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ISOLATION AND CHARACTERIZATION OF ARAUCARIA HETEROPHYLLA MUCILAGE

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ABSTRACT

Mucilage was obtained by extraction from the bark exudates of Araucaria heterophylla. Aim of this present study was to evaluate the pytochemical and physiochemical characterizations such as solubility, loss on drying, ash value, pH, particle size distribution, moisture sorption, swelling capacity, and gelatinization of the dried mucilage. Mucilage showed the presence of reducing sugars and starch. Swelling capacity and gelatinization of the mucilage suggest the suitability of the mucilage as a pharmaceutical excipient.

KEYWORDS: Araucariaceae, mucilage, gelatinization, excipient, biodegradable

INTRODUCTION

Natural gums and mucilage are having wide range of advantages over synthetic compounds such as naturally abundant, biocompatible, biodegradable, and nonimmunogenic, economic, and found to be useful as pharmaceutical excipients. Araucaria polysaccharide gum is obtained by extraction from the stem bark exudates of the plant Araucaria heterophylla (Fam. Araucariaceae) widely grown and widely distributed in all over the world. However, it appears that no significant attempt has been made to study the exudates from this plant as pharmaceutical applications. In previous studies, a method of Chemical and Biological Investigation of Araucaria heterophylla has been developed. The isolated compounds were identified using different spectroscopic methods. The resin extract showed antiulcerogenic activity and the resin showed variable cytotoxic activities against breast and colon cancer cell lines [1]. Therefore, further studies were carried out for isolation and multiscale characterization of this gum which include pytochemical characterization, solubility, particle size, ash value, moisture content, flow properties of gum, bulk density and swelling index.

MATERIALS AND METHODS

The plant material used in this study consisted of particles from the dried mucilage of Araucaria heterophylla (Family: Araucariacea) and all other reagents used were analytical grade.

Isolation and purification of mucilage [2-4]

The plant exudates was dried and hydrated in distilled water for 2-3 hrs with intermittent stirring; extraneous materials were removed by straining through a muslin cloth. The mucilage was precipitated from filtrate using acetone. The precipitate was separated and dried on water bath at 50°C. The dried mucilage was pulverized using a laboratory blender and stored in air tight container (figure1).

Phytochemical examination of mucilage [5]

Identification of the presence of carbohydrates and reducing sugars Molisch's test and reduction of Fehling's solution were done. Molisch's test, the mucilage was treated with α-naphthol and concentrated sulphuric acid, forms violet ring at the junction of two layers. Equal quantity of Fehling's solution A and B were added to the mucilage of Araucaria heterophylla. The presence of tannin was identified upon treating the mucilage with ferric chloride solution. The mucilage was treated with the ruthenium red solution and Benzidine solution for conformation of mucilage.

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Solubility test

The separated mucilage was evaluated for solubility in water, acetone, chloroform and ethanol in accordance with the B.P. specifications [6].

Loss on drying [7]

The sample (1.0 g) was transferred into each of several Petri dishes and then dried in an oven at 105°C until a constant weight was obtained. The moisture content was then determined as the ratio of weight of moisture loss to weight of sample expressed as a percentage.

Ash value

Ash content was estimated from the residue left after combustion in a furnace at 450°C [10]. The ash obtained was boiled with 25 mL of 2 M hydrochloric acid solution for 5 min and the insoluble matter filtered and washed with hot water and ignited and weighed for the determination of total ash. The acid insoluble percentage ash was calculated [8].

pH determination

A 1% w/v dispersion of the sample in water for 5 min and the pH was determined using electronic pH meter (ELICO LI 120 Model)

Particle size distribution

The particle size distribution and shape of the mucilage were determined by observing 100 particles under optical microscope, from which the values of the mean particle diameter were calculated. A surface character of the mucilage was studied by photomicroscopical images.

Moisture sorption capacity [9]

Two grams (2g) of the powder mucilage (*W*) were weighed and put into a tarred Petri dish. The samples were then placed in desiccator containing distilled water at room temperature and the weight gained by the exposed samples at the end of a 5 day period (*Wg*) was recorded and the amount of water absorbed (*Wa*) was calculated from the weight difference as

$$Wa = Wg - W$$

Swelling capacity

Ten grams (10 g) of Araucaria mucilage was weighed and placed in a 50 ml graduated measuring cylinder. The tap volume was noted after 100 taps. The Araucaria gum was shaken with 40 ml of purified water until all particles were well dispersed. The mucilage was adjusted to 50 ml volume and the sedimented volume of swollen gum was observed after 24 h. The swelling capacity is the ratio of the swollen volume to the tap volume.

Gelatinization and pasting characteristics of the mucilage [10]

Starch powder was moistened with water and loaded into a capillary tube by means of intrusion. The temperature of gelling and the time from swelling to full gelatinization were measured with a melting-point apparatus. The pasting characteristic of mucilage was observed after suspending 1 g of powder in 10 mL of distilled water and heating, with stirring, on a water bath. The time until paste formation was 2.5 ± 0.5 min

RESULTS AND DISCUSSION

Pytochemical characters

Isolated mucilage was evaluated for pytochemical characters. The presence of carbohydrate and reducing sugars were identified with the positive result upon the treatment of Molisch's test (formation of purple color) and Felhings A& B(yellow color precipitate on heating) respectively. The ferric chloride test showed the absence of tannins. Formation of pink colour with Ruthenium red and blue colour with Benzidine solution indicated the presence of mucilage.

Physiochemical characters

The dried mucilage was white crystalline powder, slightly soluble in water and it was practically insoluble in ethanol, acetone and chloroform.

The percentage loss on drying was 2% w/w. The total ash and acid insoluble ash value of mucilage was found to be 2.0 and 1.0% w/w respectively. Ash values reflect the level of adulteration contamination. The low values of total ash and acid insoluble ash obtained in this study indicate that there were low levels of contamination. Mucilage (1% w/v) in water gave a pH of 4.5. The pH of an excipient is an important parameter in determining its suitability in formulations. The stability and physiological activity of most preparations also depends on pH.

Figure 3 shows the photomicrograph of the dried mucilage. The particle size of mucilage is variable and ranges from 43.32 to 57. 76 µm which appear round, spherical or irregular in the shape (figure 2). The round shape and smaller particle size of mucilage would be expected to promote closer packing of particles.

The moisture content of Araucaria was low, and with in the official limits (BP, 2202) suggesting that it is suitable for formulations containing moisture sensitive drugs.

The moisture sorption capacity of the mucilage was more. The moisture sorption capacity is a measure of moisture sensitivity of a material and it influence the physical stability of the tablets formulated with the material when stored under humid conditions. The swelling capacity of the mucilage was low which indicates that the mucilage undergoes slow hydration and may be not good disintegrant.

The pasting characteristic of mucilage is known to influence their distribution over substrates during granulation and in turn determine to a large extent the properties of the resulting granules and tablets.

Fig 1. Extract of powder Araucaria heterophylla mucilage.

Fig 2: Particle size distribution of Araucaria mucilage

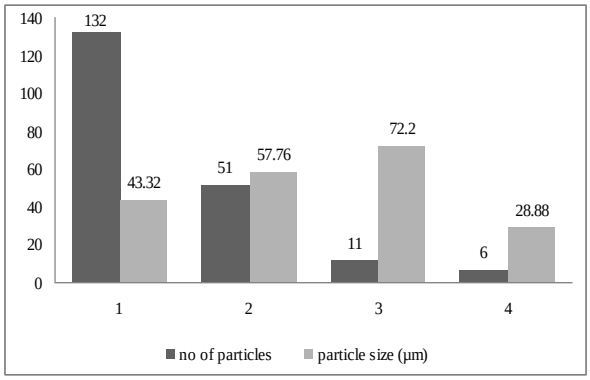

Fig: 3. Photomicrographs of Araucaria mucilage.

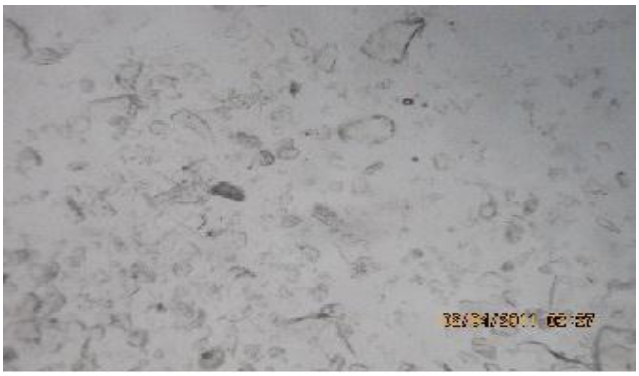

Table 1 Physicochemical Properties of the Araucaria mucilage

Parameters	**Observation**
Shape	Round
Loss on drying (%)	3%
Moisture sorption capacity (%)	4.87
Swelling capacity (%)	13.9
pH	4.5
Average particle size(µm)	43.32
Appearance	White powder
Temperature of gelatinization (°C)	94.5 (±0.9)
Pasting capacity (min)	2.5 ± 0.2 min

CONCLUSION

The mucilage obtained from Araucaria heterophylla was found to be amorphous free flowing powder and posses the characteristics of carbohydrate and reducing sugars. The mucilage exhibited good solubility in water and insoluble in organic solvents. The physiochemical properties of the mucilage revealed that it can be used as good pharmaceutical excipient for various dosage forms.

REFERENCES

1 Essam AS, Azza RA, Shahira ME, Ali ME, Samar MM. Chemical and Biological Investigation of Araucaria heterophyllaSalisb. Resin Z. Naturforsch, 64 c, 2009, 819-823.
2 Kale RH, Joshi UM, Ambhore DP, Sitaphale GR. *Int J ChemTech Res*, 1, 2009, 11-15.
3 Kumar R, Patil MB, Patil SR, Paschapur MS. *Int J PharmTech Res*, 1, 2009, 658-665.
4 Kumar R, Patil MB, Patil SR, Paschapur MS. *Int J PharmTech Res*, 1, 2009, 695-704.
5 Khandelwal, KR., Practical Pharmacognosy, Techniques and Experiments. *Nirali Prakashan,* Pune, 2002.
6 Giron D. Thermal analysis of drugs and drug products. In: J. Swarbrick; J.C. Boylan (eds), Encyclopedia of Pharmaceutical Technology. 2nd ed., *Marcel Dekker Inc*, New York, NY, pp 2766-2793, 2002.
7 British Pharmacopoeia, British Pharmacopoeia Commission, 2004.
8 Ohwoavworhua FO, Adelakun TA. Some physical characteristics of microcrystalline cellulose obtained from raw cotton of Cochlospermum planchonii. *Trop. J. Pharm. Res*, 4, 2005, 1-7.
9 Ohwoavworhua FO, Kunle OO, Ofoefule SI. Extraction and characterization of microcrystalline cellulose derived from Luffa cylindrica plant. *Afri.J. Pharamaceu. Res. Dev*., 1(1), 2004, 1-6.
10 Adebayo AS, Itiola OA. Effects of Breadfruit and Cocoyam Starch Mucilage Binders. *Pharmaceutical Technology*, 2003, 78-9003.