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Der Pharmacia Lettre, 2012, 4 (3):927-930
(http://scholarsresearchlibrary.com/archive.html)

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ISSN 0975-5071
USA CODEN: DPLEB4

Isolation and Characterization of Biopolymer Obtained from Fruit Pulp of *Prunus insititia*

Abhishek Bansal[1]*; N. V Satheesh Madhav[2] and A. K Sharma[3]

[1]*Siddhartha Institute of Pharmacy, Dehradun, Uttarakhand, India*
[2]*DIT, Faculty of Pharmacy, Dehradun, Uttarakhand, India*
[3]*Asmara College of Health Sciences, Asmara, Eritrea*

ABSTRACT

The excipients obtained from plant origin are gaining importance in the formulation of various dosage forms like, emulsions, matrix tablets etc. These excipients are eco-friendly and easily available [1]. Biopolymers are polymers that are biodegradable. The input materials for the production of these polymers may be either renewable (based on agricultural plant or animal products) or synthetic. Natural gums are widely used as emulgents, binders, suspending agents and film formers etc.These natural gums are the byproducts which results from metabolic mechanisms of plants. They are either soluble in water or forms viscous solution after absorption of water. The current study was designed to isolate, purify and characterization of biomaterial obtained from Prunus insititia. The physical, chemical and flow properties of biomaterial obtained from Prunus insititia were conducted and satisfactory results were obtained.

Key words: - *Prunus insititia*, Biopolymer, Swelling index

INTRODUCTION

The excipients obtained from plant origin are gaining importance in the formulation of various dosage forms like, emulsions, matrix tablets etc. These excipients are eco-friendly and easily available Prunus insititia belongs to the family Rosaceae. The fruit pulp consists of carbohydrate, fats and proteins, minerals. The biopolymer obtained from *Prunus insititia* can be used in pharmaceutical formulation due to its edibility, biodegradability and biocompatibility.

MATERIALS AND METHODS

Materials

The fruits of *Prunus insititia* were collected from the local market of Dehradun, India. Dimethyl Ketone was procured from SD fine chemicals (Mumbai, India). All other chemicals used were of analytical grade.

Extraction of biopolymer

The biopolymer was isolated from the fruit pulp of Prunus insititia by collecting and treating with water. The aqueous extract was further treated with 3 vol. Of dimethyl Ketone and kept aside in refrigeration for 6 hours. The biopolymer was collected by centrifugation for 15minutes at 2000rpm, and dried in an oven at 40^0C [2-4].

Characterization of biopolymer

Physical characterization

The extracted biopolymer was evaluated for physical characteristics [5-6] like. Appearance, odor, solubility, percentage yield, swelling ratio, pH, charring, and density

Chemical characterization

The extracted biopolymer was tested for chemical characteristics [5-6] like test for carbohydrates, test for chlorides, and test for sulfate.

Flow properties

The extracted biopolymer was dried and evaluated for the various flow properties of powders [7] like, bulk density, tapped density, Carr's index, Hausner's ratio and angle of repose. The procedures were followed as given in official books.

FTIR Spectroscopy

The dried biopolymer was subjected to FTIR spectroscopy .The samples were prepared by solid sampling technique using potassium bromide pellets using FTIR 1601 (Shimadzu, Tokyo, Japan). The scanning range was 400-4000cm-1.

RESULTS AND DISCUSSION

Physical characterization:-

The extracted biopolymer was brown in color and soluble in water and methanol .The pulp gave 25.5±1.103g of yield per kg and the swelling index was found to be 42±3.51%. The dried biopolymer was melted and charred at and above 225±3.4020C. The density of 1.0 % w/v solution was 1.310±0.410 g/cm^3 .The values are shown in table 3

Table1: - Physical characterization of *Prunus insititia* biopolymer

Physical properties	Observation
Appearance	Brownish powder
Odor	Characteristic
Solubility	Soluble in water, methanol
Yield (g/kg)	25.5±1.103
PH	7.0±0.41
Charring (^{0}C)	225±3.402
Density of liquid (1.0%w/v) g/cm^3	1.310±0.410
Swelling index (%)	42±3.51

Table2: - Chemical characterization of *Prunus insititia* biopolymer

Chemical properties	Observation
Molish test (for carbohydrates)	+
Ninhydrin test (for proteins)	-
Wagner's test (for alkaloids)	-
Silver nitrate test (for chlorides)	-
Barium chloride test (for sulfates)	-

Table3: - Flow properties of *Prunus insititia* biopolymer

Flow properties	Observation
Angle of repose (Θ^0)	25.11±1.03
Loose bulk density (g/cm^3)	0.352±0.15
Tapped bulk density (g/cm^3)	0.423±0.03
Carr's index (%)	19.15±0.37
Hausner's ratio	1.16±0.02

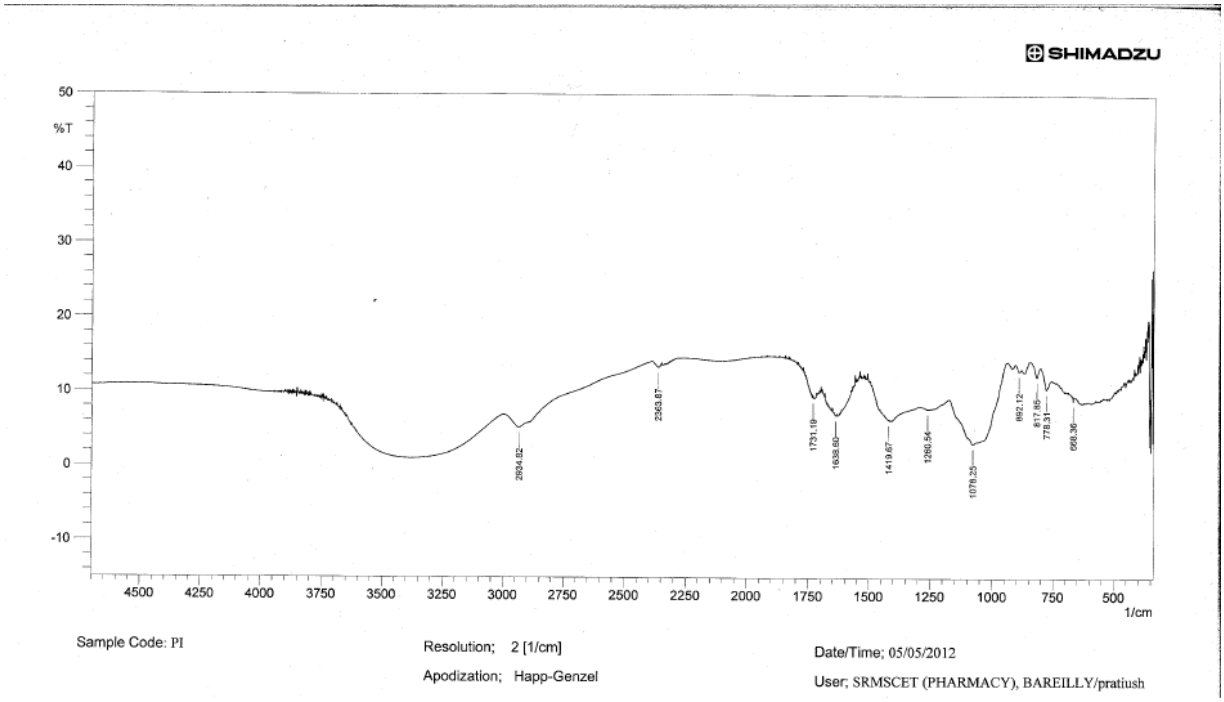
Number of trials 3 (n=3)

Chemical characterization
The biopolymer obtained from Prunus insititia gave a positive test for carbohydrates and negative tests for chlorides and sulfates.

Flow properties
The biopolymer obtained from Prunus insititia has an angle of repose of 25.11±1.030 which indicates excellent flow properties. The loose bulk density of the biomaterial was found to be 0.352±0.15/cm^{3}and tapped bulk density was 0.423±0.03g/cm^3. These values were utilized for calculating Carr's index and Hausner's ratio. Which were 19.15±0.37% and 1.16±0.02 respectively. These values were shown in Table.3

FTIR Spectrum
The FTIR spectrum of biopolymer obtained from *Prunus insititia* showed characteristic peaks at 2934.82, 2363.87, 1731.19, 1638.60, 1419.67, 1260.54, 1078.25, 892.12, 817.85, 778.31 and 668.36cm^{-1}.The FTIR spectrum of biopolymer obtained from *Prunus insititia* is shown in Fig.1

FIG:-1 FTIR Spectrum of biopolymer obtained from *Prunus insititia*



CONCLUSION

The biopolymer obtained from *Prunus insititia* has good physicochemical characteristics along with excellent flow properties. The biopolymer can be used as a binder in the formulation of tablets, as an emulsifier in the formulation of emulsions and also in novel drug delivery systems as a matrix forming material.

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