WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 10, Issue 11, 1204-1215. Review Article ISSN 2277– 7105

BRIEF INTRODUCTION OF NATURAL GUMS, MUCILAGE'S AND THEIR APPLICATION AS PHARMACEUTICAL EXCIPIENTS

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Article Received on
15 July 2021,

Revised on 04 August 2021,
Accepted on 25 August 2021

DOI: 10.20959/wjpr202111-21569

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ABSTRACT

In recent few years there had been broad improvement and modification in various dosage form for existing and newly designed drugs and natural sources, and semi-synthetic as well as synthetic excipients often need to be used for a different purposes. Gums and mucilage's are widely used in natural substances for conventional and novel dosage form. Natural gum mucilage's are included in novel drug delivered (NDDS) to perform various tasks, functions and in any cases directly or indirectly control the increase and rate of drug release. These natural materials have more advantages over synthetic material since they are chemically inert, nontoxic, less expensive, biodegradable and broadly accessible. They can also be modified in different ways to fined customized materials for drug delivery systems and this way can challenge with the accessible synthetic excipients. In the present survey we have discussed gum and mucilage, as a powerful contender to be utilized as various pharmaceutical formulations. We have also compiled the various types of gum and mucilage used as pharmaceutical excipients, which makes it a potential candidate to be used as pharmaceutical excipient.

KEYWORDS: Pharmaceutical Excipients, Natural Gums, Natural Mucilage's.

INTRODUCTION

Natural plants and its origin play vital role to safeguard our health. In recent time, the utilization of herbal products has increase huge in the western world as well as developed countries. India is one of the most medico-traditionally assorted countries in the world where the medicinal plant area is part of a long-established convention that is respected even today. Medicinal plants usage has been reported in the traditional systems of medicine, for example - ayurveda, unaniand siddha.[1] Bio-compatible, economical and easily available and are preferred to semi synthetic and synthetic excipients because of their low toxicity, low of its cost, easy availability in nature. In the traditional observe of excipient's in drug formulations incline to behave as inert vehicle to provide necessary accurate weight, viscosity and volume for the proper management of the active element, however inside the advancing pharmaceutical dosage form they regularly many functional roles inclusive of enhancing release the release of active ingredient from the preparation, improvement of the stability and bio-availability of the active ingredients of product and also enhancement of patient acceptability. In current years, plant derived polymers like gums and mucilages has pharmaceutical application which include binding agent, diluents disintegrating agents in drugs, thickeners in oral liquids, protecting colloids in suspensions, they're additionally utilize in cosmetics product, paper-making and paints those polymers produce from natural resources which includes herbal or natural gums and mucilage are bio-compatible, in low cost and much less toxicity and are preferred to semi-synthetic and synthetic excipients because of their much less toxicity, low of its price, easy availability in nature.[2]

Pharmaceutical excipient

Pharmaceutical excipients can be defined as non-active ingredient that combined with therapeutically active compounds to form drug. The ingredient which is non-active compound is turn as excipients. Excipients affect the effectiveness and behaviour of the drug product and enhance functionality and significantly. The variability of the active compounds and excipients (non-active) are distinct compounds for the product variability.[3] In earlier days, excipients have been taken into consideration inactive ingredients. Over time, pharmaceutical scientists found out that excipients are not inactive and often have substantial effect on the manufacture and high-quality, safety, and efficacy of the drug substances in a dosage form. Further, variability inside the overall performance of an excipient - each batch to batch inside an single manufacturer as well as between batches from distinct manufacturers - got here to be understood as a key determinant of dosage form performance. Excipients at

the moment are acknowledged to have defined functional roles in pharmaceutical dosage forms. These encompass (i) modulating solubility and bioavailability of the active element(s); (ii) enhancing stability of the active ingredients in finished dosage forms; (iii) helping active components keep a favoured polymorphic form or conformation; (iv) keeping pH and osmolarity of liquid formulations; (v) acting as antioxidants, emulsifying agents, aerosol propellants, tablet binders, and tablet disintegrants; (vi) preventing aggregation or dissociation; and (vii) modulating the immunogenic response of active ingredients (e.g., adjuvants) and many others. United States Pharmacopeia 28–National Formulary 23 lists forty functional categories of excipients for pharmaceuticals, and plenty of more are predicted as new - and usually increasingly complicated - drug-delivery system emerge and evolve. Approximately 800 excipients are currently used in the market pharmaceutical products within the United States. This wide variety is likewise expected to develop with new therapeutic classes, such as gene remedy and cellular therapy, and new drug delivery technologyies. In these diverse contexts, excipients and troubles related to them can be considered in the following distinctive regions. ‘‘Functionality’’: An excipient interacts with the active inside the formulated dosage form and/or provides a matrix that can affect critical satisfactory attributes of the drug substance, including stability and bioavailability. Given an excipient’s capacity have an impact on the completed dosage form, manufacturers will execute cautious characterization studies, with due interest to final specifications and change control, with a purpose to make sure constant overall performance of the dosage form.

Classification of excipients

Excipient’s are commonly classified according to their application and function in the drug products: Binders, diluents, Lubricants, glidants, disintegrates, Polishing film formers and coatings agents, Plasticizers, colourings, Suspending agents preservatives, antioxidants, Flavourings, sweeteners, taste improving agents, Printing inks, dispersing agents gums.

Gums and Mucilage’s

Gums are turned to be pathological or extra cellular products formed following injury and damage to the plant cell or as result of unfavourable conditions, such as drought, by a breakdown of cellular walls (extra cellular formation; gummosis) while, mucilage’s are usually common products of metabolism, produce in the cell (intracellular formation) and are formed without injury to the plant cell. Gums are pathological natural product which generally dissolve in water, while, mucilage are physiological natural product form slimy

masses. So we called as gums are pathological natural products, whereas mucilage's are physiological natural products.[4] Some examples of gums are acacia, tragacanth, and guar gum and mucilage's are often found in different part of plants. Like epidermal cells of leaves (Senna), in seed coats (linseed, psyllium), roots (marshmallow), barks (slippery elm) and middle lamella (aloe).[5] Gums and mucilage's have some common similarities those are following - both are plant hydrocolloids. Both are also translucent as well as amorphous substances and they are polymers of a monosaccharide and a lot of them are mixed with uronic acids. A chemical constituent in gums and mucilage's found some similar chemical and on the hydrolysis gives the sugars and uronic acids. Gums and mucilage's, which could soluble with water to gives viscous solutions or gels. Both have hydrophilic in nature. The nature of the compounds concerned enhances the properties of different gums. Linear polysaccharides are occupy greater area and are greater viscous than highly branched compounds of the equal molecular weight. The branched compound form gels are greater stable due to the extensive interaction along the chains is not possible.

Advantages of natural gums and mucilage's in pharmaceutical manufacturing

The advantages of natural plant–based materials are following.

(i) Biodegradable: naturally available biodegradable polymers are produced by all living organisms. They constitute certainly renewable source and them haven't adverse effect on humans or environmental health (*e.g.*, skin & irritation of eye). (ii) Biocompatible and non-toxic: chemically, related all of these plant materials are carbohydrates composed of repeating sugar (monosaccharide's) units. Hence, they are nontoxic. (iii) Low cost: it is always less expensive to use natural sources. The production price is also much good compared with that for synthetic material. Many developing countries and India are dependent on agriculture. (iv) Environmental-friendly processing: gums and mucilage's from different sources are easily collected in exclusive seasons in huge portion because the simple manufacturing processes involved. (v) Local availability (especially in developing countries): in developing countries, governments promote the production of plant example guar gum & tragacanth because of the more applications in a variety of industries. (vi) Better patient tolerance as well as public acceptance: there is less chance of side and adverse effects with natural materials compared with synthetic one. For example - pmma, povidone. (vii) Edible sources - most gums and mucilage's are obtained from edible sources.

Applications of gums and mucilage's

Gums and mucilage's obtain from different sources and their derivatives represent a group of polymers broadly utilized in pharmaceutical dosage forms. Various kinds of gums are used in the food industry and are seemed as safe for human consumption. However, there's growing concern the security of pharmaceutical excipients derived from natural sources. Plant gums and exudates are currently screened for their use as pharmaceutical adjuvant. Mucilage's of different origins are also utilized in conventional dosage forms of various medicines for their binding, thickening, stabilizing and humidifying properties in medicine. A newer use of many gums and mucilage's in cosmetics preparation and textiles has expanded the demand and screening of gums has become an essential pharmaceutical area. However, completely different between gums and mucilage's used as pharmaceutical excipients have stringent specifications, which few natural agents will fulfil.[6]

Table No. 1: Brief introduction of natural mucilage's and their application as pharmaceutical excipients

S. No.	Common Name	Biological Sources	Pharmaceutical Application	Pharmacological Application	Ref. No.
1.	Abelmoschus mucilage	*Abelmoschus Esculentus* (Malvaceae)	Binder in tablets, Sustained release	Used as antidabetic, antioxidant, nootropic, heart disease and neurological disorders etc.	[7, 8]
2.	Aloe mucilage	*Aloe species* (Liliaceae)	Gelling agent, sustained release agent	Wound healing, anti-inflammatory, Antitumor Activity, Moisturizing and Anti-Aging Agent, Antitumor Activity, Laxative Effects, Antiseptic, Antidiabetic, Cosmetic & Skin Protection Application.	[9]
3.	Asario mucilage	*Lepidumsativum* (Cruciferae)	Suspending agent, emulsifying agent, controlled release tablet	Hyperactive airways disorders, such as asthma, bronchitis and cough.	[10, 11]
4.	Bavchi mucilage	*Ocimumcanum* (Labiatae)	Suspending agent, emulsifying agent	Anti-diabetic.	[12]
5.	Fenugreek mucilage	*Trigonellafoenum Graecum* (Leguminoseae)	Gelling agent, tablet binder, sustaining agent, emollient and demulcent	carminative, gastric stimulant, antidiabetic and galactogogue (lactation-inducer) hypocholesterolemic, antilipidemia, antioxidant, hepatoprotective, anti-inflammatory, antibacterial, antifungal, antiulcer, antilithigenic, anticarcinogenic.	[13, 14, 15]
6.	Hibiscus	*Hibiscus*	Emulsifying	antidabetic, antioxidant, nootropic, eye, heart	[16,

	mucilage	*esculentus* Linn (Malvaceae)	agent, sustained release agent, suspending agent	disease and neurological disorders	17]
7.	Hibiscus mucilage	*Hibiscus rosasinensis* Linn (Malvaceae)	Suspending agent, Sustained release agent	Antibacterial activity, anti-convulsant activity, anxiolytic activity, analgesic activity, anti-oxidant activity, anti-pyretic activity.	[18, 19, 20]
8.	Satavari mucilage	*Asparagus racemosus (*Aapocynaceae*)*	Binding agent and sustaining agent in tablets	antispasmodic, appetizer, stomach tonic, aphrodisiac, galactogogue, astringent, antidiarhoeal, antidysentiric laxative, anticancer, anti-inflammatory, blood purifier, antitubercular, antiepileptic	[21]
9.	Cactus mucilage	*Opuntiaficus-indica*	Gelling agent in sustained drug delivery	anti-inflammatory effects hypoglycemic effects stomach ulceration, neuroprotective, antioxidant actions and also used for treating diabetes, burns, bronchial, asthma and indigestion**.**	[22]
10.	Cassia tora mucilage	*Cassia tora (caesalpiniaceae)*	Suspending agent, Binding agent	Used as tonic, carminative and stimulant	[23,24]
11.	Phoenix mucilage	*Phoenix dactylifera*	Binding properties	Anti-microbial, anti-oxidant nephro-protective, antidiabteic, anti –inflammatory, anti- tumor, hepato-protective.	[25]
12	Isapghula mucilage	*Plantagoovata*	Binding agent, disintegrant, release retardant	Used in bowel syndrome (IBS), diarrhea, constipation,and hemorrhoids. It has also been used to treat hyperlipidemia and for its anticancer effects, and it may be useful for glycemic control in patients with type 2 diabetes.	[26]

Table No. 2: Brief introduction of natural gums and their application as pharmaceutical excipients.

S. No.	Common Name	Botanical Name	Pharmaceutical Use	Pharmacological Use	Ref. No.
1.	Albizia gum	Albiziazygia(leguminoseae)	Tablet binder	Antipsychotic acitivity.	[27]
2.	Cashew gum	Anacardium Occidentale(Anacardiaceae)	Suspending agent	The pharmacological Properties antifungal, antibacterial, antiparasitic, anti-tumor, antiulcerogenic, molluscicides, antimutagenic and antioxidant activities.	[28,29]
3.	Guar gum	Cyamompsis Tetraganolobus (Leguminoseae)	Binder, disintegrant, thickening agent, emulsifier, laxative, sustained release agent.	Antidiabetic activity	[30]
4.	Gum acacia	Acacia Arabica	Suspending agent,	Antimalarial activity, also	[31]

		(Leguminoseae)	emulsifying agent, binder in tablets, demulcent and emollient in cosmetics	used in bronchitis, diarrhoea, dysentery, biliousness, bleeding piles and leucoderma.	
5.	Gum ghatti	Anogeissuslatifolia (Combretaceae)	Binder, emulsifier, suspending agent	Antiulcer activity, hepatoprotective activity, hypolipidemic activity	[32]
6.	Gum tragacanth	Astragalusgummifer (Leguminoseae)	Suspending agent, emulsifying agent, demulcent,emollient in cosmetics and sustained release agent	Antitussive effect, anti-inflammatory, its effect on bone loss, hepatic fibrosis, virus myocarditis, anti-carcinogenic.	[33]
7.	Karaya gum	Sterculiaurens(Sterculiaceae)	Suspending agent, emulsifying agent, dental adhesive, sustaining agent in tablets, bulk laxative		[34]
8.	Khaya gum	Khayagrandifolia (Meliaceae)	Binding agent	Anti inflammatory activity.hepatoprotective, anti-oxidant effect.	[35]
10.	Xanthan gum	Xanthomonas Lempestris()	Suspending agent, emulsifier, stabilizer in toothpaste and ointments, sustained release agent	Anti-bacterial, anti fungal, hypolipidemic, anti –tumor effect.	[36]
11.	Acacia	Acacia Senegal (Leguminosae)	Osmotic drug delivery	Anti-inflammatory, anti-viral, antimicrobial, anti-oxidant, anticancer, antidiabetic, immunomodulatory, hepatoprotective, cardioprotective.	[37]
12.	Bhara gum	Terminaliabellericaroxb (Combretaceae)	Microencapsulation	antioxidant, antimicrobial, antidiarrheal, anticancer, antihypertensive, hepatoprotective& antipyretic activity.	[38]
15.	Locust bean gum	Cerataniasiliqua (Leguminoseae)	Controlledrelease agent	Anti diaarheal , diuretic.	[39]
16.	Mucuna gum	Mucunaflagillepes (Papillionaceae)	Microspheres	anticholestrolemic, antiparkinson, antidiabetic, aphrodisiac, anti-inflammatory and antimicrobial.	[40]
17.	Neem gum	Azadirachtaindica (Meliaceae)	Binder in sustained release tablets.	Anti cancer, anti ulcer, also used in leukemia, gastritis, liver disorders, wound healing, viral infection.	[41,42]

18.	Tara Gum	Caesalpiniaspinosa (Leguminosae or Fabaceae)	Controlled release agent	Used in malaria, ascariasis, dysentery, fever, rheumatism and influenza	[43,44]
19.	Gum damar	Shoreawiesneri (Dipterocarpaceae)	sustained release agent		[45]
20.	Kondagogu Gum	Cochlospermumgossypium()	Gastric floating drug delivery agent	Used as sedative, stimulant, gonorrhoea, Jaundice, cough, trachoma, syphilis.	[46]
24.	Mango Gum	Mangiferaindica (Anacardiaceae)	Binder, disintegrant.	Anti-inflammatory , analgesic, anti-hyperglycemic, anti-ulcer, antioxidant, anti bacterial, anthelmintic.	[47]
25.	Terminalia Gum	Terminaliarandii(Combretaceae)	Binding agent.	Used in the treatment of dysentery, diarrhoea, heamorroids and wounds, astringent, diuretic.	[48]

CONCLUSION

Gums are abundantly found in nature. They are cheaper than the synthetic polymers available for various purposes. In addition natural gums are promising biodegradable polymeric materials. It is clear that gums and mucilages have many advantages over synthetic substances. Various applications of gums and mucilages had been established within the field of pharmaceuticals. There is a need to expand other herbal/natural sources in additions to with modifying existing natural substances for the devolvement of novel drug delivery systems. The abundance of gums, their economic cost and biodegradability have compelled formulation scientists to Design approaches for making them suitable for modifying the drug release of dosage forms. There is also need to investigate pharmacological activity of mucilage which double beneficial like used as pharmaceutical excipients as well as pharmacological effect.

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