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Shyam Gupta, Piyush Gupta, Surendra Patsariya
College Of Pharmacy, SRGI, Jhansi (UP)

Phytochemical and Pharmacological review on Fenugreek (*Trigonella foenum-graecum*)

Shyam Gupta, Piyush Gupta*, Surendra Patsariya

ABSTRACT

Fenugreek (*Trigonella foenum-graecum*) known as Methi is being used in traditional medicine. It has been found to have antimicrobial, wound healing, antifungal, anti-diarrheal, hypoglycemic, hepatoprotective, antioxidant, antihelmintic, anti-diabetic, anti-inflammatory activity. It also used in treatment of small pox and hair loss. The seed contains two alkaloid namely choline, and trigonelline. It also contain four flavanoid (two glycosides and two aglycones) and two steroidal saponins.

Keywords:. *Trigonella foenum-graecum,*

1. INTRODUCTION

Trigonella foenum-graecum (Fabaceae) commonly known as Methi or metha in local language Hindi. It is a well known herb in the Ayurvedic system of medicine.[1] It is small annual herb found in different part of India. It have two fairly distinct types of plant are recognized : the dwarf type , grown for culinary purposes and the tall growing type, known as Metha in Punjab, grown for fodder use.[2] The herb is nearly smooth erect annual, stipules root toothed, leaflets 2-2.5 cm. long, oblanceolate- oblong, toothed. Flowers, axillary, sessile. Calyx teeth linear. Corolla much exerted. Pod 5-7.5 cm. long with long persistent beak.[3] Fenugreek seeds are about 4 - 6 mm. long, 2-3 mm wide and 2 mm thick. Seeds are hard, yellowish - brown, irregularly rhomboidal in outline and flattened. Nearly in the center of one of the long, narrow sides is a small depression in which both hilum and micropyle are situated.[4] The former appearing as a whitish point. This continues in the form of a furrow running diagonally across part of each of the adjoining sides. Thus dividing the radicle pocket from the reminder of seed in which are the two large cotyledons are surrounded by a scanty, horny, dark, trance lucent endosperm. The endosperm swells and yields mucilage to the surrounding liquid. The odour of fenugreek specially if powdered, is strong and spicy, the taste is disagreeable.[5] The seed contain Ca, P, Fe, Na, and K. It also contains carbohydrate some vitamins like carotene, thiamine, riboflavin, nicotinic acid, folic acid, etc. It also contains 30% protein and various amino acids like lysine, histidine, arginine, tyrosine, aspartic acid, threonine, alanine, proline, phenylalanine, serine and many more. The seed contain two alkaloid trigonelline and choline.[2]

Correspondence:
Shyam Gupta
College Of Pharmacy, SRGI, Jhansi (Up)

It contains Alkaloid, flavanoid, carbohydrate, protein, amino acids, vitamins, and minerals.[6] It contain two alkaloid trigonelline and choline[7]. The seed also contains two flavanoid known as quercitin and luteolin found active as antioxidant. Different amino acid and 30% protein present in fenugreek seeds. Common solvent for protein 70% alcohol, saline water, distilled water.[2]

PHARMACOLOGY

Antidiabetic activity

The antidiabetic effect of fenugreek ethanolic extract (*Trigonella foenum-graecum* L) was investigated in normal and streptozotocin-induced diabetic rats. The antidiabetic effect of the extract was similar to that observed for glibenclamide.[8]

The hypoglycemic activities of the aqueous extract of the seeds *Trigonella foenum-graecum* in normal mice using oral route of administration. The methanolic extract administered through the same route produced hypoglycemic effect only at the dose of 1g/kg body weight. The aqueous extract is under further investigation to determine the chemical structure of the active component. The presence of hypoglycemic activity in aqueous and methanolic extract indicates that the active compounds are polar in nature. [9]
The beneficial effect of feeding fenugreek (*Trigonella foenum-graecum*) seed mucilage and spent turmeric (*Curcuma longa*) on diabetic status was studied in streptozotocin-induced diabetic rats. Fasting blood glucose showed a 26% and 18% improvement with fenugreek seed mucilage and spent turmeric feeding to diabetic rats, respectively. Fenugreek seed mucilage compared with turmeric was more effective in ameliorating diabetic state.[10]

Non-insulin dependent diabetes mellitus

Hypoglycemic effect of Fenugreek seed powder (*Trigonella foenum-graecum*) was studied in 60 non-insulin dependent diabetic patients. Glycosylated hemoglobin measured at the end of the 8th week of fenugreek seed powder administration was reduced significantly ($p < 0.001$). This shows that feeding Fenugreek seed powder is beneficial to diabetic subjects.[11]

Fenugreek seeds (*Trigonella foenum-graecum*) show 64% reduction in 24 hr urinary glucose excretion with significant alterations in serum lipid profile. Serum total cholesterol, LDL and VLDL cholesterol and triglyceride levels decreased without any alteration in HDL cholesterol fraction with fenugreek diet.[12]

Antifertility Activity

The antifertility effect of fenugreek seeds was studied in female and male rabbits. The plasma concentration of the androgen hormone and sperm concentrations were halved in the treated animals. In the case of the females, there was evidence of a significant reduction of developing fetuses as observed by reductions of both fetal and placental weights at 20 days of gestation and of the little size. This was further supported histopathologically by the observed proliferative changes of the endometrial glands. The circulating plasma progesterone concentrations at 10 and 20 days of gestation significantly increased with no significant effect on the prebreeding estrogen concentrations in the treated animals.[13]

Immunomodulatory Activity

Immunomodulatory activity of aqueous extract of *Trigonella foenum-graecum* L., a widely used medicinal and dietary herb, was evaluated in male Swiss albino mice. The 100 mg dose of *T. foenum graecum* showed a stimulatory effect on immune functions in mice. As it is used for a variety of medicinal purposes, its immunostimulatory effect, as reported in this study, strengthens the rationale of its use in several Ayurvedic and Unani drugs.[14]

Antiulcer Activity

The effect of fenugreek seeds (*Trigonella foenum-graecum*) compared to omeprazole was studied on ethanol-induced gastric ulcer. The aqueous extract and a gel fraction isolated from the seeds showed significant ulcer protective effects. The fenugreek seeds also prevented the rise in lipid per oxidation induced by ethanol presumably by enhancing antioxidant potential of the gastric mucosa thereby lowering mucosal injury. Histological studies revealed that the soluble gel fraction derived from the seeds was more effective than omeprazole in preventing lesion formation. These observations show that fenugreek seeds possess antiulcer potential. [15]

Anti-inflammatory and antipyretic Activity

Anti-inflammatory and antipyretic effects of the *Trigonella foenum-graecum* (TFG) leaves extract, an Iranian medicinal plant, were examined. For anti-inflammatory activity, the formalin-induced edema model was used. . The results indicate that the *TFG* leaves extract possess anti-inflammatory as well as antipyretic properties in both i.p. and p.o. administration. [16]

Antioxidant Activity

In comparative study of antioxidant potential for previously identified optimum levels along with fenugreek (FGK) were evaluated in raw and cooked patties manufactured from frozen pork. The FGK (0.01%) showed most effective antioxidant effect with significant reduction with third position in descending order on 9th day.[17,18]

Anti-Tryiodothyronine activity

The effects of fenugreek seed extract on the alterations in serum thyroid hormone concentrations were studied in adult male

mice and rats. Simultaneously, hepatic lipid per oxidation (LPO) and the activities of the antioxidant enzymes, viz superoxide dismutase (SOD) and catalase (CAT) were examined. These findings suggest that fenugreek seed extract induced inhibition in T4 to T3 conversion is not peroxidation-mediated and the inhibition in SOD activity could be the result of a decrease in the protein anabolic hormone, T3.[19]

Fibrinogen and fibrinolytic activity

In a placebo-controlled study the effect of ginger and fenugreek was examined on blood lipids, blood sugar, platelet aggregation, fibrinogen and fibrinolytic activity. Fenugreek in dose of 2.5 gm twice daily for 3 month administration did not affect platelet aggregation, fibrinolytic activity and fibrinogen.[20]

Hypocholesterolaemic effect

Fractions of fenugreek seed were added to the diet of normal or diabetic hypercholesterolaemic dogs for 8 days. The effects on levels of blood glucose, plasma glucagon and plasma cholesterol were investigated. The defatted fraction was rich in fibers (53.9%) and steroid saponin (4.8%) significantly lowered plasma glucose and cholesterol level in dogs.[21]

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