



Research Article

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LIPID LOWERING EFFECTS OF MYRISTICA FRAGRANS

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ABSTRACT

Coronary heart disease is a global health problem. Hypercholesterolemia is one of the risk factors of cardiovascular diseases and high blood cholesterol continuing challenge of public health and increase of mortalities due to cardiovascular disease. High intake of fatty diet results in elevated cholesterol, LDL and down regulates LDL receptors in liver. Several evidences suggest that antioxidants consumption controls hypercholesterolemia. The purpose of this study was to assess the effect of nutmeg seeds in the diet on lipid profile in albino rats. The rats were randomly divided into four groups of 6 rats each. It was observed from the results obtained that all the nutmeg seeds used in this study at significantly ($P > 0.05$) reduced plasma total cholesterol, low density lipoprotein, triglyceride and increased high density lipoprotein compared to the test control. Hence, the *Myristica fragrans* ethanolic seed extract have hypolipidemic effect thus indicating the possible use of these seeds in the treatment of diseases associated with hyperlipidemia such as ischemic heart disease and atherosclerosis. The experiment thus concludes that *Myristica fragrans* ethanolic seed extract possess cardioprotective effect on experimentally induced cardio toxic myocardial infarcted rats. Pretreatment with nutmeg seeds offered a protective effect against isoproterenol induced myocardial infarction in rats as evidenced by lipid profile of the heart tissue.

Key words: Lipid profile, *Myristica fragrans*,

INTRODUCTION

Hyperlipidemia is one of the main causes of half of deaths from cardiovascular disease. Cholesterol increased public health endanger [1, 2]. Hypercholesterolemia is observed in most industrial societies where poor nutrition with food containing saturated fats and cholesterol is high. Since heart disease in our country is common in vascular-induced hypercholesterolemia, in this case study seems necessary. Poor nutrition with high cholesterol increases the cholesterol level, LDL and triglycerides and decreases HDL. On the same time other hand hypercholesterolemia decreases LDL receptors in the liver and increased triglyceride and cholesterol levels and reduces HDL [3, 4].

The elevated Increased LDL and decreased HDL in serum is one of the main factors involved in heart disease, coronary atherosclerosis, especially, the, development that causes of inflammation of the and endothelial lining of blood vessels leading to function and reduction in vascular lesions is wide [5]. Oxidation of Lipoprotein, LDL of the vessels, increased cardiovascular disease. Increased serum HDL (unlike LDL) could progress of hypercholesterolemia and heart disease may prevent vascular [4-6]. Atherosclerosis is one of the diseases that can be caused by various factors (a Multifactorial Diseases). Factors in the incidence of the disorder are Genetic and or environmental factors effects and their interactions on each other and may be incriminated in contribute to their effects mainly by the changes of serum lipids and lipoproteins leading to appear that finally caused cardiac artery disease [7]. It has been found that consumption of antioxidant nutrients decreased coronary induced hypercholesterolemia and heart disease in humans and experimental animals [8].

Nutmeg is dried kernel of broadly ovoid seed of *Myristica fragrans* Houtt (Family: Myristicaceae). It is widely used as spices in culinary preparations and in alternative medicine as aphrodisiac [9], memory enhancer, anti-diarrheal [10], anti-inflammatory and anticancer drug [11]. The seeds of *M. fragrans* have been used for the treatment of heart ailments in Ayurvedic system of

Medicine. Preliminary studies showed cholesterol lowering activity of *M. fragrans* seed extract. The objective of this study was to examine the hypolipidemic effects of *M. fragrans* seed extract in isopretenol induced rats and to see whether *Myristica fragrans* seed extract feeding prevents aortic cholesterol accumulation.

MATERIALS AND METHODS

Authentic seeds of *M. fragrans* obtained from a farm for medicinal plants. The authenticity of the samples was identified by Dr V.S. Ramachandran, Professor, Department of Botany, and Bharathiar University. The sample were powdered and defatted with petroleum ether (60-80°C). Defatted material was subjected to Soxhlet extraction with ethanol (50%v/v) for 24 hr. Ethanol was removed under reduced pressure to obtain a brown solid. This extract was dissolved in 5 ml distilled water and administered orally by gastric intubation.

Animals and experimental protocol

Adult male rats of Wistar strain, weighing 120-150g, were procured from the Kerala Veterinary and Animal Sciences University, Thrissur, Kerala, India. The study was approved by Animal Ethics Committee of Kongunadu Arts and Science College (Reg. no. 659/02/a/CPCSEA). The rats were fed with commercial pellet rat pellet and water *ad libitum* and maintained under standard laboratory conditions with 12:12 h light: dark cycle.

The rats were divided into four groups of eight animals each. Group I rats served as positive control, Group II rats were administered ISO ip (85 mg/kg body weight) dissolved in physiological saline twice at an interval of 24 h for two consecutive days. Group III rats were pretreated with NM orally (200 mg/kg bw/day) for a period of 28 days and then received ISO 85 mg/kg bw/ day dissolved in physiological saline ip twice at an interval of 24 h for two consecutive days while group IV rats were pretreated with NM orally (200 mg/kg bw for a period of 28 days).

Chemicals and Reagents

All reagents and chemicals that were used in this work were of analytical grade.

Extraction and estimation of serum lipids

From the samples of heart tissue homogenate the lipids were extracted by the method of 7. To a known volume of serum, 10 ml of chloroform–methanol (2:1 v/v) mixture was added and mixed well for 30 min and was filtered through Whatman filter paper (No. 42) into a separating funnel. The filtrate was mixed with 0.2 ml of physiological saline and the mixture was kept overnight undisturbed. The lower phase containing the lipid was drained off into pre weighed beakers. The upper phase was re extracted with more of chloroform–methanol mixture, the extracts were pooled and evaporated under vacuum at room temperature. The lipid extract was re-dissolved in 3 ml of chloroform–methanol (2:1) mixture and aliquots were taken for the estimation of serum and heart tissue lipids. Total cholesterol⁸, triglycerides⁹, free fatty acids¹⁰, and phospholipids [11] and HDL [12] were assayed.

Statistical analysis

The data were expressed as Mean \pm SD for six animals in each group. Total variation present in a set of data were estimated by one way analysis of variance (ANOVA) followed by the analysis of level of significance between different groups based on ANOVA using SPSS statistical package (Version 10.0). Difference among means was analyzed by DMRT at 5% level ($p < 0.05$).

RESULTS AND DISCUSSION

Table 1 shows the levels of cholesterol, triglycerides, free fatty acids, and phospholipids in serum of normal and experimental rats. In the ISO administrated (Group II) rats, there was significant increase ($p < 0.05$) in the level of total cholesterol, triglycerides, free fatty acids and phospholipids with a significant decrease ($p < 0.05$) in phospholipids when compared with control group of rats. Pretreatment with ethanolic extract of *Myristica fragrans* seeds (at doses of 200 kg body weight) resulted in significant decrease in the cholesterol levels, triglycerides and free fatty acids levels with significant increase in the levels of phospholipids as compared with rats administrated with ISO group.

The overall result, therefore, is toward a less atherogenic lipid profile. A 1% drop in serum cholesterol reduces the risk for CHD by 2% [12]. Natarajan *et al.* 2003 [13] have reported that changes in ratios of TC/HDL-C and LDLC/HDL-C are better predictors of CHD risk reduction than changes in levels [14].

Table 1: Lipid profile of experimental animals

Parameters	Group I	Group II	Group III	Group IV
Total Cholesterol	176.7±5.37	248.81±3.98 a*	192.11±2.87b ^{ns} d*	188.08±5.05 c ^{ns}
Triglycerides	867.08±2.46	279.48±2.48 a*	161.98±2.72b ^{ns} d*	143.77±3.64 c ^{ns}
HDL Cholesterol	47.96±1.97	34.41±3.48 a*	41.41±1.07 b ^{ns} d*	44.91±2.81 c ^{ns}
LDL Cholesterol	100.68±1.96	151.3±2.93 a*	129.4±1.88 b ^{ns} d*	91.96±4.38 c ^{ns}
VLDL Cholesterol	32.07±3.86	59.41±2.0 a*	39.77±0.47 b ^{ns} d*	29.0±0.99 c ^{ns}
Free Fatty Acids	38.39±0.16	90.03±0.26 a*	47.56±0.15 b ^{ns} d*	34.61±0.29 c ^{ns}
Phospholipids	111.96±3.34	155.38±3.48 a*	110.68±1.36b ^{ns} d*	106.49±1.28 c ^{ns}

Values are expressed as mean ± SD of five animals

The symbol represents statistical significance ns – not significant Comparison between groups a represents comparison between Group II and I, b represents comparison between Group III and I, c represents comparison between Group IV and I, d represents comparison between Group V and I, e represents comparison between Group VI and I

The dietary intervention did alter these ratios in a cardio-protective direction.

The result of this study implies that the cardio protective effect of *Myristica fragrans* seeds in ISO induced myocardial infarction rats by preserving the membrane integrity and restoring the activities of enzymes to near normal levels. This might be due to the antioxidant effect of *Myristica fragrans* seeds, and hence nutmeg seems to be a promising tool to explore as therapeutic agent in cardiovascular diseases.

Polyphenols, including flavonoids, can exert their antioxidant activity by inhibiting the activities of enzymes, including lipooxygenase and cyclooxygenase, by chelating metal ions, and, most importantly, by scavenging free radicals. Generally, polyphenols are potent free radical scavengers because phenolic groups are excellent nucleophiles [15].

Moreover, it may be assumed that polyphenols in pistachio or almonds reinforce the antioxidant system. These results suggest that pistachio and/or almonds could be a useful compound to control hypercholesterolemia by both improving the lipid profile and modulating oxidative stress. This modified balance between the antioxidative enzymes might be able to remove superoxides more efficiently [15-17].

CONCLUSION

This study supports the benefits of a diet supplying a reasonable amount of fat as monounsaturated fat, while low in saturated fat, for control of plasma cholesterol. Results suggest that nutmeg seeds supplementation may improve blood lipids, ameliorate oxidative stress and this may be due to interactive or additive effects of the numerous bioactive constituents found in *Myristica fragrans* seeds. Therefore such spices may have beneficial applications in the prevention of cardiovascular diseases.

CONFLICT OF INTEREST

No conflict to disclose.

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