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Recent Development in Novel Drug Delivery System for Delivery of Herbal Drug

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ABSTRACT

Defensive and establish decisions have been depicted in the improvement of creative restorative home-grown definitions like polymeric nanoparticles, nanocapsules, liposomes, phytosomes, microspheres, transfersosomes, and ethosomes. The novel formulations are said to have notable advantages over traditional formulations of plant activities and extracts, including improved solubility, bioavailability, and toxicity protection; improved pharmacological activity; improved stability; improved tissue microphages distribution; sustained delivery; and protection from physical and chemical degradation. A well-known manufacturer of drugs and neutraceuticals has created a method called phytosomes that is intended to combine standardized plant extract or water-soluble phytoconstituents with phospholipids to create lipid-compatible molecular complexes. By combining the herbal medications into contemporary dosage forms; they can be used for better purposes and with increased effectiveness. Designing innovative medicine delivery systems for natural components could achieve this. The current review highlights the stage at which herbal compounds are being developed into novel drug delivery systems and provides an overview of their kind of active components, biological activity, and use in novel formulations.

Keywords : Herbal Ingredients, Neutraceuticals, Phospholipids, Phytosomes

I. INTRODUCTION

A new drug delivery system's objective is to direct the active ingredient to the site of action while distributing the medicine at a rate based on the body's needs during the treatment period. The creation of a novel drug delivery system (NDDS) for herbal medicines has drawn a lot of interest lately. Conventional dosage forms, such as prolonged release dosage forms, are unable to meet the demands of directing the

phytoconstituents of their desired target site to achieve an at most therapeutic response and holding the drug component at a district rate as directed by the body's requirements throughout the course of treatment. [1]The production of nano sized dose structures for herbal drugs, for example, phytosomes and nano emulsions, liposomes, strong lipid nanoparticles, polymeric nanoparticles and nanocapsules, and strong lipid nanoparticles, enjoyed a few benefits, including further developed dissolvability and bioavailability, security from poisonousness, expanded pharmacological movement, expanded solidness, further developed tissue macrophage conveyance, supported conveyance, and insurance from physical and synthetic degeneration. As a result, herbal pharmaceuticals with nano-sized NDDS have the potential to enhance activity and circumvent problems with plant-based treatments in the future. [2] The biodegradable and essentially non-toxic liposomes are a vehicle that can contain both hydrophilic and hydrophobic substances. Since the beginning of time, doctors and pharmacists have worked to give patients the best selection of medicines so that their recovery from illnesses is quicker and more thorough. [1] The medications are produced in an appropriate formulation that takes into account the constituents' safety, effectiveness, and acceptability; this formulation is sometimes referred to as a dosage form or drug delivery system. As science and engineering have advanced across the board, dosage forms have evolved from straightforward mixtures and pills to very complex machinery. The development of an NDDS for herbal medications has received a lot of interest over the last few decades. [2] The use of herbal medicines to treat a variety of diseases with fewer hazardous side effects and better therapeutic outcomes is growing in popularity in the modern world. While this is going on, various restrictions on herbal extracts and plant actives, like instability in very acidic ph and liver metabolism, have caused the medication levels to fall below the therapeutic concentration in the blood, having a reduced or nonexistent curative impact. An effort was made in the current study to touch on a variety of applications and aspects linked to the manufacture of innovative herbal drugs. [1, 2]

TYPES OF NOVEL HERBAL DRUG DELIVARY SYSTEMS:

- Liposome's
- Phytosomes
- Niosomes
- Ethosomes
- Transfersosomes
- Microspheres
- Nanoparticles
- Pharmacosomes

1. Liposomes:

The innovative drug delivery method is designed to continually dispense medications over a longer period of circulation at a predictable and repeatable pace. Given that dosages are given less frequently and generally are lower, this concept may have benefits including higher patient compliance, which helps to prevent drug-related side effects by maintaining constant blood levels rather than allowing them to fluctuate.[3] Phospholipids, cholesterol, alcohols, sterols, and Springo lipids make up liposomes. Quercetin, curcumin, Pacilitaxel, colchicines, capsaicin, brucine, Rutin, arbutin, and other active herbal compounds are present in liposomes. [3] Due to their adaptability and clinical efficacy, liposome formulations are frequently employed in the pharmaceutical industry as drug delivery systems and have been used to provide drugs via a variety of routes. [4] Liposome formulations are frequently utilized as topical medication delivery systems because they have a higher diffusivity in the skin than most other formulations. Liposomes are added to gel to improve medication retention in the skin while also delivering higher, longer-lasting drug concentrations in the skin. However, liposomes do not improve drug absorption throughout the body.[5] They serve as a drug reservoir

that allows for controlled and localized drug distribution. A sufficient amount of medication can be delivered into the skin using the liposomal gel method, minimizing any negative effects. Carbopol is employed as a hydrogel that serves as a carrier for liposomes and has the capacity to improve local medication delivery. Degradation of the hydro gel matrix regulates drug release. [4, 5]

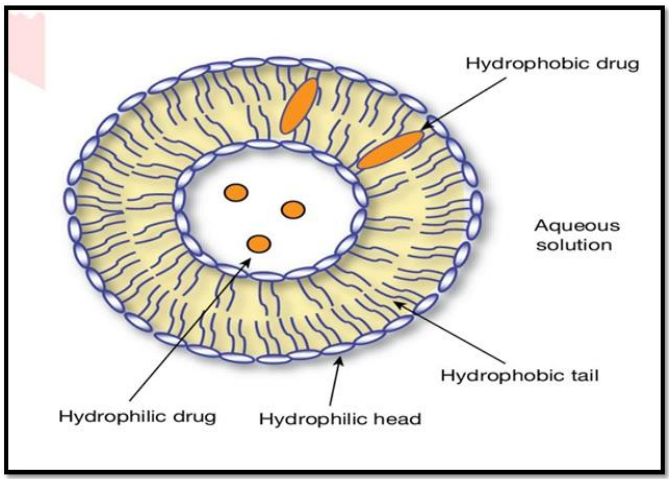

Fig no 1 - Structure of Liposome

Free radicals and other reactive oxidative species (ROS) associated with oxidative stress are protected from harm by the well-known antioxidant Quercetin liposome.[3] One of the most researched bioflavonoids currently is curcumin liposome, and numerous studies have supported its antioxidant, anti-inflammatory, anti-cancer, chemo-protective, and gastro-protective effects. Some of the most promising paclitaxel anticancer medications, paclitaxel liposomes, are particularly successful in treating breast and ovarian cancer but have drawbacks including low water solubility and low absorption. [4] Colchicine liposomes, an alkaloid found in the plants Colchicum autumnal and Gloriosa extracts, are useful for treating acute gout as well as skin conditions like psoriasis, and the sweets syndrome. Liposomes from Bruce as an analgesic and anti-inflammatory medication, brucine is well known for reducing arthritic and chronic pain. [5] The three main pharmacodynamics effects are circulation improvement, edema reduction, and pain alleviation. The introduction of liposomes as new drug delivery vehicles for phytoconstituents has led to a reduction in dosage and a reduction in side effects while also increasing bioavailability, solubility, and permeability. Now that standardization, extraction, and identification techniques have been developed, researchers may focus on creating herbal medications that can match the targeted administration, drastically reduced doses, and adverse effect characteristics of the conventional medicine approach. [3, 5]

II. PHYTOSOMES

A compound of phospholipids and organic active components is a Phytosome. Applying topically or ingesting an herbal extract enhances its absorption when using Phytosome. Herbal extract is coupled with phospholipids and is present in phytosomes, also known as herbosomes. It is a lipid and phytoconstituents-based vesicular drug delivery method.[6] Phytosome encourages phytoconstituents absorption through the GIT, which increases the bioavailability of phytoconstituents. Phospholipids, Phytochemicals, and plant extracts make up phytosomes. Ammivisanga, citrus aurentium, cucurbitapepo, fraximusornus, gingko biloba, glycine max, and oleaeuropaea are botanical components found in phytosomes. Advanced herbal drug technology known as phytosomes provides defined bioavailability of plant medicines in comparison to herbal extract. [8] Reduced particle size, increased rate of absorption, and reports that the herbal extracts performed better in vivo. According to structural elucidation, a certain pattern is created during the chemical reaction between phospholipids and the herbal substrate by creating hydrogen bonds between the polar side front of phospholipids and the polar functional group of the secondary metabolites. In solvents like acetone, dioxane, methylene chloride, hexane, and ethyl acetate, phytosomes exhibit chemical reactions. [8]

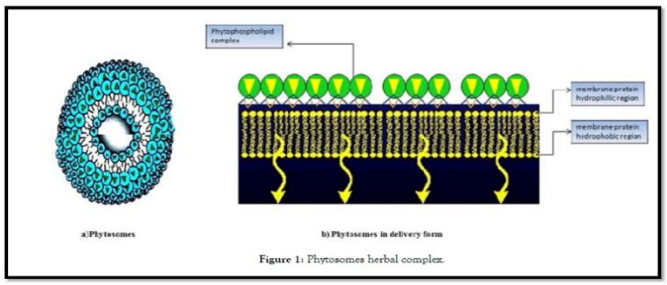

Fig no 2- Phytosome herbal composition

They resemble liposomes in their cellular structure and take on the shape of micelles in water. The active polar moiety attached to phospholipids functions as a crucial part of the cell membrane. The physical size, membrane permeability, entrapment ratio, chemical makeup, amount, and purity of the precursor starting chemical elements are just a few of the many variables that control the distinctive uniqueness of phytosomes. [7]

Phosphatidycholine and phytoconstituents can be combined in a 1:1 ratio in an aprotic solvent to create phytosomes. The ratio of phytoconstituents to phospholipids in the complex of phyto-phospholipids is in the range of 0.5-2 mole. The ideal ratio between phytoconstituents and phospholipids is 1:1. The soya-lecithin phosphatidycholine, phosphstidylserine, and phosphatidylethanolamine groups of phospholipids are the ones that are typically chosen. [8] Spectroscopic analysis demonstrates that the molecules of phospholipids are chemically linked to phytoconstituents. Herbal extracts' bioavailability has suddenly increased as a result of enhanced intestinal absorption and their complexation with phospholipids. They can make bioavailable and have been used to provide Flavonoids that protect the liver. [9] Synergistic advantages and cost-effective phytoconstituents delivery are provided by this method. Furthermore, they can be applied to enhance the absorption of drugs administered transdermally and topically through the skin. The vesicular system is passive, non-intrusive, and immediately marketable. Drug entrapment during formulation preparation is not a concern. The dose requirement is lowered due to the main constituent's increased absorption. To get the desired outcomes, they can even give in smaller amounts. [6, 9]

III. NIOSOMES

One of the promising drug carriers is the niosome, which has a bilayer structure and is produced by the self-association of cholesterol and nonionic surfactants in an aqueous phase. Niosomes have no immunogenicity, are biocompatible, and degrade in the body. They are highly stable, have a long shelf life, and allow for regulated and/or continuous drug delivery at the target site.[10] Niosomes' potential as a medicine carrier has recently been the subject of in-depth research. There have been reports of numerous nonionic surfactant types forming Niosomes, which allow for the trapping of numerous medicines with a variety of solubilities. By adjusting and optimizing Niosomes' composition, size, number of lamellae, and surface charge, drug delivery efficiency can be raised.[11] This review's goal is to explain the fundamentals of niosome synthesis and characterization, as well as a description of their usage in drug delivery, with a focus on more recent studies. Non-ionic surfactants, lipids, and fatty acids are found in Niosomes.The botanical constituents in Niosomes include tween 20, span 60, and tyloxapol. Niosomes are self-congregations of non-ionic Surfactants regardless of cholesterol, and they can be utilized to exemplify both hydrophilic and hydrophobic substances.[11] SinceNiosomes have been displayed to impressively further develop transdermal medication conveyance across the layer corneum, the primary boundary against drug transport through the skin, they can be utilized in two distinct techniques for designated drug organization.[10]

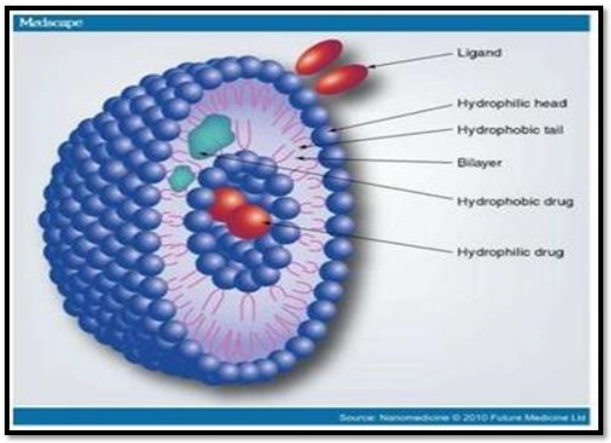

Fig no 3- Structure of Niosome

Niosomes boost stratum corneum by hydrating it and altering its characteristics by lowering trans epidermal water loss. By acting as Surfactants like the matrix, Niosomes promote medication transport through the stratum corneum. Niosomes delay the drug's release in cases of skin damage, minimizing the necessity for changing clothes throughout the day. Niosomes are incredibly promising delivery systems for many pharmacological and diagnostic substances. The synthesis, characterization, and usage of Niosomes as drug carriers have been covered in a number of papers.[12] They have good biocompatibility and low toxicity due to their nonionic nature. Niosomes' distinctive structure enables the creation of potent new drug delivery systems that can accommodate both hydrophilic and lipophillic medications. Drugs that are lipophillic and hydrophilic are entrapped in the membrane bilayers and watery core of noisome, respectively. Chemotherapy is frequently used as a cancer treatment today. Many anticancer medications' therapeutic efficiency is constrained by their low tumour tissue absorption and their damaging side effects on healthy cells. In order to test their 5-FU-loaded polyethylene glycol (PEG) coated and uncoated bola-Niosomes on breast cancer cell lines, Cosco et al (MCF7 and T47D). Active targeting for tumour therapy can further improve the effectiveness and in particular the specificity of cellular targeting of niosome drug delivery systems by utilising a ligand attached to the surface of Niosomes, which may be actively taken up, for instance, via a receptor-mediated endocytosis. [11, 12]

IV. ETHOSOMES

Ethosomes are structurally delicate nanocarrier structures that contain significant amounts of water, phospholipids, and ethanol. Ethosomes may have 2%–5% phospholipids content and a 20%–40% ethanol concentration. [13] Ethanolosomes have a higher potential for skin penetration than liposomes because ethanol has the ability to fluidize various intercellular lipids located in the stratum corneum of the skin. It has been noted that by maintaining a constant concentration of phospholipids, the size of the ethosomes shrinks as the amount of ethanol increases. Ethosomes' surface is additionally negatively charged due to the presence of ethanol, improving their colloidal security. [14] But in contrast to liposomes, ethosomes exhibit higher hydrophilic/ionized drug leakage due to disruption of the close pressing of phospholipids' bilayers brought on by the proximity of a high ethanol concentration. Extreme arrival of collected material and skin irritation are caused by ethanolosomes with ethanol convergence levels of 30%. Ethosomes are elastic nanovesicles made of phospholipids with a high ethanol concentration (20–45%). Phospholipids, ethanol, isopropyl alcohol, and water make up ethosomes. Grlcyrrhiza, Triptergiumwifordi, Sesabanid grandiflora, and Sophraflavescenes are herbal compounds found in ethosomes. [13]

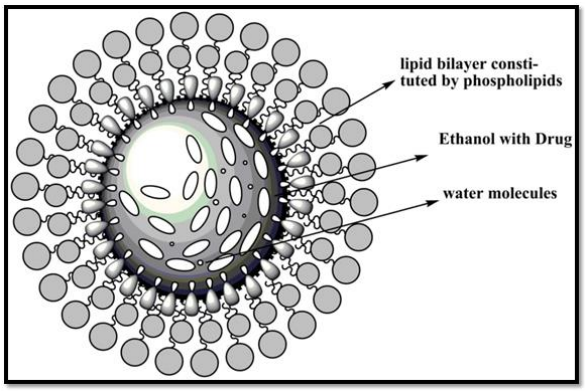

Fig no 4- Structure of Ethosome

Ethosomal systems differ from liposomes in that they also contain water and phospholipids, as well as a relatively high concentration of ethanol. In order to improve skin penetration and vesicular properties, new generations of Ethosomes systems are created by adding additional compounds to basic classical Ethosomes. But there hasn't been a definite line drawn between the traditional and modern Ethosomes. [15] The ethanol of Ethosomes increases the fluidity of cell membrane lipids, which increases skin permeability. As a result, the ethosomes readily pass through the thick layers of skin, where they combine with lipids to release the drugs.The medication delivery method using Ethosomal cells is more inert. Ethosomal formulation is renowned for delivering diverse and big groups of medicines, proteins, and peptides, among other things. Ethosomes are approved for usage in both cosmetics and pharmaceuticals due to the existence of secure compositions in them. [16] Ethosomes are a safe medication delivery system since their formulation incorporates non-toxic components. To make the Ethosomal formulations conveniently administered, they should be made in a semisolid form, such as gel or cream. When compared to more complex processes, the creation of a herbal Ethosomal formulation is straightforward. [13, 16]

V. TRANSFERSOMES

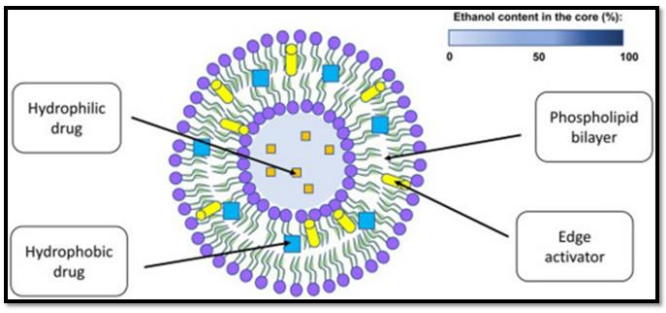

Fig no 5- Structure of Transfersosomes

Transfersosomes have a fundamental structure similar to that of traditional liposomes, but they differ from liposomes in some ways due to their softness, extreme deformability, and more easily modifiable system membrane. [17]Transfersosomes' capacity to bond with epidermal moisture and hold onto water is a crucial characteristic. To prevent dehydration, Transfersosomes include a lot of hydrophilic molecules. Vesicles made of phospholipids and edge activators are a part of the first generation of Transfersosomes. A bilayer component (such as phosphatidycholine) and multiple amphipathic membrane destabilizing components combine to form the second generation of Transfersomes.[18] Amphipathic non-phospholipidic bilayers make up the third generation of Transfersomes, but unlike the first and second generations, the surfactant has been replaced by water soluble modulator molecules (such as organic ions) that have the same effectiveness.[17] The Transfersomes go deeper toward the strata that contain water when they are introduced to the skin in order to hydrate themselves. Transfersomes penetration of the skin barrier is caused by reversible, ultra-thin bilayer deformation that maintains the integrity of the bilayer. Water, phospholipids (lipid bilayers), and edge activator are all components of Transfersomes. [18]

They are less expensive than allopathic drugs. They work well for a variety of ailments. They come with less negative consequences. There are numerous options for using them. They don't need to be tested. Transfersosomes are highly deformable vesicles that deal with problems associated with transport, including High molecular weight medicinal chemicals cannot be transdermally administered due to the skin's barrier properties. Transfersosomes include deformable particles that can pass through biological permeability barriers, such as the skin, to carry drugs. These flexible vesicles change shape and penetrate the skin through pores. They are excellent at delivering proteins and peptides. These Transfersosomes may adapt to environmental stress by squeezing through skin pores that are many times thinner than typical in order to optimize transdermal flux of medical drugs. Since the structure of transfersosomes contains hydrophilic and hydrophobic molecules, a variety of solubility's are possible. In comparison to other vesicular systems, transfersosomes have a number of

advantages, including skin penetration, stability, systemic drug release, and deformability. [17, 19]

VI. MICROSPHERES

Microspheres are typically free-flowing powders with a particle size of less than 200 m that are constructed of biodegradable proteins or artificial polymers. The word novel, in contrast to drug delivery systems, is searching for something out of necessity. In the case of chronic patients, the medication must be administered over an extended length of time, and numerous medications must be taken at the same time.[20] When a medicine's half-life is shorter and patient compliance declines as a result, frequent drug administration is required. Different types of controlled release dosage forms are created and modified in order to address the aforementioned issues, increasing patient compliance through delayed effects and reducing undesirable effects by lowering peak plasma concentration.[21]To maintain a generally constant medication level in the plasma, the controlled release dosage form delivers the drug at a predetermined pace over an extended period of time.Aluminosilicate ferrous, iron oxides, and native iron make up microspheres. Curcumin and berberinenanoemulsion are natural compounds found in microspheres. The typical components of microspheres include rutin, turmeric oil, polystyrene (PS), poly (methyl methacrylate) (PMMA), and silica. [20] These materials' various physical and optical characteristics could be advantages or drawbacks depending on the application. Because polymer beads are often hydrophobic, they have strong protein binding properties. They typically require some surfactant (such as 0.01-0.1% Tween® 20 or SDS) in the storage buffer to ensure ease of handling. During the synthesis process, functional monomers may co-polymerize with styrene or methyl methacrylate to produce beads with surface reactive groups.Covalent binding reactions may employ functional groups, which also help to stabilize the suspension. Microspheres made of silica are naturally negatively charged and hydrophilic. [22] As a result, stabilizers like surfactants are rarely used in aqueous silica suspensions. Silica spheres functionalized with carboxyl and amine are available for use in common covalent using a variety of silanes, coating techniques and plain silica microspheres can be changed to provide functional groups or change surface characteristics.[21]

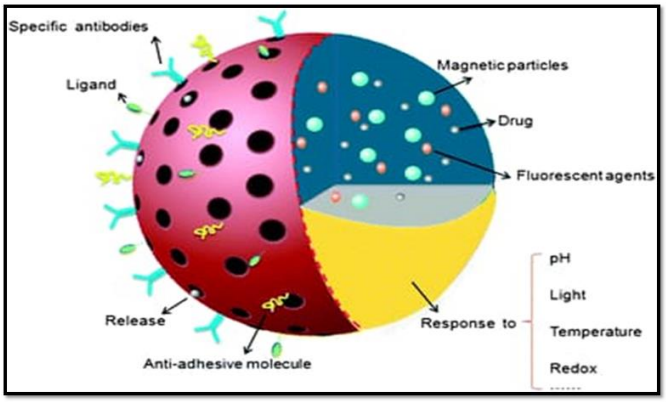

Fig no 6- Structure of Microspheres

The therapeutic action of microspheres is continuous and lasting. Decreases the need for frequent dosing, which benefits the patient. The therapeutic action of microspheres is continuous and lasting. Decreases the frequency of dose, which enhances patient compliance. They were small enough to be injected into the body and had a spherical form. Improved medicine use will increase bioavailability and lessen the frequency or severity of side effects. The shape of the microspheres allows for predictable fluctuation in medication release and breakdown. [21, 22]

VII. NANOPARTICLES

Nanoparticles are sub-Nanoscale colloidal structures with sizes ranging from 1-1000 nm that are constructed of synthetic or natural polymers. The medication is divided up, imprisoned, enclosed, or connected to a network of nanoparticles. Nanoparticles might be in the form of nanospheres or nanocases, depending on the technology used for arrangement. Nano containers are structures in which the medication is kept to a hole contained by special polymer film, whereas nano spheres are network frameworks in which the

medication is really and equally spread.Safe components such as lipids, polysaccharides, and designed biodegradable polymers are used to create the nanocarrier. Phospholipids and inorganic nanoparticles make up nanoparticles. Curcumin, Zedoary-turmeric oil, Quercetin, Pacilitaxel, and Doxorubicin are herbal components of nanoparticles. Due to their potential to heal practically all diseases, herbal medicines are currently receiving increased attention. [23]

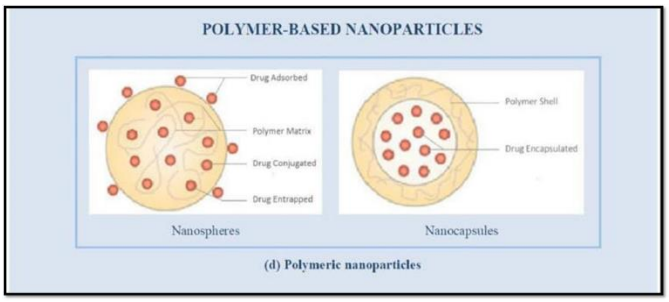

Fig no 7- Structure of Nanoparticles

However, a variety of problems, including as poor solubility, poor bioavailability, restricted oral absorption, instability, and unexpected toxicity, limit the use of herbal medicines. Nanotechnology has developed appealing therapies for the pharmaceutical industry that will deal with the issue posed by herbal medications in order to solve such issues. The value and significance of combining natural products and herbal treatments with the nanocarrier are anticipated to elevate the current medicine delivery strategy. When compared to other systems with extended circulation times, the bone marrow and spleen's sinusoidal gaps can be easily passed through by liposomes and microspheres because of their smaller size. The resistance of drugs and proteins to enzymatic degradation is increased by nanoparticles. In terms of effectiveness and efficiency, they represent a considerable advancement over conventional oral and intravenous (IV) methods of administration. It lessens the liver's toxicity. [24]

VIII. PHARMACOSOMES:

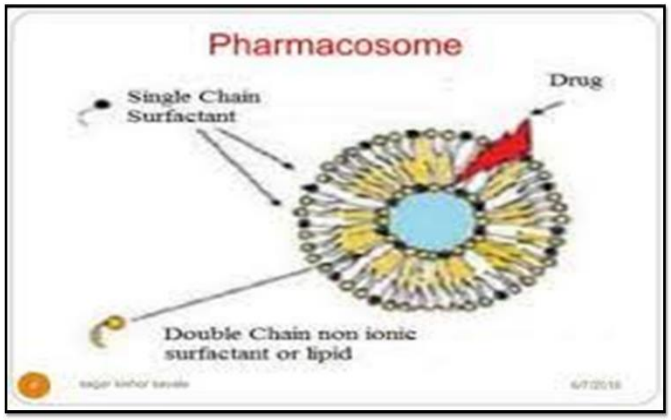

Fig no 8- Structure of Pharmacosome

The zwitterionic, amphiphillic, stoichiometric complexes of polyphenol chemicals with phospholipids are specifically referred to as Pharmacosomes. These lipid-based drug delivery systems are correctly described as colloidal dispersions of pharmaceuticals that enhance the transfer of drugs through membranes, tissues, or cell walls of an organism.[25] They are effective in achieving therapeutic goals such drug targeting and controlled release. Vesicular Pharmacosomes must interact with pharmaceuticals both on their surface and within their bulk in order to develop. [27] With or without the strong formation of an amphiphillic molecule by the spacer chain, any drug having an active hydrogen atom (-COOH, -OH, -NH2, etc.) can be esterified to the lipid. Drugs, lipids, and solvents make up Pharmacosomes' three main parts. Pharmacosomes have demonstrated a wide range of uses in the delivery of several medication kinds to treat a number of ailments. The various medications administered via Pharmacosomes include NSAIDs (aceclofenac, aspirin, diclofenac, etodolac, ibuprofen, ketoprofen, and naproxen, among others), anti-cancer medications (camptothecin, cytarabine, gemcetabine, paclitaxel, etc.), anti-viral medications (acyclovir, adefovir, didenosine (isoniazid).[26]

They require less time and effort than liposomes. Drug release occurs during hydrolysis rather than bilayer diffusion, surface desorption, or degradation as in the case of liposomes. In contrast to liposomes, the efficiency of trapping in Pharmacosomes is unaffected

by the volume of inclusion. The temperature at which the conjugate phase change takes place affects the fluidity of the Pharmacosomes' membrane since the drug and lipid are covalently bonded to one another.[28] But in the case of liposomes, medication release and system stability are regulated by membrane fluidity, which in turn depends on lipid composition. There is no drug leakage or sedimentation since the drug and carrier are covalently bonded. [25, 28].

IX. CONCLUSIONS

Since ancient times, herbal remedies have been utilized all over the world and are recognized by medical professionals and patients as having superior therapeutic outcomes since they have less side effects than modern medications. By combining the Ayurvedic medications with contemporary dose forms, they can be used effectively and in appropriate amounts. However, to improve patient compliance and prevent recurrent administration, phototherapeutics need a scientific method to render the components in a novel way. Designing NDDS for natural compounds can do this. NDDS aid to boost the therapeutic value by lowering toxicity and raising bioavailability, which reduces the need for repeated administration to combat noncompliance. Pharmaceutical scientists frequently have moved their attention to developing a scientifically sound drug delivery mechanism for natural remedies. The cutting-edge research can continue to be sold.The advancement of clear bioassays for natural normalization, pharmacological and toxicological assessment strategies, the examination of their locales of assimilation, the revelation of different creature models for poisonousness and security assessment, legitimate and administrative parts of home grown drugs, and a lot more are a portion of the troubles that should be defeated for home grown drugs.

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Sr. No	Type	composition	Herbal ingredients	Uses	Properties	Comparision
1.	Liposomes	Phospholipids Cholesterol Alcohol Sterols Springo lipids	Magnolol Nux vomica Quercetin Diospyrin Myrtus-communis Puerarin	Antitumor Antianalgesic Antioxidant Antiulcer Antidermal	-amphiphilic in nature. -microscopic vesicle of one or more lipid bilayers separated by water and aqueous buffer compartment.	Liposomes are small, round artificial vesicles that can be produced using cholesterol and protected regular phospholipids. The hydrophilic nature of liposomes and their size make them a promising medication delivery mechanism.

2.	Transferosomes	Phospholipids Alcohols Buffering agent Dyes	Mexoxicam Methotrexate Curcumin Insulin Tetracaine	NSAIDS Anticancer Hypoglycemic Topical analgesic	-ultra fordable vesicle -suitable for both low and high molecules weight and also for lipophillic as well as hydrophilic drug.	Because API has more side effects than other systems, using herbs with transferosomes may help them work more effectively and haveless negative effects.
3.	Ethosomes	Phospholipids Ethanol Isopropyl alcohol water	Grlcyrrhiza Triptergium-wifordi Sesabanid-grandiflora Sophra-flavescenes.	Anticancer Antitumor Antiviral	Combinational approach of high concentration og ethanol along with phospholipids synergizes.	Ethosomes have low risk profile. Skin irritation may occur in some patients due to the penetration enhancer or the excipients used so the herbal ingredients have low side effect so use of herbal ingredient is compatible
4.	Pharmacosomes	Phospholipids Polyphenol dichloromethane	Phytosome Flavonoids Xanthene's	Antiulcer NSAIDS Anticancer Antitumor	Colloidal depression of drug covalently bound to lipids which increases entrapment efficacy.	A phytosome is a complex mode between herbal extract and dietary phospholipids shows improved bioavailability Of phytoconstituents.
5.	nanoparticles	Phospholipids Inorganic nanoparticles.	Curcumin Zedoary- turmeric oil Quercetin Paclitaxel doxorubicin	Anticancer Hepatoprotective Antioxidant HIV therapy	Biodegradable biocompatible	Nanoparticles are colloidal sub-ionized structures made of artificial polymers.

6.	Microspheres	Aluminosilicate ferrous Iron oxides Native iron	Curcumin Berberinenanoemulsion. Turmeric oil Rutin	Nasal NSAIDS Vaccines chemotherapy	Improve bioavailability provide constant and prolonged therapeutic effect.	For microsphere the details in view of normal items have been accounted for to have critical and are beneficial over the engineered plans with regards to dissolvability, upgraded bioavailability, expanded pharmacological action, strength and less secondary effects.
7.	Phytosome	Phospholipids Phytochemicals Plant extract	Grape seed Green tea Ginseng.	Antiviral Antiulcer Antidermal	Have multiple rings. Better for absorption. Has an added dimension	A phytosome is a complex mode between herbal extracts and dietary phospholipids, shows improved bioavailability of phytoconstituent
8.	Niosomes	Nonionic surfactant Lipids Fatty acids	Span 60	NSAIDS Antiviral Antifungal antineoplastic	More stable Biocompatible	Numerous attempts have been made to construct a medication delivery system based on herbs and their phytoconstituents with Niosomes to improve therapeutic impact and bioavailability.