

# The Effect of Fenugreek (*Trigonella Foecum Graecum*) Intake on the Oxidative Stress in Hypercholesterolaemic Subjects

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## ABSTRACT

**Introduction:** The consumption of fenugreek (*Trigonella Foecum Graecum*) has been seen to have antidiabetic and hypolipidaemic effects. Hypercholesterolemia is a substrate for lipid per oxidation. An increased lipid per oxidation leads to oxidative stress. When the lipid levels are lowered, we can expect a reduction in the lipid per oxidation, which reduces the oxidative stress. Oxidative stress is a well established factor in the pathogenesis of ageing to deadly disease like carcinoma.

**Objective:** The purpose of this research was to study the effect of fenugreek intake on the oxidant and the antioxidant status in hyperlipidaemic subjects.

**Method:** Twenty subjects with an elevated lipid profile were included in this study. A detailed history was taken and clinical examinations were done for all the patients. They were grouped into two. The first group was treated with

placebo for 30 days. The second group was treated with *Trigonella Foecum* powder (fenugreek) for 30 days. Fasting blood samples were taken from both the groups before and after the 30th day of the intake of placebo and fenugreek. The blood levels of MDA (oxidant) and Caeruloplasmin (antioxidant) were estimated. Their levels before and after the intake of placebo and fenugreek were compared statistically.

**Results:** The levels of MDA and Caeruloplasmin were found to be reduced significantly following the fenugreek consumption as compared to their pre treatment levels. No significant difference was found in the controls who consumed placebo.

**Conclusion:** This study proved that a regular intake of fenugreek could reduce the oxidative stress by reducing the lipid per oxidation.

**Key Words:** Caeruloplasmin, MDA (Malon di aldehyde), Fenugreek, Oxidative stress

## INTRODUCTION

An imbalance between the oxidant and the antioxidant leads to oxidative stress. Oxidants cannot be measured directly and therefore, serum Malon di aldehyde (MDA) which is a marker of lipid per oxidation is estimated instead. There are antioxidants like superoxide dismutase, Caeruloplasmin, etc., to fight against these oxidants and to thereby reduce the oxidative stress. An increased lipid per oxidation leads to oxidative stress. When the lipid levels are lowered, we can expect a reduction in the lipid per oxidation, which reduces the oxidative stress. Oxidative stress is well established factor in the pathogenesis of ageing to deadly disease like carcinoma. There are studies which have mentioned that the intake of fenugreek reduces the oxidative stress by inhibiting the lipid per oxidation and that fenugreek has an antioxidant proper-

ty. Fenugreek belongs to the leguminosae family and it has originated from India. The fenugreek seeds (*Trigonella foecum graecum*) are widely cultivated in India. It is used day by day in the Indian recipes as a spice and as an herb. It contains fats, carbohydrates, proteins, enzymes, saponins, mucilage, trigoneline, flavonoids [1,2], gitogenin [3], etc. Each of these components has different functions. The fenugreek seeds have been proven to have both hypoglycaemic and anticholesterolemic properties [4,5]. Thereby, fenugreek can reduce oxidative stress directly by acting as an antioxidant or indirectly by reducing the lipid level and the lipid per oxidation.

## AIM

To study the effect of fenugreek on the oxidant and the antioxidant status in hypercholesterolaemic patients.

## OBJECTIVES

To estimate the levels of MDA (oxidant) before and after the placebo [1]. and the fenugreek intake in the controls and the cases respectively [2]. To estimate the levels of caeruloplasmin (antioxidant) before and after the placebo and the fenugreek intake in the controls and the cases respectively [3]. To compare the oxidant and the antioxidant status before and after the placebo and the fenugreek intake.

## MATERIALS AND METHODS

After obtaining a written informed consent from the subjects and the institutional ethical clearance, 20 subjects with elevated lipid profiles, who were in the age group of 38 to 65 yrs, of both the sexes, from the Outpatients Department of Sree Balaji Medical College and Hospital, were recruited for this study. Those with hypertension, ischaemic heart disease, chronic obstructive pulmonary disease, stroke and recent surgery were excluded from the study after taking a detailed history from them and after their clinical examinations, as some of them by themselves could alter the values.

They were randomly divided into two groups as the controls and the cases. The controls (group I) received placebo- bengal gram and rice powder which was made to 25g. The cases (group II) received 25g of readymade, defatted fenugreek powder twice daily before breakfast and dinner. They were followed up through the telephone everyday for conforming the intake. Fasting venous blood samples were taken on day zero and 30 days after the placebo and the fenugreek intake. The MDA level was measured by the TBARS method Thiobarbituric Acid reactive substances [6] and the caeruloplasmin level was measured by the Para-phenylene diamine oxidation method [7]. The results were analyzed statistically by using the paired t-test and the Wilcoxon signed ranks test.

## RESULTS

We could very well understand from the results that the MDA levels had reduced significantly ( $p^*$  value -0.007) after the intake of fenugreek, whereas there was no change in the MDA levels in those who took placebo [Table/Fig-1]. At the same time, the caeruloplasmin levels had also reduced significantly ( $p^*$  value-0.075) after the fenugreek intake, whereas there was only a slight decrease in the levels in those who took placebo [Table/Fig-1].

The caeruloplasmin levels, although they were not statistically significant, there was a good reduction in the levels, which could be taken as significant because of the sample size.

## DISCUSSION

The results of our study convincingly proved that there was a significant decrease in the MDA levels after the intake of fenugreek, as against those in those who took placebo. This may be due to the decrease in the lipid levels after the consumption of fenugreek. Galactomannans decrease the uptake of bile acids and hepatic cholesterol synthesis. The soluble fibre fraction in fenugreek also plays a role in decreasing the cholesterol levels [1,8].

The lipid per oxidation is increased in the hyperlipidemia subjects [9]. Reducing the lipid levels may raise the scope for reducing the lipid per oxidation, which is main reason for the oxidative stress which is involved with various illnesses. There are studies which have proven that a regular fenugreek intake through the diet reduces the levels of serum MDA in rats, which is end product of lipid per oxidation [10].

The results which were obtained also showed a significant decrease in the caeruloplasmin levels in those who took fenugreek, but not in those who took placebo. This could be due to the consumption of the extracellular antioxidant, caeruloplasmin, by the oxidants, to combat oxidative stress.

## CONCLUSION

This study highlights that 30 days consumption of 25 grams of fenugreek powder significantly reduced the oxidative stress by reducing the lipid per oxidation, which is the major risk factor for atherosclerosis, which leads to cardiovascular illnesses. This study also proved that oxidative stress, which is spoken about in the pathogenesis of many life threatening illnesses like carcinoma, is significantly reduced by fenugreek intake. Thereby, fenugreek can modify the risk factors and it can also help us in preventing illnesses if it is regularly included in our diet.

## LIMITATIONS

The lipid profile was not done. Although caeruloplasmin is an antioxidant, it may not be good marker of the antioxidants.

| Parameter     | GROUP I(10)            |                       | GROUP II(10)             |                         | t     | P *   |
|---------------|------------------------|-----------------------|--------------------------|-------------------------|-------|-------|
|               | Before placebo Mean+SD | After placebo Mean+SD | Before fenugreek Mean+SD | After fenugreek Mean+SD |       |       |
| MDA (nmol/ml) | 6.38±0.45              | 6.36±0.39             | 6.71±0.52                | 4.28±0.6                | 3.366 | 0.007 |
| Cp(mg/ml)     | 47.1±3.25              | 46.9±4.19             | 48.55±7.35               | 45.1±8.34               | 4.471 | 0.075 |

[Table/Fig-1]: MDA and Cp levels Before and After placebo and fenugreek

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