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Effect of natural binder (okra, wheat, fragrantmanjak) concentration on thehardness and disintegration time of tablet

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Abstract

Binders are added in tablet formulation to increase the inter-particulate bonding strength with in the tablet. Binders are promoting the ingredient in a tablet to mix together.The main aim of this work to formulate a new excipient that is fragrant manjakfor future use as binding agent in tablet formulation, also check their effect on tablet concentration and disintegration time. Binder is employed to impact cohesiveness to the granules. Natural binder like different starch, gum, mucilage, dried fruit possesses binding capacity as well as some other properties like filter, disintegration and natural polymer are safe and economical than polymer like PVP.In this research work we evaluate the adhesion ability of fragrant manjak which had a good property as tablet binder. By this purpose fragrant manjak used as binder. Estimate for their properties including hardness, friability and disintegration rate. The prepared by fragrant manjak having a good disintegration time. These study concluded that fragrant manjak having a good binding ability. It could be used as binder in pharmaceutical industries.

Keyword: Binder; Excipient; Gelatin; Okra; PVP; Starch

1. Introduction

Excipient are used to enhance flow ability and improve compatibility of the tablet. Excipient like diluent, granulating agent, lubricant, absorbent, coloring agent, sweetening agent and binder are used in tablet for active ingredient convert into pharmaceutical dosage form for suitable administration of patient (2). Binders are a major class of excipient used to provide proper strength as well as to form a cohesive mass (3).

The choice of a suitable binder for a tablet formulation requires extensive knowledge relative importance of binder properties for enhancing the strength of the tablet and also of interaction between the various material constituting a tablet.

2. Classification of binder

2.1. On the basis of their source-(3)

Table 1 Types of Binder on the basis of source

Natural polymer	Starch, pre-gelatinized starch, gelatin, acacia
Synthetic polymer	PVP, HPMC, PEG

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Sugar	Glucose, sucrose, sorbitol

2.2. On the basis of their application-(1)

Table 2 Types Binder on the basis of their application

Solution binder	Gelatin, Cellulose derivative, Starch, polyethylene glycol
Dry binder	Cellulose, Methyl cellulose.

There are mainly three type of natural binder namely okra, wheat, fragrant manjak can be used in the tablet formulation. They converted the powder into granules that possesses good flow property and compatibility and promote the cohesiveness(4).

- Advantages of polymer binder
  - Natural polysaccharide is widely used in the pharmaceutical and food industry as excipient and additive due to their low toxicity, biodegrable and low cost.
  - They can be used to modify the release of drug, thereby influencing of the incorporated drug.
- Disadvantages of polymer binder
  - Polymer binder can lead to processing difficulties such as rapid over granulation. Over time they occasionally lead to tablet hardness and decrease in dissolution performance.
  - When polymer binder is chosen the addition of strong disintegrates such as super is topically required but these are considerably expensive and have a negative effect on product stability as Method well as film coating appearance of the finish product.

3. Method of preparation of powder (which used as binder)

3.1. Preparation of okra powder

Fresh pods of Abelmoschus esculents (okra) were purchased from the local market (Nasik, India). By adopting the extraction method as already described in the literature. For this purpose, okra pod was washed, dried at room temperature and sliced horizontally into small ~1inch pieces after the calyces were removed. These slices were taken in a pan ~ 1.5L of distilled water was added and they were then heated at ~ 60-70 ℃for 4 hours with intermittent stirring. The mixture was filtered through a muslin cloth,(3)and the extract dry in sun dryer after that dried material is triturate in mortar and pestle and from a powder.

3.2. Preparation of wheat power

Wheat was place in sufficient amount of water for 3-4 days. After 3-4 days wheat soak water completely. Then crush the wheat and place these material in water for 2 days the sticky material of water is accumulated at bottom, accumulated material is dry in sun dryer for3-6 day. Prepare power of these material in mortar and pestle then granules were prepared(5).

3.3. Preparation of fragrant man jack power

The sticky material of fragrant man jack was obtained from the fruit of fragrant manjak.The fruit was clean, wash, crush and then separate its sticky material with the help of muslin cloth, collect these material and dry in sun drying for 5-6 days. Triturate these material to form power and then prepare granules.

4. Material and method

Simvastin were taken as active ingredient (drug), lactose was used as diluent. The binder material investigated were dry powder of okra, wheat. Fragrant manjak. Magnesium stearate was used as lubricant and talc were used as glidant and disintegrant.

4.1. General procedure for preparation of dry granules

Using a three different type of binder by using a following 3 formulation(6).

- Formulation no 1.–weight 50mg of simvastin,lactose650milligram,microcrystalline cellulose 750milligram, okra powder150 milligram, magnesium stearate300milligram, talc powder 300 milligram.The whole ingredient is mixed together properly and then pass through the sieves number 20 and prepare a granules.
- Formulation no 2 – Weight simvastin 50mg, lactose 650 mg microcrystalline cellulose 750mg, wheat powder 150 mg, magnesium stearate 300mg talc 300 mg. All the ingredients are mixed properly and passthrough sieves no.20
- Formulation no 3- Weight simvastin 50mg, lactose 650 mg microcrystalline cellulose 750mg, cardiadichotoma powder 150 mg, magnesium stearate 300mg talc 300 mg. All the ingredients are mixed properly and passthrough sieves no 20.

4.2. Preparation of simvastin tablet by using Okra as binder

Table 3 Formulation table of tablet by using Okra as binder

Ingredient	Weight / tablet (Mg)	Weight/5tablet(Mg)
Simvastin	10	50
Lactose	65	650
Microcrystalline cellulose	75	750
Okra powder	30	150
Magnesium stearate	60	300
Talc	60	300

4.3. Preparation of simvastin tablet by using Wheat powder

Table 4 Formulation table of tablet by using Wheat powder as binder

Ingredient	Weight / tablet(Mg)	Weight /5 tablet (Mg)
Simvastin	10	50
Lactose	65	650
Microcrystalline cellulose	75	750
Wheat	30	150
Magnesium stearate	60	300
Talc	60	300

4.4. Preparation of Simvastin tablet by using Cardia Dichotoma

Table 5 Formulation table of tablet by using Cardia Dichotoma

Ingredient	Weight / tablet (Mg)	Weight / 5 tablet(Mg)
Simvastin	10	50
Lactose	65	650
Microcrystalline cellulose	75	750
Cardia Dichotoma	30	150
Magnesium stearate	60	300
Talc	60	300

4.5. Taste for evaluation of granules

4.5.1. Angle of response

30 grams granules were placed in a Plugged glass funnelwhich had a distance of 5 cm for the flat surface the granules where then allowed to flow down through the funnel orifices by removing the cotton plug from the funnel orifices the height of the help form as well as radius of the heap was noted the angle of response was calculated as.

$$Q = \tan -1\ h/r$$

4.5.2. Bulk and tapped density

30 gram of granules wear carefully powered through short stemmed glass funnel into100 ml graduated cylinder. The volume occupied by granules was read and the bulk density calculated in g/ml the cylinder contains the granules was tapped 50 times from the height 2 cm and tap density calculated in g/ ml(6).

4.5.3. Percentage compressibility and Hauser ratio

The percent compressibility was calculated from the different between taps and bulk density divided by the tap density and the ratio expressed by as a percentage.The Hauser's ratio is the ratio between tapped and bulk density.

$$Cl = Dt–Bt/Dt.100$$

$$HR= Dt/Bt$$

4.6. Evaluation test for pre-compressed parameter

The bulk density values of granules formulation preparedwith cardiadichotoma (F1), Tritium(F2), Abelmoschus esculents (F3) were in the range of 0.41-0.43 g /cm^2. While the tapped density value of Cordia dichotoma 0.45-0.48. The Hauser ratio calculated from these value lies in the range of 1.08 - 1.15, indicating an excellent flow behavior of the granules. Similarly, the compressibility index values of the majority of the formulation are between 1 and 11.

Table 6 Evaluation table of formulations

Formulation	Bulk Density(g/cm2)	Tapped Density (g/cm2)	Hauser's Ratio	Compressibility Index
F1	0.41	0.45	1.08	7
F2	0.41	0.48	1.11	10
F3	0.42	0.48	1.11	10

4.7. Test perform for prepared tablet

The prepare tablet formulation were evaluated for their physical properties including hardness, friability, and disintegration time according to official method as described in United State pharmacopoeia or pharmacist book (5).

4.7.1. Friability test

Friability taste is performed to elevate the ability of tablet two withstand Wear and tear in packaging, handling, and transporting. The apparatus loses to perform Please taste is known as "Friabilator". Tablet were selected select at random, dusted and weighted together using the electronic balance and place in friabilator.The chamber is rotated for100 revolution. During each revolution the tablet falls from a distance of 6 inch. The tablet is Remove from chamber after 100 revolution and weighted. Loss in weight Indicates though friability. The tablet is considered to be of good quality if the loss in weight is less than 0.8 %(7).

4.7.2. Disintegration test of tablet

Mean to break the tablet in two smaller particle after swallowing. The time required to disintegrate the tablet is called as a disintegration time. The rate of disintegration is dependent upon the type of tablet. The tablet which are dissolved by slow solution in the mouth or chew or to be desired in water before administration do not need or disintegration test. The taste of this integration is required in tablet which are swallow. The rate of disintegration differs from tablet to tablet because the nature of the drug. In some it may be as long as 30 minutes. In general, Pharmacopoeia Prescribed

a limited of 15 Minutes for most of the tablet, unless otherwise indicated in the monographs. Two perform the disintegration test for tablet the disintegration test Apparatus is used(6).

4.7.3. Hardness test of tablet

Monsanto hardness tester is used to test the hardness of a tablet. It has a graduated scale which gives the reading in kg / Sq.cm. The tablet to be tested is place between the spindle and the anvil. The desire pressure needed to hold the tablet in position is applied by moving the screw knob in clockwise direction. The scale is moved that the brakes. Reading is noted, which indicates the pressure which is needed to break the tablet(9).

4.7.4. Dissolution test of tablet

Test is done for measuring the amount of time required for given percentage of drug substance in a tablet to go into solution under the specified condition in vitro. The apparatus used for the test is as per specification given in I.P.

5. Result and discussion

- Effect of binder on the uniformity of drug content
- Effect of binder on the hardness and tensile strength

Table 7 Comparison of Hardness of Formulated tablet

Tablet No.	Formulation No 1. Hardness (Kg)	Formulation No 2. Hardness (Kg)	Formulation No. 3 Hardness (Kg)
1.	3.1	3.12	1.3
2.	3.33	3.12	1.5
3.	3.4	3.4	1.8
4.	3.15	3.2	1.9
5.	3.1	3.1	1.7

6. Conclusion

Research work on effect of natural binder on the hardness of tablet was studied. The research was carried out to take an idea of types of binders which can be used in tablet preparation as appropriate binder for getting required hardness of tablet which we want to prepare. Formulation of tablet using Okra and Wheat powder as a binder show good hardness as compared with Cardiac dichotoma. At last, it concludes that Okra and Wheat powder can be used as alternative binder.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest to be disclosed.

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