

# STANDARDISATION AND PHARMACEUTICAL EVALUATION OF CHLOROPHYTUM BORIVILIANUM MUCILAGE

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## ABSTRACT

*Chlorophytum borivilianum*, a medicinal plant belonging to family liliaceae, has been traditionally used as adaptogenic drug. Various aspects of its phytochemistry and pharmacology are going to be studied world over by researchers. Present study is done on mucilage, major constituent, obtained from tubers of *C. borivilianum*. Various physicochemical as well as pharmaceutical properties of mucilage are studied. Mucilage has been found to be better suspending agent as compared to tragacanth and also found to be effective binder.

**Keywords:** binding property, *Chlorophytum borivilianum*, emulsifying property, mucilage, suspending property.

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## INTRODUCTION

In Indian system of ayurveda tubers of *Chlorophytum borivilianum* family liliaceae are very famous for its adaptogenic and aphrodisiac properties. About 256 species of this plant are found in world and all are comes under the name of safed musli. Among this *Chlorophytum borivilianum* has very great market demand. But such important medicinal plant has get attention of researchers just 2-3 years before and now it is extensively studied for its pharmacological and phytochemical aspects.

Extracts of tubers has been previously studied for antidiabetic, antistress, immunomodulatory, anti-inflammatory, antioxidant and antimicrobial activities. All this activities are supposed to be due to presence of saponin glycosides and alkaloids. Tubers also contain carbohydrates, proteins and abundant amount of mucilage. Recently one fructo-oligopolysaccharide has been isolated and evaluated for antidiabetic activity.

Plant Mucilage are pharmaceutically important polysaccharide with wide rang of applications such as thickening, binding, disintegrating, suspending, emulsifying, stabilizing, and gelling agents. They have been also used as matrices for sustained and control release drugs. Acacia, tragacanth, gum ghatti, gum karaya are popular examples of plant mucilages. Present paper deals with isolation, phytochemical and pharmaceutical evaluation of mucilage obtained from *C. borivilianum*.

## EXPERIMENTAL

### Plant material:

Extraction and isolation of mucilage: Dried tubers were ground to fine powder. Powder was first defatted with pet. ether and then extracted with methanol to remove saponins. Then marc was soaked in warm water for 3 hrs and kept aside for 2 hr. material was squeezed in a muslin bag to remove marc from filtrate. Filtrate was added slowly to acetone to precipitate mucilage (figure-1). The mucilage was separated and made moisture free with successive precipitation with ethanol. Finally isolated mucilage was dried in oven at temperature less than 50<sup>0</sup>C, powdered and stored in desiccator until use. Percentage yield of CBM (*C. borivilianum* mucilage) was 7.8 %.

### Physicochemical evaluation of CBM:

This isolated mucilage was evaluated for various physicochemical properties and results are listed in table-1.

**Evaluation of suspending property:** To evaluate suspending properties, 20 % zinc oxide suspension was prepared with three concentrations of CBM (1, 2, and 3%) and compared with same concentrations of CMC and tragacanth. 0.2 % benzoic acid was used as a preservative. After preparation of all suspensions, 20 ml of each were kept aside and observed during 50 days for its separation ratio (Figure 2). Results are elaborated in table-2. From results it is cleared that CBM is better suspending agent than tragacanth.

**Evaluation of emulsifying property:** As many mucilages are found to be good emulsifier hence CBM also evaluated for its emulsifying property. Emulsions of volatile oil (25% turpentine oil) and fixed oil (25% liquid paraffin) were prepared by using three concentrations of CBM (1, 2, and 3%) and same as that of acacia as a standard emulsifier. 20 ml of each emulsion was set aside for 24 hrs but all emulsions containing CBM were found coarse. And thus it is confirmed that CBM can not be used as an emulsifier.

**Evaluation of binding property:** CBM was evaluated for its granulating and binding properties in tablets using nimusulide as a model drug. Granules were prepared by two concentrations (5 and 10%) of CBM by wet granulation technique. Same concentrations of gelatine were used as a standard binder. The efficiency of CBM as a binder was evaluated by determining comparative evaluationary parameters with that of gelatine such as percentage of fines, average granule size, porosity (Hauser's ratio), compressibility index, angle of repose, flow rate and illustrated in table-3. Tablets The tablets were punched by using Rimek Mini Press-I machine and were evaluated for hardness, friability, disintegration and in vitro dissolution time (Table 4). The tablets shown good physical properties and drug release was found to be 90-95% within 3 hours.

## RESULTS AND DISCUSSION

*C. borivilianum* mucilage is pale white crystalline powder which has shown presence of glucose and mannose by osazone tests. TLC studies have confirmed presence of both sugars. Other standardisation parameters have been also studied. CBM was found to have better suspending property than tragacanth but poor as compared to CMC. So CBM can be utilised as suspending agent in lower concentration instead of tragacanth. CBM was found to give coarse emulsions and hence it can't be used as emulsifying agent. Binding properties has shown that binding of CBM giving same binding as that of gelatine. So it can be concluded that CBM can be used as effective suspending and binding agent but can not be emulsifying agent. It is also economic if marc left after saponin extraction is further utilised to isolate mucilage.

**Table-1** :Physicochemical evaluation of *C. borivilianum* mucilage

Sr. no.	Properties evaluated	Observation
1	Colour	Pale white
2	Odour	Characteristic
3	Taste	Mucilaginous
4	Nature	Crystalline
5	Solubility	Forms colloidal solution in water and insoluble in alcohol, chloroform
6	Total ash value	3.05%
7	Acid insoluble ash value	1.2%
8	Water soluble ash value	2.05%
9	Viscosity (1% solution)	0.02323 Poise
10	Density (1% solution)	1.004 g/ml
11	Surface tension	80.3937d/cm
12	P <sup>H</sup> (By digital P <sup>H</sup> meter)	5.4

13	Optical rotation (of acid hydrolysed mass)	+ 1.08
14	Loss on drying	13 %
15	Swelling index	4
Identification tests		
16	With ruthenium red	Pink to red colour
17	With methylene blue	Blue colour
18	With iodine	Blue colour
19	Molish test	Positive
20	Fehling's test	Negative, non reducing sugars present.
21	Phloroglucinol + HCL	Pentose sugar present
22	Test for uronic acid	Uronic acid present
24	Total carbohydrate content (Anthrone method)	72.54%
25	Osazone crystal analysis	Mannose, Glucose
26	IR spectra (Figure 3)	major peaks at 802, 1099, 1616, 1714, 1874 3241 $\text{cm}^{-1}$ which confirms hydroxyl and keto groups
27	TLC pattern Mobile phase: Water: Acetone Stationary phase: silica gel G Spraying agent: Phosphomolybdic acid	1 spot blue matches with glucose
28	Element detection	P, Fe present
29	Lead	15-20 ppm
30	Arsenic	Less than 1 ppm

Table-2 :Sedimentation rate (Hu/Ho) of different suspensions

Suspending agent (%)	CMC			TRAGACANTH			CBM		
	1	2	3	1	2	3	1	2	3
Days									
1	0.4	0.56	0.72	0.4	0.42	0.48	0.44	0.42	0.4
2	0.36	0.52	0.72	0.38	0.38	0.44	0.44	0.4	0.4
4	0.32	0.44	0.72	0.36	0.36	0.44	0.42	0.32	0.4
6	0.28	0.4	0.72	0.36	0.36	0.44	0.42	0.32	0.4
8	0.28	0.4	0.72	0.36	0.36	0.42	0.36	0.32	0.4
15	0.28	0.4	0.72	0.36	0.36	0.42	0.36	0.32	0.4
25	0.28	0.4	0.7	0.36	0.36	0.4	0.36	0.32	0.38
40	0.24	0.4	0.6	0.32	0.32	0.36	0.36	0.32	0.38

Where Hu is apparent height of solid after sedimentation and Ho is height of original suspension

Table-3: Granule properties of Gelatin and CBM

Binder conc. %	Gelatin		CBM	
	5	10	5	10
Granule size	0.35	0.38	0.40	0.42
Moisture content (%)	1.8	1.89	1.3	1.92

Density	Bulk	0.29	0.36	0.33	0.33
	Tapped	0.33	0.40	0.39	0.38
Hausner's ratio		1.09	1.1	1.07	1.13
Compressibility index		12.2	10	14.9	15.4
Angle of repose		26	22	24	28

Table -4: Tablet properties of Gelatin and CBM

Binder conc. %	Gelatin		CBM	
	5	10	5	10
Hardness (kg/cm <sup>2</sup> )	3.4	4.5	3.2	3.3
Friability (%)	0.30	0.25	0.25	0.40
Disintegration time (sec.)	243	305	258	285

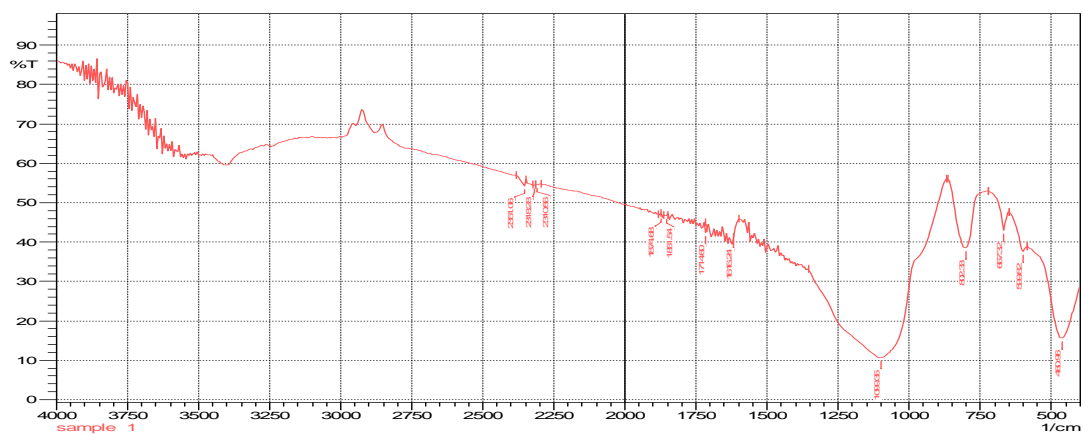
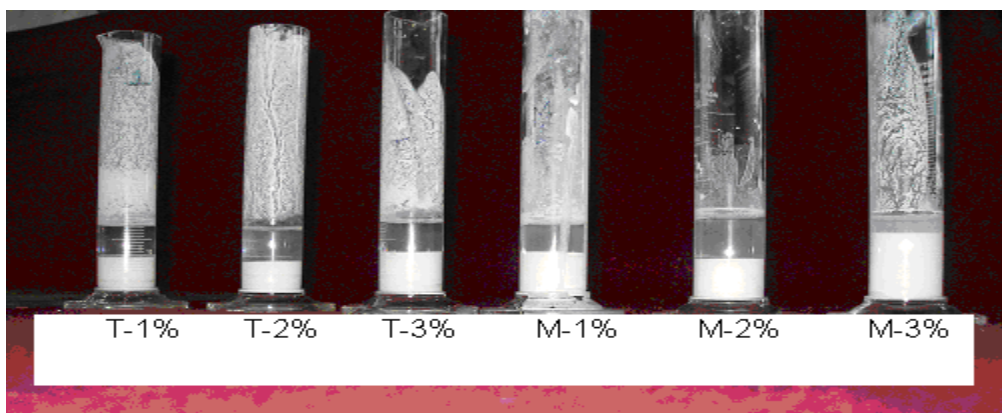


Fig.-1: IR spectra of CBM



Fig.-2 :Mucilage precipitation in acetone



**Fig.-3:** Comparison of suspending properties of tragacanth and mucilage  
Where T- Tragacanth, M: Mucilage of *C. borivilianum*

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(Received: 20 October2008

Accepted: 7 November 2008

RJC-263)

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