Journal of Population Therapeutics & Clinical Pharmacology

REVIEW ARTICLE
DOI: 10.53555/awzxe912

PHYTOSOME: A NOVEL DRUG DELIVERY SYSTEM PREPARATION TO IMPROVE BIOAVAILABILITY OF HERBAL EXTRACT

Sumit das[1*], Dr. H. Lalhlenmawia[2]

[1]M.Pharm (Pharmaceutics), Regional Institute of Paramedical and Nursing Sciences, Zemabawk, Aizawl, Mizoram -796017, Email- sumitdasngu@gmail.com
[2]Head of department (department of Pharmacy), Regional Institute of Paramedical and Nursing Sciences, Zemabawk, Aizawl, Mizoram -796017, Email- hodpharmacy@ripans.ac.in

***Corresponding Author:** Sumit das
*Regional Institute of Paramedical and Nursing Sciences, Zemabawk, Aizawl, Mizoram -796017
Email- sumitdasngu@gmail.com

ABSTRACT
Herbal medicines have diverse range of active phytoconstituents provides any opportunity to use in a variety of ways, but active constituents are poorly absorbed due to their strong polarity and lipophilicity, resulting in low bioavailability. The term phytosome means complex between a natural product and natural phospholipids, like soy phospholipids that are obtained by the reaction of stoichiometric amounts of phospholipids and phytoconstituents in an appropriate solvent. Phytosomes are little cell like structure. This is a advanced form of herbal formulation which contains the bioactive phytoconstituents of plant extract surrounds and bound by lipid. Majority of the bioactive phytoconstituents are water soluble compounds like flavonoids, saponins, glucosides, terpenoids in which flavonoids are major class of bioactive phytoconstituents possess broad therapeutic uses. Phytosome shows better absorption and as a result to produce better bioavailability because it consist of water soluble herbal extract and lipophilic outer layer.

Keywords: Herbal Medicine, Phytoconstituents, Bioavailability, Phosphatidylcholine

1. Introduction
The effectiveness of any herbal medication is dependent on the delivery of effective level of therapeutically active compound.
Severe limitations exists in their bioavailability when administered orally or tropical. Phytosomes are recently introduced herbal formulation that are better absorbed. Phytosomes are lipid compatible molecular complex and are little cell like structure which are composed of “phyto” which means plantand “some” meaning cell like.
Phytosomes are patented technology developed by a leading manufacturer of drugs and neutralceuticals to integrate standard plant extracts or water soluble phyto constituents into phospholipids to produce lipid compactible molecular complexes called phytosome and are greatly improve their absorption and bioavailability. The Phytosome process produces a little cell because of that valuable components of herbal extract are protected from destruction by digestive secretions and gut bacteria. Phytosome are better able to transition from hydrophilic environment into the

lipid-friendly environment of the enterocyte cell membrane and from there into the cell finally reaching blood.

There are three main reasons for the popularity of herbal formulations:-

i) There is a growing concern over the reliance and safety of drugs and surgery

II) Modern medicine is failing to effectively treat many of the most common health conditions.

III) Many natural measures are being shown to produce better results than drugs or surgery without the side effects.

A variety of solution have been proposed counter the problem of poor absorption such as preparation of emulsions, liposomes, nanoparticles, as well as modification of chemical structures and delivery as pro drugs.

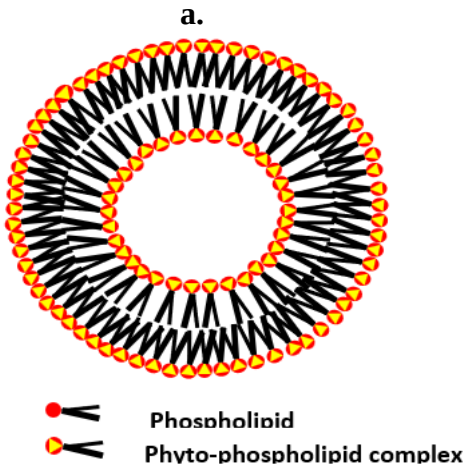
Phytosomes added dimension the proven health giving activity of phospholipids themselves. Phytosome is also often known as Herbosomes .

2. Structure of phytosome

Phytosome are formed by interaction between phosphatidylcholine and plant active components actually in a ratio form a 1:1 or a 2:1 molecular complex depending upon the substances complexes, involving chemical bonds.

Likewise phytosomes, a liposomes are formed by mixing the water soluble substances with phosphatidylcholine in definite ratio under specific conditions.

Here is no chemical bonds are formed, the phosphatidylcholine molecules surround the water soluble substance.



Phytosome are not liposomes structurally this two are distinctly different groups as shown in figure 1 and figure 2.

Simply phytosome is the unit of few molecules bonded together, while liposome is the aggregate of many phospholipid molecules that can enclose other phytoactive molecules without specifically bonding to them.

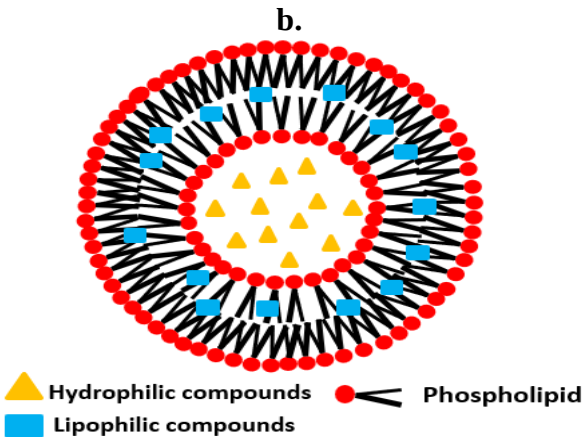


Fig2: Liposome

3. Preparation of phytosome

Phytosomes mainly can be prepared by the following methods:

a) Solvent Evaporation Method:

The PC and phytoconstituents are integrated during the solvent evaporation process in a flask holding organic solvent. For a set duration of one hour, this reaction mixture is maintained at its ideal temperature of 40°C in order to maximize drug entrapment within the phytosomes that are created. After being separated using 100 mesh screens, thin film phytosomes are kept in desiccators for the night.

b) Rotary Evaporator Vacuum Method:

Using a thin layer rotary evaporator vacuum approach, phytosome vesicles were developed. In a 250 ml round-bottom flask, the phytosomal complex was combined with anhydrous ethanol. A rotatary evaporator attached to the flask . At roughly 60°C, the solvent will evaporate and form a thin coating around the flask. Phosphate buffer (7.4) is used to hydrate the film, and as the lipid layer separates, vesicle suspension is formed in the phosphate buffer. 60% amplitude probe sonication was applied to the phytosomal suspension. Before being characterized, the phytosomal suspension will be kept in the refrigerator for a full day.

c) Reflux Method:

The reflux approach is one way to prepare phytosomes. A 100 mL round-bottom flask containing phospholipid and polyphenolic extract was refluxed in DCM for one hour at a temperature not to exceed 40°C. After evaporating the clear solution, 15 mL of n-hexane was added until a precipitate formed. After being removed, the precipitate was put in a desiccator.

d) Salting Out Method:

An essential step in the production of phytosomes is to dissolve the plant extract and phosphatidylcholine in an appropriate organic solvent. Next, n-hexane is added and the mixture is allowed to precipitate until the extract-phosphatidylcholine combination is formed.

4. Advantages of phytosome:

a) It is certain that the medication will be delivered to the appropriate tissues.
b) The components of phytosomes have been approved for use in pharmaceuticals, and their composition is safe.
c) Phosphatidylcholine serves as a carrier in addition to having additional health benefits, including heptoprotective properties.
d) Compared to liposomes, phytosomes have higher stability.
e) With their ease of penetration through the skin, phytosomes increase their efficaciousness.

f) The greatest absorption of components has led to a reduction in the required dosage.
g) The drug's entrapment capability is quite high and predefined due to its conjugation with lipids to create vesicles.
h) The clinical benefit of phytosomes is found to be much greater.

5. Evaluation of phytosome

a) SEM and TEM visualization

For SEM Five microliters (μL) of the phytosomal suspension were converted into a canopy slip, which was then placed on a specimen tab. Samples were let to dry at room temperature. Next, the photographer used a scanning microscope to view the formulation's particle size.
For TEM after shaking the complex in water, a transmission electron microscope was used to view it.

b) Particle Size Analysis

Particle diameter and polydispersity index were recorded by Beckman Coulter.

c) FTIR

The FTIR provides strong evidence for the spectroscopic interpretation of the resulting complex. Additionally, it verifies stability by contrasting the complex's spectrum with that of the micro-dispersion in water following freeze-drying at various intervals.

d) DSC

Within the aluminum crimp cell, the sample including phytosome and phospholipon was heated at a rate of 100C/min to reach a temperature of 4000*C in a nitrogen atmosphere. The analyzer was used to record the temperatures at the start of the peak transit time.

e)HPTLC

The development of a novel moiety in HPTLC is confirmed by varying retention factor values obtained from the phytoconstituents that are eluted using the selected solvent system.

6. Conclusion

An overview of phytosomes as a delivery mechanism is attempted to be provided in this review in a brief manner. A wide range of applications in cosmeticology and enhanced pharmacological qualities are provided by phytosomes. The processes used to prepare phytosomes are straightforward, repeatable, and unconventional. Apart from that the phospholipids used have their own beneficial effect to the body. There will be reports on many phytosome applications in the future. The phytosome formulation process is an easy process to scale up to a commercial level. The traditional phytoconstituent delivery system and innovative medication delivery technologies are connected via the phytosome technology. For this kind of new formulation, the analytical and characterisation approaches are well-established. An attempt was made to examine the ongoing studies on phytosomes and their potential uses in wound healing, antioxidant, anti-cancer, and other applications. To create extremely target-specific phytosomes, more study is frequently conducted.

7. Reference

1. Tawheed Amim, Suman Vikas Bhat A Review On Phytosome Technology As a Novel Approach to Improve The Bioavalibility of Neutraceuticals.
2. Bhupen Kalita, Malay K. Das, Anil Kumar Sharma Novel Phytosome Formulation In Making the Herbal Extract More Effective
3. Anjana Rani, Sunil Kmuar Murraya koenigii Extract Loaded Phytosomes Prepared using Antisolvent Precipitation Technique for Improved Antidiabetic and Hypolidemic Activity
4. Vishal Gaurav, Shivangi Paliwal, Arpita Singh, Swarnima Pandey, Mohd. Aqil Siddhiqui Phytosomes: Preparation, Evaluation and Application
5. Rajesh Akki1, K. Navya Sri1, K. L. Govardhani1, M. Gayatri Ramya phytosomes: a novel drug delivery for herbal extracts

6. Mei Lu ,, Qiujun Qiu , Xiang Luo , Xinrong Liu , Jing Sun , Cunyang Wang , Xiangyun Lin , Yihui Deng , Yanzhi Song Phyto-phospholipid complexes (phytosomes): A novel strategy to improve the bioavailability of active constituents.
7. Nilesh Jain, Brahma P Gupta, Navneet Thakur, Ruchi Jain, Jitendra Banweer,
8. Deepak Kumar Jain, Surendra Jain Phytosome: A Novel Drug Delivery System for Herbal Medicine.
9. M. Sravanthi and J. Shiva Krishna
10. PHYTOSOMES: A NOVEL DRUG DELIVERY FOR HERBAL EXTRACTS
11. Kumar Vishal Saurabh1, Asha Kesari: Herbosomes- A Novel Carrier for Herbal Delivery. International Journal of Current Pharmaceutical Research 2011; 3:37-41.
12. Manach C, Scalbert A, Morand C. Polyphenols: food sources and bioavailability. Am J Clin Nutr 2004; 79:727-47.
13. Phytosomes: A technical revolution in phytomedicine. http:// www.indena.com 2010;1-7.
14. Bhattacharya S. & Ghosh A: Phytosomes-The Emerging Technology for Enhancement of Bioavailability of Botanicals and Nutraceuticals.The Internet Journal of Aesthetic and Antiaging Medicine 2009.
15. Pandey Shivanand*, Patel Kinjal: Phytosomes- Technical Revolution in Phytomedicine. International Journal of PharmTech Research 2010; 1: 627-631.
16. Bombardelli E: Phytosome-new cosmetic delivery system. Boll Chim Farm 1991; 130 (11): 431-38.
17. Bombardelli E, Spelta M: Phospholipid-polyphenol complexes A new concept in skin care ingredients. Cosm & Toil 1991; 106(3): 69-76.
18. MurrayD: Phytosomes- Increase the absorption of herbal extract.www.doctormurray.com/articles/silybin.htm 2008.
19. Bombardelli Ezio: Phytosome in functional cosmetics. Fitoterapia 1994; 387 – 401.
20. Magistretti Maria Jose, Bombardelli Ezio: Pharmaceutical compositions containing flavanolignans and phospholipids active principles 1997.
21. A Practical Approach: Preparation of liposomes and size determination New RRC (Ed.), Oxford University , Press 1990; 36-39
22. Cott J. Natural Product Formulations Available in Europe for Psychotropic Indications. Psychopharmacol Bull. 1995; 31:745.
23. Bombardelli E, Curri SB, Della RL, Del NP, Tubaro A, Gariboldi P. Complexes Between Phospholipids and Vegetal Derivatives of Biological Interest. Fitoterapia. 1989; 60:1-9.
24. Dang Yi. New product concept. UPC code 0300540111783. 2000.
25. Manach C, Scalbert A, Morand C. Polyphenols: Food Sources and Bioavailability. Am J Clin Nutr. 2004; 79:727-47.
26. Mascarella S. Therapeutic and Antilipoperoxidant Effects of Silybin-Phosphatidylcholine Complex in Chronic Liver Disease, Preliminary Results. Curr Ther Res. 1993; 53:98-102.
27. Bombardelli E, Cristoni A, Morazzoni P. Phytosomes in Functional Cosmetics. Fitoterapia. 1994; 95:387-401.
28. Bombardelli E. Phytosome: New Cosmetic Delivery System. Boll Chim Farm. 1991; 130:431-38.
29. Bombardelli E, Spelta M. Phospholipid-Polyphenol Complexes: A New Concept in Skin Care Ingredients. Cosm & Toil.1991; 106:69-76.
30. Murray D. Phytosomes- Increase the Absorption of Herbal Extract [online]. 2008 [cited 2008 Sep 28]. Available from: URL: www.doctormurray.com/articles/silybin.htm
31. Phytosomes: A Technical Revolution in Phytomedicine [online]. 2010 [cited 2010 Mar 22]. Available from: URL: http://www.indena.com
32. Jose MM, Bombardelli E. Pharmaceutical Compositions Containing Flavanolignans and Phospholipida Active Principles. U.S. Patent EPO209037. 1987.
33. Sharma S, Sikarwar M. Phytosome: A Review. Planta Indica .2005;1:1-3.

34. Kidd P, Head K. A Review of the Bioavailability and Clinical Efficacy of Milk Thistle Phytosome: A Silybinphosphatidylcholine Complex. Altern Med Rev. 2005; 10:193-203.
35. Bombardelli E, Spelta M, Loggia Della R, Sosa S, Tubaro A. Aging Skin: Protective Effect of Silymarin- Phytosome. Fitoterapia. 1991; 62:115-22.
36. Bombardelli E, Mustich G. Bilobalide Phospholipid Complex, Their Uses and Formulation Containing Them. U.S. Patent EPO-275005. 1991.