International Journal of Modern Science and Technology, 2019;4(3):61-66.
ISSN: 2456-0235.
www.ijmst.co

Review Article

Quick Reference to the Matrix Forming Gums and Mucilage

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Abstract

The main aim of the present work is to explore the past work done on gums and mucilage as release retarding matrix forming material. Use of gums and mucilage as matrix forming material in drug delivery systems has been weighed down by the synthetic materials. Natural based excipients offered advantages such as non-toxic, less cost and abundant. The aqueous solubility of natural excipients plays an important role in their selection for designing sustained release formulations. This article provides an overview of natural gum and mucilage used as an excipient in dosage forms as well as in novel drug delivery systems as matrix forming materials. This article came with 65 different plant gums and mucilage successfully tried as release modifiers. From this article the researchers can save their valuable time by simply going in glance with the list of gums and mucilage successfully tried for making sustained release dosage forms.

Keywords: Gums; Mucilage; Plant; Sustained; Tablets.

Introduction

Gums are referred extracellular pathological products, formed by giving injury to the plant or due to unfavorable conditions (drought, the halt of cell walls). Mucilages are intracellular metabolic formations of plants. Exudates readily dissolve in water, whereas, mucilage forms slimy masses. Hydrolysis of gums and mucilages yields mixture of sugars and uremic acids [1,2].

Sustained release dosage form designed to achieve prolong therapeutic effect by continuously releasing medication over an extended period of time after administration of a single dose and also to control drug release profile at a specified rate to achieve desired drug concentration either in blood plasma or at the target site [3]. The sustained release dosage forms are of matrix (monolith) system or membrane (reservoir) system. In matrix system, the drug is homogeneously dispersed in a rate controlling medium [4]. Matrix systems are preferred as they show reduced drug fluctuations in plasma, decreased the total amount of drug in the dosage form, safety and improved patient compliance [5]. The main pitfalls of these systems are cost of formulation, additional patient education and reduced potential for accurate dose adjustment [6]. Matrix systems are classified into different types as follows [7].

Hydrophilic matrix tablet

Hydrophilic matrix tablets are meant for oral administration. These can be compressed into tablets by direct compression. They retard the drug release, simple to prepare, economical and safe excipient. These systems deliver the drug over a defined period of time without disintegration.

Fat/wax Matrix systems

Fat/wax granulation involves spray congealing in the air, blend congealing in an aqueous media without the aid of a surfactant and spray drying technique. The medicament is blended with fat/wax matrix polymer by spray congealing technique (drug suspension melted with and melted with waxy polymers and allowed to solidify later sifted to get sustained release granules. These granules can be compressed into matrix tablets.

Received: 17.03.2019; Received after Revision: 27.03.2019; Accepted: 27.03.2019; Published: 29.03.2019
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Plastic matrix systems

In this, the active medicament is dispersed in a tablet within a porous skeletal structure by direct compression. The medicament and the plastic polymer can be mixed/kneaded with organic solvent (for polymer). The drug release from these devices is delayed due to the diffusion of dissolved drug from the capillary pores of polymer. Use of hydrophobic matrices to sustain the drug release is usually delayed because the dissolved drug has to diffuse through a capillary network between the compacted polymer particles.

Biodegradable matrices

The monomers of these biodegradable polymers are biologically degraded /eroded by living cell enzymes or by metabolites of microbes.

Mineral matrices

These systems contain polymers which are obtained from various species of seaweeds.

Traditional excipients

Gums are pathological products of plants which readily dissolve in water, whereas, mucilage is physiological plant product [8]. The plant-based polymers are gaining importance nowadays in pharmaceuticals as a matrix system, film formers, mucoadhesive systems, micro/nano biphasic systems, implants, viscosity enhancers, stabilizers, disintegrants, solubilizers, and gel-forming agents are already proved effective. These traditional excipients are biodegradable, renewable, biocompatible, non-toxic, economical, eco-friendly, better patient tolerance, public acceptance and from edible sources [9]. The natural gums and mucilage used as release retention in dosage forms were shown in table 1 and table 2 respectively.

Table 1. Natural gums release retention

Common name	Botanical name	Family
Acacia gum	*Acacia catechu*	Leguminosae [10]
Albizia gum	*Albizia zygia*	Leguminoseae [11]
Almond gum	*Prunus communis*	Rosaceae [12]
Ayoyo gum	*Cochorus olitorius*	Tiliaceae [13]
Badam gum	*Prunus amygdalus*	Rosaceae [14]
Bael gum	*Aegle marmelos*	Rutaceae [15]
Bihul gum	*Grewia occidentalis*	Malvaceae [16]
Carrageenan gum	*Chondrus cryspus*	Gigartinaceae [17]
Cashew gum	*Anacardium occidentale*	Anacardiaceae [18]
Cederela gum	*Cedrela odorata foliage*	Meliaceae [19]
Drumstick gum	*Moringa olifera*	Moringaceae [20]
Galbanum gum	*Ferula gummosa*	Apiaceae [21]
Gellan gum	*Pseudomonas elodea*	Leguminoseae [22]
Ghatti gum	*Anogeissus latifolia*	Combretaceae [23]
Grewia gum	*Grewia mollis*	Malvaceae [24]
Indian Cherry gum	*Cordial obliqua*	Baraginaceae [25]
Jack fruit gum	*Artocarpus heterophyllus*	Moraceae [26]
Karaya gum	*Sterculia urens*	Sterculiaceae [27]
Khaya gum	*Khaya grandifolia*	Meliaceae [28]
Kondagogu gum	*Cochlospermum gossypium*	Bixaceae [29]
Leucaena seed gum	*Leucaena leucocephata*	Fabaceae [30]
Malva nut gum	*Scaphium scaphigerum*	Sterculiaceae [31]
Mango gum	*Mangifera indica*	Anacardiaceae [32]
Moi gum	*Lannea coromandelica*	Anacardiaceae [33]
Neem gum	*Azadiracta indica*	Meliaceae [34]
Odina gum	*Odina wodier*	Anacardiaceae [35]
Okra gum	*Abelmoschus esculentus*	Malvaceae [36]
Olibanum gum	*Frankincense*	Burseraceae [37]
Plum gum	*Prunus domestica*	Rasaceae [38]
Tamarind gum	*Tamarindus indica*	Fabaceae [39]
Tawa gum	*Beilschmiedia tawa*	Lauraceae [40]
Tragacanth gum	*Astragalus gummifer*	Leguminosea [41]
Welan gum	*Alcaligenes species*	Alcaligenaceae [42]
Xanthan gum	*Xanthomonas campestris*	Xanthomonadaceae [43]

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Table 2. Mucilage release retention

Common name	Botanical name	Family
Aloe mucilage	*Aloe species*	Asphodelaceae [44]
Asario mucilage	*Lepidum sativum*	Brassicaceae [45]
Banana peel mucilage	*Musa paradisiaca*	Musaceae [46]
Basil seed mucilage	*Ocimum gratissimum*	Labiatae [47]
Bavchi mucilage	*Ocimum canum*	Lamiaceae [48]
Bidi leaf mucilage	*Bauhinia racemosa*	Fabaceae [49]
Broom creeper Mucilage	*Cocculus hirsute*	Menispermaceae [50]
Cactus mucilage	*Opuntia ficusindica*	Cactaceae [51]
Chinee apple mucilage	*Zizyphus mauritiana*	Rhamnaceae [52]
Date palm mucilage	*Phoenix dactylifera*	Palmaceae [53]
Fenurgreek mucilage	*Trigonella foenumgraenum*	Leguminosae [54]
Golden shower mucilage	*Cassia fistula*	Caesalpiniaceae [55]
Hibiscus mucilage	*Hibiscus esculentus*	Malvaceae [56]
Humble plant mucilage	*Mimosa pudica*	Mimosaceae [57]
Ispagol mucilage	*Plantago psyllium*	Plantaginaceae [58]
Naga mucilage	*Brachystegia eurycoma*	Leguminosae [59]
Okra mucilage	*Abelmoschus esculentus*	Malvaceae [60]
Orange peel mucilage	*Citrus aurantum*	Rutaceae [61]
Red Cassia mucilage	*Cassia roxburghii*	Fabaceae [62]
Satavari mucilage	*Asparagus racemosus*	Asparagales [63]
Senna tora mucilage	*Cassia tora*	Caesalpiniaceae [64]
Vanda mucilage	*Dendrophthoe falcate*	Loranthaceae [65]

Conclusions

There are great numbers of natural substances have been used in pharmaceutical preparations. Natural gifts viz., gums and mucilages can be used as matrix forming agents. They have been shown good potential as matrix former as well as other properties like fillers, disintegrating agent and sustain releasing agent. Natural gums and mucilages exposed good matrix property in wet granulation for the manufacturing of tablets/granules. Natural matrix formers are non-polluting renewable resources for sustainable supply of cheaper pharmaceutical excipients/product. Various applications of gums and mucilages have been established in the field of pharmaceuticals. However, there is a need to develop other natural sources as well as with modifying existing natural resources for the formulation of novel drug delivery systems, biotechnological applications and other delivery systems. From this article the researchers and young scientists can save their valuable time by simply going in glance with the list of gums and mucilage successfully tried in making sustained release dosage forms.

Conflicts of interest

No conflicts of interest are declared.

Acknowledgement

The authors wish to thank to Dr. Devanna, Director-JNTUA-OTPRI, Anantapur for his encouragement and support.

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