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The Medicinal Benefits of *Trigonella Foenum-Graecum (Fenugreek)*

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Introduction

Trigonella foenum-graecum is one of the oldest traditional medicinal plants, cultivated in the Indian subcontinent. It is commonly known as "fenugreek" or "Meethi" in many different languages, belonging to the family Fabaceae. The distinctive leaves typically consist of three small obovate to oblong leaflets. The plant is well-known for both its seeds and leaves, which are commonly used in various recipes, including curries, spice blends, and pickles for their unique flavour (Tucker and DeBaggio 2009). In addition to its culinary applications, fenugreek has also been used in traditional medicine for various purposes (Ouzir *et al* 2016).

Nutritional value of fenugreek

Fenugreek has a vast diversity of nutrients and bioactive compounds which are required for improving the health and functionality of biological systems. The nutritional breakdown of fenugreek comprises (as per 100 grams serving) energy 323Kcal, water content 9%, carbohydrate 58%, Protein 23%, fat 6%. Similarly, fenugreek leaves also possess 6%, 4.4%, 1.1% carbohydrates, proteins and fibre respectively. In addition to all the macronutrients, fenugreek is also a rich source of various micronutrients, such as calcium 40% of the daily value (DV), protein: 46% of the DV, dietary fiber, vitamin B, Vitamin C (220 mg/100 g) and

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β carotene (19 mg/100 g) dietary minerals, particularly manganese: 59% of the DV, iron: 26% of the DV, magnesium (42 mg/100 g), zinc (2.4 mg/ 100 g), copper (0.9 mg/100 g) and iron (25.8 mg/100 g), are also considered as the important components of fenugreek (Wani *et al* 2018). These nutritional components make fenugreek seeds not only a flavourful culinary ingredient but also a valuable source of essential nutrients. The high protein content, along with significant amount of fiber, vitamins, and minerals, contributes to the nutritional value of fenugreek seeds. Sometimes it is also used as animal feed, as it provides palatability to green fodder of ruminants. The seeds are also used to feed fish and domestic rabbits. The seeds and leaves contain a compound called sotolone, which is responsible for imparting the distinctive aroma associated with fenugreek. The characteristic scent of fenugreek is often described slightly sweet and somewhat reminiscent of maple syrup or caramel. Fenugreek is also a rich source of several important amino acids such as aspartic acid, glutamic acid, leucine, tyrosine and phenylalanine. Additionally, it also contains minute quantities of sulfur-containing amino acids (cysteine and methionine). The most abundantly present free amino acid in fenugreek is (2S, 3 R, 4S)-4-hydroxyisoleusine. It also contains significant quantities of alkaloids (trigonella, trigocoumarin, nicotinic acid, trimethyl coumarin) and compounds like flavonoids and polyphenols. In the alcoholic extracts of the fenugreek plant, extensive variety of flavonoids, such as quercetin, luteolin, vitexin, and 7, 4-dimethoxy flavanones, is present (Petropoulos 2002)

Nutraceutical properties of Fenugreek

The traditional use of fenugreek in various cultures includes its perceived benefits for blood cleansing effect, diaphoretic properties associated with detoxification of certain toxins, and lymphatic cleansing activities, where fenugreek claims its role in irrigating cells with nutrients, removing toxic wastes, dead cells, and proteins, and preventing blockages in the lymphatic system. Fenugreek maintains the mucus condition in the body, particularly in the lungs, by helping to clear congestion. It is also mentioned as a throat cleanser due to its mucilaginous properties and eases the urge to cough. Drinking water with soaked fenugreek seeds helps in softening and dissolving the accumulated and hard masses of cellular debris. Fenugreek has been used to relieve colds, bronchial complaints, influenza, asthma, catarrh, constipation, sinusitis, pleurisy, pneumonia, sore throat, laryngitis, hay fever tuberculosis and emphysema. Some other nutraceutical properties of fenugreek are mentioned as follows:

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Lactation aid:

Fenugreek stimulates sweat production as it contains hormone precursor to increase milk formation. It is found to increase a nursing mother's milk supply within 24– 72 h after first taking the herb. Fenugreek is also related with higher daily yield of milk and fat percentage (Al-Shaikh *et al*., 1999).

Immunological activity:

Fenugreek stimulates immunomodulatory effect as evidenced from body weight, relative thymus weight, hemagglutination titre, quantitative haemolysis assay and phagocytosis (Meghwal and Goswami 2012).

Hypoglycemic effect:

Dietary fibers from fenugreek blunts glucose after a meal and slows the rate of postprandial glucose absorption. The compound 4-hydroxy isoleucine helps to lower the amount of glucose present in the blood by increasing insulin secretion. The seed extracts aids in glucose metabolism through the formation of a glucose transport molecule, GLUT-2 in the body. In addition, fenugreek lowers lipids as it contains saponins that are transformed in the gastrointestinal tract into sapogenins (Basch et al., 2003).

Hypocholesterolemic effect:

The large amount of fiber, galactose and mannose are the main composition of gum. The latter compound is associated with reduced cholesterolemia. Saponin combines with bile acids to form large micelles in the intestines. The size of these micelles is too large to be absorbed in the body. Therefore, the unhealthy-lipid content in the bloodstream decreases this helps to regulate heart health and overall metabolism.

Anticancer activity:

The compound, protodioscin derived from fenugreek, exhibits an effect to inhibit the growth of HL60 cells by prompting apoptotic modifications (Hibasami *et al.*, 2003). The seed extract of fenugreek can expressively stop the mammary hyperplasia induced by 7,12-dimethylbenz-anthracene. It was recommended that consumption of this effective herb can be useful against breast cancer. The extract of the whole plant also exhibited cytotoxicity effect *in vitro* against most of the different types of cancer cell lines in human like neuroblastoma, IMR-32 and HT29 cancer cell line (Verma *et al*., 2010). The possible mechanism for anti-cancer

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properties of *Trigonella foenum graecum* extract may be mediated by the induction of programmed cell death.

Antibacterial and antifungal activity:

Extracts from various parts of fenugreek in various solvents including methanol, petroleum ether and ethyl acetate fractions of the aerial parts has been found to be effective against various fungal strains such as *Fusarium graminearum, Botrytis cinerea, Alternaria sp*., *Rhizoctonia solani* and *Pythium aphanidermatum, Microsporum gypseum* (Haouala *et al*., 2008). The methanol extract of fenugreek also showed nematicidal activity and caused significant mortality of *Meloidogyne javanica* larvae, indicating its potential use against nematodes (Zia *et al*., 2001). The effectiveness of various extracts of fenugreek against *Helicobacter pylori* has been reported by several scientists (Wani and Kumar 2016)

Anti-inflammatory, analgesic and pain-relieving effects:

The 4-hydroxy isoleucine plays a significant role in the anti-inflammatory effects of fenugreek. The bioactive compound including alkaloids, apigenin, and saponins inactivates several inflammation-inducing enzymes and promotes fenugreek's anti-inflammatory responses. Fenugreek seed water, or fenugreek seed tea, is still consumed to relieve cramps, nausea, and fatigue during menstruation.

Advantages of fenugreek on digestion:

Spices consumed in diet positively influence the pancreatic digestive enzymes. Non-starchy polysaccharides increase the bulk of the food and increase the bowl movement. They assist in smooth digestion and the high fibre content of fenugreek helps in relieving constipation ailments (Platel and Srinivasan 2000).

Fenugreek against obesity:

The fibre present in fenugreek ominously suppresses the hunger in obese experimental units. Dietary supplementation of fenugreek is proved to have significant effect on weight loss (Raju and Bird 2006). Galacto-mannan that is present in the seeds of fenugreek capture and excrete the sugars from body before it moves in the blood and this causes loss of weight (Mathern *et al* 2009)

Hair growth:

Fenugreek seeds are used as a natural remedy for hair loss or accelerating hair growth. They can also be useful in preventing dandruff and make hair follicles healthier.

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References

Al-Shaikh M A, Al-Mufarrej SI, Mogawer H H. 1999. Effect of fenugreek seeds (Trigonella foenum graecum L.) on lactational performance of dairy goat. J. Appl. Anim. Res. 16: 177–183.

Basch E, Ulbricht C, Kuo G, Szapary P, Smith M. 2003. Therapeutic applications of fenugreek. *Altern. Med. Rev.* 8 **(1):** 20–27

Haouala R, Hawala S, El-Ayeb A, Khanfir R, Boughanmi N. 2008. Aqueous and organic extracts of Trigonella foenum-graecumL. inhibit the mycelia growth of fungi. *J. Environ. Sci.* 20: 1453–1457.

Hibasami H, Moteki H, Ishikawa K, Katsuzaki H, Imai K, Yoshioka K, IshiiY. and Komiya T, 2003. Protodioscin isolated from fenugreek (*Trigonella foenum graecum L.*) induces cell death and morphological change indicative of apoptosis in leukemic cell line H-60, but not in gastric cancer cell line KATO III. *International journal of molecular medicine* **11(1):** 23-26.

Mathern J R, Raatz S K, Thomas W, Slavin J L. 2009. Effect of Fenugreek Fiber on Satiety, Blood Glucose and Insulin Response and Energy Intake in Obese Subjects. *Phytother. Res.* **23:**1543–1548.

Meghwal M, Goswami T K. 2012. A review on the functional properties, nutritional content, medicinal utilization and potential application of fenugreek. *J. Food Process Technol.* 3: 9.

Ouzir M, El Bairi K and Amzazi S. 2016. Toxicological properties of fenugreek (*Trigonella foenum graecum*). *Food and Chemical Toxicology* 96: 145-154.

Petropoulos, G. A. Fenugreek: The Genus Trigonella; Boca Raton, Florida, USA: CRC Press, 2002.

Platel, K., Srinivasan, K., 2000. Influence of dietary spices and their active principles on pancreatic digestive enzymes in albino rats. Nahrung **44:** 42–46.

Raju J, Bird, R. P. Alleviation of Hepatic Steatosis Accompanied by Modulation of Plasma and Liver TNF-α Levels by *Trigonella Foenum Graecum* (Fenugreek) Seeds in Zucker Obese (Fa/fa) Rats. *Int. J. Obes.* 2006, **30:** 1298–1307.

Tucker A O and DeBaggio T. 2009. The encyclopedia of herbs: A comprehensive reference to herbs of flavor and fragrance.

Verma S K, Singh S K, Mathur A. 2010. *In Vitro* Cytotoxicity of Calotropis Procera and *Trigonella Foenum-graecum* against Human Cancer Cell Lines. *J. Chem. Pharm. Res*. 2: 165–861.

Wani, S.A. and Kumar, P., 2018. Fenugreek: A review on its nutraceutical properties and utilization in various food products. *Journal of the Saudi Society of Agricultural Sciences*, 17**(2):** 97-106.

Zia T, Hasnain S N, Hasan S, 2001. Evaluation of the ora hypoglycaemic effect of Trigonella foenum-graecum L. (methi) in normal mice. *J. Ethnopharmacol.* 75: 191–195.