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FENUGREEK: A REVIEW OF HEALTH BENEFICIAL EFFECTS

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Abstract: Fenugreek (*Trigonella foenum-graecum*) is one of the most popular medicinal herbs in Arabic region & India known from ancient times. It is also having nutritional value. Green leaves and seeds of Fenugreek are used for multipurpose. 100 g of seeds provide more than 65% of dietary fibre due to its high fibre content. It is used mainly for its gum, fibre, alkaloid, flavonoids, saponin and volatile contents. In various therapeutic applications, it works as antidiabetic, anti-carcinogenic, remedy for hypercholesterolemia, antioxidant, antibacterial agent & gastric stimulant. It is also used as food stabilizer, adhesive and emulsifying agent due to its fibre, protein and gum content. Mucilaginous fiber present in fenugreek seed may bind bile acids to reduce cholesterol and fat absorption; steroidal saponins, alkaloids and 4-hydroxy-isoleucine may promote glucose metabolism and inhibit absorption of cholesterol. The chemical agents present in fenugreek directly stimulate β -cells of pancreas to secrete insulin and increase the activity of enzymes that lower blood glucose level both by increasing glucose degradation and by converting more glucose into glycogen. These effects may be beneficial to diabetics, obese persons and those with vascular and coronary heart diseases. The study showed the importance of fenugreek seed and its oil as an antimicrobial agent to be used as a food preservative or in medical industries.

Keywords: Anti-cancer; Antidiabetic; Alkaloid; Flavonoid; Saponin; Volatile; Protein; Hypocholesterolemia; Fibre.



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INTRODUCTION



Trigonella foenum-graecum (Family Fabaceae) is called Methi in Ayurveda and it is regarded as the oldest known medicinal plant in recorded history. The name comes from *Foenum – graecum*, meaning Greek Hay, the plant being used to scent inferior hay. The name of genus, *Trigonella*, is derived from the old Greek name, denoting 'three - angled', from the form of its corolla. Fenugreek is an annual plant that grows 2–3 ft (0.6–0.9 m) tall, with a strong odour and small pale yellow flowers. The seeds are brownish, about 1/8 inch long, oblong, rhomboidal, with a deep furrow dividing them into two unequal lobes. The seeds are collected in the autumn. The seed of the fenugreek plant contains many active compounds with pharmaceutical applications such as alkaloids, flavonoids, saponins, amino acids, tannins and some steroidal glycosides, proteins, iron etc. The seed is also high in fibre. Its leaves are used for their cooling properties and its seeds for their Carminative and tonic effects. Seeds are used as medicine for the treatment of wounds, abscesses, arthritis, bronchitis, digestive problems etc since ancient times. It protects heart, brain and other vital organs of body through its medicinal properties. In traditional Chinese medicine it is also used for kidney problems. The recent researches have proved it effective for Atherosclerosis, Cancer, Constipation, Diabetes, High cholesterol etc.

CHEMICAL CONSTITUENTS:

Diosgenin, a steroid saponin found in fenugreek is the starting compound for over 60% of the total steroid production by the pharmaceutical industry other saponin found in fenugreek seed include yamogenin, gitogenin, tigogenin, and neotigogens. Fenugreek seeds contain alkaloids, including trigonelline, gentianine and carpaine compounds. The seeds also contain fiber, 4-hydroxyisoleucine and fenugreekine, a component that may have hypoglycaemic

activity. Other constituents of fenugreek include mucilage, bitter fixed oil, volatile oil, and the alkaloids choline and trigonelline. Extract of fenugreek is obtained by alcoholic extraction. These seeds are a rich source of fiber and protein. The fiber may be further classed as gum (gel fiber) and neutral detergent fiber. Whole Fenugreek seeds also contain 4.8% saponins. Fenugreek seed saponins are of steroidal nature (type furostanol saponins) with diosgenin as the principal steroidal saponin.

Alkaloid, flavonoids and saponin in fenugreek

Fenugreek contains different alkaloids, flavonoids and saponins but out of all these, saponins are found to be in maximum concentration in the fenugreek. Alkaloid is natural bases containing at least one nitrogen atom in its heterocyclic ring and is found in plants. Alkaloid and volatiles of fenugreek seed are two major constituents which causes bitter taste and bad odour due to which people try to avoid consumption of fenugreek seed and its products. Fenugreek contains 35% alkaloids, primarily trigonelline, whereas saponin was found to be 4.8%. One hundred gram of Fenugreek endosperm is reported to be containing 4.63 g saponin. The alkaloids, flavonoids and saponins of fenugreek have pharmacological effect. They act as antilipidemic, hypoglycaemic and cholagogic agent and their use should be promoted to manage diabetes mellitus, hypercholesterolemia because clinical evidence shows promising results in reducing serum cholesterol level. At the same time, care should be taken to avoid minor gastrointestinal symptoms and allergic reactions on its consumption.

Protein in fenugreek

Fenugreek endosperm is rich in protein such as globulin, histidine, albumin and lecithin. However, 100 g of fenugreek seed contains 25.4 g protein .It has a high proportion of protein ranging from 20 to 30% as well as amino acid 4-hydroxyisoleucine in particular, which has high potential for insulin-stimulating activity. The fenugreek protein fraction is found to be lysine-rich and comparable in quality to that of soybean protein.

Vitamins in fenugreek

Fenugreek is especially rich in choline. Vitamins - A (1040 IU per 100 g), B₁ (0.41 mg per 100 g), B₂ (0.36 mg per 100 g), C (12.0 mg per 100 g), niacin (6.0 mg per 100 g) and nicotinic acid (1.1 mg per 100 g) are reported in fenugreek seed whereas germinating seeds contain pyridoxine, cyanocobalamine, calcium pantothenate, biotin and vitamin C . Fenugreek leaves contain Vitamin C (43.10 mg per 100 g), calcium, β -carotene but by boiling in water, or steaming and frying, the vegetable loses 10.8 and 7.4% of the vitamin, respectively and exposure of the germinating seeds to β - and γ -radiation reduces the vitamin C content.

Minerals in fenugreek

Fenugreek does not contain so many minerals but it has some of them such as it has good amount of phosphorus and sulphur. It has higher occurrence of calcium, iron and zinc in curry made from fenugreek compared to the curry made from potato.

MEDICINAL STUDIES:

Anticancer Activity:

Fenugreek is a promising protective medicinal herb for complementary therapy in cancer patients under chemotherapeutic interventions because fenugreek extract shows a protective effect by modifying the cyclophosphamide induced apoptosis and free radical-mediated lipid peroxidation in the urinary bladder of mice. Diosgenin ($C_{27}H_{42}O_3$) is a crystalline steroid saponin found in fenugreek and used as a starting material for the synthesis of steroid hormones such as cortisone and progesterone. It has been found to be potentially important in treatment cancer. The seed powder in the diet due to the presence of fibre, flavonoids and saponins decreased the activity of β -glucuronidase significantly and prevented the free carcinogens from acting on colonocytes whereas mucinase helped in hydrolysing the protective mucin

Cholesterol-lowering effects

Fecal bile acid and cholesterol excretion are increased by fenugreek administration. This may be secondary 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. It is likely that both mechanisms contribute to the overall effect.

Glucose-lowering effects

The galactomannan-rich soluble fibre fraction of fenugreek may be responsible for the antidiabetic activity of the seeds. Insulinotropic and antidiabetic properties also have been associated with the amino acid 4-hydroxyisoleucine that occurs in fenugreek at a concentration of about 0.55%. In vitro studies have indicated that this amino acid causes direct pancreatic beta-cell stimulation. Delayed gastric emptying and inhibition of glucose transport also have been postulated as possible mechanisms.

Antioxidant effects

High levels of polyphenolic flavonoids (more than 100 mg per 100 g) have been isolated from fenugreek seeds. These have been associated with dose-dependent protection of erythrocytes from antioxidant damage in an in vitro study. Fenugreek has powerful antioxidant property that has beneficial effect on liver and pancreas; since antioxidant properties have been linked to health benefits of natural products; such properties are studied with germinated fenugreek seeds which are observed to be more beneficial than dried seeds because of the fact that germinated seed increases the bioavailability of different constituents of fenugreek.

Antiulcer effects

The aqueous extract and a gel fraction, isolated from the seeds showed significant ulcer protective effects. It has soothing effect on gastric and gastritis ulcer.

Health benefits of Methi Seeds/Fenugreek Seeds

Both Methi seeds and leaves are generally available and broadly used in the Indian kitchens because of its amazing health benefits. It has minerals, fibre, iron, protein, vitamins (C and B), potassium, alkaloids and etc. It is also famous for having a compound called Diosgenin (has property of estrogens and steroidal saponins).

Mentioned below are some important health benefits of the Methi seeds such as:

» Removes Body Toxins

Studies have shown that saponins and mucilage in fenugreek bind to toxins in the food and flush them out.

» Relieves Digestive Disorders

It provides relief from the indigestion, constipation and other digestive disorders.

» Cures Gastric Acidity

Methi seed helps in curing the acid reflux (heartburn) as it has mucilage which covers the stomach and intestinal linings and soothes the irritated tissues of the gastrointestinal tract. Regular consumption of 1 tsf soaked Methi seeds in water provide more relief as the soaking process makes its outer coating mucilaginous.

» Relieves Sore Throat

It provides relief from the fever, cough and sore throat when taken with a tsf of honey and lemon.

» Reduces Risk of Heart Attack

It has a special component called galactomannan (natural soluble fibre) which lowers the heart attack risk. It prevents the atherosclerosis which leads to the heart problems.

» Controls Heart Rate and Blood Pressure

Fenugreek seeds are the excellent source of electrolyte potassium which helps in controlling the heart rate as well as blood pressure by counteracting the sodium action.

» Rich Source of Vitamins

It is very helpful in treating the deficiency symptoms of the vitamin like mouth ulcers, baldness, chronic coughs, chapped lips, beriberi, boils, tuberculosis, bronchitis, etc.

» Cures Memory Loss Problem

It is rich in choline and antioxidant beta carotene which are very helpful to cure the problems like memory loss, Alzheimer's disease and early ageing.

» Cures Roundworms Problem

Methi seed is very effective against the roundworms and keeps insects away as it has some chemicals which act as an insecticide.

» Increases Breast Milk Production in lactating women

Methi seeds enhance the production of breast milk in the lactating mothers as it has Diosgenin compound which increases the milk production.

» Boosts Testosterone Level

It has ability to boost the testosterone level in the men. High testosterone level maintains the energy level for long time.

» Induces and eases child-birth

Fenugreek has been known to be helpful in inducing childbirth by stimulating uterine contractions. It also reduces labour pain. But it should be used with due precautions; as excess intake of fenugreek seeds during [pregnancy](#) may increase the risk of miscarriage or premature childbirth.

» Helps reduce menstrual discomfort

Fenugreek contains compounds like diosgenin and isoflavones with oestrogen-like properties which reduce symptoms like discomfort and menstrual cramps associated with PMS. These compounds also ease symptoms of menopause 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 veggies like fenugreek in your diet can supply a good amount of iron. But make sure to add tomatoes or potatoes to the preparations to enhance the iron absorption.

» Rich source of Iron

As women come under the most vulnerable group suffering from the iron deficiency during the puberty period, pregnancy and breastfeeding. Regular use of methi (either in the form of leaves or seeds) in the normal diet provides relief from all the deficiency symptoms of the iron by fulfilling the need of iron in the body.

» Enhances Iron Absorption in Body

Eating tomatoes or potatoes together with the methi enhances the power of iron absorption found in it.

» Benefits of Methi Seeds in Diabetes Controls Blood Sugar Level

It is helpful in controlling the blood sugar level in the diabetic person as it contains natural soluble fibre known as the Galactomannan which decreases the rate of sugar absorption in blood.

Increases Insulin Production

It also has an essential amino acid (4-hydroxy isoleucine) which is responsible for increasing the insulin production in the body.

» Benefits of Methi Seeds for weight management

Including Methi in your weight loss diet by chewing the soaked Methi seeds in morning on an empty stomach makes the stomach full and suppress appetite due to the natural soluble fibres available in the fenugreek seeds. In this way it helps in the weight loss goals.

» Reduces Risk of Kidney Stones

Methi tea cleans up the kidneys and intestines thus reduce the risk of kidney stones formation.

» Relieves Arthritis Pain

Methi water helps in relieving the arthritis pain because of its anti-inflammatory effects.

» Benefits of Methi Seeds for Skin Gives relief from Skin Problems

Applying paste of the Methi seeds helps in treating the various skin problems including scar, inflammation, boils, burns, eczema and etc. It makes the skin fair & glowing. It is generally used as a poultice to treat various skin problems. Applying warmed methi seeds (wrapped in the cloth) directly on the skin gives relief from the local pain, wounds, swelling, muscle pain, gout, leg ulcers, eczema etc.

» Beauty Benefits of Methi Seeds Makes Skin Smooth

Fenugreek seeds are in use for years as a great homemade beauty product. It is used on the face as a face pack in order to get free from the pimples, blackheads, scar, wrinkles etc. Applying paste of fresh fenugreek leaves on the face for 20 mins works wonderfully for the skin. Its seed extracts is used in the beauty products such as soaps and cosmetics.

» Benefits of Methi Seeds for Hair Makes Hair Shiny and Strong

Adding methi in the diet or applying its paste on the hair makes hair more shiny, strong, long and black.

Promote Better Hair Growth

It is great source of protein and nicotinic acid which promotes the hair growth, lecithin which makes hair healthy, strong and hydrated.

Remedy to Get Immediate Relief from Dandruff

Applying methi powder paste (using water) directly on the scalp for an hour provides relief from the severe dandruff problem.

CONCLUSION:

Various scientific studies showed that Fenugreek is having Antidiabetic, antioxidant, anticarcinogenic, anthelmintic, antiulcer, antifertility, immunomodulatory, enzymatic pathway modifier and hypocholesterolaemic activity. Based on these several health benefits as discussed in review, based on various past reported scientific findings, fenugreek can be recommended and must be taken as a part of our daily diet as its liberal use is safe and various health benefits can be drawn from this natural herb. In patient suffering from asthma its consumption should be minimised or it should be avoided. This review will be beneficial to carry out further scientific investigations to prove medicinal properties of fenugreek.

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