



## Review Article

## Fenugreek: A Health promoting Food

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## ABSTRACT

Lifestyle decisions, food habits, stress, environmental variables, and synthetic substances are all contributing to the rapid advancement of human diseases. It has been demonstrated that the herb fenugreek is effective in treating conditions like cancer, high cholesterol, diabetes, and inflammation. Fenugreek extracts and powders have been successfully used in the culinary and pharmaceutical industries because of its therapeutic properties. This review aim was to emphasize the significant nutritional advantages and therapeutic uses of fenugreek as a strong treatment for a range of diseases.

## INTRODUCTION

*Trigonella foenum-graecum* L., also known as fenugreek, is a significant spice crop utilized in human diets. It can be utilized for nutritional, nutraceutical, medical, and therapeutic purposes because it is abundant in phytochemicals, alkaloids, carbohydrates, steroidal saponins, amino acids, and minerals [1]. It has been employed as an extruded product, an emulsifier and stabilizer in culinary items, and as a flavor enhancer in traditional cuisine. The physiological and nutraceutical benefits of fenugreek, which support its prospective use in creating a variety of pharmaceutical and functional food items[2].

**Fenugreek's nutritional value**

Fenugreek is a plentiful source of bioactive compounds, including fiber, proteins, carbs, and lipids as depicted in table 1 [3]. Minerals including potassium, magnesium, calcium, zinc, manganese, copper, and iron are also

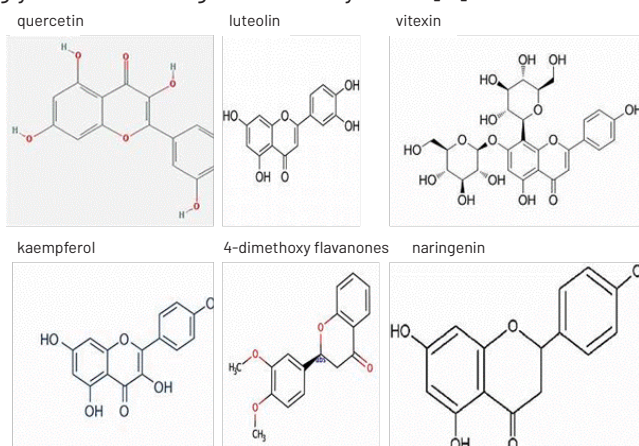
present. Additionally, it contains sulfur-containing amino acids as well as amino acids including aspartic acid, glutamic acid, leucine, tyrosine, and phenylalanine [4]. According to studies, the proteins in fenugreek are of higher quality than those found in other plants.

**Table 1:** Nutritional composition of fenugreek

Fenugreek	Composition
Iron	3.9mg
Copper	0.2mg
Manganese	0.1mg
Magnesium	22mg
Vitamin B6	0.3mg

Alkaloids, flavonoids, and polyphenols such quercetin, luteolin, vitexin, 7, 4-dimethoxy flavanones, aglycones, kaempferol, quercetin, tricetin, and naringenin are also present in substantial amounts in fenugreek as shown in figure 1 [5]. The majority of the flavonoids in fenugreek, according to a phytochemical analysis, occur as

glycosides, which are complex due to their C- and O-glycosidic bonding with carbohydrates [6].



**Figure 1:** Bioactive compounds of Fenugreek

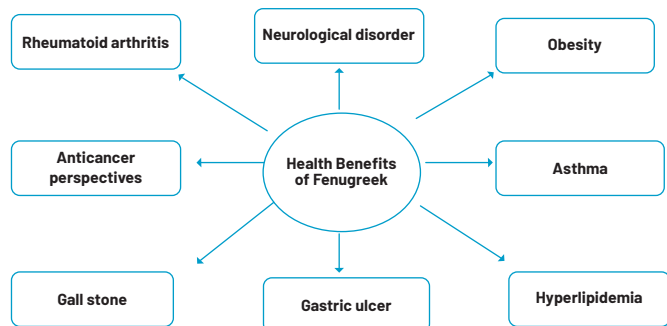
**Therapeutic Effect of fenugreek**

**Function in managing rheumatoid arthritis**

Chronic inflammation is a feature of the joint condition rheumatoid arthritis. In comparison to indomethacin, fenugreek mucilage at 75 mg/kg demonstrated the strongest impact against oedema in rats, according to a study [7]. The study also discovered that the anti-arthritic capabilities of fenugreek mucilage led to reducing the activity of inflammatory enzymes to reduce oedema [8].

**Anticancer perspectives**

Plant-based active ingredients are utilized to prevent cancer, which is one of the leading causes of mortality worldwide. According to studies, fenugreek seeds can prevent mammary hyperplasia in rats and decrease the proliferation of HL60 cells [9]. Fenugreek (*Trigonella foenum-graecum*) extract from the whole plant has also been discovered to have cytotoxic effects against many human cancer cell lines as shown in figure 2. Despite having no effect on primary or immortalized prostate cells, fenugreek extract has been discovered to have anti-cancer effects, including the ability to slow the growth of cancer cell lines from breast and pancreatic malignancies [10,11]. Fenugreek seed extract demonstrated a 70% reduction in tumor cell proliferation. Fenugreek seed extract decreasing tumor incidence and lipid peroxidation [12].



**Figure 2:** Health benefits of Fenugreek

**Fenugreek against gall-stone and gastric ulcer**

In a rat model, the antiulcer properties of *Trigonella foenum* seed [13]. They discovered that the aqueous and gel components of fenugreek seeds have an impact on ant secretory activity and mucosal glycoproteins. Additionally, they discovered that the combination of fenugreek and onion had the strongest anti-lithogenic effects, reducing cholesterol gallstones by 76%, 27%, and 75%, respectively, when onion was supplemented with fenugreek [14]. Additionally, it increases total bile acid and biliary phospholipid levels and helps prevent and treat cholesterol gallstones. These disorders respond favorably to active components like flavonoids found in fenugreek seeds, gel, and aqueous extract [15].

**Fenugreek against neurological disorders**

For the treatment of neurological illnesses like depression, Alzheimer's, and Parkinson's, fenugreek has been studied as a potent medicinal plant [16]. Studies have demonstrated that fenugreek saponins, 5% fenugreek seed powder, and ethanolic extract of fenugreek were effective in lowering the prevalence of Parkinson disease, attenuating depression, and enhancing neurotransmission [17]. Through the use of animal models, the mechanisms behind the antidepressant effects of fenugreek flavonoids. These investigations add to the growing body of research showing that fenugreek components have profound neuroprotective effects [18].

**Effect of Trigonella against obesity**

Numerous studies have demonstrated that hydroxyl isoleucine reduces insulin resistance brought on by obesity. It reduced the activity of a catalyst that changes tumor necrotic factor from mTNF to sTNF [19]. Additionally, fenugreek's fiber content reduces appetite, which is enhanced in obese experimental units. Fenugreek supplements taken orally have been demonstrated to significantly accelerate weight loss over a short period of time. Fenugreek-derived furanostolic saponins (FenfuroTM) have been shown to improve glucose tolerance, improve insulin sensitivity, and decrease insulin-activated protein kinase B's phosphorylation [20].

**Fenugreek in asthma treatment**

The 10% heights of FEV1 and FEV1/FVC were increased by fenugreek seed extract, and the serum IL-4 levels were lowered. Flavonoids inhibited the production of Charcot-Leyden and eosinophil cationic proteins, who also have antioxidant capabilities. Asthma patients' results were improved by fenugreek and honey syrups, with the latter being superior to the former when combined. To comprehend its efficacy, more study is required [21].

## CONCLUSIONS

Fenugreek has been found to have nutritional and pharmacological uses, such as antioxidants, anti-inflammatory agents, and clinical applications. Further research is needed to isolate bioactive components, synthesize recombinant pharmaceutical proteins, and conduct clinical studies.

## Authors Contribution

Conceptualization: MKN, FH

Writing-review and editing: MKN, FH

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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## REFERENCES

- [1] Syed QA, Rashid Z, Ahmad MH, Shukat R, Ishaq A, Muhammad N, et al. Nutritional and therapeutic properties of fenugreek (*Trigonella foenum-graecum*): A review. *International Journal of Food Properties*. 2020 Jan; 23(1): 1777-91. doi: 10.1080/10942912.2020.1825482.
- [2] Basu SK, Zandi P, Cetzal-Ix W. Fenugreek (*Trigonella foenum-graecum* L.): distribution, genetic diversity, and potential to serve as an industrial crop for the global pharmaceutical, nutraceutical, and functional food industries. In *The role of functional food security in global health*. Academic Press. 2019 Jan: 471-97. doi: 10.1016/B978-0-12-813148-0.00028-1.
- [3] Roy P. Nutritional attributes, bioactive components, antioxidant activity and amino acid profile of fenugreek seed powder supplemented bread (Doctoral dissertation, Chattogram Veterinary & Animal Sciences University). 2022 Aug. Available at: <http://dspace.cvasu.ac.bd/handle/123456789/1703>.
- [4] El-Bahy GM. FTIR and Raman spectroscopic study of Fenugreek (*Trigonella foenum graecum* L.) seeds. *Journal of Applied Spectroscopy*. 2005 Jan; 72: 111-6. doi: 10.1007/s10812-005-0040-6.
- [5] Tewari D, Jóźwik A, Łysek-Gładysińska M, Grzybek W, Adamus-Białek W, Bicki J, et al. Fenugreek (*Trigonella foenum-graecum* L.) seeds dietary supplementation regulates liver antioxidant defense systems in aging mice. *Nutrients*. 2020 Aug; 12(9): 2552. doi: 10.3390/nu12092552.
- [6] Xiao J, Capanoglu E, Jassbi AR, Miron A. Advance on the flavonoid C-glycosides and health benefits. *Critical Reviews in Food Science and Nutrition*. 2016 Jul; 56(sup1): S29-45. doi: 10.1080/10408398.2015.1067595.
- [7] Sharma D, Chaubey P, Suvarna V. Role of natural products in alleviation of rheumatoid arthritis—A review. *Journal of Food Biochemistry*. 2021 Apr; 45(4): e13673. doi: 10.1111/jfbc.13673.
- [8] Pundarikakshudu K, Shah DH, Panchal AH, Bhavsar GC. Anti-inflammatory activity of fenugreek (*Trigonella foenum-graecum* Linn) seed petroleum ether extract. *Indian Journal of Pharmacology*. 2016 Jul; 48(4): 441. doi: 10.4103/0253-7613.186195.
- [9] Nagulapalli Venkata KC, Swaroop A, Bagchi D, Bishayee A. A small plant with big benefits: Fenugreek (*Trigonella foenum-graecum* Linn.) for disease prevention and health promotion. *Molecular Nutrition & Food Research*. 2017 Jun; 61(6): 1600950. doi: 10.1002/mnfr.201600950.
- [10] Goyal S, Gupta N, Chatterjee S. Investigating therapeutic potential of *Trigonella foenum-graecum* L. as our defense mechanism against several human diseases. *Journal of Toxicology*. 2016 Jan; 2016: 1-10. doi: 10.1155/2016/1250387.
- [11] Shabbeer S, Sobolewski M, Anchoori RK, Kachhap S, Hidalgo M, Jimeno A, Davidson NE, Carducci M, Khan SR. Fenugreek: a naturally occurring edible spice as an anticancer agent. *Cancer biology & therapy*. 2009 Feb; 8(3): 272-8. doi: 10.4161/cbt.8.3.7443.
- [12] Almutairi Y. Anticancer Activity of Senna Leaf and Fenugreek Seed Against Two Cell Lines (Doctoral dissertation, Tennessee State University). 2022 Mar; 3: 109-12. Available at: <https://www.proquest.com/docview/2659254176?pq-origsite=gscholar&fromopenview=true>.
- [13] Sankarapillai J, Chandrakumari AS, Sinha P. Effect of *Trigonella foenum graecum* (Fenugreek) Seed Extract in Experimentally Induced Gastric Ulcer in Wistar Rats. *Pharmacognosy Journal*. 2018; 10(6): 1169-73. doi: 10.5530/pj.2018.6.200.
- [14] Srinivasan K. Anti-cholelithogenic potential of dietary spices and their bioactives. *Critical Reviews in Food Science and Nutrition*. 2017 May; 57(8): 1749-58. doi: 10.1080/10408398.2014.1003783.
- [15] Naeem A, Saddique S, Chand SA. Advancement and Future Directions towards Herbal Treatment for Various Diseases. *Saudi Journal of Medical and Pharmaceutical Sciences*. 2019 Nov; 5(11): 931-941. doi: 10.36348/sjmps.2019.v05i11.003.
- [16] Cai B, Zhang Y, Wang Z, Xu D, Jia Y, Guan Y, et al. Therapeutic potential of diosgenin and its major derivatives against neurological diseases: recent advances. *Oxidative Medicine and Cellular Longevity*.

- 2020 Mar; 2020: 1-16. doi: 10.1155/2020/3153082.
- [17] Aswar U and Rai D. Fenugreek in Management of Female-Specific Health Conditions. Fenugreek. 1<sup>st</sup> Edition. CRC Press. 2022: 259-81. doi: 10.1201/9781003082767-21.
- [18] Jiang TA. Health benefits of culinary herbs and spices. Journal of AOAC International. 2019 Mar; 102(2): 395-411. doi: 10.5740/jaoacint.18-0418.
- [19] Al-Asadi JN. Therapeutic uses of fenugreek (*Trigonella foenum-graecum* L.). American Journal of Social Issues and Humanities. 2014 Mar; 2: 21-36.
- [20] Zhang H, Xu J, Wang M, Xia X, Dai R, Zhao Y. Steroidal saponins and sapogenins from fenugreek and their inhibitory activity against  $\alpha$ -glucosidase. Steroids. 2020 Sep; 161: 108690. doi: 10.1016/j.steroids.2020.108690.
- [21] Emtiazy M, Oveidzadeh L, Habibi M, Molaeipour L, Talei D, Parvin M, et al. Investigating the effectiveness of the *Trigonella foenum-graecum* L.(fenugreek) seeds in mild asthma: a randomized controlled trial. Allergy, Asthma & Clinical Immunology. 2018 Dec; 14(1): 1-8. doi: 10.1186/s13223-018-0238-9.