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Natural Binders in Tablet Formulation

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Abstract: Binders are agents employed to impart cohesiveness to the granules. This ensure the tablet remain intact after compression. The researchers are trying to the new excipients for potential use as binding agent in tablet formulations continue to the interest. This is because different binding agent can be useful in achieving various tablet mechanical strength & drug release properties for different pharmaceutical purpose. Natural binders like different starch, gums, mucilages, dried fruits possesses binding capacity as well as some other properties like filler, disintergrant& natural polymers are safe & economical than polymers like PVP.
Keywords: Binder, Tablets, Mangifera indica, Low cost.

Introduction:

Excipients are additives used active pharmaceutical active ingredients convert in to pharmaceutical dosage form suitable for administration patients[1]. Binders are added to the tablet formulation to impart plasticity as well as increases interparticulate bonding strength in the tablet[2]. Granule and also increases the degree of consolidation or compactions while decreasing the brittle fracture tendency during tableting .the choice of a suitable binder for a tablet formulation requires extensive knowledge of the binder properties for enhancing the strength of the tablet and also interaction between various material constituting tablet[3].

Gums generally polysaccharides which are polymeric in nature of natural substance obtained from woody and non woody plant parts such as bark, seeds, sap, roots, rhizomes, fruit, leves and plant gums are widely used in formulation of pharmaceutical dosage forms. The major application of gum is a tablet, as binding agent[4-5].

The present investigation was aimed at effectiveness of natural gum& mucilage as binder in tablet formulation.

Advantage natural binder:

1) They can also be used to modify the release of drug and thereby influencing the absorption and bioavailability of the incorporated drugs[6].

2) Natural binders are widely used in the pharmaceutical and food industry as excipients and additives due to their low toxicity, biodegrable, availability and low cost[7]

Disadvantage of polymer binders[8]:

1) Polymers binder can lead to processing difficulties such as rapid over granulation, tablet hardness increases & dissolution performance decrease[9-10].

2) When polymer binders are selected addition of strong disintegrates typically required but these are considerable expensive and have a negative effect on product stability[11].

1. Mucilage Of Artocarpus Heterophyllus As A Tablet Binder[12]:

Artocarpus Heterophyllus (moraceae) found wild in the forest region. Fruit are multiple seeded containing mucilage.To isolate mucilage pulp is removed and the macerated with the water then filter acetone method was used to isolate mucilage from filter and dried in to hot air oven 45^0 c till it was completely dried. And physicochemical characteristics of mucilage has performed such as swelling index 12.2%, loss on drying 6% .this study was carried out to compare the binding effect of isolated mucilage with starch. Granule properties such as angle of repose 29.25 to 28.35%, hausner ratio.1.12 to 1.11,carr's index 10.81 to 10.51, and tablets were prepared varying concentration 4,6 & 8% by wet granulation method model drug using as paracetamol and compressed into tablets at arbitrary pressure load unit 6 tons. Tablets was evaluated in weight variation & hardness 6.2 to 6.8 (kg/cm^2), friability 0.002 to 0.005% & tablet showed 98.48 to 98.63% drug content uniformity. Mucilage obtained from artocarpus herophyllus fruit was found to be useful for the preparation of tablet dosage form.

2. Preliminary evaluation of bauhinia Racemosa Lam caesalpinaceae seed mucilage as tablet binder[13]:

The Bauhinia Racemosa Lam. Caesalpinaceae seed mucilage is suitable as binder for pharmaceutical tablet formulations. Granules were prepared with its varying concentrations and evaluated tablet characteristics. Wet granulation technique was used for the preparation of amoxicillin trihydrate granules. The four different concentration 2%, 4%, 6%, 8%, was used in the formulation. The evaluation of granules showed 0.52 to 0.72mm granule size & 28 to 30^0 angle of repose and 20.53 to 11.81% fines. The evaluation of tablet showed 3.52%, 0.89% w/w friability 4 to 10 min disintegration time and more than 90% dissolution in 60 min. 8% w/w binder concentration showed more optimum results as tablet binder. The mucilage was found to be useful as uncoated tablet dosage form.

3. A potential natural tablet binder from Grewia Optiva[14]:

The gum mucilage was isolated from the bark of Grewia Optiva. The rheological behavior gum mucilage was compared with starch. The mucilage was further subjected to physiological characterization & the gum mucilage obtained from the Grewia Optiva obtained superior rheological properties. A comparative analysis was conduct that shows the granules bound with G. Optiva mucilage gum were relatively bigger and harder than the ones obtained with starch. The hardness, disintegration time & dissolution rate increased with increase concentration of gum mucilage. They concluded that Grewia optiva gum mucilage as a cheap economic and easily available & suitable for use as a pharmaceutical tablet binder.

4. Aegle marmelos gum as tablet binder[15]:

The oral tablet of paracetamol was formulated by using Aegle marmelos fruit gum as a binder & prepared by four different tablet formulations. 2%, 4%, 6%, & 8% w/w of cordia fruit gum. Tablets were subjected to evaluation of friability, hardness, drug content, uniformity of labeled amount & disintegration time 8 to 18 min, 90% dissolution in 75 min. Tablets at 6% w/w binder concentration shows more optimum results as tablet binder. Aegle marmeloes gum was found to be useful for the preparation of uncoated tablet dosage form.

5. Evaluation of mangifera indica gum as tablet binder[16]:

The mangifera indica gum is suitable as a binder for pharmaceutical tablet formulations. Paracetamol was used as model drug, tablets were prepared by wet granulation technique. The prepared tablets were evaluated for physicochemical characteristics. The friability of the tablet ranges from 1.12 to 0.26% & disintegration time 3 to 8 min. The binding efficacy of the mangifera indica was compared with the standard binder gum acacia at similar concentration (5% w/w) the hardness of the prepared tablet from 6.3 to 6.8 kg/cm^2 which are comparable with the standard binder gum acacia (4.8kg/cm^2).

6. Evaluation of cederela gum as a binder and bioadhesive component in ibuprofen tablet formulations[17]:

Cederela gum was extracted from the incised trunk of a cederela odorata tree & purified using established methods. Ibuprofen corn starch & lactose mixing the powder for 5 min using mortar & pestle. The mixed powder was transferred into as Eureka AR 400 planetary mixer & moistened with distilled water wet mass granulated by manually 14 mesh sieve varying conc. Of binders (0.5%, 1%, 2%, 3% & 4%) were used as gum mucilage to moisten the dry mixes instead of distilled water & granules accurately weighed & compressed into tablets using a carver Hydraulic tablet press. Cederela gum had a fast onset of plastic deformation and readily deformated plastically under pressure. The Gurnham equation was found to have limitation in characteristics plastic materials such of gums. Cederela gum was found to be possess a better mucoadhesive property with a prolonged adhesion time than Hydroxypropylmethylcellulose at the highest polymer concentration and had no deleterious effect on the intestinal mucosa. The gum showed a slower release property as indicated by a slower dissolution rate than HPMC indicating it potential usefulness in sustained release tablet formulation.

7. Oxro gum as tablet binder[18]:

The oxro gum is suitable as a binder in tablet formulations. A comparative evaluation of (Abelomoschus esculentus) oxro gum as a binder in the formulation of thiamine hydrochloride granules and tablet was prepared .Standard binder comparison was employed in Gelatin, acacia and polyvinylpyrrolidine. The properties of granules & tablets evaluated were flow rate, angle of repose, density, weight uniformity, hardness, friability, disintegration time and dissolution time & dissolution rate. Hence oxro gum may not useful as a binder in conventional tablet formulation. Onunxuo concluded that oxro gum could be good candidate for evaluation as a binder or hydrophilic polymer in sustained release tablet formulations.

Conclusion:

There are large numbers of natural polymers have been used in pharmaceutical preparations. Natural substances like gums, mucilages, and also dried fruits can be used as binding agent. They have been shown good potential as binding agent as well as they possess some other properties like fillers, disintegrating agent, sustain releasing agent. Natural polymers shown good binding property in wet granulation, granules are stable and less friable in comparison with other binders.

Natural binders are non-polluting renewable resources for sustainable supply of cheaper pharmaceutical excipient or product.

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