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Research Article

Isolation, Purification and Evaluation of Binding Property of Locust Bean Gum in Paracetamol Tablets

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ABSTRACT

This research was conducted to isolate and purify "LOCUST BEAN GUM" (LBG) from locust bean seeds. It was investigated as a potential binder in paracetamol (PCM) tablets.The Locust bean gum was extracted by a standard method. The gum was extracted using ethanol (analytical grade). The viscosity of LBG at 0.5, 1.0, 1.5 and 2.0 %w/v were found to be: 62, 80, 90, and 105 mPa.S^{-1}) respectively. The physicochemical properties of various batches of PCM granules showed fair flowability and compressibility. The granule size percent cumulative showed average granule size for granules having LBG and AGbinderat 500 µm, while that of gelatin was located at 755 µm. Both LBG and AG formed softer tablet compared with gelatin. The LBG was used as binder to formulate the paracetamol tablets by wet granulation method at varying concentration of the gums ranging from 0.25, 0.50, 0.75 and 1.00 %w/v (F_1 to F_4), (acacia gum as binder,F_5 to F_8; gelatin as binder, F_9–F_{12}) using a single punch tablet machine compressed at compression 2.0 KN and punch and die size 12 mm. Evaluation of paracetamol tablet yielded tablets with lower crushing "44 N and 45 N" for F3 and F4 respectively (LBG as binder at concentration of 0.75 and 1.0 %w/v respectively) compared with F7 and F8, "52 N and 53 N" respectively (acacia gum as binder at the same concentration as former) and, F11 and F12 "101 N and 110 N" respectively (gelatin as binder also as former).The friability values for F3, F4, F7, F8, F11, and F12, are as follow: 1.41, 1.22; 1.20, 1.11; 1.04 and 1.02 % respectively. LBG and AG, both formed tablets relatively less compact compared with gelatin. The disintegration times for the same batches are in the followingorder: 27, 28, 30, 31, 60 and 75 min respectively. The resultsindicate that "LBG" is a good binder in terms of crushing strength, friability and disintegration time.In conclusion, locust been gum is relatively as good as acacia gum in formulating conventional tablets with wet formulation method.

INTRODUCTION

Locust Bean Gum

Synonyms: Carob gum, carob bean gum, carobin.

Locust bean gum (LBG) is a neutral polysaccharide composed of mannose and galactose units and, therefore, belongs to the category of galactomannans. This natural polymer has been registering increased interest in the biopharmaceutical field, particularly in oral drug delivery. In this context, it has been showing its application in the design of drug delivery systems, providing the delivery of a defined dose, at a chosen rate, to a targeted biological site.

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In this study, critical aspects of LBG are exposed, with particular emphasis on the properties that closely affect its biopharmaceutical application, such as its chemical structure, solubility and molecular weight. The most effective synergies with other polysaccharides are described and the reported biopharmaceutical applications are explored and discussed.

Several natural biopolymers have demonstrated relevance in food, cosmetic, and pharmaceutical applications. In the field of pharmaceutical drug delivery many efforts have been made, in the last decades, to develop appropriate delivery systems that minimize side effects, with improving the therapeutic efficacy. The application of natural biopolymers in pharmaceutical dosage formulations is diverse, comprising the production of solid monolithic

matrix systems, implants, films, beads, microparticles, nanoparticles, inhalable, and injectable systems, as well as viscous liquid and gel formulations. Among these dosage forms, polymeric materials are applied for different functions such as binders, matrix formers, drug release modifiers, coatings, thickeners, or viscosity enhancers, stabilizers, disintegrators, solubilizers, emulsifiers, suspending agents, gelling agents, and bioadhesives[1].

Due to certain features of LBG which are related to its gelling capacity and synergies with other polysaccharides, a growing interest is being observed regarding its biopharmaceutical use.
LBG is extracted from the seeds of the carob tree (*Ceratoniasiliqua*), which is very abundant in the Mediterranean region although its localization also extends to different regions ofAsia,North Africa, and South America. The polysaccharide is also referred in the literature by several other synonyms, such as carob bean gum, carob seed gum, carob flour, or even *ceratonia* [2].

Carob seeds, represent approximately 10% of the weight of the fruit, and are industrially processed by hull cracking, sifting, and milling operations to isolate and grind the endosperms[3,4]. The seeds composed mainly of galactomannan, which made up approximately 80%, the rest comprise of proteins and impurities[3,5]. The protein content of LBG was reported to include approximately 32% albumin and globulin, while the remaining 68% correspond to glutelin[6]. Impurities mainly, ash and acid-insoluble matter[3]. These procedures include enzymatic or alkaline hydrolysis, precipitation with ethanol or isopropanol, and purification by methanol, or by copper or barium complexes [3,5,7]. Impurities may remain insoluble even when heating at temperatures up to 70°C [8]. Precipitation with isopropanol revealed to be quite efficient in the elimination of proteins. In a general manner, purification steps have demonstrated to result in higher mannose/galactose (M/G) ratios and in a decrease of protein and impurities [3].

The strongest application of LBG concerns its use as a thickening and stabilizing agent in both food and cosmetic industries [9,10] and first references to the study of its properties date to more than 50 years ago [11,12]. In food industry it is a food additive, coded as E-410 in the European Union [13]. However, recently it has been pointed as a very useful excipient for pharmaceutical applications, as detailed in Section 6 of this review. The observed increase of interest is mainly due to its ability as controlled release excipient in tablets. However, reports of biodegradability, low toxicity, and availability at low cost [9,10,14] also contribute for its increasing use.

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Carob seeds, which represent approximately 10% of the weight of the fruit, are industrially processed by hull cracking, sifting, and milling operations to isolate and grind the endosperms, which are then sold as crude flour[3,4]. The seeds are mainly composed of galactomannan, which comprises approximately 80%, the rest corresponding to proteins and impurities[3,5]. The protein content of LBG was reported to include approximately 32% albumin and globulin, while the remaining 68% correspond to glutelin[6]. Impurities mainly refer to ash and acid-insoluble matter[3]. After seed processing, crude galactomannan can be further submitted to several processes to eliminate both the protein content and impurities. These procedures include enzymatic or alkaline hydrolysis, precipitation with ethanol or isopropanol, and purification by methanol, or by copper or barium complexes[3,5,7]. Impurities usually remain insoluble even when heating at temperatures up to 70°C[8]. Precipitation with isopropanol revealed to be quite efficient in the elimination of proteins. In a general manner, purification steps have demonstrated to result in higher mannose/galactose (M/G) ratios and in a decrease of protein and impurities[3].

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carbohydrates present in large quantities in the endosperm of the seeds of many leguminosae such as *Ceratoniasiliqua* (locust bean gum), *Cyamopsistetragonoloba* (guar gum), and*Caesalpiniaspinosa* (tara gum)[15,16]. Chemically, they consist of a (1-4)-linked β-D-mannose backbone with (1-6)-linked side chains of α- D-galactose, being thus neutral polymers[1]. The various galactomannans can be differentiated by the displayed M/G ratio, the substitution pattern of side-chain units and their molecular weight, the latter being influenced by harvesting and manufacturing practices, among other factors[17]. The M/G ratio varies, therefore, depending on the distribution of the galactose units over the mannose backbone, being approximately 4:1 for LBG (Figure 2)[18], 3:1 for tara gum and 2:1 for guar gum[5].

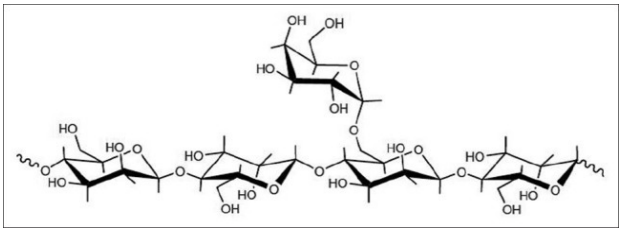

Figure 1: Structure of locust bean gum showing a linear polysaccharide (1-4)-βb-linked backbone of mannose units with single (1-6)-α-d-galactose units attached. [Adapted with permission from Coviello *et al*.].

MATERIALS AND METHODS

Materials

Locust bean seeds were obtained from University of Ilorin forestry. Gelatin and Acacia gums were obtained from the Pharmaceutical Technology Laboratory, University of Jos.

Extraction and Purification of Locust Bean Gum

The gum used was collected from the Carob bean tree. The extraction and purification of the gum began by boiling the seed for several hours in order to dehusk it to obtain the endosperm. The endosperms were separated from the husk and ground gently using a blending machine.

It was then dispersed in hot water and the shaft was sieved out using a clean muslin cloth. The filtrate (which contains the gum content) was collected. Ethanol (Analytical grade) was added onto the filtrate in order to extract the gum.
This was left to stand for more than twelve hours and the supernatant was decanted, leaving the slurry. The slurry was centrifuged for ten minutes at 4000 RPM, and dried at 60°C for 24 h by cutting into pieces and properly spread in a clean brown paper to hasten drying. The dry gum was then pulverized using porcelain mortar and pestle. The weight was taken using a weighing balance.

The characteristics of the gum which includes: The viscosity, swelling index, pH, flow rate, angle of repose, bulk density, tapped density, Hausner's ratio and the Carr's index was determined.

A 10ml of water was measured using a measuring cylinder and was used to thoroughly mix the already weighed excipient together.

After ensuring proper mixing and forming of the paste, the mixture was again dried for more than twelve (12) hours on a clean brown paper. The dried mixture was then passed through sieve 16μm mesh to reduce the particle size. It was then spread over a thin brown paper and air dried to ensure that the granules dried well. The granules were then passed through sieve sizes 800, 710, 500, 355, 250, 180μm by proper agitation/shaking. The finally granulated powder was then properly packed into batches and the powder characteristics were determined in the laboratory after which the powder was compressed into tablet.

Percentage Yield

Evaluation of Flow Properties of Locust Bean Gum Powder

This is of great importance because powder to be used should possess features or properties that will confer a firm and strong tablet which under compression will be uniformly distributed and has constant weight throughout each tablet.

Measurement of Bulk and Tapped Density

The bulk and tapped densities of the granules are determined by the modification of Kumer and Kofhan method [19].

Tapped density of a powder is expressed as the ratio of the weight of the powder to the volume occupied after tapping for a given period of time. Voids are reduced by tapping resulting to consolidation. The tapped density is important for controlling weight variations in tablet formulations.

Tapped density = weight of powder/tapped volume

Bulk density = weight of powder/bulk volume

A 30g each of locust bean gum, acacia gum and gelatin gum respectively from each batch was weighed and transferred into a 100ml measuring cylinder and the values of the bulk density in volume for each batch was recorded.

The tapped density of each powder was also recorded after tapping of the already transferred powder into the 100ml measuring cylinder after tapping for 100 times.

Hausner's Ratio

Hausner's ratio is expressed as

H = Tapped density/Bulk density

The Hausner's ratio is determined by dividing the tapped density by the bulk density.

Carr's compressibility index

Carr and Newmann developed a simple test to evaluate flowability of a powder by comparing the poured (fluff) density and tapped density of a powder and the rate at which it packed down. A useful, empirical guide is given by the Carr's compressibility index.

Carr's index (%) = Tapped index – powder density/ Tapped density × 100

The Carr's compressibility is determined by taking the difference between the tapped and bulk density divided by the tapped density. This was calculated for the two powders.

Angle of Repose of Locust Bean Gum

Angle of repose has been used as indirect methods of quantifying powder flowability because of their relationship with inter-particulate friction.

A clean glass funnel of was placed 10cm from the surface of the laboratory bench and clamped firmly to a retort stand. A simple shutter was placed over the hopper outlet to prevent wastage of the powder.

A 100 g of Locust bean gum was accurately weighed with a weighing balance and was transferred into the funnel. The shutter was then removed and the hopper tapped continuously until the powder discharge completely into a plane white paper placed under the hopper on a retort stand base. The height of the powder heap was measured by inserting a broom stick to determine the height and trace the actual height on the ruler. A circle was drawn round the base of the powder heap and the diameter was also recorded. The procedure was repeated 3 times in order to get mean height and diameter.

The angle of repose (°) was determined as the tangent of the height of the cone ''h'' divided by the radius "r".

Flow Rate

The measurement of the flow rate was done using the funnel method. A clean dried funnel was clamped on a retort stand 10cmfrom the surface of the bench.

A 100 g of the locust bean gum powder was poured into funnel to discharge completely through the funnel and the time was recorded. This was repeated three times and the result was obtained.

Flow rate (g/sec) = Weight of powder/Time taken to flow

Swelling index

Using a 100ml graduated cylinder, the bulk density of 1g of Locust bean gum was determined. Sufficient water was added to form a uniform dispersion. This was stored at room temperature for 24 hours. The sediment volume of the swollen mass after 24 hours was taken.

The swelling index (SI) was calculated as:

$$SI = V_2/V_1$$

V_1= initial volume of the material before hydration
V_2= volume of the hydrated material
SI = 7/2 = 3.5

Viscosity Determination

A 0.6 g of the locust bean gum properly triturated was dispersed in 10 ml of purified water in a measuring cylinder and shaken thoroughly and more water was added to make up to 120 ml. The whole content in the bottle was transferred into a 120 ml beaker and the Haake viscotester VT-01 was used to determine the viscosity at 25, 50 and 100 RPM. The same procedure was repeated for 1.0, 1.5 and 2.0 g of the gum.

pH Determination

A 1 g of properly triturated Locust bean gum was accurately weighed and about 10 ml of purified water was added to the material and shaken thoroughly to ensure complete dispersion of the material in a measuring cylinder. Sufficient water was added to make up to 100 ml in a 120 ml beaker.

The pH-25 (pH meter scale model and Comp) was connected to a source of light and was brought to a neutral by buffered solution in a bottle. The content in the bottle was shaken thoroughly and the pH-meter scale was inserted into the bottle and the reading on the pH meter was recorded.

Loss on Drying (LOD)

A 10g of the Locust bean gum was accurately weighed (W1) and transferred in a Crucible and was then heated in a hot air oven at 105°C for 2 hours. After 2 hours, the sample was cooled in a dry atmosphere of a dessicator and the sample was reweighed (W2).

$$\% \text{ LOD} = (W1 - W2)/ W1 \times 100$$

Particle Size Analysis

A simple method of analysis or distribution was adopted according to U.S.P (2003). The granules of experiment A labeled batches F1, F2, F3 and F4 containing 0.25, 0.50, 0.75 and1.00%w/v of Locust bean gum respectively were passed through sieve 16µm. The U.S.P (2003) standard method of sieve analysis was used.

The 800, 710, 500, 355, 250, 180 and fine <100 set of sieves were arranged on an electric stance and the first batch of granules were added. The sieves were shaken for 10 minutes using the electric shaker after which the sieves were dismantled and the weight of the powders retained on the various sieves were determined individually using an electrical weighing balance.

Preparation of Wet Granulation

The experiments were grouped into three: A, B, and C, each group has four batches containing binder in concentration of 0.25, 0.50, 0.75, and 1.0 %. Table 1 represents the percentage composition for each batch.

Tablet Compression

Paracetamol was used as the model drug. The model drug was blended with the excipients. The formulations were triturated and lubricated with 0.25%w/v of magnesium stearate. Each batch was compressed at compression 2 striches on a single punch carver hydraulic hand press (Model, Carver Inc. Menomonee Falls, Wisconsin U.S.A) and the target weight being 500mg. The compressed tablets were allowed to relax for 24 hours post compression. Compact dimensions (diameter and thickness) were determined using the vernier caliper and tablet Hardness tester (Model EH 01, capacity 500N, India) was used to evaluate hardness of the tablets.

Evaluation of Compressed Tablets

Tablet Hardness

This is measured using the Hardness tester. Although hardness of tablets is not an official test, it is necessary as a measure of the tablet strength to withstand normal handling.

This is associated with compression pressure, fill weight, density and porosity of materials, moisture content and binder. Ten (10) tablets obtained from the compression were placed individually between the fixed jaw of the Mosanto hardness tester and scale adjusted to zero. Pressure was then applied on the tablet by screwing the compression knob until the tablet just shattered into pieces. The reading at this point was noted and recorded for other nine (9) tablets in conformity with the official requirement and guidelines (4kgf-7kgf, B.P 1988) and the corresponding values recorded in kgf.

Tablet Friability

The abrasion test was performed in a frabilator (Erweka, TA3R, Germany) operated at 100r.p.m. The weights of ten (10) tablets were taken before and after the test. The friability was calculated as the percentage weight loss. A maximum weight loss of 1.0% of the weight of tablets being tested is considered acceptable in most products.

$$\text{Friability (\%)} = W1 - W2/W1 \times 100$$

W1 = initial weight of the 10 tablets and
W2 = final weight of the corresponding tablets.

Tablet Thickness and Diameter

This involves selection of twenty (20) tablets at random from each batch. The vernier caliper was used to measure the thickness and the diameter of the tablet. The mean and standard deviation were calculated.

Tablet Disintegration Time

Disintegration test determines whether tablets or capsules disintegrate within a prescribed time when placed in a liquid medium under the prescribed experimental condition.

Table 1: Composition of Various Batches of Granules

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Paracetamol	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Lactose	5.50	5.25	5.00	4.75	5.50	5.25	5.00	4.75	5.50	5.25	5.00	4.75
Sodium Alginate	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Locust Bean Gum	0.25	0.50	0.75	1.00	-	-	-	-	-	-	-	-
Acacia Gum	-	-	-	-	0.25	0.50	0.75	1.00	-	-	-	-
Gelatin Gum	-	-	-	-	-	-	-	-	0.25	0.50	0.75	1.00
Talc	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Magnesium Stearate	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Table 2: Viscosity and pH of LBG

Concentration of Gum (% w/v)	Shear Rate (RPM)	Viscosity(mPas^{-1})	pH (at 25°C)
0.5 %w/v	50	62	5.50
1.0 %w/v	50	80	5.50
1.5 %w/v	50	90	5.50
2.0 %w/v	50	105	5.50

Table 3: Physicochemical Properties of Locust Bean Gum Powder

Flow rate (g/sec)	Angle of repose (°)	Bulk density (g/cm^3)	Tapped density (g/cm^3)	Compressibility index (%)	Hausner's Ratio
27.33	38.16	0.515	0.679	24.153	0.758

Disintegration apparatus (Erweka, ZT3, Germany) was employed. Three tablets were placed in each compartment of the disintegrating basket which was lowered into a glass beaker (1L capacity) filled with deionized water to 600ml mark and in turn was placed in a water bath maintained at 37°C. The time taken for the dissociated tablet particles to pass through the mesh was recorded as the disintegration time. The official limit is 15 – 30min (B.P., 1988) for uncoated tablets.

Weight Uniformity

The weight uniformity test was performed according to the B.P 1980.

Twenty (20) tablets were randomly selected from each batch and weighed. The average weight and standard deviation from the average weight variation (%) calculated using equation.

Mean weight (MW) = Total weight/Number of tablets

% CV = Standard deviation/Calculated mean

Where, CV is coefficient of tablet weight variation

RESULTS AND DISCUSSION

Loss on Drying (LOD)

$$\% \text{ LOD} = (W1 - W2)/ W1 \times 100$$

$$\% \text{ LOD} = \frac{5.00 - 4.61 \times 100}{5.00}$$

$$= 7.8\%$$

The viscosity of LBG at 0.5, 1.0, 1.5 and 2.0 %w/v were found to be: 62, 80, 90, and 105 mPa.S^{-1}) respectively.

The viscosity of LBG at 0.5, 1.0, 1.5 and 2.0 %w/v were found to be: 62, 80, 90, and 105 mPa.S^{-1}) respectively.

Table 4: Physicochemical Properties of Various Granules with LBG, AG and Gelatin as Binder

Batch	Flow Rate(g/s)	Angle of Repose (°)	Bulk Density (g/cm³)	Tapped Density (g/cm³)	Compressibility Index (%)	Hausner Ratio
F1	7.33	33.04	0.451	0.662	31.87	1.47
F2	10.33	32.25	0.503	0.612	17.81	1.22
F3	10.00	34.06	0.463	0.560	17.32	1.21
F4	8.33	30.00	0.451	0.569	20.74	1.26
F5	8.00	29.03	0.48	0.59	18.94	1.23
F6	8.66	29.34	0.47	0.58	19.90	1.25
F7	9.66	29.38	0.46	0.58	20.31	1.26
F8	10.00	30.16	0.45	0.57	19.93	1.25
F9	9.00	35.03	0.47	0.62	23.55	1.31
F10	8.67	34.64	0.50	0.62	18.87	1.23
F11	9.00	34.22	0.49	0.62	21.52	1.27
F12	9.33	34.00	0.48	0.58	17.47	1.21

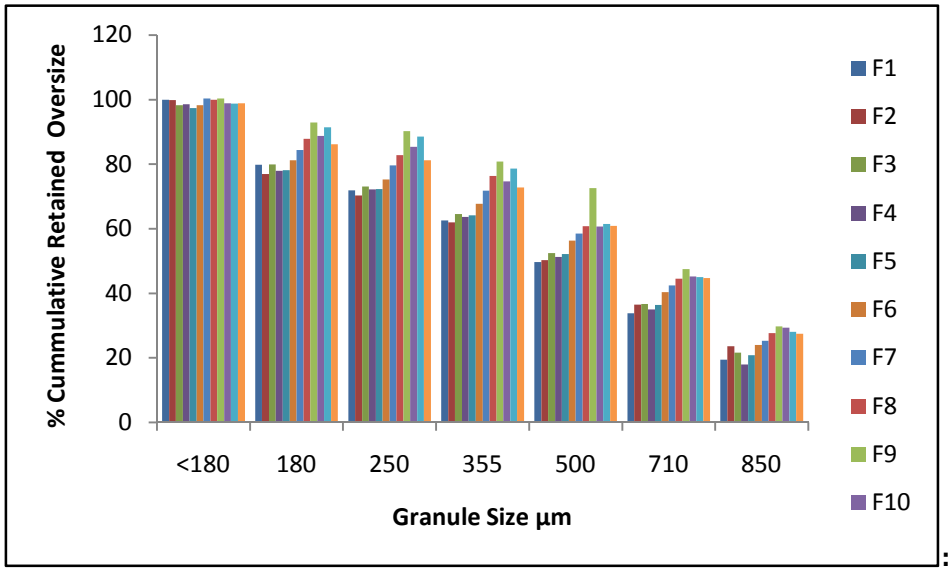

Figure 2: Granule size (µm) Vs % Cummulative retained oversize

Table 5: Compact Properties of Various batches of Tablet containing LBG, AG and Gelatin as Binder at various concentration

Batch	Tablet Wt (g)	Tablet Thickness (cm)	Tablet Diameter (cm)	Tablet Crushing Strength (N)	Tablet Volume (cm³)	Tablet Density (g/cm³)	Friability (%)	Disinte-gration Time (min)	%Drug content
F1	0.499	0.35	1.2	42	0.396	1.26	1.41	27	98.00
F2	0.490	0.33	1.2	42	0.373	1.26	1.22	27	98.90
F3	0.480	0.35	1.2	**44**	0.396	1.27	**1.20**	**27**	98.50
F4	0.493	0.36	1.2	**45**	0.407	1.27	**1.11**	**28**	97.80
F5	0.485	0.34	1.2	42	0.384	1.26	1.35	29	98.00
F6	0.481	0.35	1.2	46	0.396	1.26	1.30	30	98.60
F7	0.479	0.36	1.2	**52**	0.407	1.27	**1.22**	**30**	97.80
F8	0.485	0.35	1.2	**53**	0.396	1.26	**1.13**	**31**	98.40
F9	0.499	0.36	1.2	81	0.407	1.26	1.31	45	98.50
F10	0.499	0.36	1.2	95.4	0.407	1.26	1.22	55	97.00
F11	0.499	0.36	1.2	**101**	0.407	1.26	**1.04**	**60**	98.70
F12	0.479	0.36	1.2	**110**	0.407	1.26	**1.02**	**75**	98.80

The physicochemical properties of the gum showed fair flowability and compressibility. The granule size percent cumulative showed average granule size for both LBG and AG at 500 µm, while that of gelatin was located at 755 µm (Fig. 2).

Both LBG and AG formed softer tablet compared with gelatin. The LBG was used as binder to formulate the paracetamol tablets by wet granulation method at varying concentration of the gum ranging from 0.25, 0.50, 0.75 and 1.00 %w/v (F_1 to F_4), (acacia gum as binder,F_5- F_8; gelatin as binder, F_9 – F_{12}) using a single punch tablet machine compressed at compression 2.0 KN and punch and die size 12 mm.

Table 5 illustrates the results of evaluation of paracetamol tablet. It can be seen that,crushing strengths"44 N and 45 N" are for F_3 and F_4 respectively (LBG as binder at concentration of 0.75 and 1.0 %w/v respectively) compared with F_7 and F_8, "52 N and 53 N" respectively (acacia gum as binder at the same concentration as former), while, F_{11} and F_{12} "101 N and 110 N" respectively (gelatin as binder also as former) showed higher crushing strength value far above tablets with LBG and AG. The friability values for F_3, F_4, F_7, F_8, F_{11}, and F_{12},are in the following order: 1.20, 1.11, 1.22, 1.13, 1.04 and 1.02 % respectively. LBG and AG, both formed tablets relatively good compact compared with gelatin. The disintegration times for the same batches are in the following order: 27, 28, 30, 31, 60 and 75 min respectively. LBG was able to disintegrate the tablet within the B.P (1988) stipulated time of not more than 30 min.

The results indicate that "LBG" is a good binder in terms crushing strength, friability and disintegration time. In conclusion, locust been gum is relatively as good as acacia gum in formulating conventional tablets with wet formulation method.

Evaluation of Compressed Tablets

Friability Test

The friability test determines the hardness of tablet [20]. It is the test to determine the ability of a tablet to withstand abrasion as opposed to hardness which measures the physical strength of the tablet. Hence a tablet with high value of hardness will be expected to have a low friability. From table 5, all the twelve (12) batches failed the test as the friability exceeded the pass value. A tablet is considered to have satisfactorily passed friability test if it has a value less than 1% [21].

Disintegration Time

Disintegration involves rapid breaking up of tablet into smaller fragments to ensure that the tablet releases its active ingredient when exposed to appropriate condition.

The disintegration time for F3 and F4(LBG-Paracetamol) was lessthan 30minutes compared to batches F7 and F8 (Acacia gum); F11 and F12 (Gelatin gum) did not disintegrate within 15 to 30 minutes.

This explains the fact that Locus bean gum is a better binder than to acacia gum and gelatin.

Uniformity Weight

From Table 5, all the batches produced tablet weight not exactly but quite close to the target weight.

SUMMARY

The evaluation of paracetamol tablets yielded fairly acceptable friability in "locust bean gum, likewise acacia gum and gelatin gum. Locust bean gum and Acacia gum gave acceptable crushing strength ranging from 45 to 50 N and 45 to 60 N respectively. Acacia gum and gelatin gum gave disintegration time average of 30minutes compared to locust bean gum that gave disintegration time of less than 30 minutes.

CONCLUSION

From the work carried out, Locust bean gum showed a good release hence, it can be utilized at a lower concentration as better binder than Acacia and Gelatin gums. Also, considering the inability of tablets containing acacia and gelatin gums as binder to disintegrate within 15 to 30minutes in this research and the higher crushing strength revealed that LBG is a better binder than AG and GG for conventional tablets.
Therefore in this research work, we have been able to isolate, purify and evaluate "LBG" as a good binder in paracetamol by wet granulation method.

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