

A Review on Herbal Excipients in Novel Drug Delivery System

Author: Tupe Anjali Anil
Guided by: Prof. Kalpana S. Kale
Principal: Dr Megha T. Salve

Department of Bachelor of Pharmacy, Shivajirao Pawar College of Pharmacy, Pachegoan Ahmednagar, 413725

Submitted: 15-11-2023

Accepted: 25-11-2023

ABSTRACT

The use of natural excipients to deliver the bioactive agents has been hampered by the synthetic materials. However advantages offered by these natural excipients are their being non-toxic, less expensive and freely available. The performance of the excipients partly determines the quality of the medicines. The traditional concept of the excipients as any component other than the active substance has undergone a substantial evolution from an inert and cheap vehicle to an essential constituent of the formulation. Excipients are any component other than the active substance(s) intentionally added to formulation of a dosage form. This article gives an overview of herbal excipients which are used in conventional dosage forms as well as novel drug delivery systems. The traditional view that excipients are inert and do not exert any therapeutic or biological action or modify the biological action of the drug substance has changed and it is now recognized that excipients can potentially influence the rate and/or extent of absorption of a drug. As herbal excipients are non toxic and compatible, they have a major role to play in pharmaceutical formulation. Hence, this paper is an attempt to review herbal excipients used in NDDS.

This article gives an overview of herbal excipients which are used in conventional dosage forms as well as novel drug delivery systems.

Keywords: Herbal, Natural, Excipients, Novel, Safe, Potential

I. INTRODUCTION

Excipient The Latin word excipients, which meaning to receive, gather, or take out, is the source of the English word Excipient. The active pharmaceutical ingredient (API), the production methods, and the excipients employed All affect formulation quality. They are excipients. Maintain the product's safety and efficacy while making a Significant contribution to the API's performance

[1]. Excipients are mostly utilised as diluents, binders, Disintegrates, adhesives, glidants, and sweeteners in conventional dosage forms like tablets and capsules. [2] Excipients are mostly utilised as diluents, binders, disintegrates, adhesives, glidants, and sweeteners in Conventional dosage forms like tablets and capsules. They are frequently referred to as "bulking agents," "fillers," Or "diluents" for a variety of reasons, including long-term stabilisation, bulking up solid formulations that Contain potent active ingredients in small amounts, or to confer a therapeutic enhancement on the active Ingredient in the final dosage form, such as facilitating drug absorption, reducing viscosity, or improving Solubility. Along with promoting in vitro stability3)

❖ PHARMACEUTICAL EXCIPIENT

Pharmaceutical excipients can be defined as Nonactive ingredients that are mixed with Therapeutically active compound(s) to form medicines. The ingredient which is not an active compound is Regarded as an excipients. Excipients affect the behavior And effectiveness of the drug product more and more Functionality and significantly. The variability of active Compounds, excipients and process are obvious Components for the product variability [12].

❖ CLASSIFICATION OF EXCIPIENTS

Excipients are commonly classified according to their Application and function in the drug products:

- Binders, Diluents
- Lubricants, Glidants, Disintegrants
- Polishing Film formers and coatings agents
- Plasticizers, Colorings
- Suspending agents Preservatives, antioxidants
- Flavorings, Sweeteners, Taste improving Agents
- Printing inks, Dispersing agents Gums [12] The Herbal or natural excipients have great merit over their synthetic analogs as these are non-

toxic, low-cost, and freely obtainable. The performance of the excipients partly determines the quality of the medicines.

❖ **Advantages of Herbal Excipients:**

- Biocompatible and non-toxic – Chemically, nearly all of these plant materials are carbohydrates in Nature and composed of repeating monosaccharide units. Hence they are non-toxic.
- Economic – They are cheaper, and their production cost is less than synthetic material.
- Safe and devoid of side effects – They are from a natural source and hence, safe and without side Effects.
- Easy availability – In many countries, they are produced due to their application in many industries[16-19].

❖ **Disadvantages of Herbal Excipients:**

- Microbial contamination – During production, they are exposed to the external environment and hence, There are chances of microbial contamination.
- Variation – Synthetic manufacturing is a controlled procedure with fixed quantities of ingredients while Production of natural polymers is dependent on environment and various physical factors.
- The uncontrolled rate of hydration-Due to differences in the collection of natural materials at different Times, as well as differences in region, species, and climate conditions the percentage of chemical Constituents present in a given material may vary.
- Slow Process – As the production rate depends upon the environment and many other factors, it can't be Changed. So, natural polymers have a slow rate of production.
- Heavy metal contamination – There are chances of Heavy metal contamination often associated with Herbal excipients[16-19]

❖ **POTENTIAL OF NOVEL DRUG DELIVERY FOR HERBAL DRUGS**

Controlled drug release and subsequent biodegradation are important for developing successful formulations. Potential release mechanisms involve: (i) desorption of surface-bound / adsorbed drugs; (ii) diffusion through the carrier matrix; (iii) diffusion (in the case of nanocapsules) through the carrier wall; (iv) carrier matrix erosion and (v) a combined erosion /

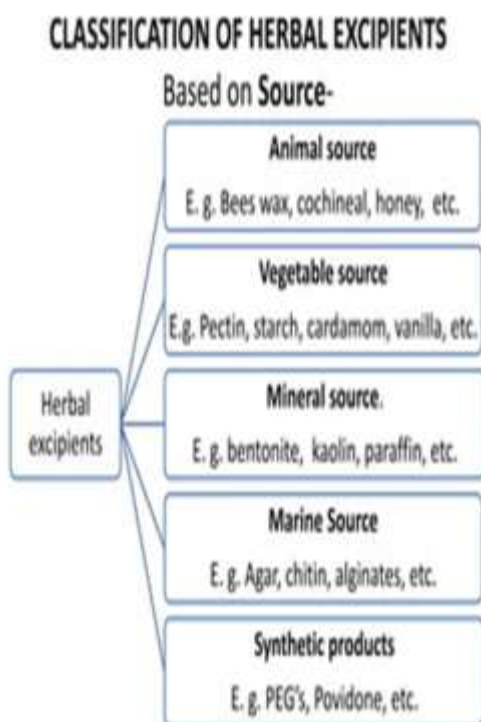
diffusion process. The mode of delivery can be the difference between a drug's success and failure, as the choice of a drug is often influenced by the way the medicine is administered.[6] Sustained (or continuous) release of a drug involves polymers that release the drug at a controlled rate due to diffusion out of the polymer or by degradation of the polymer over time. Pulsatile release is often the preferred method of drug delivery, as it closely mimics the way by which the body naturally produces hormones such as insulin. It is achieved by using drug-carrying polymers that respond to specific stimuli (e.g. exposure to light, changes in pH or temperature).[7] Various drug delivery and drug targeting systems are currently under development to minimize drug degradation and loss, to prevent harmful side-effects and to increase drug bioavailability and the fraction of the drug accumulated in the required zone. Drug carriers include soluble polymers, microparticles of insoluble or biodegradable natural and synthetic polymers, microcapsules, cells, ghost cells, lipoproteins, liposomes and micelles. Carriers can degrade slowly, respond to stimuli (e.g. sensitive to pH or temperature), and even be targeted (e.g. by conjugation with specific antibodies against some characteristic components of the region of interest). Targeting is the ability to direct a drug-filled system to a location of interest. Two main mechanisms for influencing the desired sites of drug release can be distinguished: (i) passive targeting and (ii) active targeting. An example of passive targeting is the preferential accumulation of chemotherapeutic agents in solid tumors due to the increased vascular permeability of tumor tissues

Compared to normal tissues. One strategy that could enable active targeting involves surface functionalization of drug transporters with ligands that are selectively recognized by receptors on the surface of the cells of interest. Since ligand-receptor interactions can be very selective, this may allow for more precise targeting of the site of interest.



HISTORY AND DEVELOPMENT

Since ancient days, natural products, including plants, have been the basis of treatment of human diseases. The basis of concept of modern medicine development remains rooted in traditional medicine and therapies.[4,5] In different parts of the world like ancient China, Egypt, Africa, America, and India, plants had been used for medicinal purposes long before recorded history. Chemical analysis first became available in the early 19th century which started the extraction and modification of herbal ingredients.[4,6] For a long time, herbal medicines were not considered for development as novel formulations owing to lack of scientific justification and processing difficulties, such as standardization, extraction, and identification of individual drug components in complex polyherbalsystems. However, modern phytopharmaceuticals research solves the scientific needs for herbal medicines as in modern medicine, which gives way for developing novel formulations such as nanoparticles, microemulsions, matrix systems, solid dispersions, liposomes, SLNs, and so on. Nanomicellar system,[7] nanotubes,[8] and colloidal nanogels have been developed for curcumin to be used alone



❖ Functions of Excipients:

- Add bulk to the formulation.
- During manufacturing it helps to handle Active Pharmaceutical Ingredients.
- Assist in drug administration.
- Enhance patient compliance.
- Enhance drug solubility and bioavailability of Active Pharmaceutical Ingredients.
- Avoid drug degradation.
- Give robust and reproducible result of formulation.
- Modify the pH and osmolarity of the liquid dosage forms.
- Prevents drug aggregation and helps in drug particles dispersion.
- Helps to mask unpleasant taste, color and odour.\

❖ Application of herbal excipient

• Tamarind Gum

Tamarind tree, *Tamarindusindica*, member of 21 evergreen families. The seeds produce tamarind xyloglucanis, which is obtained from the endosperm of tamarind gum seeds and is also known as tamarind seed powder (TKP). The microspheres formed had a size between 230 and 460 μm . In another study, diclofenac sodium matrix tablets were analyzed with TSP. Tablets produced by wet granulation were examined for their drug release properties 10, 11.



• Guar gum

Guar gum comes from the endosperm of the nut of the legume plant *Cyamopsistetragonolobus*. Refined guar splits are acquired when the fine layer of fibrous substance, which forms the husk, is detached and separated from the endosperm halves by polishing. Strong acids cause hydrolysis and overlooking of viscosity,

and alkalis in concentration also tend to decrease viscosity. It is insoluble in most hydrocarbon solvents 12.



- **Locust bean gum**

Locust bean gum (LBG) (also called locust bean gum) is obtained from the refined endosperm of the locust bean gum *Ceretoniasiliqua* L. It is an evergreen tree from the legume family. Locust bean gum is obtained by separating and processing the endosperm of locust bean gum. 13. Locust bean gum Botanically it is known as *Gleditsiatriacanthos* and belongs to the order Leguminosea (suborder). Honey locust gum It is familiar, botanically as *Gleditsiatriacanthos*, and belongs to the order Leguminosea (suborder



- **Khaya gum**

Khaya Gum is a polysaccharide obtained from the cut trunk of the *Khayagrandidfoliola* tree (Meliaceae family). The fact that rubber is naturally available, inexpensive and non-toxic has also

sparked interest in growing rubber for pharmaceutical applications. Subsequent work has demonstrated its potential as a directly compressible matrix system also in the form of 61 controlled release tablets 16.



- **Aloe mucilage**

It is obtained from the leaves of *Aloe barbadensis* Miller. The tissue or pulp of the aloe pulp appears to contain proteins, lipids, amino acids, vitamins, enzymes, inorganic compounds and small organic compounds, adding them to various carbohydrates. Many researchers have identified partially acetylated mannan (or acemannan) as the main compound



- **Hakea Gum**

Dried *Hakea* gum secretion from the plant *Hakea concinata* from the Proteaceae family. Gums containing acidic arabinogalactans (type A). The mole fraction (%) of the sweet components: glucuronic acid, galactose, arabinose, mannose, xylose is 12:43:32:5:8 18



- **Pectin**

Pectins are non-starchy linear polysaccharides obtained from plant cell walls. 19. For food production, microcapsules containing folic acid were produced from alginate and polymer mixtures from alginate and pectin to increase the stability of folic acid.



- **Alginates**

Alginates are natural polysaccharide polymers isolated from brown algae (Phaeophyceae). Alginic acid can be converted into its salts, with sodium alginate currently being the main form. Alginates offer various options for drug delivery, for example in alginate matrix gel beads, in liposomes, for modulation of gastrointestinal transit time, for local applications and for delivery of biomolecules in tissue engineering applications



II. CONCLUSION

Nanoparticles now have a very attractive raised surface and a wide range of biological applications. The above shows that nanoparticle systems have great potential because of their ability to convert poorly soluble, poorly absorbed and labile biologically active materials into deliverable drugs. The basis of this system can include a variety of drugs, enzymes and genes and is characterized by an extended circulation time due to a hydrophilic coating that prevents the identification of By the reticuloendothelial system. To optimize this drug delivery system, a better understanding of the different mechanisms of biological compounds and particle engineering is still required. Further progress is required to translate the perception of nanoparticle technology into practice in the context of the next generation of drug delivery systems.

REFERENCE

- [1]. Shirwaikar, A., Shirwaikar, A., Prabhu, S., & Kumar, G. (2008). Herbal excipients in novel drug delivery systems. *Indian Journal of Pharmaceutical Sciences*, 70(4), 415. <https://doi.org/10.4103/0250-474x.44587>
- [2]. <https://pubmed.ncbi.nlm.nih.gov/20046764/>
- [3]. Bais, S. K., &Ghatage, P. V. (n.d.). Herbal Excipient and Novel Drug delivery system used in Liposome and Ethiosome. *Ijcr.org*. Retrieved November 20, 2023, from <https://ijcr.org/papers/IJCRT2302085.pdf>
- [4]. Singh, P., Mahmood, T., Shameem, A., Bagga, P., & Ahmad, N. (n.d.). A review on Herbal Excipients and their pharmaceutical applications.

- Saspublishers.com. Retrieved November 20, 2023, from <https://saspublishers.com/media/articles/S-AJP-5353-57.pdf>
- [5]. Arpitasingh, Gupta, N., & Gupta, A. (2021). A REVIEW ON HERBAL EXCIPIENTS. *International Journal of Indigenous Herbs and Drugs*, 05–08. <https://doi.org/10.46956/ijihd.vi.111>
- [6]. Selvadurai, S., Divya, S., Geetha, A., Rohini, K., & Anbazhagan, S. (2020). Herbal excipients- significance of substances of natural origin as excipients. *International Journal of Pharmtech Research*, 13(3), 242–252. <https://doi.org/10.20902/ijptr.2019.130315>
- [7]. Ansari, S. H., Sameem, M., & Islam, F. (2012). Influence of nanotechnology on herbal drugs: A Review. *Journal of Advanced Pharmaceutical Technology & Research*, 3(3), 142. <https://doi.org/10.4103/2231-4040.101006>
- [8]. <https://images.app.goo.gl/nb49dGeG8UfXSEBXA>
- [9]. <https://images.app.goo.gl/JqmZXXzkQf6uadKHA>
- [10]. A review on herbal excipients. (n.d.). Org.In. Retrieved November 20, 2023, from <https://www.saap.org.in/journals/index.php/herbsanddrugs/article/view/111/158>
- [11]. <https://images.app.goo.gl/GFwhFhSzKpKCokga6>
- [12]. <https://images.app.goo.gl/nVrbc3FpG88x3FsL9>
- [13]. <https://images.app.goo.gl/Hk6d1tDXJXaVE4My5>
- [14]. <https://images.app.goo.gl/6p44oJj3UfVWab93A>
- [15]. <https://images.app.goo.gl/qoKyNMQo2fAChq68A>
- [16]. <https://images.app.goo.gl/bmfHd9QmVvb9tjWH8>
- [17]. <https://images.app.goo.gl/wsnZgjBaxVM7Cyc86>
- [18]. <https://images.app.goo.gl/UjD2XGBRo3a7BpiTA>
- [19]. <https://images.app.goo.gl/SwNGw4KLSJYDAgTM7>
- [20]. Sandhiya, V., & Ubaidulla, U. (2020). A review on herbal drug loaded into pharmaceutical carrier techniques and its evaluation process. *Future Journal of Pharmaceutical Sciences*, 6(1). <https://doi.org/10.1186/s43094-020-00050-0>