



Research Article

EFFECT OF TEMPERATURE ON BINDING PROPERTIES OF NATURAL GUMNandre Rohini Sunil^{1*}, Bhamre Vaibhav Gulabrao², Rajbhoj Swapnil Sanjay¹¹T. Y. B. Pharm K. B. H. S. S. Trust's Institute of Pharmacy, Malegaon, Maharashtra, India²Department of Pharmaceutics, K. B. H. S. S. Trust's Institute of Pharmacy, Malegaon, Maharashtra, India

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Article Received on: 07/04/14 Revised on: 02/07/14 Approved for publication: 07/08/14

DOI: 10.7897/2230-8407.0508129

ABSTRACT

Different binding agents can be useful in achieving various tablet mechanical strength and drug release properties for different pharmaceutical purpose. The major application of gums in tablet is as binding agent. The basic purpose of this study was to study effect of temperature on binding properties of natural gum as a binder. *Aegle marmelos* fruit gum exposed to temperature for varying period of time has been selected as the binding agent. Tablets prepared by using this gum were studied for various evaluations so as to study effect of temperature on binding properties of gum.

Keywords: Natural binding agent, *Aegle marmelos* Gum, temperature, binding properties

INTRODUCTION

The development of new excipients for potential use as a binding agent in tablet formulation is continuous to be of interest. This is because different binding agents can be useful in achieving various tablet mechanical strength and drug release properties for different pharmaceutical purpose. Gums generally are polysaccharides which are polymeric in nature of natural substances obtained from woody and non woody plant parts such as bark, seeds, sap, roots, rhizomes, fruits, and leaves. Plant gums are widely used in diverse application for the formulation of pharmaceutical dosage forms. The major application of gums is in tablet as binding agent¹. Extraction is defined as the process of isolation of soluble material from an insoluble residue, which may be liquid or solid, by treatment with a solvent. On the basis of the physical nature of crude drug to be extracted the extraction process may be liquid – liquid or solid – solid extraction².

MATERIAL AND METHODS

Paracetamol was selected as the model drug for tablet preparation. *Aegle marmelos* was collected from nearby area and gum has been extracted from it.

Extraction of gum

Dried gum → Soak in alcohol (48 Hrs) → Slurry → Precipitation by acetone → Precipitate → Dry gum → Powder the gum → Store in tightly closed container.³

Standardization of gum

The powder was standardized for following properties⁴

Loss on drying

The 5 g powder was dried at 100°C till the constant weight of gum powder was obtained.

Ash Value

2 g of gum powder was accurately weighed and evenly distributed in crucible. It was dried at 105°C for one hour.

pH

pH of 2 to 8 % w/w solution was determined using pH meter

Temperature study

The gum extracted in above procedure is then exposed to temperature a 60°C in hot air oven. 10 g of the exposed gum was removed periodically with interval of one hour. This gum was used for preparation of tablet as a binder.⁵

Preparation of tablets

Paracetamol is mixed with natural excipients of AMG by geometric mixing. Then lubricant was added and mixed for an additional 5 minutes and the final blend was directly compressed using 12 mm punches equipped with round, flat and plain punches. The force of compression was adjusted so that hardness of all the prepared tablets ranged from 6 to 7 kg/cm². All the preparations were stored in airtight containers at room temperature.

Evaluation of tablets**Organoleptic properties**

Organoleptic properties of tablets like color, odor and taste were evaluated.

Dimensions

The dimensions of the tablets are thickness and diameter. The tablets should have uniform thickness and diameter. Thickness and diameter of a tablet were measured using vernier callipers.

Hardness

Hardness of tablets was determined using Pfizer hardness tester.

Weight variation test

Weigh individually 20 units selected at random and calculate the average weight. Not more than two of the individual weights deviate from the average weight by more than the percentage shown in the table and none deviates by more than twice that percentage.

Percent Friability

For tablets with an average weight of 0.65 g or less take a sample of whole tablets corresponding to about 6.5 g for tablets with an average weight of more than 0.65 g. Dedust the tablets carefully and weigh accurately the required number of tablets. Place the tablets in the drum and rotating at 100 rpm. Remove the tablets, remove any loose dust from them and weigh them accurately. The test is run only once unless the results are difficult to interpret or if the weight loss is greater than the targeted value, in which case, the test is repeated twice and the mean of the three tests is determined. A maximum loss of weight (from a single test or from the mean of the three tests) not greater than 1.0 per cent is acceptable for most tablets. If obviously cracked, chipped or broken tablets are present in the sample after tumbling, the sample fails the test. If the size or shape of the tablet causes irregular tumbling, adjust the drum base so that it forms an angle of about 10° with the horizontal and the tablets do not

bind together when lying next to each other, which prevents them from falling freely.

Disintegration Test

Unless otherwise stated in the individual monograph, introduce one tablet into each tube and if directed in the appropriate general monograph, add a disc to each tube. Suspend the assembly in the beaker containing the specified liquid and operate the apparatus for the specified time. Remove the assembly from the liquid. The tablets pass the test if all of them have disintegrated. If 1 or 2 tablets fail to disintegrate, repeat the test on 12 additional tablets or capsules; not less than 16 of the total 18 tablets or capsules tested disintegrate. If the tablets or capsules adhere to the disc and the preparation under examination fails to comply repeat the test omitting the disc. The preparation complies with the test if all the tablets or capsules in the repeat test disintegrate.^{6,7}

Table 1: Formulation Table

Ingredients	FP	F1	F2	F3	F4	F5	F6	F7	F8
Paracetamol	400	400	400	400	400	400	400	400	400
Binder	55	55	55	55	55	55	55	55	55
M.C.C.	30	30	30	30	30	30	30	30	30
Talc	15	15	15	15	15	15	15	15	15
Total weight	500	500	500	500	500	500	500	500	500

(All weights are in mg) F: Formulation; P: Before temperature exposure; 1 to 8: Temperature exposure at 1 to 8 h

Table 2: Organoleptic Properties of Drug

S. No.	Property	Drug	Tablet
1.	Color	White	White
2.	Odor	Odorless	Odorless
3.	Taste	Bitter	Bitter

Table 3: Standardization Values for Gum

S. No.	Parameter	Experimental Value
1	Loss on drying	Less Than 8 % w/w
2	Ash Value	Less than 3.5 % w/w
3	Ph	5.4

Table 4: Values for Different Evaluation Parameters

Formulation code	Thickness (cm) at different time (h)	Diameter (cm) at different Time (h)	Hardness	Percent Friability	Disintegration Time
FTP	0.51	1.1	6.1	0.276 (%)	290 sec
FT 1	0.5	1	5.7	0.257 (%)	270 sec
FT 2	0.5	1.09	5.6	0.35 (%)	184 sec
FT 3	0.51	1.01	5.3	0.494 (%)	162 sec
FT 4	0.51	1.09	5.1	0.56 (%)	154 sec
FT 5	0.5	1.01	4.9	0.60 (%)	140 sec
FT 6	0.5	1.04	3.21	0.66 (%)	136 sec
FT 7	0.5	1.09	3.2	0.76 (%)	110 sec
FT 8	0.51	1.1	3.1	0.84 (%)	97 sec

RESULT AND DISCUSSION**Organoleptic properties**

From Table 2 it is observed that the organoleptic properties of drug remain unaffected on mixing with gum and compression.

Standardization of gum

Above table shows the values of standardization parameters for the dried gum and it is within acceptable limit.

Thickness and diameter

All prepared formulations were checked for their dimensions (thickness and diameter) using Vernier Caliper and it found in average range of 0.51 cm. and 1.1 cm respectively. Table 4 shows results of thickness and diameter values for all formulations.

Hardness

All prepared formulations were evaluated for their tablet Hardness (kg/cm²) using Monsanto Hardness Tester and average range was found to be 3.1 to 6 (Kg/cm²). Table 4 shows of hardness values for all formulations. From Table 4

it is observed that hardness of tablet decreases from FT pre to FT8 successively.

Percent Friability

All prepared formulations were checked for their tablet Percent friability using Roche friabilator and it is found in average range of 0.533(%). Table 4 shows a result of percent friability values for all formulation. From Table 4 it is observed that percent friability increases successively from formulation FT pre to FT8.

Disintegration Test

Prepared formulations were checked for their tablet disintegration time (sec.) using disintegration test apparatus it is found decreasing from FTP to FT8. Table 4 shows a result of disintegration time for all formulations.

CONCLUSION

As tablets are formulated with temperature affected gum and there is no change in concentration, the change in results must be because of effect of temperature on gum. From all the results of tablet evaluation it is notice that the hardness and disintegration time decreases and percent properties of gum. Considering all the results we can conclude the binding

properties gum decrease exposure to temperature at varying conditions as time in this work.

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Cite this article as:

Nandre Rohini Sunil, Bhamre Vaibhav Gulabrao, Rajbhoj Swapnil Sanjay. Effect of temperature on binding properties of natural gum. Int. Res. J. Pharm. 2014; 5(8):633-635 <http://dx.doi.org/10.7897/2230-8407.0508129>

Source of support: Nil, Conflict of interest: None Declared