

# Trigonella Foenum Graecum–Is It A Lipid Lowering Agent?

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## ABSTRACT

**Introduction:** Cardiovascular disease is a significant cause of morbidity and mortality in patients with Diabetes mellitus. Dyslipidaemia is one of the major risk factors for cardiovascular disease. The clinical guidelines for the management of dyslipidaemia are controversial.

**Aim:** The objective of our study is to find out whether the fenugreek lowers the lipid levels in blood.

**Method:** 20 subjects who have been attending the master health checkup department with moderate blood lipid levels those who were not advised to take lipid lowering

drugs were selected for our study. The study design also included the 10 subjects with normal lipid profile. They were divided into 2 groups, the study group was given 25 gms of fenugreek powder mixed with water twice daily, for 4 weeks. At the end of 4 weeks, fasting blood sample was collected from all subjects and all parameters of lipid profile were collected. The data collected was analysed statistically using student 't'-test.

**Result and Conclusion:** The results showed a significant decrease in blood lipid levels of those who took fenugreek regularly.

**Key Words:** Fenugreek, Diabetes Mellitus, Lipid Profile

## INTRODUCTION

Fenugreek (*Trigonella foenum graecum*) is a plant of the family, fabaceae. Fenugreek is consumed as a green leafy vegetable. Fenugreek seeds are used as a spice. This plant is cultivated world wide as a semi-arid crop and it is a common ingredient in many food recipes. The name 'fenugreek' or 'foenum graecum' is Latin for "Greek hay". India is the largest producer of fenugreek. Fenugreek seeds are a rich source of the polysaccharide, galactomannan. They are also a source of saponins such as diosgenin, yamogenin, gitogenin and tigogenin and probably of the lipid lowering agents, neotigogens [1]. The other bioactive constituents of fenugreek include mucilage, volatile oils, and alkaloids such as choline and trigonelline.

Fenugreek is used as a medicinal plant in the traditional Chinese medicine under the name 'Hu Lu Ba'. Several human intervention trials have demonstrated the anti-diabetic effects of fenugreek seeds [2].

Diabetes mellitus is a common secondary cause of hyperlipidaemia, particularly, if the glycaemic control is poor, which in-turn is an important risk factor for atherosclerosis and coronary heart disease [3].

Most of the metabolic symptoms which are associated with

Type-1 and Type-2 diabetes in both humans and relevant animal models is by reducing serum glucose and improving glucose tolerance [2]. Fenugreek is currently available commercially in encapsulated forms and it is being prescribed as a dietary supplement for the control of diabetes by the practitioners of complementary and alternative medicines. Fenugreek contains high dietary fibre and so a few seeds which are taken with warm water before going to sleep help in avoiding constipation.

The steroidal saponins accounts for many of the beneficial effects of fenugreek, particularly the inhibition of cholesterol absorption and synthesis. The seeds are rich in dietary fibre, which may be the main reason behind their ability to lower the blood sugar levels in diabetics. Amino acids like 4-hydroxyisoleucine help in lowering the elevated cholesterol and the triglyceride levels in the blood. Fenugreek seeds yield nicotinic acid and alkaloids. They contain a high percentage of mucilage in the coatings of the seeds which promote evacuation of the intestinal contents. Hence, fenugreek is a mild but effective laxative [4].

The mortality risk for people who do not have any known clinical coronary heart disease is increasing and so before they fall into this category of having a high blood lipid profile, an

intervention should be done. It should be hypothesized that alternate medicine which uses herbs and spice supplements can be investigated and suggested.

## METHODS

This prospective, human clinical trial was performed between December 2011 and February 2012 at a referral centre in India. Those who came for a master health checkup (screening) to the Outpatients Department with a border line blood lipid profile and who had not been advised to take any lipid lowering agents were included in this study as the cases, after an explanation and counselling were given to them. The study protocol was approved by the ethics committee of our institute. A written informed consent was obtained from all the subjects. Those with a history of chronic illnesses or long term medication were excluded from the study. A detailed questionnaire was used to assess the pattern of the lifestyle, obesity and the dietary pattern of the study subjects. Their anthropometric measurements and vital parameters were recorded. A preliminary clinical examination was carried out. Finally, 10 cases were included in the study design and age and sex matched controls (n=10) were recruited from among the teaching faculties of a medical college and hospital. Cases were advised to take 25gms of fenugreek powder which was mixed in water, twice daily after breakfast and dinner for 4 weeks [Table/Fig 1]. The fenugreek powder was available at all the retail stores. Adequate packets of fenugreek powder were distributed to the participants. The basic blood examination for the lipid profile was done for both the groups at the beginning and the end of 4 weeks. The blood lipid profile was estimated by the following methods. Total cholesterol was estimated by using the CHODPOD method (cholesterol oxidase peroxidase by colorimetric method). Triglycerides were estimated by a colourimetric method. Triglyceride was estimated by GPD-POD liquid (Glycerol phosphate dehydrogenase and Peroxidase). High density lipoprotein (HDL) was estimated by using a diagnostic reagent for the precipitation of the non-HDL lipoproteins in the tests for the determination of the high density lipoprotein cholesterol high density lipoprotein (HDL-C). Low density lipoprotein (LDL) was estimated by using the formula, total cholesterol – (TGL/5-HDL-C) and very low density lipoprotein (VLDL) was calculated by using the formula, TGL/5. The data which were obtained were entered in Microsoft Excel sheets and they were analyzed by using the SPSS, version 8.0. The continuous variables were compared by using the Student's 't' test among the groups and a 'p' value of < 0.05 was considered as significant.

## RESULTS

The values of the blood lipid profile, total cholesterol, triglycerides, LDL and VLDL were significantly decreased in the study group as compared to those in the control group. The value of HDL was increased in the study group as compared to that in the control group, as has been shown in the [Table/ Fig- 2] and [Table/Fig- 3].

Group	Height(cm) Mean+/-SD	Weight(kg) Mean+/-SD	BMI Mean+/-SD
Cases n=10	163+/-9	70+/-8	26+/-1
controls n=10	155+/-30	76+/- 6	28+/-2

[Table/Fig-1]: Descriptive statistics

Parameter (mg/dl)	Cases		Control	
	Basal	After 4 weeks	Basal	After 4 weeks
Total cholesterol	220	177	214	206
Triglyceride	232	164	154	151
LDL	138	99	137	134
VLDL	50	35	35	33
HDL	39	45	42	41

[Table/Fig-2]: Blood lipid profile

Parameter	Cases mean+/-SD	Control mean+/-SD	t-value	P-value
Total cholesterol	43+/-15	7+/-3	6.997	0.000*
Triglyceride	68+/-86	7+/-11	2.488	0.034*
LDL	37+/-13	7+/-3	7.121	0.000*
VLDL	10+/-9	1+/-2	3.355	0.007*
HDL	5+/-6	1+/-1	3.440	0.007*

[Table/Fig-3]: Statistical analysis of lipid profile before and after taking fenugreek

\* 'P' value 0.05 is significant

## DISCUSSION

In the present study, there was a significant decrease in the

blood lipid profile of the study group who took the fenugreek powder for 4 weeks as a clinical trial as compared to that of the control group. In an animal study which was done by Annida B et al., the supplementation of fenugreek leaves lowered the lipid profile in STZ-induced diabetic rats [1]. This was similar to the findings of our study. According to Stark A and Madar Z et al., the values of fasting blood sugar, triglycerides and very low density lipoprotein decreased significantly after the treatment for 8 weeks with fenugreek seeds which were soaked in hot water [6].

Diabetes mellitus is a heterogeneous metabolic disorder which is characterized by hyperglycaemia which results in defective insulin secretion or resistance to the insulin action or both. Preliminary human trials and animal experiments had suggested the possible hypoglycaemic and the antihyperlipidaemic properties of the fenugreek seed powder (when it was taken orally) [2].

This lipid lowering effect of the fenugreek powder may be due to the saponin which it contains, which increase the biliary cholesterol excretion [7]. Its triglyceride lowering effect may be due to the pectin component of the fenugreek extract that absorbs the bile acids [5,6]. The fenugreek seeds contain the phenolic compounds, mainly flavonoids. An amino acid compound, 4-hydroxyisoleucine, was identified in the fenugreek extract by using an LC-MS apparatus in the positive ionization mode. The 4-hydroxyisoleucine fragments resemble the spectrum which is exhibited by a molecular ion at  $m/z$  148 (M+H)<sup>+</sup>, with the fragments at  $m/z$  138, 130 and 118 [8,9,10].

The hypolipidaemic effect of the fenugreek seeds could be attributed to the presence of 4-hydroxyisoleucine, an atypical, branched amino acid chain [9]. The lipid lowering effect of fenugreek is due to its action on the adipocytes and the liver cells, which leads to decreased triglycerides and cholesterol synthesis in addition to an enhanced low density lipoprotein (LDL) receptor mediated LDL uptake [10]. This research study was aimed at studying the importance of the “pre-diabetes state” which is otherwise known as the ‘metabolic syndrome’. Populations with the prediabetes state or the metabolic syndrome are at an increased risk of cardiovascular morbidity or mortality [10,11]. There is a considerable disparity in the clinical guidelines on the lipid targets in the metabolic syndrome [12]. The metabolic syndrome should be included as a risk score in the prediction of coronary vascular disease [13,14].

## CONCLUSION

The prevention of coronary artery disease (CAD) by lowering

the blood lipid profile levels at the early stages, is warranted. So, the fenugreek powder might be useful as an adjuvant therapy in dyslipidaemia in the early stages. Further studies can be planned to extract the exact component which lowers the blood lipid profile, from the fenugreek seeds. Human clinical trials can be conducted which compare the hypolipidaemic effects of the statin therapy and the fenugreek supplements.

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