Scholars Academic Journal of Pharmacy (SAJP) **ISSN 2320-4206 (Online)**
Sch. Acad. J. Pharm., 2016; 5(3): 53-57 **ISSN 2347-9531 (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com

Review Article

A review on Herbal Excipients and their pharmaceutical applications

Prashant Singh*, Tarique Mahmood, Arshiya Shameem, Paramdeep Bagga, Nesar Ahmad
Faculty of Pharmacy, Integral University, Lucknow -226026, Uttar Pradesh, India

***Corresponding author**
Prashant Singh
Email: anu.prashant1701@gmail.com

Abstract: The Herbal or natural excipients have a great advantage over their synthetic analogues as these are non-toxic, less expensive and freely available. The increasing awareness about these herbal excipients, which are manly polymers of natural origin, the pharmaceutical industries are getting more inclined towards their use in formulation development. The plant derived gums, mucilages from natural sources like carrageen an, thaumatin, lard, storax, agar, gum acacia, tragacanth and many more to name comply with many requirements of pharmaceutical excipients. These can be preferred for formulation development as being stable and involving less regulatory issues as compared to their synthetic counter parts. They can also be easily modified to meet the specific needs, thereby being a potent and economic vehicle for delivering active pharmaceutical ingredient in formulation. Thus present study aims to throw light on the potential of natural excipients which can be proposed to be used as diluent, binder, disintegrant as well as lubricant in various types of formulations as they are biocompatible and capable of giving additional nutrition to the developed dosage form.
Keywords: Herbal excipients, Natural pharmaceutical aids, Natural polymers, Herbal binders.

INTRODUCTION

Excipients are defined as 'the substance used as a medium for giving a medicament [1]. The specific application of natural polysaccharide polymers in pharmaceutical formulations include to aid in the processing of the drug delivery system during its manufacture, protect, support or enhance stability, bioavailability or patient acceptability, assist in product identification, or enhance any other attribute of the overall safety, effectiveness or delivery of the drug during storage or use [2]. Several pharmaceutical excipients of plant origin, like starch, agar, alginates, carrageen an, guar gum, xanthan gum, gelatin, pectin, acacia, tragacanth, and cellulose find applications in the pharmaceutical industry as binding agents, disintegrates, sustaining agents, protective's, colloids, thickening agents, gelling agents, bases in suppositories, stabilizers, and coating materials[3]. As plants sources are renewable and can be cultivated or harvested in sustainable manner, can supply constant availability of raw material. Waste from food industry can be achieved as a raw material to extract herbal excipients. These are other reasons for increase in demand of herbal material as excipients [4]. However, substances from plant origin also pose several potential challenges such as being synthesized in small quantities and in mixtures that are structurally complex, which may differ according to the location of the plants as well as other variables such as the season. This may result in a slow and expensive isolation and purification process. Another issue that has become increasingly important is that of intellectual property rights [5, 6]. The specific application of plant-derived polymers in pharmaceutical formulations include their use in the manufacture of solid monolithic matrix systems, implants, films, beads, microparticles, nanoparticles, inhalable and injectable systems as well as viscous liquid formulations [7,8,9]. Ability to produce a wide range of material based on their properties and molecular weight, natural polymers became a thrust area in majority of investigations in drug [10, 11].

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]

ADVANTAGE OF HERBAL EXCIPIENTS

- Biodegradable – Naturally occurring polymers produced by all living organisms. They show no adverse effects on the environment or human being.
- 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 [13].

DISADVANTAGES OF HERBAL EXCIPIENTS

- Microbial contamination – During production, they are exposed to external environment and hence, there are chances of microbial contamination.
- Variation – Synthetic manufacturing is 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 is 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 [13, 14].

Table 1: Various Herbal Excipients with their source and uses

S.No.	Name of Excipients	Source	Category / Uses
1	Agar	Gelidium amansii (Gelidaceae)	Laxative, Suspending agent, emulsifying agent, gelling agent in suppositories, surgical lubricant, tablet disintegrates, medium for bacterial culture [15].
2	Gum Ghatti	Anogeissus latifolia (Combretaceae)	Binder, emulsifier, suspending agent [16].
3	agacanth	Astragalus gummifer (Leguminosae)	Thickening agent, demulcent, Suspending agent, emulsifying agent, emollient in cosmetics and sustained release agent [17].
4	Albizia gum	Albizia zygia (Leguminoseae)	Binder agent [18].
5	Aloe mucilage	Aloe species (Liliaceae)	Gelling agent, sustained release agent [19].
6	Bavchi mucilage	Ocimum canum (Gigarginaceae)	Suspending agent, emulsifying agent [20].
7	Cassia tora	Cassia tora Linn (Leguminoseae)	Binding agent [21].
8	Gum acacia	Acacia arabica (Combretaceae)	Suspending agent, emulsifying agent, binder in tablets, demulcent and emollient in cosmetics [22].
9	Khaya gum	Khaya grandifolia (Labiatae)	Binding agent [23].
10	Satavari mucilage	Asparagus racemosus (Aapocynaceae)	Binding agent and sustaining agent in tablet [24].
11	Tamarind seed	Tamarindus indica (Leguminoseae)	Binding agent, emulsifier,
12	Gellan gum	Pseudomonas elodea (Leguminoseae)	Disintegrating agent [25].

PHARMACEUTICAL APPLICATION OF HERBAL EXCIPIENTS

Tamarind Gum

Tamarind xyloglucan is obtained from the endosperm of the seed of the tamarind tree, Tamarindus indica, a member of the 21 evergreen families. Tamarind Gum, also known as Tamarind Kernel Powder (TKP) is extracted from the seeds Microspheres formed was in the size range of 230 - 460μm. In another study Diclofenac sodium matrix tablets containing TSP was investigated. The tablets prepared by wet granulation technique were evaluated for its drug release Characteristics [26, 27].

Guar gum

Guar gum comes from the endosperm of the seed of the legume plant Cyamopsis tetragonolobus. Refined guar splits are obtained when the fine layer of fibrous material, which forms the husk, is removed and separated from the endosperm halves by polishing. Strong acids cause hydrolysis and loss of viscosity, and alkalies in strong concentration also tend to reduce viscosity. It is insoluble in most hydrocarbon solvents [28].

Locust bean gum-

Locust Bean Gum (LBG) (also known as Carob Gum) is obtained from the refined endosperm of seeds from the carob tree Ceretonia siliqua L. It is an evergreen tree of the legume family. Carob bean gum is obtained by removing and processing the endosperm from seeds of the carob tree [29].

Honey locust gum

It is known botanically as Gleditsia triacanthos, and belongs to the order Leguminosea (suborder Mimoseae). The gum is obtained from the seeds [30, 31].

Khaya gum

Khaya gum is a polysaccharide obtained from the incised trunk of the tree Khaya grandifoliola (family Meliaceae). The fact that the gum is naturally available, inexpensive and non-toxic has also fostered the interest in developing the gum for pharmaceutical use. Further work has also shown its potential as a directly compressible matrix system in the formulation of 61 controlled release tablets [32].

Aloe mucilage

It is obtained from the leaves of Aloe barbadensis Miller. The aloe parenchyma tissue or pulp has been shown to contain proteins, lipids, amino acids, vitamins, enzymes, inorganic compounds and small organic compounds in addition to the different carbohydrates. Many investigators have identified partially acetylated mannan (or acemannan) as the primary polysaccharide of the gel, while others found pectic substance as the primary polysaccharide [33].

Hakea Gum

Hakea gum a dried exudates from the plant Hakea gibbosa family Proteaceae. Gums that are acidic arabinogalactans (type A). Molar proportions (%) of sugar constituents Glucuronic acid, Galactose, Arabinose, Mannose, Xylose is 12:43:32:5:8[34].

Pectin

Pectins are non-starch, linear polysaccharides extracted from the plant cell walls [35]. In the food industry, folic acid incorporated microcapsules were prepared using alginate and combinations of alginate and pectin polymers so as to improve stability of folic acid. The blended alginate and pectin polymer matrix increased the folic acid encapsulation efficiency and reduced leakage from the capsules as compared to those made with alginate alone; they showed higher folic acid retention after freeze drying and storage [36].

Alginates

Alginates are natural polysaccharide polymers isolated from the brown sea weed (Phaeophyceae). Alginic acid can be converted into its salts, of which sodium alginate is the major form currently used. Alginates offer various applications in drug de-livery, such as in matrix type alginate gel beads, in liposomes, in modulating gastrointestinal transit time, for local applications and to deliver the bio molecules in tissue engineering applications [37].

CONCLUSION

Natural excipients development is gaining a lot of attention these days. Polymers play a vital role in the drug delivery. So, the selection of polymer plays an important role in drug manufacturing. Some polysaccharides obtained from plants such as carrageen an, alginate, konjac glucomannan, gum arabic, guar gum and locust bean gum have shown excellent potential as carrier materials in matrix type controlled release dosage forms such as microparticles, beads, tablets and cross-linked hydrogels. Excipients that have never been used before must pass formidable regulatory requirements before being incorporated into approved dosage forms.

ACKNOWLEDGEMENT

Authors are thankful to Professor H.H. Siddiqui for their generous guidance and Professor S. W. Akhtar, hon'able Vice Chancellor, Integral University, for providing of all the necessary facilities for this work.

REFERENCES

1. Morton's; The Nurse Dictionary. 24th ed. Faber & Faber: London, 1957.
2. The Joint IPEC – PQG Good Manufacturing Practices Guide for Pharmaceutical Excipients, 2006.

3. Wade A, Weller PJ; Handbook of Pharmaceutical Excipients.p.426-8. 11th ed. The Pharmaceutical Press: London. 1994.
4. Perepelkin KE; Polymeric materials of the future based on renewable plant resources and biotechnologies; Fibers, films, plastics. Fiber Chem., 2005; 37: 417-30.
5. Lam KS; New aspects of natural products in drug discovery: Trends Microbiol., 2007; 15: 279289.
6. Chesney JD, Venkataraman SK, Henri JT; Plant natural products. Back to the future or into extinction? Phytochemistry. 2007; 68: 2015-2022.
7. Pandey R, Khuller GK; Polymer based drug delivery systems for mycobacterial infections. Curr. Drug Deliv, 2004; 1: 195-201.
8. Chamarthy SP, Pinal R; Plasticizer concentration and the performance of a diffusion-controlled polymeric drug delivery system. Colloids Surf. A. Physiochem. Eng. Asp, 2008; 331: 25-30.
9. Alonso-Sande M, Teijeiro D, Remuñán-López C, Alonso MJ; Glucomannan, a promising polysaccharide for biopharmaceutical purposes. Eur. J. Pharm. Biopharm., 2008; doi:10:1016/j.ejpb.2008;02:005.
10. Banker GS, Anderson NR, Lachman L, Lieberman HA, Kanig JL; The theory and practice of industrial pharmacy. p.336. 3rd Ed., Mumbai: Varghese Publishing House.1987.
11. Bhardwaj TR, Kanwar M, Gupta A; Natural gums and modified natural gums as sustained-release carriers. Drug Dev Ind Pharm., 2000; 26: 1025-38.
12. Bi Y, Sunada H, Yonezawa Y, Danjo K, Otsuka A, Iida K; Preparation and evaluation of a compressed tablet rapidly disintegrating in the oral cavity. Chem. Pharm Bull., 1996; 44: 2121–2127.
13. Girish K, Dhiren JP, Shah VD, Prajapati VC; Gums and mucilages: versatile excipients for pharmaceutical formulations Asian J. Pharm. Sci., 2009; 4(5): 309-332.
14. Shirwaikar A, Prabu SL, Kumar GA; Herbal excipients in novel drug delivery systems, Indian J. Pharm. Sci., 2008; 70 : 415-422.
15. John GL, Declan MD, James EK; The use of agar as a novel filler for monolithic matrices produced using hot melt extrusion. Eur. J. Pharm. Biopharm., 2006; 64:75-81.
16. Jain NK, Dixit VK; Studies on gums and their derivatives as binding agent. Indian J. Pharm. Sci., 1988; 50:113-114.
17. Owen SC, Raymond CR, Paul JS, Paul JW; Handbook of Pharmaceutical Excipients, the Pharmaceutical Press and the American Pharmaceutical Association. 2003; 654-656.
18. Oluwatoyin O; Assessment of Albizia zygia gum as a binding agent in tablet formulations. Acta. Pharm., 2005; 55:263–276.
19. Jani GK, Shah DP, Jain VC; Evaluating mucilage from Aloe barbadensis Miller as a pharmaceutical excipient for sustained-release matrix tablets. Pharm. Tech., 2007; 31: 90-98.
20. Patel MM, Chauhan GM, Patel LD; Mucilage of Lepidium sativum Linn (Asario) and Ocimum canum Sims. (Bavchi) as emulgents. Indian J. Hosp. Pharm., 1987; 24:200-202.
21. Pawar H, mello PM; Isolation of seed gum from Cassia tora and preliminary studies of its applications as a binder for tablets. Indian Drugs, 2004; 41:465-468.
22. Shefter E, Raymond CR, Paul JS, Paul JW; Handbook of Pharmaceutical Excipients, the Pharmaceutical Press and the American Pharmaceutical Association 2003; 1-2.
23. Odeku OA, Itiola OA; Evaluation of the effects of khaya gum on the mechanical and release properties of paracetamol tablets. Drug Dev. Ind. Pharm., 2003; 29:311-320.
24. Kulkarni GT, Gowthamrajan K, Rao GB; Evaluation of binding properties of selected natural mucilages. J. Sci. & Ind. Res., 2002; 61:529-532.
25. Antony PJ, Sanghavi NM; A new disintegrant for pharmaceutical dosage forms. Drug Dev. Ind. Pharm., 1997; 23:413-415.
26. Tavakoli N, Ghasemi N, Taimouri R, Hamishehkar H; Evaluation of okra gum as a binder in tablet dosage forms. Iranian J Pharm Res., 2004; 2:47.
27. Jani GK, Shah DP; Assessing Hibiscus rosa-sinensis Linn as an Excipient in Sustained-Release Tablets. Drug Develop Ind Pharm., 2008; 34 (8): 807 – 16.
28. Gleditsia triacanthos L. (online). 2009 (cited 2009 Nov 15).
29. Caesalpinia spinosa (online).2009 (cited 2009 Oct 22).
30. Aspinall GO, Bhattacharjee AK; Plant gums of the genus Khaya. Part IV. J Chem. Soc., 1970; 365–69.
31. Vazquez B, Avila G, Segura D, Escalante B; Anti-inflammatory activity of extracts from Aloe vera gel. J Ethnopharmacol, 1996; 55:69-75.
32. Dav V, McCarthy SP; Review of Konjac Glucomannan. Journal of Environmental Polymer Degradation. 1997; 5(4):237.
33. Satpathy TK; Chitosan Used In Pharmaceutical Formulations: A Review. Pharmainfo. 2008; 6(3):1-18.
34. Odeku OA, Fell JT; In-vitro evaluation of khaya and albizia gums as compression coatings for drug targeting to the colon. J Pharm Pharmacology., 2005; 57(2):163-68.

35. Barton P, Parslow N; Malignant, Krasner DL, Rodeheaver GT, Sibbald RG; Chronic Wound Care, A Clinical Source Book for Healthcare Professionals, Third Edition. Wayne, PA: HMP Communications. 2001; 699-710.
36. Madziva H, Kailasapathy K, Phillips M; Alginate-pectin microcapsules as a potential for folic acid delivery in foods. J Microencap, 2005; 22:343–51.
37. Tonnesen HH. Karlssen J; Alginate in drug delivery systems Drug Develop Ind Pharm., 2002; 28:621-30.