Extraction and Evaluation of *Trigonella Foenum graecum* Linn & *Linum usitatissimum* Seed Mucilage

Shubham Verma, Nitin Kumar and Pramod K Sharma

Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University, Greater Noida, G. B. Nagar. U. P. (India)

**Abstract:** Herbal or plant products are now used as an alternative to synthetic products due to its local accessibility and non-toxic behaviour. The main aim of this study was undertaken to isolate and evaluate the mucilage from *Trigonella foenum graecum* L. and *Linum usitatissimum* and explore it as pharmaceutical excipients. Phytochemical characterization of *Trigonella foenum graecum* L. and *Linum usitatissimum* such as bulk and tapped densities, pH, swelling index, angle of repose Carr’s index and Hausner’s ratio were studied. Solubility behaviour of both isolated mucilages and identification tests for carbohydrates, gum, mucilage, fats and oil were also studied.

**Key words:** Alasi · Extraction · Methi · Mucilage · Natural Excipients

**INTRODUCTION**

Nowadays herbal products are more often used instead of synthetic products because of its biocompatibility, bio-degradability, inertness, non-toxicity, local accessibility, stability and low prices compared to synthetic products. Mucilages and gums obtained from natural source have been extensively used as pharmaceutical ingredients for their binding, thickening, stabilizing, humidifying, disintegrating and release controlling properties in medicines [1, 2]. It is also used in cosmetics, textiles and paints [3]. Novel drug delivery systems have the intention to produce effective drug therapy with better patient compliance by using herbal excipients. In drug delivery systems, investigations on natural polymers are mainly centered on polysaccharides and proteins, due to their ability to produce a wide range of materials and properties based on their molecular structures [4]. Mucilages and gums are extracted from many seeds, plants and fruits such as fenugreek, linseed, tamarind seed, albizia gum and cashew gum etc. The seeds of *Trigonella foenum graecum* L. also known as fenugreek seed or methi in Hindi. It is an herbaceous plant of leguminaceae or fabaceae family. The seeds of *Trigonella foenum graecum* L. are also used as vegetables and also functions as a preservative and added to pickles. The riped fenugreek seeds have some medicinal use such as in treatment of dysentery, dyspepsia, enlargement of liver, diabetes and chronic cough [5, 6]. *Linum usitatissimum* seeds are also known as linseed, flaxseed and alasi in Hindi. It belongs to linaceae family. Seeds of *Linum usitatissimum* is used to make medicines. It is mainly used in constipation, diarrhoea, irritable bowel syndrome and in diverticulitis. Flaxseed is also used in atherosclerosis and hypertension [7]. Linseed is one of the richest sources of á-linolenic acid and soluble mucilage.

**MATERIALS AND METHODS**

The seeds were procured from local market of Greater Noida, India and all other chemicals are used of analytical grade.

**Extraction of Mucilage[8]:** Mucilage was extracted from the plant material in following two steps.

**Step 1. Extraction of Mucilage:** *Trigonella foenum graecum* L. and *Linum usitatissimum* seeds were used for isolation of mucilage.
Physicochemical Characterization of Isolated Mucilages

Organoleptic Evaluation of Isolated Mucilage: The isolated mucilage was characterized for organoleptic properties such as color, odor, fracture and texture [9, 10].

Identification Tests for Carbohydrate, Fat, Gum and Mucilage: Aqueous solution of extracted mucilage was used for chemical characterization. Tests for carbohydrate, gums, fat and mucilage were performed according to standard procedure.

pH of Mucilages: The mucilage was weighed and dissolved in water to get a 1% w/v solution. The pH of solution was determined using digital pH meter [11].

Swelling Index of Isolated Mucilages: The swelling characteristics of Trigonella foenum graecum L. and Linum usitatissimum seed mucilages were tested in distilled water. The swelling index is the volume in ml occupied by 1 gm of the substance. The swelling indices of the selected mucilages were determined by accurately weighing 1 gm of mucilages, which was further introduced into a 25 ml glass stoppered measuring cylinder then 25 ml of distilled water was added and the mixtures were shaken thoroughly every 10 min for 1 hr and then allowed to stand for 24 hrs at room temperature. Then volumes occupied by the mucilages were measured. The procedure was repeated thrice then the mean value was calculated [12].

Bulk & Tapped Densities: The pre-weighed quantities of mucilages were poured in graduated cylinders and the volume recorded. Then the powders were subjected to tapping in a bulk density apparatus until constant volume were obtained [13].

Powder Compressibility and Hausner’s Ratio: Powder compressibility is also known as Carr’s index. Carr’s index and Hausner’s ratio were calculated from the bulk and tapped densities [14].

Powder Flow Property: It is also known as angle of repose. The angle of repose was determined by the fixed height funnel method [14].

Infrared Spectra of the Isolated Mucilages: Hundred milligrams of the powdered pectin was mixed with potassium bromide (400 mg) and was compressed in a hydraulic press to form a pellet at 15 tons pressure. The pellets were scanned from 4000 to 400 cm⁻¹ in a bruker FTIR spectrophotometer [15].

RESULTS AND DISCUSSION

Trigonella foenum graecum L. and Linum usitatissimum were isolated by hot water extraction method and then subjected to identification. Confirmation of mucilage was done when it gave negative result for gums and flavanoids. Isolated mucilage also showed presence of carbohydrates and remaining phytoconstituents such as tannins and fats were absent. These results considered as a proof for purity of isolated mucilage. The organoleptic properties of the isolated mucilages were depicted in table 1 in which colors of both isolated mucilages were found to be light brown with characteristic taste.
Fig. 1: FTIR Spectroscopy of *Trigonella foenum graecum* L.

<table>
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<th>Frequency (cm$^{-1}$)</th>
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<tbody>
<tr>
<td>3654</td>
<td>O-H stretch</td>
</tr>
<tr>
<td>2914.16</td>
<td>C-H</td>
</tr>
<tr>
<td>2853.35</td>
<td>C-H</td>
</tr>
<tr>
<td>2621.98</td>
<td>C=C</td>
</tr>
<tr>
<td>1425.17</td>
<td>C-H Bend</td>
</tr>
<tr>
<td>1368.37</td>
<td>C-H Rock</td>
</tr>
<tr>
<td>1029.45</td>
<td>C-H Bend out of plane</td>
</tr>
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Fig. 2: FTIR Spectroscopy of *Linum usitatissimum*

<table>
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</table>
The pHs of both isolated mucilages (Trigonella foenum graecum L. and Linum usitatissimum) were found to be 7.9 & 7.0 respectively and both mucilages having good flow property. Micromeretic studies of isolated mucilages like bulk density, tapped density, Carr’s index etc were carried out and depicted in Table 2. The solubility behaviour of both mucilages were carried out using different solvents by which it was found that both isolated mucilages are soluble in hot water and swells to form gel in cold water and both isolated mucilages are insoluble in acetone, ethyl alcohol, methanol and chloroform. IR spectroscopic study revealed the presence of characteristics group in the extracted mucilage of Trigonella foenum graecum L. and Linum usitatissimum which are depicted in Fig-1 and Fig-2 respectively.

CONCLUSION

From the above study, we conclude that Trigonella foenum graecum L. and Linum usitatissimum seed mucilages can be used as a pharmaceutical excipients to prepare different dosage forms and also concluded from both isolated mucilages that fenugreek mucilage have good flow property than linseed mucilage.

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