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ISOLATION AND CHARACTERIZATION OF MUCILAGE FROM BUTEA MONOSPERMA (*LAM.*) BARK

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ABSTRACT

Butea monosperma (*Lam.*) found wildly grown in the forest of Marathwada region contains a high proportion of mucilage and it also being used for different therapeutic purposes. The present study is planned to isolate mucilage from the Butea monosperma bark by using ethanol precipitation method followed by its characterization by studying its morphological characteristics, identification by chemical tests, solubility, melting range, pH, Swelling index, Ash values, presence of foreign organic matter, test for lead and arsenic, Loss on drying, Density, compressibility index and angle of repose. The results of present work B. monosperma bark mucilage can be used as natural polymer and excipients in the pharmaceutical formulations.

KEYWORD: Butea monosperma bark, mucilage, isolation, characterization.

INTRODUCTION

Gums and mucilage are widely employed in the pharmacy as thickeners, suspending agents, emulsifying agents, binders and film formers. With the increase in the demand for such natural polymers, it has been necessary to explore the newer sources of gums and mucilage to meet the industrial demand. India, due to its geographical and environmental positioning has traditionally been a good source for such products among the Asian countries.[1] Mucilage is a sticky substance used as an adhesive, it is also gummy substance obtained from certain plants. Mucilage is act as a membrane thickener and food reserver. Scientifically and technically mucilage is naturally occurring, high-molecular weight (200,000 and up), organic plant product of unknown detailed structure.[2] Chemically, mucilage is closely allied to gums and pectin but differ in certain physical properties. Although gums swell in water to form

sticky, colloidal dispersion and pectin gelatinize in water, mucilage form slippery, aqueous dispersion.[3] Mucilage occurs nearly in all classes of plant in various parts of plants, including marsh mallows and flaxes and certain seaweeds but it has relatively small percentage. The chief sources of mucilage are Icelandic and Irish moss, Linseed, Locust bean, Slippery elm and Quince seed.[4] The use of natural gums and mucilage as important part of formulation is with the development of pharmacy and different dosage forms as general excipient for oral use, eg. in tablets and capsules etc. the options are limited.[5]

The synthetic polymers have certain disadvantages such as high cost, toxicity, environmental pollution during synthesis, non-renewable sources, side effects, less patient compliance, etc.[6] While the advantages of natural plant based materials include low cost, natural origin, free from side effects, bio acceptable, renewable source, environmental-friendly processing, local availability (especially in developing countries), better patient tolerance as well as public acceptance etc.[7]

Mucilage is polysaccharide complexes formed from sugar and uronic acid units. Mucilage from slimy masses in water and are typically heterogeneous in composition. Upon hydrolysis, arabinose, galactose, glucose, mannose, xylos and various uronic acids are the most frequently observed components. Mucilage is obtained mainly from bark or other plant parts. Some are obtained from marine algae, and from selected microorganisms.[8] The Butea monosperma Bark (BMB) contains a high proportion of mucilage and it also being used for different therapeutic purposes. Therefore, in present study the bark of Butea monosperma was selected for the isolation of mucilage.

MATERIAL AND METHOD

Collection of plant material

Butea monosperma bark **(**BMB) was collected from surrounding forest area of Nanded District of Marathwada region, Maharashtra, India. The collected bark was authenticated by Pharmacognosy Dept. of Nanded Pharmacy College, Nanded.

Isolation of *Mucilage*

100gm powdered bark was boiled with 1000 ml distilled water for 15 to 20 min and then mass was filtered through Buckner funnel without filter paper. The retained residue was again boil with 500 ml distilled water for 15 min followed by passing through eight fold of muslin

cloth. The mucilage was precipitated from the filtrate by adding ethanol. The precipitated mucilage was dried in an oven at 45^0C till complete drying.[9,10]

Characterization of *Mucilage*

The separated mucilage was evaluated for its physicochemical characteristics such as its morphological characteristics, identification by chemical tests, solubility, melting range, pH, swelling index.[11] ash values.[12] presence of foreign organic matter, test for lead and arsenic.[13] Loss on drying.[14] density, compressibility index and angle of repose.[15] (Table 1 and 2). The evaluation was carried out as per procedures describe in official books.

RESULT AND DISCUSSION

Table 1:- Physicochemical Characteristics of mucilage from *Butea monosperma*.

Tests	Observation
Description	Brownish powder
Solubility	Soluble in luck warm water, Practically insoluble in ethanol, acetone, ether and chloroform.
Odour	Characteristic.
Appearance	Lustrous.
Identification: a) Mounted in 96% ethanol b) Mounted in ruthenium red c) Mounted in iodine solution	Transparent angular masses. Particles stained red. Particles stained blue.
Melting range	Above 200°C
P^H (1%w/v)	Neutral
Loss on drying (%)	5 ±0.159
Ash value (%)	5.7±0.87
Acid insoluble ash (%)	1.3±0.43
Swelling index (ml)	17±1.23
Test for Carbohydrate (Molish test)	Positive
Test for tannins (Ferric chloride test.	Negative
Test for chloride (Silver-nitrate test)	Negative
Test for Sulphate (Bariumchloride test)	Negative
Uronic acid test	Positive
Test for foreign matter	NMT 0.2%
Test for heavy metal as lead.	20-23PPM
Test for Arsenic.	Negative
Flavonoid test	Negative

Table 2:- Flow property of mucilage of bark of *Butea monosperma*.

Parameter	Result
Angle of repose (θ)	29.17±1.34
Bulk density (gm/cm^3)	0.53±0.06

Tapped density (gm/cm^3)	0.64±0.04
Compressibility index (%)	17.18±1.02
Housner's ratio	1.20±0.42

All the percent values were expressed in mean±SD, n=5

In the present study, we are the first to report the mucilage from BMB. Furthermore, the mucilage was characterized for their physical, chemical and flow property.

PHYSICAL CHARACTERIZATION

The ethanol-precipitated mucilage was found to be brownish grey color powder with characteristic odour. The mucilage is completely soluble in Luke warm water produces viscous solution with neutral pH, while it was practically insoluble in ethanol. The total mucilage was found to be 8.23±1.35 gm/kg. The loss on drying was 5 ±0.159%, considered to be within limits. Which suggesting its suitability in formulations containing moisture sensitive drugs and may lead to the activation of enzymes and the proliferation of microorganisms. The percentage of swelling was 17.0±1.23%, which was found to be satisfactory, suggests the mucilage may perform well as binder/disintegrant/matrixing agent.[16] The dried mucilage was melted and charred at an above 200^{o}C, indicating their thermal stability. The total ash and acid insoluble ash value of BMB mucilage was found to be 5.7±0.87 and1.3±0.43% w/w respectively, which indicates low levels of contamination.[17]

CHEMICAL CHARACTERIZATION

Chemically the mucilage has shown the presence of sugars and oxidized sugar i.e. carbohydrates and uronic acid. This is basic composition for all mucilage. Further BMB mucilage gave negative test for other water-soluble contaminants such as tannins, sulphates and chlorides. The amount of foreign organic matter was negligible. Furthermore, the heavy metal concentration was within acceptable limits. The results represented in table1.

FLOW PROPERTY CHARACTERIZATION

The Loose bulk density and Tapped bulk density values were 0.53±0.06and 0.64±0.04 gm/cm^3 respectively. The dried BMB mucilage showed 29.17±1.34° angle of repose, indicates a good flow property. The compressibility index of the dried mucilage was 17.18±1.20% and Hausner's ratio was found to be 1.21±0.04. These results indicates good flow of the dried mucilage, which indicate the BMB mucilage will be good binder in tablet formulations and other pharmaceutical formulations (Table 2).

CONCLUSION

The results of present study on BMB mucilage showed that mucilage possess good physicochemical property with significant flow characteristics. The swelling ability and pH indicates the mucilage can be used as good excipient for tablet formulations, liquid orals and other pharmaceutical dosage forms.

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