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Review on Herbal Excipients

Arpita singh[1,*], Nidhi Gupta[1], Amresh Gupta.[1]

1. *Department of Pharmaceutics, Goel Institute of Pharmacy & Sciences, Lucknow, 226028, U.P*

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* Corresponding Author:
Arpita singh
arpitmohan2010@gmail.com

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ABSTRACT

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. The plant acquired gums, mucilages from the natural origin for example carrageenan, thaumatin, lard, storax, agar, gum acacia, tragacanth, and excipients. They can also be easily altered to meet the specific needs, thereby being a potent many more to name comply with many requirements of the pharmaceutical and economic vehicle for transporting active pharmaceutical ingredients in the formulation. Thus present study aims to throw light on the probable of natural excipients which can be present to be used as a diluent, binder, disintegrant as well as lubricant in different types of formulations as they are biocompatible and capable of giving additional nutrition to the developed dosage form. This article gives an overview of natural excipients which are used in conventional dosage forms as well as novel drug delivery systems.

Keywords: Herbal excipients; natural pharmaceutical aids; natural polymers; herbal binders.

INTRODUCTION

An excipient is defined as a substance that is used as a medium for giving a medicament, that is to say with simply the function of inert support of the active principle or principles [1]. An excipient is derived from the Latin word excipients that mean to receive, together, to the out. The standard of the product depends on the production processes, active pharmaceutical ingredient (API) & the excipients which are used in the formulation. These excipients give in a great way to the performance of the API which supports the safety efficacy of the product [2]. In the past excipient is mostly used to provide the bulk of the formulation as it contains a potent drug that could not be taken alone & to convince uniformity of the drug in a dosage form. A wide range of excipients are used in a dosage form which correlates with a different route of administration, state of formulation, the strength of formulation excipient are attached in different concentrations. Excipients are used as a stabilizing agent for API in the formulation, which conforms the active compound are active & stable substantially till the self-life of the product to challenge with other similarities by masking disagreeable task and authorize to guarantee, that the required amount of the active ingredient reached the right place to the body at the estimated time [3, 4].

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].

Being natural the herbal excipients are affordable, non-toxic, biodegradable with some exception, biocompatible, eco-friendly and cab be modified chemically thus attract the consumers. As plants sources are renewable and can be

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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 excipient. These are other reasons for increase in demand of herbal material as excipient Plant Derived Polymers: Due to multiple applications of plant based polymers in pharmaceuticals as diluent, binders, thickener, suspending agent, disintegrant, gelling agent as well as utilize in cosmetics, textile and paper industry gained tremendous interest by researches.

Pharmaceutical herbal excipients

Pharmaceutical excipients are defined as a non-active ingredient which is used with therapeutically active compound the formulate the pharmaceutical substance. These affect the quality and efficacy of the drug more & more performance & functionally. The alternation of active ingredients, excipients, and processes are clear components for the productalternation [5]. Many pharmaceutical excipients are obtained from plant origin such as-Agar, Alginate, Starch, Carrageen a guar gum, Xanthan gum, Gelatin, Pectin, Acacia, Tragacanth, & Cellulose found in the pharmaceutical industry as Binding agent, Disintegrates, Protectives, cellulose, Sustaining agent, thickening agent, Base in suppositories, gelling agent, stabilizer & coating agent.

Classification of herbal excipient

Classification according to their application and function in the drug

- Binder
- Diluents
- Lubricants
- Colidants
- Disintegrants
- Polishing film-forming & coating agent
- Plasticizers
- Coloring agent
- Suspending agent, preservatives, antioxidants etc.

Classification is based on source (Table 1)

- Marine origin/algal (seaweed) gums: agar, carrageenans, alginic acid, and laminarin;
- Plant origin: Shrubs/tree exudates: gum arabic, gum ghatti, gum karaya, gum tragacanth, and khaya and albiziagums.
- Seed gums: guar gum, locust bean gum, starch, amylose, andcellulose;
- Extracts: pectin, larchgum;
- Tuber and roots: potato starch;
- Animal origin: chitin and chitosan, chondroitin sulfate, and hyaluronic acid;
- Microbial origin (bacterial and fungal): xanthan, dextran, curdian, pullulan, zanflo, emulsion, Baker's yeast glycan, schizophyllan, lentinan, krestin, and scleroglucan [7].

Advantage of herbal excipients

- **Biodegradable:** Naturally occurring polymers produced by all living organisms. They show no adverse effects on the environment or human beings.
- **Biocompatible and non-toxic:** Synthetically, all most all of these plant materials are carbohydrates in nature and composed of repeating monosaccharide units. Hence, they are non-toxic.
- **Economic:** They are inexpensive and their manufacturing cost is less than synthetic material.
- **Safe and devoid of side effects:** They are from a natural origin and hence, safe and without aftereffects.
- **Easy availability:** In many countries, they are produced due to their application in many industries [17] .

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 the production of natural polymers is dependent on the 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 existing in a given substance may differ.
- 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 construction.
- Heavy metal contamination- There are chances of Heavy metal contamination often associated with herbal excipients [18, 19] .

Application of herbal excipient

Tamarind Gum

Tamarind tree, *Tamarindus indica*, a member of the 21 enduring families. *Tamarind xyloglucanis* acquired from the Endosperm of the seed of the 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 work, Diclofenac sodium matrix tablets carrying TSP was investigated. The tablets produced by the wet granulation technique were evaluated for its drug release characteristics [20, 22] .

Guar gum

Guar gum comes from the endosperm of the nut of the legume plant *Cyamopsis tetragonolobus*. 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 alkalies in strong

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concentration also tend to decrease viscosity. It is insolvable in most hydrocarbon solvents [23].

Locust bean gum-

Locust Bean Gum (LBG) (also known as Carob Gum) is acquired 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 acquired by detaching and processing the endosperm from seeds of the carob tree [24].

Honey locust gum

It is familiar, botanically as *Gleditsia triacanthos*, and belongs to the order Leguminosea (suborder Mimoseae). The gum is acquired from the seeds [25, 26].

Khaya gum

Khaya gum is a polysaccharide acquired from the engraved trunk of the tree *Khaya grandifoliola* (family Meliaceae). The fact that the gum is naturally available, inexpensive, and non-toxic has also fostered an interest in growing 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 [27].

Aloe mucilage

It is obtained from the leaves of *Aloe barbadensis* Miller. The aloe parenchyma tissue or pulp has been appearing to carry proteins, lipids, amino acids, vitamins, enzymes, inorganic compounds, and small organic compounds in adding to the different carbohydrates. Many investigators have recognized partially acetylated mannan (or acemannan) as the primary polysaccharide of the gel, while further found pectic material as the primary polysaccharide [28].

Hakea Gum

Hakea gum dried exudates from the plant *Hakea gibbosa* family Proteaceae. Gums that are acidic arabinogalactans (type A). Molar portions (%) of sugar constituents Glucuronic acid, Galactose, Arabinose, Mannose, Xylose is 12:43:32:5:8 [29].

Pectin

Pectins are non-starch, linear polysaccharides extracted from the plant cell walls [30]. In the food production, folic acid included microcapsules were produced using alginate and mixtures of alginate and pectin polymers to enhance the stability of folic acid. The incorporated alginate and pectin polymer matrix expended the folic acid encapsulation efficiency and decreased leakage from the capsules as contrasted to those made with alginate alone; they showed higher folic acid retention after freeze drying and storage [32].

Alginates

Alginates are natural polysaccharide polymers separated from the brown sea weed (*Phaeophyceae*). Alginic acid can be transformed into its salts, of which sodium alginate is the major form presently used. Alginates offer different entreaties in drug delivery, for example in matrix type alginate gel beads, in liposomes, in modulating gastrointestinal transit time, for local applications, and to deliver the biomolecules in tissue engineering applications [33].

Table 1: Various herbal excipients with their source and uses

S. No	Name of excipients	Source	Category / Uses
1	Agar	*Gelidium amansii* (G0+ +elidaceae)	Laxative, Suspending agent, emulsifying agent, gelling agent in suppositories, surgical lubricant, tablet disintegrates, medium for bacterial culture [8].
2	Gum Ghatti	*Anogeissus latifolia* (Combretaceae)	Binder, emulsifier, suspending agent [9].
3	Tragacanth	*Astragalusgummifer* (Leguminosae)	Thickening agent, demulcent, Suspending agent, emulsifying agent, emollient in cosmetics and sustained release agent [10]
4	Albizia gum	*Albizia zygia* (Leguminoseae)	Binder agent [11]
5	Aloe mucilage	*Aloe species* (Liliaceae	Gelling agent, sustained release agent [12].
6	Bavchi mucilage	*Ocimum canum* (Gigarginaceae)	Suspending agent, emulsifying agent [14] .
7	Cassia tora	*Cassia tora* Linn (Leguminoseae)	Binding agent [15] .
8	Gum acacia	*Acacia arabica* (Combretaceae)	Suspending agent, emulsifying agent, binder in tablets, demulcent and

CONCLUSION

Herbal excipients are preferable as they are not only full filling their role in formulation but give health benefits by discarding the problem of synthetic chemicals. More research effort should be provided for investigation on herbal materials to innovate no-toxic, biocompatible, patient acceptable, cost-effective, eco-friendly excipient, suitable to be incorporated in pharmaceutical preparations. Some polysaccharides acquired from plants like carrageenan, 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.

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