



# EFFECT OF *TRIGONELLA FOENUM GRAECUM* (FENUGREEK) ON SERUM CHOLESTEROL AND TRIGLYCERIDES IN ALLOXAN INDUCED DIABETIC RATS\*

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## Abstract

A study was conducted to assess the effect of fenugreek (*Trigonella foenum graecum*) seed powder at two different doses (2g/kg & 8g/kg) on serum cholesterol and serum triglyceride in alloxan induced diabetic rats. Administration of fenugreek seed powder @2g/kg & 8g/kg for 30 days produced significant reduction of serum cholesterol & serum triglyceride. The present study suggests that fenugreek seed powder at both dose rates can be considered as an effective hypolipidaemic agent.

**Keywords:** Fenugreek, hypolipidaemia

Diabetes mellitus is a chronic metabolic disease affecting millions of people all over the world. During diabetes, besides hyperglycemia, there occurs a profound alteration in the concentration and composition of lipids. Diabetes mellitus is known to cause hyperlipidemia through various metabolic derangements. Among several metabolic derangements insulin deficiency has been known to stimulate lipolysis in adipose tissue and give rise to

hyperlipidemia and fatty liver. Thus in diabetes, hypercholesterolemia and hypertriglyceridemia often occurs (Hardman *et al.*, 2001). More than 400 plants with glucose lowering potential are known. Also a number of plants are known to have hypolipidemic effect. However there is little information about plants with both hypoglycemic and hypolipidemic effects. *Trigonella foenum graecum*, commonly known as fenugreek is used in the Ayurvedic medicine for the treatment of diabetes mellitus. The present study was conducted to assess the hypolipidemic effect of fenugreek.

## Materials and Methods

The experiment was conducted in thirty two male albino rats weighing 150 – 200 g. Work was carried out after getting approval from Institutional Animal Ethics Committee. They were maintained on identical feeding and managerial practices in the laboratory for one week before the commencement of study. Well dried seeds of fenugreek were taken and pulverized in a blender to get fine powder. The rats were

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randomly divided into four groups, each group of eight animals each.

Group I : ( $T_0$ ) Normal control, no treatment was given.

Group II : ( $T_1$ ) Alloxan (Diabetic) control, no treatment was given.

Group III : ( $T_2$ ) Diabetic, feed incorporated with *Trigonella foenum graecum* (fenugreek) seed powder at a dose of 2g/kg body weight from day 16 to day 45 (30 days).

Group IV : ( $T_3$ ) Diabetic, feed incorporated with *Trigonella foenum graecum* (fenugreek) seed powder at a dose of 8g/kg body weight from day 16 to day 45 (30 days).

All the treatment groups except normal control were made diabetic by subcutaneous injection of alloxan monohydrate at a rate of 120 mg/kg body weight on zero day. After 16 days blood glucose was estimated using O-toluidene method. The rats that showed moderate hyperglycemia (200-250mg/100ml) were selected for specific drug treatment.

$T_2$  and  $T_3$  were administered the fine fenugreek seed powder with feed daily at a dose of 2g/kg and 8g/kg body weights respectively for 30 days.

Blood was collected on last day of the experiment (45<sup>th</sup> day) retro orbitally from the inner canthus of the eye in fresh vials without any anticoagulant.

#### Estimation of Cholesterol

Cholesterol level in serum was estimated by enzymatic CHOD-PAP method (Allain *et al.*, 1974) using kit from Agappe Diagnostics.

#### Estimation of Triglyceride

Triglyceride level in serum was estimated by enzymatic GPO-PAP method (Nussel and Arav., 1975) using kit from Agappe Diagnostics.

#### Statistical analysis of data

The data obtained were analyzed by using one way Analysis Of Variance for comparison between groups and student *t* test for within groups as described by Snedecor and Cochran (1985). The results are expressed as mean  $\pm$  standard deviation

### Results and Discussion

Serum cholesterol (mg %) estimated on 45<sup>th</sup> day of the experiment is presented in Table 1. The results are graphically represented in Fig.1. Animals of Group II (diabetic control) remained hypercholesterolaemic throughout the period of study. There was significant decrease ( $P < 0.05$ ) in the cholesterol levels of animals treated with fenugreek seeds at both doses (Group III and IV) compared to Group II.

The serum triglyceride estimated on 45<sup>th</sup> day of experiment is shown in Table-2 and is graphically represented in Fig. 2.  $T_2$  &  $T_3$  showed significant reduction ( $P < 0.05$ ) in serum triglyceride when compared to diabetic control ( $T_1$ ).

**Table 1.** Effect of Fenugreek seed powder at two different doses on serum cholesterol (mg%)

| Animal No.    | Group I                        | Group II                        | Group III                      | Group IV                       |
|---------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|
| 1             | 49.23                          | 165.43                          | 85.39                          | 70.00                          |
| 2             | 72.31                          | 162.14                          | 128.09                         | 90.77                          |
| 3             | 73.85                          | 152.26                          | 93.63                          | 83.08                          |
| 4             | 83.89                          | 173.66                          | 104.12                         | 70.77                          |
| 5             | 53.08                          | 199.18                          | 89.14                          | 78.46                          |
| 6             | 90.77                          | 171.19                          | 95.13                          | 114.62                         |
| 7             | 87.69                          | 148.97                          | 76.40                          | 82.31                          |
| 8             | 102.31                         | 158.85                          | 100.37                         | 91.54                          |
| Mean $\pm$ SD | 76.64 $\pm$ 18.38 <sup>D</sup> | 166.46 $\pm$ 15.70 <sup>A</sup> | 96.53 $\pm$ 15.41 <sup>B</sup> | 85.19 $\pm$ 14.31 <sup>C</sup> |

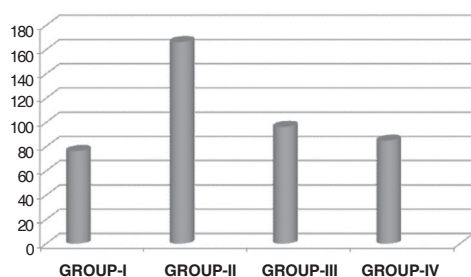


Fig. 1

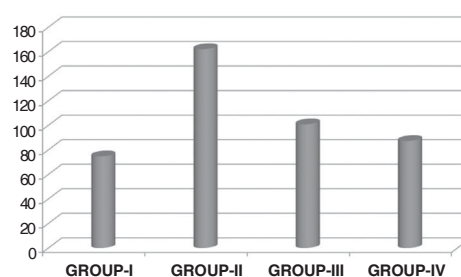


Fig. 2

**Table 2.** Effect of Fenugreek seed powder at two different doses on serum Triglyceride (mg %)

| Animal No. | Group I                  | Group II                  | Group III                 | Group IV                 |
|------------|--------------------------|---------------------------|---------------------------|--------------------------|
| 1          | 48.73                    | 173.47                    | 79.12                     | 49.8                     |
| 2          | 61.39                    | 162.59                    | 136.26                    | 102.77                   |
| 3          | 77.22                    | 135.37                    | 101.10                    | 100.40                   |
| 4          | 81.65                    | 182.99                    | 120.88                    | 57.71                    |
| 5          | 54.43                    | 193.20                    | 84.98                     | 75.89                    |
| 6          | 90.51                    | 179.59                    | 109.90                    | 117.00                   |
| 7          | 87.34                    | 121.77                    | 61.54                     | 90.12                    |
| 8          | 96.20                    | 147.62                    | 112.82                    | 104.35                   |
| Mean±SD    | 74.68±17.68 <sup>D</sup> | 162.08±25.04 <sup>A</sup> | 100.83±24.35 <sup>B</sup> | 87.26±23.92 <sup>C</sup> |

Sheela & Augusti (1992) reported an increase in serum lipids in alloxan induced diabetes. According to Prince and Menon (1998), the marked hyperlipidemia that characterized the diabetic stage is a consequence of the uninhibited action of lipolytic enzymes on the fat depots. Ponnachan *et al.* (1992) were of opinion that in fenugreek seed powder treated rats, serum cholesterol levels were reversed to that of control rats. Prasanna (2000) observed that serum triglyceride and cholesterol were significantly decreased in hyperlipidaemic patients when treated with fenugreek seed powder.

Adams (2001) suggested that insulin has an antilipolytic activity which may result in hypocholesterolaemia. Puri *et al.* (2002) suggested that fenugreek seeds act through stimulating synthesis/secretion of insulin from pancreatic  $\beta$  cells. Hypocholesterolaemic activity of fenugreek seeds may also be due to its insulinomimetic activity. In a study conducted by Khosla *et al.* (1995) similar results were obtained with fenugreek seeds.

They attributed the hypolipidaemic effect of fenugreek to the rich fibre content.

From the present study it can be concluded that the fenugreek seed powder at both doses (8g/kg & 2g/kg body weight) is having potent hypolipidaemic effect.

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