

PHARMACOGNOSTIC STANDARDIZATION AND ANTI DIABETIC ACTIVITY OF "FENUGREEK LEAVES"

Komal Verma*, Dr. Ashish Mishra and Dr. Shilpi Mishra

Advance Institute of Biotech and Paramedical Sciences Kanpur.



*Corresponding Author: Komal Verma

Advance Institute of Biotech and Paramedical Sciences Kanpur.

Article Received on 27/05/2025

Article Revised on 18/06/2025

Article Accepted on 08/07/2025

ABSTRACT

The Fabaceae family includes fenugreek (*Trigonella foenum-graecum*), which is referred to as Menthulu in Telugu and Methi in Hindi. It has been said to have antidiabetic properties and is known in English as fenugreek. **Diabetes** – One of the oldest known illnesses to impact humans is diabetes mellitus, a metabolic ailment of the endocrine system. Traditional medical systems have utilised a variety of herbs as antidiabetic medicines since ancient times. Notably, fenugreek has been used to treat diabetes in Indian traditional medicine. To look into the potential antidiabetic benefits of leaf extracts from *Trigonella foenum-graecum*, often known as fenugreek, the current study will extract them, screen for phytochemicals, and perform a preliminary pharmacognostic evaluation. Ethanolic and aqueous extracts of fenugreek leaves were prepared using Soxhlet extraction and subjected to standard physicochemical evaluations, including percentage yield, Calculations were made for total ash, acid-insoluble ash, extractive values, and drying loss. Alkaloids were among the important bioactive components identified by qualitative phytochemical screening, flavonoids, phenolics, saponins, tannins, steroids, and carbohydrates. It has been shown that the seeds and leaves can help lower hyperglycemia and related complications. **Other Properties of Fenugreek:-** Antilipidmic, antioxidant, gastroprotective activity. **Aim and Objective:-** Pharmacognostic Standardisation and Assessment of *Trigonella foenum-graecum* (fenugreek) Leaf Extract's Antidiabetic Effects.

KEYWORD: Diabetics, Antidiabetic, Trigenella, foenum graceum Fenugreek Leaves.

INTRODUCTION

Recent worldwide research has unequivocally demonstrated that Type II diabetes mellitus (DM), an endocrine system metabolic condition, is a serious illness and a huge public health issue.

Its global incidence has been steadily rising, with India Projected to witness over 80.9 million diabetes case by 2030. (Bjork, 2003). Current estimate show that 9.2% contributing to a total of 347 million individuals living in conjunction with the illness, In India now has 41 million diabetics, by 2025.

DM. Diabetes mellitus is high blood sugar levels brought on by impaired insulin-mediated glucose metabolism dependent mechanisms.

Its also known as chronic metabolic condition or disease. Sign. and Symptoms of Diabetes –

- Recurrent Infections.
- Slow healing sores
- Nausea
- Abdominal discomfort
- Excessive thirst or urination

- Weight Loss
- Blurred Vision.

Type of Diabetes - Main four types of diabetes mellitus

Diabetes Types 1 and 2, as well as Other Particular Types Diabetes during pregnancy.

Type1 Diabetes - Type I Diabetes referred to Insulin dependent diabetic mellitus (IDDM) is brought on by on an immune logical reaction that kills the pancreatic islet β - Cell Leaving the body completely insulin deficient, loss of β - Cell function.

Type2 Diabetes - The primary feature of type 2 diabetes is insulin resistance or reduced insulin production.

Fenugreek (*Trigonella foenum-graecum*)

Fenugreek (*Trigonella foenum – graecum*) is an herbaceous plant that is well known for both its culinary and medicinal uses.

Botanical Classification

Family – Fabaceae

Genus – Trigonella

Species – Foenum – graecum

Biological activity of various compounds

from Fenugreek (Trigonella Foenum Graecum)

Compound	Biological Activity	Reference
Saponins	Antioxidant, hypoglycemic, anticancer	Kaur & Kapoor 2002, Naharet al., 2010
Alkaloids	Antidiabetic, anti inflammatory, cardioprotective, neuroprotective, antimicrobial, antiobesity	Ramesh et., al; 2015
Fenugreek Proteins	Antioxidant, hypoglycemic cholesterol – lowering properties	Prasadetal 2017
Fenugreek Seed Extracts	Antidiabetic, hepatoprotective, anticancer	Agrawal et al; 2011

MATERIALS AND METHODS

Fresh Trigonella foenum – graecum (fenugreek) leaves were used in study. The leaves of Fenugreek (Trigonella foenum – graecum) were collected local Kanpur between the month of January and February and Taxonomically authenticated by Dr. Navin K. Ambasnt, Department of Botany Christ Church College, Kanpur.

Fresh Trigaonella foenum graccum (fenugreek) Leaves were collected locally in bulk, thoroughly dried in the sun after being cleaned with running tap water to get rid of any remaining dust. The dried plant material was using a mechanical grinder and passed through sieve No. 80 to obtain uniform Powder for extraction using 100

millilitres of Ethanol 25 grammes of the powdered leaf material were extracted using the soxhlet method for 72 hour at a steady temperature.

The soxhlet apparat us consisted of a round –bottom flask, a soxhlet extractor and a reflux condenser. The powdered drug was placed in a Fitter paper thimble Inserted into the extractor chamber. The Ethanol solvent was heated to its boiling point and its vapors passed through dripped onto the plant material.

The process continued as the solvent repeatedly percolated through the sample allowing through extraction of soluble phyto constituent once the level of extract reached the siphon arm, it was automatically transferred to the Boiling flask.

This cycle continued until completed extraction was achieved.

The dried extract was weighted to calculated the % yield.

The Ethanol extract showed ayicid of 8.96% while a separately prepared aqueous extractwere stored in a refrigerator till further use.

S. No.	Parameters	Result % w/w
1	Total Ash	8.25
2	Acid insoluble ash	8.01
3	Water Soluble ash	0.65
4	Water Soluble Extractive	9.8
5	Alcohol Soluble Extractive	7.11
6	Loss on drying	7.39

Physiochemical investigation**Determination of loss on drying**

The percentage loss on drying (%LOD) of the ethanolic extract of Trigonella foenum-graecum was determined to assess its moisture content, as excessive water can

facilitate microbial growth, encourage fungal or insect contamination, and accelerate degradation through hydrolytic reactions. The %LOD was measured using a gravimetric method. For this, 5 g of accurately weighed, air-dried extract was placed into a pre-dried and tared flat

weighing bottle. A consistent weight was attained when two successive weight readings deviated by no more than 5 mg after the sample was dried in a hot air oven set to a temperature between 100°C and 105°C. Table No. 3.2 provides a summary of the final drying percentage loss.

Determination of ash values

A silicon crucible that had been previously burnt and tared was filled with 4 g of precisely weighed powdered *Trigonella foenum-graecum* leaf material. After spreading the sample uniformly, it was slowly lit and heated to 500–600 °C until a white residue formed, signifying full combustion and the lack of carbon. After cooling in a desiccator, the crucible was weighed again. Table No. 3.2 displays the results of the calculation of the total ash content, which was expressed in milligrammes per gramme of air-dried material.

Tests for Alkaloids

The following assays were used to assess if fenugreek (*Trigonella foenum-graecum*) leaf extracts contained alkaloids:

- a. **Mayer's Test:** A little amount of the extract was dissolved in acetic acid, and a few drops of Mayer's reagent were added to determine whether alkaloids were present. A positive alkaloids result was

indicated by the formation of a dingy white precipitate.

- b. **Hager's Test:** After dissolving the extract in acetic acid, Hager's reagent was added. The presence of alkaloids was verified by the production of a yellow precipitate.
- c. **Dragendorff's Test:** Dragendorff's reagent and a few drops of acetic acid were added after a tiny amount of the extract had been dissolved in alcohol. The presence of alkaloids was demonstrated by the production of an orange-red precipitate following vigorous shaking.
- d. **Wagner's Test:** After dissolving the extract in acetic acid, a few drops of Wagner's reagent were added. The presence of alkaloids was verified by the production of a reddish-brown precipitate.

Photochemical Screening

The existence of different secondary metabolites is thought to be responsible for the medicinal plant's therapeutic capacity. The qualitative analysis of the extracts revealed the following findings.

Ethanol Extract – Alkaloids, Steroids, carbohydrates, flavonoids, coumarins, and quimones were detected.

Aqueous Extract –Only carbohydrates and flavonoids were confirmed.

Phytochemical constituents present in the extract of Fenugreek leaves (*Trigonella foenum-graecum*)

Phyto-chemical	Test	Inference	Result	
			Aqueous extract (FAE)	Ethanol extract (FEE)
Alkaloids	Dragendorff's	Orange precipitate	-	+
	Wagners test	Red precipitate	-	+
	Mayers test	Dull white precipate	-	+
	Hagers test	Yellow precipate	-	+
Steroids	Liebermann Burchard test	Bluish green	-	+
	Salkowski test	Bluish red to cherry red color in choloform layer and green fluorescence in Acid layer	-	+
Carbohydrate	Molish test	Violet ring	+	+
	Fehling's test	Brick red precipitate	+	+
	Benedict's test	Red precipitate	+	+
Flavanoids	Shinoda's test	Red or pink		
Amino acid	With ninhydrin reagent	Purpule Colour	-	-
Resin	With aqueous acetone	Turbidity	-	-
Quinone	Con. Sulphuric acid	Red Colour	-	-

RESULT AND DISCUSSION

Extraction Yield

The percentage yield of *Trigonella foenum-graecum* leaf extracts was calculated following Soxhlet extraction and subsequent solvent evaporation. The ethanolic (alcoholic) extract produced a yield of 8.96%, whereas the aqueous extract resulted in a slightly higher yield of 9.15%. This variation in yield may be attributed to the

differential solubility of phytoconstituents in the respective solvents.

S. No.	Type of Extract	Solvent Used	Yield (%)
1	Aqueous Extract (FAE)	Water	9.15%
2	Ethanolic Extract (FEE)	Ethanol	8.96%

Physicochemical investigations

Physicochemical investigation of ethanolic extract

S.No.	Parameters	Result % w/w
1	Total ash	8.25
2	Acid insoluble ash	8.01
3	Water soluble ash	0.65
4	Water soluble Extractive	9.8
5	Alcohol soluble Extractive	7.11
6	Loss of drying	7.39

Trigonella Foenum – *graecum* leaf extracts was calculated. Soxhlet extraction and subsequent solvent evaporation.

The Ethanolic extract produced a yield of 8.96% whereas the aqueous extract resulted in a slightly higher yield of 9.15%.

CONCLUSION

Result Shows Considerable *Trigonella foenum graecum* leaves extract more Anti diabetic activity as well as.

According to the current research, *Trigonella graecum* leaf extracts in ethanol and aqueous show anti-diabetic properties.

REFERENCE

- Krug Eg., Trends in diabetes sounding the alarm, Lancet, 2016; 387(10027): 1485-14866. [https://oi.org/10.1016/50140-6736\(16\)](https://oi.org/10.1016/50140-6736(16))
- Nathiyas, Durga M, Devaenas T. 2014 Therapeutics not of *Tribgonella foenum – graecum* (Fenugreek)
- Yadav R, Kaushik R, Gupta D.? The health benefits of *Trigonella foenum – graecum*; a review. Int J Eng Res., 2011; 1: 32-35.
- Jain SC, Agrawal M., Sharma RA. The genus *trigonella* phyto chemistry and Biology Anc Sci Life., 1996; 16(2): 108-117.
- Yadav s, Sehgal s, effect of home processing and storage on ascorbic acid and B-careotene content of bathua and junugreek (*Trigonella foenum graecum*) leaves, plant foods Hum Nutr., 1997; 50(3): 239-247.
- Kokiwar PR, Guptha S, Durg e PM Prevalance of diabetes in a rural area of central India, Int J Diab Dev Ctries, 2007; 27(1): 8-10.
- American Diabetic Association. Diagnosis and classification of diabetes mellitus. Diabetes Care, 2005; 28: S37-S42.
- Amita Pandey and Shalini Tripathi. Concept of standardization, extraction and prephytochemical screening strategies for herbal drug. J Pharmacogn Phytochem, 2014; 2(5): 115-119.
- Anand RM, Nandakumar N, Karunakaran L, Raghunathan M and Murugan V. A Survey of medicinal plants in Kollimalai hill tracts. Tamil Nadu, Nat Prod Radiance, 2006; 5(2): 139-43.
- Ananthan R, Latha M, Ramkumar KM, Pari L, Baskar C and Bai VN. Effect of *Gymnema montanum* Leaves on Serum and Tissue Lipids in Alloxan Diabetic Rats. Exp Diabetes Res., 2003; 4(3): 183-9.