

## Effects of Pumpkin Seed and Apricot Oil on Atherogenic Index in the Rats: an Experimental Study

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### ABSTRACT

**Objective:** To evaluate the effects of pumpkin seed oil and apricot oil on the atherogenic index.

**Methods:** This experimental study was carried out on 24 male albino rats (n=24) at the Department of Biochemistry in collaboration with the Diagnostic and Research Laboratory, Liaquat University of Medical and Health Science Jamshoro, Sindh. The study population (n=24) divided into three groups, with 8(n=8) in each group. Lipid profile determined and atherogenic index calculated by the formula  $\log \text{Triglycerides}/\text{HDL}$  ratio. The atherogenic index was compared in three groups (high-fat diet group, High-fat diet+Pumpkin seed oil group and high-fat diet+apricot oil group). Data analyzed on IBM SPSS 22.0 and p value <0.05 taken as significant.

**Results:** Serum cholesterol, triglycerides, and LDL levels were decreased in the groups of rats given high-fat diet +pumpkin seed oil group and high-fat diet +apricot oil group as compared to high fat diet controls. HDL levels increased to significant level in the groups of rats given high-fat diet +pumpkin seed oil and high-fat diet +apricot oil as compared to high-fat diet control. The atherogenic index was  $1.426 \pm 0.19$  in high-fat diet controls, and this decreased to  $1.31 \pm 0.21$  in the rats given high fat diet+ pumpkin seed oil and at the same time decreased to  $1.20 \pm 0.14$  in those given high fat diet with apricot oil.

**Conclusion:** Pumpkin seed oil and apricot oil, both are effective in decreasing the atherogenic index in the rat taking high fat diet but apricot oil is more effective in reducing atherogenic index in the rats taking high fat diet.

**Keywords:** Atherogenic index, Apricot oil, High fat diet, Pumpkin seed oil

### INTRODUCTION

Cardiovascular diseases are one of the foremost causes of fatality at international level; accountable for thirty percent of all deaths occurring worldwide. Dietary habits might play very important role in controlling the havoc of cardiovascular dysfunctions, leading to fatality.<sup>1</sup>

They are mostly attributed to dyslipidemia that is one of the modifiable and prevalent risk factors for coronary heart disease, stroke and diabetes mellitus in Pakistani populace.<sup>2,3</sup> Dyslipidemia is a term used for increased triglyceride and LDL levels with decrease in HDL levels. Higher pervasiveness of dyslipidemia and its affirmative association to cardiovascular diseases demand standard revision on its statistics and precisely appraise the control of lipids via awareness to the dire consequences of dyslipidemia and its control strategies.<sup>3</sup> Coronary heart disease is the major cause of death worldwide due to fat deposition in blood vessels.<sup>4</sup> Various herbal remedies have been claimed to be effective for the treatment of dyslipidemia. For reducing total cholesterol levels, garlic, sunflower oil, phytosterol, green tea and plant protein has been studied and reported; while for controlling LDL levels, the frequently reported herbal medicines were tree nuts, sunflower oil, curcumin, phytosterols, green tea, plant protein and fenugreek. For increasing levels of HDL levels, research has been done on phytosterols, quercetin, peanut, fenugreek, plant protein and coffee.<sup>5</sup> Pumpkin seed oil has various health advantages and has been widely cultured for centuries for its property of bearing seeds and fruits which are fit to be eaten. Its seeds are rich in biologically active compounds having anti-oxidant properties, e.g.,  $\gamma$ -tocopherol,  $\alpha$ -tocopherol,  $\gamma$ -tocotrienol,  $\alpha$ -tocotrienol, lutein, zeaxanthin, oleic-linoleic type of oil. That's why, pumpkin seed oil has been frequently used as a salad oil in Slovenia, Austria and Hungary.<sup>6</sup> Similar to pumpkin oil, apricot oil (*Prunus armeniaca* L.) is also widely used due to its antioxidant properties. It is a frequently cultivated crop in Pakistan and belong to Rosaceae family.<sup>7</sup> As a well-off source of containing oleic oil, good phyto-components and tocopherols, the kernel apricot seeds are popular for being used as antioxidant.<sup>8</sup> In our population, every third person is loving to eat fatty food and so, dyslipidemia is an unsolved problem which leads to

atherosclerosis., therefore, present study has been designed to determine the effects of giving pumpkin seed oil and apricot oil on plasma atherogenic index in the rats given high fat diet.

### METHODS

This experimental study was carried at the Department of Biochemistry and the Diagnostic and Research Laboratory, Liaquat University of Medical and Health Science Jamshoro, Sindh. Total 24 male wistar albino rats (n=24) were obtained from the animal house of Hussain Ebrahim Jamal Research Institute of Chemistry (HEJ) Institute, University of Karachi. Ethical approval was taken from the ethical review committee (ERC) of the LUMHS Jamshoro. Study and experimental protocols were in accordance to the "NIH – Animal Care" for conducting the Animal research. Ethics standards of Animal house of Sindh Agriculture University were followed too. Pumpkin seed oil and Apricot essential oil purchased from the herbalist and validated at the Department of Botany, University of Sindh, Pakistan. High fat diet to feed rats was prepared by mixing 60% fats, 20% carbs and 20% proteins.

Rats having body weight of 120-180 grams, looking healthy were selected through random sampling and divided into three groups (8 rats in each group).

Group 1: High fat diet (60% fats, 20% carbs and proteins)

Group 2: High fat diet+ Pumpkin seed oil (100 mg/Kg ) for 3 months

Group 3: High fat diet+Apricot oil (100 mg/Kg ) for 3 months

After the completion of experiment, the rats were allowed 8 hours overnight fasting. Fasting rats were given ethylene ether to anesthetize them. Unconscious rats were pricked with capillary tube below and behind the eyeballs to get blood sample. Blood sample was collected from retro – orbital capillary plexus. Sera were separated by centrifuging blood at 13000 rpm for 14 minutes. Lipid profile determined on cobas e 411 Roche.

Atherogenic index was calculated as  $\log \text{Triglycerides}/\text{HDL}$  ratio. Triglycerides /HDL ratio >0.24 was considered high risk of atherogenic tendency, 0.1 – 0.24 as medium risk and 0.3 – 0.1 as low risk.

The data analyzed on IBM SPSS 22.0 and p-value<0.05 considered as significant.

## RESULTS

Mean  $\pm$  Sd of the cholesterol, triglycerides, LDL and HDL were compared in three groups. One group given high fat diet only, in second group pumpkin seed oil added to high fat diet and in third group, fat diet given with apricot seed oil. Serum cholesterol was 385.5 g/dl in control rats given high fat diet without any intervention, while the cholesterol levels decreased to 266.7 g/dl in the group of rats given both high fat diet and pumpkin seed oil and similarly decreased to 248.1g/dl in the group of rats given both high fat diet + apricot seed oil. This decrease is statistically significant determined by one way ANOVA. ( $p$  value  $<0.01$ ) Similarly triglycerides, and LDL levels were also decreased in the groups of rats given high fat diet +pumpkin seed oil and high fat diet +apricot oil as compared to high fat diet controls. HDL levels increased to significant level in the groups of rats given high fat diet +pumpkin seed oil and high fat diet +apricot oil as compared to high fat diet controls. (Table No. 1)

Atherogenic index was  $1.426 \pm 0.19$  in high fat diet controls, and this decreased to  $1.31 \pm 0.21$  in the rats given high fat diet+ pumpkin seed oil and at the same time decreased to  $1.20 \pm 0.14$  in those given high fat diet with apricot oil. (Figure No. 1)

Table 1: Comparison of lipid profile among high fat diet controls, high fat diet + Pumpkin seed oil and high fat diet +apricot oil (n=24)

	High fat diet controls	High fat diet+ Pumpkin seed oil	High fat diet+Apricot oil	p-value
Serum Cholesterol (g/dl)	385.5 $\pm$ 33.1	266.7 $\pm$ 16.3	248.1 $\pm$ 16.7	<0.01**
Triglycerides (g/dl)	402.1 $\pm$ 12.3	344.5 $\pm$ 31.5	286.4 $\pm$ 24.5	<0.01**
LDL (g/dl)	242.9 $\pm$ 13.3	234.3 $\pm$ 27.1	205.7 $\pm$ 8.3	<0.01**
HDL (g/dl)	21.4 $\pm$ 2.2	24.3 $\pm$ 2.8	31.1 $\pm$ 4.1	<0.01**

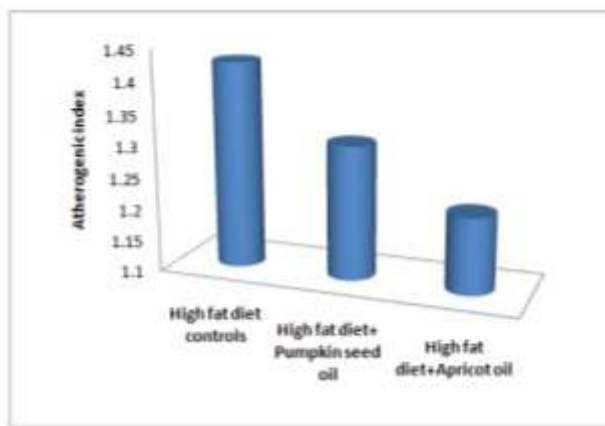


Figure 1: Comparison of Atherogenic index among high fat diet controls, high fat diet + Pumpkin seed oil and high fat diet +apricot oil (n=24)

## DISCUSSION

At global level, the diseases of heart and the blood vessels are highly prevalent instead of the different therapeutic strategies. It has been reported that adding herbal therapy, changes in diet and life style may prevent from coronary artery diseases.<sup>9</sup> In last ten years, medicinal herbs are being used globally due to their better efficacy and tolerability with lesser side effects and no toxicity.<sup>10</sup>

Similar to present study, Abd-elnoor EV<sup>11</sup> reported that use of pumpkin seeds powder and oil resulted in a significant decrease in cholesterol, triglycerides and LDL in diabetic rats but in our study the rats were non diabetic rats taking high fat diet. Pumpkin seed oil being the natural source of antioxidants, phytosterols, tocopherols, vitamins, carotenoids, proteins, and polyunsaturated fatty acids has been suggested as beneficial for better heart health.<sup>12</sup> In present study, adding pumpkin seed oil to high fatty

diet has decreased the atherogenic index to the safe levels. In consistency with present study, El Sayed MM et al.<sup>13</sup> has also reported decline in atherogenic index in the rats given pumpkin seed oil.

The results of a study done on human adult volunteers by Kopčėková J et al.<sup>14</sup> revealed that by consuming apricot seeds on daily basis i.e., for 42 days in the group of people taking fat rich food, improved the lipid profile and this way decreased the atherogenicity. Kopčėková J et al.<sup>7</sup> reported that LDL levels reduced notably ( $P < 0.05$ ) subsequent to consuming the apricot seeds for 42 days. According to a study by Ying Q et al.<sup>15</sup> that compared the atherogenic index and thrombogenicity index of different oils, determined that Apricot kernel oil showed the lowest atherogenic index (0.05) and thrombogenicity index (0.11). Apricot oil can be added as salad in diet to keep atherogenic index normal. Future studies are required to be carried on human population.

## CONCLUSION

Pumpkin seed oil and apricot oil, both are effective in decreasing the atherogenic index in the rat taking high fat diet but apricot oil is more effective in reducing atherogenic index in the rats taking high fat diet.

**Conflict of Interest:** None.

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