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Spectrophotometric estimation of total polysaccharides in *Cassia tora* gum

Harshal A. Pawar, Priscilla M. D' Mello

Harshal Ashok Pawar
Department of Pharmacognosy,
Dr.L.H.Hiranandani College of
Pharmacy, Ulhasnagar, India

Priscilla M. D'mello
Principal
K.M.Kundnani college of Pharmacy
Cuffe Parade, Colaba, Mumbai, India

ABSTRACT

Seed galactomannans commonly known as seed gums, are important food hydrocolloids used all over the world in different industries. They exhibit excellent binding, suspending, emulsifying, thickening, stabilizing and water-holding properties and could be utilized for the preparation of pharmaceutical dosage forms like tablets, syrups, suspensions, lotions, ointments and for sustained drug release systems. The present paper deals with the spectrophotometric estimation of total polysaccharide content of the gum obtained from *Cassia tora* seeds collected from Jalgaon region (Maharashtra). The gum was isolated by precipitation method & evaluated for total polysaccharide content using Phenol – sulphuric acid method. The total polysaccharide content in *Cassia tora* gum was found to be 77 % w/w.

Key words: *Cassia tora*, Polysaccharide, Natural Gum, Seed gum, Leguminosae

INTRODUCTION

Cassia tora Linn. (Family-Leguminosae) is a well-known plant widely distributed in India and other tropical countries (Nadkarni RM et al 1954). It is an annual undershrub and grows wild in wasteland. It is commonly known as "Sicklepod." Various medicinal properties have been attributed to this plant in the traditional system of Indian medicine. Different parts of the plants are reputed for their medicinal value. Several anthraquinones have been isolated from the seeds of *Cassia tora* (Shibata S et al 1969, Raghunathan K et al 1974). Sennosides, which are well known for their medicinal importance, have been detected in the leaves of the plants (Lohar DL et al 1975). The extracts of *Cassia tora* have been used as a remedy for various skin ailments, rheumatic disease and as laxatives (Hooker JD et al 1879, Kirtikar KR et al 1975, Jain SK et al 1968). The extract of *Cassia tora* leaves has been found to possess significant hepatoprotective activity and anti-inflammatory activity (Maitya TK et al 1997, Maitya TK et al 1998). The seeds of *Cassia tora* have been used in Chinese medicine as aperients, antiasthmatic, diuretic agent and also improve the visual activity (Asolkar LV et al 1992).

Seed galactomannans commonly known as seed gums, are important food hydrocolloids used all over the world in different industries. These are neutral heteropolysaccharides of galactose and mannose having a main chain of β -(1 \rightarrow 4) - mannopyranose units and galactose units are attached to the main mannan chain through α (1 \rightarrow 6). They exhibit excellent binding, suspending, emulsifying, thickening stabilizing and water-holding properties and could be utilized for the preparation of pharmaceutical dosage forms like tablets, syrups, suspensions, lotions, ointments and for sustained drug release systems. The present investigation deals with determination of total polysaccharide contents of *Cassia tora* gum spectrophotometrically using Phenol – sulphuric acid method (Foster DS et al 1961). The major sugar components of *Cassia tora* gum are galactose and mannose. Both these sugars are epimers of glucose. The absorption maxima of both these sugars after derivatisation is almost same as that of glucose. Hence, the absorption measurements were done at 488nm using glucose as standard.

***For Correspondence:**
Mr. Harshal Ashok Pawar
LECTURER,
Department of Pharmacognosy,
Dr.L.H.Hiranandani College of
Pharmacy,
Smt.CHM Campus, Opposite Railway
Station, Ulhasnagar, Dist.Thane,
Pin-421003, Maharashtra (India)

MATERIALS AND METHODS

Materials

Cassia tora seeds were collected from Chalisgaon, Dist. Jalgaon (Maharashtra) in the month of October. The plant was originally authenticated by Dr. J. M. Pathak, Research Director-Pharmacognosy, Zandu foundation, Mumbai. A herbarium sample of this plant is preserved at the Department of Pharmacognosy, Principal K. M. Kundnani college of Pharmacy, Mumbai. All the chemicals and reagents used were of LR grade.

Instrumentation

JASCO V 550 UV –VIS Spectrophotometer was employed for all spectroscopic measurements using a pair of matched quartz cells.

Methodology

Isolation of gum from *Cassia tora* seeds

The seeds of *Cassia tora* were subjected to dry milling in a mixer and the endosperm of seeds were separated from the seed coat.

The endosperm of *Cassia tora* seeds (100gm) were soaked in distilled water and shaken frequently for 4-5 hrs. The viscous solution obtained was passed through the muslin. The mucilage was precipitated out by addition of 95% ethanol in the ratio 1:1 by continuous stirring. The coagulated mucilage, which formed as a white mass was transferred to an evaporating dish and treated successively with ethanol. The coagulated mass was dried in oven at 40-45°C, powdered and stored in airtight container (Yield = 7.22% w/w).

Preparation of blank solution

To 1ml of distilled water added 1ml of 5% phenol followed by 5ml of concentrated H₂SO₄.

Preparation of standard solution

A stock solution 100µg/ml of glucose was prepared in distilled water. Aliquots were taken from this solution to obtain sugar concentrations 60-90µg/ml.

1ml of 5% phenol solution was added to 1 ml of sugar solution followed by 5ml of concentrated H₂SO₄. The absorbance was measured after 10 minutes at 488nm against blank.

Estimation of polysaccharide in *Cassia tora* gum (Test Preparation)

About 10mg of gum was dissolved in 100ml of distilled water. From this 1ml was used for sugar analysis. To estimate the polysaccharide content in *Cassia tora* gum, 1ml of 5% phenol added to the 1ml of *Cassia tora* gum solution, followed by 5ml of concentrated H₂SO₄. The absorbance was measured after 10 minutes at 488nm against blank. The experiment was carried out in triplicate (i.e. Test-1, Test-2 & Test-3).

RESULTS AND DISCUSSION

The absorbance readings of standard and test were tabulated in table -1.

Table-1: Absorbance reading for standard and test

Sr. No.	Concentration (mcg/ml)	Absorbance of Standard	Absorbance of Test			Mean	% RSD*
			Test-1	Test-2	Test-3		
1	0	0	0.341	0.346	0.339	0.342	0.59
2	60	0.25					
3	70	0.308					
4	80	0.345					
5	90	0.395					
6	100	0.435					

*Relative Standard Deviation

The calibration curve for different concentrations of glucose is represented in figure -1. Using the proposed method, the calibration curve was found to be linear in the range of 60-90µg/ml. A correlation coefficient of 0.9988 indicates good linearity between the concentration and absorbance. The % Relative Standard Deviation (% RSD) of 0.59 indicates that the used method is precise & accurate. The total polysaccharide content of *Cassia tora* gum was calculated using regression equation obtained from the calibration curve.

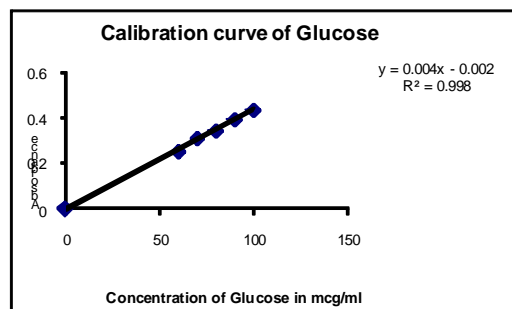


Fig.1: Calibration curve of glucose

The total polysaccharide content in *Cassia tora* gum was found to be 77 % w/w (Mean of three determinations).

CONCLUSION

The use of natural gums and polymers is increased in development of various pharmaceutical dosage forms because they are economical, readily available, non-toxic, capable of chemical modifications, potentially biodegradable and with few exceptions, also biocompatible. Majority of investigations on natural polymers in drug delivery systems center around polysaccharides. Natural gums can also be modified to have tailor-made products for drug

delivery systems and thus can compete with the synthetic controlled release excipients available in the market.

Gum obtained from the seeds of *Cassia tora* contains galactomannans i.e. neutral heteropolysaccharide of galactose & mannose. Quantitatively analyzing the total polysaccharides in complex mixture is difficult task. Phenol-sulphuric acid technique is one of the simple, rapid, precise and accurate spectroscopic technique for the determination of total polysaccharides in *Cassia tora* seed gum.

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