

A Comprehensive Survey on Significance of New Drug Delivery Systems in the Herbal Medicines

Sarita Jangra
 Department Of Pharmacy
 Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

ABSTRACT: *Plant-based medicines have been used for various diseases by the human race since time immemorial. However, these phytomedicines suffer from restrictions, which are primarily due to problems with stability and low lipid solubility. In order to overcome these problems, new phytomedicines drug delivery systems are being developed. Vesicular delivery systems such as liposomes, phytosomes, ethosomes, transferosomes, and particulate delivery systems such as microspheres, micro pellets, nanoparticles, and micro and nano emulsions are used in these novel herbal drug delivery systems. For the enhancement of stability, bioavailability and toxicity reduction, several herbal medicines have been introduced into these systems. This analysis highlights the current status of the production of novel herbal formulations and their therapy applications. Before chemists undertook to synthesise synthetic silver bullets for all those diseases, and before pharmaceutical firms hitched our collective wellbeing to what became a multibillion dollar wagon for them, the future of medicine is rooted in the past. Almost all the drugs came from the plants in the past; for centuries, the herb was man's only chemist. Herbs are staging a revival, herbal 'renaissance' is happening all over the world, and more and more people are taking notice of herbal remedies instead of conventional medicine to treat different kinds of ailments.*

KEYWORDS: *Drug, Medicines, Nanoparticles, Plant, Systems.*

INTRODUCTION

It is possible that herbal medicines are as old as the human race. Since ancient times, plant preparations or plant parts have been commonly used in medicine. To date, the use of phytomedicines in most of the population of the world is widespread[1].

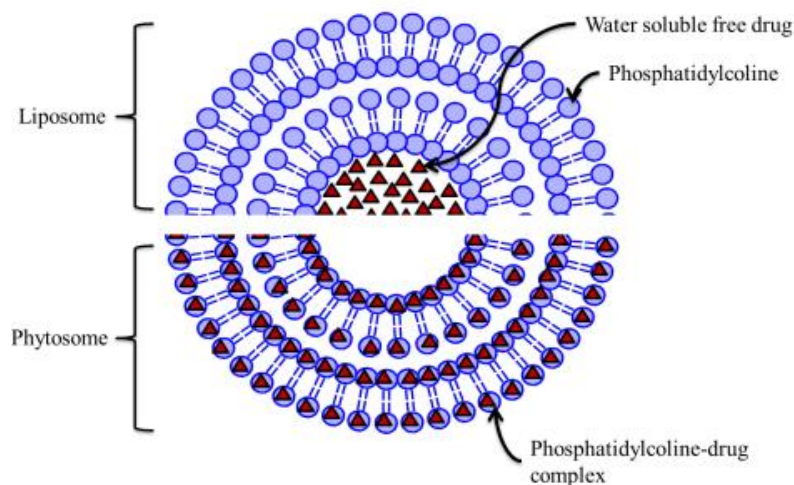


Figure 1: Illustrates the difference between phytosomes and liposomes[2].

Herbal medicines are common in the modern world because of their ability to treat a number of illnesses with less harmful and stronger medicinal effects. Certain herbal and phytochemical limitations, such as highly acidic pH instability, pre-systemic liver metabolism, issues with solubility and absorption, can lead to drug levels below the plasma therapeutic concentration, resulting in little or no therapeutic effects[3].

Table 1: Illustrates the Herbal liposomal drug delivery systems[4].

Herbal drug	Purpose	Medicinal Uses
Essential oil from <i>Atractylodes macrocephala</i> Koidz	Increase in solubility and bioavailability	Anti-arthritis
Extracts of <i>Tripterygium wilfordii</i> (Triptolide)	Increase stability	Angiogenesis inhibitor, anticancer, polycystic kidney disease, digestive disorders
Quercetin	Increase in bioavailability and reduction in side effects	Anticancer / Antioxidant
Silymarin	Increase in hepatoprotective activity	Hepatoprotective
Capsaicin	Increase in permeation and prolongation of action	Neuropathy, Neuralgia, arthritis
<i>Artemisia arborescens</i> L. essential oil	Increase in the stability and antiherpetic property	Anti-herpes

Table 2: Illustrates the Commercial phytosome preparations[5].

Herbal Source	Phytoconstituent	Medicinal Uses
<i>Silybium marianum</i>	Sylibin flavonoids	Hepatoprotective, antioxidant
<i>Ginkgo biloba</i>	Ginkgo flavonoids	Protects brain and vascular linings
<i>Panax ginseng</i>	Ginsenosides	Nutraceutical, immunomodulator
<i>Thea sinensis</i>	Epicallocatechin	Systemic antioxidant and anticancer
<i>Olea europaea</i> oil	Polyphenols	Antioxidant, anti-inflammatory and anti hyperlipidemic

DISCUSSION

Nanoparticles are particles of the submicron scale of around 200 nm in diameter, consisting of biodegradable and non-biodegradable polymers[6]. The benefits of nanoparticles include improved stability, long-term storage, increased solubility of the ingredients, improved absorption of the embedded drug and decreased dose and dose-related side effects. Nanoparticles can be used

both for controlled release and for targeting the drug to a specific tissue or organ[7]. Curcuminoids, paclitaxel, and praziquantel have been documented in the literature for nanoparticle systems. Table 4 offers recorded nanoparticles of various herbal drugs and phytoconstituents[8].

Table 3: Illustrates Herbal microspheres and their applications.

Herbal drug	Purpose	Medicinal Uses
Rutin	Site-specific delivery to cardiovascular and cerebrovascular region	Cardiovascular and cerebrovascular agent
Camptothecin	Dose reduction, enhancement of cytotoxicity	Cytotoxic, anticancer
Sylimarin	Sustained release, enhancement of activity	Hepatoprotective activity
Turmeric oil	Sustained release, increase in bioavailability	Hepatoprotective, anticancer, antibacterial

Table 4: Illustrates Herbal nanoparticles[9].

Herbal drug	Purpose	Medicinal Uses
Curcumin	Solubility and bioavailability enhancement	Anticancer activity
Zedoary turmeric oil	Enhancement of stability, hepatoprotective activity and anticancer effects	Anticancer, hepatoprotective
Quercetin	Enhancement of antioxidant activity	Antioxidant and anticancer
Paclitaxel	Reduction of side effects	Anticancer
Paclitaxel and Doxorubicin	Reduction of side effects / Avoidance of resistance	Anticancer

Table 5: Illustrates Herbal micro/nano emulsions.

Herbal Drug	Purpose
Curcumin	Enhancement in oral bioavailability
Ubiquinone self-nano-emulsified delivery	Enhancement in solubility, bioavailability and avoidance of precipitation of drug in the vehicle
Zedoary turmeric oil	Improvement in aqueous dispersibility, stability and oral bioavailability
Docetaxel submicron emulsion	Improvement of residence time for better anticancer activity
Berberine nanoemulsion	Improvement of residence time, absorption and enhancement of anticancer activity
Quercetin microemulsion	Enhancement of penetration into stratum corneum and epidermis; Better antioxidant activity

Figure 1 illustrates the difference between phytosomes and liposomes. Table 1 illustrates the Herbal liposomal drug delivery systems. Table 2 illustrates the Commercial phytosome preparations. Table 3 illustrates Herbal microspheres and their applications. Table 4 illustrates Herbal nanoparticles. Table 5 illustrates Herbal micro/nano emulsions.

CONCLUSION

Increased bioavailability, increased solubility and permeability may result in the application of novel drug delivery systems to phytoconstituents, thereby reducing the dosage and, thus, side effects. Compared to traditional extracts, a variety of plant constituents have demonstrated an improved therapeutic effect at a similar or lower dosage when integrated into novel drug delivery systems. Therefore, the development of a novel drug delivery system for useful herbal drugs has great potential. A nano-size particle or nanoparticle is a broad class of materials that contain particulate matter that is not as large as 100 nm. It is a well-known research area of this century and has a wide range of groundbreaking advances in the field of nanotechnology, such as biological systems treatment, tracking, diagnosis and control.

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