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A STUDY OF PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL ACTIONS OF *TRIGONELLA FOENUM-GRAECUM*: A REVIEW

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Abstract

According to the Ayurveda plants are have so many constituent which may be used for the treatment of so many diseases. Herbal drugs are easily available and have fewer side effects. So many of the people are attracted towards the herbal plant drugs. Fenugreek is easily available in our kitchen and use as a drugs from oldest time. Fenugreek was used to ease childbirth and to increase milk flow. Today, it is still taken by Egyptian women for menstrual pain and as hilba tea to ease stomach problems of tourists. They contain mucilage, sugars, an alkaloid- trigonellin, which is not poisonous- cholin and a scented compound. Medicinal Action and Uses of Fenugreek like Allergies, Appetite/loss of Catarrh/bronchial, Cholesterol/high, Diabetic Retinopathy, Gas, Gastric Disorders, Lung Infections, Mucus Excessive, Throat/sore, Abscesses, Anemia, Asthma, Boils, Body Odour, Bronchitis, cancer, Eyes/swollen, Fevers, Gallbladder Problems, Heartburn, Inflammation, Sinus Problems, Ulcers, Uterine Problems, Water Retention focused the investigator's attention on this plant.

Key Words: Trigonella foenum-graecum, Potential uses, Pharmacology.

Introduction:

Trigonella foenum - graecum (Linn.) belonging to the family Papilionaceae commonly known as Fenugreek is a aromatic, 30-60 cm tall, annual herb, cultivated throughout the country. A nearly smooth erect annual. Stipulets not toothed. Leaflets 2-2.5 cm long, oblanceolate -oblong, toothed. Flowers 1-2, axillary, sessile. Calyx-teeth linear.

Corolla much exerted. Pod 5-7.5 cm long, with a long persistent beak, often falcate, 10-29 seeded, without transverse reticulations.

Morphology:

1. **Appearance:** Solid- rhomboidal seeds,3 to 5 mm long,2 mm thick. Hard,pebble-like.
2. **Colour:** Yellowish brown-light brown
3. **Odour:** characteristic spicy
4. **Taste:** Bitter and mucilaginous

Chemical constituents:

Alkaloides: Trimethylamine, Neurin, Trigonelline, Choline, Gentianine, Carpaine and Betain.

Amino acids: Isoleucine, 4-Hydroxyisoleucine, Histidine, Leucine, lysine, L-tryptophan, Argenine.

Saponins: Graecunins, fenugrin B, fenugreekine, trigofenosides A-G.

Steroidal sapinogens : Yamogenin, diosgenin, smilagenin, sarsasapogenin, tigogenin, neotigogenin, gitogenin, neogitogenin, yuccagenin,saponaretin.

Fibers: Gum, neutral detergent. fiber

Other : Coumarin, lipids, vitamins, minerals. 28% mucilage; 22 % proteins; 5 % of a stronger-swelling, bitter fixed oil.

Traditional uses:

1. Fenugreek seeds are rich in vitamin E and is one of the earliest spices known to man.as preservative and addes to pickles..
2. Fresh fenugreek leaves are beneficial in the treatment of indigestion, flatulence and a sluggish liver.
3. The dried leaves of the fenugreek is used as a quality flavour for meat, fish and vegetable dishes.
4. An infusion of the leaves is used as a gargle for recurrent mouth ulcers. A gargle made from the seeds is best for ordinary sore throat.

5. Fresh Fenugreek leaves paste applied over the scalp regularly before bath helps hair grow, preserves natural color, keeps hair silky and also cures dandruff.
6. Fenugreek seeds made in gruel, given to nursing mothers increase the flow of milk.
7. Topically, the gelatinous texture of fenugreek seed may have some benefit for soothing skin that is irritated by eczema or other conditions. It has also been applied as a warm poultice to relieve muscle aches and gout pain.
8. Fenugreek seeds reduces the amounts of calcium oxalate in the kidneys which often contributes to kidney stones. In animal studies, fenugreek appeared to lessen the chance of developing colon cancer by blocking the action of certain enzymes.
9. Traditional Chinese herbalists used it for kidney problems and conditions affecting the male reproductive tract.
10. Fenugreek is currently used as a source of the steroid diosgenin , one of its active constituents from which other steroids can be synthesized.

Pharmacological Uses:

1. Antidiabetic activity
2. Antiplasmodic activity
3. Hypolipidemic activity
4. Immunological activity
5. Antibacterial activity
6. Anthelmintic activity
7. Anti-inflammatory and analgesic activity.
8. Antioxidant activity.

Glucose-lowering effects:

The galactomannan-rich soluble fiber 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 β -cell stimulation. Delayed gastric emptying and inhibition of glucose transport also have been postulated as possible mechanisms. A study of alloxan-induced diabetic mice has shown that the hypoglycemic activity of dialysed fenugreek seed extract was comparable to that of insulin (1.5 U kg⁻¹). Fenugreek seed extract also improved intraperitoneal glucose tolerance in normal mice.

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.

Antitumor activity:

A potential protective effect of Fenugreek seeds against 7,12- DMBA-induced breast cancer in rats. At 200 mg/kg b.wt., Fenugreek seeds' extract significantly inhibited the DMBA-induced mammary hyperplasia and decreased its incidence. Epidemiological studies also implicate apoptosis as a mechanism that might mediate the Fenugreek's anti-breast cancer protective effects.

Antioxidant Effect:

A study has demonstrated the potent antioxidant properties of the fenugreek seeds. In the study, scientists evaluated the protective effect of polyphenol-rich extract from the seeds of fenugreek against hydrogen peroxide(H₂O₂)-induced oxidation in normal and diabetic human erythrocytes (RBCs).

Anthelmintic Activity:

Seeds of *Trigonella Foenum-graecum* showed mark and potent anthelmintic activity. Alcoholic extract had shown

promising result as anthelmintic activity and water extracts has also shown activity up to lesser extent. Therefore an attempt has been made to evaluate anthelmintic activity of seeds on adult earthworm *Pheritima postuma*.

Antibacterial activity:

The seed extracts of Fenugreek were found more effective against *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*. seeds were boiled in water to produce aqueous extracts.

Analgesic activity:

The analgesic potential of *Trigonella foenum – graecum* (TFG) seeds in rats by using tail flick method in comparison to established analgesic drug diclofenac potassium (DIP, 10 mg/kg, p.o.). Successively extracted (aqueous and ethanol) extracts of TFG seeds were administered 1 h prior to pain induction in dose range of 50, 100 and 200mg/kg orally.

Potential Dangers:

(a) **Allergies:** Individuals with 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. Numbness, facial swelling, breathing difficulty and fainting are likely a cause of an allergic reaction.
3. Dizziness, diarrhea and gas when fenugreek is used at recommended doses.
4. Fenugreek may cause loose stools in some women, can produce uterine contractions ,hypoglycemia in some mothers.

Conclusion:

Fenugreek is one of the primary supplements used to support type II diabetics or noninsulin dependent diabetes mellitus (NIDDM). Research as to the cause seems to indicate high levels of body fat too many calories consumed

from refined foods, lack of polyunsaturated fats and chromium deficiencies. Fenugreek Seed helps by not only reducing blood sugar levels with its

high concentrations of phytochemicals, but it has also helped reduce low density cholesterol's and triacylglycerols.

T. foenum-graecum 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 are a rich source of the polysaccharide

galactomannan. They are also a source of saponins such as diosgenin, yamogenin, gitogenin, tigogenin, and

neotigogens. Other bioactive constituents of

fenugreek include mucilage, volatile oils, and alkaloids such as choline and trigonelline.

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