



Research Article

Spectrophotometric Estimation of Total Polysaccharides in *Plantago ovata* Husk Mucilage

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ABSTRACT

Mucilage of *Plantago ovata* husk has various characteristics like binding, gelling, granulating, film former, disintegrating, suspending, and sustaining properties and could be utilized for the preparation of pharmaceutical dosage forms like tablets, suspensions, gel and for sustained drug release systems. The present paper deals with the spectrophotometric estimation of total polysaccharide content of the mucilage obtained from *Plantago ovata* husks. The mucilage was isolated by precipitation method and evaluated for total polysaccharide content using Phenol – sulphuric acid method. The total polysaccharide content in *Plantago ovata* husk mucilage was found to be 71.37%w/w.

Key words: Mucilage, *Plantago ovata*, Polysaccharide

1. INTRODUCTION

Natural gums and mucilages have been widely explored as pharmaceutical excipients. These are widely used in the pharmaceutical industry as thickener, emulsifier, stabilizer, gelling agent, granulating agent, suspending agent, binder, film former, disintegrant and as sustained release matrix. Demand for these natural sources is increasing and new sources are being developed. Natural gums and mucilages are preferred over semi-synthetic and synthetic excipients in the field of drug delivery because they are cheap and easily available, have soothing action and nonirritant nature. Further, they are eco-friendly, capable of multitude of chemical modifications, potentially degradable and compatible due to their natural origin¹. The biological name of isabgol is *Plantago ovata* (Family- Plantaginaceae). The seed and husk of the isabgol are widely used in pharmaceutical industry as demulcent, emollient, laxative, as an adjunct to dietary and drug therapy on lipid and glucose levels, in patients with type II diabetes, and in the treatment of dysentery². The seed and husk of the isabgol contains mucilage which is present in the epidermis of the seed³. The mucilage of isabgol consists of pentosan and aldobionic acid, which on hydrolysis yields arabinose,

galactose, galactouronic acid and rhamnose⁴. Mucilage of *Plantago ovata* husk has various characteristics like binding, gelling, granulating, film former, disintegrating, suspending, and sustaining properties and could be utilized for the preparation of pharmaceutical dosage forms like tablets, suspensions, gel and for sustained drug release systems^{5,6}. The present investigation deals with determination of total polysaccharide contents of Mucilage of *Plantago ovata* husks spectrophotometrically using Phenol–sulphuric acid method and absorption measurements were carried out at 488nm using glucose as a standard^{7,8}.

2. MATERIALS AND METHODS

2.1. Materials

Plantago ovata husk were purchased from Local market, Thane (Maharashtra, India). All the chemicals and reagents used were of LR grade.

2.1.1. Instrumentation

SHIMADZU 1800 UV –VIS Spectrophotometer was employed for all spectroscopic measurements using a pair of matched quartz cells.

2.2. Methodology

2.2.1. Isolation of mucilage from *Plantago ovata* husk

The husk of *Plantago ovata* were soaked in distilled water for 48 hrs and then boiled for few minutes for complete release of mucilage into water. The material was squeezed through muslin cloth for filtering and separating out the marc. Then, an equal volume of acetone was added to the filtrate so as to precipitate the mucilage. The separated mucilage was dried in oven at temperature less than 60°C, powdered, sieved (#80) and stored in a desiccators until use.⁹

2.2.2. Preparation of blank solution

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

2.2.3. 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 50-100µg/ml. 1ml of 5% phenol solution was added to 1 ml of sugar solution followed by 5ml of concentrated sulphuric acid. The absorbance was measured after 10 minutes at 488nm against blank.

2.2.4. Estimation of polysaccharide in *Plantago ovata* husk mucilage (Test Preparation)

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

3. RESULTS AND DISCUSSION

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

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 50- 100µg/ml. A correlation coefficient of 0.996 indicates good linearity between the concentration and absorbance. The %Relative Standard Deviation (% RSD) of 0.593 indicates that the used method is precise and accurate. The total polysaccharide content of *Plantago ovata* husk mucilage was calculated using regression equation obtained from the calibration curve. The total polysaccharide content in *Plantago ovata* husk mucilage was found to be 71.37% w/w (Mean of three determinations).

Table-1: Absorbance readings for standard and test solutions

Sr. No.	Concentration (mcg/ml)	Absorbance of Standard	Absorbance of Test			Mean	S.D.	% RSD*
			Test-1	Test-2	Test-3			
1	0	0						
2	50	0.4249	0.5782	0.579	0.5889	0.5820	0.00596	0.593
3	60	0.5012						
4	70	0.5992						
5	80	0.6849						
6	90	0.7263						
7	100	0.8096						

S.D.: Standard deviation, RSD: Relative standard deviation

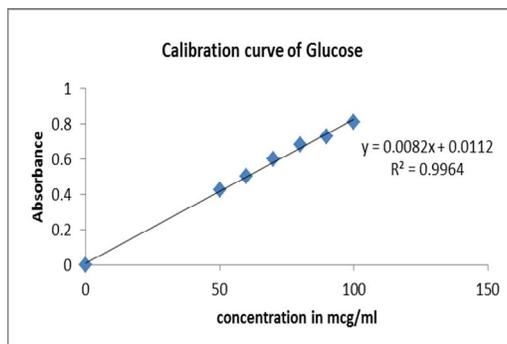


Fig. 1: Calibration curve for glucose

4. 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, and capable of chemical modifications, potentially biodegradable and with few exceptions, also biocompatible. Gum obtained from the *Plantago ovata* husk mucilage contains neutral pentose and aldobionic acid. 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 *Plantago ovata* husk mucilage.

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REFERENCES

- 1) Sharma. V., Arora. V., Ray C. Use of natural superdisintegrant in mouth dissolving tablet - An emerging trend, International Bulletin of Drug Research. , 1(2): 46-54
- 2) Reynolds JEF. Martindale - The Extra Pharmacopoeia, 30th ed. Pharmaceutical Press, London, 1993.
- 3) Sangwan, YK, Sngwan S, Jalwal P, Murti K, Kaushik ,M, Mucilages and Their Pharmaceutical Applications: an Overview, Pharmacologyonline2;2011:1265-1271
- 4) Dhar, MK, Kaul, S, Sharma, P, Gupta, M, *Plantago ovata* Cultivation, Genomics, Chemistry and Therapeutic Applications, Chapter 22; page no:775-777
- 5) Baveja SK, Gupta BM. Rheology of Aqueous dispersions of *Plantago ovata* seed husk-I. Indian J Pharm Sci. 1968; 30:187-94.
- 6) Baveja SK, Gupta BM. Rheology of Aqueous dispersions of *Plantago ovata* seed husk-II. Indian J Pharm Sci. 1968; 30:247-51.
- 7) Foster DS, and Cornella TS, Colorimetric Method of Analysis, Vol.VIII A, D.VanNostrand Company Inc. Princeton, New Jersey, New York. 1961; 162.
- 8) Harshal AP., Priscilla MD., Spectrophotometric estimation of total polysaccharides in *Cassia tora* gum, Journal of Applied Pharmaceutical Science, 2011; 3: 93-95.
- 9) Washi SP, Sharma VD, Jain VK, Sinha P. *Plantago ovata*: genetic diversity, cultivation, utilization and chemistry. Indian J Nat Prod. 1985; 1:3-6.