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RECENT ADVANCES IN HERBAL NANOTECHNOLOGY

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Abstract: Since ancient times, potential of plants in research and medicine have found pronounced applications, due to better therapeutic value. To meet the mounting demands for commercial nanoparticles, novel eco-friendly methods of synthesis has led to a remarkable progress via unfolding a green synthesis protocol towards metallic nanoparticles synthesis. Nanotechnology on herbal constituents to tailoring for its potential benefits has been gained an imperative circumstance in recent times. Researchers are focused on the nanotizing the herbal proportions to render and take diversified advantages, as well as to precede futher explorations in the field.Nanophytomedicines are prepared from active phytoconstituents or standardized extracts. Nanotechnology has been considered to be a novel innovation of the period in different fields of science. The different types of nanocarriers that are used in cosmetics such as cubosomes, liposomes, hydrogels, dendrimes, nanoemulsions, nanocrystals, microemulsion, and solid lipid nanoparticles. These nanoparticles have benefits of higher stability, insolubility or bio-persistent, hyperpigmentation. This review on nanotechnology used in cosmetics draws special attention to different types of nanoparticles used in cosmetics and their characterization techniques.

Index Terms - Nanotechnology, herbal, Phytoconstituent.

INTRODUCTION:

Nanotechnology was subsequently established by the National Nanotechnology Initiative, which defined nanotechnology because the manipulation of matter with a minimum of 1 dimension sized from 1 to 100 nanometers. Nanotized herbal drug containing active principles of veteh root, seawort, cassia twig and liquorice root is found to be effective in pulmonary, liver, bone, brain and carcinoma. The in-vivo pharmacokinetic parameters of polymeric nanoparticles containing curcumin reveal a minimum of 9 fold increase in oral bioavailability as compared to curcumin administered with piperine as absorption enhancer. Incorporation of Nanotechnology on herbal constituents to tailoring for its potential benefits has been gained a crucial circumstance in recent times. Researchers are focused on the nanotizing the herbal proportions to render and take diversified advantages, also on precede futher explorations within the sector. Nanophytomedicines are prepared from active phytoconstituents or standardized extracts. Liposome nanoparticle (NP) with entrapped doxorubicin has been reported to be 300 fold simpler thanks to better pharmacokinetic ability in treatment of Kaposi sarcoma. Nanotized herbal drug containing active principles of veteh root, seawort, cassia twig and liquorice root is found to be effective in pulmonary, liver, bone, brain and carcinoma . The in-vivo pharmacokinetic parameters of polymeric nanoparticles containing curcumin reveal a minimum of 9 fold increase in oral bioavailability as compared to curcumin administered with piperine as absorption enhancer. Swarna bhasma has particle size of 56 nm. Liposome containing Aloe vera extract in size range but 200 nm diameter has shown higher rate of cell proliferation and increased synthesis of collagenase in in vitro test using human skin fibroblast and epidermal keratinocytes. The biological synthesis of nanoparticles could also be an economical and ecofriendly method and has ability to exchange the physical and chemical methods because these methods are toxic and dear.

Nanocarriers and Nanodevices:

Substantial researches on developing bio-compatible and biodegradable nanocarriers and nanodevices as novel drug delivery systems. Natural polymers or bio polymers are generally bio compatible, biodegradable, nontoxic and non-immunologic. Basically they are in bifold viz., polysaccharides and proteins. Chitosan, starch, dextran, and alginate are samples of commonly used polysaccharides while collagen, gelatin, and albumin are samples of commonly used proteins. These biopolymers are widely applied in formulation of nanospheres, nanocapsules, and recently nanofibers so as to reinforce drug delivery tospecific pharmacological sites or tissue engineering. Since the polymers are from natural origin, really it doesn't harm the living tissues.

Nanopores:

Nanoporesallow DNA to undergo one strand at a time hence DNA sequencing are often made more efficiently. Thus shape, electrical property of every base on strand is often monitored. As these properties are unique for every of 4 bases that structure ordering . The passage of DNA through a nanopore are often wont to decipher the encoded information including error in code related to cancer Nanopores, the small holes formed by proteins, might be used for a spread of applications, including sequencing DNA and detecting anthrax. Researchers reported the newest developments on natural and artificial nanopores and their applications at the March Meeting during a number of sessions dedicated to the subject.

TYPES OF NANOPARTICLE:

Polymeric Nanoparticles:

Figure 1 Refer to colloidal systems with particle size starting from 10 to 1000 nm. Nanoparticles have several advantages including solubility enhancement, bioavailability enhancement, efficacy enhancement,dose reduction improved absorption of herbal medicines[8-10] Liu et al. developed triptolide-loaded poly (DL-lactic acid) nanoparticles. to beat the issues of poor solubility and toxicity of triptolide, nanoparticles were developed with biocompatible and biodegradable polymers, poly (DL-lactic acid).They were uniform in size, spherical in shape with smooth surface.The study of fine particles is named micromeritics. A nanoparticle or ultrafine particle is typically defined as a particle of matter that's between 1 and 100 nanometres (nm) in diameter. The term is usually used for larger particles, up to 500 nm, or fibers and tubes that are but 100 nm in just two directions. At rock bottom range, metal particles smaller than 1 nm are usually called atom clusters instead. Nanoparticles are usually distinguished from microparticles (1-1000 µm), "fine particles" (sized between 100 and 2500 nm), and "coarse particles" (ranging from 2500 to 10,000 nm), because their smaller size drives very different physical or chemical properties, like colloidal properties and optical or electric properties.

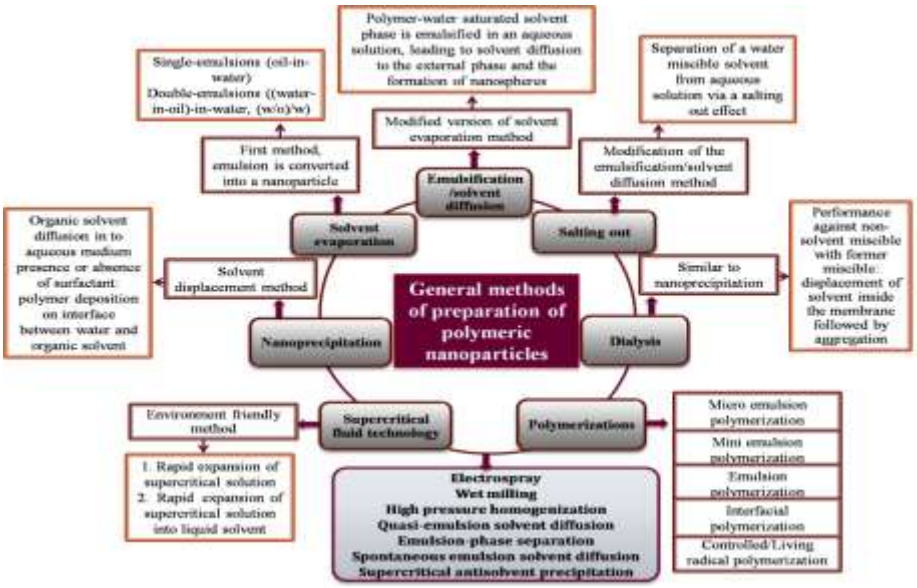

Fig.1 General Methods of preparation of polymeric nanoparticle

Synthesis of Nanoparticles:

Nanoparticles are generally characterized by their size, morphology and surface charge, using advanced microscopic techniques such as scanning electron microscopy (SEM), transmission electron microscopy (TEM) and atomic force microscopy (AFM). Electron microscopy techniques are very useful in ascertaining the overall shape of polymeric nanoparticles, which may determine their toxicity. The surface charge of the nanoparticles affects the physical stability and redispersibility of the polymer dispersion as well as their in vivo performance.

Microemulsion: Microemulsions are clear, thermodynamically stable isotropic liquid mixtures of oil, water and surfactant, frequently in combination with a cosurfactant. The term (ME) can be define as a fluid system obtained by titration, composed of a simple emulsion along a medium chain alcohol, like pentanol or hexanol; initially semi-transparent, and titrated until clear. Microemulsion are transparent emulsions and in which an oil is dispersed in an aqueous medium (or vice-versa) containing a surfactant, with or without a suitable cosurfactant in it. These conditions produce a thermodynamically stable system, with droplets of the internal phase measuring on the nanounit. Substances which are active may be carried in the microemulsions when they are solubilized in the oil, or the aqueous phases of the emulsions.

Nanocrystals: A nanocrystal is a material particle having at least one dimension smaller than 100 nanometres, based on quantum dots (a nanoparticle) and composed of atoms in either a single- or poly-crystalline arrangement. The size of nanocrystals distinguishes them from larger crystals. The microscopic crystals of a pharmaceutical product can make it soluble in water even if the bulk compound is not. The tiny particle size means a much greater surface area to volume ratio giving access to more water molecules that can surround the particles, which is the essence of dissolving a compound. This effect can then allow the particles to be carried across the lining of the gut wall where they would previously simply move fast with no interaction. A demonstration of gymnemic acids derived from the herb Gymnema sylvestre, can be made more readily bioavailable by forming the active compounds as nanoscopic crystals, called Nanocrystals. The compounds have medicinal activity in a range of diseases, in particular diabetes mellitus, with the native herb having been used in traditional medicine for several centuries. The Nanocrystals of gymnemic acids could provide important clues as to how to transfer the medical benefits of the herb to a regulated pharmaceutical product for further investigation and with a more strict profile in treating disease.

Effect of nanotechnology on physical and chemical property:

Nanoparticles often have unique physical and chemical properties. For example, the electronic, optical, and chemical properties of nanoparticles may be very different from those of each component in the bulk. At the nanoscale, materials behave very differently compared to larger scales and it is still very difficult to predict the physical and chemical properties of particles of such a very small size. The principal parameters of nanoparticles are their shape, size, surface characteristics and inner structure. Nanoparticles can be encountered as aerosols (solids or liquids in air), suspensions (solids in liquids) or as emulsions (liquids in liquids). In the presence of certain chemicals, properties of nanoparticles may be modified. The composition of a specific nanoparticle can be very complex, depending on what interactions it has had with other chemicals or particles and on its lifetime. The chemical processes taking place on the surfaces of nanoparticles are also very complicated and remain largely unknown.

NOVEL DRUG DELIVERY SYSTEM FOR HERBAL REMEDIES:

A need of the hour NDDS is designed to overcome the drawbacks of the traditional herbal drug system due to its wide applications to mankind. Nanoparticle can be used to target the herbal medicines to individual organ which improves the selectivity, solubility, drug delivery, safety, effectiveness and reduces the frequent dose.

Introduction of herbs:

Herbs are plants with savory or aromatic properties that are used for flavoring and garnishing food, for medicinal purposes, or for fragrances; excluding vegetables and other plants consumed for macronutrients. Culinary use typically distinguishes herbs from spices. *Herbs* generally refers to the leafy green or flowering parts of a plant (either fresh or dried), while *spices* are usually dried and produced from other parts of the plant, including seeds, bark, roots and fruits.

Herbs have a variety of uses including culinary, medicinal, and in some cases, spiritual. General usage of the term "herb" differs between culinary herbs and medicinal herbs; in medicinal or spiritual use, any parts of the plant might be considered as "herbs", including leaves, roots, flowers, seeds, root bark, inner bark (and cambium), resin and pericarp

Herbal teas:

Some herbs can be infused in boiling water to make herbal teas (also termed tisanes). Typically the dried leaves, flowers or seeds are used, or fresh herbs are used. Herbal teas tend to be made from aromatic herbs,may not contain tannins or caffeine, and are not typically mixed with milk.Common examples include chamomile tea,or mint tea.Herbal teas are often used as a source of relaxation or can be associated with rituals.

Medicinal plant:

Some plants contain phytochemicals that have effects on the body. There may be some effects when consumed in the small levels that typify culinary "spicing", and some herbs are toxic in larger quantities. For instance, some types of herbal extract, such as the extract of St. John's-wort (*Hypericum perforatum*) or of kava (*Piper methysticum*) can be used for medical purposes to relieve depression and stress.However, large amounts of these herbs may lead to toxic overload that may involve complications, some of a serious nature, and should be used with caution. Complications can also arise when being taken with some prescription medicines. Herbs have long been used as the basis of traditional Chinese herbal medicine, with usage dating as far back as the first century CE and far before. In India, the Ayurveda medicinal system is based on herbs. Medicinal use of herbs in Western cultures has its roots in the Hippocratic (Greek) elemental healing system, based on a quaternary elemental healing metaphor. Modern pharmaceuticals had their origins in crude herbal medicines, and to this day, some drugs are still extracted as fractionate/isolate compounds from raw herbs and then purified to meet pharmaceutical standards. Indigenous Australian peoples developed "bush medicine" based on plants that were readily available to them. The isolation of these groups meant the remedies developed were for far less serious diseases than the western illnesses they contracted during colonisation. Herbs such as river mint, wattle and eucalyptus were used for coughs, diarrhea, fever and headaches.

Herbal cosmatic:

Originally there was always doubt in ancient societies, especially in the sceptical medium of western traditions, as to the efficacity of herbal medicines. The use of herbal cosmetics dates back to around six centuries ago in the European and Western countries. Mixtures and pastes were often concocted to whiten the face. During the 1940s, herbal cosmetics took a turn with the emerging red lipstick color, with every year gaining a more intense red. Herbal cosmetics come in many forms, such as face creams, scrubs, lipstick, natural fragrances, powders, body oils, deodorants and sunscreens. They activate through the epithelium of sebaceous glands to make the skin suppler. Ayurvedic oils are widely used in India, prized for their natural health-giving properties. One method and perhaps the best, used to extract natural oils from herbs to make lipstick is partition chromatography. The process involves separation in watery solution, and then the injection of colour under pressure.

DEVELOPMENT OF HERBAL MEDICINE:

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesise hundreds of chemical compounds for functions including defence against insects, fungi, diseases, and herbivorous mammals. Numerous phytochemicals with potential or established biological activity have been identified. However, since a single plant contains widely diverse phytochemicals, the effects of using a whole plant as medicine are uncertain. Further, the phytochemical content and pharmacological actions, if any, of many plants having medicinal potential remain unassessed by rigorous scientific research to define efficacy and safety. NDDSs Are reduce the repeated administration to overcome non-compliance, And also help to increase the therapeutic value by reducing toxicity and increasing the bioavailabilityA NDDS in the traditional medicine system is essential to conflict more chronic diseases like asthma, diabetes, cancer, and other Disease. In ancient Sumeria, hundreds of medicinal plants including myrrh and opium are listed on clay tablets. The ancient Egyptian Ebers Papyrus lists over 800 plant medicines such as aloe, cannabis, castor bean, garlic, juniper, and mandrake. From ancient times to the present, Ayurvedic medicine as documented in the Atharva Veda, the Rig Veda and the Sushruta Samhita has used hundreds of pharmacologically active herbs and spices such as turmeric, which contains curcumin. The Chinese pharmacopoeia, the *Shennong Ben Cao Jing* records plant medicines such as chaulmoogra for leprosy, ephedra, and This was expanded in the Tang Dynasty *Yaoxing Lun*.[18] In the fourth century BC, Aristotle's pupil Theophrastus wrote the first systematic botany text, *Historia plantarum*. In around 60 AD, the Greek physician Pedanius Dioscorides, working for the Roman army, documented over 1000 recipes for medicines using over 600 medicinal plants in *De materia medica*. The book remained the authoritative reference on herbalism for over 1500 years, into the seventeenth century.

Introduction of Drug delivery:

Refers to approaches, formulations, technologies, and systems for transporting a pharmaceutical compound in the body some time based on nanoparticlesas needed to safely achieve its desired therapeutic effect. It may involve scientific site-targeting within the body, or it might involve facilitating systemic pharmacokinetics; in any case, it is typically concerned with both quantity and duration of drug presence. Drug delivery is often approached via a drug's chemical formulation, but it may also involve medical devices or drug-device combination products. Drug delivery is a concept heavily integrated with dosage form and route of administration, the latter sometimes even being considered part of the definition. Drug delivery technologies modify drug release profile, absorption, distribution and elimination for the benefit of improving product efficacy and safety, as well as patient convenience and compliance. Drug release is from: diffusion, degradation, swelling, and affinity-based mechanisms.Some of the common routes of administration include the enteral (gastrointestinal tract), parenteral (via injections), inhalation, transdermal, topical and oral routes. Many medications such as peptide and protein, antibody, vaccine and gene based drugs, in general may not be delivered using these routes because they might be susceptible to enzymatic degradation or cannot be absorbed into the systemic circulation efficiently due to molecular size and charge issues to be therapeutically effective. For this reason many protein and peptide drugs have to be delivered by injection or a nanoneedle array. For example, many immunizations are

based on the delivery of protein drugs and are often done by injection. Protein drugs delivered by injection can usually reach the extracellular space. Many approaches have been evaluated for targeting the intracellular space with protein drugs but delivering proteins into cells (e.g. into the cytosol) is still challenging.

BIODEGRADABLE POLYMER:

For environmentally degradable polymers, see Biodegradable plastic. For natural and synthetic degradable polymers, see Biodegradable polymer. Many opportunities exist for the application of synthetic biodegradable polymers in the biomedical area particularly in the fields of tissue engineering and controlled drug delivery. Degradation is important in biomedicine for many reasons. Degradation of the polymeric implant means surgical intervention may not be required in order to remove the implant at the end of its functional life, eliminating the need for a second surgery. In tissue engineering, biodegradable polymers can be designed such to approximate tissues, providing a polymer scaffold that can withstand mechanical stresses, provide a suitable surface for cell attachment and growth, and degrade at a rate that allows the load to be transferred to the new tissue. In the field of controlled drug delivery, biodegradable polymers offer tremendous potential either as a drug delivery system alone or in conjunction to functioning as a medical device.

VARIOUS MEDICINAL PLANTS:

Table no. 1 medicinal plants

Sr. No.	Plant Name	Plant Structure	Active Constituent	Microrganism inhibitory concentration (MIC)
Various plant for green synthesis				
1	Cuminum cyminum		cyminum L. from Alborz mountain contained α-pinene (29.2%), limonene (21.7), 1,8-cineole (18.1%), linalool (10.5%), and α-terpineole (3.17) as the major compounds.	MIC of cumin essential oil were about 78-150 µg/mL against a panel of gram positive and gram negative **microorganism s** including E. faecalis
2	Euphorbia hirta,		It is reported to contain alkanes, triterpenes, phytosterols, tannins, polyphenols, and flavanoids.	Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values ranged from 25 to 100 mg/ml. The growth of all the bacteria was inhibited though to varying degrees.
3.	Tecoma stans,		alkaloids, aminoacids, phytosterols, monoterpenes, triterpenes, glycosides, phenols, tannins, saponins, quines and flavonoids.	The MBC values lies between 62.5 to 150 mg/ml. The results reported in the present work shows evidence that Tecoma stans flowers possess phytochemicals that exhibit broad spectrum antimicrobial activity against tested pathogenic bacteria.

4.	Nerium indicum		The bark contains scopoletin, scopolin, tannins, red coloring matter, a aromatic oil, wax and flobefin and a yellow colored stable oil. The roots contain bitter glycosides, fenolinic acid and a aromatic oil. Its roots contain glycosided, neriodorin, neriodorein, and karabin.	indicum was found to be less potent 100mg/ml against P. aeruginosa. Present study was supported by the Britto et al., 2011, investigated that the methanol extracts for plants of *Apocynaceae* family had shown 12.5mg/ml concentration was found to be the minimum inhibitory concentration against most of the pathogens
5.	Munronia Pinnata		like glycosides, flavonoids, tannins,	(MIC) value within the range of 0.250 µg/mL-0.750 leading to cell distortion and death of the bacteria.
6.	Abutilon indicum		abutilin A (1) and (R)-N-(1'-methoxycarbonyl-2'-phenylethyl)-4-hydroxybenzamide (2),	**Abutilon indicum** plant ethanolic andaqueous extracts showed at 25, 50, 75, 100, 200mg/ml .
2.	**Various plant by silver nanoparticle:**			
1	Jasminum grandiflorum		The major compounds identified were benzyl acetate (23.7%), benzyl benzoate (20.7%), phytol (10.9%), linalool (8.2%), isophytol (5.5%), geranyl linalool (3.0%), methyl linoleate (2.8%) and eugenol (2.5%).	At lower concentrations, hot ethanol Jasminum grandiflorum (10 µg/ml) and Hibiscus rosa-sinensis (25 µg/ml) extracts were found to have statistically significant (P≤0.05) antimicrobial activity
2.	Cymbopogon citrullus		The primary compounds of the lemongrass oil were neral (31.5%), citral (26.1%), nonan-4-ol (6.54%), camphene (5.19%), 6-metil-hept-5-en-2-one (4.36%), citronelal (3.83%), β-caryophyllene (3.26%), citronelol (2.95%), caryophyllene oxide (2.63%),	Minimum inhibitory and minimum bactericidal concentration (MIC and MBC) tests, LGO were detected as effective against 6 species of bacteria excluding P. aeruginosa. MIC of LGO for the strains except P. aeruginosa ranged from 0.016 to 0.5% (V/V).

3.	Eugenia Jambolana		The major components were E- caryophyllene (42.5 %) and α-humulene (22.2 %) in sample A, caryophyllene oxide (28.9 %), humulene epoxide II (13.1 %), E-caryophyllene (12.3 %) and α-humulene (9.5 %) in sample B, and caryophyllene oxide (37.3 %) and humulene epoxide II (17.1 %) in sample C.	Minimum inhibitory concentration (MIC) ranging from 31.75 to 62.5 µg/mL
4.	Punicagranatum		twelve compounds were isolated and identified as oleanolic acid (1), ursolic acid (2), palmitic acid (3), tricin (4), catechin (5), rutin (6), apigenin (7), apigenin-7-O-glucoside (8), 2S, 3S, 4S-trihydroxypentanoic acid (9), gallic acid (10), beta-stitosterol (11), and daucosterol (12).	The minimum inhibitory concentrations of adherence of Punica granatum L. gel against the test organisms were: 1:16 for S. mutans (ATCC), The minimum inhibitory concentrations of adherence of miconazole against the same organisms were: 1:512, 1:64, 1:4, 1:128 and 1:16, respectively
5	Medicago sativa (Alfalfa),		Vitamins A, C, E, and K, minerals, and trace elements are present in alfalfa.	The maximum inhibition was seen in 300µg/ml concentration of extract. The minimal inhibitory concentration(MIC) of alfalfa extract to Bacillus licheniformis
6.	Phyllanthus niruri		The active phytochemicals, flavo- noids, alkaloids, terpenoids, lignans, polyphenols, tannins, coumarins and saponins, have been identified from various parts of *P. niruri*. Extracts of this herb have been proven to have thera- peutic effects in many clinical studies.	The antibacterial zones of inhibition obtained for the herb Solanum nigrum was in the range of 12.3-14.6 mm and ranged from 9.7-11.6 mm for the herb Phyllanthus niruri.
3.	**Various plant for Antimicrobial property:**			

1.	Plectranthus zeylanicus		The major constituents were: thymol (64.3%), p-cymene (10.3%), γ-terpinene (9.9%) and β-caryophyllene (2.8%). ... Plectranthus amboinicus, Lamiaceae, essential oil composition, thymol, p-cymene, γ- terpinene, antimicrobial activity.	Plectranthus amboinicus or locally known as bangun-bangun, is an indigenous vegetable which can be freshly eaten. However, the plant is unpopular among local people and being neglected. ... The antimicrobial activity of Plectranthus amboinicus was more at 100 mg/ml concentration when compared to 50 mg/ml concentration.
2.	Croton bonplandianum,		bonplandianum contains various bioactive compounds. The prevailing compounds were Squalene, (9Z, 12Z)-octadeca-9, 12-dienoic acid, methyl 12-oxo- octadec-9-enoate- and phytol.	bonplandianum against bacterial isolates showed best results at the concentration of 7.5 mg/75 µl and the results are shown in Table 1. The aqueous leaf extract showed maximum zone of inhibition 15±2mm against S. aureus while the minimum zone of inhibition 10±1mm against P.
3.	Plectranthus Amboinicus		The major constituents were: thymol (64.3%), p-cymene (10.3%), γ-terpinene (9.9%) and β-caryophyllene (2.8%). ... Plectranthus amboinicus, Lamiaceae, essential oil composition, thymol, p-cymene, γ- terpinene, antimicrobial activity.	Plectranthus amboinicus or locally known as bangun-bangun, is an indigenous vegetable which can be freshly eaten. However, the plant is unpopular among local people and being neglected. The antimicrobial activity of Plectranthus amboinicus was more at 100 mg/ml concentration when compared to 50 mg/ml concentration
4.	Asparagus adscenden		This plant also contains vitamins A, B1, B2, C, E, Mg, P, Ca, Fe, and folic acid. Other primary chemical constituents of Asparagus are essential oils, asparagine, arginine, tyrosine, flavonoids (kaempferol, quercetin, and rutin), resin, and tannin.	The extract was active at 5–20 mg/ml against various pathogenic microbial (16 species, 18 strains) using the agar dilution assay, with the minimum inhibitory concentration (MIC) between 10–20 mg/ml for enteropathogens, the MIC between 5–20 mg/ml for dermatopathogens, and MIC = 10 mg/ml for a pneumonia causing bacteria

5.	Bacopa monnieri,		monnieri contains alkaloid brahmine, nicotinine, herpestine, bacosides A and B, saponins A, B and C, triterpenoid saponins, stigmastanol, β-sitosterol, betulinic acid, D-mannitol, stigmasterol, α-alanine, aspartic acid, glutamic acid, and serine and pseudojujubogenin glycoside	Diethyl ether extract of Bacopa monnieri have maximum (18.00±1.00 mm) inhibitory effect against Staphylococcus aureus at a concentration of 300 µg. Ethyl acetate and ethanolic extract has the moderate effect over Staphylococcus aureus (Table 1). ... This reveals the potency (15.00±1.73 mm) of ethyl acetate at 300 µg.

VARIOUS MEDICINAL PLANTS:

Medicinal important of Eugenia Jambolana :

Eugenia jambolana it is family is (Myrtaceae) is a large evergreen tree up to 30 m high. Colour it is Bark pale brown,and it is slightly rough on stems. It is a widely used in medicinal plant throughout India and popular in various of Medicine like Ayurveda and Siddha. In the Traditional System of Medicine, the various plant parts such as bark, fruit, seed and leaf are used as astringent, sweet, sour, Colour carminative, diuretic, digestive, in diabetes, leucorrhoea, gastric disorder, The present of review and research article is therefore an effort to give a literature on pharmacognosy, phytochemistry and pharmacological activities

plectranthus zeylanicus:

This study have been reports to the simple green synthesis method for the preparation of silver nanoparticles (Ag NPs) by using the plant the raw material used dichloromethane extraction of Plectranthus zeylanicus leaf extract. Widely used method scanninig electron microscope That is pathway of nanoparticles formation is by means of reduction of AgNO3 by leaf extract, which acts as both reducing and capping agents. Synthesized Ag NPs were subjected to different characterizations for studying the structural, chemical, morphological, optical and antimicrobial properties. The bright circular margin in SAED pattern and diffraction peaks in XRD profile reveals high crystalline nature of biosynthesis Ag NPs. Morphological studies shows the formation of nearly spherical nanoparticles. FTIR spectrum confirms the existence of various functional groups of bio-molecules capping the nanoparticles. UV-visible spectrum displays single SPR band at 428 nm indicating the absence of anisotropic particles. The synthesized Ag NPs exhibited better antimicrobial property towards gram negative Escherichia coli and towards tested Penicillium spp. than other tested microorganisms using disc diffusion method. Finally it has proven that the synthesized bio-inspired Ag NPs have potent antimicrobial effect. Present finding point towards the possible application of biogenic silver nanoparticle as effective antimicrobial agent against nonsocial infection.

Advance in nanotechnology based stratergies for the treatement of amyotrophic lateral sclerosis:

A wide variety of potential therapeutic agents have been assessed in animal models of ALS. However, due to the lack of safe and effective delivery routes, efficacy is suboptimal and these promising agents are still a long way from clinical use In the last few years, significant progress has been achieved in the nanotechnology field, opening the gate for the development of nanobased therapeutic strategies in ALS. Drug properties like bioavailability, biostability, BBB penetration and ability to target neurons or astrocytes can be greatly enhanced by utilizing nanotechnology. Many therapeutic macromolecules, such as siRNA, ASOs, pDNA, their efficiency in treating ALS can also be significantly improved by using nanocarriers. Multifunctional methods of delivery combined with imaging capability will significantly benefit the field. Moreover, nanotechnology also makes it possible to transport multiple therapeutic substances simultaneously (e.g. small molecules, genes, and therapeutic proteins) to potentially facilitate more effective synergistic therapeutic outcomes. Amyotrophic lateral sclerosis (ALS), also known as motor neuron disease (MND) or Lou Gehrig's disease, is a rapidly progressive neurodegenerative disease that causes dysfunction of the nerves that control muscle movement. The morbidity of ALS is around one to three people per 100,000 worldwideTo date; there is no effective treatment for ALS, the reported median life expectancy of ALS patients ranges from 24 to 48 months from the time of diagnosis. ALS mainly affects motor neurons in the brain, brainstem, and the spinal cord, leading to progressive motor neuron degradation and muscle atrophy, which ultimately result in paralysis and eventually to death due to respiratory failure.

Nanotechnology an effective for enhancing bioavaliability and bioactive of phyotomedicine : Phytomedicine have been serving as a crucial source of drugs since ancient times. Today, about 50% of useful drugs is obtained from natural sources. The usage of phytomedicine has been increased due to their better therapeutic activity and less side effects as compared to the allopathic medicines. Phytomedicine posses are significant therapeutic efficacy that should be explored with nanotechnology. Literatures reported that phytomedine posses excellent in-vitro bioactivity but poor aqueous solubility, larger molecular size, degradation during gastric emptying, extensive metabolism are the certain problems, which limits the utility of these plant extracts invivo. Application of nanotechnology leads to increase in bioavailability and bioactivity of phytomedicine by reducing the size of the particles, surface modification, attaching or entrapping the phytomedicine with different polymers of micro or nano materials. Nanomaterials aids the targeted delivery, sustained delivery and improves the pharmacokinetics profile, diffusion of drugs into various organs by crossing the barriers including the blood brain barrier. The current research should focus on designing and development of multifunctional nanomaterials and in-vivo studies of their formulations.

The Prospect of Application of Extractive Reference Substance of Chinese Herbal Medicines:

The ERSs of Ziziphi spinosae semen and ERS of Fritillaria thunbergii bulbus are given as examples of the development of ERS and demonstrate why we are optimistic about the utility of this approach. There is a fundamental difference in outlook between the antagonistic-oriented approach of single chemical pharmaceuticals and the orientation of TCM towards balancing the human body's function. Strategies of meaningful quality control need to take into account the complexity of CHM. No work into the safety and efficacy can afford to ignore the synergic action exerted by multi-ingredients in the herbals according to TCM constructs. Research and application of ERS, a standardized extractive with its detectable chemical pattern for a given species, are becoming a new trend

for reference substances used for herbal medicine quality control. The criteria on the ERS of CHM should pursue the Authenticity, Specificity, Consistency and Stability (ASCS) in a holistic manner. Overcoming the inertia generated by dogma needs to be done as soon as possible to achieve real meaningful quality control of Chinese herbal medicines.

Plant Are Better synthesis of Nanoparticle:

A number of plants are being currently investigated for their role in the synthesis of nanoparticles. Gold nanoparticles with a size range of 2–20 nm have been synthesized using the live Alfalfa plantAlfalfa (Medicago sativa), also called lucerne, is a perennial flowering plant in the legume family Fabaceae. It is cultivated as an important forage crop in many countries around the world. It is used for grazing, hay, and silage, as well as a green manure and cover crop. The name alfalfa is used in North America. The name lucerne is the more commonly used name in the United Kingdom, South Africa, Australia, and New Zealand. The plant superficially resembles clover (a cousin in the same family), especially while young, when trifoliate leaves comprising round leaflets predominate. Later in maturity, leaflets are elongated. It has clusters of small purple flowers followed by fruits spiralled in 2 to 3 turns containing 10–20 seeds. Alfalfa is native to warmer temperate climates. It has been cultivated as livestock fodder since at least the era of the ancient Greeks and Romans. Alfalfa sprouts are a common ingredient in dishes made in South Indian cuisine.Nanoparticles of Ag, Ni, Co, Zn, and Cu have also been synthesized inside the living plants of Brassica juncea (Indian mustard), Medicago sativa (Alfalfa), and Helianthus annuus (Sunflower). Helianthus annuus, the common sunflower, is a large annual forb of the genus Helianthus grown as a crop for its edible oil and edible fruits. This sunflower species is also used as wild bird food, as livestock forage (as a meal or a silage plant), in some industrial applications, and as an ornamental in domestic gardens. The plant was first domesticated in the Americas. Wild Helianthus annuus is a widely branched annual plant with many flower heads. The domestic sunflower, however, often possesses only a single large inflorescence (flower head) atop an unbranched stem. The name sunflower may derive from the flower's head's shape, which resembles the sun.The research group of Gardea-Torresdey from the University of Texas at El Paso first reports on the formation of Ag and Au nanoparticles by living plants Medicago sativa and it opened up new and exciting ways to fabricate nanoparticles. It is showed connecting link to materials science and biotechnology in the new emerging field of nanobiotechnology. The Certain plants are known to accumulate higher concentrations of metals compared to others and such plat Helianthus annuus, the common sunflower, is a large annual form of the genus Helianthus grown as a crop for its edible oil and edible fruits. This sunflower species is also used as wild bird food, as livestock forage (as a meal or a silage plant), in some industrial applications, and as an ornamental in domestic gardens. The plant was first domesticated in the Americas. Wild Helianthus annuus is a widely branched annual plant with many flower heads. The domestic sunflower, however, often possesses only a single large inflorescence (flower head) atop an unbranched stem.

The name sunflower may derive from the flower's head's shape, which resembles the sun. had better metal accumulating ability and later assimilating it. As nanoparticles,Brassica juncea, commonly brown mustard, Chinese mustard, Indian mustard, leaf mustard, Oriental mustard and vegetable mustard, is a species of mustard plant. Sun-dried biomass of Cinnamomum camphora leaf extract, when treated with aqueous silver or gold precursors at Cinnamomum camphora is a species of evergreen tree that is commonly known under the names camphor tree, camphorwood or camphor laurelPlant extract has been used as reducing and capping agent for the synthesis of nanoparticles. It could be advantageous over microbial synthesis because there is easy culturing and maintenance of the cell. It has been shown that many plants can actively uptake and bioreduce metal ions from soils and solutions during the detoxification process, thereby forming insoluble complexes with the metal ion in the form of nanoparticles. Plant leaf extract had been used for synthesis of silver and gold nanoparticles, which lead to formation of pure metallic nanoparticles of silver and goldEuphorbia hirta (sometimes called asthma-plan is a pantropical weed, originating from the tropical regions of the Americas. It is a hairy herb that grows in open grasslands, roadsides and pathways in the warmer regions of India and Australia as an introduced species. It is used in traditional herbal medicine.[5] Family it is Euphorbeaceae N.indicum Linn. belongs to familyApocynaceae. All parts of the plants are poisonous and used in eastern system of medicine. It is anti-helimenthic, diaphoretic, carminative, febrifuge, ophtholic, powerful heart poison and repellan.

Performance evaluations of silver:

Assessment of the microbial effectiveness of silver as a household-level water treatment option should, as far as possible, model actual use conditions in the field, for example, water of varying quality, realistic contact times and testing of all three classes of pathogens which cause diarrhoeal disease. In order to comprehensively assess effectiveness, the World Health Organization (WHO) has set health-based performance targets for household water treatment products based on the removal of bacteria, viruses and protozoa (WHO, 2011). These targets are based on microbial risk models using assumed levels of reference pathogens in untreated water. Since 2014, WHO has been testing products against those targets through the WHO International Scheme to Evaluate Household Water Treatment Technologies.

Disinfection efficacy of silver:

Numerous studies have been conducted on the disinfection efficacy of silver and silver nanoparticle applications against a range of microorganisms found in water. Although the majority of these have focused on bacterial disinfection (often using indicator bacteria), some have also looked at the impact on bacteriophages, viruses and protozoa. In addition to the material below, which focuses on water disinfection, there is also a short section (Appendix A) on the general disinfectant mode of action of silver and silver nanoparticles.

Copper/silver ionization:

Copper/silver is generally applied to water as an ionization process, with the electrolytic generation of copper and silver ions. Sometimes it is used in combination with a halogen (e.g. chlorine, iodine), although it may also be applied as copper and silver salts. Copper/silver systems are generally used for Legionella control (typically in hospital hot water systems), where there are long contact times within the plumbing system. They have been investigated for the treatment of swimming pool water (which is beyond the scope of this report).

Biosynthesis of silver nanoparticle Punicagranatum (pomegranate):

Recently, research in the synthesis of nanoparticles using microbes and fruit extracts has been time-consuming and cost effective. Biological routes of nanoparticles synthesis using microorganisms, enzymes are developing a clean, non-toxic, and eco-friendly procedures for synthesis of nanoparticles is desirable Flexibility and, most importantly, elimination of toxic extensively on extracellular and intracellular synthesis chemicals. Fruit-mediated synthesis is actively practiced for the synthesis metal nanoparticles using bacteria, fungi, yeasts and by researchers because of its positive advantages, such as many other biological

resources. One of the major disadvantages of using microbes for bio-reduction is the necessity of maintaining the aseptic conditions, which is not only labour-intensive but also very expensive in terms of industrial scale production. Leaf extracts have been used for the synthesis of silver nanoparticles, which has shown the possibility of rapid synthesis and also reduction of the steps involved in downstream processing, thereby making the process more cost-efficient. The most important medical application of AgNPs is, as tropical ointments to prevent infection against burn and open wounds. Punicagranatum is a fruit bearing decidedness shrub or small tree growing between four and eight meters tall. In the Indian subcontinent ancient Ayurveda system of medicine, the Punicagranatum (pomegranate) has extensively been used as a source of traditional remedies for thousands of years. The rind of the fruit and the bark of the pomegranate tree are used as a traditional remedy against intestinal parasites. The fruit and seed are used in modern herbal medicine. And also helps overcome depression, protect against heart ailments, provides relief from stomach disorders, reduces risk of developing cancer provides youthful and glowing skins is reduce symptoms of anemia.

CONCLUSION:

Recently, pharmaceutical scientists have shifted their focus to designing a drug delivery system for herbal medicines using a scientific approach.Cuscuta chinensis Lam. is a parasitic plant in the family Convolvulaceae. It is native to China and was first described in 1786.This species is used medicinelly in Nepal. Cuscuta chinensis is a commonly used traditional Chinese medicine synonym is Grammica Chinensis provide to nourish the liver and kidney. Due to the poor water solubility of its major constituents such as flavonoids and lignans, its absorption upon oral administration could be limited. So, the nanoparticles for the same were developed. A recent experimental study of polylactic acid nanoparticles of lipophilic anti-cancer herb drug (Cucurbitacins and Curcuminoids) using a precipitation method have been developed.Work has also been carried out in the development and characterization of SLNs for the traditional Chinese medicine for their targeted delivery and increased bioavailability and efficacy the recent years, nanostructured carrier system like polymeric nanoparticles, liposomes, SLNs, polymeric micelles, nanoemulsions, etc., have been investigated for their potential to deliver anticancer drugs by oral route.Moreover, the oral route offers great potential for delivery of cytotoxic agents and therefore the attention has focused on the development of oral chemotherapy in oncology.

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