

Therapeutic Effect of Fenugreek Seed on the Patients Suffering from Diabetes Mellitus type II

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Abstract

Nowadays diabetes is the most dreadful disease for humankind in the whole world. Indians are more centrally obese at a given level of BMI compared to white Caucasians and that Indians are more insulin resistant even at lower level of BMI so they are more prone to have diabetes.. Consumption of fenu greek seed decreases the blood glucose level as its amount is inversely associated with insulin resistance. A detailed clinical examination done on selected patients. The criteria for the selection are as follows: 1.All patients are sedentary middle aged workers. 2. Patients with complications like were not included 3.Patients selected were explained the outline and aim of the study. They were advised to have fenugreek seed in the form of powder. 4. We made 3 groups. Group A fed 5 gm, group B fed 10 gm and group C fed 15 gm of fenugreek seed . 5.Patients are recalled after 2 weeks for the investigation to know the proper effect of fenugreek seed. 6.The investigations include Anthropometric data, GTT, blood glucose, and serum lipid profile. The test applied for clinical estimation of blood glucose is GOD-POD (glucose oxidase peroxidase) method. This study proves that consumption of fenugreek seed improves the blood glucose levels in the diabetics' patients

Keywords: diabetes, fenugreek seed, polysaccharide etc.

1. Introduction: Diabetes Mellitus is a chronic disease that has affected humankind throughout the world. The life span of diabetics is shorter than that of non diabetics at nearly all ages. Diabetes has been defined as a genetically and clinically heterogeneous group of disorder all of which show glucose intolerance.^{1,4, 5, 11}

Prevalance- Diabetes is on increase in India. The multicenter ICMR study showed a prevalence of 2.5 % in the urban and 1.8% in the rural population above the age of 15 years. One in every eight individuals in India is a Diabetic. There are 171 million people worldwide suffering from diabetes in 2000 according to World Health Organization (WHO) statistics and this number would be more than double by 2030 ([WHO 2008](#)). The disease is responsible for 3.2 million deaths every year ([WHO 2008](#)).

- Diabetes mellitus is characterized by high blood glucose level with typical manifestations of thirst, polyuria, polydipsia, and weight loss.

- It is caused by partial or total lack of insulin and alteration in carbohydrate, protein and fat metabolism that creates defects in insulin-mediated signal pathways, resulting in decreased glucose transportation from blood into muscle and fat cells.
- The major risk is vascular injury leading to heart disease, which is accelerated by increased lipid levels and hypertension. Management of diabetes includes: control of blood glucose level and lipids; and reduction of hypertension.

Fenugreek (*Trigonella foenum-graecum*) is a plant in the family [Fabaceae](#). Fenugreek is used both as [herb](#) (the leaves) and as a [spice](#). Fenugreek has many medicinal and culinary purposes involving the seeds and the leaves. Both Indian Ayurvedic medicine and traditional Chinese medicine recommend fenugreek to treat various disorders.

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](#), which has been shown to lower blood sugar and prevent diabetes induced cataract. It also lowers cholesterol and triglycerides.

Fenugreek seed has many amino acids but the most abundant amino acid is 4-hydroxyisoleucine. This amino acid has shown to stimulate the pancreas to release insulin (Diabetes 1998). Insulin causes blood sugar to drop which may help ease diabetic symptoms. Fenugreek also regulates blood sugar through the enzymes sucrase and alpha-amylase. By inhibiting these two enzymes, fenugreek can help slow the break down of carbohydrates into sugar further reducing blood sugar levels in the body.

Fenugreek seeds are 55 percent soluble fiber. This gel-forming fiber absorbs water as it passes through the gut and swells up, binding with the food. It delays gastric emptying, slows down carbohydrate absorption and inhibits glucose transport. Nearly 50% dry weight of seeds as well as SDF is edible dietary fiber, making it the highest concentration among all natural sources of fiber. About 30% of SDF (w/w) is gel-forming SOLUBLE fibers similar to guar gum, psyllium husk and oat bran. The INSOLUBLE fiber (20% of SDF), is bulk-forming like wheat bran.

comparison of Fiber content in some major food grains :

COMPOSITION of NATURAL SOURCES of VEGETABLE FIBER

Source	Total Fiber	Soluble Fiber	Insoluble Fiber	Protein	Fat
Fenugreek Seeds	46 - 48%	20 - 28%	18 - 24%	26 - 30%	4 - 8%
Soya Bean	20%	15 - 18%	3 - 5%	40 - 43%	19%
Oats	15 - 18%	7 - 8%	7 - 8%	14 - 19%	N/A
Wheat	12%	1 - 3%	9 - 11%	10 - 12%	1 - 3%

Guar Bean	40%	25%	15%	28%	10 - 15%
Psyllium seed	24 - 26%	24 - 25%	1 - 2%	5%	Trace

The WHO recommends that any diabetic should include 15-25 gram of beta glucans per day. ^{1,3}

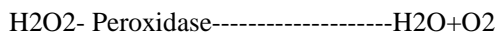
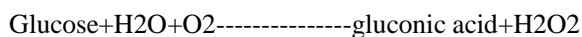
2. Methodology - A detailed clinical examination was carried out and recorded. The criteria for the selection of patients are as follows:

- All patients are sedentary middle aged workers.
- Patients with complications were not included.
- Patients selected were explained the outline and aim of the study. They were given advice regarding the incorporation of fenugreek powder in their daily routine.
- We made three groups. Group A fed 5gm, group B fed 10 gm and group C fed 15 gm of fenugreek seed in the powdered form.
- Patients are recalled after 2 weeks for the base line investigation Anthropometric data, GTT (75 gm oral glucose tolerance test), blood glucose, and serum lipid profile to know the proper effect of fenugreek seed.

Clinical evaluations was done at periodic intervals and were repeated regularly as per to the protocol. The test applied for clinical estimation of blood glucose is GOD-POD method. The method of GOD-POD is described below:

GOD POD(Glucose oxidase Peroxidase) method

Principle- The -CHO (aldehyde) group of carbohydrate is oxidized by glucose oxidase to give gluconic acid and water. The oxygen reacts with 4- aminophenazone in the presence of phenol to form a pink colored compound and intensity of which can be determined at 530 nm. The overall reaction is:



Sample- Plasma or serum

Reagents-

1. Buffer or enzymes- this reagent is prepared by mixing following constituent in 100 ml of phosphate buffer(N/10)
 - a. glucose oxidase-650units
 - b. peroxidase-500units

- c. 4 aminophenazone-20mg
- d. Sodium azide-30mg
- 2. Phenol reagent(ready to use)-100mg/dl
- 3. glucose standard- 100mg/dl

Preparation of glucose reagent – mix the two parts of buffer reagent and 1 part of phenol reagent to get glucose reagent. It is preferable to prepare the reagent fresh. Otherwise it is stable at 2-8°C in an amber colored bottle for 2 weeks. bring the reagent to room temperature before use.

Procedure- Pipette in tubes labeled as follows;

	Test	Standard	Blank
Glucose reagent(ml)	3.0	3.0	3.0
Plasma or serum(ml)	0.02		
Glucose standard 100mg/dl(ml)		0.02	
Distilled water(ml)			0.02

Calculation- Plasma or serum glucose (mg/dl) = O.D of test/O.D of standard x 100.

Note; avoid using contaminated or hemolyzed sample.

3. Result and Discussion – In this study 108 patients were studied for a period of one month. All these patients developed a sense of well being and showed significant fall in their glycolated hemoglobin. In these patients there was significant decrease in the body weight and increase in lean body mass. Group A fed 5 gm, group B fed 10 gm and group C fed 15 gm of fenugreek seed in the powdered form.

From the study it is clear that small dose of fenugreek seed are not effective significantly. As in group A there is no significant difference in fasting and postprandial blood glucose but there is fall in blood glucose is seen in group B, whereas in group C there is mild decrease in blood glucose is observe.

S.No	BLOOD GLUCOSE	GROUP A(fed 5 gm)	GROUP B(fed 10 gm)	GROUP C(fed 15 gm)
1.	Initial			
	Fasting	136	174	141
	Postprandial	196.4	194	217
2	2 weeks			
	Fasting	120	142	135
	Postprandial	184	194	198.3
3	4 weeks			
	Fasting	113.3	120	134
	Postprandial	190.5	178.3	162
4	6weeks			
	Fasting	120.4	108	124.5
	Postprandial	192	164.7	158

4 Conclusion- This study confirms that the amount of fenugreek seed is inversely proportional to the glucose resistance and support the hypothesis that diets with a low glycemic load and high soluble fibres reduces the blood glucose level in Diabetic patients..

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