity of verdure in Odisha. Loss of Biodiversity has been concentrated widely in the Talcher mining hall yet fauna especially Aculeata stays an ignored area of study. Along these lines, the current lady study was directed to investigate the wealth, species lavishness, and variety of Aculeata around the fringe towns of Hingula OCP i.e.Mallibandha, Chitalpur, Kumunda, and Banbaspur.

2. MATERIALS AND METHODS

2.1 Study Area

Talcher coalfield is located on the Brahmani river in the Angul District in the Indian state of Odisha. It covers an area of 50 km^2. It lies in the latitude of $20^0$53' to $25^0$12' North and longitude 84^0 to $85^0$23'East. Coal was discovered in Talcher Coalfield at Gopal Prasad in 1837. Before industrialization, it was rich in biodiversity.

There are around 9 open cast projects and 3 underground mines locked in the Talcher Coal mines area. Hingula Open Cast Project was opened in 1998 to supply coal to the different areas of Odisha and India. The all out region covered by this venture is 1870.01 hectares. Its creation limit is about 15.0 Metric tons each year, It lies in the scope of 200 57' 39 " and 200 58' 18 " North and Longitude 85^0 09' 33 " and 85^0 12' 82 ". The environment of this locale is by and large dry besides in the rainstorm season. The Coalfield is depleted by the Brahmani stream streaming along the eastern edge of coalfields. Singhidajhor, Nandira, Tikira, and Bangurnala are significant feeders of the Brahmani stream. The investigation region covered Mallibandha, Chitalpur, Kumunda, and Banbaspur town regions which are adjoining Hingula Open Cast Project with a 15 km span. Coal mineshafts have genuinely albeit furtively added to the debasement of biodiversity. Notwithstanding, the populace development of Aculeata has been because of expanded dampness, contamination, mugginess in specific regions.

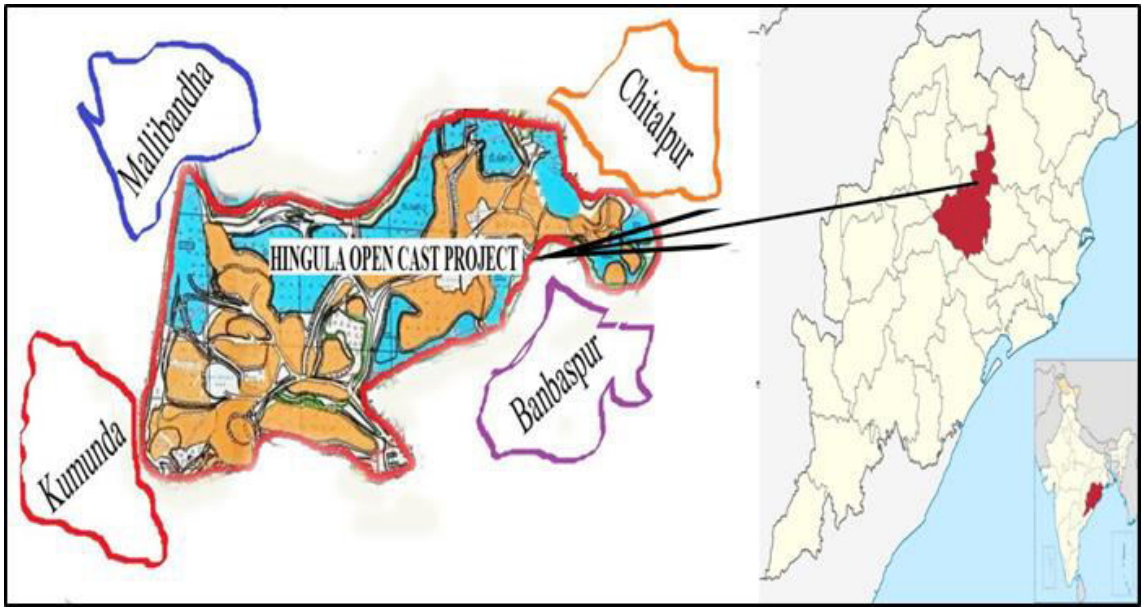

Figure 1- Study Areas of Hingula Open Cast Project, Talcher, Angul, Odisha, India

2.2 Study Design

Four locales were chosen from the fringe spaces of the Hingula Open Cast Project dependent on natural surroundings which might be significant as per Clark and Swamy. Study districts were partitioned into four regions as follows.

1. Area-I- Mallibandha Village

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2. Area -II- Chitalpur Village
3. Area -III-Kumunda Village
4. Area -IV-Banbaspur Village

As they are poikilotherms and being temperature-delicate and cognizant, generally they work between 10 am. furthermore, 4 pm. whose openness further develops energy with an increment in temperature. In light of their accessibility, Aculeata can be arranged as extremely customary (VR,>50views), regular(Re,11-50 perspectives), Rare(Ra,3-10views).

2.3. Sampling and Identification

An examining of Aculeata was completed from January – 2021 to December – 2021 in various investigation regions in and around of Hingula Open Cast Project. Irregular examining was completed by direct looking through strategies following Sutherland. (Sutherland, 1996) [18] at a thirty days span during the time of 10:00 to 16:00 hours, in light of the fact that Aculeata is observed to be generally dynamic during the center of the day. A scope net example was taken, utilizing a creepy crawly airborne net with a four-foot handle, in the vegetation encompassing 20m by 20m inspecting plot to set up insect local area structure. The vegetation structure was overwhelmed by grasses and forbs, with few bushes. An equivalent number of 50 compasses were taken while strolling rapidly[24]. Clear net examples were frozen, and Aculeata were subsequently distinguished as species in the research facility. The recognizable proof of Aculeata has likewise been completed with the assistance of an Aculeata ID guide [17,18,31]Most of the species were photograph archived. Photos are taken by a Stemi DV4 sound system camera with a microlens. Aculeata is recognized by ID key [ ] up to class and species level basing on the Literature accessible [ ]. The legitimacy of species, name, authority, and spelling has been followed to the Balton synopsis.[ ]Suspected species were gathered through entomological nets and safeguarded in liquor. Some were recognized by Google focal point. Examples of Aculeata species variety were inspected utilizing mathematical species extravagance, Shannon file of species variety, and Simpson equality index.[26].

3. Data Analysis

A rundown of animal types and a total check of the quantity of people for every territory have been accomplished for species lavishness and species variety calculation.

Margalef variety list (Margalef, 1958) (DMg) can be determined as follows

$$D_{Mg} = \frac{S-1}{\ln N}$$

Where 'S' is the no. of species and 'N' represents the total no. of individuals in the study area. It explains the species richness of the study area.

The Shannon-Weiner file (Shannon and Weaver,1949) is utilized to ascertain the variety of species in various regions adjoining Hingula Open Cast Project. The Shannon-Weiner list (H^') is determined as follows:The Shannon-Weiner file (Shannon and Weaver,1949) is utilized to figure the variety of species in various regions nearby Hingula Open Cast Project. The Shannon-Weiner list (H^') is determined as follows:

$$H' = -\sum_{i=1}^{s} p_i \ln p_i$$

Where $pi = ni/N$, n_i = No of Individuals of a Species at a time, N= Size of the whole community and ln = Natural Logarithm

Evenness of Aculeata **(j')**

The equity of an animal types was determined by utilizing [27, Pielou EC.] which is characterized as $J' = \frac{H'}{\ln S}$

Where S= No. of Species present in the site, ln = Natural logarithm, and H' is the diversity Index.

The Value of J' varies from 0 to 1.

Jacard's index (Cj)

It was utilized to ascertain the comparability of Aculeata species between two environments among various sorts of regions contemplated.

It was given by the accompanying connection

Cj= $\frac{a}{a+b+c}$

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Where a=Total number of species observed in both Area-I & Area-II.

b=Species found in Area-I, but not in Area-II.

c=Species found in Area-II, but not in Area-I

Table-1.List of Aculeata diversity in and around areas of Hingula Open Cast Project, Talcher, Odisha.

	Scientific Name	**Area-I**	**Area-II**	**Area-III**	**Area-IV**	**Status**	**Total**
Sl.No	Family-Formicidae						
1	Camponotus atriceps (Smith,1858)	32	19	27	12	VR	90
2	Camponotus floridanus (Fabricius,1804)	9	33	21	30	VR	93
3	Camponotus sp.(Mayr,1861)	27	13	19	21	VR	80
4	Camponotus pennsylvanicus(Fabricius,1776)	14	23	11	18	VR	66
5	Camponotus ligniperda(Mayr,1865)	19	21	13	12	VR	65
6	Formica fusca (Linnaeus,1758)	12	11	12	13	VR	48
7	Formica sanguinea (Latreille,1798)	16	21	17	23	VR	77
8	Formica cunicularia (Latreille,1798)	09	21	13	17	VR	60
9	Megaponera analis (Latreille,1802)	17	21	18	14	VR	70
10	Oecophylla smaragdina (Fabricius,1775)	12	11	12	23	VR	58
11	Paraponera clavata (Fabricius,1775)	11	27	17	12	VR	67
12	Pheidole pallidula (Nylander,1894)	13	14	12	16	VR	55
13	Polyergus brevicep (Emery,1893)	14	21	12	19	VR	66
14	Paratrechina longicornis (Latreille,1802)	21	17	21	22	VR	81
15	Paratrechina solitaria(Smith,1858) .	19	14	12	09	VR	54
16	Paratrechina impressa (Roger,1861)	17	18	21	22	VR	78
17	Solenopsis invicta (Buren,1972)	12	14	13	21	VR	60
	Family-Apidae						
18	Apis dorsata(Fabricius,1793)	04	18	21	06	Re	49
19	Apis cerena (Fabricius,1793)	21	27	19	15	VR	82
20	Apis mellifera (Lepeletier,1836)	23	17	21	18	VR	79
21	Apis florea(Linnaeus,1758)	24	16	21	21	VR	82
22	Apis laboriosa (Smith,1871)	19	21	23	12	VR	75
23	Bombus terrestris(Latreille,1758)	24	23	29	17	VR	93
24	Melissodes bimaculatus(Lepeletier,1825)	21	26	19	18	VR	84
25	Xylocopa micans(Lepeletier,1841)	14	17	25	14	VR	70
26	Xylocopa latipes(Drury,1773)	19	29	23	22	VR	93
27	Xylocopa violacea(Linnaeus,1758)	26	25	19	23	VR	93
28	Xylocopa femorata(Smith,1876)	22	16	18	23	VR	79
	Family-Vespidae						
29	Vespa crabro(Linnaeus,1758)	03	-	-	01	Ra	4
30	Vespa tropica (Linnaeus,1758)	04	-	03	02	Ra	9
31	Polistes bellicosus(Cression,1872)	-	02	-	-	Ra	2
32	Vespa orientalis(Linnaeus,1758)	01	-	02	-	Ra	3
	Family: Sphecidae						
33	Chalybion californicum(Saussure.1867)	08	07	11	06	Re	32
34	Chalybion japonicum(Dahlbom,1843)	11	19	21	13	VR	64
35	Sphex pensylvanicus(Linnaeus,1763)	16	21	17	21	VR	75
	Family: Megachilidae						
36	Megachile zombae(Latreille,1802)	-	02	01	-	Ra	3
	Total	534	605	564	536		2239
	Margalef Index($D_{Mg)}$	5.25	4.99	5.21	5.09		
	Shannon-Weiner Index(H')	3.40	3.41	3.43	3.39		
	Evenness($j^{'}$)	0.96	0.98	0.97	0.97		
	VR-Very Regular(>50 views), Re-Regular(11-50 views),Ra-Rare(2-10 views)						

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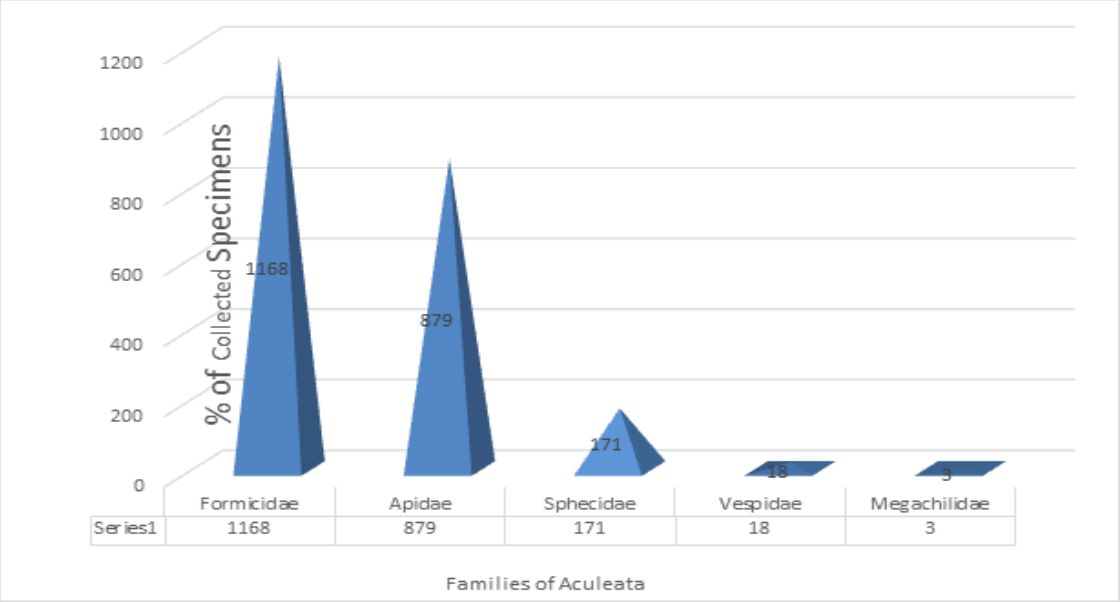
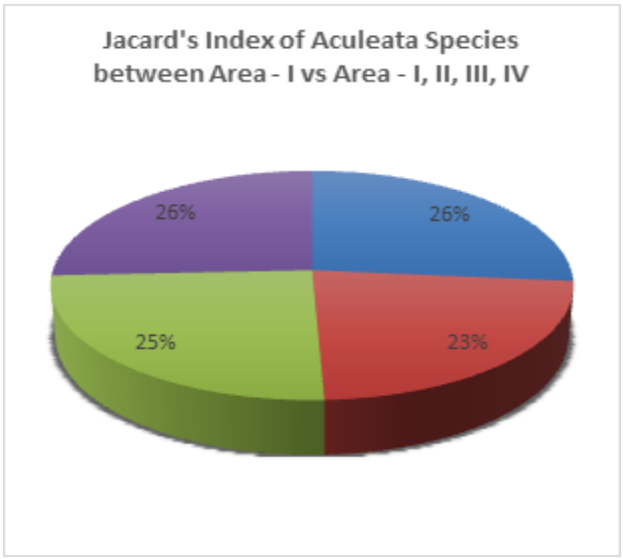
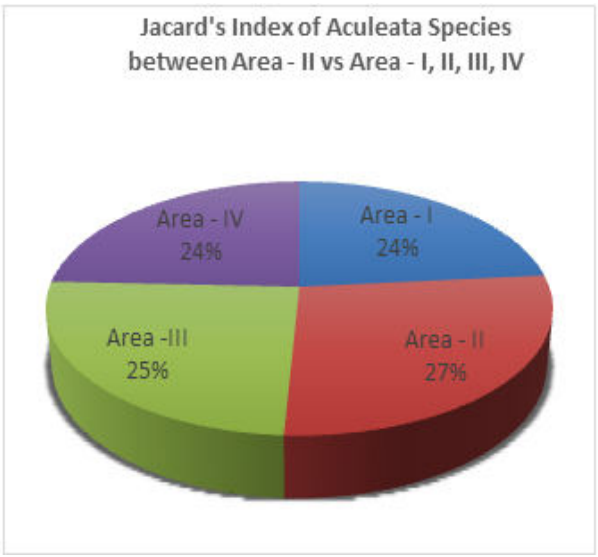
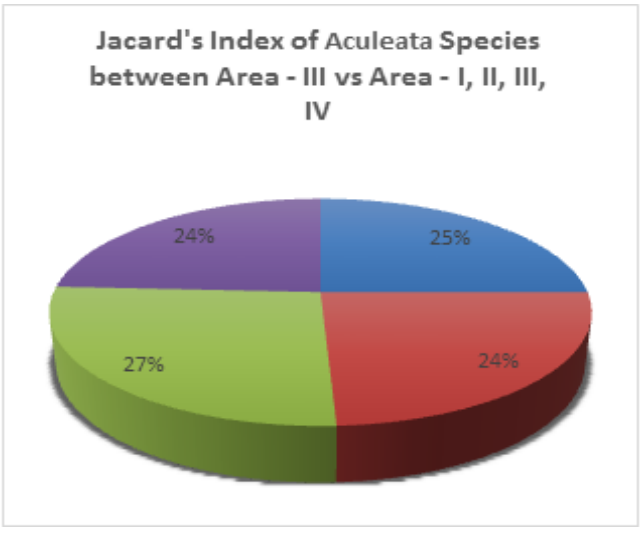
Table-2 Showing Jaccard's similarity index (Cj)

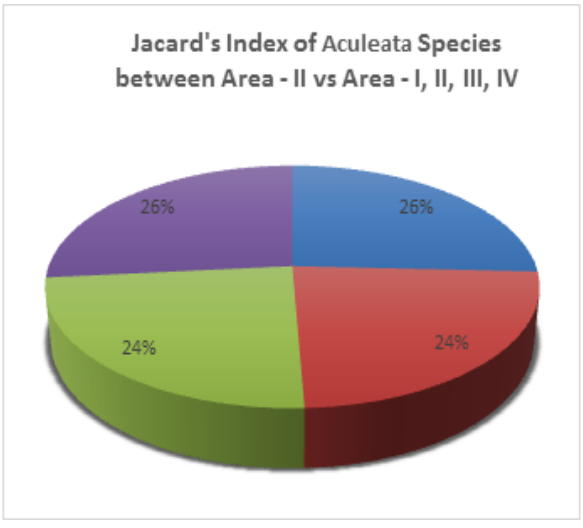
	Area-I	**Area-II**	**Area-III**	**Area-IV**
Area-I	1	0.86	0.94	0.97
Area-II	0.86	1	0.91	0.89
Area-III	0.94	0.91	1	0.91
Area-IV	0.97	0.89	0.91	1











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4. RESULTS AND DISCUSSION

The current examination was led at fringe spaces of the Hingula Open Cast Project to investigate the Aculeata fauna. An all out number of 36 types of Aculeata in 18 genera and 5 families were recorded in the investigation regions. (Table-1) During the examination, Formicidae was observed to be more assorted and prevailing with 17 species having a place with 9 genera, contributed 52% followed by Apidae with 11 species and 4 genera. They likewise contributed a 39% variety of absolute Aculeata recorded in fringe spaces of the Hingula Open Cast Project. Family Vespidae with 4 species and 2 genera contributed 0.8%. Family Sphecidae with 3 species and 2 genera contributed 7.6% and Family Megachilidae with 1 class and contributed 0.13%. (Table.1)

The Shannon-Weiner Index (Area-I = 3.40, Area – II = 3.41, Area-III = 3.43 and Area - IV =3.39) as displayed in the Table-1 doesn't change among the various environments. Species lavishness or Margalef's extravagance (D Mg) Index was observed to be 5.25 in Area-I, 5.21 in Area-III and 5.09 in Area-IV. Region II has shown nearly low wealth ie.4.99. The Jaccard's similitude record (Cj) as displayed in Table-2 was most elevated (0.97) between Area-I and Area-IV and least (0.86) between Area-I and Area-II. Equity (j) in species wealth of) Area-III and Area-IV are something similar while Area-I and Area-II show little variety with 0.96 and 0.98 separately.

In the current investigation greatest assortment of Aculeata was done in July and August. Present information uncovered that the Aculeata of the investigation locale is rich and broadened might be because of an assortment of vegetation and complex natural conditions, precipitation examples, and temperature.

Ale size, various territory, and accessibility of normal and counterfeit water bodies may be the reasons for the greatest variety of Aculeata in the fringe towns of the Hingula Open Cast Project. The size of water bodies remains as a significant factor to decide the species extravagance and variety of Aculeata. In any case, the investigation additionally uncovered that the Aculeata and their natural surroundings are under danger because of extreme anthropogenic exercises like environment modification, coal unearthing, contamination, deforestation, and so on

5. CONCLUSION

A complete number of 2239 Aculeata were seen in fringe spaces of the Hingula Open Cast Project. As per IUCN red rundown information, Aculeata is the most un-worried about normal changes in the climate. From the current information, the Aculeata populace has diminished because of anthropogenic activities like coal removal and environment fracture in the Talcher Area which could be a risk signal for the vanishing of this magnificent animal, particularly in Talcher. Up until now, less investigations have been done on the peril of this sublime life form, energetic examinations are fundamental.

6. ACKNOWLEDGEMENTS

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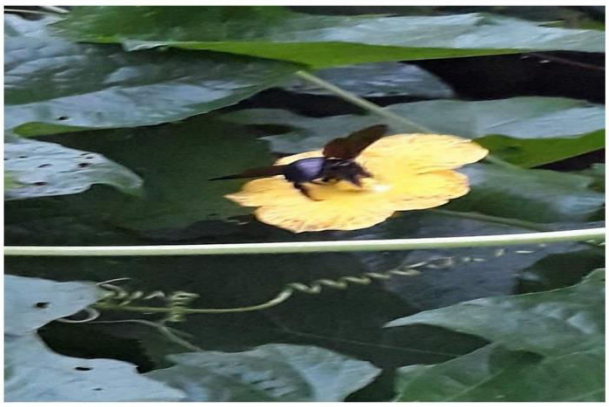
1.Apis florea

2.Camponotus pensylvanicus

3.Apis mellifera

4.Chalybion californicum



5.Xylocopa femorata

6.Negachile zombae

7.Camponotus sp.

8.Megaponera anali

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9.Sphex pensylvanicus

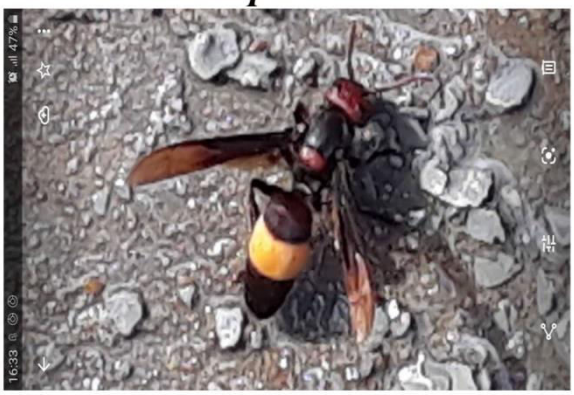
10. Oecophylla smaragdina

11. Pheidole pallidula

12. Pachycondyla impressa

13. Solenopsis invicta

14. Vesa orientalis



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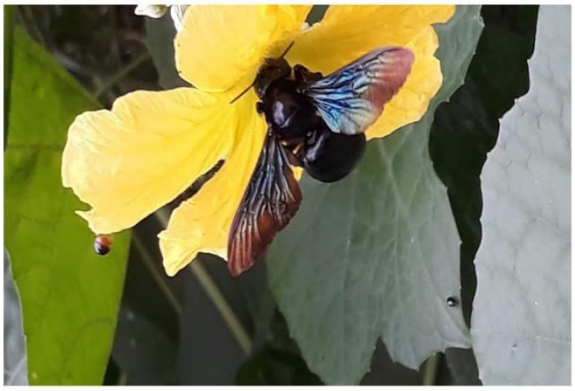

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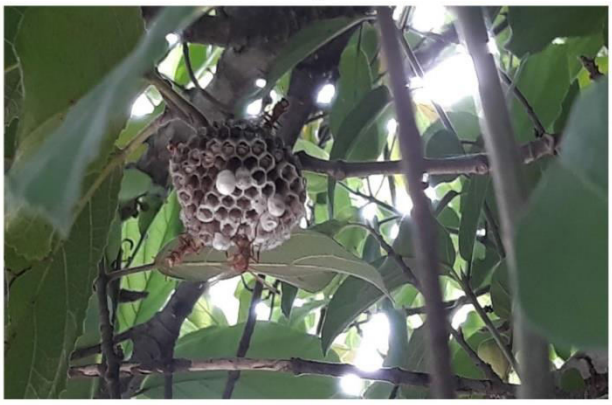
17. Xylocopa micans

18. Pachycondyla solitaria

19. Megaponera analis



20. Vespa carbo

21. Oecophylla smaragdina

22. Camponotis ;ogmo[erda

23. Paratrechina longicornis

24. Polistes bellicosus

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EVALUATION OF URANIUM CONCENTRATION IN GROUND WATER AND ITS HUMAN HEALTH IMPACT IN A PART OF ATRU TEHSIL OF BARAN DISTRICTS OF HADOTI REGION OF RAJASTHAN, INDIA

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ABSTRACT
Uranium concentrations in ground water samples collected from some villages of Atru tehsil of Baran districts of Rajasthan have been measured using a LED fluorimetry technique. The source of water is ground water and the water sources are mainly hand pumps, tube wells and open wells. The uranium concentration in ground water samples is found to vary from 1.1ppb to 13.1ppb in pre monsoon with a mean, median, mode, standard deviation value of 4.09ppb, 3.91ppb, 4.10ppb, 2.66ppb and 2.4ppb to 15.6ppb in post monsoon with a mean, median, mode, standard deviation value of 5.8ppb, 5.25ppb, 5.10ppb and 3.21ppb. Along with uranium, its associated physico-chemical parameters of water such as pH, electrical conductivity, temperature, total alkalinity, phenolphthalein alkalinity, total hardness, magnesium hardness, calcium hardness, chloride, fluoride, sulphate, phosphate, nitrate, total dissolved solids (TDS) and oxidation reduction potentials (ORP) were also determined using standard Bhabha Atomic Research Centre (BARC) protocols [(1)]. Statistical tools were applied to analyze the data and its spatial distribution. The study will be helpful in identification of the health risks associated with uranium and other physico-chemical parameters in ground water used as potable water. The analytical data for all water parameters and uranium were cross checked with respect to recommendations given by BIS/WHO limits to identify the pollution level.

Keywords: Uranium, Groundwater, Atru, Baran, LED fluorimetry.

INTRODUCTION
Ground water is an indispensable natural resource for domestic and potable water supply in terms of its global contribution as unfrozen fresh water reserve[(2)]. Ground water plays a major role in supplying water for drinking, agricultural, and industrial uses [(3-5)]. Uranium is a widely known actinide, radioactive, lithophilic and naturally occurring heavy trace element found mostly in igneous rocks, soils, granites and earth crust [(6)]. In nature, uranium generally occurs in tetravalent state as insoluble species and hexavalent state as highly soluble species. Precipitation being the principal source for ground water; the responsibility to preserve this resource from pollution is increasing owing to the erratic nature of precipitation and near utilization of surface water resources (CGWB, 2015) [(7)] . The occurrence of ground water and groundwater potential in hard rock areas in various parts of india were documented by several authors (Javed and Wani, 2009; Gopalan, 2011; Sivaramakrishnan et al, 2015; Vittala et al, 2005) [(8-11)] . Application of uranium in ground water depends on lithology, geomorphology and other geology conditions of region (Michel et al. 1991; Ortega et al. 1996; Kumar et al. 2011) [(12-14)]. Uranium concentration in most of the ground water are generally lower, in ranges of 0.1 to 1 ppb, but it can leach, easily dissolved and transported in oxidizing groun dwater due to the presence of oxygen. Hence, it can be transported distant away from its original occurrence (Bucur et al. 2006) [(15).] Mostly uranium is attending in ground water rather than surface water, so there is a need to evaluate the amount of uranium present in ground water higher amounts of uranium content can affect some parts of the body (Brugge and Oldmixon et al. 2005) [(16)] . Higher amount of uranium content can affect the kidneys and it is reason due to its chemical nature and not due to radioactive property (Kurttio et al. 2006) [(17)]. Uranium isotopes during their disintegration course decay into other radioactive elements and ultimately decay to stable lead isotopes in the process emits beta and gamma radiation (Fontes et al. 1983) [(18)]. The decay products of 238U (234Th and 234 Pa) and 234 U (231Th) are responsible for the presence of beta and gamma radiations in purified natural uranium (Bleise et.al 2003) [(19)]. Even though Climate change affects ground water, buffering capacity makes it more resilient to the effects of climate change than surface water. Thus, the role of ground water in water supplies likely becomes more dominant in arid regions with large scale climatic variations (Jac, 2012) [(20)]. Therefore, the aim of this study was to investigate the quality of the ground water, the analysis of uranium and its correlation with some physico-chemical properties of drinking water samples of Atru tehsil of Baran districts of Rajasthan, India.

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Study Area

Fig.1: Study map of Atru tehsil of Baran districts of Rajasthan with the locations

Atru is a town in the Baran district in Rajasthan, India. It is located in the southeast of northern Indian state of Rajasthan. It is tehsil of Baran. It is located around 30 kilometers south of the Baran district [21] . Fig.1 shows study map of Atru tehsil of Baran districts of Rajasthan with the locations. Atru tehsil is the biggest tehsil of the Baran district, and has 141 villages under its administration. There are many facilities like a railway station, a hospital, schools, markets, well equipped rods for traffic. The town has a dry climate except during monsoon. The summer runs from March to mid of June, as in most parts of the country. The period from mid of June to September is the monsoon season followed by the months October to mid of November constitutes the post monsoon or the retreating monsoon. January is generally the coldest month with an average daily maximum temperature of **24.3** °C and the average daily minimum temperature of **10.6** °C. Usually, the town has a dry climate but in monsoons, the weather becomes humid. The months from November to February constitute winter. The average rainfall experienced by the town is around 895.2 mm.

METHODOLOGY

Estimation of Uranium in Ground Water Samples

Uranium analysis was done in LED fluorimeter LF-2 (Quantalase Enterprises Pvt. Ltd., India). Calibrate the fluorimeter with four uranium standards to check the instrument performance and the linear dynamic range. One uranium standard of 500 ppb can be prepared; each time 50 micro liter can be added to 5 ml ultrapure water and 0.5 ml buffer, to avoid the error in the preparation of lower ppb level standards. Also, the ppb level standards require fresh preparation before analysis. If the TDS level is low (less than 1500ppm) in clear drinking water samples, then the water sample can be directly analyzed for uranium using a fluorimeter, no chemical processing is required. Take 5 ml of water sample in a cleaned and dry suprasil quarts cuvette, add 0.5 ml of buffer (fluorescence enhancing agent that is 5 % sodium pyrophosphate solution, pH is almost 7 adjusted using phosphoric acid). Record the fluorescence response of the sample only, in terms of counts, minimum 4 repetitions. Add 50microliter of 500 ppb uranium standard onto the cuvette that contains the sample and buffer, record the fluorescence response of the first standard added (amount of standard additions depends on the sample fluorescence counts). Again add 50microliters of 500ppb uranium standard onto the cuvette and record the fluorescence response. **Estimation of Physico-chemical parameters in groundwater samples**

The measurement of ORP, TDS, EC (electrical conductivity), pH, Temperature, Salinity, DO, resistivity, was done using an in-situ using eutech instruments technology made easy cyber scan series 600 waterproof portable meter used portable electrode sensors. Measurement of nitrate, chloride, fluoride was done using a eutech instruments technology made easy cyber scan series 600 waterproof portable meter used portable electrode sensors. The measurements of total-hardness and Ca-hardness in groundwater/drinking water samples by EDTA Complex metric titration method. Here to determine Mg hardness by the simple difference between the values of Total hardness and Ca hardness. The measurements of total alkalinity were found by the H2SO4 titration method using methyl orange as an indicator, in the groundwater samples which was due to bicarbonate

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alkalinity only. The phosphate, sulphate concentrations were determined respectively by UV-Visible Spectrophotometer Instrument (Lab India UV/VIS Spectrophotometer). A UV-Visible spectrophotometer was used for the above techniques [(1)].

RESULTS AND DISCUSSION

The analytical results of uranium and other parameters of 34 drinking water samples collected from different villages in Atru tehsils of Baran district study area are presented in **table 1** for pre-monsoon and post-monsoon samplings. Gamma radiation level at the sampling sites was found between 79nSv/h to 114nSv/h with a mean value of 91.83nSv/h both in pre mansoon and post monsoon. There is no standard range prescribed for gamma radiation the cosmic radiation contributes to about 31nSv/h in mean sea level. pH value of ground water/drinking water ranged from 7.23 to 7.89, with an average, median, mode, standard deviation of pH is 7.55, 7.53, 7.45, 0.17 in pre monsoon and 7.18 to 7.78, with an average, median, mode, standard deviation of pH is 7.45, 7.46, 7.35, 0.16 in post monsoon. The minimum total dissolved solids value in the sample was estimated to be 667ppm while maximum as 1601ppm, mean of TDS is 996.67ppm in pre monsoon and minimum 616.1ppm and maximum 1327ppm, mean of TDS is 907.56ppm in post monsoon. TDS is found higher to BIS/WHO standards, TDS was found to be exceeding the permissible due to the large number of dissolved solids that are found in natural waters of the area. Fig.2 and 3 depicts spatial distribution of uranium in ground water samples during pre and post monsoon of atru tehsil of baran district. The electrical conductivity of ground water/drinking water of atru tehsil ranges between 663.4-1588µS/cm, mean of electrical conductivity is 983.27 in pre monsoon & from 600-1276µS/cm, mean of electrical conductivity is 872.41 in post monsoon . ORP values of analyzed water samples vary from 35.2 to 161.5mV, having average value of ORP is 78.05 in pre-monsoon and ranged between 36.10 to 162.2mV, with mean of ORP is 79.75 in post-monsoon. Fig.4 and 5 depicts percentage of uranium in groundwater samples under uranium range (pre and post monsoon) in the study area. Salinity value of water varies from 220-2456ppm, mean of salinity is 596 in pre monsoon and 618.3-1366ppm, mean of salinity is 918.10 in post monsoon. Fluoride value of water varies from 0.23-1.1ppm, mean of fluoride is 0.66 in pre monsoon and 0.36-1.3ppm, mean of fluoride is 0.85 in post monsoon. According to WHO/BIS standards, the fluoride was established to be exceeding the permissible limits i.e. 1.0ppm. The main cause of increase in fluoride may be due to the large number of accidental contamination of drinking water or fires or explosions. Chloride value of water varies from 42-1100ppm, mean of chloride is 294.38 in pre monsoon and 39-1000ppm, mean of chloride is 294.93 in post monsoon. According to WHO/BIS standards, the chloride was established to be exceeding the permissible limits i.e. 250ppm. The main cause of increase in chloride may be due to the anthropogenic or human-caused factors such as road salt, sewage contamination and water softeners. Nitrate value of water varies from 43-170ppm, mean of nitrate is 88.33 in pre monsoon and 38-250ppm, mean of 103.62 in post monsoon. The main cause for increase in nitrates may be due to the large number of well constructions, well location, overuse of chemical fertilizers, or improper disposal of human and animal waste. Total alkalinity value of water varies from 200-900mg/l, mean of total alkalinity is 509.44 in pre monsoon and 250-780mg/l, mean of total alkalinity is 498.12 in post monsoon. The total hardness value of water varies from 120-800mg/l, mean of total hardness is 287.55 in pre-monsoon and 110-780mg/l, mean of total hardness is 279.75 in post-monsoon. According to WHO/BIS standards, the Total hardness was found to be exceeding the permissible limits i.e. 200ppm. The reason for the increase in total hardness may be due to a large number of dissolved polyvalent metallic ions from sedimentary rocks, seepage and runoff from soils. Calcium and magnesium, the two principal ions, are present in many sedimentary rocks, the most common being chalk and limestone. The calcium hardness value of water varies from 56-620mgl/l, mean of Ca hardness is 191.44 in pre monsoon and 50-610mg/l, mean of Ca hardness is 186.25 in post-monsoon. Mg hardness value of water varies from 20-190mg/l, mean of Mg hardness is 96.11 in pre-monsoon and 20-170mg/l, mean of Mg Hardness is 93.5 in post-monsoon. The phosphate value of water varies from 0.16-0.98mg/l, the mean of phosphate is 0.55 in pre-monsoon and 0.42-0.96mg/l, mean of phosphate is 0.72 in post monsoon. The sulphate value of water varies from 18-93mg/l, mean of sulphate is 47.61 in pre monsoon and 15-90mg/l, mean of sulphate is 47 in post monsoon. Carbonate value of water varies from 0-360mg/l, mean of carbonate is 136.66 in pre monsoon and 0-360mg/l, mean of carbonate is 86.25 in post monsoon. Bicarbonate value of water varies from 20-800mg/l, mean of bicarbonate is 367.77 in pre monsoon and 90-660mg/l, mean of bicarbonate is 411.87 in post monsoon. Uranium value of water varies from 1.1-13.1ppb, mean of uranium is 4.09 in pre monsoon and 2.4-15.6ppb, mean of uranium is 5.8 in post monsoon. The total hardness, fluoride, chloride, nitrate, total alkalinity level was found to be higher than the prescribed limit 200ppm, 1ppm, 250mg/l, 45ppm and 200ppm whereas other physic-chemical water quality parameters were found to be within the permissible limit. The minimum uranium value was establish to be 1.1 ppb and maximum uranium value was establish to be 13.1ppb, mean value of uranium is 4.09 in pre monsoon and the minimum uranium value was establish to be 2.4ppb and maximum uranium value was established to be 15.6ppb, mean value of uranium is 5.8 in post

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monsoon in the study area. The uranium level determined for some villages areas of Atru tehsil of Baran districts of Rajasthan was established to be within the permissible limit. Fig.6 to 9 shows correlation of the Uranium with F^-, NO_3^-, SO_4^-, PO_4^{-3} in drinking water samples in pre monsoon and post monsoon in the study area.

Human Health Impact of Uranium

Uranium is a radioactive element that discharges first and foremost alpha particles and is correlated with many health risks. Uranium is a deadly chemical only if it is taken in to the body as it is an alpha emitter. The Uranium adulterate water does not cause any radiological effects although chemically it can affect the human body. Kidneys are the primary attack of uranium contamination. A higher Uranium trace causes the failure of the functioning of the kidneys. The passage between the pharynx and stomach cancers are also an effect of regularly consumption of uranium pollute water [23].

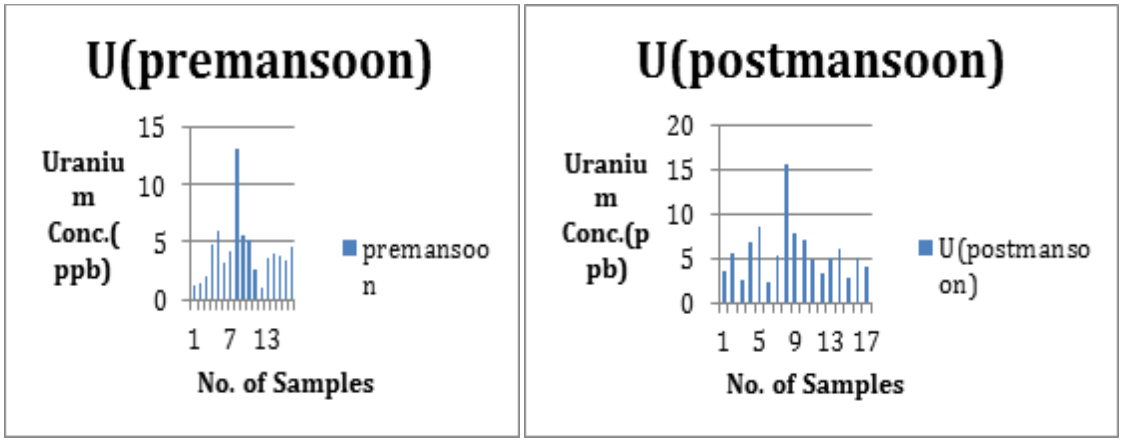

Fig. 2 and 3: Spatial distribution of uranium in groundwater samples during pre and post monsoon of atru tehsil of baran district

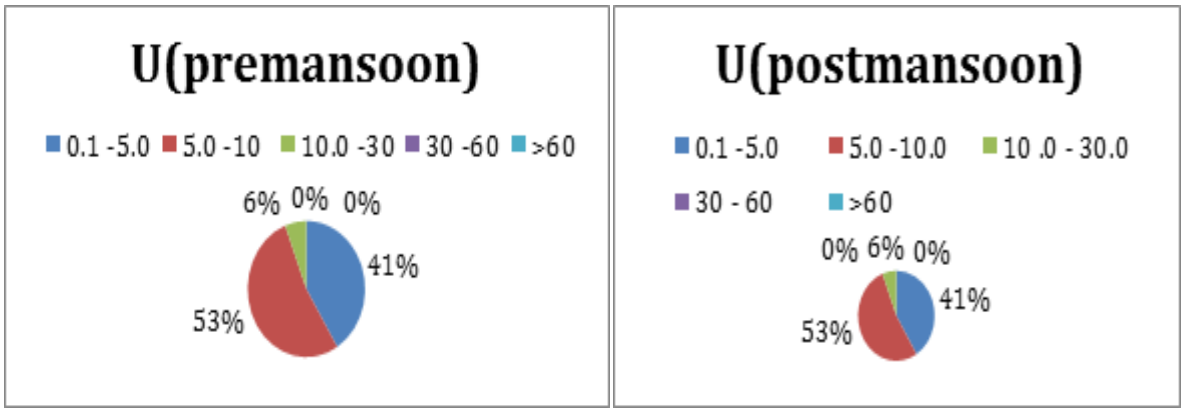

Fig.4 and 5: Percentage of uranium in groundwater samples under uranium range (pre and post monsoon)

Correlation coefficient = r

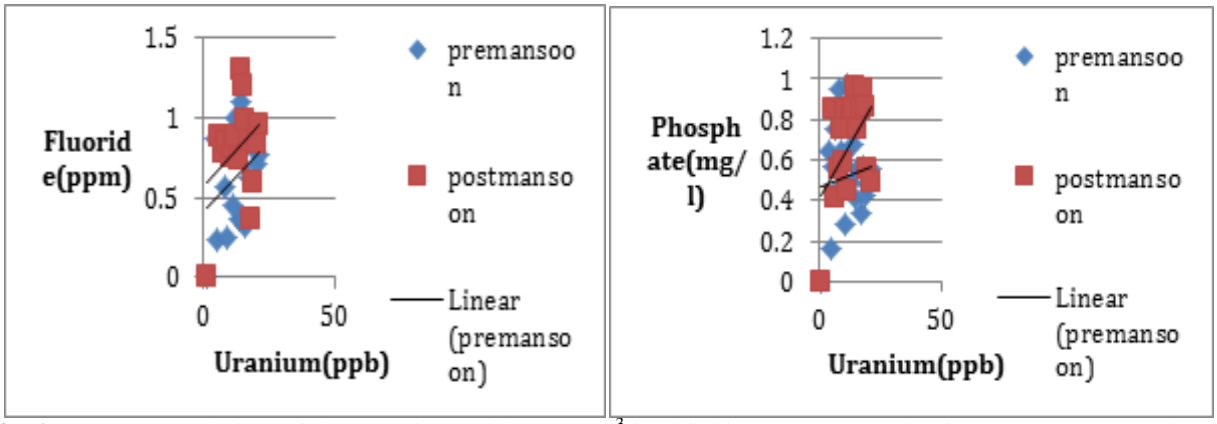

Fig.6 and 7: Correlation of the Uranium with F^-, PO_4^{-3} in drinking water samples in pre monsoon and post monsoon (r = 0.217269 (pre mansoon), r = 0.36377(post mansoon) and r = 0.01474 (pre mansoon), r = 0.325635(post mansoon))

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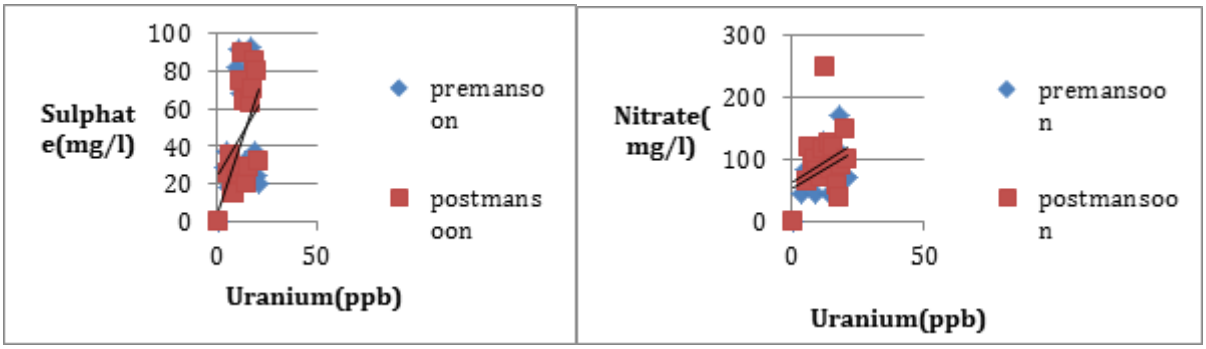

Fig.8 and 9: Correlation of the Uranium with Sulphate, Nitrate in drinking water samples in pre monsoon and post monsoon (r = 0.257513 (pre mansoon), r = 0.321573 (post mansoon) and r = 0.362589 (pre mansoon), r = 0.701957(post mansoon))

Table.1: Summary of Maximum, Minimum, Mean, Median, Mode of Uranium and Physico-chemical water quality parameters in Atru tehsil of Baran district of Rajasthan, India (pre monsoon and post monsoon).

Parameter	Pre-monsoon						Post-monsoon						BIS/WHO limits
	Maximum	Minimum	Mean	Median	Mode	STDEV	Maximum	Minimum	Mean	Median	Mode	STDEV	
pH	7.89	7.23	7.55	7.53	7.45	0.17	7.78	7.18	7.45	7.46	7.35	0.16	6.5-8.5
TDS(ppm)	1601	667	996.67	911.15	-	265.21	1327	616.1	907.56	855.35	-	213.57	500
EC(µS/cm)	1588	663.4	983.27	906.65	-	257.42	1276	600	872.41	826	-	208.64	-
ORP(mV)	161.5	35.2	78.05	74.10	-	31.35	162.2	36.10	79.75	74.7	44.2	33.03	-
Temp.	33.8	20.8	31.63	32.4	32.4	2.78	21.8	19.4	20.63	20.6	20.4	0.83	-
Salinity(ppm)	2456	220	596	447	663	531.76	1366	618.3	918.10	884.10	-	213.13	-
DO(%)	8.34	3.26	6.66	5.81	-	1.17	8.26	5.36	7.16	7.21	-	0.74	-
Fluoride(ppm)	1.1	0.23	0.66	0.36	0.36	0.27	1.3	0.36	0.85	0.84	0.89	0.21	1.0
Chloride(ppm)	1100	42	294.38	195	157	273.36	1000	39	294.93	225	140	259.46	250
Nitrate(ppm)	170	43	88.33	85	45	33.54	250	38	103.62	95	120	48.18	45
Total alkalinity(mg/l)	900	200	509.44	530	450	184.78	780	250	498.12	490	490	149.18	200
Total Hardness(mg/l)	800	120	287.55	235	180	169.18	780	110	279.75	245	-	172.66	200
Ca Hardness(mg/l)	620	56	191.44	135	100	134.87	610	50	186.25	120	120	141.23	-
Mg Hardness(mg/l)	190	20	96.11	103	120	50.29	170	20	93.5	105	110	47.77	-
Phosphate (mg/l)	0.97	0.16	0.55	0.56	0.64	0.20	0.96	0.42	0.72	0.80	0.85	0.18	-
Sulphate(mg/l)	93	18	47.61	34.5	37	27.44	90	15	47	33.5	25	27.08	200

Carbonate (mg/l)	360	0.0	136.66	180	0.0	112.77	360	0.0	86.25	80	0.0	100.05	-
Bicarbonate (mg/l)	800	20	367.77	330	-	221.18	660	90	411.87	420	650	165.98	-
Uranium(ppb)	13.1	1.1	4.09	3.91	4.10	2.66	15.6	2.4	5.8	5.25	5.10	3.21	60(AERB)

CONCLUSION

Uranium levels were established to vary from 1.1-13.1ppb in pre monsoon and 2.4-15.6ppb in post-monsoon respectively. Hence the ground water samples analyzed by LED Fluorimeter in the present study of Atru tehsil of Baran districts of Rajasthan, India were found suitable as ground water but it is recommended that the water requires proper treatment drinking water treatment devices can be used to remove specific contaminants, such as uranium, from drinking water. There are drinking water treatment devices available to reduce the levels of uranium in drinking water to levels below the guideline level of 0.02 mg/L. A water treatment professional should be consulted for advice on a particular situation so that they will be provided with an accurate cost of the available systems, based on specific water quality. If the levels of Uranium exceed its permissible limits, then techniques like Reverse osmosis which is a process that filters most impurities from water by passing it through a very fine membrane. Contaminants such as uranium are left behind on the membrane while treated water passes through. You may need to install a pre-filter before the reverse osmosis system and also distillation system works by boiling water into water vapors, then returning it to its liquid state. The minerals and contaminants such as uranium form scales and are trapped in the boiling chamber. However, it is well within the safe standard limit of BIS, WHO, USEPA and AERB.Uranium with fluoride nitrate, sulphate, phosphate weak positive correlation during pre-mansoon and post-mansoon in the study area. These types of significant positive correlation between the ions indicated that the ions are from the same source of origin. Times to time quantitative and qualitative measurements are needed to constantly monitor the physic-chemical water quality parameters from the various groundwater sources to adopt appropriate remediation strategies [(24)].

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NATIONAL EDUCATION POLICY – 2020: ISSUES & CHALLENGES

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ABSTRACT
For the sustainable development of India, it is imperative to provide quality and modern education to all to lead the world in the areas of economic development, social justice and equality, scientific progress, national integration, and preservation of Indian culture. To provide good quality education opportunities to all the future of our country depends on its capacity.

Goal 4 (SDG4) of the Sustainable Development Action Plan (SDG4) adopted by India in 2015 includes the 'Global Education Development Action Plan', aimed at "ensuring inclusive and equal quality education for all and promoting sustainable learning opportunities for all" by 2030. Is about to do. To achieve this, the entire education system is essential needs to be redesigned. Only then can all the important goals and objectives of the Sustainable Development Action Program 2030 be achieved.

The National Education Strategy 2020 is the first such education policy of the 21st century that can easily address important developmental issues in the country. The stated objective of this policy is to create a quality and practical education system that will make India a global knowledge superpower.

Keywords: The structure of school education, new formula, New Teaching Method, Language, vocational education, and child psychology, Interdisciplinary education, Rules regarding examination, issues & Challenges.

INTRODUCTION
Former ISRO chief K. A committee chaired by Kasturirangan has drafted a 'New Education Policy 2020' and announced it in India. Earlier in India, first National Education Policy in 1968, Second National Policy in 1986, then formation of 'National Education Policy Action Plan' committee under the chairmanship of Acharya Ramamurthy in 1992, 86th Amendment in 2002, then Right to Education Act in 2009. Attempts have been made to bring about various changes and innovations in this education policy. But in the true sense of the word, after 34 years, an innovative and modern 'New Education Policy 2020' has been announced in the country. Under the new Education Policy 2020, radical changes have been made in the structure of school and higher education. Education courses have been taken out of the framework of different disciplines and made interdisciplinary and coordinated. This simply means that higher education can now be completed by taking both engineering and music subjects at the same time. According to the new education policy, scientific approach will be developed in school children and importance has been given to impart necessary skills for the 21st century.

The Issues of New Education Policy-2020:
Under the New Education Policy 2020, radical changes have been made in the structure of school and higher education. Education courses have been taken out of the framework of different disciplines and made interdisciplinary and co-ordinated. This simply means that now, one can complete higher education by pursuing both engineering and music at the same time. According to the new education policy, scientific approach will be developed among the school students and importance has been given to imparting essential skills for the 21st century.

New Structure of School Education, New Formula:
According to the provisions of this policy, students in the age group of 3 to 14 years have come under the ambit of Right to Education Act. Earlier this age group was 6 to 14 years.

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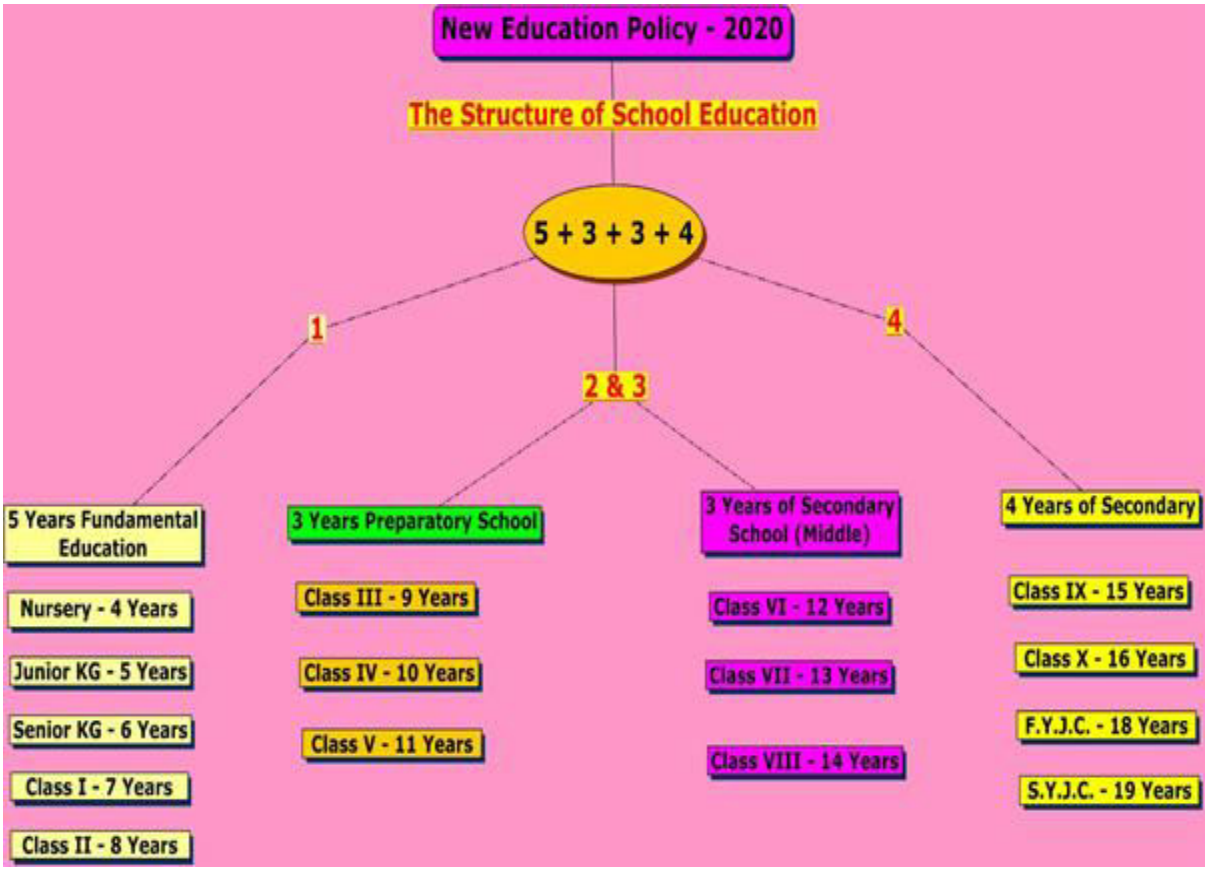
The Structure of School Education Will Now Be 5 + 3 + 3 + 4.



How Will Education Be Delivered?

According to the above new formula of education, you must have noticed that Anganwadi has now been added to primary education. Education in the age group 3 to 8 will be considered as basic education and child friendly education and curriculum will be developed for it. Anganwadi schools will be linked with pre-primary classes. Efforts will be made to link pre-primary schools with primary schools wherever possible. Where existing Anganwadis and pre-primary schools fail to implement the new curriculum, new independent pre-primary schools will be set up with all facilities and necessary facilities for intellectual, mental, and physical development of the child between the ages of 3 and 6 along with education. For children aged 3 to 8, learning will be done through activities, games, and flexibility. Efforts will be made to impart basic literacy and numeracy in children till the completion of pre-primary education.

Language Preference

Three language system of education will be introduced after class VI. In which local language will be preferred. In regions where Hindi is not spoken, Hindi language education will be given preference, while in Hindi speaking regions, any other recognized Indian language will be given preference. Now students up to class V will be taught only native language, local language, and national language. Remaining subject though it is English will be taught as one subject.

Vocational Education

Vocational education will be included in school education. Five hours of extra education per week under the "National Education Programme" will be provided to the gifted children in schools and remedial education will be provided during and after regular school hours for children who are behind the expected ability.

The student teacher ratio will be kept at 30:01 to ensure proper attention to each student.

Libraries and reading rooms will be set up in public places and schools all over the country to give priority to reading and the growth of knowledge through it.

Child Psychology

A social worker and a psychologist should be appointed in each school to monitor the attendance and mental status of the children, and to maintain continuity.

It is also necessary to provide the necessary infrastructure to the schools to achieve the desired goals.

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Interdisciplinary Education
The new education policy proposes a four-year course by combining 9th to 12th, abolishing the branch-wise distinction of Arts, Commerce and Science, and making it a total course of eight semesters, with Language, Mathematics and Science as compulsory subjects and any other subject of your choice. Students can choose.

Promotion of Indian Languages, Arts, and Culture
The promotion of Indian arts and culture is important not only for the nation but also for the individual. Cultural ess and expression are among the major competencies considered Important to develop in children, to provide them with a sense of identity, belonging, as well as an appreciation of other cultures and identities. It is through the development of a powerful sense and knowledge of their own cultural history, arts, languages, and traditions that children can build a positive cultural identity and self-esteem. Thus, cultural awareness and expression are important contributors both to individual as well as societal well-being.

Online and Digital Education: Ensuring Equitable Use of Technology
National Education Policy 2020 recognizes the importance of leveraging the advantages of technology while acknowledging its potential risks and dangers. It calls for carefully designed and appropriately scaled pilot studies to determine how the benefits of online/digital education can be reaped while addressing or mitigating the downsides. In the meantime, the existing digital platforms and ongoing ICT-based educational initiatives must be optimized and expanded to meet the current and future challenges in providing quality education for all.

Professional Education: -
Preparation of professionals must involve an education in the ethic and importance of public purpose, an education in the discipline, and an education for practice. It must centrally involve critical and interdisciplinary thinking, discussion, debate, research, and innovation. For this to be achieved, professional education should not take place in the isolation of one's specialty. Professional education thus becomes an integral part of the overall higher education system. Stand-alone agricultural universities, legal universities, health science universities, technical universities, and stand-alone institutions in other fields, shall aim to become multidisciplinary institutions offering holistic and multidisciplinary education. All institutions offering either professional or general education will aim to organically evolve into institutions/clusters offering both seamlessly, and in an integrated manner by 2030.

Direct Phd Now: -
Flexibility has also been introduced in higher education and interdisciplinary subjects can be studied together in colleges and universities. Education can be stopped at any stage. The marks of that education will be retained, and further education can be taken after some time. For students who want to do research, there will be a 4-year course. After that there will be no need to do M.Phil., one can directly take admission for PhD. Otherwise, degree can be taken in 3 years.

A Single Governing Body: -
This is a major decision taken in the new national policy. At present, different regulatory bodies are functioning for different courses in higher education, instead there will be a single regulatory body (except for law and medical disciplines). Like America, a National Research Institute will be established in India to give importance to researchers and improve their quality. Not only science but also research in sociology will be financially supported. The standard of higher education in the country will be taken to international level.

It will increase communication with students from foreign quality educational institutions and educational exchange can also take place. This will lead to a coherent education system. Financial support will be provided to various critical elements and components of education, such as ensuring universal access, learning resources, nutritional support, matters of student safety.

Fees Will Be Fixed By the Government
The Union Ministry of Education has set a target of starting at least one multidisciplinary interdisciplinary college in every district by 2030. Until now, the degree was taken by taking the subjects of a single branch, now the degree will be completed by taking the subjects of multiple disciplines simultaneously. Not only universities but also colleges will have multi-disciplinary courses so the fees will be fixed accordingly. Similar conditions are to be fixed for charging fees of government as well as private educational institutions. Fees will be fixed within that framework and a ceiling will also be put on the fees. This will give great relief to the parents. In the education system, quality, equality, and integration are paramount, it will be possible to make up for it by making major improvements.

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The Challenges of 'New Education Policy - 2020': -

Although the new education policy has many diverse merits, some potential risks or drawbacks must be noted.

i. Education may be privatized – the PPP model of education sector will fall into the hands of corporates and monies.

ii. Old educational institutions in the country will be closed and new institutions will be established.

iii. The number of foreign universities will increase, and this will create a specialized education sector (SEZ).

iv. All levels of reservation will be banished

v. Poor and backward students will not get tuition fee concession

vi. Malpractices in teacher recruitment will increase

vii. In this policy, there is no mention about the appointment, salary, service protection, promotion, and pension etc. of teachers, professors, and other employees.

viii. Poor students in rural and remote areas are likely to be excluded from school and vocational education due to inadequate resources.

ix. The current public (Government - Centre and States) expenditure on education in India has been around 4.43% of GDP. It is not possible to say for sure how much more will be added.

x. It cannot be said for sure that this new policy will get proper and complete response from all levels in India.

xi. The size of the school education system, and the higher education system is also large. Bringing together all the stakeholders at the state, district, and taluka levels to implement this new education policy is going to be an exceedingly challenging task. Creating a sense of shared responsibility and ownership among the diverse stakeholders at the state and district level will be a major challenge for the Ministry of Education.

xii. K. As pointed out by the drafting committee headed by Kasturirangan, India's education system is underfunded, and the entire system is based on bureaucracy and the environment is hostile to innovative ideas and growth potential in the education system.

xiii. The existing organizational structure and system of the Ministry will have to undergo a major overhaul.

xiv. This policy will depend on the cooperation between the Centre and the States. Its implementation depends on the active cooperation of the States.

CONCLUSION

The new education policy will help develop the capabilities and skills of 21st century students to fulfil their aspirations and goals. Through this policy, it will be possible to improve the quality of students, develop them holistically, enhance technological knowledge, make students self-reliant and accelerate their economic development. Also, this policy will preserve, promote, and respect Indian culture. There will be knowledge and skill creation, enhancement of research and effective use of technology. As this policy is up to date, it will help to make learning lively, enjoyable, and practical for the students. Although many changes in this policy seem noble, revolutionary, modern, and effective and appropriate in the age of information technology, the reality is that the real success of this policy will depend on the test of time to come.

The New Education Policy 2020 is certainly a guiding document. Considering the new challenges of the new age, the policy aims to address diverse educational needs, structural disparities and prepare students for the future. Along with this, the most challenging task of facing many crises in the education system is also to be completed through this policy.

In a way the implementation of the new education policy has now become an especially important part, this policy will play a significant role in creating a new India and a future ready youth generation.

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ASSESSMENT QUALITY OF LIFE OF DIABETICS IN MOROCCO: ABOUT 140 CASES

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ABSTRACT
The prevalence of diabetes is increasing, from 6.4% in 2010 to 7.7% of the world's population in 2030.

In this study we are interested in measuring the physical, mental and social scores to assess the quality of life of Moroccan diabetics.

Cross-sectional study of 140 diabetic patients followed at the Mohamed V Military Instruction Hospital in Rabat from the first of November until the end of December 2019. The quality of life is analyzed with the SF 12 quality of life scale. We looked at the assessment of the physical, mental and social scores in diabetic patients. In terms of patient demographics, we analyzed age and sex, and for diabetes characteristics we looked at the type of diabetes and length of illness. To assess the physical quality of life score, we measured general health, physical pain, physical functioning and physical limitation, and to assess the mental and social score, we measured mental health, vitality, social functioning, and emotional limitations.

The average age was 56 ± 11.9 years with 65% of men. The mean time to progression of diabetes was 9.62 ± 7.12 years. Diabetes was type 2 in 92% of patients. The result showed a mediocre physical quality of life and a good psychological quality of life. Quality is related to age, sex, and length of illness.

Keywords: diabetes, quality of life, sex, age.

1, INTRODUCTION

Diabetes is a major public health problem. The World Health Organization (WHO) describes it as a growing epidemic on a global scale. Morocco is strongly affected by the disease; the prevalence rate is 12.6% for men against 12.3% for women. Diabetes affects all social environments. Its effects are manifested in everyday life, both physically, mentally and socially [1].

The global prevalence of diabetes has almost doubled since 1980, from 4.7% to 8.5% in the adult population. The WHO estimates that 422 million adults were living with diabetes in 2014 compared to 108 million in 1980. The prevalence of diabetes is increasing, from 6.4% in 2010 to 7.7% of the world's population in 2030.

These figures indicate an increase in associated risk factors such as overweight or obesity. Early diagnosis is the starting point for living well with diabetes.

The quality of life in relation to health (QVRS) measure is an essential complement to medical evaluation. In recent years, the measurement of the quality of life in the field of health is becoming widespread, while few studies have focused specifically on the emotional experience of diabetics.

2. PATIENTS AND METHODES

This is a cross-sectional study of 140 cases, our target population consisted of type 1 and 2 diabetic patients aged 20 years and over consultants at the Mohamed V Military Instruction Hospital in Rabat.

The data collection was done during the diabetology consultations at the Mohamed V Military Instruction Hospital in Rabat.

This study is based on a generic SF-12 quality of life questionnaire, a shortened version of SF-36 filled out by patients for two months from November 1st to the end of December 2019.

The quality of life is analyzed with the SF 12 quality of life scale (Short Form).We looked at the assessment of the physical, mental and social scores in diabetic patients. In terms of patient demographics, we analyzed age and sex, and for diabetes characteristics we looked at the type of diabetes and length of illness. To assess the physical quality of life score, we measured general health, physical pain, physical functioning and physical limitation, and to assess the mental and social score, we measured mental health, vitality, social functioning, and emotional limitations.

The 12 items of the questionnaire are coded, the analysis of this coding requires 2 recordings: the first record the ordinal values in a scale from 0 to 100. The second is a grouping of the 12 questions.

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The higher the score in each area, the better the quality of life.

3. RESULTS

The assessment of the quality of life of type 1 and 2 diabetic patients is based on the analysis of data and characteristics of diabetic patients who consulted at the Rabat Military Hospital.

In this study, we looked at the evaluation of the mental and social and physical scores in diabetic patients.

Our sample consisted of 65% male with a sex ratio H / F = 1.86.

The results of the study show that the average age was 56 ± 12 years, with extremes ranging from 20 to 95 years.

Our study was based on both types of diabetes 1(DID: insulin-dependent diabetes) and type 2 (DND: diabetes insulin dependent), type 2 representing 92% of the sample.

One hundred and forty diabetics responded to the generic SF-12 questionnaire. The questionnaire allowed us to calculate an average mental and social score of 60.11 ± 18.48 with a minimum score of 16.25 and a maximum score of 97.50. Sixty-three percent of subjects studied their mental health is excellent against those who have poor mental health that presents only 2.1%. The average score for mental health is 72.35 ± 15.80. For emotional limitations, we have an average of 53.93 ± 48.75. According to these results, 51% of diabetics were in very good emotional condition. Social activities (life and relationships with others) are quite good with an average of 56.97 ± 24.19, the majority of patients have a good social health status, especially regarding relationships with others and with their families. The vitality score in the population is modest with an average of 59.14 with no difference between men and women with scores 59.3 and 58.8 respectively. The results of the descriptive analysis on the different measures of mental and social score are summarized in Table 1.

Table 1: Results of different measures of mental score, length of illness and age (n=140) .

Dimensions	Average	Standard deviation	Min	Max
Age	55,96	11,9	20	85
Lenght of illness	9,62	7,12	1	31
Mental Health	72,35	15,80	20	100
Social funtioning	56,93	48,75	0	100
Emotional limitation	53,17	49,26	0	100
Vitality	59,14	27,7	20	100
mental score	60,11	18,48	16,25	97,50

The comparative study of the mental score according to age shows that young people [20-45 [perceive their quality of mental and social life less than the elderly (Figure 1), this result can be explained by the fact that young people are more affected by type 1 diabetes, which further impairs the quality of life.

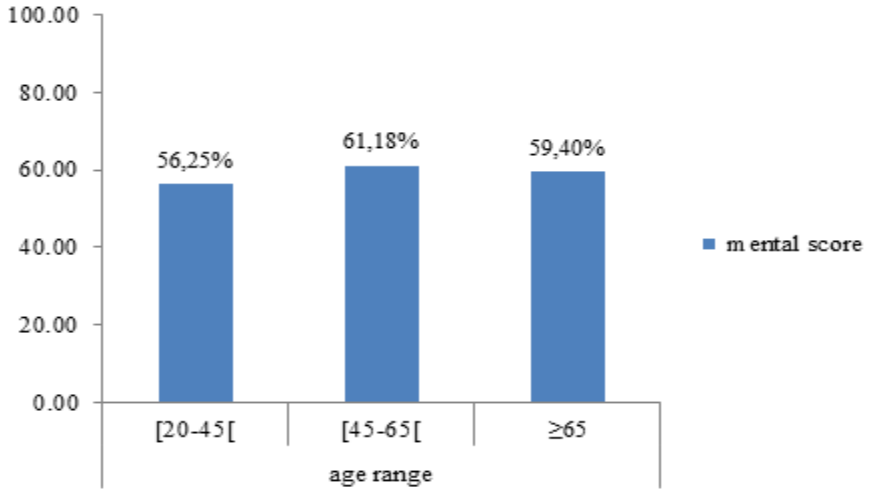

Fig. 1: Comparison of mental and social score by age range (n=140).

The comparative study of sex scores shows the existence of a difference between men and women. In general, men express a better quality of life compared to women for all age groups (Figure 2). The mental and social score of men is higher at 61.95 than that of women at 56.69, p≤0.01.

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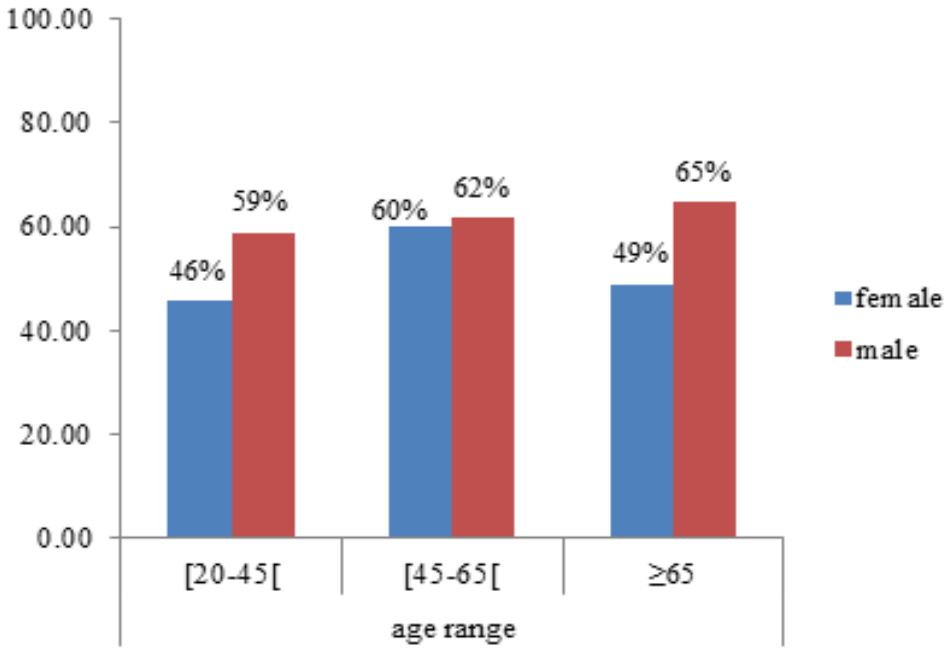

Fig. 2: Comparison of mental and social score by gender and age range (n=140).

Regarding the mental and social score, the score in type 1 diabetics was lower than in patients with type 2 diabetes with T1D scores: 56.70 and T2D: 60.40; This explains why patients with type 1 diabetes have poor mental health compared to patients with type 2 diabetes (Figure 3).

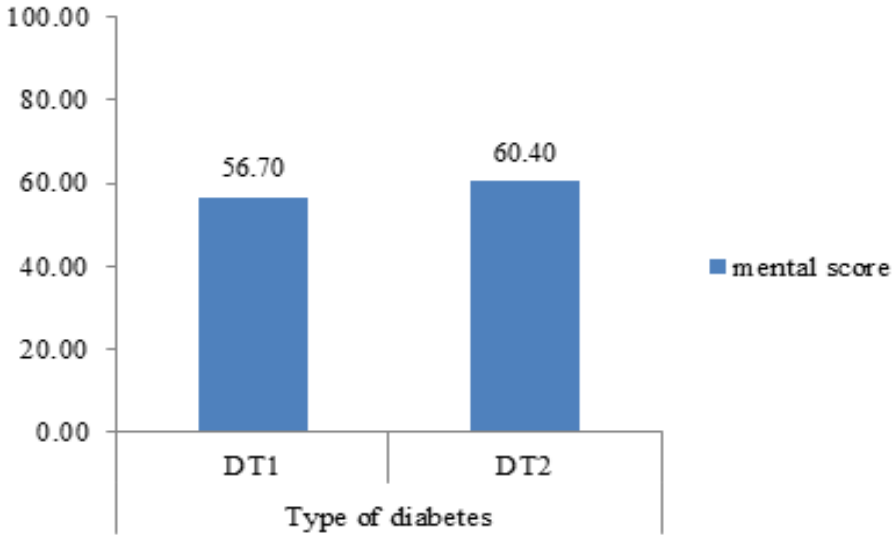

Fig. 3: Comparison of mental and social score by type of diabetes (n=140).

One hundred and forty diabetics responded to the generic SF-12 questionnaire. The questionnaire allowed us to calculate a physical summary score average of 52.66 with a minimum score of 6.25 and a maximum score of 100. Forty-seven percent of the subjects studied their general health is mediocre against those with excellent general health who present only 2%. The average score for general health is 47.35 ± 20.46. For limitations due to physical condition, we have an average of 45.17 ± 49.26. Based on these results, 44% of diabetics were in good physical condition. In addition, for the scores obtained for physical pain, we note that the majority of the population suffer significant physical pain with an average of 62.50% of the population. The results of the descriptive analysis of the different measures are summarized in Table 2.

Table 2: Results of different measures of physical score (n=140).

Dimensions	Average	Standard deviation	Min	Max
General health	40	20,46	0	100
Phsical	63,21	35,41	0	100

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funtioning				
Physical limitation	45,17	49,26	0	100
Physical pain	62,50	27,7	0	100
Physical score	52,65	28,58	6,25	100

The comparative study (Figure 4) shows a decrease in physical activity with age. The first two age groups have high values (53, 43 and 53, 47), while people over 65 years have a lower score (49, 47), this difference in scores between categories of age is highly significant ($p \leq 0.01$).

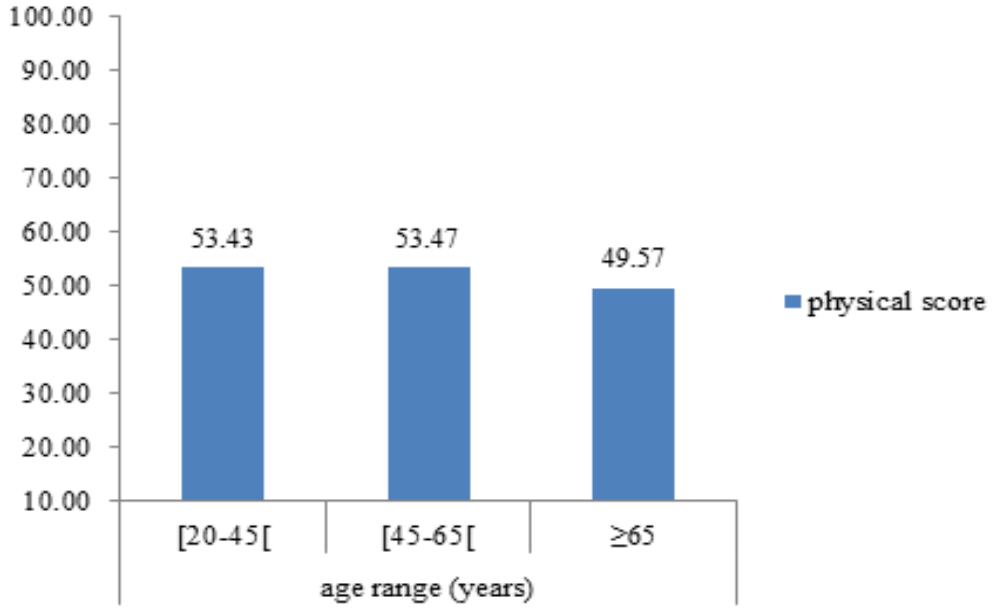

Fig. 4: Comparison of physical score by age group (n=140).

The comparative study of SF-12 scores by sex (Figure 5) shows the existence of a difference between men and women. In general, men express a better quality of life compared to women for the different dimensions measured (p≤0, 01).

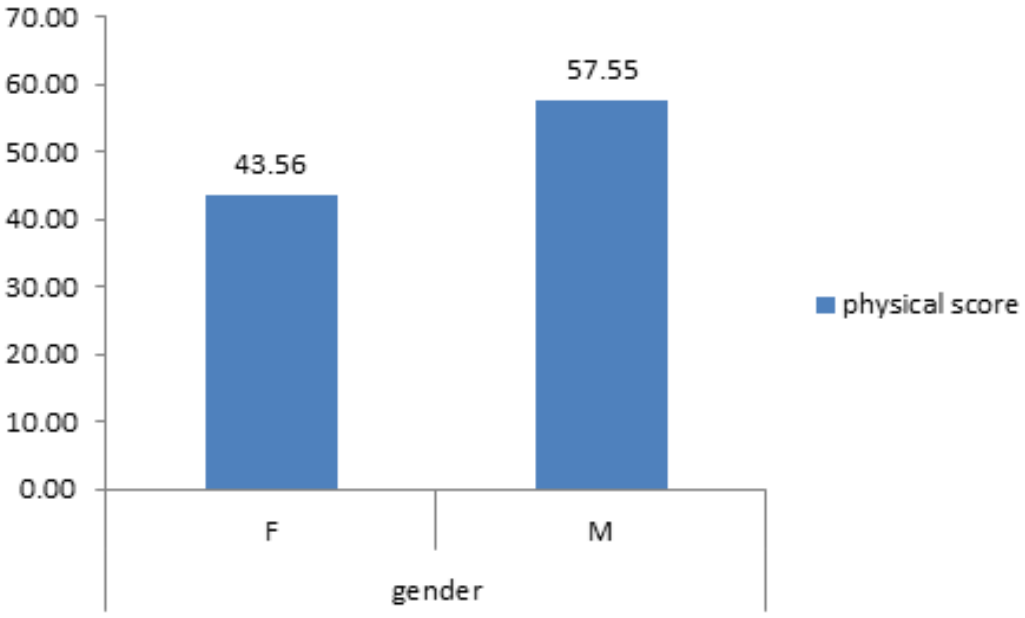

Fig. 5: Comparison of physical score by gender (n=140).

The comparison of the physical scores of the two types of diabetes involved in the DID and DND study, showed that the majority of patients with type 2 diabetes had a more or less better physical score than patients with type 1 diabetes with scores 52, 79 and 51.14 respectively, (Figure 6).

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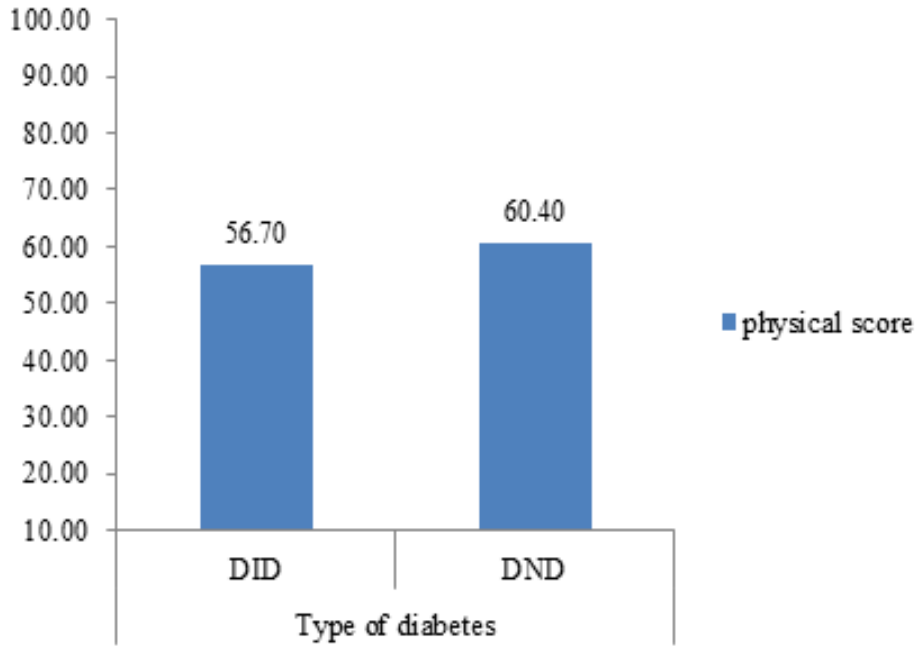

Fig. 6: Comparison of physical score by type of diabetes (n=140).

4, DISCUSSION

The quality of life related to health has become a very important element in the management of chronic diseases, particularly diabetes. We performed a cross-sectional work that aims to assess the quality of life of diabetic patients and to detect factors associated with their quality of life in order to compare them with data from the literature [2].

Many measurement tools have therefore been developed, the methodological difficulty is major since it is a question of obtaining a quantitative measure of a purely qualitative, subjective and very personal concept [3].

In general, the quality of psychic life in relation to health in our population is rather good. Patients with type 2 diabetes have a psychic score that is at least higher than that of patients with type 1 diabetes, as the latter seriously affects the quality of life of these patients and especially if the diabetes is old, this finding is identical to that reported by other studies [4].

The results of our study show a significant association between psychic quality of life and sex, women perceive poorly their quality of psychic life than men and that men over 65 have a good perception of the majority of domains. Measured for the mental and social score, these results are similar to those in the literature [1].

The scores corresponding to social functioning, emotional limitations, and vitality, dimensions mainly related to mental and social health are lower in women compared to men. This observation is identical to that reported by other studies. The psychic score was higher in men than women, with (67.69; 62).

The impact of diabetes was not limited to the emotional field, but affected especially relational life and leisure. There were globally few differences regarding the impact of diabetes, according to the type of diabetes, but the switch to insulin therapy was perceived as a penalty for a poor therapeutic compliance. These results encourage to better take into account psychosocial aspects of diabetes and to integrate this component in a more patient centered medicine [5]**.**

Illness perception is associated with feelings of loss, constraints and restrictions, especially regarding food. Patients, especially those treated by insulin or insufficiently controlled, often expressed a negative emotional impact. They nevertheless could express positive feelings and exhibit a positive perception of insulin, especially those who were characterized by a satisfactory glycemic control [6; 7].

The DAWN2™ study has, among others; approach underlines the need for considering the care of a chronic disease like diabetes from a point of view not only biomedical, but also bio-psychosocial [8].

The results of our study are similar to those of the literature [10, 11]. Patients with type 2 diabetes have a physical score that is at least higher than that of patients with type 1 diabetes, as the latter seriously affects the quality of life of these patients and especially if diabetes is old, this finding is identical to that reported by other studies [12].

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The most significant results from our study show that people over 65 have a poor perception of the majority of the measured domains, especially those related to physical health and relationships with others, these results are similar with those of literature [13, 14]. In the elderly, the decline in health, particularly physical, is attributed to the natural aging process, which is a fertile ground for the development of diseases whose effects worsen with age, often leading to comorbidities in addition to changes in social and professional life;

The youth class [20-45 [have near-balanced physical health scores, which seems logical given their young age, is a better perception of their physical health.

The scores for physical functioning, physical limitations, and physical pain, dimensions mainly related to physical health are lower in women compared to men. This finding is identical to that reported by other studies [15, 16, 17], such as the ENTRED 2007-2010 study, which showed that the physical score was higher in men than in women (43 vs 38) respectively and that this physical score decreased with age. Being elderly, being a woman, having income deemed to be inadequate, altered the quality of life. Overall, the existence of diabetes complications was linked to an impairment of quality of life [18].

5, CONCLUSION

In conclusion, diabetes is a chronic condition that causes an impairment of the quality of life of patients who have it. This finding is identical to that reported in other countries [9].

The deterioration of quality of life worsens with age and length of illness. The young age of the patients, the male sex, the less old diabetes and balanced with simple hygienic-dietary measures, the absence of previous complications, a good follow-up, are associated with a better quality of diabetic life. This study is preliminary result of a more important investigation.

Conflict of interest: No conflict of interest

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DIAGNOSIS AND CLINICAL MONITORING OF SYSTEMIC LUPUS ERYTHEMATOSUS

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ABSTRACT

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that can affect any organ or tissue in the body.

In disease development and activity, genetic predisposition, environmental triggers, and the hormonal milieu al interact.

Clinical manifestations and organ involvement patterns are highly variable, reflecting the complex mosaic of di srupted molecular pathways that culminate in the SLE clinical phenotype.

The pathogenesis of SLE is complicated by the presence of autoantibodies and immunocomplexes, activation of the complement system, dysregulation of several cytokines, including type I interferons, and disruption of nuclei c acid clearance after cell death.

Immunomodulators and immunosuppression have altered the natural progression of SLE.Furthermore, morbidi ty and mortality in SLE are caused not only by direct immune-
mediated tissue damage but also by SLE and treatment-
related complications such as accelerated coronary artery disease and increased infection risk.In this section, we discuss the diagnostic approach, as well as the etiopathogenetic rationale and clinical evidence for SLE management.

This includes 1) lifestyle changes such as avoiding UV light; 2) prevention of co-morbidities such as coronary artery disease, osteoporosis, infections, and drug toxicity; 3) use of immunomodulatory (such as hydroxychloroquine and vitamin D), and 4) immunosuppressants and targeted therapy. We also go over new upcoming agents and regimens that are currently being tested.

Keywords: Lupus erythematosus, diagnosis, treatment.

INTRODUCTION

The classic autoimmune disease is systemic lupus erythematosus (SLE).

Sustaining autoimmune process results from a complex interaction of impaired apoptotic clearance, upregulatio n of the innate and adaptive immune systems, complement activation, immune complexes, and tissue inflammat ion.

Multiple pathogenic mechanisms are likely to converge on the clinical phenotypes known as SLE.

In fact, while SLE can affect many organs and tissues, the pattern of clinical manifestations and autoimmune ph enomena varies between patients and even changes over time.

As a result, diagnosis is frequently difficult or delayed, requiring keen clinical expertise to combine clinical and immunological findings.We examine classification criteria as well as current and future treatments from a mechanistic and evidence-based standpoint.

Epidemiology

Lupus is a disease that affects women of childbearing age all over the world.

The female to male ratio in women aged 15 to 44 years can reach 13:1, while it is only 2:1 in children and the el derly.

While it occurs in all ethnic groups, it is more common in non-Caucasians.

While people of African descent have a higher prevalence in Europe and the United States, SLE is uncommon i n Africa.

It is more common in African-Americans in the United States, who also have poorer outcomes. In fact, African-American women are roughly three times more likely than Caucasian Americans to have lupus and die from it. According to the Centers for Disease Control and Prevention, there are approximately 322,000 cases of probable or definite SLE, with African Americans, American Indians, and Alaska Natives having a higher prevalence.

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Pathogenesis Overview

The interaction of genetic predisposition, environmental precipitants, and immunological and hormonal factors i s required for the clinical onset of SLE.

Immune tolerance to selfantigens is lost in such a permissive environment, along with proinflammatory stimuli such as type 1 interferons and other cytokines.

Autoimmunity then develops as a result of a complex interplay between defective clearance of apoptotic waste a nd immune complexes, as well as neutrophil extracellular traps, nucleic acid sensing, disrupted lymphocyte biol ogy, and interferon pathways.50% monozygotic twin concordance and increased risk in families point to genetic susceptibility.

Many genes have been linked to a proclivity to develop lupus, typically encoding immune components such as HLA, IRF5, ITGAM, STAT4, BLK, and CTLA4, among others.

Lupus has been linked to a variety of environmental factors. UV light (the most well-known), drugs/supplements (echinacea, trimethoprim/sulfamethoxazole), smoking, infections (particularly the Epstein-Barr virus, silica, and mercury are all potential sources of harm. Additionally, stress has been linked to a 50% increase in the risk of developing lupus.

There is evidence that both the innate and adaptive arms of the immune system are disrupted in lupus. system linked in feedback loop T cells are defective, and their aberration in lupus is significant.

Hyper activation of the BLYS or BAFF pathway, The discovery of a cell-independent B cell survival pathway resulted in the development of a new biologic therapy. As will be explainedlaterfurthermore, the discovery of a strong type 1 interferon "signature" in lupus confirmed the import ance of the innate immune system.

Dendritic cells play an important role in the clearance and sensing of nucleic acids and immune complexes, whi ch are known autoantigens in lupus.Endogenous and exogenous nucleic acids, in fact, are a major antigenic stim ulus in lupus. Autoantibodies against nucleic acid-
bound antigens are one of the disease's hallmarks. Apoptosis and neutrophil extracellular traps (NETs) are the p rimary sources of such antigens.

Excess and impaired NET degradation are linked to lupus severity, lupus nephritis, anti-
dsDNA antibodies, and complement consumption.

These findings emphasized the critical role of hypersensitivity to an inability to manage nucleic acids from dyin g cells as well as immunocomplexes, resulting in the development of a "waste disposal" theory.

Diagnosis

Several sets of categorization for manifestations have been developed over time for epidemiological and scientif ic work.

Some, such as the SLICC classification criteria, which are more sensitive and thus particularly useful in early di agnosis, can, however, be included as a diagnostic framework to confirm clinical decision-making.

Classification Criteria

For more than three decades, the 1982 ACR criteria, revised in 1997, have been widely used.

The 2012 Systemic Lupus International Collaborating Clinics (SLICC) criteria were evidencebased, included a "stand alone" criterion of lupus nephritis, and required at least one clinical (acute cutaneous lupus, chronic cutan eous lupus, oral or nasal ulcers, synovitis, serositis, proteinuria or red blood cell casts, neurologic manifestations , hemolytic anemia, leukopenia or lymph for a total of four (hypocomplementemia, direct Coombs test, and hypocomplementemia),

Clinical Diagnosis

This section discusses key organ manifestations, as well as some recent developments, that are important in lup us diagnosis. There is more information and reviews of each clinical manifestation of lupus available elsewhere.

Cutaneous Lupus

In SLE, skin involvement occurs in nearly 90% of patients and includes lupus-specific manifestations such as discoid lupus, subacute cutaneous lupus, and chronic cutaneous lupus (discoid lupus, lupus profundus, chilblain lupus, and lupus tumidus). Alopecia, vasculitis, livedo reticularis, periungual telangiectasias, and Raynaud's phenomenon are examples of non-lupus manifestations. The histology of most forms of cutaneous lupus is

similar, with interface dermatitis, perivascular and periadnexial inflammation, and immunoglobulin and complement deposition at the dermo-epidermal junction. A biopsy is frequently required in the diagnosis of cutaneous lupus. In lupus, a true photosensitive rash is raised, delayed, and. It usually happens a few days after long-lasting.

Ultraviolet light exposure tends to last for more than 3 weeks and may be associated with systemic symptoms such as arthralgia or fatigue

Musculoskeletal Involvement
In over 90% of SLE cases, arthralgia and genuine synovitis are present. Most frequently, it manifests as symmetric polyarthritis affecting the knee, proximal interphalangeal, and metacarpophalangeal joints.

Monoarthritis should trigger an investigation into potential secondary causes. If sensitive imaging is not used, erosions are uncommon and are linked to anti-cyclic citrullinated peptide antibodies. By using ultrasound and MRI, it was discovered that periarticular involvement, which includes the tendons and joint capsule, is more prevalent than previously thought. This involvement can result in Jaccoud's arthropathy, a condition that can cause reducible abnormalities. Articular ultrasonography and magnetic resonance imaging may be used to measure the severity of the disease and help distinguish between fibromyalgia-related tenderness and active inflammatory disease.

Renal Disease
Renal involvement is present in about 50% of patients with lupus with a predilection for certain ethnic groups such as African-Americans (70%). Early detection and treatment are paramount since lupus nephritis is a major cause of morbidity and mortality in SLE and delayed diagnosis is a risk factor for end-stage renal disease.

Renal disease is suspected when there is proteinuria. However, lupus nephritis (class III, IV, and V) can be present in 25% of SLE patients without clinical signs of renal disease.

Urine protein levels above 500 mg/24h are associated with histopathological lupus nephritis and should prompt a renal biopsy.

Central Nervous System Disease
SLE has been linked to a wide range of neuropsychiatric symptoms. Only a few of them, however, is more specific for SLE and useful for diagnosis. These include seizures, psychosis, and hallucinations.

Multiple mononeuritis, myelitis, peripheral or cranial neuropathy, and acute confusional state. Importantly, other known causes must be ruled out.

In addition to clinical evaluation, magnetic resonance imaging (MRI) and cerebral spinal fluid analysis are important diagnostic tools. Central nervous system MRI is helpful to detect chronic microvascular changes, infarcts, hemorrhages, cortical atrophy, edema, abscesses, and transverse and longitudinal myelitis.

Cognitive impairment affects up to 80% of SLE patients.To detect cognitive impairment and/or functional disorders, formal psychometric testing and a psychiatric evaluation may be useful. Surprisingly, mild to moderate cognitive impairment is present in the majority of patients and is better at the time of diagnosis and does not worsen during follow-up. The most important correlate of cognitive impairment is depression.

MANAGEMENT

Principles
The goals of lupus treatment are to

1) Maintain the lowest level of activity possible with immunomodulators, immunosuppression as needed, and avoidance of known triggers,
2) Prevent organ damage from active lupus,
3) Reduceco-morbidities secondary to lupus and its treatment, particularly accelerated atherosclerosis, the leading cause of death, and
4) Address fatigue and pain, which are frequently unrelated to active lupus. Early treatment initiation, as well as collaboration with the patient toward these shared goals, are critical. This translates into avoiding known flare triggers, the need for sun protection, optimizing immunomodulators (hydroxychloroquine and vitamin D, including adherence monitoring), avoiding maintenance prednisone >6mg daily, and controlling the active disease with immunosuppression or biologics when necessary. In this section, we will go over the reasoning behind it.

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Immunomodulators
Immunomodulators can improve immune regulation in SLE without increasing the risk of infection or cancer.

Hydroxychloroquine—Hydroxychloroquine modulates the immune response pleiotropically by inhibiting B cell receptor and TLR signalling as well as intracellular TLR-3 and-7 activation, which is essential in nucleic acid sensing. It raises lysosomal pH, interfering with MHC-antigen binding and thus autoantigen processing, as well as cytokine secretion. By interfering with the STING pathway, hydroxychloroquine has an anti-type 1 interferon effect.

Hydroxychloroquine is the cornerstone of lupus treatment. Unless there is a clear contraindication, it should be used in all patients. It is the only medication that has been shown to improve survival in lupus patients. It has been shown to reduce lupus flares, and prevent organ damage, including cardiovascular events, the triple mycophenolate response in lupus nephritis, seizures, and the risk of developing neuropsychiatric lupus. Hydroxychloroquine alleviates skin symptoms and arthritis. Hydroxychloroquine improves lipidslowers insulin resistance and the risk of thrombosis and improves bone density.

Vitamin D—for its immunomodulatory and anti-fibrotic effects, vitamin D should be supplemented in all SLE patients with insufficiency or deficiency. The vitamin D3 receptor (VDR) mediates vitamin D immunomodulatory properties in a variety of immune cell lineages, including monocytes, dendritic cells, and activated T cells, as well as in the skin, vasculature, and other tissues. Vitamin D has an anti-inflammatory and anti-proliferative effect in vitro by promoting Th1 (TNF-, IL-2, IFN-) to Th2 (IL-4, IL-5, IL-10, GATA3) polarization as well as Th17 (IL12, IL23, IL-6, 17) to Treg (IL-10, TGF-, FoxP3, CTLA4) polarisation [132]. It has an impact on the development and function of NKT.

Vitamin D deficiency is common in SLE patients. Some VDR polymorphisms have been linked to lower serum vitamin D levels as well as SLE. Vitamin D deficiency is associated with increased disease activity and fatigue in lupus patients, as well as an increased risk of thrombosis, including antiphospholipid antibodies. Importantly, as demonstrated in an observational cohort and a randomized controlled study, vitamin D supplementation is associated with decreased proteinuria, higher complement levels, and improvement in overall disease activity in SLE. Aim for a 25(OH) vitamin D level of 40 ng/ml with supplementation. Supplementing with vitamin D is safe and should be done indefinitely. Vitamin D levels should be checked on a regular basis to determineDHEA.

Dehydroeipandrosterone—DHEA is an adrenal hormone that is regulated by ACTH. It is an important peripheral precursor of both estrogens and androgens. conversion Women with lupus have lower levels of androgens and higher levels of estrogen.independent of corticosteroid use, estradiol, lower DHEA, and DHEA-S (its metabolite). Furthermore, DHEA supplementation has been linked to the regulation of pro-inflammatory cytokines (IL-2, IL-1, IL-6, TNF-a) and may inhibit antibody production in mice.

Many of the numerous randomized clinical trials in women with SLE revealed a modest benefit. Improvement in disease activity, as well as improvements in cytokine profile and bone density DHEA, should not be used in postmenopausal women because it may cause breast cancer.increases the risk of hormone-sensitive malignancies. There is no evidence to support DHEA use in men.

Corticosteroids
Corticosteroids have an impact on all aspects of the immune system. High-dose or "pulsed" corticosteroids are essential for rapidly abating the autoimmune response in life-threatening manifestations such as nephritis, vasculitis, and central nervous system disorders.

Lupus, myocarditis, and alveolitis are a few examples. For example, in lupus nephritis, pulsedPreviously, therapy (250-1000mg IV daily for three days) was recommended in addition to there is no agreement on whether to use cyclophosphamide or mycophenolate for induction. Routine maintenance. The "rituxilup" protocol demonstrated that lupus nephritis can cause kidney damage.Remission can be achieved without the use of oral corticosteroids by using rituximab andMycophenolate suggests that corticosteroids may not be required to control even severe asthma. Lupus manifestations Only 25 mg of voclosporin were used in a recent phase 2 clinical trial.Prednisone was prescribed.Oral corticosteroids should be avoided as much as possible.

Prednisone is responsible for 80% of organ damage in lupus patients after diagnosis. Dosages of even 10 to 20 mg per day raise the risk of cardiovascular events.and any higher dose6 mg causes 50% more organ damage later in life.

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Cytotoxic-immunosuppressants

Cyclophosphamide - A highly toxic alkylating agent that depletes T and B cells and inhibits antibody production. It was previously more widely used to induce and maintain lupus nephritis and other severe lupus manifestations such as central nervous system lupus. However, less toxic immunosuppressive medications such as mycophenolate, calcineurin inhibitors, and azathioprine for nephritis and rituximab for severe central nervous system lupus have largely replaced them. Cyclophosphamide has been linked to premature ovarian failure, hemorrhagic cystitis, an increased risk of bladder and other malignancies, leukopenia, and an increased risk of infection.

Azathioprine - Azathioprineis an analogue of purine. In vivo, it is converted to 6-mercaptopurine, then to thioinosinic acid and 6-thioguanine, which are incorporated into DNA and RNA and inhibit their synthesis. Aside from its antimetabolite role, azathioprine may have a tolerogenic effect in T cells by inhibiting CD28-mediated signal 2 in T cells.

Azathioprine has been widely used to treat renal and extrarenal lupus. In two small randomized trials, azathioprine was shown to reduce mortality, flare rate, and corticosteroid use in patients with severe renal or central nervous system disease compared to corticosteroids alone. Given its inferiority to cyclophosphamide, its use in lupus nephritis induction waned in the following decades.

Methotrexate-Methotrexate is an antimetabolite that inhibits DNA synthesis, repair, and replication by binding irreversibly to dihydrofolate reductase, reducing purine synthesis. However, the mechanism of its anti-inflammatory effects extends beyond cell cycle arrest caused by folate deficiency and is not fully understood.

Co-administration of folate, for example, has no effect on efficacy while reducing side effects. Low-dose methotrexate has pleiotropic effects, including increased anti-inflammatory activity at low dosesinflammatory adenosine signalling, activated lymphocyte apoptosis, decrease in circulating pro-inflammatory T-cells, decrease in adhesion molecules on endothelial and synovial cells, reactive oxygen species, and others. Inflammatory adenosine signaling activated lymphocyte apoptosis, decreased circulating pro-inflammatory T-cells, decrease endothelial and synovial cell adhesion molecules, reactive oxygen species, and others.

Methotrexate has been used to treat lupus since the 1960s. Evidence from three sources combinedMethotrexate reduced inflammation in small randomized trials and several observational studies. Disease activity, was corticosteroid-free, was effective for joint and skin disease, andAnti-dsDNA and complement levels were improved. Methotrexate had a minor effect. Arandomized controlled trial of steroid-sparing activity.

Mycophenolate-Mycophenolate depletes guano side nucleotides preferentially in theProliferation of T and B cells is inhibited. It inhibits lymphocyte and monocyte recruitment.tissue that is inflamed It inhibits inducible nitric oxide synthase, which may reduce nitric oxide production.Macrophages mediate oxidative tissue damage. Mycophenolate is effective for lupus nephritis induction and maintenance.

According to the ALMS trial (n=140), 22.5% of patients treated with mycophenolate improved.achieved complete renal remission after 24 weeks versus 5.8% in the cyclophosphamide group. The larger ALMS lupus nephritis induction trial revealed thatMycophenolate versus cyclophosphamide.

Currently being studied

Anifrolumab: Type 1 interferon signaling is mediated by the type I IFN-α/β/ω receptor (IFNAR). Anifrolumab is a monoclonal antibody blocking IFNAR. In a phase 2b trial, 305 lupus patients were randomized to receive a placebo or one of two dosages of anifrolumab . At 24 weeks, 34% and 29% of patients receiving anifrolumab (300mg and 1000mg every 4 weeks, respectively), while only 17.6% in the placebo group, achieved the primary outcome of SRI-4 response with sustained reduction of oral corticosteroids.

The effect was greater in patients with the interferon signature at baseline. Both skin and joint disease showed a favourable response. In addition, anifrolumab was associated with decreased anti-dsDNA titers and higher C3 levels. There was a mildly increased risk of viral infections, including influenza and herpes zoster. However, the first phase III trial (TULIP 1) did not reach its primary endpoint of decreasing the SRI-4. TULIP 2 is currently under way- s, compared to only 17.6% in the placebo group. The effect was stronger in patients who had the interferon signature at the start. Both skin and joint disease responded favorably. Furthermore, anifrolumab was linked to lower anti-dsDNA titers and higher C3 levels. There was a slight increase in the risk of viral infections, such as influenza.

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Ustekinumab

There is increased Th17 activity in lupus. Serum IL-17 and IL-23 levels are higher in SLE and correlate with disease activity.IL-17-producing cells have been found in lupus nephritis biopsies. IL-17 is also produced by double-negative T cells. STAT3, which is activated by IL-23, is upregulated in lupus and encourages the production of IL-17 as well as differentiation toward Th17and Tfh have been linked to the overstimulation of B cells and are increased in SLE. Double negative T cell growth is facilitated by IL-23 and the generation of-2 may have a subliminal impact on the generation of Tregs.Ustekinumab, a monoclonal antibody targeting IL12 and IL-23 that is now licensed to treat psoriasis, psoriatic arthritis, and inflammatory bowel disease, can disrupt the IL-23/Th17 axis.102 SLE patients were randomly assigned (3:2) to receive ustekinumab or a placebo in a phase 2 trial. At 24 weeks, 60% of patients receiving ustekinumab achieved the primary goal, SLE responder index-4 (SRI-4), as opposed to 31% of patients receiving standard of treatment (p=0.0046). Skin and joint scores significantly improved, according to subgroup analysis. Ustekinumab increased C3 and decreased levels of anti-dsDNA.

Baricitinib: Through the JAK-STAT pathway, the Janus kinases (JAKs), a family of tyrosine kinases, mediate the intracellular signaling of a number of cytokines. One JAK inhibition may prevent the simultaneous blockage of the downstream effects of multiple cytokines. A group of cytokines may nevertheless signal through various JAKs, and various JAKs may facilitate signaling from various groups in this redundant system.

The FDA has currently approved baricitinib and tofacitinib for the treatment of rheumatoid arthritis. JAK1 and JAK2 are reversibly inhibited by the drug baricitinib.These mediate signaling for a variety of molecules, including type 1 interferons, IFN, IL-6, IL-12, and IL-23. a double-blind, multicentre, international study. A phase 2 placebo-controlled trial evaluated baricitinib's effectiveness in treating SLE patients. The primary outcome, as measured by SLEDAI-2K, was the percentage of patients whose rash or arthritis had cleared up by 24 weeks. There were 314 patients with insufficient control despite receiving conventional therapy. A statistically significant larger percentage of individuals receiving baricitinib 4 mg daily than those receiving placebo (67% vs. 58% vs. 53%, respectively) were successful in achieving the primary outcome.

Several of the Results were influenced by the way baricitinib affected arthritis because there was no discernible difference in skin ratings. Additionally, there were fewer flares in the 4 mg group when compared to the placebo group (33% vs. 51%). Compared to the 2 mg (2%) and placebo (1%), the 4 mg arm (6%) had more serious infections. In the 4 mg arm, one deep venous thrombosis (1%) was found.

Atacicept: is a TACI-Ig fusion protein that inhibits B cells by inhibiting APRIL and BLYS simultaneously. Atacicept demonstrated a dose-dependent reduction in circulating B cells and immunoglobulins in a phase 1b trial.306 patients were randomly assigned to receive weekly subcutaneous atacicept (75mg or 150mg) or placebo in the

ADDRESS II phase 2b trial. Atacicept was associated with a trend toward better SRI-4 response at 4 weeks when compared to placebo, particularly in people with high disease activity, serologically active disease, or both. For example, 62% of patients treated with atacicept in the serologically active group achieved SRI-4 at 24 weeks, compared to 24% in the placebo arm.

Lifestyle

Some lupus treatments are non-pharmacological. Patients should avoid sun exposure by wearing protective clothing and applying sunscreen with an SPF of at least 50 (as demonstrated in a randomized clinical trial. Fibromyalgia and "fibromyalgia-ness" (a proclivity to respond to illness and psychosocial stress with fatigue, an increase in symptoms, and widespread pain) are more common in SLE.Regular exercise, stretching, and relaxation can help with fibromyalgia fatigue, cognitive dysfunction, and pain.

Prevention of Co-Morbidities

Lupus increases all-cause mortality by 2.4 times. Cardiovascular events are the leading cause of death in lupus, followed by infections, and finally renal and respiratory complications. The risk of cardiovascular events is 2.66 times higher. To prevent premature death, aggressive management of traditional (smoking, obesity, diabetes, hypertension, dyslipidemia) and lupus (lupus activity, antiphospholipid antibodies, homocysteinemia, excessive corticosteroid use) modifiable cardiovascular risk factors is critical.

Homocysteinemia affects 15% of patientsand is associated with an increased risk of cardiovascular disease, renal injury, and fibrosis, as well as a higher prevalence of myocardial infarction and thrombosis in patients with antiphospholipid antibodies. In lupus patients, hyperhomocysteinemia is an independent risk factor for cardiovascular disease.Lupus infections are common, especially from encapsulated bacteria.

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Future Perspectives and Personalized Medicines

The more granular understanding of the molecular basis of lupus pathogenesis has led to several new promising treatments that are undergoing late-phase clinical testing. These recent phase 2 trials underlined how targeting a specific pathway may elicit dramatically different responses in patient subgroups.Precise phenotyping of disease phenotypes based on molecular and clinical features is critical for designing personalizedtreatment.

The Accelerated Medicine Partnership (AMP), for example, is an ongoing effort to identify the molecular pathways involved in lupus nephritis at the single-cell level.

CONCLUSION

A complicated area of clinical care is covered by published SLE guidelines, although the methodological consistency, recommendations, and scope differ drastically. For optimal care and health outcomes for SLE patients, collaborative and interdisciplinary efforts are required to create thorough, high-quality evidence-based guidelines.

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LOSARTAN POTASSIUM ONCE-DAILY SUSTAINED-RELEASE MATRIX TABLETS: FORMULATION AND IN VITRO ASSESSMENT

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ABSTRACT

The goal of the current study was to create a Losartan potassium sustained release tablet based on hydrophilic and hydrophobic polymers that can release the medication up to 24 hours later at a predefined pace. In order to achieve the desired theoretical release profile, a polymer mixture was used in the preparation of the Losartan potassium matrix tablet. The effects of hydrophilic and hydrophobic polymers on potassium losartan were investigated.

The physical and chemical characteristics of the formulated tablet were also noted. To assess the SR matrix tablet of Losartan potassium, the in vitro release profile was monitored for 24 hours.

Angiotensin II type 1 (AT1) receptor antagonist losartan potassium (LP) has powerful and highly selective antihypertensive action.

With an oral bioavailability of roughly 33% and a plasma elimination half-life of 1.5 to 2.5 hours, it is easily absorbed from the digestive tract. For antihypertensive effects, administration of LP in a sustained release dosage would be preferable because it would keep the drug's plasma concentrations much above the therapeutic value. Batch B4 was created using a combination of HPMC K4M (67.2 mg), HPMC K200M (90 mg), and Eudragit RSPO (112.5 mg), with a drug release of between 94 and 98%, according to an in vitro dissolution profile. The highest similarity factor values were displayed by batch B4 (f2 = 67.76).

Keywords: Losartan potassium, HPMC K4M, HPMC K200M, Eudragit RSPO, Sustained release, Matrix tablets.

INTRODUCTION

Angiotensin II type 1 (AT1) receptor antagonist losartan potassium (LP) has powerful and highly selective antihypertensive action. With an oral bioavailability of roughly 33% and a plasma elimination half-life of 1.5 to 2.5 hours, it is easily absorbed from the digestive tract. A once-daily sustained-release version of losartan potassium is preferred to lessen administration frequency and boost patient compliance. Since the medication is widely soluble in water, it is important to choose release-retarding excipients carefully in order to maintain a steady drug input rate in vivo.

The most popular technique for regulating medication release is to include it in a matrix system. Hydrophilic polymer matrix systems are frequently employed in oral controlled drug delivery because of their adaptability, which helps them achieve a desired drug release profile, cost-effectiveness, and widespread regulatory approval. Because of this, an effort has been made in the current work to create once-daily sustained-release matrix tablets containing losartan potassium employing hydrophilic matrix materials such as hydroxypropyl methylcellulose (HPMC).

Because of the quick diffusion of the dissolved drug through the hydrophilic gel network, drug release for an extended period of time utilizing a hydrophilic matrix system is constrained, particularly for highly water-soluble medicines. Considering such medications' considerable water solubility, in order to create sustained-release dosage forms, hydrophobic polymers and a hydrophilic matrix are both appropriate.

Hydrophobic polymers have a number of benefits, including uses that are well-established and safe as well as good stability at various pH and moisture levels. Therefore, hydrophobic polymers like Eudragit RSPO were utilized in this investigation.

The primary goal of the study is to create hydrophilic and hydrophobic matrix systems using polymer materials in order to examine their effects.

MATERIALS AND METHODS

Materials

Losartan potassium, HPMC K4M, HPMC K200M, Eudragit RSPO, MCC, Mg. Stearate, Talc, all the ingredients used were of analytical grade.

Methods

Preparation of Tablets

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Tablets containing losartan potassium SR were created using the direct compression method. 40# sieve was used to filter the drug. Through a 30# sieve, HPMC K4M, HPMC K200M, and Eudragit RSPO were passed. Everything else was put through a 40# sieve. All ingredients were mixed for 15-20 min. Following the initial mixing, Mg. stearate (60# sieve) was added, and the mixer was run again for 3-5 minutes. Compressed using flat punches with a 10/30 diameter and a hydraulic pellet press was the prepared blend (Type: KP-587, PCI services, Mumbai). Losartan potassium, together with the other pharmacological components specified in Table 1, is present in each tablet in an amount of 100 mg.

Table 1: Composition of Sustained release tablets of Losartan potassium *

Ingredients	B1	B2	B3	B4	B5	B6	B7	B8
Losartan potassium	100	100	100	100	100	100	100	100
HPMC K4M	67.5	67.5	67.5	67.5	90	90	90	90
HPMC K200M	45	90	45	90	45	90	45	90
Eudragit RSPO	67.5	67.5	112.5	112.5	67.5	67.5	112.5	112.5
Talc	10.25	10.25	10.25	10.25	10.25	10.25	10.25	10.25
Magnesium stearate	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
MCC	45	45	45	45	45	45	45	45
Lactose	113	68	68	23	90	45.5	45.5	0.5
Total	450	450	450	450	450	450	450	450

*All weights in mg.

Evaluation of Powder

Angle of Repose

The funnel method was used to determine the powder's Angle of Repose. Powder blends were measured out precisely and poured into the funnel. The funnel's height was adjusted such that its tip just touched the top of the powder mixture. The powder mixture was permitted to freely flow through the funnel and onto the surface. The powder cone's diameter was measured, and the following equation was used to determine the angle of repose:

$\tan \alpha = h/r$

Bulk Density

a) Loose Bulk Density (BD): Weigh precisely 25 g of medication that has been transferred into a 100 ml graduated cylinder after being passed through a 20# sieve. Without compacting, carefully level the powder, then check the unsettled apparent volume (V0). The formula below can be used to compute the apparent bulk density in gm/ml. 4, 5 Bulk volume/density Equals weight of powder

b) Tapped bulk density (TD): Weigh precisely 25 g of medication that has been transferred into a 100 ml graduated cylinder after being sieved with a 20# mesh size.

Then, using a mechanically tapped density tester that gives a set drop of 142 mm at a nominal rate of 300 drops per minute, mechanically tap the cylinder containing the sample by elevating the cylinder and letting it fall under its own weight.

The cylinder should be tapped 500 times to start, and the tapped volume (V1) should be measured to the nearest graduated units. The tapping should then be repeated 750 times more, and the tapped volume (V2) should be me asured to the same graduated units.

Volume is determined if the difference between the two volumes is less than 2%. (V2). Use the formula below t o determine the tapped bulk density in grams per milliliter.

Tapped density = Weigh of powder / Tapped volume

Carr's Index

Carr's compressibility index was used to calculate the powder blend's compressibility index. Evaluation of a powder's BD, TD, and packing down speed is a straightforward test. The following is the formula for Carr's index:

Carr's index (%) = [(TD-BD) ×100] / TD

Hausner's Ratio Hausner's Ratio

Is a number that is correlated to the flow ability of a powder.

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Hausner' Ratio = TD / BD

Table 2: Evaluation of physical properties of powder blend of all formulations

Powder Blend	Angle of repose	Bulk Density	Tapped Density	Carr's Index	Hausner's ratio
B1	23.22	0.471	0.581	18.93	1.23
B2	21.53	0.437	0.572	23.60	1.31
B3	24.51	0.454	0.584	22.26	1.29
B4	23.56	0.473	0.581	18.59	1.23
B5	24.54	0.494	0.574	13.94	1.16
B6	22.19	0.493	0.573	13.96	1.16
B7	25.43	0.489	0.586	16.55	1.20
B8	24.74	0.485	0.575	15.65	1.19

*All results were an average of n=3 observation.

Evaluation of Tablets

Thickness

Utilizing vernier callipers, the thickness of the tablets was measured (For-bro engineers, Mumbai, India). Test for Weight Variation 6 Twenty tablets of each formulation were weighed using an electronic scale (Sartorius electronic balance: Model CP-2245, Labtronic) to evaluate weight variance. The test was carried out in accordance with the recommended procedure.

Drug Content Uniformity

Twenty tablets of each formulation were weighed using an electronic scale (Sartorius electronic balance: Model CP-2245, Labtronic) to evaluate weight variance. The test was carried out in accordance with the recommended procedure.

Hardness

By mixing a precisely weighed amount of powdered Losartan potassium with water and filtering the resulting solution via a 45-micron membrane, the drug content was ascertained. Using a twin-beam UV visible spectrophotometer, the absorbance was measured at 205 nm.

Friability

The Friability of the tablets was measured in a Roche friabilator (Camp-bell Electronics, Mumbai, India). Tablets with a known weight (W0) or a sample of tablets are de-dusted in a drum for a fixed time (100 revolutions) and weighed (W) again. Percentage friability was calculated from the loss in weight as given in the equation below. The weight loss should not be more than 1% w/w.

%Friability = (W0-W)/ W0 *100

Table 3: Evaluation of various parameters of Tablets of all batches*

Batches	Hardness (kg/cm2)	Thickness (mm)	Friability (%)	Avg. wt. (mg)	Assay (%)
B1	6.2±0.10	3.1±0.15	0.084±0.002	453.2±1.4	99.39±0.52
B2	6.3±0.15	3.0±0.26	0.077±0.002	453.7±2.4	99.76±0.10
B3	6.4±0.15	3.0±0.21	0.085±0.002	455.6±2.7	98.38±0.46
B4	6.4±0.06	3.1±0.15	0.079±0.001	454.1±2.3	99.49±0.16
B5	5.9±0.25	2.9±0.11	0.083±0.002	452.6±1.6	99.72±0.11
B6	6.3±0.20	3.2±0.06	0.081±0.002	454.7±2.2	99.50±0.11
B7	6.4±0.26	2.9±0.06	0.085±0.001	454.4±1.6	98.94±0.44
B8	6.4±0.15	3.1±0.06	0.087±0.002	453.6±2.6	99.49±0.51

In Vitro Release Studies

USP equipment type II (operating at 75 rpm) was used for in vitro dissolution investigations.

The dissolution medium was kept at 37°C + 0.5°C and comprised phosphate buffer pH 6.8 for the first three hours and 0.1N hydrochloric acid for the first two hours. The UV-visible spectrophotometer at 205 nm was used to measure the drug release at various time intervals. All batches' in vitro drug release profiles were contrasted with those of the market product.

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Table 4- Effect of the independent variable on a dependent variable by 23 full factorial designs of Losartan potassium Sustained release matrix tablet

	X1	X2	X3	Q1	Q22	T80
B1	67.5	45	67.5	8.8	96.8	16.9
B2	90	45	67.5	7.3	95.2	17.4
B3	67.5	90	67.5	5.4	93.5	18.5
B4	90	90	67.5	4.7	92.6	19.1
B5	67.5	45	112.5	4.7	92.4	18.5
B6	90	45	112.5	4.3	91.4	20.1
B7	67.5	90	112.5	5	92.7	19.1
B8	90	90	112.5	4.9	92.9	19.1

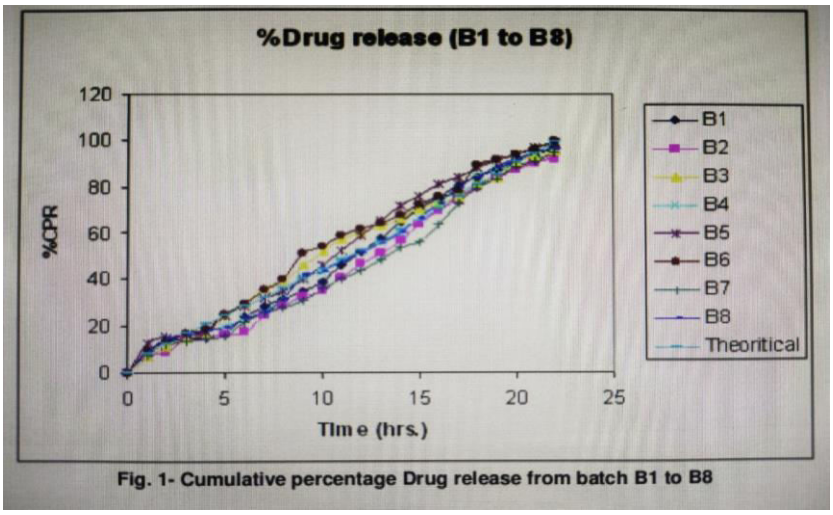

Fig. 1- Cumulative percentage Drug release from batch B1 to B8

Table 5- Summary output of regression analysis for the effect of X1 & X2 on Q1

Regression Statistics for Q1	
Multiple R	**0.99926196**
R Square	0.998524464
Adjusted R Square	0.989671251
Standard Error	0.176776695
Observations	8

Stability Study

According to ICH recommendations, a stability study for tablets was conducted under rapid and long-term conditions for a month. Drug goods packed in an aluminum strip and kept in a refrigerator are the subject of Q1 A (R2).

Table 7- Evaluation of Tablets of Checkpoint batch

Parameters	Accelerated (25°C + 2°C, 60 % + 5 %RH)	
	Initial	After 30 days
Weight	454.1±2.3mg	456.3±1.2mg
Hardness	6.42±0.12kg/cm^2	6.23±0.42kg/cm^2
Friability	0.079±0.001	0.081±0.001
Thickness	3.1±0.15mm	3.1±0.12mm

Note: all values denote the mean ± SD (n=3)

Table 8- Assay of tablets at Long-term and accelerated stability conditions.

Condition	Accelerated25°C + 2°C, 60 % + 5 %RH
Initial	99.45±0.47
30 days	93.93±0.79

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Note: all values denote the mean ± SD (n=3)

RESULTS AND DISCUSSION

Angiotensin II type 1 (AT1) receptor antagonist losartan potassium has powerful and highly selective antihypertensive action. With an oral bioavailability of about 33% and a plasma elimination half-life of 1.5 to 2.5 hours, it is easily absorbed from the digestive tract. With all of its obvious benefits, losartan potassium has shown to be a good choice for the creation of a sustained-release dosage form. In the current study, sustained-release tablets of losartan potassium were created using HPMC K4M and HPMC K200M, which were used in hydrophilic matrix drug delivery systems. However, used alone, these materials did not produce satisfactory results, so they were combined with hydrophobic polymers such as Eudragit RSPO.

HPMC K4M, HPMC K 200M, and Eudragit RSPO were used to manufacture batches of the potassium salt of losartan in accordance with a 23 complete factorial design. Different batches of prepared powder blends were assessed. The results showed that the powder mix had good flow properties, including an Angle of repose range of 21 to 26, a Carr's index range of 14 to 24, and a Hausner's ratio range of 1.16 to 1.31. In accordance with accepted parameters for tablet formulation, hardness, thickness, and friability were found to be in the range of 5.9 to 6.4, 2.9 to 3.2, and 0.077 to 0.087, respectively.

Table 9- In-Vitro drug release of Checkpoint batch at Accelerated storage condition

Time (hrs.)	Initial	After 30 Days
0	0.0	0.0
1	9.39±0.07	8.35±0.14
2	14.37±0.47	13.56±0.25
3	15.63±0.52	14.84±0.35
4	18.02±0.19	17.09±0.42
5	19.18±0.15	20.56±0.56
6	23.01±0.09	22.98±0.48
7	25.54±0.13	25.63±0.52
8	31.73±0.42	31.12±0.97
9	41.89±0.36	42.04±0.63
10	43.30±0.23	43.54±0.47
11	47.75±0.47	48.12±1.23
12	51.13±0.68	51.43±0.52
13	55.43±0.49	55.68±0.63
14	59.92±0.86	60.23±0.24
15	66.16±1.20	66.85±0.82
16	72.75±0.12	71.24±0.34
17	79.70±1.08	79.53±0.17
18	84.14±0.15	84.33±0.19
19	88.62±0.56	87.24±0.46
20	91.73±0.45	90.53±0.75
21	94.5±0.65	92.62±1.54
22	96.26±0.75	95.32±0.27
F2	---	**88.67**

Note: all values denote the mean ± SD (n=3)

The results of the angle of repose (30) show that the powder has good flow characteristics. Lower Carr's index values provided additional evidence in favour of this. Compressibility index values up to 24% often produce satisfactory to exceptional flow characteristics. Hardness and powder density is frequently linked qualities. Additionally, powder density may affect a number of qualities, including compressibility, tablet porosity, dissolving, and others.

All powder formulations' measured drug contents were found to be uniform. All of these findings suggest that the powder has adequate flow characteristics, compressibility, and medication content. Different tablet formulations were tested for things including thickness, weight homogeneity, drug content, hardness, friability, and in vitro dissolution. Each formulation displayed a consistent thickness. The Pharmacopoeia limit for the percentage deviation for tablets containing more than 450 mg in a weight variation test is 5%.

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All tablet formulations passed the test for weight uniformity required by law since the average percentage deviation of all formulations was found to be within the above standard. Between different batches of tablets, there was good consistency in the amount of drug present, and the percentage of drug content was greater than 95%. The hardness of a tablet is not a perfect predictor of strength. Friability is a different indicator of a tablet's durability.

Conventionally compressed tablets are generally regarded as appropriate if they lose less than 1% of their weight. The proportion of friability in the current investigation was less than 1% for all formulations, showing that friability was within the allowed ranges. 15 All tablet formulations met internal standards for weight fluctuation, drug content, hardness, and friability and displayed acceptable pharmacy technical qualities.

CONCLUSION

For 24 hours, the hydrophilic matrix of HPMC alone was unable to effectively restrict the release of losartan potassium. The results clearly show that a matrix tablet made of both hydrophilic and hydrophobic polymers is a better system for the once-daily sustained release of a highly water-soluble medication like losartan potassium. The developed tablets were stable and retained their pharmaceutical properties, and the medication exhibited no degradation over a one-month period.

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ROLE OF VERNACULAR ARCHITECTURE IN THERMAL COMFORT OF LUCKNOW

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ABSTRACT
Vernacular architecture is known to have mechanisms that enhance indoor thermal comfort of interiors at negligible costs. Therefore, it is often termed as sustainable energy efficient architecture. In modern context when energy saving aspects are very much sought-after aspects, present research work deals with study of traditional vernacular architecture of Lucknow to explore similar aspects. Present study deals with study of nearly 30 traditional vernacular houses in season of winter. The study was conducted in the form of spatial survey accompanied by thermal measurements. During the survey responses of the occupants were carefully recorded on ASHRE and Nicole scale which also gave an idea about the satisfaction level of the occupants. The research involved the study of physical environmental and personal parameters which gave an insight into behavioral adaptations made by occupants for achieving state of thermal comfort. The results showed that planning and designing strategies along with use of local building materials helped in maintaining of indoor thermal comfort even at extreme outdoor environmental parameters along with behavioral adaptive measure by occupants.

Keywords: Thermal Comfort, Vernacular Architecture, Indoor Environment.

INTRODUCTION
Over ages, people living in different climatic zones in different parts of the world have contributed towards the development of vernacular architecture in one way or the other [1]. It involves meticulous amalgamation of bio-climatic features along with the requirements of built environment in terms of planning and constructing methods [2]. Therefore, this architectural style considers climatic factors and actually deals with energy efficient and energy saving strategies in order to provide improved thermal comfort to the inhabitants [3].

Across the globe many international research studies have been conducted so far which clearly defines the and correlates the bio-climatic features of vernacular architecture with the thermal comfort aspects with reduced energy consumption patterns. In India also, notable work in the very field has been done by Singh et al.[4], Dhaka et. al[5], Indraganti et al.[6], Dili and Naseer [7], Praseeda et.al.[8], Priya et.al[9] etc. and many more. In similar context, present research study was carried to understand the role of vernacular architecture elements in shaping up of indoor thermal comfort in buildings in Lucknow.

The study was carried out in months of winter season and included study of environmental parameters and socio-cultural parameters to understand correlation between elements of built environment and socio-cultural aspects that effect indoor thermal comfort of a building and can contribute towards possible energy savings.

Case Study
Lucknow, which is located in the Gangetic plains in northern India, has composite climate [NBC10]. The area is rich in traditional vernacular architecture. The methodology included case study of nearly 30 vernacular houses using method of questionnaire-based surveys, and thermal measurements and visual recording of the data. The study showed that traditional vernacular houses are typically in courtyard planning with construction done in lahori bricks and surkhi lime along with frequent use of mud phuska as outer coating cover. Roofs are generally high in these houses with construction of timber joists or jack arches.

Houses had rooms aligned along with courtyards which allowed more natural light and ventilation inside the houses. Ingress of sunlight was seen in almost all the traditional vernacular houses. Figure 1 represents typical vernacular house profile.

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Figure 1: Typical vernacular house profile

Data Collection

The research study included collection of data in terms of environmental parameters and personal parameters as discussed below.

Environmental Parameters

For field study time period, the indoor air temperature of the living room and the outdoor temperature of the houses were recorded as shown in Table 1.

Table 1: Typical environmental parameters profile of vernacular houses

Housing Typology		Month	Mean Outdoor Temp, To (°C)	Mean Indoor Temp, Ti (°C)	Mean outdoor humidity (%)	Mean outdoor air velocity (m/s)
Traditional Vernacular House	TVH	Dec	17	21	59	2.65
		Jan	15	22	51	2.65
		Feb	21	26	53	7.45

It can be interpreted from the table that in traditional vernacular houses, the mean indoor temperature in winter season is higher than the mean outdoor temperature, which make them warm from inside as compared to the outdoors. This further adds to optimum comfort which inhabitant achieve through use of warm woolen clothes in months of winter season.

Similarly study of relative humidity of the area, showed that there was no or negligible difference between mean outdoor and mean indoor humidity levels in winter season in these houses within some cases the humidity level was more inside the house than outside. this showed that at given low outdoor temperatures and low humidity level outside, the internal temperatures were more and same was with humidity levels which gives the interpretation that indoor environment of traditional houses was more comfortable at given extreme outdoor climatic conditions. Further, presence of courtyards accentuated the comfort levels inside these houses.

Personal Factors: Adaptive Measures

Study of personal factors, such as activity (metabolism) and clothing, were also studied during the field research. It was found that people increased the thermal insulation in terms of clothing levels. They wore more woolen winter clothes during winter season and opted for adaptive behavioral patterns like more consumption of hot beverages like tea, coffee, and closing of doors, windows and shutting down of fans etc. level of clothing insulation is closely related with thermal comfort [11].

Regarding activity levels, people tend to decline physical activity during winter season to minimize the loss of energy from their bodies as body heat which is also related with their metabolic state which was accounted as 1.0 during the study [12].

RESULTS AND DISCUSSION

Vernacular houses were studied in detail with its layout, construction materials, views, and the data of various factors (physical and personal) recorded during the survey. The analysis was done using regression analysis and

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comparison was drawn with the previous studies done by ASHRAE and Humphrey. The analysis also yielded overall satisfaction of occupants which gives an idea of thermal comfort state of occupants as is shown in Figure 2.

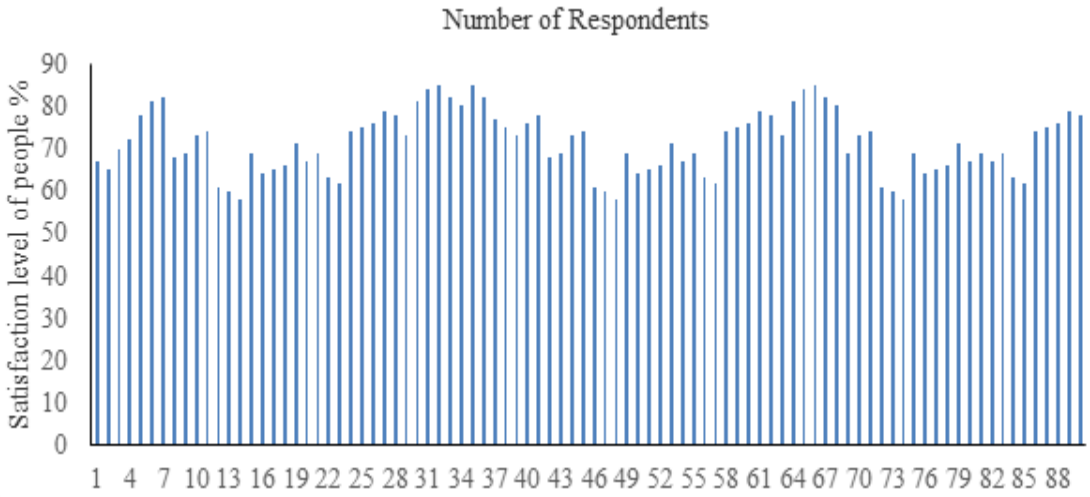

Figure 2: Satisfaction level of respondents: traditional vernacular houses

The study showed that occupant's adaptation is in the form of their attire choice which is further related with environmental parameters like temperature, wind and humidity levels. Inhabitants of vernacular houses used preferably sweaters and warm clothes in winters and were quite comfortable even without the use of energy equipment to make them thermally comfortable.

The outdoor temperature of winter season in Lucknow varied from 17°C to 26°C with indoor temperatures ranging from 21°C to 26°C for traditional vernacular houses. This showed prevalence of higher temperatures inside linked with more comfortable indoor environment as is also evident from the satisfaction level of occupants.

Since in vernacular houses, the sunlight was available in all the rooms and large windows were present which opened in the courtyard , the interiors of all traditional vernacular houses had proper air ventilation which kept the thermal environment comfortable for the occupants.

CONCLUSION

The study showed that vernacular houses had unique layout and building construction features which not only give an idea of bio-climatic planning and designing aspects but also adds to energy saving aspects in interiors of these houses. Aspects like courtyard planning, presence of large windows, opening towards courtyards allowing for optimum natural light and ventilation, high roofs all are different bio-climatic strategies which can be seen as lessons from the study and can be used in modern conventional houses as strategy to save energy and propagate sustainable modern housing in present context.

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EFFECTS OF MULCHING ON GROWTH AND YIELD OF OKRA (*Abelmoschus esculentus*) CV. HARITHA

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ABSTRACT
Mulch has a great role in soil moisture conservation through modification of microclimatic soil conditions. It helps to prevent weed growth, reduce evaporation, and increase infiltration of rainwater during the growing season. Different types of mulches have been used to obtain good crop growth and yield. Hence considering this a field experiment was laid out at the Sri Lanka School of Agriculture – Palamunai to evaluate the effect of different types of Mulching materials in the growth and yield performances of Okra (Abelmoschus esculentus L.) under field conditions. There were five treatments (T1- Control, T2-Paddy straw, T3-Mango leaves, T4-Polythene, T5-Paddy husk) with four block and the experimental units were arranged in the Randomized Complete Block Design (RCBD) manner. Growth parameters those were plant height, stem girth, number of leaves, days for 50% flowering, yield components and total yield were evaluated for the ability of the different mulching materials in Okra cultivation. Collected data were analyzed using ANOVA procedures by SAS statistical software. Plant height showed significant difference on later days of crop growth. Higher plant heights were observed in T3 and T4 and the lowest was found where no any mulching material applied. Stem girth showed not significant ($p>0.05$) during the entire growth period for all the mulching materials used. No. of leaves showed significant ($p<0.05$) values except 2nd week. It was found that, highest number of leaves observed in T4 where polythene mulch applied and the lowest number of leaves found in control treatment where no any mulch applied. Early days of harvesting, yield and yield components showed significant ($p<0.05$) differences between the treatments. On the basis of yield, application of polythene mulch showed not significant with application of paddy straw on 4th harvesting. Paddy straw and paddy husk showed similar performances with T4. Even though polythene mulches showed better performances in most of the tested parameters, it can be concluded that, paddy straw and paddy husk were the viable options next to polythene mulch as an environmental friendly strategy.

Keywords: Abelmoschus esculentus, Environmental friendly, Growth, Mulch, Weeds

INTRODUCTION
Mulching is the process or a field practice for covering the soil to make the more favourable condition for plant growths, development, and thus it is for the sustain the crop production. Commonly farmers are using natural mulches such as leaf, stray, dead leaves, paddy straw, paddy husk and compost have been used for centuries, still in the recent advancement of technology, synthetic materials have altered the method and benefit of mulching such as plastic covering the soil. It has several merits in the soil rejuvenation process (Park et al., 2004; Roh and Pyon, 2004; Willis, 1962). Commonly, it prevents directs evaporation of moisture from the soil and reduces the water losses and soil erosion over the surface. While, it prevents the rise of water containing salt in the field and causes the easy absorption plant available water and nutrients for easy growth and development. In case of soil temperature controls of soil, plastic mulching will provide the higher temperature than other mulching, it means organic sources of mulching will provide the ambient soil temperature in all part of soil and it causes the smooth transfer of water and nutrients Tarara, (2000). Soil temperature was lowest with the use of sorghum straw mulch as the organic mulching practices, which is best for agronomic practices (Abdalla, 1969)

Application of mulch had significant effect on the number of leaves of okra which causes for the high level of leaf area development and increment of photosynthetic production for the translocation process. In crop production, mulching is one of the most beneficial and simplest agronomic practices used to aid water retention as it is sensing the economic benefits in the water conservation practices, increase soil nutrition and usage efficiency, improve seed germination and seedling growth, development and survival, suppress weed growth and kill the weed seeds for further destruction process, enhance pest and disease protection by removing the weeds because it is the host plant for the most of the pest life cycle completion, enhance root establishment by having the micro climate production among the soil, transplant survival and increase the plant growth and harvest (Mugalla et al., 1996; Iqbal, et al., 2009; Mochiah et al., 2012). Amoroso et al., (2010) reported that the mulched plants have been shown to have higher shoot dry weight than non-mulched plants.

Okra is cultivated in tropics, subtropics and some warmer temperate region (Farinde et al., 2007) but In Sri Lanka, Dry zone and intermediate zone are the possible leaders of the production. By concerning the health

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important of Okra, the crop production is the indeed one and it has the export scope in the earning of foreign exchange for country. So that the efficient production is the viable requirement and profitable way of cultivation is the prominent concept we have to test here. In Sri Lanka, in Dry zone and intermediate zone, there is lack of re-searches and scientific articles in the usage of different types of mulching practices in the field level and there is no scientifically proven data to go for the field level practices to the usage of organic mulching in the field level especially in the Okra Cultivation. This study aims that to evaluate effect on growth and yield on usage of the mulching in the cultivation of Okra in field level by using different mulching; polythene, paddy straw, paddy husk and mango leaves with the objective of to evaluate the influence of different mulching materials on growth and yield of *Abelmoschus esculentus* (cv. Haritha).

MATERIALS AND METHODS

The experiment was conducted in the field of Sri Lanka School of Agriculture, Palamunai. The land was prepared well manually and using two-wheel tractor up to the depth of 15 – 30 cm. and planting 3-4 seeds per hole at depth of 1-2cm. The land was ploughed well and raised from the land level. The Haritha variety of Okra seeds were used for this study. About 40 gram of pure seed was collected from Sri Lanka School of Agriculture, Palamunai. The seeds were sown at the rate of two seeds per hill and two weeks after germination thinning out was done and a single plant was allowed for the growth and development. Seeds were planted with the spacing of 90 cm x 60 cm. Watering was done twice a day by basin irrigation method except on rainy days after germination for one week and after that days went to once in a day till five weeks then once in two days till eight weeks and followed 3-4 days' interval- As recommended by DOA, Sri Lanka, this all was done according to the climatic pattern. Urea, Triple Super Phosphate (TSP) and Muriate of Potash (MOP) were applied as recommended by DOA, Sri Lanka.

There were five treatments and four replications. Each replication contained 10 Plants. The treatments were as follows; T1 –Control, T2 –Paddy straw, T3 –Mango leaves, T4-Polythene and T5 –Paddy husk. This experiment was laid out in a Randomized Complete Block Design (RCBD) manner. Growth and yield of Okra (Haritha variety) were evaluated by measuring growth and yield parameters. Plant height was measured in (mm) from surface of the soil to the top of the terminal bud in each plant at once in two weeks' intervals. Stem girth was measured with using Vernier scale from bottom level, intermediate level, top level each plant per each pot measure for finally average stem girth was calculated. Number of fully expanded leaves was recorded at once in two weeks' interval. Days taken to 50% of flowering was measured by observing manually through naked eye. Pod length was measured with using a measuring tape from bottom level, intermediate level, top level per each pod per measure for finally average pod length calculated.

Pod weight was measured by using a top loading balance. Pod girth was measured with using Vernier scale from bottom level, intermediate level, top level each pod measure for finally average pod girth calculated. Pods were harvested in alternative days up to eight harvests and total yield was calculated. Collected data were analyzed using ANOVA procedures by SAS 9.1.3 statistical programme and Difference between the treatments were compared using Duncan's Multiple Range Test (DMRT) at 5% significance interval.

RESULTS AND DISCUSSION

Plant Height

Results revealed that there were significant ($p<0.05$) differences among the treatments on plant height throughout the experiment except 2nd week after sowing (2WAS). Data regarding plant height are given in Table 1.

Table 1: Effects of different mulching materials on Plant Height of Okra in 2nd, 4th, 6th and 8th week

Treatment	2nd week	4th week	6th week	8th week
T1	7.61 ± 0.02^{b}	20.23 ± 0.09^{c}	45.32 ± 1.43^{c}	57.63 ± 3.61^{c}
T2	8.37 ± 0.06^{ab}	22.19 ± 0.25^{b}	59.66 ± 0.84^{ab}	78.12 ± 0.91^{ab}
T3	7.80 ± 0.07^{ab}	25.87 ± 0.22^{a}	64.57 ± 1.91^{a}	75.86 ± 3.34^{ab}
T4	7.68 ± 0.08^{ab}	27.22 ± 0.10^{a}	69.72 ± 0.43^{a}	88.16 ± 1.75^{a}
T5	8.43 ± 0.16^{a}	21.05 ± 0.25^{bc}	50.75 ± 2.65^{bc}	70.57 ± 3.43^{bc}
Sig	**ns**	*	*	*

Values represent mean± standard error of ten replicates. Means followed by the same superscripts in a same column are not significantly different at 0.05 probability level according to DMRT. '*' and 'ns' represents significant at $P<0.05$ and not significant, respectively.

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In the 2nd week, there were no any significant differences between treatments. But in 4th week onwards, it showed significant differences among treatments. T3 and T4 showed similar performances. Meantime, T5 and T2 were statistically similar and the performances followed to T3 and T4. But the scenario got different in 6th WAS, it showed T2, T3 and T4 were in similar performances and did not show any differences among them. This phenomenon also been followed in 8th WAS too. But from 6th WAS to 8th WAS, T2 and T5 were not significantly differ among them, it shows that paddy husk started to work in the field level.

This finding holds the close conformity to the several findings. different mulching types on the growth performance of Okra (Abelmoschus esculentus) which shows that plant height, weed count in polythene mulch, and low soil temperature was recorded in sawdust and sorghum straw mulch (Dalorima et al., 2014).

Stem Girth

Stem girth is the prominent parameter which holds the xylem and phloem vessels in which all the transport is occurred. Data regarding the stem girth is presented in the table 2. It was revealed that, there were no any significant differences between the mulch applications on stem girth of Okra plants. It showed that mulching materials not influenced the stem girth.

Table 2: Effects of different mulching materials on stem girth of Okra in 2nd, 4th, 6th and 8th week

Treatment	2nd week	4th week	6th week	8th week
T1	1.96±0.02^{a}	7.64±0.17^{a}	8.57±0.29^{a}	9.13±0.26^{a}
T2	2.32±0.09^{a}	8.80±0.13^{a}	10.04±0.08^{a}	13.94±1.51^{a}
T3	2.16±0.02^{a}	8.17±0.20^{a}	10.57±0.18^{a}	10.35±0.17^{a}
T4	2.20±0.03^{a}	9.13±0.06^{a}	11.15±0.12^{a}	11.87±0.20^{a}
T5	2.23±0.02^{a}	8.63±0.20^{a}	9.98±0.12^{a}	9.85±0.18^{a}
Sig	ns	ns	ns	ns

Values represent mean± standard error of ten replicates. Means followed by the same superscripts in a same column are not significantly different at 0.05 probability level according to DMRT. '*' and 'ns' represents significant at P<0.05 and not significant, respectively.

Number of Leaves

Number of leaves is the most important aspects as it is the relative proportional to the photosynthetic rate of plant. The data regarding the number of leaves in each treatment is expressed in the table 3. in 2nd WAS, there were any significant differences among tested treatments. In 4th WAS, T2 and T4 showed statistically similar performances and T2 and T5 showed same performances among them but these all four treatments showed significant difference over T1.

In 6th WAS, the scenario slightly differs. T2, T3 and T4 were statistically similar in their performances, meantime, T2, T3 and T5 were not significantly differ among them. But T4 takes highest performances among all other tested treatments.

Table 3: Effects of different mulching materials on no. of leaves of Okra in 2nd, 4th, 6th and 8th week

Treatment	2nd week	4th week	6th week	8th week
T1	5.00±0.00^{a}	8.00±0.00^{c}	9.00±0.00^{c}	10.25±0.09^{c}
T2	5.00±0.00^{a}	9.00±0.00^{ab}	10.25±0.09^{ab}	11.25±0.09^{bc}
T3	5.00±0.00^{a}	8.25±0.09^{c}	10.25±0.09^{ab}	12.25±0.09^{ab}
T4	5.50±0.11^{a}	9.25±0.09^{a}	11.00±0.00^{a}	13.00±0.21^{a}
T5	5.25±0.09^{a}	8.50±0.11^{bc}	10.00±0.21^{b}	11.75±0.31^{b}
Sig	**ns**	*	*	*

Values represent mean± standard error of ten replicates. Means followed by the same superscripts in a same column are not significantly different at 0.05 probability level according to DMRT. '*' and 'ns' represents significant at P<0.05 and not significant, respectively.

In 8th WAS, T3 and T4 showed statistically (P<0.05) similar performances among them. But T2, T3 and T5 were not significantly differ among them. In this case also, T4 holds the higher performances over all other tested treatments. These findings have the close conformity to the several findings. The leaves number was significantly increased by the influence of organic manure (El-Kader et al., 2010), and under black plastic, the mulch plant gave the maximum number of leaves also observed (Olabode et al., 2007).

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Days For 50% Flowering

Flowering is the prominent factor which will determine the harvest and early flowering and late flowering will determine the path of the yield increment. The data related with the flowering is presented in the table 4.

Table 4: Effects of different mulching materials on days to 50% flowering of Okra

Treatment	Days
T1	37.50 ± 0.11^{a}
T2	34.75 ± 0.09^{c}
T3	35.00 ± 0.15^{b}
T4	34.50 ± 0.11^{c}
T5	36.50 ± 0.11^{b}
Sig	*

Values represent mean± standard error of ten replicates. Means followed by the same superscripts in a same column are not significantly different at 0.05 probability level according to DMRT. '*' and 'ns' represents significant at P<0.05 and not significant, respectively.

It shows highly significant (P<0.05) to the treatments T2 and T3. The maximum value is recorded in T2 (37.75). T4 and T1 showed statistically similar performances and T3 and T5 also did not significantly differ among them.

Pod Length

Length of the pod is the direct proportional to the numbers of seeds while other parameters show the cumulative effect on them. The data regarding the Pod length of Okra is presented in the Table 5. in 1st WAS, T4 significantly differed among all other tested treatments. T1, T2, T3 and T5 were statistically similar in their performances and followed by T4. In the 2nd WAS, the same phenomenon observed as it is in the 1st WAS. T4 showed significant difference among the tested treatments. But rest of the treatments did not show significant differences among them and it was followed to T4. In the 3rd WAS, there were not any significant differences among the treatments except T5. T5 showed lower performances. In the 4th WAS onwards, all treatments did not show significant differences among them.

Pod Girth

Pod Girth is the factor related with the size of the seeds. The data regarding the pod Girth is presented in the table 6. in 1st WAS, T4 showed significant differences (P<0.05) with all other tested treatments. T1, T2, T3 and T5 remained same in their pod girth sizes. In the 2nd WAS, T2, T3 and T4 were statistically similar in their effect on the pod girth and showed significant differences with T5. T1 still remain in lower performances than all other tested treatments.

In 3rd WAS, T4 showed highest effect on pod girth and significantly differed with all other treatments. T1, T2, T3 and T5 remained statistically similar performances in pod girth size development. In 4th WAS, T4 significantly differed with all other tested treatments and the maximum value recorded for it. But T2, T3 and T5 showed statistically similar in the performances and followed to T4. In the 5th WAS, T1, T2, T3 and T5 were statistically similar in their performances. In T4 and T5, there were no significant differences among them and the maximum value was recorded in the T4 (15.52 mm).

In 6th WAS, there were no significant differences among the tested treatments. In 7th WAS, T3, T4 and T5 were statistically similar in their performances and maximum value was recorded to T4 (16.65 mm). but T1, T2, T3 and T5 showed statistically similar performances in the pod girth increment. In the 8th WAS, there were no significant differences among the tested treatments.

Total Yield

Effect of mulching materials will be determined by this parameter in most cases. The aim of the re-search is defined by this aspect. The yield data recorded in this experiment is presented in the table 7. in the 1st WAS, T4 showed significant differences among all other tested treatments and the maximum value (148.65 g) was recorded. T1, T2 and T5 were statistically similar in their performances. In 2nd WAS, T4 showed highest value (132.60 g) and significantly differed with all other treatments. T2, T3 and T5 were statistically similar in their performances. In 3rd WAS, T2,T3 and T4 were statistically similar in their effect on the Yield performances and T5 and T1 did not show significant differences (P<0.05) among them.

In 4th WAS, T2 and T4 showed statistically similar performances and maximum value is recorded in T4 (126.75 g). meantime T1, T3 and T5, showed similar performances and it was followed by T4. In the 5th WAS, there were no any significant differences among the tested treatments. In the 6th WAS, T2, T3 and T4 showed similar

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performances and maximum value was recorded T4 (148.20 g). meanwhile T1 and T5 were statistically similar in their performances.

In 7th WAS and 8th WAS, there were no any significant differences among the tested treatments. These findings have the close conformity with several researches. plastic on lettuce plants was effective in controlling weed growth and thus increased marketable yield to 7% compared to the control or unmulched plants (Zenaida et al., 2017). Superior plastic mulch shows relevant fruit size, number and weight of marketable okra fruits, with lesser weeds, as Poffley (1997). Meantime, the rice straw mulch was effective in minimizing weeds (Devasinghe et al 2011). Most of the experiments on mulching materials were primarily to determine their effect in soil water conservation, reduction of salt accumulation in the soil, soil temperature amelioration, weed suppression and the resultant effect on crop yield (Jamil et al., 2005; Awodoyin et al., 2007; Al- Rawahy et al., 2011; Mochiah et al., 2012).

CONCLUSIONS

Highest plant height was observed during 4th and 6th weeks mango leaves and polythene mulch showed higher not significant values meanwhile 8th polythene mulch showed maximum plant height and lowest was found where no any mulches applied. Stem girth not showed any significant differences among them. It could be concluded that stem girth was not influenced. While taking the account on the numbers of leaves, in 6th WAS, T2, T3 and T4 were statistically similar in their performances, meantime, T2, T3 and T5 were not significantly differ among them. But T4 takes highest performances among all other tested treatments. In case of yield and yield components, early days of harvesting showed significant values in pod length, pod weight, pod girth and total yield. But later days no any significant differences were found in tested treatments. Finally, it could be concluded that the performances of T4 (Polythene) showed significant differences to all other treatments. Optimum days for flowering, maximum yield increment also observed. T2 (Paddy straw), T5 (Paddy husk) showed better performances next to T4. Despite the fact that polythene mulches outperformed polythene mulches in the majority of the studied metrics, it can be stated that paddy straw and paddy husk were feasible alternatives to polythene mulch as an environmentally friendly method.

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Table 5: Effects of different mulching materials on pod length of Okra up to eight harvestings

Treatment	1st harvesting	2nd harvesting	3rd harvesting	4th harvesting	5th harvesting	6th harvesting	7th harvesting	8th harvesting
T1	16.41±0.22^{b}	16.56±0.14^{b}	16.17±0.32^{ab}	18.00±0.43^{a}	14.65±0.55^{a}	15.08±0.71^{a}	17.41±0.26^{a}	16.86±0.17^{a}
T2	14.90±0.28^{b}	17.87±0.21^{b}	17.00±0.36^{ab}	18.55±0.66^{a}	17.65±0.14^{a}	16.20±0.39^{a}	18.38±0.40^{a}	17.61±0.26^{a}
T3	17.17±0.24^{b}	16.98±0.27^{b}	17.46±0.22^{ab}	18.97±0.10^{a}	17.34±0.23^{a}	16.25±0.37^{a}	18.79±0.32^{a}	17.60±0.36^{a}
T4	20.09±0.14^{a}	19.70±0.19^{a}	18.61±0.27^{a}	18.66±0.39^{a}	17.27±0.83^{a}	16.08±0.48^{a}	19.47±0.17^{a}	19.20±0.27^{a}
T5	17.07±0.39^{b}	17.15±0.18^{b}	14.88±0.56^{b}	20.33±0.51^{a}	16.89±0.30^{a}	15.78±0.24^{a}	20.06±1.01^{a}	17.29±0.29^{a}
Sig	*	*	ns	ns	ns	ns	ns	ns

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Table 6: Effects of different mulching materials on pod girth of Okra up to eight harvestings

Treatment	1st harvesting	2nd harvesting	3rd harvesting	4th harvesting	5th harvesting	6th harvesting	7th harvesting	8th harvesting
T1	12.18±0.03^{b}	10.93±0.26c	12.53±0.10^{b}	12.07±0.15^{c}	12.38±0.26^{b}	13.76±0.22^{a}	14.03±0.27^{b}	13.88±0.17^{a}
T2	13.34±0.28^{b}	13.13±0.14ab	13.71±0.22^{b}	12.99±0.16^{bc}	13.02±0.14^{b}	14.39±0.24^{a}	13.12±0.17^{b}	13.93±0.19^{a}
T3	13.34±0.22^{b}	12.95±0.12ab	13.70±0.27^{b}	13.92±0.12^{b}	13.37±0.12^{b}	14.91±o.22^{a}	14.44±0.12^{ab}	13.83±0.30^{a}
T4	14.83±0.17^{a}	14.46±0.08a	16.35±0.23^{a}	15.67±0.18^{a}	15.52±0.08^{a}	14.84±017^{a}	16.65±0.29^{a}	15.25±0.48^{a}
T5	12.93±0.25^{b}	12.75±0.33^{b}	13.70±0.24^{b}	13.75±0.18^{b}	14.01±0.33^{ab}	14.66±0.25^{a}	14.81±0.46^{ab}	14.01±0.24^{a}
Sig	*	*	*	*	ns	ns	ns	ns

Table 7: Effects of different mulching materials on total yield of Okra up to eight harvestings

Treatment	1st harvesting	2nd harvesting	3rd harvesting	4th harvesting	5th harvesting	6th harvesting	7th harvesting	8th harvesting
T1	125.10±2.83^{b}	87.10±4.73^{c}	103.28±4.89^{b}	87.00±3.32^{b}	131.25±6.56^{a}	112.50±3.02^{b}	119.70±6.34^{a}	132.30±6.24^{a}
T2	123.60±1.73^{b}	104.47±4.35^{b}	152.10±5.67^{a}	123.92±0.60^{a}	152.10±5.67^{a}	127.50±4.04^{ab}	146.25±4.43^{a}	132.75±3.25^{a}
T3	97.80±5.66^{c}	100.70±4.36^{bc}	145.50±5.40^{a}	103.65±1.45^{b}	142.50±5.40^{a}	130.80±5.28^{ab}	142.50±7.04^{a}	133.35±6.35^{a}
T4	148.65±3.83^{a}	132.60±3.17^{a}	165.00±1.31^{a}	126.75±1.33^{a}	165.00±1.31^{a}	148.20±7.38^{a}	144.85±4.53^{a}	132.15±1.41^{a}
T5	117.30±2.19^{bc}	115.00±4.21^{b}	105.75±2.58^{b}	101.10±2.49^{b}	44.15±3.64^{a}	115.35±1.14^{b}	134.53±7.24^{a}	121.05±3.30^{a}
Sig	*	*	*	*	ns	ns	ns	ns

Values represent mean± standard error of ten replicates. Means followed by the same superscripts in a same column are not significantly different at 0.05 probability level according to DMRT. '*' and 'ns' represents significant at P<0.05 and not significant, respectively.

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THE ROLE OF PHYSIOTHERAPY IN ERGONOMICS IN MANAGING NECK PAIN FOR BUS OPERATORS

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ABSTRACT

Background and Purpose: *Musculoskeletal disorders, particularly neck pain, are more common in bus operators due to poor posture, uncomfortable perch position, prolonged working time, vehicle vibration, and repetitive movements involved in long travel such as steering, bending forward, and prolonged sitting can cause excessive strain on the cervical spine, resulting in cervical pain. Bus operators often experience physical as well as psychological problems such as low spirits and stress while operating the bus. This significantly affects the body parts in which discomfort may be experienced, most notably the neck. The purpose of the study is to assess the ergonomic exposure and physiotherapy management for neck pain among bus operators.*

Case Description: *A case of a 30-year-old male bus operators who was working for six hours per day for the past five years has chronic neck pain with reduced neck mobility.*

Objective: *To determine the effect of onsite physiotherapy for bus operators and to create awareness of ergonomics among them. The purpose of the study is to assess the ergonomic exposure and physiotherapy management for neck pain among bus operators.*

Intervention: *The incidence and severity of neck pain can be effectively decreased with the use of proper intervention techniques. According to estimates, effective ergonomic design for bus operator includes posture correction, cognitive behavioral therapy, as well as physiotherapy management for neck pain that includes stretching, strengthening exercises, traction, and manual therapy.*

Outcome Measure: *The outcome measure is recorded using the Numerical Pain Rating Scale [NPRS] and Neck Disability Index Scoring.*

Conclusion: *This case study has proven that the bus operators are exposed to a high risk of neck pain due to their poor ergonomics. Therefore, it is important to provide proper ergonomics guidelines for bus operators and implement physiotherapy management in the workplace to prevent the incidence of neck pain and other musculoskeletal disorders among bus operators.*

Paper Type*: A Case Study Research.*

*Keywords**: Neck pain, Bus operators, Neck Disability Index, Ergonomics, Physiotherapy.*

INTRODUCTION

One of the most demanding and deleterious jobs in the contemporary world is driving. According to research from the past 40 years, bus drivers or operators are more likely to experience musculoskeletal disorders than employees in other occupations.[1] The term "work-related musculoskeletal diseases" (WRMSDs) refers to conditions where the working environment compromises the efficiency and functionality of a number of articulation, bone, tendons, nerve and cartilage. Uncomfortable seating, exposure extending to vibration and improper postures are risk factors for WRMSDs.[2] The repetitive motions involved in long-distance driving, such as serving, crouching, and slouching can cause sluggish stress along the frisky chain and have an impact on the operators social and confidential life.[2]

According to a recent worldwide analysis, bus operators who drive for long distance were more likely to experience neck discomfort and upper limb WRMSDs than people with other skeletal anatomical characteristics.[2] Individual factors such as lifetime, identity, load, body mass index, and general fitness status are also associated with work-related ailments of operators.[3] Operators must practice defensive driving techniques while considering the bus's passengers' safety as well as their own, other operators and pedestrians' safety, as well as the requirement to follow traffic laws and corporate policies.[4]. Emplacement of a variety of different things can cause discomfort in the neck and shoulder blades. Poor posture is a major contributor to discomfort and is the main cause of cervical pain. Hunching forward causes an excessive amount of pressure on the neck muscles while standing or sitting becausethe head's weight is not being supported in an upright position.[5] There is a strong correlation between the shoulder muscles' capacity to contract and the location of the scapula. Shoulder pullout is a result of bad posture, which is harmful to muscular performance. The location of the scapula is essential for maintaining muscle harmony. [5]

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One of the uttermost frequently used anatomy parts when operating bus is the neck and shoulder region. In the operators sitting position, the neutral lumbar lordosis gradually decreases, and there is either an increase or decrease in neck flexion. Multiple effects may result from overusing and supporting the muscles in this area improperly. Numerous muscles that support the joints and vertebrae are located in the body's neck and shoulder regions [(5)]. Bus operators work longer shifts—more than eight hours per day—have historically adjusted their scapular posture to compensate for bad posture, which contributes to musculoskeletal diseases. Bus operators often begin their journeys correctly by leaning forward. After a few minutes, the torso leans forward, the shoulders tense, and the gluteal and hip flexor muscles become overworked.[(5)] Even a chair that is cosy in fixed circumstances may have bad moving properties that make it uncomfortable while operating bus. The seating position and duration of usage are other factors that influence whether a seat is deemed comfortably by a user. The ideal chair for automobile might shall not be the ideal chair for another and one person's perch position might not be ideal for another. Therefore, when creating a seat, it's crucial to keep the user in mind.[(6)] According to the research's findings, professional bus operators who have postural neck pain have an unusual and important impression of improper posture. Musculoskeletal conditions including neck discomfort, sprains, and strains can develop in the event that the work environment is not designed with drivers in mind and involves manual, visual, foot, seat, or a combination of these jobs.[(7)]The intend of this study was to analyze both the drivers' posture and the frequency of neck pain in onsite assessment. Effective ergonomic design for bus operators on onsite, including posture correction, cognitive behavioral therapy, and cervical pain management using manual therapy, stretching, strengthening exercises, and traction, is considered to be essential.

Role of Ergonomics in Bus Operators:

The profession of ergonomics makes an entreaty of speculation, postulation, statistics, and methodologies to design in order to maximize human wellness and total organization performance. Workplace efficiency is a concept that focuses on understanding interactions between humans and machines.[(14)] Science underlies the field of ergonomics. It combines expertise in engineering, psychology, anatomy and physiology, and statistics to make sure that the designs enhance the skills and capacities of those who use them.[(15)] It is used to boost productivity and provide employees with more comfort.[(16)] Human anatomical, anthropometric, physiological, and biomechanical aspects are taken into account by physical ergonomics, which is primarily concerned with workplace ergonomic. It all comes down to creating a better workplace with positions created to match people's strengths and improve the working environment. It is a strategy or treatment for a range of musculoskeletal conditions associated with the workplace.[(17)] The positioning of the cervical and upper back when someone is sitting is influenced by the location and incline of the work area. As a result, it is crucial to consider both the seat and the task at hand.[(18)] In operators with LBP, weariness and neck-shoulder pain were more severe.[(19)]

Neckdisabilityindex

The Neck Disability Index (NDI) is regarded as a reliable tool for measuring cervical pain and disability in patients with cervical pain brought on by acute or chronic illnesses, which can lead to people facing repetitive motion dysfunction.[(10)] Case-completed, condition-specific handy status form with 10 items including torment, self-help, elevating, interpreting, migraine, attention, duty, operating, dozing, and leisure. The NDI has a good hold and is useful in maintaining its current position as the most commonly used self-reported proportion for cervical pain.[(11)] Scoring: The maximum outcome for each section is 5. If the first statement is marked, the section score is 0, and if the last statement is marked, the section score is 5. The score is determined if all ten portions are completed.[(12)] The NDI can be evaluated using a raw outcome or after being twice reported as a rate. Each part is graded on a scale from 0 to 5, with 5 denoting the most severe pain imaginable and 0 denoting no discomfort at all. A score is calculated by adding all the points. A raw score, with a maximum score of 50, or a rate, might be used to represent the test. No activity restrictions are indicated by 0 points or 0%, and total activity restrictions are shown by 50 points or 100%. More patient-rated impairment translates to a higher score.[(13)]

Case Description

A case of a 30-year-old man who was a bus operator for the past five years experienced neck pain for the past three months. He used to operate a bus for six hours per day, six days a week. He was a known alcoholic and had a habit of chewing tobacco. He reported being satisfied with his present job but often experiencing mild stress due to traffic while driving. He engaged him in recreational and physical movement during his rest time, but his neck pain sometimes affected his routine physical activity. His symptoms first appeared on his right side of the neck during the first week of July 2022. He initially consulted his primary care doctor, who recommended pain medication and rest, but this did not relieve his symptoms. During the onsite ergonomic evaluation, we noticed his daily task routine. It was proven that his neck pain was due to poor posture for an

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extended period of time, which is hunching forward while driving. However, the pain gets aggravated only while driving and relieved during inactivity.

METHODOLOGY

A 30-year-old male who was a bus operator for the past 5 years had chronic neck pain due to his poor posture while driving. We assessed him in his work station. A low seat position causes him to extend his neck higher while driving, putting pressure on his neck muscles. The assessment was taken using the Neck Disability Index, which is a valid and reliable tool for assessment. We obtained an informed consent form from the subject before the evaluation and during the intervention. The intervention was education of posture while driving (figure-01), strengthening of neck muscles such as isometric exercises (figure-08), stretching of tight muscles (figure-09) and relaxation techniques such as massage and deep breathing exercises, and creating awareness of the role of ergonomic among bus operators.

Strength exercises were given as three sets, held for 10 seconds, with ten repetitions for a week; stretching was given as four sets, one repetition, held for 15 seconds (figure-02 to 07). Advice was given such as lean back, perch at the right elevation, don't perch too adjacent to the steering, make sure you can depress the peavey properly, correct headrest location, prevent whiplash, have proper lumbar support, take breaks while positioned.

Figure-01

Figure-02

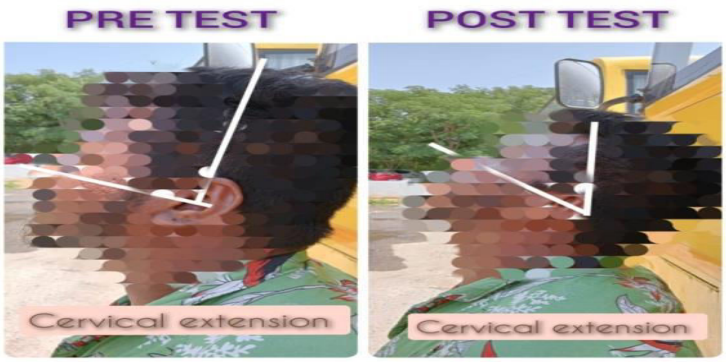

Figure-03

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Figure-04

Figure-05

Figure-06

Figure-07

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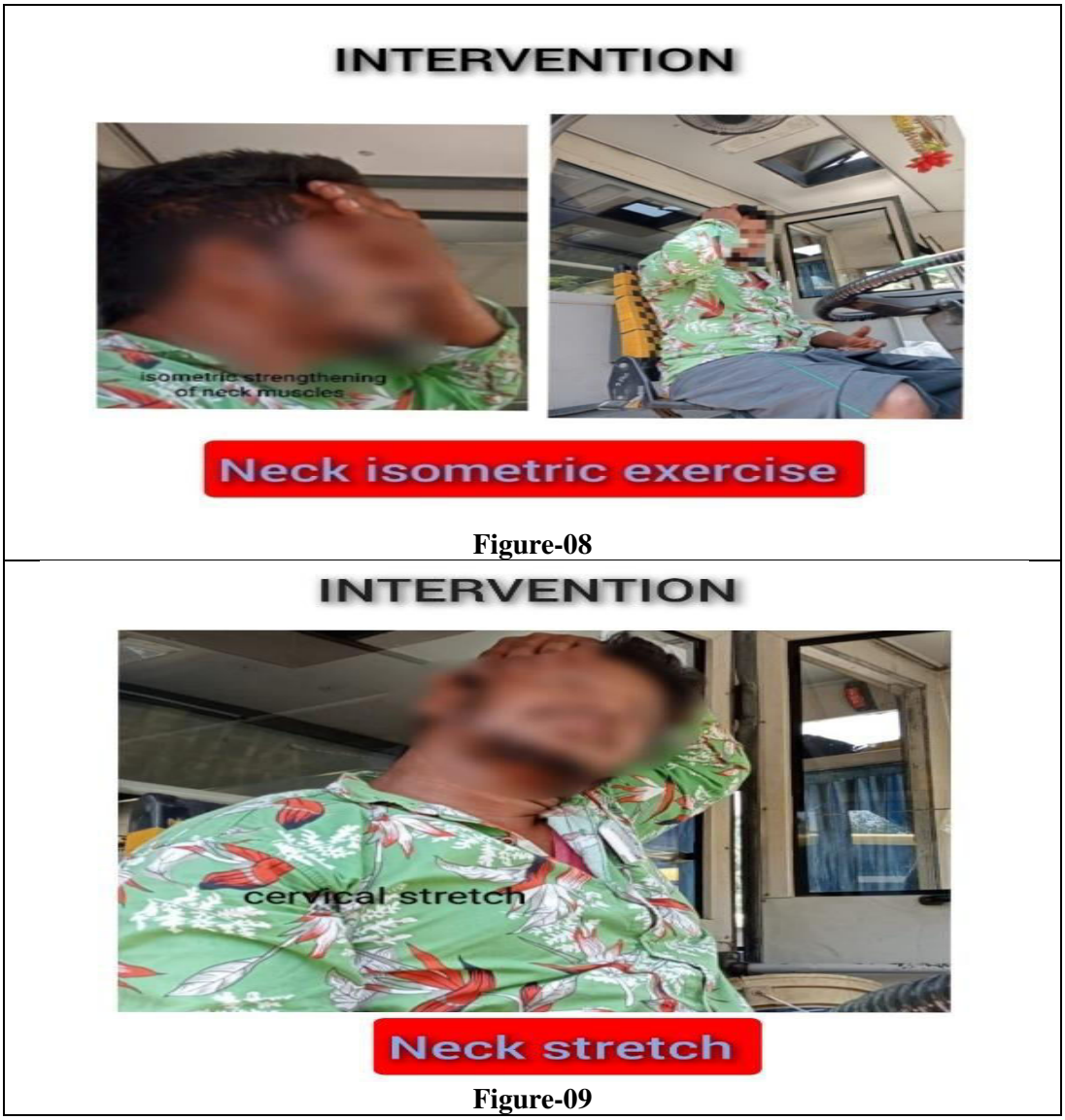

Figure-08

Figure-09

Outcome Measure:
It was recorded by using Numerical pain rating scale (NPRS) and Neck Disability Index (NDI) [13] ,which has a set of questionnaire

Subject: X

Table-3

		Pre-Intervention Test	Post Intervention Test
NPRS (0-10cm)		**7**	**5**
Cervical Range of Motion	Flexion	35	40
	Extension	38	42
	Right Rotation	80	85
	Left Rotation	83	86
	Right Lateral Rotation	36	41
	Left Lateral Rotation	38	42
Neck Disability Index			
	Pain Intensity	3	2
	Personal Care	3	1
	Lifting	4	3
	Reading	3	1
	Headache	4	1
	Concentration	4	3
	Work	4	3

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	Driving	4	3
	Sleeping	3	3
	Recreation	3	1
	Score	70%	21%

DISCUSSION

In this case study a 30 years male bus driver have chronic cervical pain due to poor posture and repetitive movements while driving this leads to neck strain with reduced neck movement. Occupational stress and prolong driving with poor perch posture also affects the operators physical and psychological status. The study assessed the ergonomic exposure and outcome were noted by Neck disability Index [13] and NPRS[20]as pre and post test. The values are notably reduced after education of posture while driving and after intervention. Therefore, physiotherapy has a vital role in managing neck pain for bus operators.

According to Taklikar C.S et al,(2016) concluded that the majority of bus operators indicated moderate to significant levels of work stress. Bus operators enduring stressful conditions were more likely to experience increased blood pressure, musculoskeletal morbidity such as ache in back region, knee pain, tension and headache, joint stiffness and ligament injuries as well as digestive problems such as dyspepsia and regurgitation.[1] N Rugbeeret et al, (2016) concluded that the majority of the bus drivers who was operating a bus continuously without taking break are most commonly affected with work-related musculoskeletal disorder. Some bus drivers were obese due to unhealthy diet, consuming alcohol, smoking, sitting for prolong time while driving and reduced physical activity. Drivers with elevated BMI may be more vulnerable to cardiovascular disease and traffic accidents.[2] SandulYasobanetet al,(2015) stated that the probability of bus operators exposed to the existing ergonomic factors might develop WMSDs. Moreover, it was observed that the operators who participated in less physical exercise seemed to have a greater chance of getting WMSDs. The reported discomfort in a specific body part has a higher exposure of developing WMSDs. Overall upper back and lumbar pain were revealed to have themost painful body parts. Further ergonomic research and effectiveergonomic intervention are basic components that advised forthe bus operators who have a higher risk of acquiring WMSD.[3] Muhammad Kashif et al,(2016) reported that balance, head ache, day-to-day activities, cognition, sleep, and numbness weresome of the observed issues brought on by neck pain. Providing drivers with advice on positional aware, maintaining good driving posture, taking breaks between long periods of operating and adjusting their seats to fit their bodies will all be beneficial in reducing neck strain.[7]

CONCLUSION

From this study, we found that onsite assessment and physiotherapy intervention benefit the bus operator in preventing work related musculoskeletal disorder. Onsite physiotherapy in the work place benefits those bus operator those who can't reach health care advice for their problems. From this we conclude that doing regular exercise and maintaining good posture while driving can reduce the neck pain and it also helps to prevent other musculoskeletal disorders among bus operators.

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TWO FORESTS SPECIES WITH A POTENTIAL FOR REFORESTATION AND TIMBER PRODUCTION

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ABSTRACT
P. oocarpa Schiede ex Schltdl., and P. douglasiana Martínez support the forest industry because they produce sawn wood, resin, chips, posts, needles, cones, and seeds, and also are used during reforestation and restoration zones. The aim of this study was to define the amount of P. oocarpa and P. douglasiana plants produced in nurseries by state and their timber volume for harvesting for the industry. The reforestation potential was defined using two effective reforestation efforts, while the annual and average timber production was estimated from the databases of the species included in the state reports from Mexico. For P. oocarpa, a total average 13 436 040 plants were produced in eight states, where Chiapas, Guerrero, and Nayarit had the higher production; while 2 641 236 plants were produced in three states for P. douglasiana, in which Nayarit reached the higher amount. For both species, total plants had a potential to reforest 14 615.71 ha. The average total volume produced was 77 288.19 m^3: P. douglasiana had the higher timber volume produced (57 093.30 m^3) that P. oocarpa (20 194.88 m^3). Jalisco state was the largest timber producer for P. douglasiana (93.8%) while Chiapas for P. oocarpa (50.24%). The production values estimated intent to be a basis for decision-making during forest management and conservation.

Keywords: Conifers species of Mexico, forest management, Pinus douglasiana, P. oocarpa.

1. INTRODUCTION
For Mexico, P. oocarpa Schiede ex Schltdl., and P. douglasiana Martínez are two species that live in different ecological conditions. The first species has a great range distribution from northwestern Mexico (Sierra Madre Occidental) southward up to Chiapas. It is found in different environmental conditions as dry-temperate (annual precipitation 500–2000 mm) to humid subtropical (Perry, 1991), altitude range from 500–2300 m a.s.l., and often occurs in pure stands or pine-oak woodland (Farjon, 2017). The second species harbors in the mountains of Mexico W at elevations ranging from 1400–2500 m a.s.l. with a precipitation average of 1 000 mm; this occurs in pine forest or pine-oak forest (Farjon, 2017).

Both species support the forest industry annually because they produce sawn wood, resin, chips, posts, needles, cones, and seeds (Semarnat, 2016; Flores and Moctezuma-López, 2021); products used to manufacture cellulose, paper and derivatives, furniture, house building, sleepers, packing boxes, frames, moldings, and plywood (Semarnat, 2016). Flores et al. (2021) indicate that these species provide economic benefits to the country but they demand management with the least possible impact; there are general studies that have examined the timber production for the Pinus genus but not for species by state. Studies by Moctezuma and Flores (2020) and Flores et al. (2021) indicated that Mexican pines produce an average 8 501 million Mexican pesos annually (85.1 % of the total money of all forest species under exploitation), and that most of the timber is obtained from the east of the country.

On the other hand, P. oocarpa and P. douglasiana are used during reforestation and restoration areas. According to Flores et al. (2021), for the first species13 436 040 plants are produced on average per year all over the country while for the second 2 641 236; this amount of plants could be used in order to reduce forest land degradation. Although there is a work has been done to date, more studies need to be conducted to ascertain the reforestation potential by species in each state.

This study aimed to define the amount of P. oocarpa and P. douglasiana plants produced in nurseries by state and their timber volume for harvesting for the industry. This information was identified as being important to help the forest owners to manage both species in a sustainable form.

2. MATERIALS AND METHODS

2.1. Reforestation Potential
The reforestation potential was defined using two effective reforestation efforts: number of plants produced in nurseries, and percentage survival of planted plants; all of these by state. The first effort was determined based on Conafor data (2019) for total seedlings planted from 2016 to 2018. The second effort was assessed the percentage of seedling survival defined by Conafor (2010).

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2.2. Timber Production

The annual and average timber production was estimated from the databases of the species included in the state reports of the Ministry of Environment and Natural Resources (Semarnat, 2013 to 2017). For the total national volume, the percentage contribution of each species was also calculated. On the other hand, the annual and average volumes of timber produced from 2013 to 2017 in each state were determined, using the Flores method (2019).

3. RESULTS AND DISCUSSION

It was evaluated the reforestation potential of two Mexican pines species in which Pinus oocarpa was the better than P. douglasiana. For P. oocarpa, a total average 13 436 040 plants were produced in eight states, where Chiapas, Guerrero, and Nayarit had the higher production; while 2 641 236 plants were produced in three states for P. douglasiana, in which Nayarit reached the higher amount (Table 1). The total amount of plants had a potential to reforest 14 615.71 ha; specifically, 12 214.58 with 48% average survival for P. oocarpa and 2 401.12 ha with 59% average survival for P. douglasiana.

Table 1: Pines plants produced in Mexico in the 2016–2018 period by state.

Species / State	**Plant production per year**			
	2016	2017	2018	Mean
Pinus oocarpa				
Chiapas	6 500 000	9 461 038	8 209 610	8 056 883
Estado de México	800 000	549 573	700 000	683 191
Guerrero	2 460 000	2 550 000	2 050 000	2 353 333
Jalisco	500 000	0	250 000	250 000
Michoacán	605 000	850 000	452 000	635 667
Nayarit	1 120 000	1 166 500	598 398	961 633
Sinaloa	500 000	250 000	286 000	345 333
Zacatecas	200 000	0	250 000	150 000
Total	12 685 000	14 827 111	12 796 008	13 436 040
Pinus douglasiana				
Jalisco	966 500	766 698	200 000	644 399
Michoacán	100 000	0	0	33.333
Nayarit	2 375 000	2 200 000	1 315 512	1 963 504
Total	3 441 500	2 966 698	1 515 512	2 641 236

According to Flores et al. (2021), P. oocarpa is the third species most used in Mexico during the reforestation zones due to this pine posse large natural distribution and is managed in several management programs. However, some states produce other species but not the target pine and reduce his reforestation potential. P. douglasiana is the eleventh species most produced in the country but the amount tends to be reduced yearly. For both species, it is necessary to increase their reforestation efforts in order to support the national restoration strategy. During the reforestation process, it is mandatory to know the species' tolerance to adverse conditions (rainfall, soil, frost, drought, and high temperatures) of the plantation site to reach a higher survival rate.

On the other hand, the amount of average total volume produced was 77 288.19 m^3. P. douglasiana had the higher timber volume produced (57 093.30 m^3) that P. oocarpa (20 194.88 m^3). Jalisco state was the largest timber producer for P. douglasiana (93.8%) while Chiapas for P. oocarpa (50.24%) (Table 2).

Table 2: Annual and average timber produced in Mexico in the 2013–2017 period by state based on species distribution.

Species / State	Timber production per year (m^3)					
	2013	2014	2015	2016	2017	Mean
Pinus oocarpa						
Chiapas	5 009.94	19 585.77	23 187.80	2 141.24	807.58	10 146.47
Chihuahua	6.08	0.00	0.00	0.00	33.63	7.94
Colima	0.00	0.00	0.00	0.00	0.00	0.00
Durango	0.00	0.00	0.00	0.00	0.00	0.00
Edo. México	0.00	0.00	0.00	0.00	0.00	0.00
Guanajuato	0.00	0.00	423.54	0.00	0.00	84.71
Guerrero	0.00	0.00	0.00	23 817.76	25 866.60	9 936.87
Hidalgo	0.00	0.00	0.00	0.00	0.00	0.00

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Jalisco	0.00	0.00	0.00	0.00	0.00	0.00
Michoacán	0.00	0.00	0.00	0.00	0.00	0.00
Nayarit	0.00	0.00	0.00	0.00	0.00	0.00
Oaxaca	0.00	0.00	0.00	0.00	0.00	0.00
Puebla	0.00	0.00	0.00	0.00	0.00	0.00
Querétaro	0.00	0.00	0.00	0.00	0.00	0.00
San Luis Potosí	0.00	0.00	0.00	0.00	0.00	0.00
Sinaloa	0.00	0.00	0.00	0.00	0.00	0.00
Sonora	0.00	0.00	0.00	0.00	0.00	0.00
Zacatecas	0.00	0.00	0.00	48.66	45.82	18.90
Total	5 016.02	19 585.77	23 611.34	26 007.66	26 753.63	20 194.88
Pinus douglasiana						
Chihuahua	13.67	196.15	0.00	0.00	100.00	61.96
Colima	0.00	0.00	0.00	0.00	1 768.60	353.72
Durango	0.00	0.00	0.00	0.00	0.00	0.00
Guerrero	0.00	0.00	0.00	7 486.97	8 122.72	3 121.94
Jalisco	5 013.67	54 442.99	80 414.68	48 204.97	79 702.11	53 555.68
Edo. México	0.00	0.00	0.00	0.00	0.00	0.00
Michoacán	0.00	0.00	0.00	0.00	0.00	0.00
Nayarit	0.00	0.00	0.00	0.00	0.00	0.00
Oaxaca	0.00	0.00	0.00	0.00	0.00	0.00
Sinaloa	0.00	0.00	0.00	0.00	0.00	0.00
Zacatecas	0.00	0.00	0.00	0.00	0.00	0.00
Total	5 027.34	54 639.14	80 414.68	55 691.94	89 693.43	57 093.30

P. douglasiana and P. oocarpa play an important role in the Mexican Gross Domestic Product, in which the Pinus is the main genus used during the production of 8.5 million m^3 of roundwood (FAO, 2020; Semarnat, 2020). This characteristic demand the implementation of sustainable management programs that seek to increase productivity and guarantee the continuity of species.

5. CONCLUSIONS

P. oocarpa is most produced in nurseries and most used during the national reforestation program than P. douglasiana, but possed a lower survival rate. However, P. douglasiana had a higher timber volume produced than P. oocarpa. The production values estimated intent to be a basis for decision-making during forest management and conservation.

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EXPRESS QUALITY CONTROL OF PRODUCTS AFTER AEROSOL CAMERAS OF THE FLUIDIZED BED BY RADIATION OF NANOPARTICLES

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INTRODUCTION

Nowadays, antibody (AB) and interferon (INF) preparations They are increasingly being used in medicine because of their more precise focus on the main causes of autoimmune, infectious, oncological and other significant diseases.

In the hierarchy of biosystems, the higher the level of organization of living matter, the more sensitive it can be to lower-energy effects.

Most biotechnological solid dosage forms (powders, pills, dragee) are produced using fluidized bed(FB) cameras, the basis of which are the laws of hydrodynamics and heat transfer in dispersed media. And of course, quality control of such drugs by classical methods can cause difficulties due to the low concentration of the active pharmaceutical ingredient (API). As a rule, in these cases, they resort to the use of complex methods of biopharmaceutical analysis – from IFA and PCR to biotesting, which in itself is quite long and energy-consuming and can take from 4 man-hours to analyze one sample.

As we found out, preparations made in the FB devices containing AB to INF-γ emit in the subterahertz and gigahertz range, several times exceeding the background values. Mandatory when studying the radio thermal properties of these drugs is their activation – heating up to 37^0C. Referring to the works of IRE RAS (Academician N.D. Devyatkov, prof. O.V.Betsky) according to the distinctive reactions of aqueous solutions to contact with the millimeter wavelength range of electromagnetic radiation, the fundamental point of this interaction is the modulation of shimmering dipoles on the surface of supramolecular complexes.

A few specific characteristics are determined for preparations containing biologically active nanoparticles that are capable of induced radio thermal radiation as an active substance (DV): 1) increased radio thermal emission in the subterahertz region – as an indicator of the formed complex with increased internal energy; 2) special terahertz spectra – as a reflection of a specific supramolecular organization. It is worth noting that dispersion will lead to degeneration of the spectra); 3) special biological activity relative to the unicellular model of S. Ambigua.

Activation with the main drug AB to INF-γ of a drug prepared using the "Placebo" technology is a substance prepared according to the same technological process as a drug containing antibodies to gamma interferon, except for the solvent used: with the absence of an antibody to gamma interferon, due to its own subterahertz radiation, is proof of the formation of water-lactose supramolecular complexes, and hence, biological activity.

Study of the possibility of non-contact exposure of water samples containing ultrahigh dilution (UHD) to sensor solutions by measuring their own radio thermal electromagnetic radiation (EMR):

a) Investigation of own radiothermal radiation of samples containing SVR (i.e. effector solutions).

b) Studies of the induction of intrinsic radiothermal EMR in sensor solutions.

In the Faraday chamber, in the absence of background radiation, placebo and lactose UHD solution in Petri dishes are located at a distance of 1 cm.The effector solution and the sensor solution are heated to a temperature of 37 ° C. Experiments to control their own EMR are carried out 2 times for reproducibility, provided that the MAX AVG mode is used, which is the result of hardware measurement of the EMR flux density for 300-fold repeatability.

c) Investigation of relaxation kinetics of effectors and sensors before and after contactless incubation.

The relaxation kinetics of the remotely activated sample is recorded according to the EMR flux density data after 1 hour, 10 minutes, 48 hours and 169 hours. All measurements of aqueous solutions are performed using the TES92 detector in the Faraday's camera.

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Thus, the main goal of our work is to develop an express method of quality control of biotechnological drugs, the active substance of which is AT to INF–γ, to study its physico-chemical properties and compare it with a placebo drug.

Methods. In the course of our work, the following substances were used: lactose monohydrate as an excipient filler; affine purified polyclonal rabbit AB to recombinant human INF as API; lactose powder intact as a control of results.

Equipment: Pilotlab fluidized bed apparatus, which was used to saturate lactose powder with solutions with pharmaceutical substances before granulation; TES-92 integrated flux density sensor (TES Electrical Electronic Corp., Taipei, Taiwan), which was used to determine the flux density of radiothermal radiation, having a frequency range from 50 MHz to 3.5GHz, measuring range the electric field strength is from 20 mV/m to 108 V/m, and the measuring range of the magnetic field strength is from 53 μA/m to 286.4 mA/ m.

RESULTS AND DISCUSSION

In our studies on the study of own radiothermal radiation of drug, which presents AB to INF-γ as an API, placebo of the drug and IL, there is a clear distribution of the device readings between the drugs, which makes it possible to distinguish them from each other.

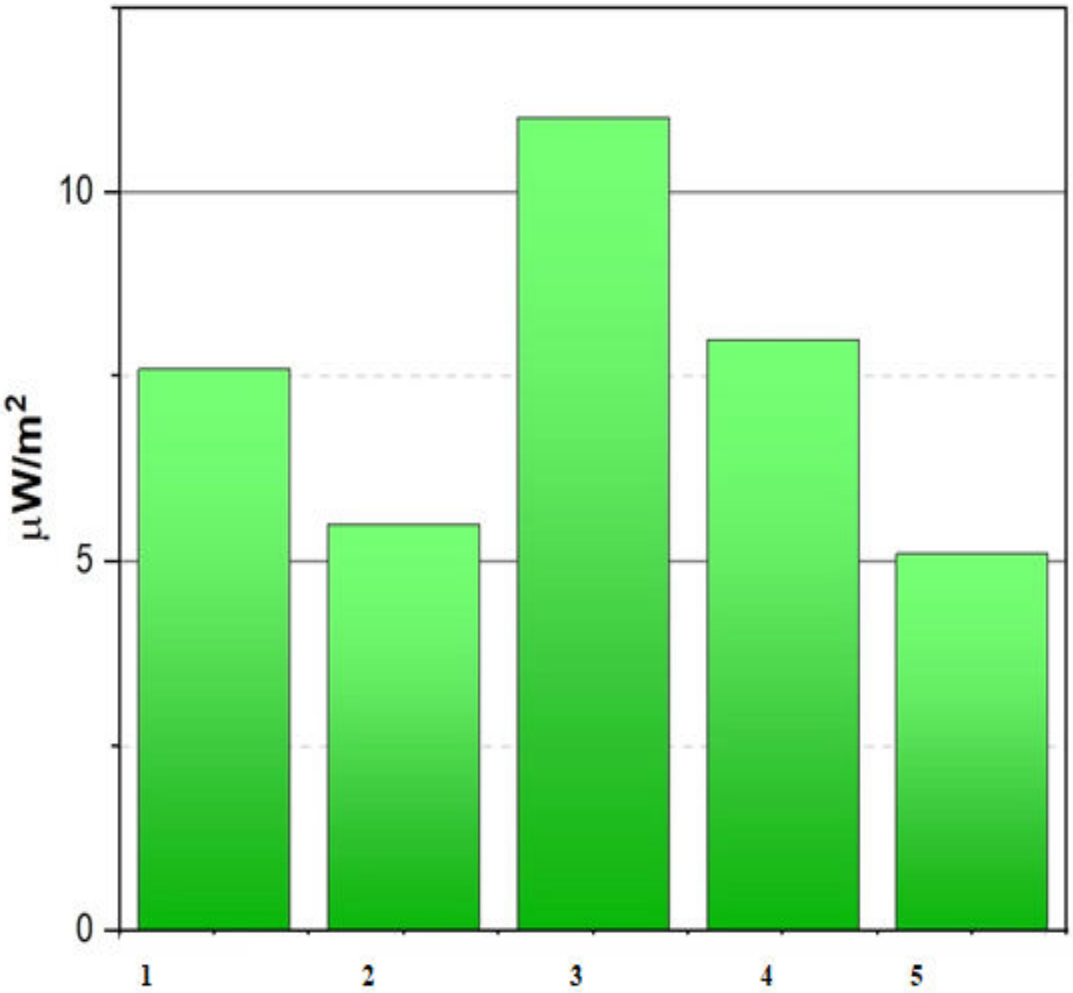

Fig. 1 Comparison of measurement results of activated sludge from 14.04 to March 2022, where 1 – 14.04.22; 2 – 21.04.22; 3 – 12.05.22; 4 – 12.11.22; 5 – March 2022 (average values of three samples).

In turn, the IL values during all measurements do not go beyond the background radiation of 1 μW/m2, regardless of whether it was activated or not. The difference in drug AB to INF-γ and its placebo drug was also traced. In the case of the drug, TES-92 detected on average 74,8 +/- 7 MW/m2 when heated to 370C. For his placebo drug, the readings of the device did not exceed the values in 6,42 +/- 4 μW/m2.

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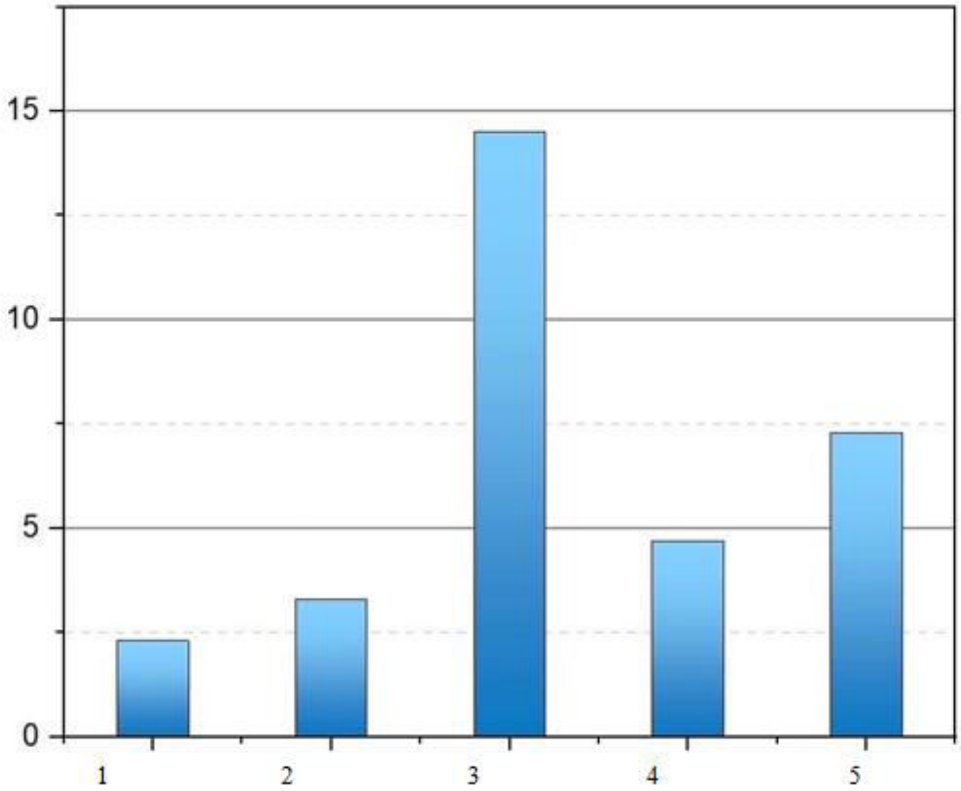

Fig. 2 Comparison of Placebo drug measurements from 14.04 to March 2022, where 1 – 14.04.22; 2 – 21.04.22; 3 – 12.05.22; 4 – 12.11.22; 5 – March 2022 (average values of three samples). Units of measurement along the ordinate axis - μW/m^2

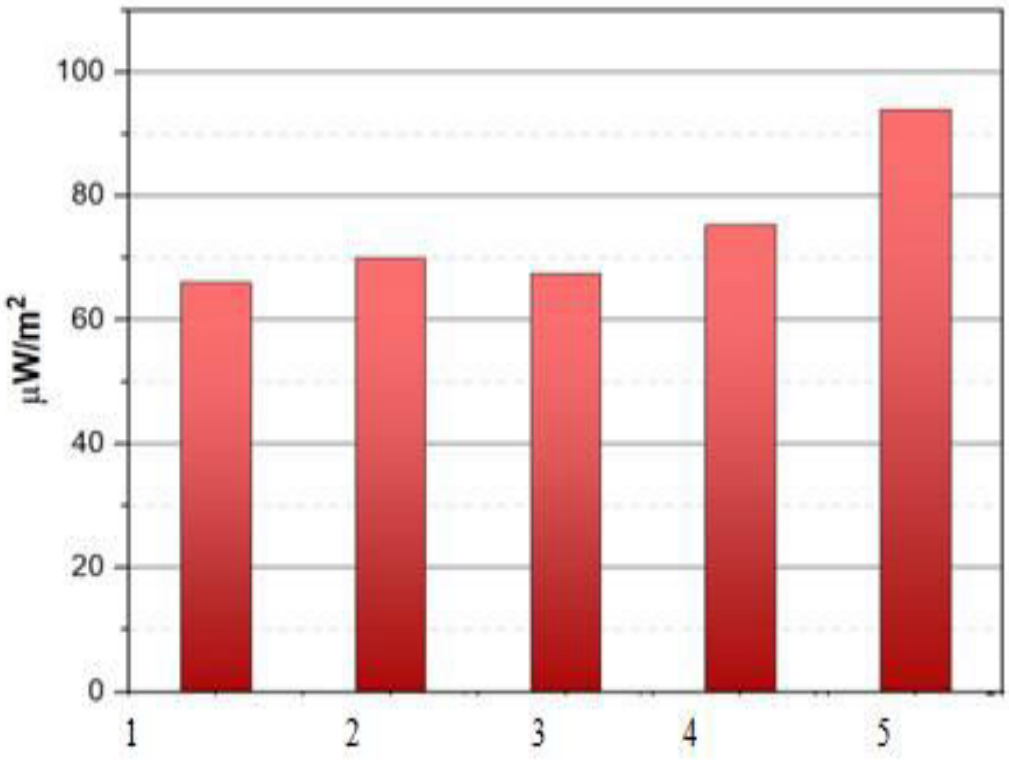

Fig. 3 Comparison of measurements for the drug AB to INF-γ from 14.04 to March 2022, where 1 – 14.04.22; 2 – 21.04.22; 3 – 12.05.22; 4 – 12.11.22; 5 – March 2022 (average values of three samples).

We also investigated the intrinsic radiation of 5% solutions of these substances. For solutions or placebo of the drug in the activated state, the indications did not exceed 2,5+/- 1,5 μW/m2, while the drug readings reached 27.5 μW/m2.

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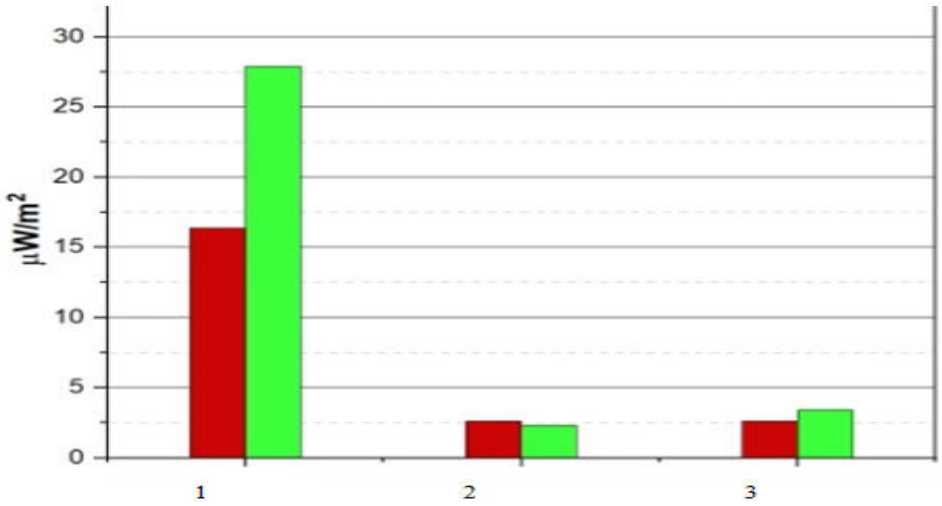

Fig. 4 Comparation of 5% Solution of the drug AB to INF - γ, IL and placebo without activations and heated up to 37^{0}C, where 1 – 5% sol. of the drug AB to INF - γ; 2 – 5% sol. IL; 3 – 5% sol. placebo.

In the case of activation of the drug with AB to INF - γ, its placebo drug and IL with different relaxation periods, the following data were obtained. In the maximum value for the drug Ab 27 μW/m^2, as well as for placebo at 60 minutes of heating to 37^{0}C, and in the case of IL, values below the background are observed in 1,5 +/- 1 μW/m^2.

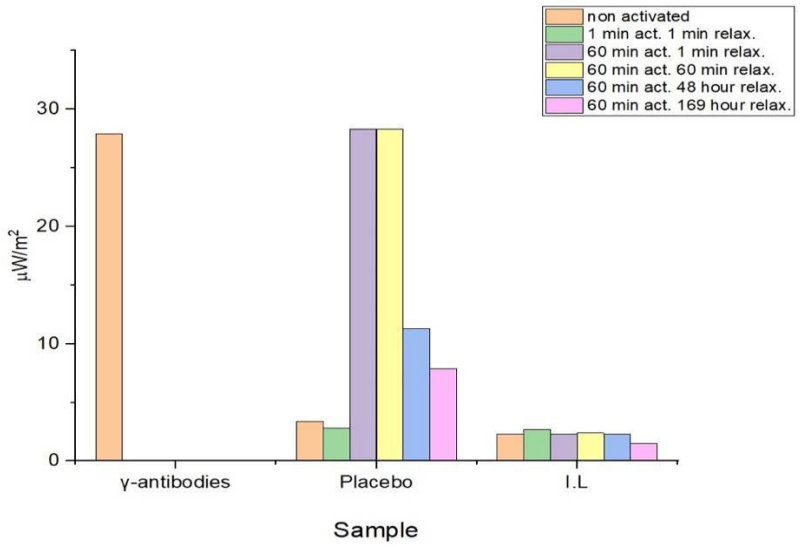

Fig.5 Graphical representation of the results obtained using various modes of activation by the effector solution (AB to INF - γ) of the sensor solution (placebo).A 5% solution of intact lactose was used as a control.

CONCLUSION

In this article, we propose a modern approach to quality control of biotechnological drugs, offering a new express method for products containing nanoparticles (AB, INF).

The proposed methodology is distinguished by its mobility, the speed of obtaining results, and the simplicity of interaction, which together allows it to be implemented at the stages of development or in the production process of biotechnological drugs.

Based on the data obtained using TES-92, we can observe the presence of distant effects of activation by drug with AB to INF- γ with a Placebo and relaxation through certain time points.

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AN EXAMINATION OF INDIA'S RIGHT TO PRIVACY THROUGH THE LENS OF THE RIGHT TO BE FORGOTTEN

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ABSTRACT
Information is readily available online in today's environment when technology has permeated practically every area of our life. The world has been completely changed by the internet, and things only seem to be moving in their favour. On the internet, personal data is being kept for ever-longer periods. As a result, instead of forgetting by default as it is experienced in the human brain, remembering by default is now the norm thanks to the wonders of technology. The "Right to be Forgotten" was enthusiastically brought into the European Union in this context, and it was heralded as a new era in the protection of online data privacy. The General Data Protection Regulation was created shortly just after the aforementioned provision to give people the "Right to be Forgotten" so they could ask data controllers to delete their personal information in specific situations. The researcher examines the potential legal barriers to recognising such a right and argues in favour of its implementation in India because it is legally solid. In this paper, the development of such a right in India will be examined in light of a significant ruling by the Judiciary. The paper will also look at defences and arguments for the right to be forgotten being recognised as a fundamental right in India.

Keywords: Right to Privacy, Right to be Forgotten, Data Privacy, Data Protection Bill.

1.1. INTRODUCTION

Any and every type of information can now be preserved online thanks to the field of digitization. Numerous people benefit from the abundance of data that is readily available online, but some individuals also experience negative effects from it. There are some situations where people don't want personal activities to be publicly disclosed on different social media platforms. And with good reason—citizens' right to privacy should always be protected and not infringed upon. An individual's private space shouldn't be invaded. People now utilise the internet more and more frequently in their daily lives. The main issue is that such online databases are designed to maximise the utility of the web. Pages are still visible even when they are removed from the site because of the cache. The Internet never forgets as the phrase goes.

The public frequently posts private information, regrets doing so much later, and wishes they had never published it in the first place and would have kept it confidential. Once information is shared and made public online, the original purpose for which it was intended to be used becomes utterly irrelevant. It is only natural that data made available online is open to interpretation, which may be interpreted to qualify as information misuse or even abuse.

Imagine that you are a renowned and well-respected person, but a search engine only identifies you as the creator of that popular video. Well, Mr Mario Costeja Gonzalez experienced a comparable incident. Mr Gonzalez had put up some property for auction in 1998 as a result of some financial difficulties, the specifics of which were described in a newspaper article that later appeared online. However, the story of his auction was always clearly shown anytime his name was googled, which hurt his reputation. So, he requested that Google take down the aforementioned post. The Court of Justice of the European Union, which has its headquarters in Luxembourg, ruled in the abovesaid case, that Google must remove any search results that are outdated, incorrect, or even irrelevant data if the request is made by the concerned party. As a result, in Mr Gonzalez's situation, Google must delete the search results that appear regarding his property's auction.

This ruling is significant because it establishes the legal framework for the Right to be Forgotten or the Right to Erasure. It also establishes the basis for the GDPR's right to deletion clause. But this right is far more complex than a straightforward removal request. The "right to be forgotten," its implications, and its use in India are examined in greater detail in this research paper.

1.2. OBJECTIVE OF STUDY

- To understand the development of the right to be forgotten in India
- To learn judicial pronouncements protecting the right to be forgotten in India.

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- To examine the rules put in place to address privacy issues in India.

1.3. RESEARCH METHODOLOGY

For the proposed study, the researcher employed a doctrinal research approach. It is based on secondary research resources such as encyclopedia entries, scholarly publications, court decisions, legal reports, and the most significant laws and rules currently in effect

1.4. REVIEW OF LITERATURE

(Jain, 2007) in his book "Indian Constitutional Law," discusses the numerous developments that have occurred in Indian constitutional law. After the constitutional law took effect, there were numerous case laws. Few court rulings had a substantial impact on constitutional law and served as turning points. By interpreting Article 21 as a whole, the court has inferred other rights for the general public, including the right to privacy and the right to be forgotten. To live honourably, one must have the right to privacy. The researcher concluded that one of the fundamental liberties protected by the Indian Constitution is the right to privacy, and even the Supreme Court of India has recognised this.

(Becker, M., 2019) his research paper, titled "Privacy in the Digital Age: Comparing and Contrasting Individual versus Social Approaches to Privacy" discussed privacy rights and different aspects in the digital era. The author also discusses the challenge that the digital era poses to an individual's right to privacy. Even it explains the value of privacy on social networking sites and other apps.

And other Acts and Articles are referred to by the researcher.

1.5. LIMITATION OF STUDY

The study's limitation is that it only looked at secondary research on the information that was already accessible about the project's subject. The study has been constrained by the researcher's use of solely references to Indian legislation and rulings.

1.6. WHAT IS PRIVACY?

The United Nations recognises the right to privacy as a basic human right (UDHR). What this right comprises is challenging to concisely and exactly express. Regarding information or personal data and the degree to which it is shared with third parties, privacy has a dual aspect. The tools that were accessible at the time, such as literacy, bookkeeping, newspapers, and, most recently, the Internet, have changed how people today interpret privacy. The notion of privacy in the contemporary age has changed as a result of the Internet and the introduction of mass data gathering and retention. The present privacy debate is on how third parties handle the data they possess, including how it is protected, who gets access to it, and under what circumstances.

1.7. RIGHT TO PRIVACY

Black's Law Dictionary refers to the right to privacy as a "right to personal autonomy." In this sense, having the freedom to make your own decisions is equivalent to having the right to privacy. One may exercise this privilege to prevent others from using personal information about him, such as his name, picture, etc. Any unjustified interference in his private life could put him through emotional hardship, damage his relationships with his family, and his reputation, and jeopardies his mental health.

All people have the right to privacy just by being alive. Physical integrity, individual freedom, the right to free speech, and the freedom to move or think are also included. Thus, privacy encompasses more than just the physical body and also includes integrity, individual autonomy, data, voice, consent, objections, movements, thoughts, and reputation. As a result, it is a relationship that is neutral and free from interference, unwelcome intrusion, or invasion of personal space between an individual, a group, and an individual. All contemporary societies agree that maintaining one's privacy is crucial, and they do it not only for ethical considerations but also for legal ones.

The concepts of privacy and the right to privacy are difficult to grasp. Privacy often relates to modern information and communication technologies and is based on the principle of natural rights. The right to privacy refers to our ability to protect the space around us, which includes all we own, such as our bodies, homes, assets, ideas, feelings, secrets, identities, etc. By controlling the scope, mode, and duration of the information you choose to release, you can decide which portions of this area other people can access.

1.8. WHAT IS THE RIGHT TO BE FORGOTTEN?

Citizens can request to have their information deleted from the internet under the concept of the "right to be forgotten" or "right to erasure." Additionally, the same can be verified via a traceable mechanism. It is frequently linked to the right to privacy under the heading of the right to be left alone. This right is crucial in the

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social media era since every image, recording, communication, or post has the potential to be used against you. These rights protect both a person's privacy and dignity. A search engine's only goal is to deliver information on a relevant topic. Because it is powered by artificial intelligence (AI), it is unable to comprehend inaccurate or irrelevant information. Its database has a wealth of information about every associated human. Since social platforms have made people so vulnerable, it is only fair to demand the right to privacy and the right to be forgotten to protect one's dignity. According to the global conversation surrounding it, the Right to Privacy guarantees and protects the Right to be Forgotten as a natural right.

1.9. DEVELOPMENT OF RIGHT TO BE FORGOTTEN IN INDIA

There is presently no legal framework for such a right to erasure or the right to be forgotten in India.

The Gujarat High Court's decision in *Dharmaraj Bhanushankar Dave v. State of Gujarat*, the first case in India to deal with the idea of the right to be forgotten, was significant. The petitioner had filed a case to have a published ruling that exonerated him from charges removed, which is how the matter came to be. The petitioner was unable to identify specific legal requirements that had been broken, so the court declined to issue an order for the revocation of the judgement. As a result of the absence of a legal framework, the petitioner was unable to seek any relief.

The supporting opinion was concluded in the famous case *K.S. Puttaswamy v. Union of India* concluded that a person's right to privacy and liberty depends on their ability to be left alone. The Supreme Court also noted that the right to be forgotten just can not be utilised when the data in question was required for (1) practising the freedom of speech and expression and information; (2) complying with legal requirements; (3) carrying out a task carried out from the public's interest or health policy; (4) cataloguing intended purpose in the interest of the public; (5) science-based or cultural study purposes or interpreting data; or (6) the institution, exercise, or maintenance of a claim. As a result, the court recognised the right to privacy as a fundamental right protected by Article 21 of the Constitution, together with the right to be forgotten and to be left alone. The right to privacy was further expanded to include both physical and virtual environments, such as the internet and social media.

Justice Sanjay Kishan Kaul stated “The right of an individual to exercise control over his personal data and to be able to control his/her own life would also encompass his right to control his existence on the Internet”.

The petitioner in *Sri Vasunathan v/s The Registrar General & Ors* asked to have his daughter's name removed from the cause title because it was easily searchable and would damage her reputation. The court ruled in the petitioner's favour and issued an order that the name is omitted from the order's body and cause title. Only copies of the order that turned up in a search on the internet were covered by the remedy.

In *Subhranshu Rout @ Gugul v. the State of Odisha*, the accused assaulted the woman and created a phoney profile to share personal images of her on Facebook. No one, much less a woman, would wish to create and showcase the grey areas of her personality, the Odisha High Court ruled. Women are the victims in the majority of incidents, including this one. As a "right in rem," they have the authority to impose the right to be forgotten. Once the relationship between the victim and the accused becomes strained, as it did in the current case, the taking of pictures and films with permission cannot justify the exploitation of such content.

However, the right to be forgotten is uncertain in India due to a lack of legislative protections. What would a proposed right to be forgotten cover, for instance? Would it eliminate the source itself or just a search result from a search engine?

Under the direction of the B.N. Srikrishna Committee, the Personal Data Protection Bill, 2019 was created in place of such inquiries. Section 20 of the bill establishes the right to be forgotten. It states that three grounds may be used to request the right to limit and stop the further disclosure of personal data.

1. Either no longer applies to the reason for which it was collected or has fulfilled that goal.
2. Was made with the data principal's consent by section 11 and that consent has now been revoked; or
3. Was made in violation of this Act or any other currently in effect law's provisions.

The committee also placed a strong emphasis on obtaining the consent of an individual before processing and using their personal information. According to the committee, consent/assent must be specific, unequivocal, and able to be withdrawn just as efficiently as it was given.

1.10. CONCLUSION

It is crucial to protect privacy in this day and age where every piece of information is accessible with only a click. Both human beings' vulnerability and connection have increased. Information on a person is available

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online, on social media, or elsewhere. An individual should have the right to safeguard and maintain his or her identity in this regard. A person can do this thanks to the right to be forgotten.

Although this right is not universally recognised, which creates questions and limits its effectiveness. However, it should be mentioned that social media platforms allow people or users the option to erase any information that infringes on their right to privacy. The right to be forgotten is prospective in nature and shields a person from further harm.

Even though this right has been acknowledged in India, no concrete legal framework has yet been established. Even though we have cyber cells to address these problems, victims have found it impossible to seek redress because there is no legal structure.

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A REVIEW ON ONYCHOMYCOSIS

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ABSTRACT
Onychomycosis is the most common nail infective disorder. It is caused mainly by anthropophilic dermatophytes, in particular by Trichophyton rubrum and T. mentagrophytesvar. interdigitale. Yeasts, like Candida albicans and C. parapsilosis, and molds, likeAspergillus spp., represent the second cause of onychomycosis. The clinical suspect of onychomycosis should be confirmed my mycology. Onychoscopy is a new method that can help the physician, as in onychomycosis, it shows a typical fringed proximal margin. Treatment is chosen depending on the modality of nail invasion, fungus species and the number of affected nails. Oral treatments are often limited by drug interactions, while topical antifungal lacquers have less efficacy. A combination of both oral and systemic treatment is often the best choice.

Keywords: *onychomycosis; nail lacquers; systemic antifungal therapy; fungi; nail.*

INTRODUCTION
Onychomycosis is the most common nail infective disorder, and it is responsible for about 50% of all consultations for nail disorders. Onychomycosis has been reported as a gender- and age-related disease, being more prevalent in males and increasing with age in both genders. In the elderly, onychomycosis may have an incidence >40%. Predisposing factors are diabetes mellitus, peripheral arterial disease, immunosuppression due to HIV or immunosuppressive agents.

In most cases, this infection is caused by anthropophilic dermatophytes, in particular by Trichophyton rubrum, followed by Trichophyton mentagrophytes var. interdigitale. The non-dermatophyte molds, like Scopulariopsis brevicaulis and Aspergillus spp., can be involved in onychomycosis as primary pathogens or as contaminant agents and secondary pathogen. Other molds that have been isolated from affected nails include Fusarium spp., Acremonium spp., Alternaria spp. and Neoscytalidium sp. The estimated worldwide prevalence of non-dermatophyte molds onychomycosis is 10%–15%. Yeasts, like Candida albicans and Candida parapsilosis, represent the third cause of nail fungal infection, and they occur only when predisposing factors are present, mainly immunosuppression and diabetes

Toenails are more commonly affected than fingernails: onychomycosis in these cases frequently involves several nails, and dry-type plantar tinea pedis is often present. There are different clinical types of onychomycosis, depending on the modality of nail invasion. Clinical diagnosis of onychomycosis always requires laboratory confirmation, and treatment depends on many factors, like the fungus species and the number of affected nails.

Onychomycosis in childhood is rare and affects approximately 0.5% to 2.6% of all children. Similar to adults, the most common presentation is distal subungual onychomycosis, and toenails are affected more commonly than fingernails. Children acquire the fungus from a dystrophic or traumatic nail abnormality or from a parent, indirectly, through environment contamination. Genetic predisposition to develop fungal invasion of the soles and nails seems necessary at a young age.

Clinical Features

Distal and Lateral Subungual Onychomycosis

Figure 1. Distal and lateral subungual onychomycosis (DLSO): whitish discoloration, onycholysis and subungual hyperkeratosis.

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Through the hyponychium, fungi enter the nail and spread proximally on the surface of the nail unit plate. One or both of the great toenails are typically affected by distal and lateral subungual onychomycosis (DLSO), which is frequently accompanied with tinea pedis. The nail plate has a yellow-white appearance, is onycholytically separated, and has distal subungual hyperkeratosis. Less frequently, the onycholytic nail may develop a brown, black, or orange colour.

Dermatophytoma, a subungual accumulation of hyphae and scales that is hardly touched by antifungals and involves excision of the region and systemic treatment, is one potential dermatophyte-related DLSO presentation.

When the infection is the Melanoides form of Trichophyton rubrum or another fungus that produces melanin, such as Neoscytalidium dimidiatum or Aspergillus niger, DLSO may be accompanied by black nail pigmentation (also known as "fungal melanonychia"). Non-dermatophyte-caused onychomycosis is frequently accompanied by a severe periungual irritation.

Traumatic onycholysis (typically symmetrical and subungual hyperkeratosis is absent) and nail psoriasis (diffuse hyperkeratosis, multiple/all toenail involvement, additional skin and nail indications of psoriasis) are two alternative diagnosis for DLSO.

Superficial Onychomycosis in White

Figure 2. White superficial onychomycosis (WSO): white opaque friable patches of the nail plate.

Fungi colonise the dorsal nail plate, appearing as white, opaque structures that can be removed with a scraper. The classic form of this condition is caused by Trichophyton interdigitale, in which dermatophytes colonise the nail plate's outermost layers without actually penetrating it (Figure 5). However, Fusarium species and other moulds can also result in a condition called white superficial onychomycosis (WSO), which has a deeper nail invasion.

It is typical for T. interdigitale to cause tinea pedis interdigitalis (athlete's foot).

The differential diagnosis includes transverse toenail leukonychia from trauma and superficial nail fragility from prolonged nail polish usage.

Proximal Subungual Onychomycosis

Figure 3. Proximal subungual onychomycosis (PSO): white discoloration of the proximal nail plate.

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Typically, fungus-related components are found in the ventral nail plate, resulting in proximal leukonychia. Proximal subungual onychomycosis (PSO) caused by dermatophytes is extremely uncommon, and the T. rubrum type was once thought to be an indication of HIV infection. It appears as a white spot in the lunula region, beneath the proximal nail plate. Acute periungual inflammation is frequently present with PSO, which is a common presentation of non-dermatophyte mould infection, particularly caused by Aspergillus sp. and Fusarium sp.Acute bacterial paronychia and pustular nail psoriasis are included in the differential diagnosis.

Endomycosis Endonyx

Figure 4. Endonyx onychomycosis: white discoloration of the nail plate that is firmly attached to the nail bed.

Massive nail plate invasion without nail bed involvement is the hallmark of endonyx onychomycosis. Clinically, the damaged nail may have milky white discolouration and lamellar cracking.

There is no onycholysis or nail bed hyperkeratosis, and the nail plate is firmly affixed to the nail bed.

It is very uncommon and brought on by T. soudanense or T. violaceum.

Onychomycosis with total dystrophy

The most serious stage of onychomycosis, total dystrophic onychomycosis (TDO), can arise from persistent DLSO or PSO. The nail plate is friable, yellowish, and has a widespread thickening.

Figure 5. Total onychomycosis: the nail plate is completely invaded by fungi and friable

Onychomycosis diagnosis

Mycology should be used to confirm the clinical suspicion of onychomycosis. The mycological examination is divided into two parts: direct microscopic examination and culture. For the first, the nail material is collected from the affected nail and immersed in a 40% KOH solution before being placed on a slide and examined under an optical microscope for hyphae and spores. KOH does not identify the type of fungus causing onychomycosis, and a culture is required for a more specific diagnosis. Histopathology of nail clippings can be used to diagnose onychomycosis, with periodic acid-Schiff (PAS) stain allowing easy visualisation of fungal hyphae.

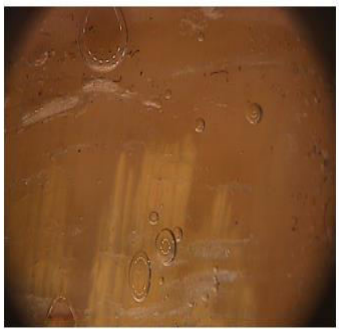

Figure 6. Onychoscopy of DLSO, showing the typical proximal fringed (ragged) margin.

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Digital dermoscopy, also known as onychoscopy, is a simple and quick procedure that allows for the differentiation of onychomycosis from common nail dystrophies.

The following DLSO characteristics are not seen in traumatic onycholysis or nail psoriasis: proximal margin of the onycholytic area with jagged edge and sharp structures directed to the proximal fold; longitudinal striae of different colors in the onycholytic nail plate; and overall appearance of the color of the affected nail plate in a matted variable discoloration resembling the aurora borealis.

CLSM (confocal laser-scanning microscopy) is a new diagnostic technique. The CLSM aspect of dermatophytes appears as a network of long structures with high reflection and the typical shape of hyphae: the CLSM aspect of yeasts has been reported by Arrese et al., whereas moulds have not yet been described in nails.

Other novel diagnostic tools for onychomycosis include the dermatophyte test strip, fluorescence microscopy, and Raman spectroscopy. The dermatophyte test strip is an immunochromatography test that employs a monoclonal antibody that reacts with Trichophyton species and provides a positive signal after 15 minutes of contact with one of these dermatophytes. It is a ready-to-use kit that is quick, simple, and inexpensive. Because the test has a high sensitivity and a negative predictive value, it can be used to rule out onychomycosis in all suspicious cases.

The method had previously been tested in a small series on onychomycosis.

Treatment

Onychomycosis treatment is determined by the clinical type, the number of involved nails, and the severity of the infection. The disadvantages of therapies include the fact that oral treatments are frequently limited by drug interactions and potential hepatotoxicity, and topical antifungals have limited efficacy when used without nail plate debridement. A combination of oral and systemic treatment is frequently the best option.

Topical Treatment

A transungual delivery vehicle is required for the penetration of a topical antifungal through the nail plate. The inability of topical antifungal agents to penetrate the nail unit limits their use, and relapses and re-infections are common, occurring in at least 20%-25% of patients.

In severe onychomycosis, combining systemic antifungals, debridement, or nail avulsion reduces treatment duration and increases cure rate. Nail lacquers are effective in the treatment of WSO and DLSO limited to less than 50% of the distal nail in monotherapy. The treatment period lasts 6 to 12 months. Amorolfine 5% or ciclopirox 8% in non-water-soluble lacquers and ciclopirox in water-soluble nail lacquer are two options. Amorolfine nail lacquer is used once a week, whereas ciclopirox nail lacquer is used every day. Fungistatic and fungicidal properties of amorolfine against dermatophytes, non-dermatophytes, moulds, and yeast. Gupta et al. recommend amorolfine 5% nail lacquer for onychomycosis without matrix involvement and mild cases of distal and lateral subungual onychomycosis affecting up to two nails.

Ciclopirox has antifungal, anti-inflammatory, and anti-allergic properties. It is used every day. There are two formulations that improve nail permeability: ciclopirox 8% in non-water-soluble lacquers and ciclopirox in water-soluble nail lacquer.

New topical antifungals for the treatment of dermatophyte-induced onychomycosis include efinaconazole 10% solution and tavaborole 5% solution. Efinaconazole 10% nail solution is a promising drug for toenail onychomycosis that was approved by the FDA in June 2014. It is a new triazole antifungal that is applied topically once daily without nail debridement to treat mild to moderate DLSO. Cure rates are comparable to those seen with itraconazole taken orally. A recent study looked at the efficacy of this nail lacquer on 1655 patients with onychomycosis for 52 weeks and discovered that efinaconazole was more effective at treating the disease in its early stages.

Systemic Treatment

Systemic treatment is required for DLSO that extends to the proximal nail, PSO caused by dermatophytes, and deeply infiltrating white superficial onychomycosis. Fluconazole, itraconazole, and terbinafine have improved treatment success, resulting in a mycological cure in more than 90% of fingernail infections and approximately 80% of toenail infections. The clinical characteristics of the onychomycosis (total onychomycosis, very thick subungual hyperkeratosis, and dermatophytoma, which make it difficult for the drug to reach the affected area in active concentration), etiological agents (several non-dermatophytes, including Neoscytalidium, Scopulariopsis, and Fusarium sp., do not respond to systemic antifungals), and (immunodepressed patients have a poor prognosis, and several drugs may modify antifungal blood levels).

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Terbinafine can be given as a continuous therapy of 250 mg per day for 12 weeks or as a pulse therapy of 500 mg per day for four weeks on and four weeks off. Itraconazole is given in pulse therapy at a dose of 400 mg daily for one week every month. The treatment period for fingernails is two months and three months for toenails.

Continuous terbinafine and itraconazole pulse therapy are both effective and safe treatments for dermatophyte toenail onychomycosis in diabetics. These regimens are compatible with topical nail lacquers. There have been no studies that compare the cure rates of systemic and topical antifungals in combination, but these combinations are commonly used in clinical practise. Periodic removal of the affected nail plate by a podiatrist or topical application of urea ointment can hasten healing. Recurrences and reinfections are common (affecting up to 20% of cured patients).

Fluconazole is also used to treat dermatophyte onychomycosis at a dose of 150-300 mg weekly for more than six months, but it is less effective. Fluconazole, itraconazole, and terbinafine have a favourable safety profile. Posaconazole and albaconazole are new drugs that could be used as an alternative therapy.

Non-dermatophyte moulds do not respond to systemic antifungals in general, so topical therapy combined with periodic removal of the affected nail plate is the best option in these cases of onychomycosis. Terbinafine should not be used to treat onychomycosis caused by Candida sp. because the yeast is not sensitive to it. Furthermore, the isolation of Candida from a nail should always be accompanied by a thorough examination of the patient, as Candida onychomycosis is frequently associated with diabetes or immunodeficiency.

Onychomycosis treatment takes several months because the nail grows slowly, especially in the elderly. The type and severity of onychomycosis, as well as the patient's comorbidities, influence drug selection. The majority of patients present with a DLSO caused by dermatophytes involving the distal part of one or two great toe nails, and the treatment of choice is topical antifungal application, possibly in conjunction with periodic removal of the affected nail plate.

CONCLUSIONS

Onychomycosis is a common fungal infection that requires specialised treatment. Therapy takes several months because the nail grows very slowly, particularly in the elderly. The type and severity of onychomycosis, as well as the patient's comorbidities, influence drug selection. The majority of patients present with a DLSO caused by dermatophytes involving the distal part of one or two great toe nails, and the treatment of choice is topical antifungal application, possibly in conjunction with periodic removal of the affected nail plate. We recommend systemic treatment with fluconazole, itraconazole, or terbinafine for DLSO that extends to the proximal nail, PSO caused by dermatophytes, and deeply infiltrating white superficial onychomycosis.

More research on lasers and photodynamic therapy is required before their use can be standardised.

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UNDERSTANDING ECO-INNOVATIONS – A STUDY

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ABSTRACT
As a result of the global environmental crisis, which includes a shortage of resources, the degradation of the environment, and pollution, nations from around the globe have been compelled to pay more attention to sustainable development. The development and implementation of environmentally friendly technologies are often regarded as the most efficient and cost-effective means of lowering environmental pressure while maintaining economic competitiveness. Consequently, eco-innovation has become a must for firms seeking a competitive edge and pursuing sustainability in the face of rising environmental pressure.

The primary objectives of this article are to clarify the concept of eco-innovation and emphasize its significance in determining the impact of eco-innovations on overall environmental performance. This study is conceptual in nature based on the reviewed literature. This study also discusses the drivers and motivations for the adoption of eco-innovation. Contributing to a theoretical definition of the idea of eco-innovation and conceptualizing eco-innovation has a considerable impact on the nature of empirical investigations that are carried out, in addition to the actions that are taken for policy and strategy.

Keywords: Eco-innovation, environmental innovation, green innovation

INTRODUCTION
Today, firms are faced with a number of environmental challenges such as pollution, scarcity of natural resources, global warming a growing demand for environmentally friendly products. Aware living in world with finite resources, cleaner production has promoted green technology as tools for resource efficiency. Green technology is the solution that will provide a balance in terms of the environment, economics and society. Practitioners and academia are discovering the substitute for green energy sources and production (Kamarudin Bakar et al., 2011). Eco-innovation is not only focusing of production process to reduce the pollution load on the environment but it also makes good business sense as prevention technique. In recent decades, the expansion of economic activity is a contributing factor to the global environmental problems such as global warming and resource scarcity. However, as businesses are responsible for the environmental concerns, companies are seen shifting from traditional practices to greener practices (Laperche and Uzunidis, 2012; Ekins, 2010; Tyl, Millet and Vallet, 2010). The expectation is that the management of a firm should help shoulder the burden by practicing eco-innovation, which will benefit the entire ecosystem with an increased quality of life (Fernando et al., 2016). Firms can meet sustainable business performance in the aspect of economic, social and environment through eco-innovation (Olsson and Galaz, 2012; Pujari, 2006). In today's business practices, it is vital to know how firms can create and add value (environmental and monetary) to their products and services through innovation. It is also critical to create and increase the awareness of eco-innovation among the business world.

Eco-Innovation – the concept
There are four different notions/terms used in the literature to describe innovations that have a reduced negative impact on the environment: "green", "eco", "environmental" and "sustainable". The Brundtland report, commissioned by the United Nations, was the one which coined the term "sustainable innovation", defining it as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities (Brundtland, 1987, p. 24).

The eco-innovation notion was derived from the concept of sustainable development created by the World Commission on Environment and Development (OECD, 2008). Eco innovation includes process innovation in production activities to produce environmentally friendly products. According to European Commission (2008), eco-innovation is: The production, assimilation or exploitation of a novelty in products, production processes, services or in management and business methods, which aims, throughout its lifecycle, to prevent or substantially reduce environmental risk, pollution and other negative impacts of resource use (including energy) (p. 11).

In a broad sense, innovations are considered eco-innovative when they are inspired by ecodesign (A. Smith, Voß, & Grin, 2010) and when their goal is to reduce the environmental impact and to develop new technologies,

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products, or processes for the reduction of pollution in order to develop more renewable and sustainable technologies and to improve waste processing and sustainable services (Kemp & Pearson, 2007; Kemp & Pontoglio, 2011).

Focusing on "green", "eco" and "environmental innovation", Schiederig et al. (2012) observed that despite "environmental" innovation being the currently predominant term; since 2005, the notions "green" and "eco-innovation" became increasingly used in scientific publications. Besides this, Schiederig et al. (2012, p. 182) identified six important aspects in the different definitions: (1) Innovation object: Product, process, service, method; (2) Market orientation: Satisfy needs/be competitive on the market; (3) Environmental aspect: Reduce negative impact (optimum = zero impact); (4) Phase: Full life cycle must be considered (for material flow reduction); (5) Impulse: Intention for reduction may be economical or ecological; and (6) Level: Setting a new innovation/green standard to the firm.

Table 1. Definitions of Eco-innovation

Author (Year)	Definition
Fussler and James (1996)	The process of developing new products, processes or services which provide customer and business value but significantly decrease environmental impact.
Hemmelskamp (2000)	Effect Innovation which serves to prevent or reduce anthropogenic burdens on the environment, clean up damage already caused or diagnose and monitor environmental problems.
Rennings (2000)	Innovation processes toward sustainable development.
Charter and Clark (2007)	A process where sustainability considerations are integrated into company systems from idea generation through to R&D and commercialization.
Kemp and Pearson (2007)	The production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives.
European Commission (2007)	Any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy
Oltra and Saint Jean (2009)	Innovations that consist of new or modified processes, practices, systems and products which benefit the environment and so contribute to environmental sustainability
Carrillo-Hermosilla et al. (2010)	Innovation that improves environmental performance
Kemp and Oltra (2011)	Eco-innovation is context-specific which is why we need research from those countries, by researchers from those countries who understand the broader context and societal processes in which eco-innovation is embedded.
Eco-innovation Observatory (2013)	The introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle.

Source: Adapted from Gonzalez-Moreno. et al. (2013)

The ECO-DRIVE study (CML et al. 2008) suggests that eco-innovation should be analysed on three levels: • micro (product or service, process, company); • meso (sector, supply chain, region, product system/service system); and • macro (economy-wide: nation, economic blocks, global).

Driving Factors to Eco-Innovations

Previous studies on the drivers of eco innovation was largely dominated by technology push and market pull theory (Rehfeld & Rennings, 2007) also in supply and demand side drivers (Triebswetter & Wackerbauer, 2008). Technology push in particular is necessary for the initial stage of the innovation and market factors play out in the diffusion of innovation. Both factors are imperative for the successful innovation. However, another factor appeared in the empirical studies and academic literature.

Several recent studies on environmental innovation emphasize on the regulation and policy and institutional effects (Porter & Linde, 1995; Oltra, 2008; Horbach, 2008). Also, according to Horbach & Rennings (2007), the

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general innovation theory has been enhanced by the influence of the regulatory policy and categorized the drivers of eco-innovation mainly in three categories demand side, supply side and regulatory and policy side drivers. According to a study on data collected from 442 Chinese firms to investigate the relationship among the drivers, eco-innovation behaviour, and firm performance. The results reveal that certain factors (i.e., technological capabilities, environmental organizational capabilities, a market-based instrument, competitive pressures, and customer green demand) contribute to the development of eco-innovation. Competitive pressure provides firms with the greatest incentive to adopt eco-innovation, followed by a market-based instrument, technological capabilities, customer green demand, and environmental organization capabilities. The market-based instrument is effective in inducing eco-innovation, while a command-and-control instrument does not. With regard to the adoption of eco-innovation, we show that eco-innovation behaviour can significantly enhance a firm's environmental performance, and, through environmental performance, has an indirect positive impact on its economic performance (Cai and Li, 2018).

According to the resource-based perspective, for a corporation to maintain a competitive advantage over its rivals, its resources must be scarce, valued, difficult to copy, and irreplaceable (Barney,1991). We refer to the two categories of necessary internal resources outlined by Sarkis et al. (2010), namely technological and environmental organizational capacities. The findings of another study indicate that the development of eco-innovation is influenced by a number of elements, including customer desire for environmentally friendly products, technological skills, environmental organizational capabilities, a market-based instrument, and competitive pressures (Cai and Li, 2018). In another study, the determinants of eco-innovation have been classified into the following categories: technology, market, regulation, and firm-specific factors (Horbach, Rammer, & Rennings, 2012).

CONCLUSION

Pervious research has concluded that an organization's environmental performance can be significantly boosted through the adoption of eco-innovation practices. However, there is no direct effect that has a considerable bearing on the performance of the economy. Eco innovation is the process of making existing products, processes, technologies, and infrastructures more environmentally friendly. This process can help lessen the amount of damage done to the environment. As a result, the use of eco-innovation has the potential to lessen a company's consumption of energy, the amount of waste it generates, and the number of environmental accidents it causes, while also improving the company's environmental image and performance. However, it can be challenging to achieve short-term economic gains from eco-innovation because of the high costs and risk that are connected with it. As a result, eco innovation does not have an effect that is directly related to financial performance (Cai and Li, 2018).

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PREVENTION OF WORK-RELATED LOW BACK PAIN IN SWEEPERS; A CASE STUDY

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ABSTRACT
Background: Low back pain (LBP) is a common complaint among gardeners and sweeping professionals, and it can be caused by a variety of factors. According to the Mayo Clinic LBP can manifest itself in many ways, including improper pasture, improper biomechanics falls, and overuse (such as lifting weights). Possible treatments for LBP include medication, steroid injections, education, physical therapy, or surgery. Surgery is usually used as a last resort as it can be very expensive and cause serious complications LBP has been proven to be significantly reduced by a number of physical therapy techniques, including electrotherapy, traction, and lumbar stabilisation exercises such as bridging cat camel exercise11s Superman stance, and thoracic extension. The motive of the study is to look into the work-related low back pain and to prevent the same among the sweepers by training/prescribing them with exercises and relaxation techniques to reduce pain.

Case Description: A case of 43-year-old female sweeper who was working for 8 hours per day for the past 5 months has low back pain.

Objective: The intention of this study is to prevent work-related LBP in sweepers by ergonomic view.

Conclusion: The ergonomic advice and modifications to the workstation were found to have improved the sweeper's performance with LBP during the onsite evaluation.

Paper Type: A case study research.

Keywords: Low back pain, sweepers, ergonomics, work-related musculoskeletal disorder.

INTRODUCTION
Particularly as a career and vocation, sweeping is regarded as a straightforward duty because of their ignorance of health risks, sweepers frequently suffer from work related health problems. Musculoskeletal discomfort, which can affect many body areas such as the upper and lower back, neck, shoulders, and limbs, is a significant issue with occupational health around the world[(1)] . The issue of musculoskeletal disorders in adult population is huge. Low back pain is very common that almost half of the adult population suffered from low back pain which last for more than 24 hours at times during the year [(1)]. Episode of LBP are common between sweepers and gardeners. In terms of disability, low back pain ranks first among all conditions as the leading cause of impairment worldwide [(2)] . The occupation of sweeping is to blame for the rise of chronic LBP cases. LBP is a health condition that affects workers of various professions at work. Work-related LBP is correlated with personal, physical, psychological risk factors, and ergonomic stressors [(2)]. Low back discomfort is brought on by prolonged standing, poor posture, psychosocial concerns, rhythmic movements performed over an extended length of time, and repetitively carrying heavy loads [(2)]. Workplace musculoskeletal disorders have grown to be a significant issue for many workers. Although sweepers have dedicated their life to keeping our society clean, the community has alienated them from the mainstream in terms of social, economic, and mental aspects. The goal of the current study is to develop an ergonomic exercise programme to prevent work-related low back pain in sweepers [(1)].

CASE DESCRIPTION
The subject was a woman, age 43, who had suffered from LBP for the previous five months. She works as a sweeper. She works in a single shift duty of 8 hours duration per day. She is not involved in any kind of physical activity. While taking personal interviews and observing her work pattern; She had extreme difficulty with the following tasks: Bending down, standing for long period of time and twisting movements. She was unable to stand more than 30 minutes and could not bend to pick up objects. She complains of pain in the low back during the working hours and sometimes it radiates down in her legs , that she could not work for a long time. She works at home after work and on weekends as well. The subject reported of having no other health issues such as diabetes or hypertension and also not under any medications. She doesn't take medicine even for pain relief. After ergonomic analysis it is clear that, she is bending with her waist instead of hip and knees. Overall musculoskeletal pain was assessed by Visual Analogue Scale (VAS). At the time of assessment, her pain level was 5/10 on the Visual Analogue Scale (VAS). In standing, posture showed increased lordosis, and a slight forward head posture. She had normal gait pattern and showed no difference in ROM during ambulation. With palpation, she has no tenderness to touch but had pain only during work. The subjective and objective

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information obtained from the patient, showed that she had limitations in functional strength and endurance. Due to the routine work for 8 hours, this patient finds limitations to reach the health care facilities like physiotherapy advice. Furthermore, while consult with the supervisor of this particular sweeper we noticed the supervisors or the higher officials of the sweepers were unaware of the proper posture and lack of knowledge on work-related musculoskeletal disorders. The are not allowed to sit and work in proper posture instead they do forward flexion of the trunk to do their work which is the major risk factor of LBP.

This study helps to open up few facts of importance of work-related musculoskeletal disorders and principles of ergonomics which need immediate attention among community.




DISCUSSION

We have used a descriptive case study to analyse the activities of the sweeper in the garden which might support achieving the study's goal. Sweepers play a key role in maintaining the cleanliness in our surroundings. The respondents of the study are the female sweeper whom we went onsite to take assessment on work-related musculoskeletal disorder [(4)]. As the objective of the study is to prevent work-related low back pain in sweeper, a face-to-face interview and observational analysis of various activities were employed, data was collected and analysed for further studies. Survey was not conducted as the subject is untutored [(6)].

Assessment was taken and found that the subject had difficulties in Bending down, standing for long period of time and twisting movements. She was unable to stand more than 30 minutes and could not bend to pick up objects without principles of ergonomics. Musculoskeletal pain was assessed using Visual Analogue Scale (VAS), and the score was 5 out of 10 which indicates moderate to severe pain. After evaluation, it was clear that low back pain was common problem followed by radiating pain to legs. Correction of her work posture based on ergonomics along with some physiotherapy pain management was given [(6)]. According to a previous study, age, rest period, repetition movement, approach or exceed, organization care about security, contentment, and well-being are significant risk elements associated to the workplace involving extremities. Therefore, ergonomics, organization and individual measures, aimed at minimizing repetitive movements and hard work locate and facilitate rest by exercise which is very important to reduce neck and upper extremities Musculoskeletal conditions in hotel maids [(5)]. The residential sweepers of the buildings, who were mostly women, suffered from a variety of musculoskeletal issues [(7)] . Inappropriate use of ergonomics principles and a lack of worker-friendly products make musculoskeletal issues worse [(7)]. Additionally, the sweepers lack knowledge of the appropriate stance for carrying out the tasks at work. They occasionally experience severe

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social marginalization and internalize inferiority complexes. This part of the study has received more focus due to its vulnerability and weakness. Policy makers and our community should develop recurring educational programmes that can play the primary role in decreasing musculoskeletal issues brought on by job position and poses [(7)] .

CONCLUSION

By its very nature, sweeping requires a standing posture that includes abduction and adduction of the shoulders and arms, as well as bending, twisting, and stooping. The repeated and uncomfortable attitude that led to the evolution of musculoskeletal issues was the most significant risk factor in the current investigation.

The post treatment on the work field has shown improvement in LBP. Ergonomic intervention showed more better results to alleviate the pain. Onsite treatment includes active exercise such as thoracic extension, calf stretch, hamstring stretch, side bends and knee flexion in standing position. These have reduced the LBP and provided relaxation in the lumbar region. Exercise prescription includes medium intensity with 10 repetitions, 3 sets per day. Therefore, it was obvious that the sweeping duty needed to be built according to ergonomic principles, i.e., Use brooms of the right size with long handles to prevent bending, interspacing activities to lessen repetitive motions; sequencing job tasks to avoid static posture; Reduce forceful motions, keep your posture erect as much as you can, and bend using hip and knees instead at waist. This present study recommends conducting observational and experimental studies among sweepers by implementing advanced tools that might resolve the issues faced by sweepers, with work related musculoskeletal problems.

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4. Occupational hazards and health problems among street sweepers in Uyo, Nigeria Ofonime Effiong Johnson, Ukeme Anthony John
5. Prevalence of Upperlimb Musculoskeletal Pain among Hostel Housekeeper's Akanksha, Dr. Vivek Chauhan (M.P.T)
6. Work Related Musculoskeletal Risk Assessment Using REBA Assessment Tool in a Medical Doctor during COVID-19 Pandemic - A Case Study Susan Annie George1, Arun Thomas Abraham2.
7. Ergonomic study of musculoskeletal problems among residential building sweepers. Hemani Malhotra.

MANUSCRIPT SUBMISSION

GUIDELINES FOR CONTRIBUTORS

1. Manuscripts should be submitted preferably through email and the research article / paper should preferably not exceed 8 – 10 pages in all.
2. Book review must contain the name of the author and the book reviewed, the place of publication and publisher, date of publication, number of pages and price.
3. Manuscripts should be typed in 12 font-size, Times New Roman, single spaced with 1" margin on a standard A4 size paper. Manuscripts should be organized in the following order: title, name(s) of author(s) and his/her (their) complete affiliation(s) including zip code(s), Abstract (not exceeding 350 words), Introduction, Main body of paper, Conclusion and References.
4. The title of the paper should be in capital letters, bold, size 16" and centered at the top of the first page. The author(s) and affiliations(s) should be centered, bold, size 14" and single-spaced, beginning from the second line below the title.

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5. The abstract should summarize the context, content and conclusions of the paper in less than 350 words in 12 points italic Times New Roman. The abstract should have about five key words in alphabetical order separated by comma of 12 points italic Times New Roman.
6. Figures and tables should be centered, separately numbered, self explained. Please note that table titles must be above the table and sources of data should be mentioned below the table. The authors should ensure that tables and figures are referred to from the main text.

EXAMPLES OF REFERENCES

All references must be arranged first alphabetically and then it may be further sorted chronologically also.

- **Single author journal article:**

Fox, S. (1984). Empowerment as a catalyst for change: an example for the food industry. *Supply Chain Management*, *2*(3), 29–33.

Bateson, C. D.,(2006), 'Doing Business after the Fall: The Virtue of Moral Hypocrisy', Journal of Business Ethics, 66: 321 – 335

- **Multiple author journal article:**

Khan, M. R., Islam, A. F. M. M., & Das, D. (1886). A Factor Analytic Study on the Validity of a Union Commitment Scale. *Journal of Applied Psychology*, *12*(1), 129-136.

Liu, W.B, Wongcha A, & Peng, K.C. (2012), "Adopting Super-Efficiency And Tobit Model On Analyzing the Efficiency of Teacher's Colleges In Thailand", International Journal on New Trends In Education and Their Implications, Vol.3.3, 108 – 114.

- **Text Book:**

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2007). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies* (3rd ed.). New York: McGraw-Hill.

S. Neelamegham," Marketing in India, Cases and Reading, Vikas Publishing House Pvt. Ltd, III Edition, 2000.

- **Edited book having one editor:**

Raine, A. (Ed.). (2006). *Crime and schizophrenia: Causes and cures.* New York: Nova Science.

- **Edited book having more than one editor:**

Greenspan, E. L., & Rosenberg, M. (Eds.). (2009). *Martin's annual criminal code:Student edition 2010.* Aurora, ON: Canada Law Book.

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Young, M. E., & Wasserman, E. A. (2005). Theories of learning. In K. Lamberts, & R. L. Goldstone (Eds.), *Handbook of cognition* (pp. 161-182). Thousand Oaks, CA: Sage.

- **Electronic sources should include the URL of the website at which they may be found, as shown:**

Sillick, T. J., & Schutte, N. S. (2006). Emotional intelligence and self-esteem mediate between perceived early parental love and adult happiness. *E-Journal of Applied Psychology, 2*(2), 38-48. Retrieved from http://ojs.lib.swin.edu.au/index.php/ejap

- **Unpublished dissertation/ paper:**

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Holloway, M. (2005, August 6). When extinct isn't. *Scientific American, 293*, 22-23.

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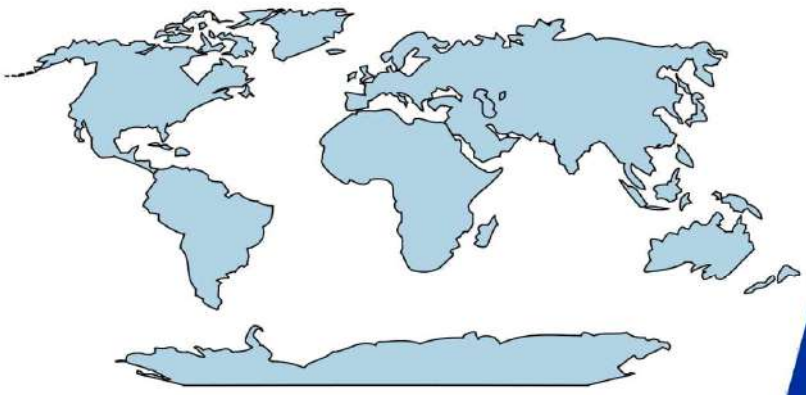

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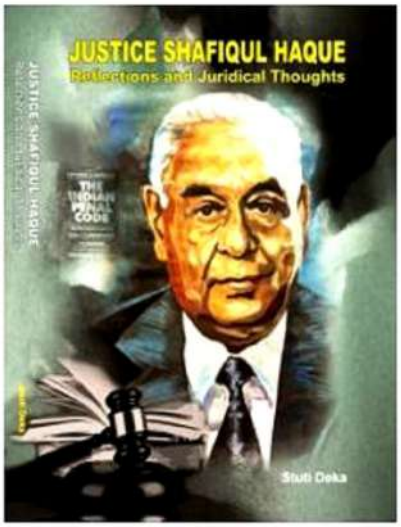

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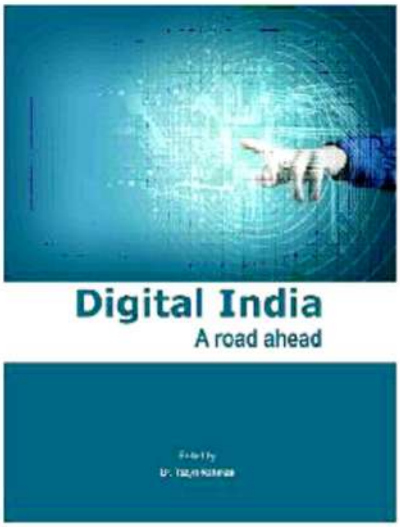

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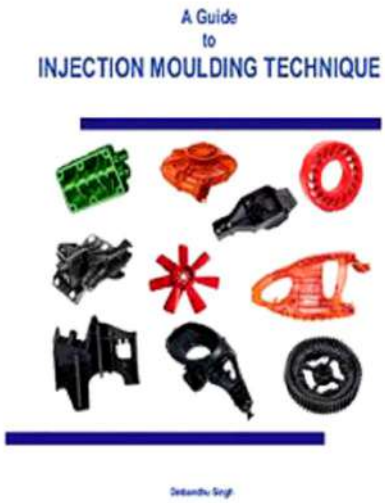

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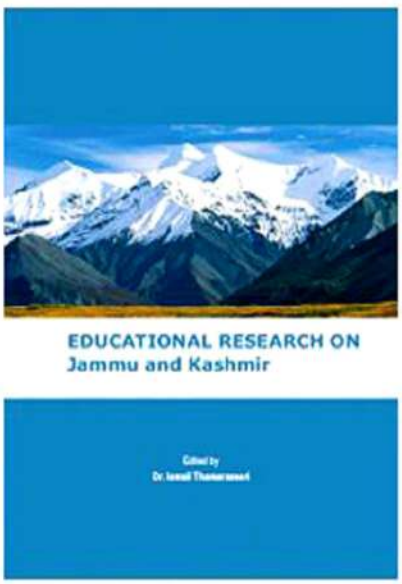

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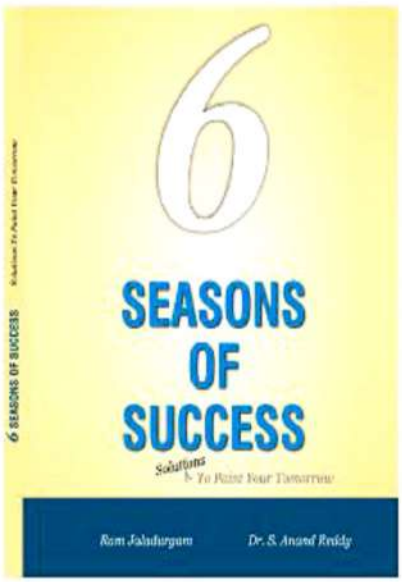

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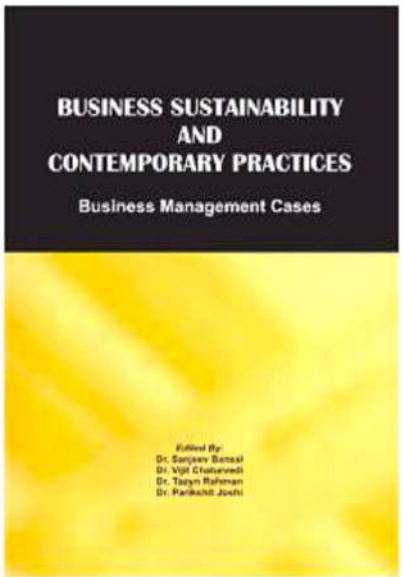

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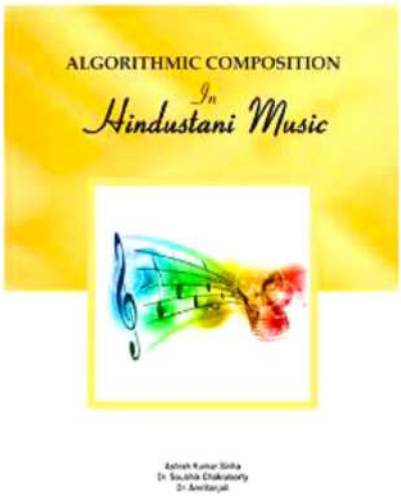

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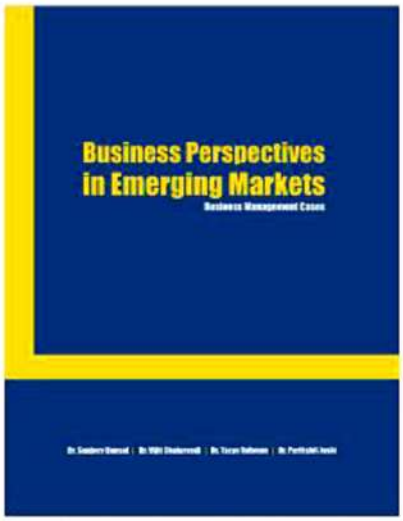

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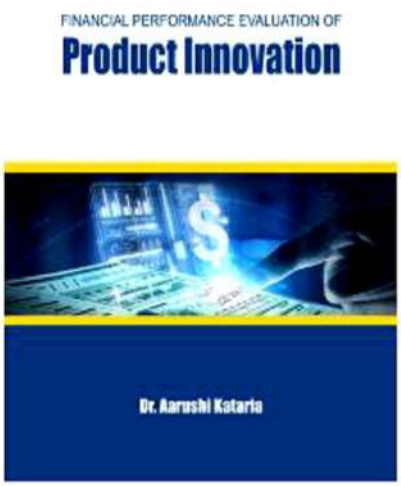

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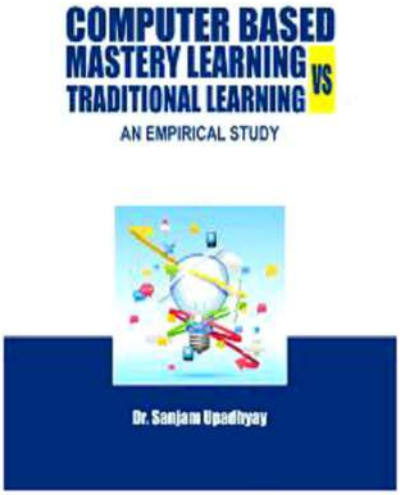

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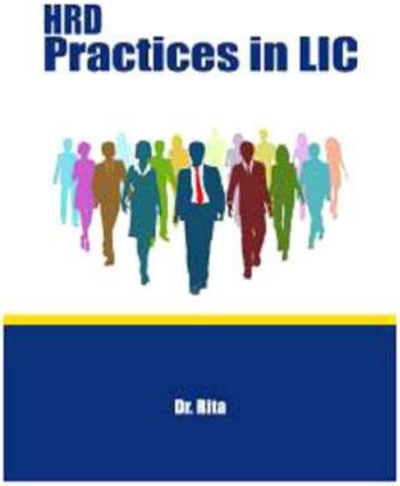

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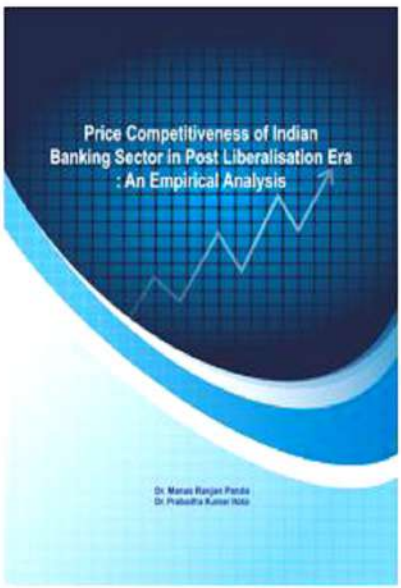

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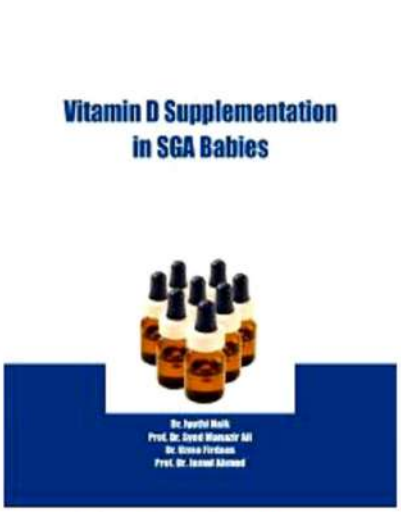

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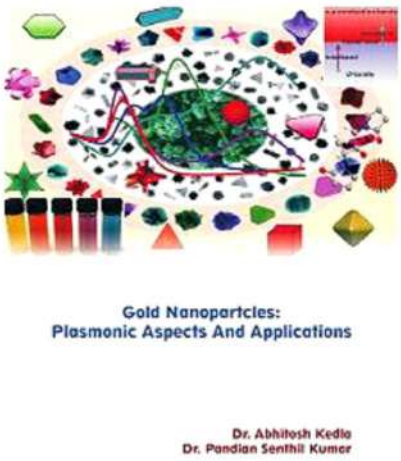

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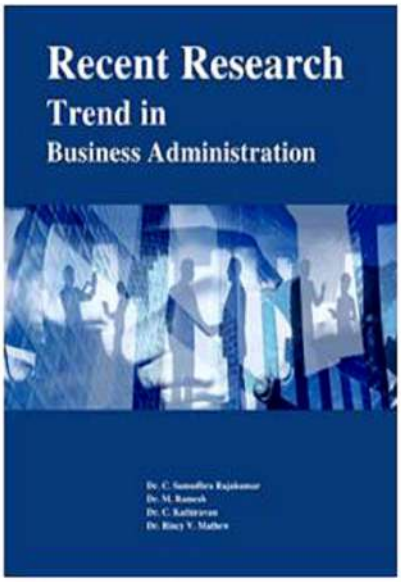

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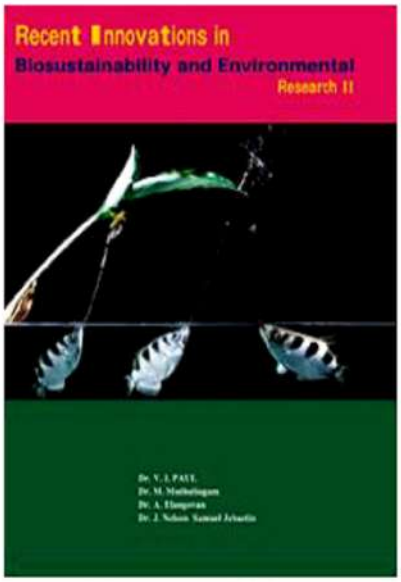

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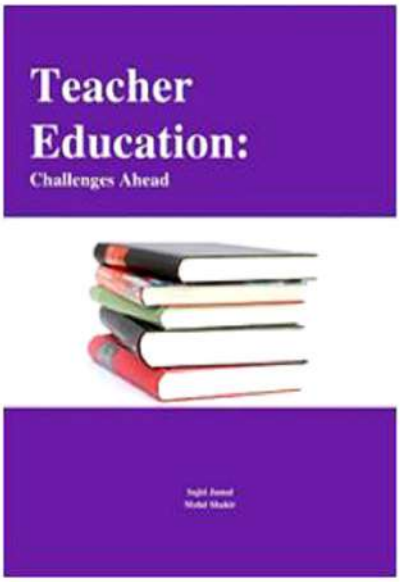

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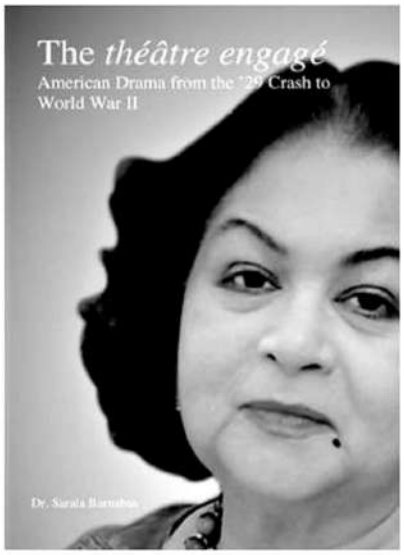

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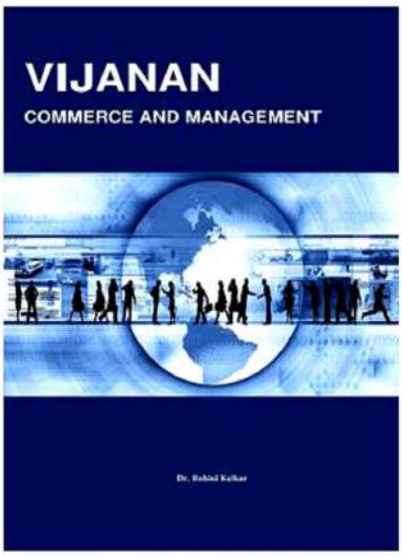

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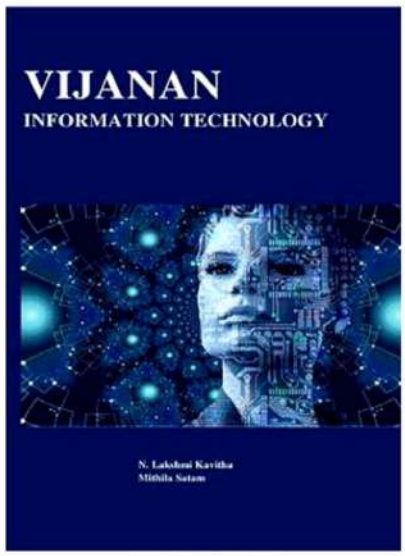

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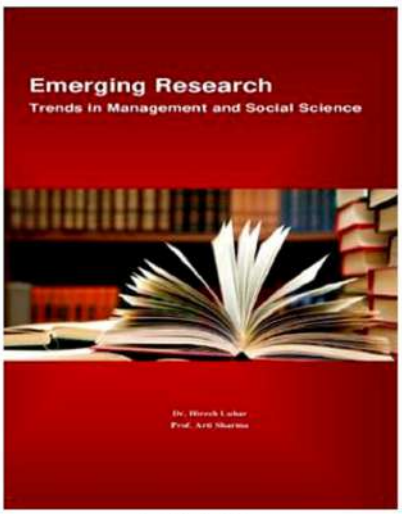

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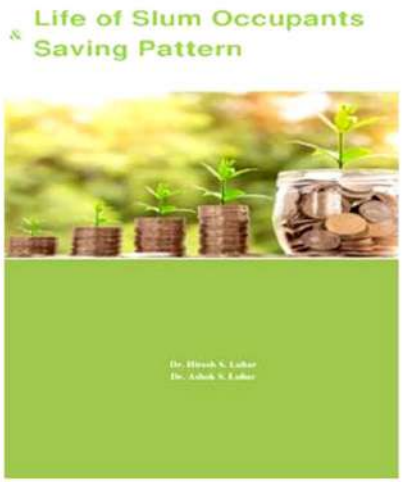

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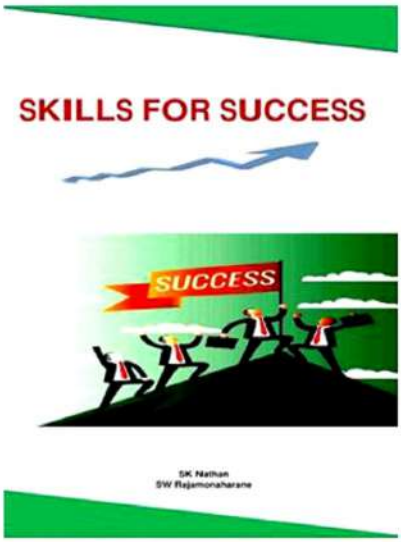

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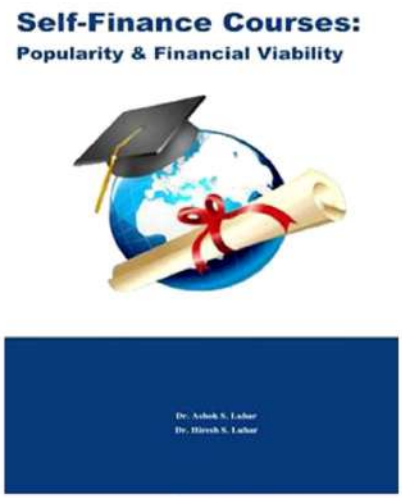

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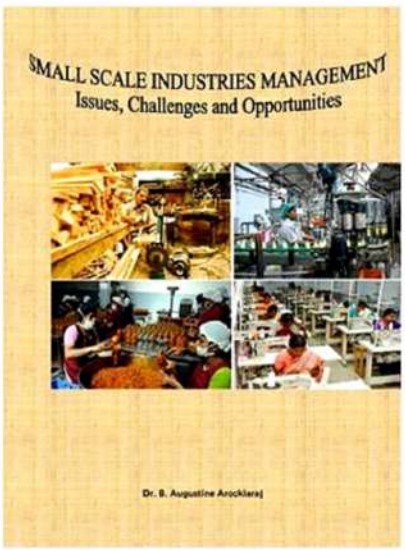

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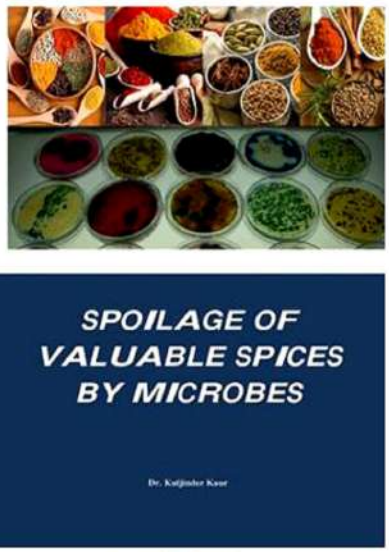

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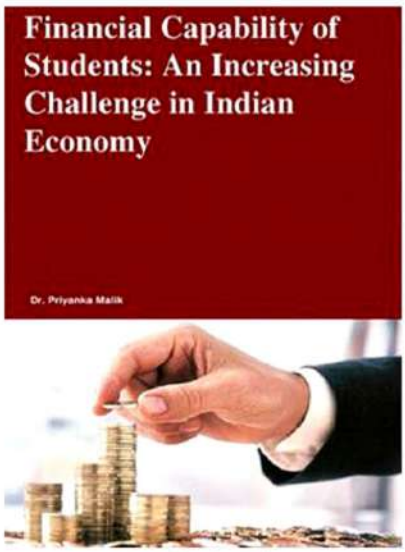

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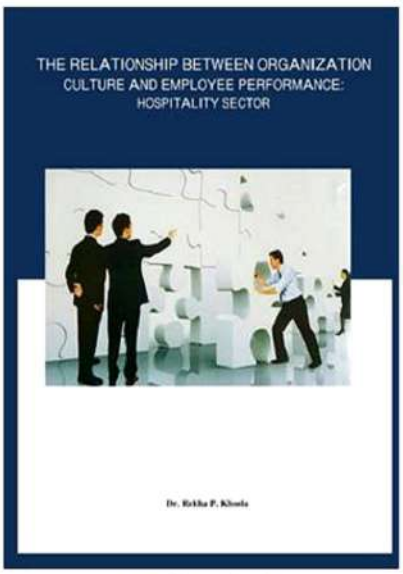

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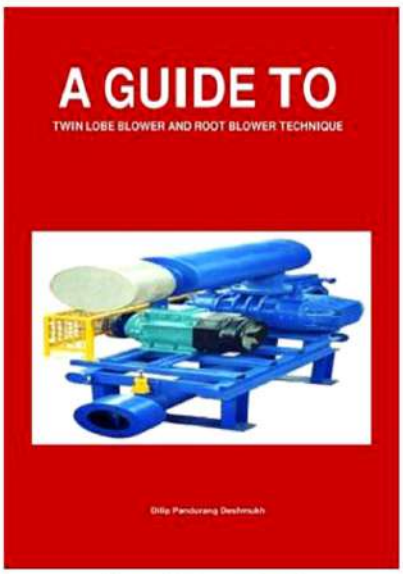

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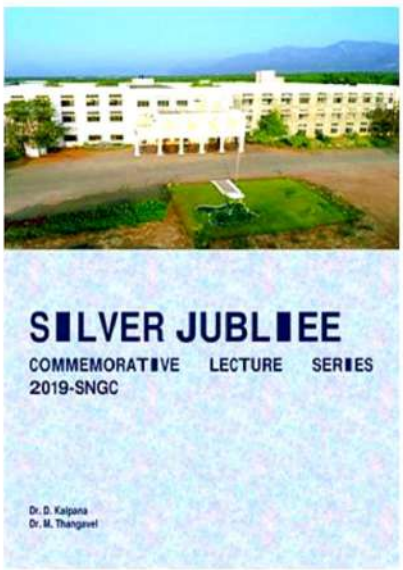

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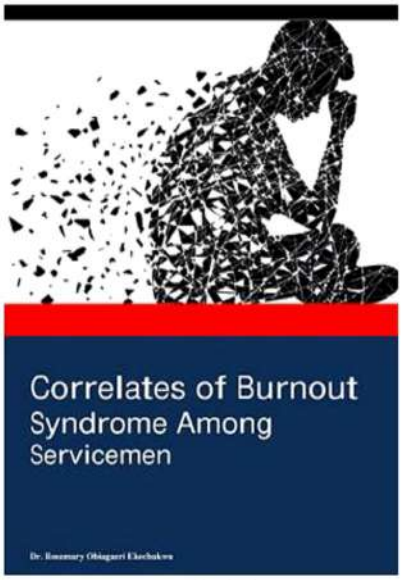

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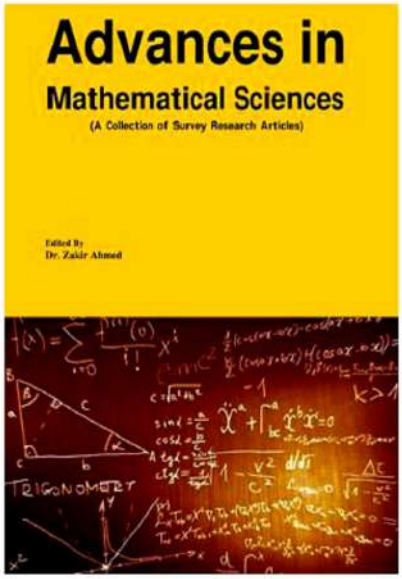

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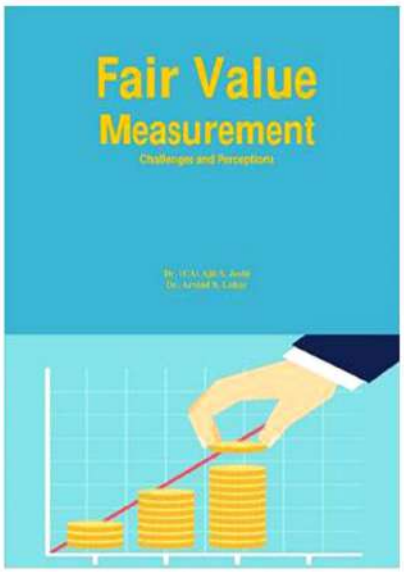

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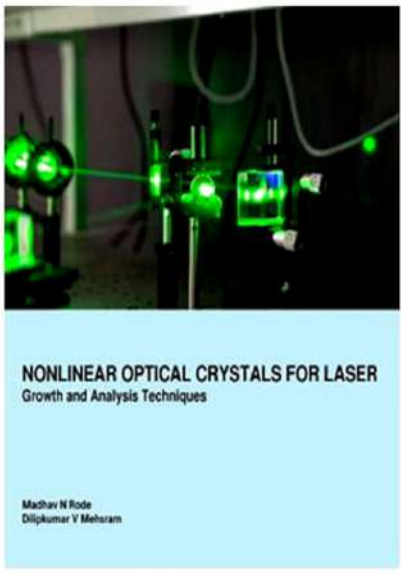

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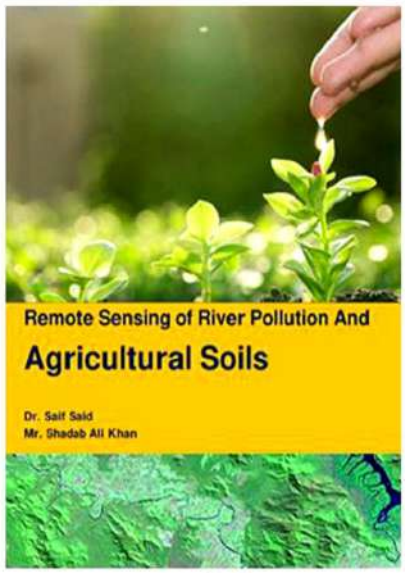

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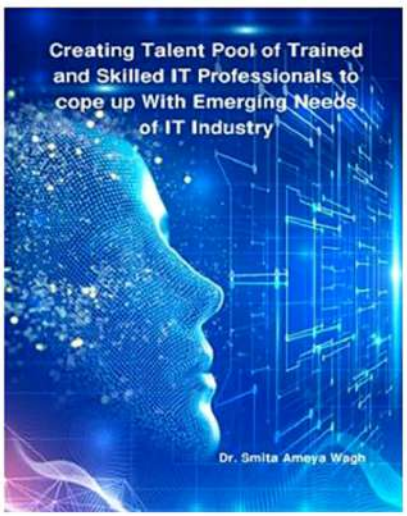

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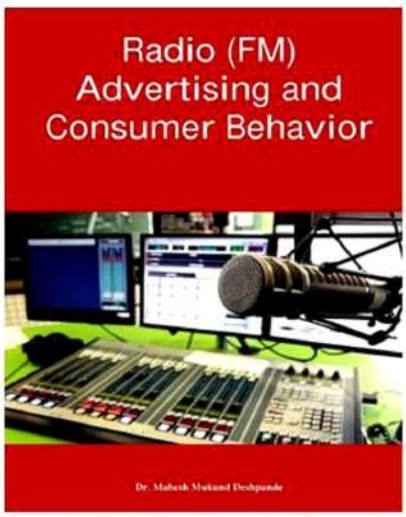

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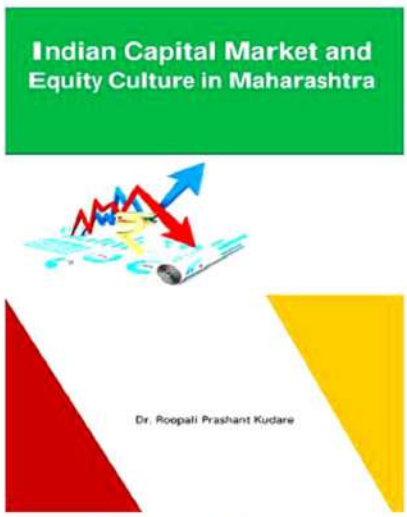

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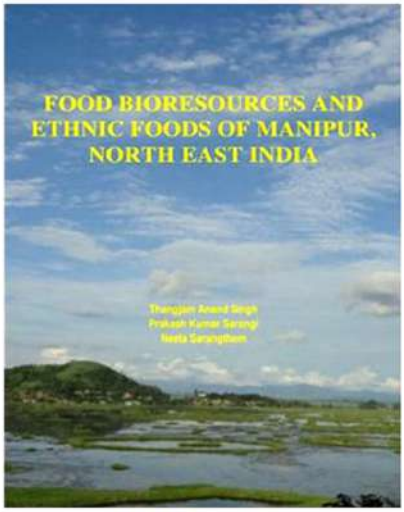

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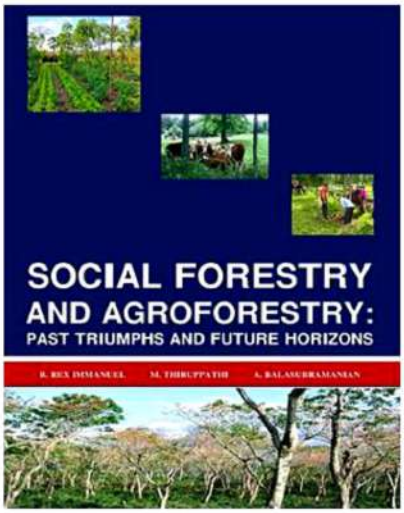

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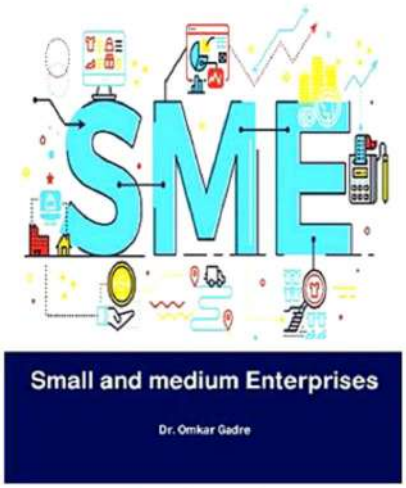

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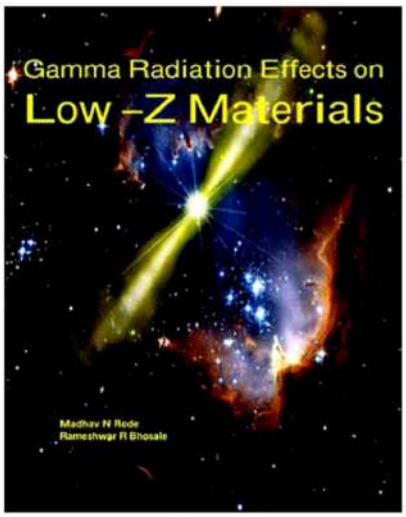

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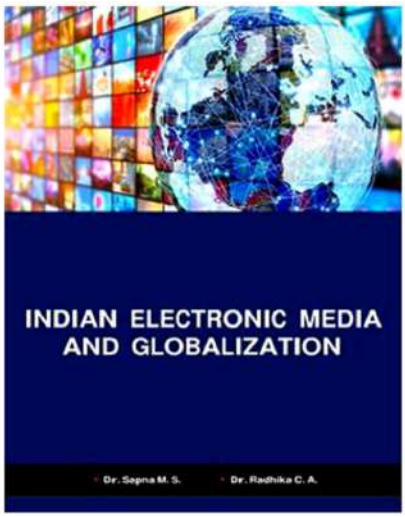

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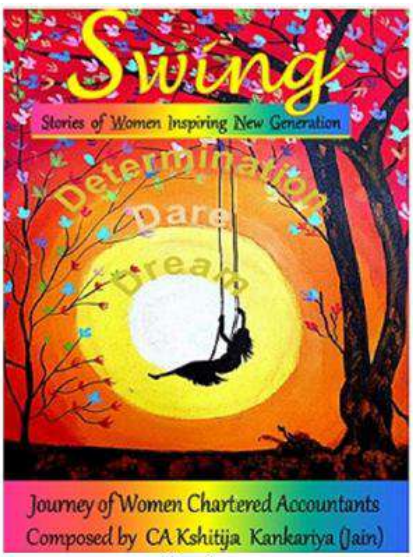

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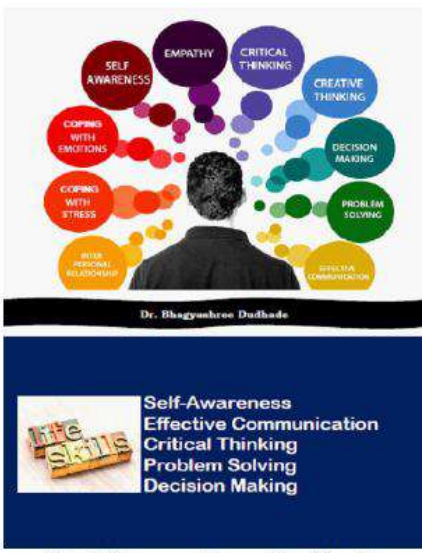

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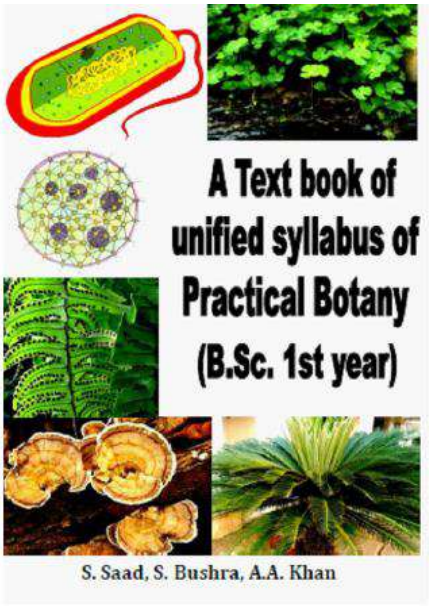

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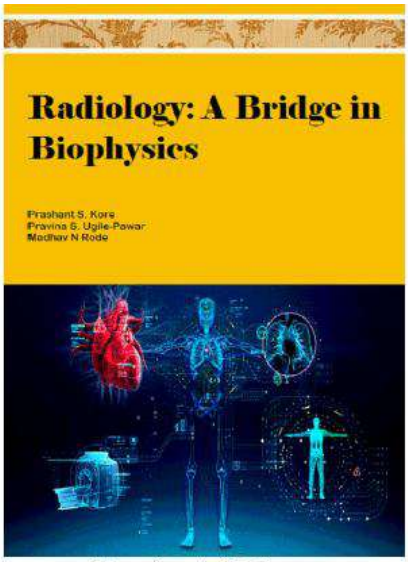

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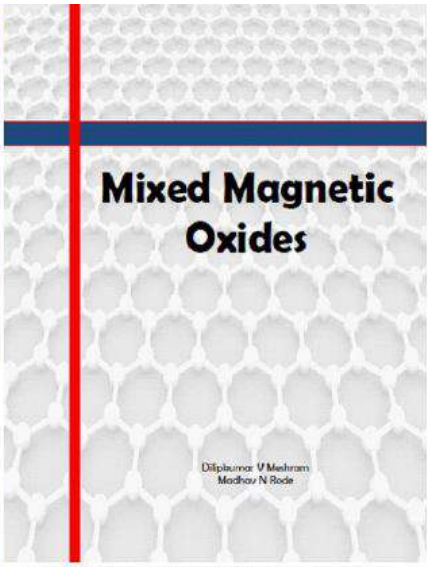

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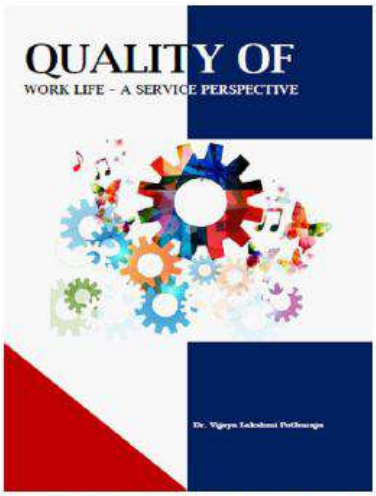

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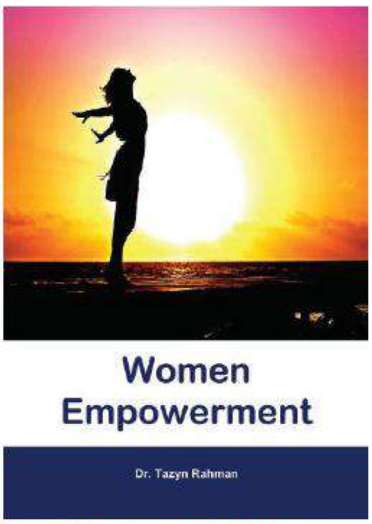

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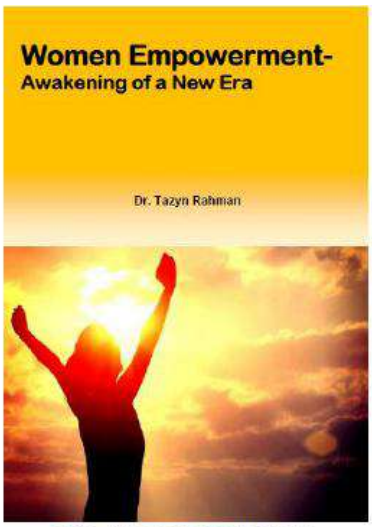

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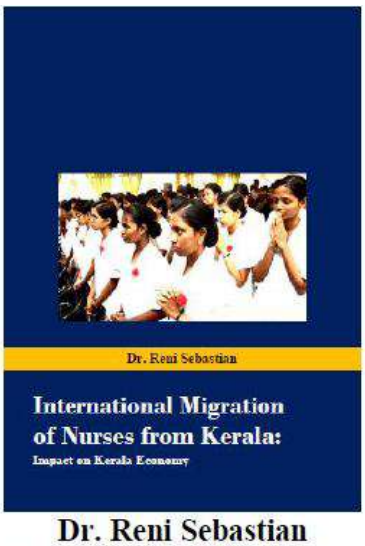

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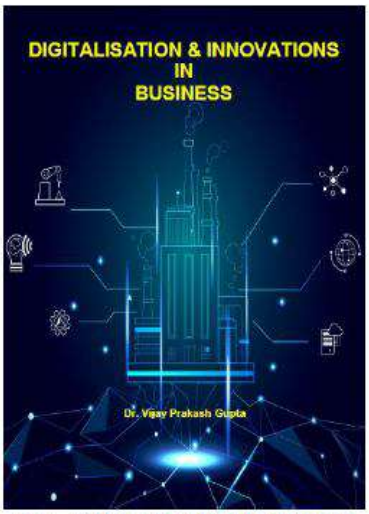

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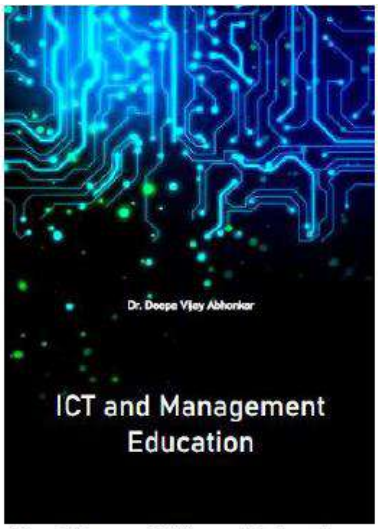

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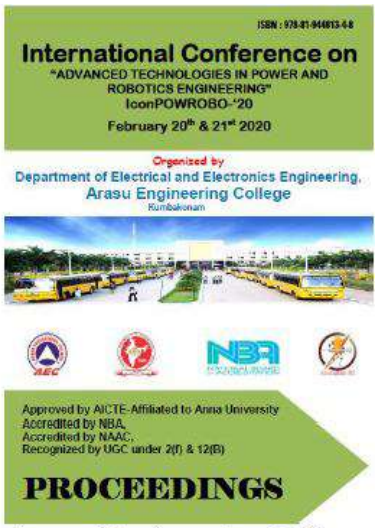

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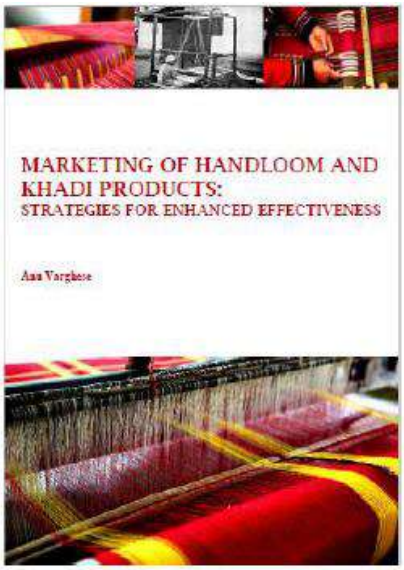

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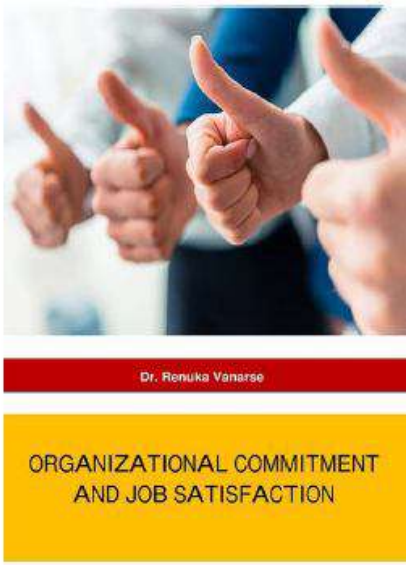

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