



## Phytosomes - An emerging approach for effective management of Dermatological Disorder

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### ABSTRACT

The word "Phyto" means plant, and also sometimes, it can be signified as cell-like. The development of phytosomes produces a little cell by itself, by which the active ingredient of the herbal extracts is protected from the intestinal secretions and instinctive bacteria destruction. The introduction of phytosomes into herbal formulation is very recent and useful because they have advanced bioavailability, and they are better absorbed. Also, they consume this enhanced ability to cross lipid-rich bio membranes to finally reach the blood. Phytosomes can also be defined as complex chemical mixtures which are formulated by countering more than one mole synthetic or natural phospholipids phosphatidyl ethanolamine or phosphatidylserines with the one mole of another component. There are various plants materials which can be merged in the process of phytosomes, such as several herbal extracts including quercetin, grape seed, Rhein, neem, green tea, aloe vera, marigold and ginseng. The bioavailability of phytosomes further as linked to conventional herbal extracts because it has enhanced capability to penetrate the lipid bio membrane to finally reach the systemic blood circulation. Phytosomes has been categorized as a novel line for herbal drug delivery. Various conventional dosage forms such as gels and creams remained expressed using these constituents, but they appeared to be a better dermatological effect. Hence, phytosomes were formulated by binding phosphatidylcholine (acts as a transporter and protect the skin) and herbal extracts. They consist of a phospholipid molecular structure which includes two fat-soluble tails and a water-soluble head, and because of its dual solubility, it was absorbed better and was also used for the treatment of skin carcinomas, antiaging and skin disorders.

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### INTRODUCTION

A dwarf structure known as Phytosomes act as an intermediate between novel drug delivery and conventional system. Phytosomes are having availability to carry themselves from the lipid environment to the hydrophilic environment of the cell membrane. The Phytosomes developed by indene from Italy as it was seen in the enhancement of bioavailability, of convinced selected Phyto medicine by the incorporation of standard herb extract into phospholipid which improve the pharmacological activ-

ity.

As we know, the meaning of Phyto is plant and some means cell. It also considered as herbosomes. A newly developed technology in which standard plant extract or Phyto constituent which are water-soluble formed complex with phospholipid and produce a lipid well-suited molecular compound which centrals to the enhancement of pharmacokinetic and pharmacodynamic activity.

Phytosomes have a protective effect for an herbal component to get destroyed GIT secretion these are use in the treatment of short- and long-term liver disease and also is being used in anti-inflammatory activity and also in dermatological composition. It is also be used in the treatment of fatal diseases without de naturing the active phytocompound. The hydrophilic plant constituent has their advantage in skin disorder, anti-ageing, and different types of carcinomas are difficult to treat by using conventional drug delivery systems and hence transformed into phytosomes.

Today number of marketed products available in the market, which contain phytosomes drug delivery system such as Ginkgo biloba, Silybum marianun and Camellia sinensis. Earlier plant extract hand-me-down as traditional and modern medicine system, at the same time several pharmacological actions were studied and carried out in various plant extract, and their therapeutic was assist.

[1] standard extract of the plant, mainly flavonoids, are derived as phytosomes are considered as phytosomes. The selection of flavonoids is done from the group containing quercetin, kaemferol-3, rhamnoghglucoside, quercetin-3-rhammoside, hyperoxide, vitexin, Diosmine,3-rhamnoside, (+) catechin, (-) epicatechin, apigrnin-7-glucoside, luteolin, Luteolin glucoside, ginkgo netine and bilobetine etc.

This present review will emphasis on the advancement of herbal drug delivery by comparing emerging technology in the field of novel drug delivery systems mainly focused on phytosomes exploration.

### Phytosomes technology

Drug delivery by phytosomes means plant hub incorporated in vesicles remain available in nano form. It provides a coating like envelop all over the surrounding of phytoconstituent by this. The main constituent is protected from degradation by gastric secretion. These are having the accessibility to absorb hydrophilic into a lyophilic environment of the cell and lastly reaches to the systemic circulation [2].

By reacting a small amount of phospholipid (phos-

phatidylcholine) by standard extract of a hub in a non-polar solvent. The phospholipid uses, i.e., phosphatidylcholine is obtained from soyabean. As it is a dual nature compound, were phosphatidyl part is lyophilic, and the choline part is hydrophilic in nature. The choline part will bind to the constituent that are water-soluble and form a structure on the other side, phosphatidyl which is liquid soluble, will form a tail and get enclosed with choline bound material [3].

As we shaw phospholipid form molecular complex, it means it is compatible with lipid, and it termed as Phyto-phospholipid complex. Mutually the phospholipid and the polar colin head are bonded with a chemical bond. For the protection of plant concentrate to get demolished intestinal secretion and gut bacteria, the phytosomal technology a little structure where they can be protected (Figure 1).

## MATERIALS AND METHODS

### Preparation of phytosomes

Phytosomes are arranged by means of the exact amount of phospholipid, i.e., soya lecithin with herbal extract in an aprotic solvent. The main constituent of soya lecithin and a compound having a dual function, i.e. phosphatidylcholine Figure 2 demonstrate chemical structure. Phospholipid and standard plant extract in ratio of range 0.5 to 2.0 is being reacted. The reaction is carried out in the natural mixture of aprotic Solvent like acetone, methylene chloride by this process main constituent is being isolated by precipitation with non-solvent the solvent is evaporated by using a rotary evaporator at last, after drying the attained developments are soluble in a polar and aprotic solvent in which the individual complex is insoluble (Figure 3) [4].

### Properties of phytosomes

#### Chemical properties

These are measured as complex of herbal product and phospholipid which consequence of reaction among the essential amount of phospholipid and the substrate in a solvent. Then by analyzing the spectroscopic data, it is assumed that the interaction of phospholipid and substrates is due to the formation of hydrogen bond between the phospholipid and Substrate.

#### Biological properties

It is considered as a small form of natural products which is better absorbed and utilize and also improve the pharmacological action absorption and enhancement in bioavailability. Phytosomes behaviors can be expressed in a physical or biological sys-

tem on their physical size, membrane permeability, a percentage in entrapment chemical composition quantity and purity of material utilized [5].

## RESULTS AND DISCUSSION

### Advantage phytosomes technology

1. Phytosomes elements, i.e., phosphatidyl colin, behave as a mediator and bifold roll, which possess health benefits.
2. Phytosomes constituents are secured and approved for a pharmaceutical used.
3. It provides enhanced absorption and increases the bioavailability of essentials that are water-soluble and give a better therapeutic result.
4. It leads to dose reduction as the bioavailability enhanced.
5. It is more stable than liposomes as it is composed of a hydrogen bond.
6. It easily permits via skin to increase the effectiveness

There are various commercial phytosomal products are available ( Table 1).

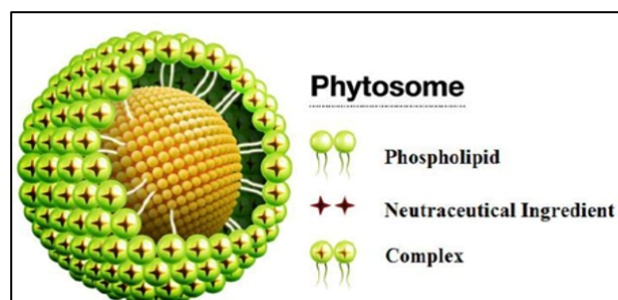


Figure 1: Structure of Phytosomes

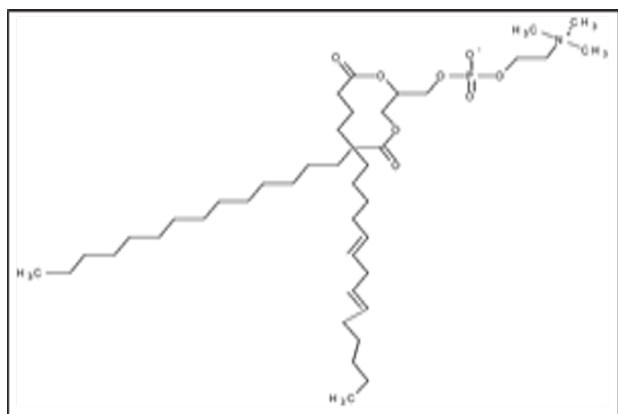


Figure 2: Molecular structure of phosphatidylcholine

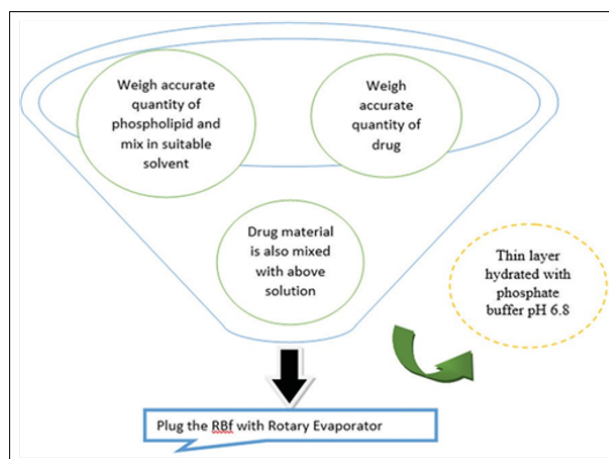


Figure 3: Preparation method for phytosomes

### Characterization of phytosomes

The key feature which supports the performance of phytosomes in biological as well as a physical system it depends upon the chemical arrangement and physical properties of phytosomes like size, shape. Numerous methods used for the characterization of phytosomes are Thin-layer chromatographic (TLC), infrared spectroscopic (IR), Transmission electron microscopic (TEM), Photon correlation spectroscopy (PCS), X-ray diffraction.

<sup>1</sup>H-NMR, <sup>13</sup>C-NMR and IR are cast-off for the learning of molecular interaction in phospholipid and other material to identify the thermal behaviours such as fusion reduction solvent decomposition of phytosomes is analyzed by thermal gravimetric analysis (TGA) and differential scanning and calorimetry (DSC) [6].

### Advancement & current research on phytosomes technology

In past years number of researches has been conducted to identify that phytosomes are a novel delivery system for the improvement of bioavailability of herbal drugs by reducing dose concentration now a days plant extract is an area of interest due to their pharmacological potential like sily marine, curcumin, grape seed, hesperidin, ginkgo Biloba extract and andrographolide etc. the benefit of phytosomes technology has demanded, more herbal medicine for the certain disease's management. Some crucial research works of the research are described below.

1. [7] Bacopa side a main constituent present in *Bacopa monneri* plant having anti amnesic activity in this study phytosomes are prepared from Bacopaside and *in vivo* study were performed on rodent which shows a therapeutic change in the compound prepared by phospholipid when it was compared to *B. monneri* extract.

**Table 1: Commercial Phytosomes Products**

S. No.	Phytosomes	Phytoconstituents	Complexed Dose*	Indications
1.	Silybin Phyto-some	Silybin from <i>Silybum marianum</i>	120 mg	Hepatoprotective, antioxidant for liver and skin
2.	Ginkgo Phyto-some	24 % ginkgo flavonoids from <i>Ginkgo biloba</i>	120 mg	Protects the brain and vascular linings, anti-skin Ageing
3.	Ginseng Phyto-some	37.5 % ginsenosides from <i>Panax ginseng</i>	150 mg	Nutraceuticals, immunomodulator
4.	Green Tea Phytosome	Epigallocatechin from <i>Thea sinensis</i>	50-100 mg	Nutraceutical, systemic antioxidant, anticancer
5.	Grape Seed Phytosome	Procyanidins from <i>Vitisvinifera</i>	50-100 mg	Nutraceutical, systemic antioxidant, cardio-protective
6.	Hawthorn Phytosome	Flavonoids from <i>Crataegus</i>	100 mg	Nutraceutical, cardio-protective and antihypertensive.
7.	Olive oil Phytosome	Polyphenols from <i>Oleaeuropaeaoil</i>	-	Antioxidant, anti-inflammatory, anti-Hyperlipidemic
8.	Echinacea Phytosome	Echinacosides from <i>Echinacea augustifolia</i>	-	Nutraceutical, immunomodulator
9.	Cantele Phyto-some	Terpenes	-	Vein and Skin disorders
10.	Palmetto berries Phytosomes	Fatty acids, alcohols and sterols	-	Non-cancerous prostate enlargement.
11.	Super Milk thistle Extract	Silybin from Silymarin	-	Food Product antioxidant for liver and skin

2. [8] in this study, researchers have used nine volunteer patients who are verified the activity of silymarine (Hepatoprotective) and originate that phytosomal form of silymarine have four-time greater permeability through the liver.

3. [9] he has used 232 chronic hepatitis patients and reported that silymarin phytosomes Then uncomplexed form.

4. [10]. This study was achieved by preparing sinigrin phytosomes, and the assessment of *in vitro* wound healing capacity was evaluated, and the effect shows better healing as compared to alone sinigrin.

5. [11] reported that silymarine phytosomes have fetoprotectant activity.

6. [12] he has also performed a number of experiments and reported, and that silymarine Phytosomes have better fetoprotectant activity.

7. [13] by using solvent evaporation technique phytosomes prepared containing herb- Epimedm flavonoid. Different ratio of EPF-PVP precipitate was evaluated by dissolution study.

8. [14] prepared a phytosomes of quercetin by reproducible method and reported that the healing efficacy of quercetin phytosomes are better than an uncomplexed molecule in rat liver damage induced using carbon tetra chloride.

9. [15] silymarin phytosomes has a long-lasting action as a compared single constituent and leads person reduction of edema, and inhibition antioxidant.

**Table 2: List of patent Phytosomes technology**

S. NO	Patent title	Description of innovation	Patent no
1	Phospholipid curcumin complex and piperine as chemo sensitizing agent	Treatment of drug-resistant	EP2228062A1
2	Soluble isoflavone composition	Exhibit improved solubility	WO/2004/045541
3	Fatty acid monoesters of sorbitol furfural and composition for cosmetic and dermatological use	Fatty Acid monoester of sorbitol furfural selected from two different series of compounds in which side chain is a linear alkyl radical optionally containing at least one ethylenic unsaturation	EP1690862
4	A composition comprising Ginkgo Biloba derivates for the treatment of asthmatic and allergic conditions.	Useful for asthma and allegoric condition	EP1813280
5	Phospholipid complexes of olive fruits or leaves extracts having improved bioavailability.	Having improved bioavailability	EP/1844785
6	Treatment of skin and wound repair with thymosin beta-4	Composition of thymosin for treatment of skin	US/2007/0015698
7	An antioxidant preparation based on plant extract for the treatment of aging or photodamaged skin.	Used in circulation problems arteriosclerosis and high blood pressure	EP1214084

10. [16] pharmacokinetic studies were performed in the rat by using silymarin phytosomes and reported that enhancement bioavailability of silybin.

11. [17] declared that silymarin Phytosome displays better anti-hepatotoxic action than crude silymarin.

#### **Permeability of phytosomes for trans dermal drug delivery**

By using trans dermal drug delivery system (TDDS) has central to the increase in bioavailability of Phyto constituents when they are given by the transdermal route. Through TDDS, the delivery of therapeutic mediator over the skin systemic circulation owing to the lipophilic nature of stratum corneum it acts as a major barrier for drug permeability by preparing phytosomes of phytoconstituent Will provide a major help for overcoming this barrier. The number of successful researches has been performed successful, which proves that phytosomes technology has great potential and can be used as a transdermal application.

Phytosomes of curcumin (flavonoid from turmeric, *Curcuma longa*) and naringenin (grapefruit flavonoid, *Vitis vinifera*) is shown advanced antiox-

idant action than pure curcumin at all dose levels checked. In the study, the detection of the presence of silybin in mice was found to increase dramatically after administration of a modified silybin-phospholipid complex Phytosome causes to surprise enhancement for the lipophilic properties of silybin-phospholipid complexity and development of the biological outcome of silybin [18].

Treatment of Ginkgo biloba phytosome was found to be increasing superoxide dismutase, catalase, glutathione peroxidase and the functions of glutathione reductase in all regions of the brain in comparison and those preserved only with sodium nitrite. Ginkgo writes phytosomes were given to Wistar mice at 50 mg/kg and 100 mg/kg for 7 and 14 days. Chemical hypoxia is caused by the administration of sodium nitrite (75 mg/kg) 1 h after storage medical management. Thirty minutes afterward sodium nitrite administration, animals killed the cerebellum, cerebral cortex, hippocampus and striatum were also separated homogenized. Supernatants are used for rating of antioxidant enzymes, catalase, glutathione peroxidase, superoxide dismutase and glutathione reductase [19].

Patients facing from chronic hepatitis (viral, alcohol or drug-induced) pickled with silybin phytosome with a dose of 120 mg either twice daily or thrice daily for up to 120 days, and liver function reimbursed to normal quicker in patients captivating silybin phytosomes compared to a group of controls (49 treated with commercially available silymarin, 117 untreated or given placebo, [9].

[20] has performed research on incorporative curcumin in transdermal formulation, but he found that it results in low bioavailability. Then, he prepared Phytosomes compared with the vesicular system and found that it gives an excellent antioxidant and antiaging property as compared to other vesicular system.

[16] as his found in suggested that gin select phytosomes have better transdermic action and provide support ginseng saponin that presents in the phospholipid, he gives a better permeation result.

#### Patented technology of phytosomes

A huge number of investigates have been achieved for the commercialization of phytosomes, and a few patented phytosomes technology are listed in the given table given below, along with their full description and patent number (Table 2) [18].

#### CONCLUSIONS

Overall, on the basis of the present scenario, it seems phytosomes shown a promising result in the enhancement of therapeutic as well as those reduction capability and better permeability as associated conventional herbal extract. It shows that phytosomes is a better doses form the improvement of solubility, bioavailability and permeability of phytoconstituent main compound present in the plant part. Nanotechnology is measured to be the most promising and transforming field. Over the last dozens of years, nanotechnology is widely being used and is beneficial in the field of dermatology, cosmetics, and biomedical applications as well. New technologies and novel delivery systems have been invented by scientists, which are currently being used in the manufacture of cosmeceuticals. By the increase in usage of cosmeceuticals, the conventional delivery systems are being replaced by the novel delivery systems. Herbals are a rich source of active ingredients and can be a safer and cost-effective treatment for skin diseases ranging from rashes to dreadful skin cancer. More than 50% of plant species useful for the treatment of skin diseases appear to be restricted to forests, so activities such as deforestation, habitat destruction, urbanization etc., may pose a serious threat to this species.

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#### Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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