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seed powder**

## Hypolipidemic effects of fenugreek seed powder

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### Abstract

Effects of fenugreek (*Trigonella foenugraecum*) on serum lipid profile in hypercholesteremic type 2 diabetic patients were studied. Administration of fenugreek seed powder of 25 gm orally twice daily for 3 and 6 weeks produces significant ( $p < 0.001$ ) reduction of serum total cholesterol, triacylglyceride and LDL-cholesterol in hypercholesteremic group but the change of serum HDL-cholesterol was not significant. On other hand, changes of lipid profile in hypercholesteremic type 2 diabetic patients without fenugreek were not significant ( $p < 0.001$ ). The present study suggests that fenugreek seed powder would be considered as effective agent for lipid lowering purposes.

### Introduction

Hyperlipidemia is the current medical as well social problem, specially associated with diabetes mellitus leading to increasing morbidity and mortality. The major risk factors of hyperlipidemia are associated with atherosclerosis which predisposes ischemic heart disease and cerebro-vascular disease (Brown and Goldstein, 1990). In type 2 diabetic patients there is mild to moderate hypertriglyceridemia, low level of high density lipoprotein (HDL) and over production of very low density lipoprotein (VLDL) (Foster, 1991). Serum total cholesterol is also increased (Florey et al, 1973). In the present century modern medicine draws its nourishment from the rich legacy of traditional medicine. Fenugreek (*Trigonella foenumgraecum*) is one of the oldest medicinal plants, dating back to Hippocrates and ancient Egyptian times (Jensen, 1992). The antihyperlipidemic properties of oral fenugreek seed powder has been suggested (Basch, 2003). Al-Habori et al. (1998) showed the effect of fenugreek seeds and its extracts on plasma lipid profile on rabbits.

Studies have also shown that fenugreek seeds reduce

serum lipids in experimental animals. Sharma (1984, 1986) demonstrated that fenugreek administration increased excretion of bile acids and neutral sterols in feces, thus depleting the cholesterol stores in the body in experimental rats. Awal et al. (1999) has studied the effect of fenugreek and karela on lipid profile in hypercholesterolemic diabetic patients and shown that fenugreek significantly reduces the lipid level. The present study was undertaken to demonstrate the effect of whole fenugreek seed on lipid profile.

### Materials and Methods

Thirty patients of type 2 diabetes mellitus with hyperlipidemia of either sex, aged 30-65 years, weighing 58-84 kg were selected for the study from Diabetic Center, Rajshahi. Patients having history of coexisting liver, kidney or thyroid disorder, etc were not included in the study. Patients were well controlled with hypoglycemic drug and not on any other hypolipidemic medications. Counseling of the patients about the study was done and informed consents were



taken from the patients. Three fasting blood samples of 5 mL were collected on three separate days to estimate lipid profile. The fenugreek seeds were collected from the local market. These were washed with clean water and dried in sun light. After drying seeds was crushed in an electric grinder to make powder. The powder was then stored in a clean, oven-dried stopper plastic container.

The patients were divided into two groups: One group received only their usual anti-diabetic treatment (control group) and another group received fenugreek seed powder with their usual treatment (experimental group). Patients were advised to come after overnight fasting and blood samples were collected in early morning. The control group on the day 1, blood sample was taken as baseline record and advised to continue their usual diabetic treatment (i.e. drug or diet control plus exercise). Another two blood samples were taken on day 21 and day 42 for the study of serum lipid levels. In experimental group on day 1, blood sample was taken as baseline record and advised to continue their usual diabetic treatment (i.e. drug or diet control plus exercise). They were advised to swallow 25 gm of fenugreek seed powder twice daily (after breakfast and after dinner). Again two blood samples were taken on day 21 and day 42 day as study group serum level. All the parameters of lipid profile i.e. serum total cholesterol, LDL-cholesterol, triacylglyceride and HDL-cholesterol were done.

All values expressed as mean in mg/dL  $\pm$  SEM (standard error of mean). Statistical significance of difference between the base line serum level i.e. control (day 1) serum level and after 3 weeks (day 21) of treatment serum level and again base line serum level i.e. control (day 1) serum level and after 6 weeks (day 42) of treatment serum level was performed. The 'p' values of 0.05 or less were regarded as significant.

## Results

The mean serum total cholesterol, LDL-cholesterol, triacylglyceride and HDL-cholesterol level of control group on the first day, after 3 weeks (day 21) and after 6 weeks (day 42) was compared with serum total cholesterol, LDL-cholesterol, triacylglyceride and HDL-cholesterol level of experimental group, on the first day, after 3 weeks (day 21) and after 6 weeks (day 42). The results are shown in Table I.

The fenugreek seed powder significantly ( $p < 0.001$ ) reduced serum total cholesterol, serum triacylglyceride level and serum LDL-cholesterol level in hyperlipidemic type 2 diabetic patients. The serum HDL-cholesterol level increased but not significantly by the fenugreek seed powder. No significant changes

found in control group i.e. hyperlipidemic patients not taking fenugreek.

## Discussion

The present study has been undertaken to demonstrate the effect of fenugreek (local name: Methy) seed powder on lipid profile in hyperlipidemic type 2 diabetic patients. In this study parameter of lipid profile was done for all hyperlipidemic patients. Estimation of lipid profile was done in all the patients after 3 and 6 weeks. No significant changes were observed in all the parameters of lipid profile in control group. But significant changes were observed in serum total cholesterol, LDL-cholesterol and triacylglyceride level in experimental group. Changes of serum HDL-cholesterol level were not significant.

Similar observations were made by number of workers, demonstrated hypolipidemic effect of fenugreek powder in experimental animals like rabbit, rat, etc (Al-Habori et al., 1998). Some researchers also demonstrated the hypolipidemic effect of fenugreek seeds in hyperlipidemic type 2 diabetic patients (Sharma, 1986; Awal et al., 1999; Prasanna, 2000).

Modern lipid lowering agents i.e. statins (atorvastatin, cimvastatin, rosuvastatin etc.) are expensive. The most important adverse effects of statins are liver and muscle toxicity. Other risk factors are: Hepatic dysfunction, renal insufficiency, hypothyroidism, advanced age and serious infections (Stancu and Sima, 2001). Limitations of the use of synthetic statins are pregnancy and lactations, etc (Keefe et al., 2004). Liver and kidney functions may be modified. On the other hand herbal agents like fenugreek, are cheap easily available in many countries like Bangladesh, India, Nepal, Pakistan and Mediterranean region and south African countries. There is no toxic or adverse effect shown by any researcher worked on fenugreek cited above.

In addition to its high fiber content (total fiber content 48%), fenugreek also contains a biologically significant level of saponins. Saponins are known to have hypocholesterolemic effects (Sharma, 1986; Sharma and Raghuram, 1990).

The quality and quantity of protein in the diets have a direct effect on the levels of cholesterol. Generally plant protein appears to lower cholesterol level (Keefe et al., 2004). The plant protein in fenugreek is 26%, so it might exert a lipid lowering effect (Sharma, 1986). Further, since a high proportion of diabetic patients in tropics and subtropics suffer from malnutrition, fenugreek which is in rich protein (26%), has an added advantage in that it is a good source of protein as well as fiber (48%) (Sharma, 1986).

Table I		
Serum lipid profile in patients with type 2 diabetes mellitus treated with or without fenugreek		
Day	Without fenugreek	With fenugreek
<i>Total cholesterol (mg/dL)</i>		
Day 1	285.0 ± 1.5	285.12 ± 2.40
Day 21	288.0 ± 2.2 <sup>NS</sup>	279.12 ± 2.36 <sup>a</sup>
Day 42	289.9 ± 1.9 <sup>NS</sup>	278.37 ± 2.31 <sup>a</sup>
<i>LDL-cholesterol (mg/dL)</i>		
Day 1	157.3 ± 0.4	158.7 ± 0.6
Day 21	156.0 ± 1.3 <sup>NS</sup>	155.7 ± 0.5 <sup>NS</sup>
Day 42	160.7 ± 4.2 <sup>NS</sup>	152.0 ± 6.4 <sup>a</sup>
<i>Triacylglyceride (mg/dL)</i>		
Day 1	201.5 ± 1.6	202.6 ± 4.1
Day 21	201.1 ± 4.4 <sup>NS</sup>	191.9 ± 3.7 <sup>a</sup>
Day 42	201.1 ± 4.4 <sup>NS</sup>	189.4 ± 4.1 <sup>a</sup>
<i>HDL-cholesterol (mg/dL)</i>		
Day 1	35.4 ± 0.6	35.0 ± 0.2
Day 21	35.5 ± 0.3 <sup>NS</sup>	36.5 ± 0.5
Day 42	34.8 ± 0.4 <sup>NS</sup>	37.4 ± 0.7

From the results it can be concluded that fenugreek seeds exhibits significant hypolipideic effect in hyperlipidemic persons. Synthetic statins has some adverse effects and costly. In the light of these comparative findings, it can be stated that fenugreek seeds may be useful in hyperlipidemic states of patients with hypertension, atherosclerosis, ischemic heart diseases etc.

## Conclusion

The present study fenugreek seed powder significantly reduced serum total cholesterol, triacylglyceride and LDL-cholesterol but serum HDL-cholesterol level elevation is not significant. So, it can be suggested that fenugreek may be used for lipid lowering purposes and needs extensive comparative study with the modern lipid lowering agents. Further study on the fenugreek seeds in this aspect and isolation of active principles from the extract is suggested.

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