



Research Article

EFFECT OF FENUGREEK WITH BIOPSYCHOSOCIAL INTERVENTIONS DECREASES HbA1C IN TYPE 2 DIABETES MELLITUS PATIENTS - A CROSS-SECTIONAL STUDY

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Diabetes a growing health problems in high, middle & low economic status groups. The aim of this study is to evaluate the effect of fenugreek in lowering HbA1c levels in type 2 diabetes mellitus patients in Chennai. 100 patients of age 30 to 50 yrs of Type 2 diabetes patients whose HbA1c level above 6% & below 7 % were selected from three private clinic in villivakkam, pattabiram & chromepet. Height, weight, waist and hip circumference and Glycosylated hemoglobin (HbA1c) were measured at the time of first consultation and after 3rd and 6th month of fenugreek treatment. The samples were analyzed using students t-test. The result showed the following- at the end of 3rd month , HbA1c decreased by 0.3% (95% confidence interval, $P < 0.05$), weight decreased by 3.5 kg (96% confidence interval, $P < 0.03$), and waist circumference decreased by 4.5 cm (96% confidence interval, $P < 0.03$) & at the end of 6th month HbA1c decreased by 0.4% (95% confidence interval, $P < 0.05$), weight decreased by 5.5 kg (98% confidence interval, $P < 0.02$), and waist circumference decreased by 7.5 cm (98% confidence interval, $P < 0.02$). The outcome of the study is that powdered fenugreek lowers the HbA1c level in type 2 diabetes patients.

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INTRODUCTION

Diabetes mellitus is a pandemic disease and non communicable disease of world and is one of the main threats to human population. There is a drastic increase in the incidence of type 2 diabetes worldwide (American Diabetes Association, 2011). This is a disease characterized by a dual defect: 1) by insulin resistance which prevents cells from using insulin properly, and 2) degrees of reduced pancreatic insulin secretion (Adler *et al.*, 1997). Fenugreek is a herb that is widely used in cooking and as a traditional medicine for diabetes in Asia. It has been shown to acutely lower postprandial glucose levels, long-term effect on glycemia & in lowering HbA1c levels (Al-Habori and Raman, 1998). Fenugreek (*Trigonella foenum-graecum* Linn) is a dietary supplement used as a traditional medicine, frequently used parts are seeds and leaves. They have hypoglycemic properties commonly consumed as a condiment (Assad and Morse, 2013; Yoshikawa *et al.*, 1997) and used medicinally as a lactation stimulant (Hannan, 2007).

Fenugreek seeds also lower serum triglycerides, total cholesterol (TC), and low-density lipoprotein cholesterol (LDL-C). The lipid-lowering effect of fenugreek might also be attributed to its estrogenic constituent, indirectly increasing thyroid hormones (Kirtikar *et al.*, 2000). This study addresses the effectiveness of fenugreek for lowering hemoglobin (HbA1c) in randomized controlled trial and determines whether the intervention of taking fenugreek alone without usual anti diabetic drugs lowers HbA1c in patients with type 2 diabetes.

MATERIALS AND METHODS

The study took place in Chennai in 3 private clinic. Type 2 diabetes patients were screened from patients attending the clinic of which 100 met the following inclusion criteria: Patients with at least three months of diagnosed type 2 diabetes mellitus and who belonged to age 30 to 50 yrs with HbA1c above 6% & below 7 %. All patients gave their informed consent to the study. Patients were randomly assigned to a 6-months individual - based trial, were given powdered fenugreek stuffed in capsules. 4 capsules in the morning, 3 in afternoon & 3 at bed time with a glass of warm water half an hour before

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food. Each capsule contained 200mg of fenugreek powder, the outer cover of the capsule made of natural cellulose weigh about 100mg and doesn't interfere with the gut interaction with fenugreek powder.

The curriculum included: pathology of diabetes, physical activity and change in diet as a therapy, the diabetic foot, and diabetic complications. Patients were taught simple exercise and a physiotherapist tailored an individual program for each patient including both aerobic and resistance exercise. The diet instruction classes were taught by a dietician. Before patients entered the program were counseled to set personal goals. Goal achievement was evaluated in collaboration with the patients at the end of the program. The nurse specialist and the dietician were trained in the use of the motivational interviewing technique. During a period of 3 & 6 months patients were scheduled for 6 one-hour sessions of individual counseling with a consultant psychologist and guidance about type 2 diabetes, medications, risk factors, blood- glucose self-monitoring, and increasing level of physical activity to the recommended 30 minutes of daily exercise was emphasized. The programme also included 4 individual counseling sessions with a dietician. In addition, the patients received 30 minutes guidance and instructions about foot-care from a podiatrist. Height, weight, waist and hip circumference and glycated hemoglobin (HbA1c) were measured at the time of first visit and repeated after three months & six months of therapy. The primary outcome measure was change in glycemic control, as indicated by HbA1c levels. Anthropometrics (height, weight, waist and hip circumference) and glycosylated hemoglobin (HbA1c) were measured at the time of first visit, 3 months and after 6 months. The samples were analyzed using students t-test.

RESULTS

Table 1. Baseline characteristics of patients - pre therapy & post therapy with fenugreek after 3months

	Pre counseling n = 100		Post counseling n = 100		t-value	Confidence interval (CI)	p value
	M	SD	M	SD			
HbA1c%	6.8	0.78	6.5	0.89	1.983	95% (-5.1,-1.7)	< 0.05
Weight in kg	78.1	11.8	74.6	10.67	2.397	96% (-8.3,-2.4)	< 0.03
Waist circumference (cm)	108.1	10.8	103.6	10.69	2.361	96% (-8.8,-0.8)	< 0.03

Confidence interval 95 %, P < 0.05 being considered significant. HbA1c-Glycated hemoglobin, HbA1c decreased by 0.3% (95% confidence interval, P < 0.05), weight decreased by 3.5 kg (96% confidence interval, P < 0.03), and waist circumference decreased by 4.5 cm (96% confidence interval, P < 0.03)

Table 2. Baseline characteristics of patients post therapy with fenugreek after 6months

	Post counseling after 3 months n = 100		Post counseling after 6 months n = 100		t-value	Confidence interval (CI)	p value
	M	SD	M	SD			
HbA1c%	6.4	0.89	6.0	0.9	1.963	95% (-5.1,-1.6)	< 0.05
Weight in kg	74.6	10.67	72.6	10.6	2.327	98% (-8.4,-2.6)	< 0.02
Waist circumference (cm)	103.6	10.69	100.6	10.6	2.321	98% (-8.6,-0.6)	< 0.02

Confidence interval 95 %, P < 0.05 being considered significant. HbA1c-Glycated hemoglobin, HbA1c decreased 0.4% (95% confidence interval, P < 0.05), weight decreased 5.5 kg (98% confidence interval, P < 0.02), and waist circumference decreased 7.5 cm (98% confidence interval, P < 0.02)

DISCUSSION

Fenugreek is a medicinal plant that is being used as therapy in diabetes (Vuorelaa *et al.*, 2000). Medicinal plants are used by 80% of the world population as the only available medicines especially in developing countries (Hashim *et al.*, 2010). This plant has lipid lowering and sugar decreasing in diabetic and non diabetic peoples and have antioxidant and antibacterial activity. This plant decrease body fats and effective on obesity.

This plant use in therapy atherosclerosis (Nandini *et al.*, 2007) rheumatism (Vyas Amit *et al.*, 2010), sugar lowering (Gupta *et al.*, 2001), blood lipids lowering (Xue *et al.*, 2007), appetizer (Max *et al.*, 1992) and contain antioxidant activity (Birjees *et al.*, 2008).

Fenugreek contains active components like saponins that are transformed in the gastrointestinal tract into saponogenins. Saponinthis plant including; Sarsapogenin, Yuccagenin, Smilagenin and, the most important saponin in this plant is Diosgenin (Elnaz *et al.*, 2010). Fenugreek seeds contain 50-percent fiber (30-per-cent soluble fiber and 20-percent insoluble fiber) that can slow the rate of postprandial glucose absorption Fenugreek seeds, contain oils, alkaloids, amino acids (lysine, argenine, tryptophan, threonin, valyn and methionin) and musilages that in this plant is most famous galactomannan, too is contain vitamins A, C, D, B1 and, minerals calcium, iron and zin.c Fenugreek seed powder in the diet reduces blood sugar and urine sugar with concomitant improvement in glucose tolerance and diabetic symptoms in type 2 diabetic patients (Analava and Debaprasad, 2004).

Few studies (Madar *et al.*, 1988; Jain *et al.*, 1995; Sharma *et al.*, 1998) showed hypoglycemic effects of fenugreek seeds type 2 diabetics. The hypoglycemic effects of fenugreek have been attributed to several mechanisms (Sauvaire, ?) demonstrated in vitro the amino acid 4-hydroxyisoleucine in fenugreek seeds increased glucose-induced insulin release in human and rat pancreatic islet cells, It was observed that 4-hydroxyisoleucine extracted from fenugreek seeds has insulin tropic activity(Sauvaire, ?) show 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.

In humans, fenugreek seeds exert hypoglycemic effects by stimulating glucose-dependent insulin secretion from pancreatic beta cells, (Ajabnoor and Tilmisany, 1988) as well as by inhibiting the activities of alpha-amylase and 50ignali, two intestinal enzymes involved in carbohydrate metabolism. According report (Tim Kr, 1998) the hypoglycemic effect of fenugreek is thought to be largely due to its high content of soluble fiber, which acts to decrease the rate of gastric emptying thereby delaying the absorption of glucose from the small

intestine. The cases suggest fenugreek reduces post-prandial hyperglycemia primarily in subjects with diabetes, but less so in subjects without diabetes. This effect might be more pronounced if raw seeds rather than boiled seeds had been used. Fenugreek may aid with insulin secretion, as suggested by animal studies, since typically these patients have little or no endogenous insulin production (Handa *et al.*, 2005).

Future research

The use of fenugreek as a dietary supplement hold promise in future to be used in patients with impaired glucose tolerance and could benefit from a low-risk, inexpensive, food-based intervention on type I diabetes mellitus along with insulin. We also aim at focusing on treating hypercholesterolemia of its lipid lowering properties. We aim at a large scale randomized clinical trials for evaluating the effect of fenugreek seed powder on measures of insulin resistance, insulin secretion and better glucose control among the patients with type 2 diabetes.

Conclusion

In this trial, it has been shown that the levels of HbA1c reduced in the patients of with type 2 diabetes who were taking fenugreek alone without medications for diabetes. Therefore, it is recommended that fenugreek is safe and may be considered in patients with HbA1c < 8% as a potential means to lower the high levels of HbA1c.

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