

Formulation and Evaluation of Paracetamol Suspension from *Trigonella Foenum Graecum* Mucilage

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ABSTRACT:

The purpose of the study is to formulate and evaluate a new, cheap and effective natural suspending agent that can be used as an effective alternative for traditional suspending agent. The study procedure involved extraction of suspending agent from the *Trigonella foenum graecum* (fenugreek) seeds, solubility testing of the mucilage obtained, phytochemical testing, determination of swelling index, preparation of paracetamol suspension (blank), determination of sedimentation volume, measurement of viscosity, and determination of flow rate. The study showed that the extraction of fenugreek seeds had 8% w/w of suspending agent. The natural suspending agent was soluble in hot water and cold water. The photochemical test showed contains carbohydrates, alkaloids, proteins and amino acid. The swelling index was found to be 150%. The sedimentation volume by using fenugreek as a suspending agent shows highest sedimentation volume then acacia, tragacanth and paracetamol alone. Fenugreek can be employed as a stabilizer of choice and high viscosity is desired especially in cosmetic, pharmaceutical and food industries.

Keywords: Paracetamol, suspension, suspending agent, *Trigonella foenum-graecum*, Mucilage

INTRODUCTION:

A pharmaceutical suspension thermodynamically unstable system it should stabilized by adding suitable suspending agent [1, 9]. A number of plant gums have been used as suspending agent in suspension formulations. There are reports about the successful use of *Albizia zygia* [2] gum, *Abelmoschus esculentus* pods contain gum has been found to have binding property for tablet preparation [3] Mucilage, *Boswellia Serrata* Roxb. Gum in tablet formulation, Tamarind Seed [4] Polysaccharide Isapgol [5] mucilage as suspending agent. *Trigonella foenum-graecum* was reported as binding agent [6], it is the rhombic yellow to amber colored fenugreek seed, commonly called *maithray*, is

frequently used in the preparation of pickles, curry powders, and pastes [7], and is often encountered in the cuisine of the Indian subcontinent. The young leaves and sprouts of fenugreek are eaten as greens, and the fresh or dried leaves are used to flavor other dishes. The dried leaves (called *kasturi methi*) have a bitter taste and a strong characteristic smell.



Figure 1: Seeds of *Trigonella foenum graecum*

OBJECTIVE:

The purpose of the study was to formulate and evaluate a new, effective natural suspending agent that can be used as an effective alternative for the formulation of pharmaceutical suspension.

MATERIALS AND METHODS:

Paracetamol (Sunij Pharmaceuticals, Ahmadabad), suspending agent isolated from *Trigonella foenum-graecum* (Seed was collected from the local area of Erode, Tamilnadu, South India), Distilled Water (vehicle), Tragacanth, Acacia, Benzoic acid (Loba Chemie, Mumbai).

EXTRACTION OF SUSPENDING AGENT FROM *Trigonella foenum - graecum* (Seed):

Dried pods of *Trigonella foenum-graecum* were segregated from pods. The brown mucilaginous covering was isolated from the cleaned seeds by soaking them in warm water. The mucilaginous portion were picked manually and crushed in mortar and filtered through a muslin cloth and the extract was collected in beaker. Thrice the volume of acetone was added and stirred. Then the purified product dried and powdered. The powder was passed through sieve no. 74. It is stored in desiccators for further evaluation.

Solubility:

Solubility of isolated mucilage was studied using different types of solvents like water, alcohol acetone, Polyethylene Glycols, Propylene Glycol, Glycerin, Sorbitol, Ethyl Alcohol, Methanol, Benzyl Alcohol, Isopropyl Alcohol, etc..

Percentage yield in 100 g seeds of *Trigonella foenum graecum*.

Phytochemical test:

The qualitative analysis was carried out to determine the compounds of selected natural suspending agent to *Trigonella foenum graecum*.

Table 1: Phytochemical screening of mucilage of *Abelmoschus esculentus*

| | Tests | Observation |
|----|---|----------------------|
| 1. | Test for Carbohydrates(Molisch's test) | <i>Positive</i> |
| 2. | Test for Tannins(Ferric chloride test) | <i>Negative</i> |
| 3. | Test for proteins (Ninhydrin test) | <i>Positive</i> |
| 4. | Test for alkaloids (Wagner's test) | <i>Positive</i> |
| 5. | Test for glycosides(Keller - Killaini test) | <i>Negative</i> |
| 6. | Test for mucilage (Ruthenium red test) | <i>Positive</i> |
| 7. | Test for flavonoids (Shinoda test) | <i>Negative</i> |
| 8. | Test for reducing sugar (Felhing's test) | <i>Negative</i> |
| 9. | Mounting in the iodine | <i>Starch absent</i> |

Determination of Swelling Index [8]:

The natural suspending agent 1g was taken in a China dish and then 10 ml of distilled water was added and the mixture was shaken and allowed to stand for 1 hour. After 1 hour the remaining water in China dish was discarded and the weight increase of the natural suspending agent was rated.

$$\text{Swelling Index \% (SI)} = (W_2 - W_1 / W_1) \times 100 \quad \text{----- (1)}$$

W1= Weight of tablet at time '0'

W2= Weight of tablet at time 't'

PREPARATION OF PARACETAMOL SUSPENSION

Procedure:

Compound tragacanth powder 2 g and 5 g of Paracetamol were triturated together with 50 ml of water to form a smooth paste. The mixture was transferred into a 100 ml of measuring cylinder made up to volume with distilled water and then shaken vigorously for 2 min. (thus making 2% w/v of the gum in the preparation). The suspension contains 0.1% w/v benzoic acid as preservative. The procedure was repeated using 3% w/v of compound tragacanth powder. The above procedure was continued with acacia gum and *Trigonella foenum graecum* (seed).

DETERMINATION OF SEDIMENTATION VOLUME

Each suspension (50 ml) was stored in a 50 ml measuring cylinder for 4 days at 35°C. Observations were made every 24 hr for 4 days. The sedimentation volume, F (%), was then calculated using the following equation.

$$F = 100 V_u / V_o \quad \text{----- (2)}$$

MEASUREMENT OF VISCOSITY USING BROOKFIELD VISCOMETER:

The viscosity (centipoise) of the sample was determined at 25°C using Brookfield Synchro-electric viscometer; model LVF (Brookfield Laboratories, Massachusetts) at 100 RPM (spindle #4). All determinations were made in at least triplicate and the results obtained are expressed as the mean values.

$$\text{Viscosity of suspending agent } \eta_1 = \eta_2 \times (\rho_1 t_1 / \rho_2 t_2) \quad \text{----- (3)}$$

DETERMINATION OF FLOW RATE:

The time required for each suspension sample to flow through a 10 ml pipette was determined and the apparent viscosity ($\eta\alpha$ in mls⁻¹) was calculated using the equation:

$$\text{Flow rate } \eta\alpha = \frac{\text{Volume of pipette (ml)}}{\text{Flow time (s)}} \quad \text{----- (4)}$$

RESULTS AND DISCUSSION:

Percentage yield of *Trigonella foenum-graecum* seeds contain 8% of suspending agent.

PHYTOCHEMICAL INVESTIGATION OF NATURAL SUSPENDING AGENT (*Trigonella foenum graecum*) (seed)

Preliminary tests were performed to confirm the nature of mucilage obtained. In view of phytochemical test, *Trigonella foenum graecum* mucilage contains carbohydrates, alkaloids and proteins.

SOLUBILITY STUDIES OF ISOLATED NATURAL SUSPENDING AGENT:

The result shows that the natural suspending agent is soluble in hot water, cold water and insoluble in organic solvents.

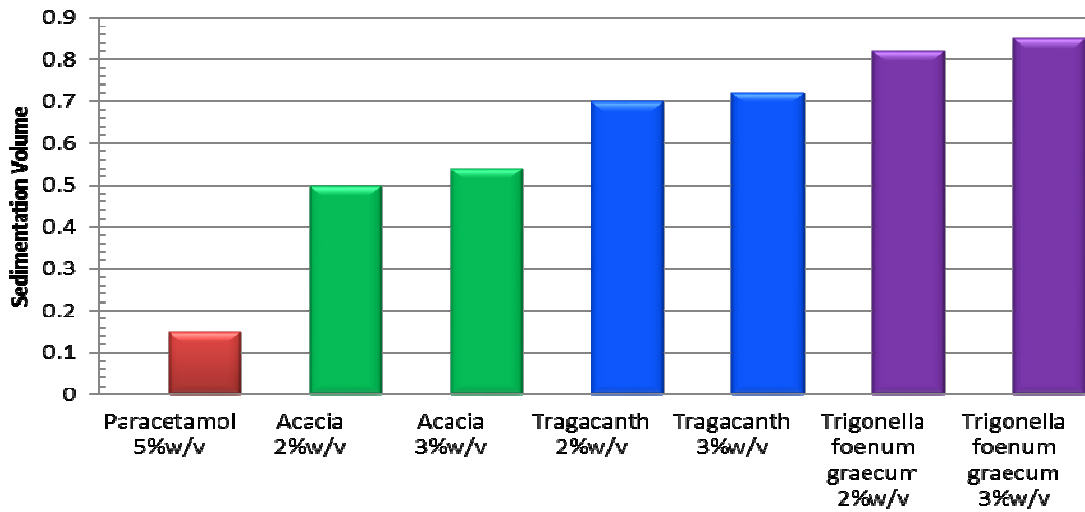
SWELLING INDEX:

Swelling index of *Trigonella foenum graecum* = $(25-10/10) \times 100 = 150\%$.

Result shows that the time increase, swelling index was increased, because weight gain by mucilage was proportional to rate of hydration. The direct relationship was observed between swelling index and mucilage concentration, as mucilage concentration increase swelling index increased.

DETERMINATION OF SEDIMENTATION VOLUME

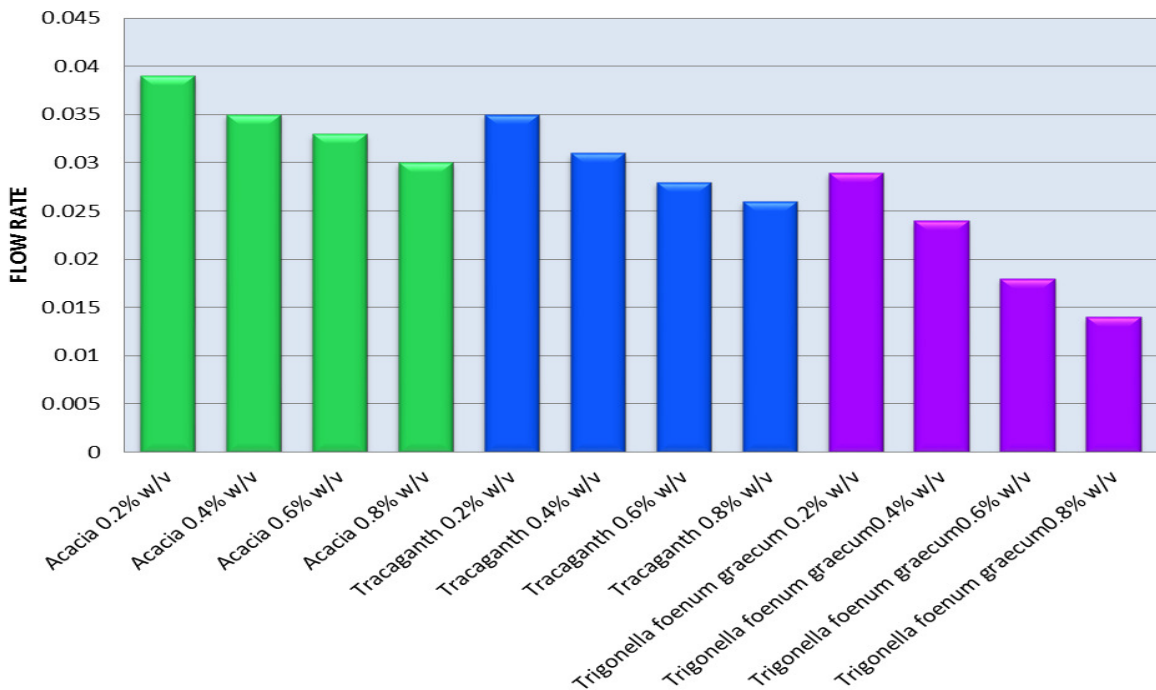
Sedimentation Volume



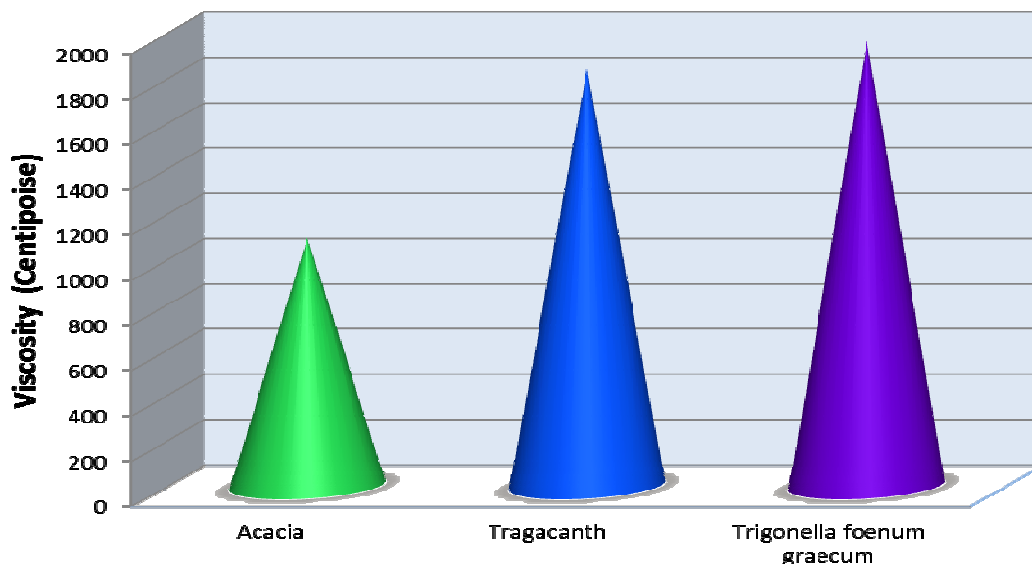
From the above result, the sedimentation volume by using *Trigonella foenum- graecum* as suspending agent shows highest sedimentation volume than acacia, tragacanth and paracetamol alone. The order of the sedimentation volume was found to be,

Trigonella foenum graecum>*Tragacanth*>*Acacia*>*Paracetamol* (Blank)

DETERMINATION OF FLOW RATE

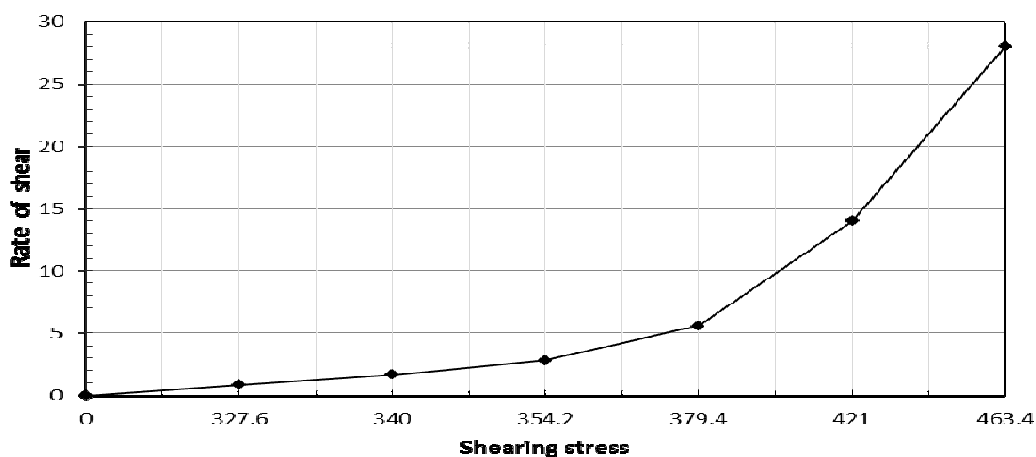


Determination of viscosity (3% w/v at 17°C Temperature)



The preparations were assessed based on their sedimentation volume, viscosity and flow rate. The result shows that the sedimentation volume was found to be directly proportional to the concentration of the suspending agents and reverse in case of flow rate. It reveals that obtained material have considerable viscosity it is applied to increase the stability of prepared suspension.

Rate of shear with effect of shearing stress:



At initial, the flow of shearing stress gets started slowly. While increasing shearing stress, the rate of shear also increased suddenly. Hence it comes under the Pseudo plastic flow type.

CONCLUSION:

The extracted mucilaginous substance of *Trigonella foenum graecum* is edible, has the potential as a suspending agent even at lower concentration (1-3% w/v) and can be used as a pharmaceutical adjuvant. The suspending ability of suspending agents were in the order of fenugreek > tragacanth > acacia. Thus fenugreek exhibits the best suspensibility of all the conventional suspending agents. Due its high viscosity it can also employed especially in cosmetic, pharmaceutical and food industries.

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