

EFFECT OF NIGELLA SATIVA ON LIPID PROFILE IN ALBINO RATS

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ABSTRACT

Background: Coronary heart disease is a global health problem. Dyslipidemia is one of its major risk factors. The purpose of this study was to assess the effect of *Nigella sativa* seeds in the diet on lipid profile in albino rats.

Material and Methods: Eighty-four albino rats were divided into six groups. Control groups I, III and V were given; low fat diet with 3% sunflower oil, high fat diet with 20% sunflower oil and high fat diet supplemented with 1% colic acid and 0.5% propylthiouracil as atherogenic elements respectively. The Experimental groups II, IV and VI were given above diets respectively supplemented with *Nigella sativa* seeds. Lipid profile was estimated at 0, 12 and 24 weeks.

Results: Albino rats fed on low fat diet containing 3% sunflower oil supplemented with *Nigella sativa* showed significant reduction in TC and LDL cholesterol and rise in HDL cholesterol. Those on high fat diet containing 20% sunflower oil with *Nigella sativa* seeds showed significant reduction in TG and LDL cholesterol and increase in HDL cholesterol. While in those given high fat diet with 20% sunflower oil, along with 1% cholic acid and 0.5% propylthiouracil with the addition of *Nigella sativa*, there was significant reduction in TC and LDL cholesterol and rise in HDL cholesterol.

Conclusion: *Nigella sativa* seeds in the diet has a favorable effect on lipid profile by lowering the triglyceride, total cholesterol and LDL cholesterol and increasing the HDL cholesterol in albino rats.

Key words: Lipid profile, *Nigella sativa*, Albino rat.

INTRODUCTION

Coronary heart disease (CHD) is a global health problem. High intake of fats and dyslipidemia are risk factors for its development.¹ Excessive intake of fatty foods and lack of exercise lead to obesity. Certain food items like fruits in association with exercise may be protective.² High plasma cholesterol is positively related to the risk of CHD.^{3,4} Elevation of plasma cholesterol is usually due to an increase in the level of low-density lipoprotein (LDL) cholesterol.⁵ Saturated fats and cholesterol in the diet play a major role in the causation of hypercholesterolemia and act as a risk factor for CHD.^{6,7}

Diets containing polyunsaturated fats decrease the plasma cholesterol when substituted for saturated fats.^{8,9,10} Saturated fats and cholesterol in the diet raise the plasma cholesterol while diets low in saturated fats and cholesterol decrease the cholesterol level in human beings.^{11,12} Polyunsaturated fats lower the triglyceride (TG), very low density lipoprotein (VLDL) cholesterol and LDL cholesterol.^{13,14}

Elevated LDL cholesterol and decreased high-density lipoprotein (HDL) cholesterol in the plasma have been independently associated with increased risk for CHD.⁴

Obese people tend to have relatively high triglyceride and low HDL-cholesterol. Obesity also raises the LDL cholesterol levels. High level of plasma triglycerides is also considered a risk factor for CHD.¹⁵

Nigella sativa seeds used as a herbal medicine has many effects including cholerectic activity.¹⁶ It is reported that the Holy Prophet Muhammad (Peace be upon him) said, "Black seeds i.e. the seeds of *Nigella sativa* is a remedy for every disease except death."¹⁷

The purpose of this study was to assess the effect of *Nigella sativa* seeds on lipid profile in albino rats.

MATERIAL AND METHODS

This experimental study was performed in the Department of Pathology, Postgraduate medical center, Lahore, Pakistan, in the year 2006.

Eighty-four albino rats, with equal number of males and females were obtained from Pakistan Council of Scientific and Industrial Research (PCSIR) Laboratories, Lahore. The weights of rats ranged from 150-200 grams and their age at the start of the study was 8 weeks. They were divided into six groups, each with equal number of male and female rats. Both sexes were kept in separate cages in the animal house of Postgraduate Medical Institute, Lahore.

Each group of animals was given separate diet for a period of 24 weeks. Six different diets included two low fat diets (A and B) and four high fat diets (C to F). Diet A contained 3% sunflower oil and diet B 3% sunflower along with Nigella sativa seeds. Diet C contained 20% sunflower oil and diet D 20% sunflower with Nigella sativa. Diet E contained 20% sunflower oil, 1% cholic acid and 0.5% propylthiouracil as atherogenic elements and diet F contained 20% sunflower oil, 1% cholic acid, 0.5% propylthiouracil with Nigella sativa seeds.

Nigella sativa seeds were given in powdered form in a dose of 30mg/kg bodyweight of albino rats. Minerals and vitamins were mixed with the diet according to the recommendations.

Prepared diets were stored at 4°C in the clean closed glass containers. Weighed quantity of diet was placed in each cage container daily at 9 AM and 9 PM throughout the study period.

Good hygienic conditions and optimum temperature (24±2°C) was maintained. They were provided with fresh drinking water daily.

Blood samples were collected under the deep ether anesthesia by heart puncture with sterile disposable syringes at 0, 12 and 24 weeks. Lipid profile was estimated in the samples, consisting of; triglyceride (TG), total cholesterol (TC), HDL cholesterol and LDL cholesterol.

RESULTS

Albino rats in Group-II fed on low fat diet containing 3% sunflower oil supplemented with Nigella sativa, showed significant reduction in TC and LDL cholesterol and rise in HDL cholesterol. (Table-1)

Albino rats in Group-IV fed on high fat diet containing 20% sunflower oil with Nigella sativa seeds showed significant reduction in TG and LDL cholesterol and increase in HDL cholesterol as compared to control Group-III. (Table-2)

Table-1: Comparison of lipid profile in Group-I and Group-II.

Lipid profile	Group-I			Group-II		
	0 Week	12 Weeks	24 Weeks	0 Week	12 Weeks	24 Weeks
Triglycerides	82.35±4.92	86.9±5.0	92.31±5.10	81.68±4.76	85.5±4.66	92.40±6.81
Total Cholesterol	73.37±3.63	78.13±3.88	85.1±3.36	71.18±5.26	74.2±5.17*	85.42±5.62
HDL Cholesterol	21.60±3.28	39.6±3.58	24.93±2.29	21.51±2.12	23.8±2.13	27.36±1.37*
LDL Cholesterol	35.29±2.34	39.6±3.58	41.65±2.52	33.25±2.34	33.4±9.93*	39.13±4.27*

Values are expressed in mg/dl (Mean ±SD), *P<0.05 Significant.

Table-2: Comparison of lipid profile in Group-III and Group-IV.

Lipid profile	Group-III			Group-IV		
	0 Week	12 Weeks	24 Weeks	0 Week	12 Weeks	24 Weeks
Triglycerides	83.24±4.74	79.8±4.14	74.19±4.56	79.16±3.67	73.4±3.01*	71.2±3.88*
Total Cholesterol	74.56±4.17	67.5±3.73	60.95±4.13	73.7±4.57	66.6±4.23	60.36±3.10
HDL Cholesterol	22.70±2.41	20.6±2.23	18.38±2.83	22.15±1.85	24.3±2.58	21.64±2.48*
LDL Cholesterol	35.16±2.59	30.9±2.24	27.67±2.39	35.73±3.56	27.6±4.95*	24.35±2.40*

Values are expressed in mg/dl (Mean ±SD), *P<0.05 Significant.

Table-3: Comparison of lipid profile in Group-V and Group-VI.

Lipid profile	Group-V			Group-VI		
	0 Week	12 Weeks	24 Weeks	0 Week	12 Weeks	24 Weeks
Triglycerides	81.76±7.9	104.60±7.86	128.9±9.05	79.5±1.29	103.92±9.1	127.01±8.81
Total Cholesterol	71.69±4.97	129.34±12.69	186.81±12.3	72.62±3.46	126.31±3.80*	183.43±17.09*
HDL Cholesterol	22.33±2.06	33.83±4.59	49.29±0.35	22.53±3.12	35.45±4.2*	49.62±4.72
LDL Cholesterol	37.41±12.05	74.59±6.5	111.26±10.22	36.3±7.36	70.08±5.36*	108.5±12.99*

Values are expressed in mg/dl (Mean ±SD), *P<0.05 Significant.

When albino rats were given high fat diet with 20% sunflower oil, along with 1% cholic acid and 0.5% propylthiouracil with the addition of *Nigella sativa* seeds in Group-VI, there was significant reduction in TC and LDL cholesterol and rise in HDL cholesterol as compared to control Group-V. (Table-3)

DISCUSSION

In our study, albino rats were divided into six groups. Control Group-I were given low fat diet, Group-III high fat diet and Group-V high fat diet with atherogenic elements. The experimental groups II, IV and VI were given the above diets respectively supplemented with *Nigella sativa* seeds. Estimations of lipid profile included TG, TC, HDL and LDL cholesterol.

Supplementation of *Nigella sativa* seeds to the diet had a favorable effect on the lipid profile. It decreased TG, TC and LDL cholesterol and increased HDL cholesterol as compared to controls.

The findings in the present study are consistent with those reported by Shabir (1995). The hypo-triglyceridaemic effect of *Nigella sativa* is possibly due to its cholerectic activity as reported by El-Dakhkhany¹⁶ and Brunton (1991). The cholerectic function of *Nigella sativa* is either by reducing the synthesis of cholesterol by hepatocytes or by decreasing its fractional reabsorption from the small intestine (Brunton 1991).

These results are also in agreement with the results obtained by Shepherd¹³ and Hostmark,¹⁸ who observed that polyunsaturated fat have hypo-triglyceridaemic effect.

The albino rats in group-II fed on low fat diet with *Nigella sativa* showed significant rise in HDL cholesterol level as compared to group I. The finding that *Nigella sativa* causes significant increase

in HDL cholesterol level is in conformity with the results of Bonanoma (1988).

Havel and Rapaport reported that enriched fatty diets cause elevation of plasma total cholesterol and LDL cholesterol leading to the development of atherosclerosis and CHD.¹⁹ Plasma total cholesterol has received too much importance because of its strong and consistent association with CHD. Segal (1993) reported that elevation of LDL cholesterol is positively associated while elevation of HDL cholesterol is negatively associated with the development of CHD. McNamara and Howel²⁰ and Klag (1993) reported that High total and LDL cholesterol levels increase the risk of cardiovascular disease (CVD). Persons with low HDL cholesterol are necessarily at risk of premature CHD as reported by Rader²¹ and Ascherio²² Fish intake, having long-chain fatty acids in abundance reduce the plasma VLDL cholesterol concentration.²³

Further studies are required to establish the beneficial effect of *Nigella sativa* seeds in human beings.

CONCLUSION

Nigella sativa seeds in the diet has a favorable effect on the lipid profile by lowering the triglyceride, total cholesterol and LDL cholesterol and increasing the HDL cholesterol in albino rats.

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