

A Review on Astonishing Benefits of Fenugreek (*Trigonella foenum-graecum*)

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ABSTRACT

(*Trigonella foenum-graecum* L. *Leguminosae*) Fenugreek is oldest plant in medicinal plants, originating in India and Northern Africa. Usually fenugreek seeds parched or boiled, and given with aloes, anise-seed and other substances used as a tonic. Fenugreek contains mucilage, sugars, an alkaloids, saponins, flavonoids, fixed oils etc., which imparts medicinal action to fenugreek. These are in the treatment of allergies, antidiabetic effect, weight loss, and cholesterol lowering effect, gas, gastric disorders, immunomodulatory effect, antifertility effect, antioxidant activity, anthelmintic, antibacterial effect, lung infections, and anticancer effect, also to treat sore throat, abscesses, anemia, asthma, boils, body odour, bronchitis, gallbladder problems, heartburn, inflammation, ulcers, and uterine problems.

Keywords: *Trigonella foenum-graecum*, medicinal action, Anti-diabetic, gastric disorders.

INTRODUCTION

Trigonella foenum - graecum (Linn.) commonly known as fenugreek (methi). It is aromatic, 30-60 cm tall, annual herb, cultivated throughout the world.^{1, 13}



Fig. 1: Images of fenugreek.^{2, 7, 12}

Botany

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Fabales

Family: Fabaceae

Genus: *Trigonella*Species: *foenum-graecum* Linn. [1, 8, 9, 10, 11]

Fenugreek is an erect hairy annual herb. The plant grows to a height of about three feet, the long slender stems has. It has long stalked leaves up to 5 cm long stipules triangular, lanceolate, leaflets about 2.5 cm long, ovate to oblanceolate. The flowers are sessile axillary white or pale yellow. The pods are thin, sword-shaped 10-15 cm (4-6 inch), with a curved beak-like tip, each carrying 10-20 seeds. The plant exhibits a spicy odor which pursues on the hands after touching.

Mediterranean climates are mostly suitable for the plants. Plants mature within four months and flowers generally in midsummer. Seeds are small (5 mm. long), hard, and brownish to yellow in color. Seeds are flattened and have a characteristic rhomboidal shape.²

Fenugreek is regarded and suggested a helpful medicinal plant for the management of various dysfunctions and disorders and is recorded in history and in Ayurveda also.³

The potential and pharmacological actions of fenugreek are due to the variety of its constituents, namely, saponins (0.6 - 1.7%) that are converted in the gastrointestinal tract into saponogenins. Saponins include Sarsapogenin, Yuccagenin, Smilagenin and, the most important saponin is Diosgenin, seeds contain 45-60% carbohydrates, mainly 50-percent fiber (30-per-cent soluble fiber and 20-percent insoluble fiber) that can slow the rate of postprandial glucose absorption, then 5 - 10% fixed oils (lipids), pyridine alkaloids trigonelline (0.2 - 0.38%), choline (0.5%), gentianine and carpaine, the flavonoids apigenin, luteolin, orientin, quercetin, vitexin and isovitexin, amino acids (lysine, argenine, tryptophan, threonin, valyn and methionin) and mucilages, most important is galactomannan, it also contain vitamins A, C, D, B¹ and , minerals calcium, iron and zinc, and nicotinic acid and 0.015% volatile oils (n-alkanes and sesquiterpenes)^{2,4,5}

Due to the multipurpose actions of plant, it is extensively used in Egypt, Greek, Italy and South Asia for management of health problems. It is used as anti-diabetic, anti-fertility, anti-microbial, anti-parasitic and hypocholesterolaemic, antibronchitis, carminative, aphrodisiac, analgesic, antipyretic, anticancer, antioxidant,

immunomodulator, and recently reported in balancing the blood sugar level [3, 14]. Fenugreek powder is also used as a lactation stimulant and protective against ethanol toxicity in India. Literature survey exposed that whole plant have a lot of actions for treatment of diseases e.g., fresh leaves are used for the treatment of indigestion, flatulence, and the dried leaves are used as a quality flavor for meat, fish, and vegetable dishes while seeds as food preservative in pickles, chutneys and other similar food products. Seeds are very tough and difficult to grind so that seed extract is also used in vanilla, butterscotch and rum flavoring. In persistent common sore throat and mouth ulcers gargle made from the seeds are used. Main reason of use of this plant is to get better the health quality of person as well as anticipation of the diseases³.

BENEFITS OF FENUGREEK TO HEALTH

1. Fenugreek seeds are rich source of vitamin E and are one of the most primitive spices as preservative and additives to pickles.
2. Fresh fenugreek leaves are beneficial in the treatment of digestive disorders, flatulence and a sluggish liver.
3. The dried leaves of the fenugreek are used as a eminence flavor for meat, fish and vegetable dishes.
4. An infusion prepared from leaves is used as a gargle for continual mouth ulcers. A gargle made from the seeds is best for common sore throat.
5. Fresh Fenugreek leaves paste when applied over the scalp frequently before bath is helpful for hair growth, preserves natural color, makes hair silky and also prevents dandruff.
6. Fenugreek seeds with gruel increase the flow of milk in nursing mothers.
7. The gelatinous texture of fenugreek seed may have soothes skin irritation by eczema or other conditions. Warm poultice of fenugreek seeds relieves muscle aches and gout pain.
8. Fenugreek seeds reduce the amounts of calcium oxalate in the kidneys so contributes to prevent kidney stones. Animal studies showed that, fenugreek reduces the chance of rising colon cancer by blocking the action of certain enzymes.
9. Fenugreek is currently used as a source of the steroid diosgenin, from which other steroids can be synthesized.

PHARMACOLOGICAL USES**Immunomodulatory Effect**

Fenugreek shows stimulatory effects on macrophages. Macrophages are vital part of the immune system; act as primary line of defense against infections by phagocytosis

and killing of invading microorganisms as phagocytic, microbicidal and tumoricidal effector cells. Macrophages interact with lymphocytes and regulate immune response. There are many plants reported but they show nonspecific immunity, i.e. macrophages functions. Fenugreek shows immunomodulatory effects on the specific as well as non-specific immune functions. Fenugreek seeds are rich source of dietary fiber as well as mucilage (about 28%). Both of these induce macrophages. Fenugreek also contains small quantity of iron in an organic form, which may be readily absorbed and facilitate hematopoietic stimulation in bone marrow. Thus by specific as well as non-specific way, fenugreek shows immunomodulatory effects.

Antifertility Effect

Fenugreek is used as antifertile natural agent. In the case of male, it reduces the weight of testis, plasma concentration of the androgen hormone and sperm concentrations. In females, the circulating plasma progesterone concentrations is significantly increased at 10 and 20 days of gestation and pre-breeding estrogen concentrations does not show any significant effect. Research showed that for antifertile activity of fenugreek, female rabbits are more susceptible than male rabbits, but male rabbits are more prone toward toxic effect than female rabbits.³

Glucose-lowering effects

The antidiabetic activity of the seeds of fenugreek may be due to galactomannan-rich soluble fiber fraction. Insulinotropic and antidiabetic properties also have been associated with the amino acid 4-hydroxyisoleucine that present in fenugreek at a concentration of about 0.55%. In vitro studies have showed that this amino acid causes direct pancreatic β -cell stimulation possibly due to delayed gastric emptying and inhibition of glucose transport. A study of alloxan-induced diabetic mice has shown that the hypoglycemic action of dialyzed fenugreek seed extract was comparable to that of insulin (1.5 U kg⁻¹). Fenugreek seed extract also showed enhancement in intraperitoneal glucose tolerance in normal mice⁶.

Cholesterol-lowering effects

Fenugreek administration increases fecal bile acid and cholesterol excretion. This may be secondary due to a reaction between the bile acids and fenugreek-derived saponins causing the formation of micelles too large for the digestive tract to absorb. Another hypothesis

attributes the cholesterol lowering activities to the fiber-rich gum portion of the seed that reduces the rate of hepatic synthesis of cholesterol. Both mechanisms may contribute to the overall effect^{3,6}.

Antitumor activity

Research showed that potential protective effect of Fenugreek seeds against 7, 12-DMBA-induced breast cancer in rats. At 200 mg/kg body wt., fenugreek seeds extract appreciably inhibited the DMBA-induced mammary hyperplasia and decreased its incidence. Epidemiological studies also associate apoptosis as a mechanism that might mediate the fenugreek's antibreast cancer protective effects⁶.

Antioxidant effect

Antioxidants Production from natural sources has been considered vital way for management of human diseases¹⁵ A study has showed the potent antioxidant properties of the fenugreek seeds. In the study, scientists evaluated the protective effect of polyphenol-rich extract of the seeds of fenugreek against hydrogen peroxide (H₂O₂)-induced oxidation in normal and diabetic human erythrocytes (RBCs).

Anthelmintic Activity

Seeds of fenugreek showed marked and potent anthelmintic activity. Alcoholic extract had exposed promising result as anthelmintic activity and water extracts has also revealed activity up to lesser extent.⁶

Antibacterial activity

Aqueous extract of seeds of fenugreek were found more effective against *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*. Aqueous extract prepared by boiling the seeds in water.

Analgesic activity

Study revealed the analgesic potential of fenugreek seeds in rats by using tail flick method in comparison to well-known analgesic drug diclofenac potassium (DIP, 10 mg/kg, p.o.). For this, successively extracted (aqueous and ethanol) extracts of fenugreek seeds were administered 1 hr prior to pain induction in dose range of 50, 100 and 200mg/kg orally.^{3,6}

Reduces risk of heart disease

Presence of galactomannan in fenugreek plays a key role in maintaining heart health. It also contains high amount of potassium that

counters the action of sodium to help control heart rate and blood pressure.

Aids digestion

Fenugreek is rich source of fibers and antioxidants, they helps in flushing out harmful toxins from the body and thus, aids digestion. In some cases, fenugreek tea is used to alleviate indigestion and stomach pain. Also drinking fenugreek decoction early in the morning reduces constipation.

Helps counter acid reflux or heartburn

Mucilage of fenugreek seeds cover the lining of the stomach and intestine and soothe irritated gastrointestinal tissues. One teaspoon of fenugreek seeds in food can be a valuable remedy for acid reflux or heartburn. Fenugreek seeds can be soaked in water before consuming, to make their outer coat mucilaginous.⁶

Helps to lose weight

The natural soluble fibers present in the fenugreek can swell and fill the stomach thereby suppressing the appetite and aiding weight loss. For this soaked fenugreek seeds chewed in the morning on an empty stomach.

Increases breast milk production in lactating women

Fenugreek due to the presence of diosgenin a source of steroid hormone, increases milk production in lactating mothers. So, it ranks high among the 'must haves' for nursing mothers.

Induces and eases child birth

Fenugreek has been recognized to be helpful in inducing childbirth as it stimulates uterine contractions. It also reduces labour pain. But excess intake of fenugreek seeds during pregnancy can lead to the risk of miscarriage or premature childbirth.^{3,6}

Helps to reduce menstrual discomfort

Fenugreek contains constituents like diosgenin and isoflavones, shows estrogen like properties which help reduce symptoms like discomfort and menstrual cramps associated with PMS. These constituents also relieve menopausal symptoms like hot flashes and mood fluctuations.

Women are more prone to iron deficiency during adolescence (initiation of menstrual periods), during pregnancy and breastfeeding. Including green leafy vegetables like fenugreek (*methi*) in the diet can supply a good amount of iron. Addition of tomatoes or

potatoes to the preparations enhances the iron absorption.⁶

Helps slightly to increase breast size

Consumption of fenugreek seeds increases secretion of sex hormones. The estrogen like property of fenugreek is capable to support in breast enlargement by balancing hormones in women. Daily consumption of fenugreek seeds can be used as home remedy for breast enlargement.^{3,6}

Helps to prevent colon cancer

The fiber content of fenugreek (saponins, mucilage, etc.) binds to toxins from the food and flushes them out. This helps to protect the mucus membrane of the colon from cancer.⁶

Potential Dangers

(a) Allergies

Individuals who have peanut allergies should use with caution or avoid all together. Otherwise, fenugreek is extremely safe.

(b) Side Effects

1. Fenugreek may increase the risk of bleeding.
2. Fenugreek may reduce potassium levels in the blood. Lack of feeling, facial swelling, and difficulty in breathing and fainting are likely to cause an allergic reaction.
3. When fenugreek is used at recommended doses, dizziness, diarrhea and gas may occur.
4. Fenugreek may cause loose stools in some women, also can produce uterine contractions and hypoglycemia in some mothers.⁷

CONCLUSION

Fenugreek (*T.FOENUM GRAECUM*) seeds are easily found in kitchen, we can consume it easily in our daily diet and cure our diseases. Fenugreek was found to possess different activities such as anticancer, anti-inflammatory, antiseptic, aphrodisiac, astringent, bitter, demulcent, emollient, expectorant, anthelmintic, wound healing and gastro protective. Fenugreek seeds contains polysaccharide, galactomannan, saponins such as diosgenin, yamogenin, gitogenin, tigogenin, and neotigogens, flavonoids and amino acid, alkaloids, Other bioactive constituents of fenugreek include mucilage, volatile oils, Some side effect also found in fenugreek seeds like as it may increase the risk of bleeding, may reduce potassium levels in the blood, numbness, facial swelling, difficulty in breathing and fainting, and dizziness, diarrhea and gas when it is taken at

recommended doses, also fenugreek may cause loose stools in some women, can produce uterine contractions and hypoglycemia in some mothers. Regardless of this few sideeffects fenugreek showed astonishing benefits so it must be included in daily diet.

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