



Research Article

**FORMULATION AND EVALUATION OF HYPOGLYCEMIC EFFECT OF FENUGREEK
(TRIGONELLA FOENUM-GRAECUM) CAPSULES**

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Abstract: *Background:* The seed of *Trigonella foenum-graecum* L. (Fenugreek) is used in traditional medicine as blood sugar lowering agent, this hypoglycemic property is related to the amino acids of the plant specially 4-hydroxyisoleucine. *Method:* fenugreek seeds were powdered and filled into capsules, where each capsule was containing 500 mg of fenugreek powdered seed. The capsules were given to patient suffering from type 2 diabetes and blood glucose level was regulatory monitored. *Result:* all volunteers have shown a reduction in blood glucose level. *Conclusion:* from the collected data, it was concluded that fenugreek has hypoglycemic effect.

Keywords: Fenugreek, hypoglycemic, 4-hydroxyisoleucine

Introduction

Herbal medicine is the oldest form of medicine known to mankind. Herbs have played an important part in our development. They provide us with food, medicine and cosmetics.¹ Today approximately 25% of all prescription drugs are derived from trees, shrubs or herbs. Medicinal and aromatic constituents are present in different parts of the plants like root, seed, stem, bark, wood, leaf, flower, fruit or plant exudates.

Diabetes mellitus is a chronic disease characterized by deficiency in insulin release and/or insulin receptors insensitivity resulting in increased blood glucose levels and glucose intolerance. The main signs and symptoms of this disease are polyphagia, polydipsia and polyuria. Prognosis of the disease includes neuropathy, nephropathy, retinopathy, blood coagulability and increased infection chances and all are due to ineffective treatment or poor patient compliance Drug treatment if effective delays prognosis of the disease and improves patient's life quality but none is able to completely cure the disease.²

Oral hypoglycemic drugs are used extensively and successfully in the treatment of this disease, but despite the good pharmacological profile of these agents (sulfonylureas, biguanides, glitinides or thiazolidindiones), their uses are limited by decreased action in the long run (due to decreased insulin production by the body or insulin-receptors down regulation) and side effects. Therefore, patients may need to take insulin injection in different stages of disease progress. Insulin, though show great extent of efficacy, is not devoid of complications and is not as convenient as oral hypoglycemic.

For this reason some patients tend to use an adjunctive herbal treatment either alone or concurrently with oral hypoglycemic agents to increase their efficacy. One of

the most extensively used herbs as hypoglycemic is fenugreek.³



Figure *Trigonella foenum graecum* seeds.



Fenugreek capsules

Fenugreek (*Trigonella foenum-graecum* L. *Leguminosae*) is one of the oldest medicinal plants, originating in India and Northern Africa. An annual plant, fenugreek grows to an average height of two feet. The

leaves and seeds, which mature in long pods, are used to prepare extracts or powders for medicinal use. Applications of fenugreek were documented in ancient Egypt, where it was used in incense and to embalm mummies. In modern Egypt, fenugreek is still used as a supplement in wheat and maize flour for bread-making. In ancient Rome, fenugreek was purportedly used to aid labor and delivery. In traditional Chinese medicine, fenugreek seeds are used as a tonic, as well as a treatment for weakness and edema of the legs. In India, fenugreek is commonly consumed as a condiment and used medicinally as a lactation stimulant. There are numerous other folkloric uses of fenugreek, including the treatment of indigestion and baldness.⁴

Fenugreek seeds contain 50-percent fiber (30-percent soluble fiber and 20-percent insoluble fiber) that can slow the rate of postprandial glucose absorption. This may be a secondary mechanism for its hypoglycemic effect.⁴

The hypoglycemic effects of fenugreek have been attributed to several mechanisms. The amino acid 4-hydroxyisoleucine in fenugreek seeds increased glucose-induced insulin release in human and rat pancreatic islet cells. This amino acid appeared to act only on pancreatic beta cells, since the levels of somatostatin and glucagon were not altered. In human studies, fenugreek reduced the area under the plasma glucose curve and increased the number of insulin receptors, although the mechanism for this effect is unclear.

In humans, fenugreek seeds exert hypoglycemic effects by stimulating glucose-dependent insulin secretion from pancreatic beta cells, as well as by inhibiting the activities of alpha-amylase and sucrase, two intestinal enzymes involved in carbohydrate metabolism.⁴

Trigonella foenum-graecum (Fenugreek) seeds and leaves are also said to have antidiabetic activity. A curative dose of *Trigonella foenum-graecum* (Fenugreek) seeds also produces antiulcer action and hypocholesterolaemic effects. *Trigonella foenum-graecum* (Fenugreek) exerts, its hypoglycaemic effect by delaying glucose absorption and enhancing its utilization. Seeds of *Trigonella foenum-graecum* (Fenugreek) are therefore considered to be

potentially useful for glucose control and for preventing hyperlipidaemia and atherosclerosis in diabetic subjects. The active component of *Trigonella foenum-graecum* (Fenugreek) seeds has been found to be associated with a defatted part, rich in fiber containing steroidal saponins and proteins comparable to those of soybean.⁵

In a study of the efficacy of fenugreek as a whole seed powder, as well as its subfractions and leaves, the hypoglycemic effects were highest in the whole seeds, followed by gum isolate, extracted seeds, and cooked seeds; the leaves had the weakest effect.⁶ Fenugreek's proposed effects on low-density lipoprotein and corresponding lack of effect on high-density lipoprotein would be especially beneficial for diabetic patients. Because patients with diabetes present an altered lipid profile, fenugreek may reduce their risk for developing atherosclerosis and coronary heart diseases. Seeds of *Trigonella foenum-graecum* L. (*Leguminosae*) are known to exhibit hypoglycaemic activity when taken orally. The hypoglycaemic effect of *Trigonella* seeds, and their major alkaloids, trigonilline.⁷

Fenugreek is contraindicated in pregnant women because it has stimulant effect in the uterine.⁵

The present study aimed to investigate the hypoglycemic effect of fenugreek powdered capsule.

Material & Methodology

Material:

The seed of *Trigonella foenum graecum*, Home miller, Manual Capsule Filling machine, Empty capsules., Glucometer.

Method:

Fenugreek seeds were powdered and filled into capsule size 0. Each capsule was containing 500 mg. The capsules were administered to patient suffering from type 2 diabetes for 15 days, two capsules per day and blood glucose level was measured during this period (every 4 days) and also it was measured one week later, after ceasing the experiment

Results

Table 1. Blood glucose level at zero time

Name	Age	Gender	Blood glucose level at time zero
1.Patient No1	59	Male	220 mg/dl
2.Patient No2	50	Male	163 mg/dl
3.Patient No3	42	Female	140 mg/dl
4.Patient No4	37	Male	136 mg/dl
5.Patient No5	41	Female	137 mg/dl
6.Patient No6	50	Male	135 mg/dl
7.Patient No7	55	Female	160 mg/dl

Table 2 Monitoring blood glucose level during study period

Name	1 st reading	2 nd reading	3 rd reading	4 th reading (Wash out period)	Remark
1.Patient No1	166 mg/dl	145mg/dl	140 mg/dl	166 mg/dl	36.36%
2.Patient No2	143 mg/dl	113 mg/dl	110 mg/dl	140 mg/dl	32.51%
3.Patient No3	133 mg/dl	130 mg/dl	113 mg/dl	128 mg/dl	19.28%
4.Patint No4	120 mg/dl	163 mg/dl	145mg/dl	133 mg/dl	-6.61%
5.Patient No5	133 mg/dl	126 mg/dl	120 mg/dl	130 mg/dl	17.51%
6.Patient No6	113 mg/dl	110 mg/dl	113 mg/dl	130 mg/dl	16.29%
7.Patient No7	145 mg/dl	133 mg/dl	120 mg/dl	148mgdl	21.87%

Discussion:

From the data obtained it is seen that the blood glucose level has shown a consistent decrease. The fenugreek treated patients have shown significant decrease in blood glucose level. This is in consistency with reported data.^{4,5}

Conclusion:

From The data collected by monitoring the blood glucose level, it is seen that, the blood glucose level is decreased and restored to the normal level in most of patient. This result is in consistent with the literature reports which state that fenugreek have hypoglycemic effect.

Recommendation:

Since *Trigonella foenum-graecum* grows in Sudan in large quantities, it is highly recommended that a more comprehensive study be carried out to evaluate the possibility of producing capsules from this plant to use them as hypoglycemic agent for treatment of type 2 diabetic patients.

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