



## Effect of fenugreek (*Trigonella foenum-graecum*) seed powder on lipid profile: A single blind placebo controlled study

Achliya Amit<sup>1</sup>, Verma Shubhangi<sup>1</sup>, Daphale Ajay<sup>1</sup>, Chhajed Neel<sup>1\*</sup> and Bhise Kasturi<sup>1</sup>

<sup>1</sup>Department of General Medicine, Dr. Panjabrao Deshmukh Memorial Medical College, Amravati, Maharashtra 444603, India

### Abstract

**Background:** Dyslipidemia is one of the most prevalent risk factors contributing to atherosclerotic cardiovascular disease. Clinical trials have demonstrated that treatment of dyslipidemia reduces cardiovascular events. Fenugreek seed powder supplementation has lipid-lowering activity, but has not been studied extensively. In light of this, we undertook the present study at tertiary care hospital in Amravati, Maharashtra, with the aim of studying the effect of fenugreek seed powder on serum lipid profile in patients with dyslipidemia & to determine the adverse effects of it.

**Methods:** The study was a single blind placebo controlled study conducted on 60 patients with dyslipidemia from June 2022 to November 2022, after meeting inclusion and exclusion criteria.

**Results:** It was found significant decrease in serum total cholesterol (237.32 to 204.51mg/dl) p value <0.001, serum LDL cholesterol (154.69 to 133.88 mg/dl) p value < 0.001 & serum triglycerides (196.95 to 165.09 mg/dl) p <0.01 with no effect on serum HDL cholesterol (41.11 to 38.92mg/dl) p >0.05, without any major side effects.

**Conclusion:** Fenugreek seed powder significantly lowers serum total cholesterol, LDL cholesterol and triglyceride levels in dyslipidemia patients, with no effect on serum HDL cholesterol levels. fenugreek seed powder supplementation considerably improves lipid Profile. Hence it could be well-thought-out as an effective lipid lowering nutritional supplement. Further high quality & large scale studies are needed to decisively establish the clinical efficacy of fenugreek seed powder.

**Keywords:** fenugreek seed powder; dyslipidemia; lipid profile; cholesterol; LDL; triglycerides; HDL

### Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality in India. A quarter of all mortality is related to CVD. Ischemic heart disease and stroke are the predominant causes and are responsible for >80% of CVD deaths [1]. Dyslipidemia, in particular elevated LDL cholesterol, is one of the most prevalent risk factors contributing to the evolution of atherosclerosis and consequent vascular disease [2]. Clinical trials have unequivocally demonstrated that treatment of dyslipidemia reduces cardiovascular (CV) events [3]. The first-line treatment of cardiometabolic risk factors are lifestyle modifications. Regardless of recommendations to the contrary, the role of diet in the treatment of hypercholesterolemia has been mostly abandoned with the advent of the statins. The potential of diet to prevent CV disease (CVD) is often under appreciated

by patients, who would rather take a pill than change ingrained habits, and by physicians, who perceive diet as ineffective and unimportant. The addition of plant stanols/sterols (2 g/d) and soluble fiber (10–15 g/d) can further reduce LDL-C by roughly 10% [4].

**\*Correspondent author:** Dr. Chhajed Neel, Department of General Medicine, Dr. Panjabrao Deshmukh Memorial Medical College, Amravati, Maharashtra 444603, India. Email: [neelchhajed69@gmail.com](mailto:neelchhajed69@gmail.com)

Received 22 January 2023; Revised 10 March 2023; Accepted 18 March 2023; Published 27 March 2023

**Citation:** Amit A, Shubhangi V, Ajay D, Neel C, Kasturi B. Effect of fenugreek (*Trigonella foenum-graecum*) seed powder on lipid profile: A single blind placebo controlled study. J Med Sci Res. 2023; 11(2):114-118. DOI: <http://dx.doi.org/10.17727/JMSR.2023/11-22>

**Copyright:** © 2023 Amit A et al. Published by KIMS Foundation and Research Center. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Fenugreek (*Trigonella foenum graecum*) is one of the oldest medicinal plants, dating back to Hippocrates and ancient Egyptian eras. Numerous studies have shown that *Trigonella foenum-graecum* supplementation has lipid-lowering action. Meta-analysis executed by Heshmat-Ghahdarijani et al. to assess the effect of fenugreek supplementation on human serum lipid profile using data sourced from PubMed, EMBASE, Scopus, and Coherence library from January 2000 to December 2019, showed that fenugreek supplementation significantly improved lipid profile (LDL, TG, TC, and HDL) [5].

Dyslipidemia is characterized by means of hypercholesterolemia, hypertriglyceridemia, increased levels of low-density lipoprotein cholesterol (LDL-C), and decreased HDL-C. Statins are widely used for the treatment of dyslipidemia, but are associated with skeletal muscle, metabolic, neurological, and other possible side effects [6]. Also cost is limiting factor in most of the patients in developing countries like India. Due to these reasons, there is a strong desire to use herbs or plants for treatment, due to fewer side effects, less toxic & easier consumption or availability as well as low price as compared to synthetic counterparts. Recently, many medicinal plants have demonstrated the potential for the treatment of dyslipidemia, one such promising plant is *Trigonella foenum-graecum*. *Trigonella foenum-graecum* is a useful medicinal plant belonging to family Fabaceae known for a long time for their medicinal qualities. The antihyperlipidemic properties of oral fenugreek seed powder has been suggested in a meta-analysis by Khodamoradi et al [7] and Askarpour et al [8]. But Indian studies are limited. The main purpose of this study was to investigate the effect of *Trigonella foenum-graecum* seed powder on the lipid profile in patients with abnormal lipid profile but did not started any treatment yet. However, only a limited quantity of clinical research exists to support their efficiency. Further research is necessary to establish the value of these extracts in the treatment of dyslipidemia.

The study aimed to determine the effect of fenugreek seed powder on serum lipid profile in patients with dyslipidemia and to determine the adverse effects of fenugreek seed powder.

## Materials and methods

This prospective study was conducted over a period of 6 months from June 2022 to November 2022 at Dr. PDMC Amravati, Maharashtra, India. The study was approved by the Institutional Ethical committee and written informed consent was obtained from all study subjects. Total of sixty patients who fulfilled eligibility criteria were recruited for the study and randomized

into treatment and control groups. Patients with dyslipidemia as defined by criteria laid down by NCEP ATP III panel, of either sex, aged 30-70 years, were enrolled for the study. All the patients were properly informed about the research work, possible effects, and side effects of fenugreek seed powder.

Patients who were not willing to participate in the study and unable to give informed consent were excluded from the study. Patients already on lipid-lowering therapy, having history of coexisting liver, kidney or thyroid disorder, etc. were not included in the study. Patients who are pregnant and lactating & receiving any medication known to affect lipid metabolism e.g., oral estrogen, HIV protease inhibitors, B-blockers, glucocorticoids, thiazide diuretic were excluded from the study.

Detail clinical, anthropometric and biochemical evaluation of all eligible patients was undertaken at the start of study by preparing a standardized questionnaire, their basal lipid profile was obtained in fasting state and they were randomized alternately into 2 groups (Group A and Group B) of 30 patients each. Patients in Group A (Study Group) received fenugreek seeds Powder extract 5gm twice daily before meals for 6 weeks and patients in Group B (Control Group) received placebo capsules twice daily before meals for 6 weeks along with the standard of care.

Patients were asked to follow up every fortnightly and adverse effects if any were noted. At the end of 6 weeks of study period, lipid profile was repeated in Fasting state in all the patients along with detail clinical examination. Data obtained was analyzed statistically using paired 't' test. The 'p' values of 0.05 or less were regarded as significant.

## Results

In this study both the groups were comparable as far as age and sex are concerned. There was no significant difference in BMI of patients in both the groups. The serum total cholesterol, HDL cholesterol, LDL cholesterol & serum triglyceride level of study group & control group was compared on the first day and after 6 weeks. The sociodemographic profile and lipid profile at the start of study is shown in Table 1. Effect of fenugreek seed powder on lipid profile after 6 weeks is shown in Table 2.

In the study group, serum total cholesterol decreased from 237.32 at the start of study to 204.51 at the end of 6 weeks of study period which is statistically significant,  $p < 0.001$ .

In the control group serum total cholesterol decreased from 214.78 to 212.06,  $p > 0.05$  which is not significant. Serum HDL cholesterol in the study Group before and after 6 weeks of study period was 41.11 and 38.92,  $p > 0.05$  while in control Group, serum HDL cholesterol before and after the study period was 39.25 and 38.9,  $p > 0.05$ . Thus there was no statistically significant difference in serum HDL cholesterol before and after therapy in both the groups.

**Table 1:** sociodemographic profile and lipid profile at the start of study.

Baseline characteristics	Placebo (Control Group)	Fenugreek seed powder (Study Group)
Age group (Years)		
30-39	1	1
40-49	4	4
50-59	12	12
60-69	12	12
>70	1	1
Total	30	30
Female sex-no (%)	11(36.6%)	12(40%)
Body mass index-no(%)		
<25	5(16.6%)	5(16.6%)
25-30	14(46.6%)	15(50%)
>30	11(36.6%)	10(33.3%)
Total cholesterol (mg/dl)	214.78	237.32
HDL cholesterol (mg/dl)	39.25	41.11
LDL cholesterol (mg/dl)	141.9	154.69
Serum triglycerides (mg/dl)	170.67	196.95

Serum LDL cholesterol reduced from 154.69 to 133.88 mg/dl in the study group after 6 weeks of therapy,  $p < 0.001$  which is statistically significant, whereas in the control group there was no significant reduction in Serum LDL cholesterol, from 141.9 to 138.2 mg/dl,  $p > 0.05$ .

There was a significant reduction in serum triglycerides in the study group from 196.95 to 165.09 mg/dl,  $p < 0.01$ , where as in the control group, there was no significant change in Serum Triglycerides level, from 170.67 to 173.6 mg/dl,  $p > 0.05$ .

Effect of fenugreek seed powder and placebo on weight shown in Table 3.

In the study group and placebo group, the mean weight before the start of study was  $71.73 \pm 6.669$  kg and  $72.66 \pm 8.04$  kg respectively. At the end of 6 weeks of study period the mean weight in study and placebo group was  $71.53 \pm 6.48$  kg and  $72.56 \pm 7.99$  kg respectively and respective p value was  $> 0.05$  in both the groups which is not significant. Thus there was no significant difference in weight before and after therapy in both the groups.

In the present study, 3 patients in study group reported flatulence which subsided without any treatment in 3-4 days and there were no withdrawals because of side effects.

Thus, the results of the present study demonstrate that ingestion of fenugreek seed powder significantly lowers serum total cholesterol and serum LDL cholesterol and serum triglyceride levels in hyperlipidemia patients

**Table 2:** Effect of fenugreek seed powder on lipid profile after 6 weeks.

Lipid profile	Fenugreek Group			Placebo Group		
	Baseline	After 6 weeks	p value	Baseline	After 6 weeks	p value
Total cholesterol(mg/dl)	237.32	204.51	<0.001	214.78	212.06	>0.05
HDL cholesterol(mg/dl)	41.11	38.92	>0.05	39.25	38.9	>0.05
LDL cholesterol(mg/dl)	154.69	133.88	<0.001	141.9	138	:0.05
Serum triglycerides (mg/dl)	196.95	165.09	<0.01	170.67	173.6	>0.05

**Table 3:** Effect of fenugreek seed powder on weight.

Weight (Kg)	Fenugreek Group		Placebo Group	
	Basal	After 6 weeks	Basal	After 6 weeks
Mean	71.73	71.53	72.66	72.56
Standard déviation	6.669	6.48	8.04	7.99
p value	> 0.05		> 0.05	

without any major side effects. There was no effect of fenugreek seed powder on serum HDL cholesterol levels.

## Discussion

The present study has been undertaken to demonstrate the effect of fenugreek (local name: Methi) seed powder on lipid profile in hyperlipidemic patients. In this study parameter of lipid profile was done for all dyslipidemia patients. Estimation of lipid profile was done in all the patients at baseline and after 6 weeks of therapy.

No significant changes were seen in all the parameters of lipid profile in control group. But significant changes were observed in serum total cholesterol, LDL-cholesterol and triglycerides level in study group. Changes of serum HDL-cholesterol level were not significant. Similar observations were made by number of workers. Sharma et al studied effect of fenugreek seeds on blood glucose and serum lipids in type I diabetes [9]. In this study Serum total cholesterol, LDL and VLDL cholesterol and triglycerides were significantly reduced but the HDL cholesterol fraction, however, remained unchanged. These findings were consistent with our study. In another study conducted by Geberemeskel et al to study effect of fenugreek seed powder solution on hyperlipidemia in newly diagnosed type II diabetic patients, the treatment group (consumed 25 g *Trigonella foenum-graecum* seed powder solution orally twice a day for one month) showed significantly lower total cholesterol level by 13.6%, triglyceride level also reduced by 23.53% and low-density lipoprotein cholesterol level also reduced by 23.4% as compared to the baseline level and significantly increased high-density lipoprotein cholesterol level by 21.7% as compared to the baseline level in the treatment group. However, lipid profile levels in the control group (which received metformin) were not significantly changed [10].

On the other hand, results of the current study are in contrast with previous studies conducted by Kassaian et al [11]. who reported no significant effect of *Trigonella foenum-graecum* seed powder on TC, HDL-C, and LDL-C levels between treatment and control groups. Elsaadany et al studied antihyperglycemic Effect of fenugreek and ginger in patients with type 2 diabetes in a double blind placebo controlled study, in this study fenugreek seeds significantly reduced triglycerides levels while all the other lipid parameters did not significantly change [12]. These discrepancies might be possibly due to methodological issues such as modifications in the method of preparation, dose, and type of *Trigonella foenum-graecum* seed given.

Thus, the result put forward that *Trigonella foenum-graecum* seed powder solution has a potential antidyplidemia effect even though the mechanism of action is not well clear. But quite a few hypotheses have been put forward in this regard. The reductions of TC, TG, and LDL-C levels and increase in HDL-C level by *Trigonella foenum-graecum* seed powder might be hypostasized due to crude fiber and saponin content in *Trigonella foenum-graecum* seeds.

In addition to its high fiber content (total fiber content 48%), fenugreek also contains a biologically noteworthy level of saponins. Saponins are known to have hypocholesterolemic effects. Diosgenin is a furostanol saponin, which hinders the absorption of cholesterol and in this way lower hepatic cholesterol level and increases biliary cholesterol excretion, eventually lowering the serum cholesterol concentration [13]. 3 patients in our study reported flatulence which subsided on its own within 3-4 days, similar minor GI side effects were noted in few patients in study by Sharma et al [9].

This study is single blinded; a double blind placebo control study with a larger sample size and over a longer duration is needed to establish long term safety and efficacy. And also, it needs further comprehensive work to assess at a larger scale and long-term outcomes of *Trigonella foenum-graecum* seed powder.

## Conclusion

The present study showed that fenugreek seed powder significantly reduced serum total cholesterol, triglycerides and LDL-cholesterol but serum HDL-cholesterol level elevation is not significant. *Trigonella foenum-graecum* seed powder is an effective natural food source that has an ability to control dyslipidemia. To summarize fenugreek seed powder may be used for lipid lowering purposes and needs extensive comparative study with the contemporary lipid lowering agents. In order to provide adequate confirmation, more research including comprehensive pharmacological investigation should be carried out to isolate and characterize a specific bioactive compound of the *Trigonella foenum-graecum* seed powder, and appropriate interpretation of its mechanism of action needs further study.

## Conflicts of interest

Authors declare no conflicts of interest.

## References

- [1] Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. *Circulation*. 2016; 133:1605–1620.
- [2] Pirillo A, Casula M, Olmastroni E, Norata GD, Catapano AL. Global epidemiology of dyslipidaemias. *Nature Reviews Cardiology*. 2021; 18:689–700.

- 
- [3] Alenghat FJ, Davis AM. Management of blood cholesterol. *Jama*. 2019; 321:800–801.
- [4] Sikand G, Severson T. Top 10 dietary strategies for atherosclerotic cardiovascular risk reduction. *American J Prev Cardiol*. 2020; 4:100106.
- [5] Heshmat-Ghahdarjani K, Mashayekhiasl N, Amerizadeh A, Jervekani ZT, Sadeghi M. Effect of fenugreek consumption on serum lipid profile: A systematic review and meta-analysis. *Phytotherapy Res*. 2020; 34:2230–2245.
- [6] Ruscica M, Ferri N, Banach M, Sirtori CR, Corsini A. Side effects of statins: from pathophysiology and epidemiology to diagnostic and therapeutic implications. *Cardiovascular Res*. 2022; 118:3288–3304.
- [7] Khodamoradi K, Khosropanah MH, Ayati Z, Chang D, Nasli-Esfahani E, et al. The effects of fenugreek on cardiometabolic risk factors in adults: A systematic review and meta-analysis. *Compl Therap Med*. 2020; 52:102416.
- [8] Askarpour M, Alami F, Campbell MS, Venkatakrisnan K, Hadi A, et al. Effect of fenugreek supplementation on blood lipids and body weight: A systematic review and meta-analysis of randomized controlled trials. *J Ethnopharm*. 2020; 253:112538.
- [9] Sharma RD, Raghuram TC, Rao NS. Effect of fenugreek seeds on blood glucose and serum lipids in type I diabetes. *European J Clin Nutr*. 1990; 44:301–306.
- [10] Geberemeskel GA, Debebe YG, Nguse NA. Antidiabetic effect of fenugreek seed powder solution (*Trigonella foenum-graecum* L.) on hyperlipidemia in diabetic patients. *J Diab Res*. 2019; 2019.
- [11] Kassaian N, Azadbakht L, Forghani B, Amini M. Effect of fenugreek seeds on blood glucose and lipid profiles in type 2 diabetic patients. *Int J Vit Nutri Res*. 2009; 79:34–39.
- [12] Elsaadany MA, AlTwejry HM, Zabran RA, AlShuraim SA, AlShaia WA, et al. Antihyperglycemic effect of fenugreek and ginger in patients with type 2 diabetes: A double-blind, placebo-controlled study. *Curr Nutri Food Sci*. 2022; 18:231–237.
- [13] Kumar N, Kumar M, Verma MK, Ramanarayanan S, Ranjan A, et al. Bioactive effects and safety profiles of fenugreek (*Trigonella foenum-graecum* L.) for pharmaceutical and medicinal applications. *Pharma innov*. 2021; 10:912–919.