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# A REVIEW ON NATURAL GUMS AND THEIR APPLICATIONS

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## ABSTRACT

Recent past has witnessed the promising roles of natural gums as pharmaceutical ingredients. Gums became important excipients in many pharmaceutical preparations owing to their abundance, biodegradability, non-toxicity and comparatively low cost. They have notable applications in pharmaceutical preparation as binders, disintegrants, suspending agents, emulsifiers. The use of these gums as gelling or matrix-forming agents to suit the requirement as excipient in novel drug delivery systems is one of the interesting fields of emerging research. The present article is focused on reviewing some important features of gums, their economic importance uses and pharmaceutical applications.

**KEYWORDS:** Natural gums, Mucilage, Controlled release, Coating agents.

## 1. INTRODUCTION

Natural gums are widely used as pharmaceutical excipients as they have the ability to meet the needs of advanced drug delivery systems. They are also efficient in fulfilment of multifunctional roles such as improvement of solubility and stability of dosage form due to which the bioavailability of active ingredient is improved and it can also modify the drug release.[3] They are widely used in controlled release dosage forms as the gums can efficient in imparting the release retardant properties of the dosage form. The use of the natural gums, in dosage forms as pharmaceutical excipients enhances the patient acceptability and also ensures the ease of manufacture.[4] Synthetic polymers are toxic in nature, its production involves high cost and also environmental pollution occurs during its synthesis and moreover its side effects leads to poor patient compliance.[5-7] The gums obtained naturally are more

superior than synthetic polymers as they are nontoxic, economical, easily available, biodegradable and biocompatible. Natural gums can be easily modified chemically and biochemically to obtain the desirable properties required for the designing of drug delivery system that can compete with the synthetic polymers.[8] The use of natural gums have been investigated for their applications in different pharmaceutical dosage forms like ophthalmic solutions, suspensions, microspheres, buccal films, matrix controlled systems etc.[9] They are also efficient as stabilizers, binders, disintegrants, coating agents, gelling agents, emulsifying and suspending agents in various dosage forms. The properties of the gums can be enhanced when one or more gums are interacting with each other due to the presence of numerous OH groups.

**Advantages:** Natural gums offer several advantages due to their natural abundance. Some of the advantages are as follows.

- They are biodegradable polymers as they are produced by living organisms.
- They are biocompatible and non-toxic.
- Relatively cheap as the production cost is very low.
- Readily available as a local source or through cultivation.
- The production is ecofriendly.
- Many of the gums are obtained from an edible source, hence they are easily acceptable.

**Disadvantages:** Disadvantages of natural gums are related to their production from a natural source. Some of the disadvantages are.

- Microbial contamination due to high moisture content and possible degradation.
- Environmental and seasonal factors will influence the quality variation of gums.
- The difference in collection and climatic conditions also leads to quality variation of gums.
- Natural gums are found to show a decrease in viscosity on storage

## 2. CHEMICAL NATURE OF GUMS

Gums are polysaccharides in nature and they are also the translucent amorphous substances. Upon hydrolysis, gums produce an indefinite number of mono saccharides.[15] They can be further classified into pentosans [e.g., xylan] and hexosans [e.g., starch and cellulose] depending on the type of hydrolysis products obtained. Gums contain ‘polyuronides’. Polyuronides are the products that consist of complex substances of calcium, potassium and magnesium salts.[16] Hemicelluloses produced by gums are galactose and arabinose. Gums are biodegradable and with few exceptions they are also biocompatible.[17] There is

possibility of chemical modifications.[18] Natural gums are safe for oral consumption, hence can be used in the form of food additives or drug carriers.[19] Gums are metabolised by the intestinal flora and are ultimately degraded intotheir individual component sugars.[20] By the process of hydrolysis using dilute mineral acids, followed by the use of different chromatographic techniques for separation of liberated mono saccharides, constituent sugar units in a polysaccharide can be easily identified.[21] By phenol-sulfuric acid method the total carbohydrate content of the polysaccharides and also the content of monosaccharide can be estimated.[22] Methylation, periodate and lead tetra-acetate oxidation methods are used to determine the mode of linkage between the mono saccharides. For structural elucidation of gums is carried out using NMR and mass spectroscopy techniques.

### 2.1. Applications as emulsifying and suspending agents

Gums can also be used as emulsifying and suspending agents. They can effectively stabilize the emulsion via interfacial absorption and the subsequent formulation of condensed films of high tensile strength that resist coalescence of droplets. They stabilize oil/water emulsions by forming a strong multi-molecular film around each oil globule and thus retard the coalescence by the presence of a hydrophilic barrier between the oil and water phases.

**2.2. Gums as Sustaining Materials in Dosage Form:** Natural gums are used widely in pharmaceutical dosage forms, their use as biodegradable polymeric materials. The use of several natural gums such as Guar gums, xanthan gums and karaya gum 98 has been explored for the development of sustained-release dosage forms.

**2.3. Gums as Coating Agent:** Plant-based materials can be modified and has been widely used for functional and non-functional purposes, to coat tablets, capsules, granules, powders, and pellets. Grewia Gum as a film coating agent in theophylline tablet formulation.

**2.4. Application of Gums in Microencapsulation:** Microencapsulation is defined as a process to entrap one substance with another substance**.** The gums because of their ability as a coating and matrix-forming agent can be utilized for microencapsulation of drug particles for sustaining the drug release. Several gums such as Kondagogu, Xanthan, gum guar 100 has been utilized in microencapsulation.

**2.5. Natural Polymers for Nano Drug Carriers:** Natural gums have also been utilized for the development of nanoparticles 105. Recent reports have shown on development of

nanoparticles using guar gum, kondagogu, gum ghatti 106, 107, 108. Development of polyelectrolyte nanoparticles using *Moringa* gum has shown complexation techniques 109 for controlled and extended-release of molecularly entrapped drug.

## 3. CONCLUSION

The advent of natural gums as pharmaceutical excipients is attractive because they are economical, abundant, non-toxic, and capable of chemical modifications, potentially bio-degradable and biocompatible. Applicability of gums and mucilages has been well established in the fields of pharmaceuticals. However, there is a need to develop other natural sources as well as with modifying existing natural materials for the formulation of novel drug delivery systems, biotechnological applications, and other delivery systems. Therefore, in the years to come there will be continued interest in natural gums and their modifications aimed at the development of better materials for drug delivery.

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