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Research Article

EVALUATION OF *HIBISCUS CANNABINUS* SEED MUCILAGE AS A TABLET BINDER

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ABSTRACT
The present study was performed with an objective to find out the potentials of mucilage extracted from plant *Hibiscus cannabinus* as a tablet binder. The mucilage was extracted by using water as solvent and precipitated using ethanol as non-solvent. Physical characteristics such as solubility, swelling index, loss on drying, and pH of mucilage were studied. Paracetamol (Crocin) was used as model drug for formulation of tablet. Different batches of tablets with concentration of mucilage ranging from 1 to 10% were formulated. The evaluation parameters such as Hardness, dissolution time, Disintegration time, pH, were studied. The tablets prepared with 4% of mucilage were found to be ideal and comparable with a commercial marketed preparation Crocin.

KEY-WORDS: *Hibiscus cannabinus,* tablet, Mucilage.

INTRODUCTION

Excipients are the additives used to convert active pharmaceutical ingredients into pharmaceutical dosage form suitable for administration to patients [1]. Plant products serve as an alternative to synthetic products because of local accessibility, environment friendly nature and lower prices compared to imported synthetic products. Natural sources are being utilized in healthcare system throughout the world since recorded history of mankind. According to WHO, around 80% of the population in developing countries relies on alternative and traditional medicines for primary health care[2]. Number of pharmaceutical excipients,which are major raw material for any pharmaceutical company & forms major portion of most of the dosage form, are obtained from natural sources[3].

Drugs are rarely administered in pure forms; generally they are admixed with various kinds of adjuvants, which lead to formation of dosage forms. These non-drug components are collectively called as additives or excipient. These can be used in natural from or after modification and derivatisation[4].

A binder is an agent which added to a drug- filler mixture to ensure that granules and tablets can be formed with the required mechanical strength. Binder is used as a solution which is used as agglomeration liquid during wet agglomeration. The binder is referred to as a solution binder. When binder is used as a dry powder which is mixed with the other ingredients before compaction, is known as dry binder. Both are included in the formulation at relatively low concentrations, typically 2-10% by weight [5].

Mucilage's are used for their binding, thickening, stabilizing and humidifying properties in medicine[6].

MATERIAL AND METHODS

Plant material

The plant material was collected from Naik seeds and Fertilizers, Pune. The botanical identity of plant was confirmed at Agharkar Research Institute, Pune.

From the seeds the mucilage was isolated by extraction and precipitation by acetone. For evaluation of binding properties of isolated mucilage tablets were prepared using model drug Paracetamol. Also various properties of granules as well as tablets were checked.

Preparation of Granules

Paracetamol was used as model drug for preparation of granules. The percentage of lactose was changed as per concentration of binder used in tablets. The formula used to prepare tablets is given in table 1.

Maize starch was used as disintegrant. Lactose and magnesium stearate were used as diluents and lubricant respectively. Binder used was mucilage isolated from *Hibiscus cannabinus*. In above formula binder concentration was gradually increased and concentration of lactose decreased.

Procedure

1) Granules were prepared in various batches by using different concentrations of binder i.e. 1 to 5 % w/w, 6, 8 and 10 % w/w concentrations. Binder solutions were prepared in water by using mild heat treatment. The quantity of water used was just sufficient for granulation.
2) The wet mass was passed through sieve no. 60 and dried at room temperature for 20 min. The dried granules were resieved through sieve no. 20 (850 μm).
3) Then granules were evaluated for percentage fines, and angle of repose. Also the bulk densities and tapped densities were assessed using a tapped density apparatus. Compressibility index of granules was determined by Carr's index. Hausner's ratio was also calculated.
4) The specified quantity of maize starch, magnesium stearate was added to prepared granules just before punching of granules.
5) The standard binder solutions were prepared by using acacia in 1-5%, 6, 8, 10% w/w, tragacanth in 1-5%, 6, 8, 10% concentration. The granules using standard binder solution were prepared in similar manner.
6) The granules were punched by using Twelve extension rotary press tablet punching machine. The punching was done by two methods in one method pressure of punching was kept constant i.e. (Batch A). In another method hardness of tablets prepared by using standard binders and binder from *Hibiscus cannabinus* as kept same[7].

RESULT & DISCUSSION

Study of different evaluation parameters of tablet such as hardness, disintegration time, weight variation, friability, and content uniformity was done. The in vitro dissolution profile was done for all tablets by using methods specified in USP and parameters were compared with that of standards like Acacia and Tragacanth.

The evaluation of tablets was done and results summarized in tabular form in tables 2 to 4. & Fig.1.

In the tablets showed higher friability but superior in terms of disintegration time.Tablets prepared with *H .cannabinus* binder disintegrated faster than acacia and tragacanth. This result confirms the result of swelling factor and water absorption capacity, which showed that mucilage from *H. cannabinus*, swelled to greater extent and absorbed more water than acacia and comparable to tragacanth.

Dissolution study

In vitro dissolution study

The in vitro dissolution profile was also carried out for tablets to find out change in dissolution data when hardness of standard binder and hardness of *H. cannabinus* mucilage tablets were kept same. The results of dissolution profile have been shown in table 5 to 12 and figures 2 to 9.

CONCLUSION

The property of *H. Cannabinus* mucilage as a tablet binder was studied. For study the concentration of mucilage from 1 to 10% was used to prepare tablets. In this, Paracetamol was used as a model drug having analgesic activity. Different evaluation tests were performed and results compared with standard marketed tablet containing paracetamol as a drug (Crocin). The tablet formulation with 4% concentration of mucilage as a binding agent gets matched with results from standard preparation. So the *H. cannabinus* mucilage can also acts as a good binding agent.

REFERENCES

1. Kibbe A H. Editor. Handbook of pharmaceutical excipients. 3rd ed. London (UK); pharmaceutical press. 2000

2. Anonymous. The wealth of India. Raw materials Vol. 8. Council of science and Industrial Research, New Delhi, pp.77-78. 2003

3. Tripathy S, Pramod K., Banthia, A K. Novel delivery system for Aceclofenac. Scientific abstract. 56th Indian Pharmaceutical Congress, p. A. 71. 2004

4. Kapoor V P, Joshi H, Chaubey M. Application of seed gums in pharmaceutical formulations. Published by Photochemistry division, National Botanical Research Institute. Lucknow, India. p.42.1992

5. Deodhar U P. Preliminary Pharmaceutical Evaluation of seed gum of *Leucaena leucocephala,* M.Pharm Thesis, Poona College of Pharmacy, Pune University, Pune, pp.3-4, 13-14.1996

6. Monif T, Malhotra A K, Kapoor V P. *Cassia fistula* seed galactomannan. Potential binding agent for pharmaceutical formulation. Ind. J. Pharm. Sci. 1992; 54: 234-240.

7. Banker G S, Anderson N R. Tablets. In.; Lachman L. Lieberman H A, Kanig J L, editors. The theory and Practice of Industrial Pharmacy. 3rd ed. Mumbai. Varghese Publishing House P. 115 1997

Table 1: Formula for tablets (using 1% binder)

Name of ingredient	Quantity (%)
Paracetamol	83.33
Maize starch	5.0
Lactose	9.5
Magnesium stearate	2.5
Binder	1.0

Table 2: Evaluation of tablets prepared using Acacia

Sr. No.	Parameter	Binder Concentration % w/w.							
		1	2	3	4	5	6	8	10
1.	Hardness (kg/cm^2)	2.5	3	3.5	3.8	4.0	5.5	5.8	6.0
2.	Friability (% w/w)	0.76	0.70	0.66	0.65	0.52	0.50	0.48	0.45
3.	Disintegration time (min)	1.30	1.47	2.10	5.16	6.55	8.27	9.12	9.57
4.	Content Uniformity (%)	96.21	96.73	97.23	97.87	98.12	98.42	98.97	99.23
5.	Uniformity of weight (mg)	600	595	600	601	597	600	598	600

Table 3: Evaluation of tablets prepared using *H. cannabinus* mucilage

Sr. No.	Parameter	Binder Concentration % w/w.							
		1	2	3	4	5	6	8	10
1.	Hardness (kg/cm^2)	3.0	3.5	3.5	4.0	5.0	5.5	6.0	6.2
2.	Friability (% w/w)	0.72	0.70	0.68	0.65	0.60	0.55	0.50	0.45
3.	Disintegration time (min)	1	1.52	2.17	4.48	7.45	8.45	9.48	10.20
4.	Content Uniformity (%)	96.27	97.17	97.84	98.52	99.10	99.32	99.80	99.85
5.	Uniformity of weight (mg)	603	601	598	598	602	603	600	595

Table 4: Evaluation of tablets prepared using Tragacanth

Sr. No.	Parameter	Binder Concentration % w/w.							
		1	2	3	4	5	6	8	10
1.	Hardness (kg/cm^2)	3.0	3.5	3.8	4.2	4.5	5.7	6.0	6.2
2.	Friability (% w/w)	0.74	0.70	0.65	0.60	0.55	0.50	0.45	0.40
3.	Disintegration time (min)	1.20	2.10	2.27	4.27	7.17	9.10	10.21	10.48
4.	Content Uniformity (%)	96.17	97.10	97.53	98.12	98.97	99.20	99.46	99.87
5.	Uniformity of weight (mg)	600	598	599	600	600	595	595	601

Table 5: Percentage drug release for 1 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	85.210	86.218	98.319
20	99.266	99.025	99.664

Table 6: Percentage drug release for 2 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	73.613	85.210	85.210
20	99.894	99.518	99.770

Table 7: Percentage drug release for 3 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	64.538	79.412	79.160
20	85.171	85.588	93.401
30	99.975	99.598	99.975

Table 8: Percentage drug release for 4 % binder concentration

Time(min)	%Drug release		
	Acacia	tragacanth	Mucilage
0	00	00	00
10	55.714	65.042	65.555
20	83.812	84.924	85.193
30	90.787	86.112	99.745
40	97.073	98.395	

Table 9: Percentage drug release for 5 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	46.639	52.941	57.227
20	54.216	70.672	79.291
30	73.972	77.501	94.283
40	92.176	93.473	99.599
50	98.978	99.529	

Table 10: Percentage drug release for 6 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	40.588	38.319	33.025
20	50.115	54.123	62.132
30	77.894	75.896	71.389
40	81.521	81.770	81.499
50	92.994	90.978	88.434
60	98.283	98.313	99.723

Table 11: Percentage drug release for 8 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	37.311	28.235	21.429
20	41.507	31.322	27.465
30	53.560	42.759	33.818
40	73.810	74.235	41.499
50	87.471	80.594	47.244
60	99.258	96.090	64.896

Table 12: Percentage drug release for 10 % binder concentration

Time(min)	%Drug release		
	Acacia	Tragacanth	Mucilage
0	00	00	00
10	33.277	30.504	19.916
20	40.958	37.398	21.902
30	47.964	41.339	27.941
40	66.387	50.866	36.818
50	80.471	58.980	43.773
60	98.232	76.003	46.011

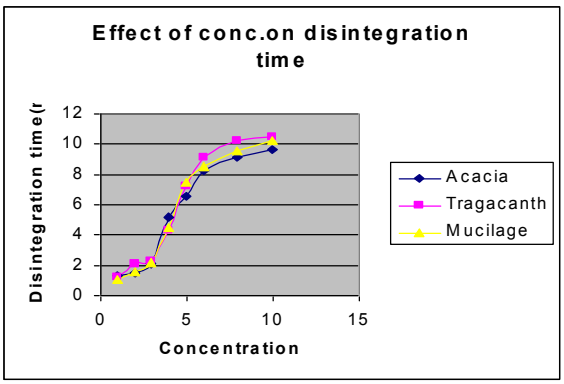

Fig.1. Effect of concentration on D.T. of tablets

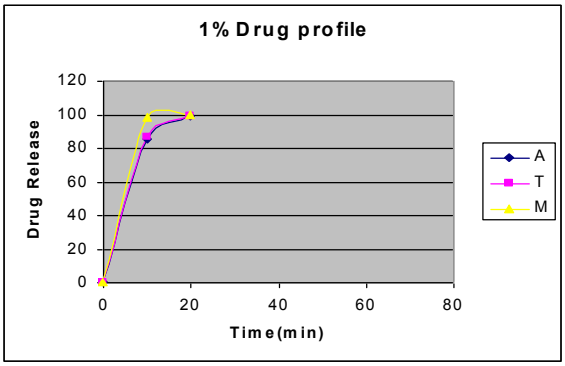

Fig.2 Comparative dissolution profile for A.1%, T.1% and *H.c.*1%

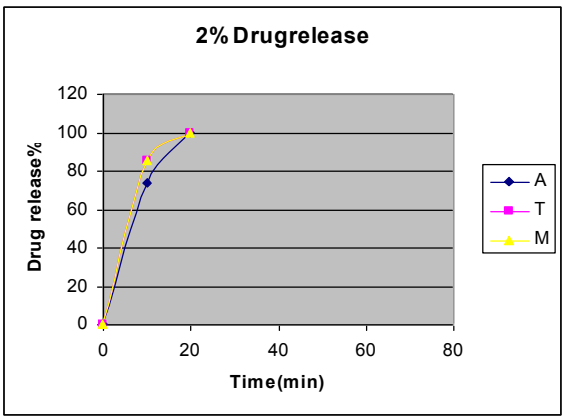

Fig.3.Comparative dissolution profile for A2%, T2% and Hc2%

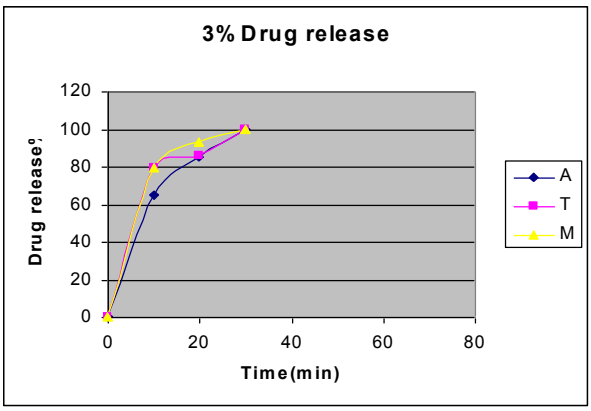

Fig.4 Comparative dissolution profile for A.3%, T.3% and *H.c.*3%

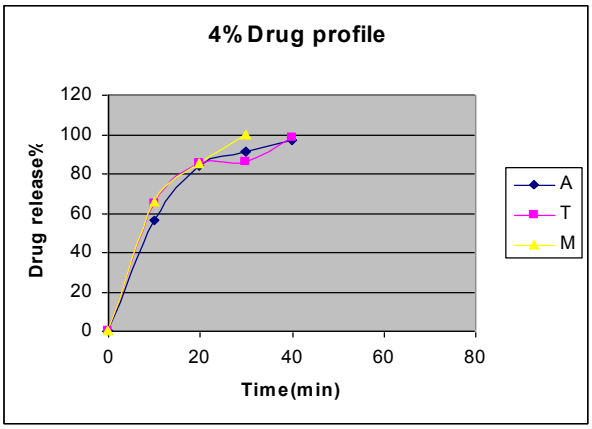

Fig.5.Comparative dissolution profile for A4%, T4% and *Hc*4%

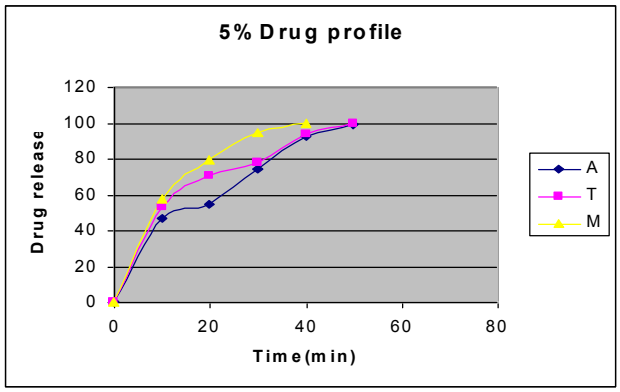

Fig.6. Comparative dissolution profile for A.5%, T.5% and *H.c.*5%

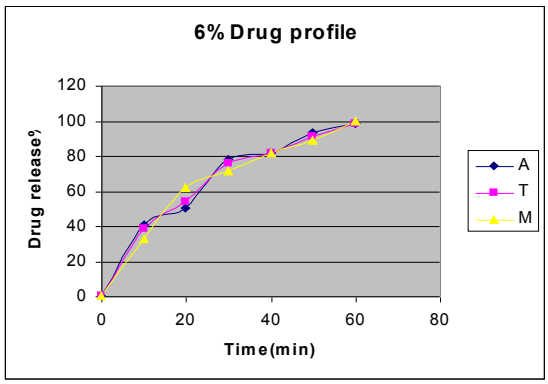

Fig.7.Comparative dissolution profile for A.%6, T.6% and H.c.6%

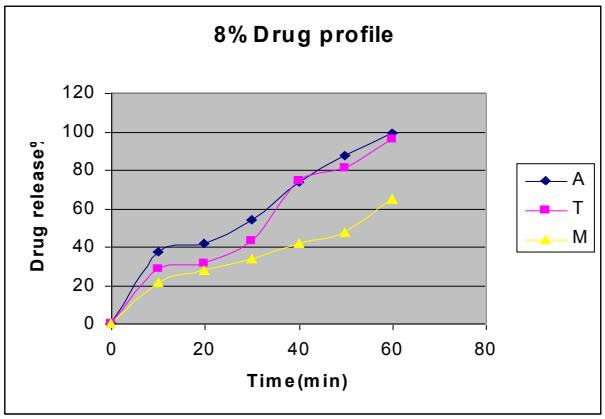

Fig.8.Comparative dissolution profile for A. 8%, T.8% and *H.c.* 8%

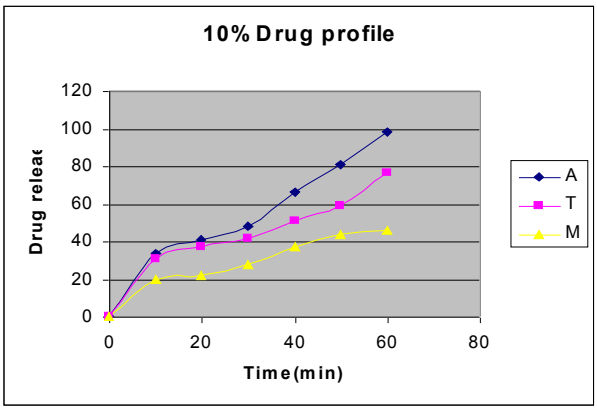

Fig.9.Comparative dissolution profile for A.10%, T.10% and *H.c.*10%

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