Journal of Nutritional Dietetics & Probiotics

Chembio Publishers
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Mini Review *Volume 1; Issue 2*

Phytosomes: A Novel Approach for Delivery of Herbal Constituents

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Received Date: August 18, 2018; **Published Date:** September 06, 2018

Abstract

Phytosome is a complex obtained by reaction between a natural product and phospholipids in a suitable solvent; the phospholipids-product interaction occurs as a result of hydrogen bond formation between the phospholipids phosphate and ammonium groups of the polar head and those of the natural product substrate that can be revealed using spectroscopic methods. Size of phytosome varies from 50 nm to a few hundred μm. It can be deduced that the fatty chain gives unchanged signals both in free phospholipids and in the complex and that can be detected by FTIR data, which indicates that long aliphatic chains are wrapped around the active principle producing lipophilic envelope [1].

Keywords: Liposome; Phospholipids

Abbreviations: TEM: Transmission Electron Microscope; PCS: Photon Correlation Spectroscopy ; DLS: Dynamic Light Scattering Technique; PC: Phospholipids Complex; FTIR: Fourier-Transform Infrared Spectroscopy

Advantages of Phytosome

Phytosome protects herbal components from destruction by digestive secretions and gut bacteria in its small cell assuring its proper delivery to the tissues. Phytosome entrapment efficiency is high and moreover predetermined because the drug itself is in conjugation with lipids in forming vesicles so dose requirement has been reduced as the maximum absorption of chief constituents and marked enhancement in the bioavailability of drug occurs. Phytosomes in skin care products have great clinical benefit because it acts as a hepatoprotective as a result, it imparts synergistic effect when hepatoprotective substances are employed [2].

Phytosomes versus Liposomes

Phytosomes are being much better absorbed than liposome's; as in liposome's the active principle is dissolved in the medium contained in the cavity or in the layers of the liposome membrane, whereas in phytosome active principle is an integral part of the membrane, being anchored through chemical bonds to the polar head of the phospholipids as showed in Figure 1. Liposomes may require hundreds or even thousands of PC molecules surrounding the water-soluble compound. In contrast, in phytosomes, 1:1 PC to the plant components depending on the substance can form complex [3].

Citation: Nermeen M Khalil. Phytosomes: A Novel Approach for Delivery of Herbal Constituents. J Nutri Diet Probiotics 2018, 1(2): 180007.

Figure 1: Schematic diagram showing the difference between phytosome versus liposome [3].

Phytosome Preparation

Phytosomes are obtained by re acting 1-3 moles phospholipids such as phosphatidyl choline, phosphatidyl ethanolamine or phosphatidyl serine with one mole of active phytoconstituents (flavonoids or terpenoids) in an aprotic solvent (dioxin, acetone, methylene chloride, ethyl acetate) complex is then isolated by evaporation of the solvent. Different methods of preparation were used to prepare phytosomes one of them is known as solvent evaporation technique, at which PC and the plant extract was added together in a suitable solvent in the same flask at a certain temperature for a specific period before complete evaporation of the solvent and then hydration of the resulted residue to obtain the phytosome complex. Co-solvency method is another common method for preparation of phytosomes at which in separate flasks, the extract, and the PC were dissolved in methanol and then mixed with stirring at definite temperature until complete evaporation of the solvent and then hydration of the phytosome residue. Salting out technique; an important method of phytosome preparation that done by dissolving both PC and the plant extract in a suitable organic solvent and then n-hexane was added until the extract-PC complex precipitation occur [4].

Characterization of Phytosome

Phytosome vesicles spherical shape can be visualized using transmission electron microscope (TEM) while entrapment efficiency of the phytosome formulation can be determined using ultracentrifugation technique. Particle size, zeta potential and polydispersity index phytosome can be determined by a computerized inspection system with photon correlation spectroscopy (PCS) using dynamic light scattering technique (DLS). Phytosome complex formation can be confirmed by comparing the FTIR spectrum of the complex with that of PC and the crude extract [5].

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