

Determination of Proximate Composition of N.Sativa L. Seeds and its Effective Role in Improving Lipid Profile among Hyperlipidemic Women

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ABSTRACT

Objective: To find out the proximate composition of Nigella sativa L. and its hypolipidemic effect on blood lipid profile among hyperlipidemic women.

Methodology: To determine the proximate composition of nigella sativa seed the kjeldhah method, soxhlet extraction using petroleum ether and AOAC procedure were used. To determine hypolipidemic impact a total of 64 mild to moderate hyperlipidemic women aged 25-35 years were selected for the 8 weeks of study. The sample was selected from the university of Lahore teaching hospital, Lahore. After removing physical contaminants like dirt, dust and foreign grains black seeds were air dried. After drying seeds were ground into fine powder by using commercial blender. Each capsule was prepared containing 500 mg powder of N. Sativa, and transfer them in air tight jars. After screening the participants of experimental group were advised to use 2 capsule Nigella sativa supplement before breakfast and two capsules in the afternoon prior to their meal for 8 weeks. Participants were also advised to follow the given 7-day diet plan for 8 weeks. The anthropometric measurements, biochemical evaluation (lipid profile) and dietary intake data were collected.

Results: The mean age group of Hyperlipidemic patients enrolled in study was 32.5 ± 0.34 years. There was a significant reduction in Low density lipoprotein (LDL) Total Cholesterol levels and Triglycerides levels with p-value less than 0.05. High density lipoprotein levels were also improved from 49.5 ± 8.38 mg/dl to 51.81 ± 10.21 mg/dl.

Conclusion: The study concluded that Nigella sativa L. seed powder supplementation showed a significant improvement in lipid profile of hyperlipidemic patients. The study found an increase in high density lipoprotein among patients.

Keywords: Nigella sativa L. seed powder, Black cumin, Blood Lipid profile, Hyperlipidemia, Hypolipidemia, Lipid ameliorating effect, Proximate analysis

INTRODUCTION

Hyperlipidemia is a condition in which the body's plasma cholesterol (hypercholesterolemia) and triacylglycerol (hypertriglyceridemia) levels are abnormally high. Hyperlipidemia is also known as hyperlipoproteinemia since the lipoprotein must coexist with elevated levels of cholesterol and triacylglycerol in the plasma. As a result, high triglyceride levels represent increased levels of triglyceride-rich lipoproteins such as chylomicrons and VLDL, as well as their remains. A rise in cholesterol levels typically indicates an increase in LDL, which may or may not be accompanied by an increase in VLDL¹. Hyperlipidemia, a significant systemic illness, is a modifiable risk factor for coronary heart disease and extracoronary atherosclerosis, as well as a higher risk of cardiovascular disease (CVD), which is the leading cause of death globally². Several prospective studies have found that high-density lipoprotein cholesterol (HDL-C) content is inversely related to coronary heart disease. As a result, a low HDL-C level is a well-known risk factor for coronary heart disease³. BMI is now the most extensively used anthropometric test for predicting health risk connected to weight status, and several research have found a link between BMI and hyperlipidemia². Hyperlipidemia is inherited polygenically in the majority of patients, and the disorder's expression is heavily impacted by factors such as (central) obesity, saturated fat intake, and the cholesterol content of a person's diet. Another process includes high levels of "apo B-100" lipoproteins in the blood, which can lead to atherosclerotic disease even if the patient does not have a family history of the condition. It is common for a person's risk of developing hyperlipidemia and cardiovascular disease to be influenced by a combination of hereditary and environmental variables⁴. Hyperlipidemia is linked to a number of causes, including hereditary, environmental, and lifestyle factors. Excessive alcohol use, smoking, high blood pressure, and other risk factors may all be managed. Secondary hyperlipidemia, also known as acquired hyperlipidemia, is common and is associated to diabetes, renal

failure, and alcoholism⁵. vascular disease, which can be fatal if left untreated, is one of the most common complications of untreated hyperlipidemia. Coronary artery disease, peripheral artery disease, cerebrovascular accidents, aneurysms, type II diabetes, excessive blood pressure, and even mortality are examples of these complications⁶.

Nigella sativa was used in traditional medicine for millennia, and a wide spectrum of chemical components discovered in N. sativa reflect its broad therapeutic properties. The seeds produce various alkaloids (the isoquinoline alkaloids like nigellicin and pyrazole alkaloids)⁷. Unsaturated fatty acids (eicosadienoic acid (3%)), oleic acid (20%), the dihomolinoleic acid (10%), saturated fatty acids palmitic acid linoleic acid and the saturated fatty acids (for example, stearic acid (3%) (14%)) are found in black cumin seeds. Crude fibre, vitamins including ascorbic acid, pyridoxine, thiamine, folic acid, and minerals like Fe, P, Ca, Zn, Na, and Cu have also been found in the seeds⁸. Furthermore, the seed oil has been used to separate free sterols, and steryl glucosides, steryl esters and acylated steryl glucosides⁹. Black cumin seed oil contains B-carotene (provitamin A) and tocopherol compounds, as well as phytosterols such as the beta-sitosterol and, in lower levels, campesterol, stigmasterol, and lanosterol¹⁰. Phosphatidylcholine, phosphatidylserine, phosphatidylinositol and phosphatidylethanolamine, are the four primary phospholipid classes¹¹.

MATERIAL AND METHOD

1. Kjeldhal method, soxhlet extraction procedure using petroleum ether AOAC procedures

2. Interventional Non-randomized (quasi Experiment) with pre-, post-test.

Subjects: The proximate composition determined by using procedures at labs of university institute of diet and nutrition science university of lahore, Lahore

Interventional Non-randomized (quasi Experiment) with pre-, post-test. Study designed to check hpolipidemic impact of Nigella sativa L. supplementation. A total of 32 mild to moderate hyperlipidemic women aged 25-35 years were selected for the 8 weeks of study. The sample was selected from the university of Lahore teaching hospital, Lahore.

Determination of proximate composition and Procurement and preparation of Nigella sativa L. supplementation: Black cumin seeds (Nigella sativa) were purchased from local market. After removing physical contaminants like dirt, dust and foreign grains black seeds were air drayed. The protein content of seed determine by kjeldhal method for fat determination soxhlet extraction of seed for 24 hrs using petroleum ether and to determine moisture fiber and ash AOAC procedures were used¹⁸. To prepare capsule after drying seeds were ground into fine powder by using commercial blender each capsule was prepare containing 500 mg powder of N. Sativa, and transfer them in air tight jars¹².

Treatment plans

Screening: The participants who meet the study inclusion criteria were enrolled in the study. The baseline data was comprised of blood lipid profile (HDL, LDL, TC, and TG), anthropometric measurements (weight, height, BMI) and 24-hour dietary recall.

After screening the participants of experimental group were advised to use 2 capsule Nigella sativa supplement before breakfast and two capsules in the afternoon prior to their meal for 8 weeks¹². Participants were also be advised to follow the given 7-day diet plan for 8 weeks.

Table-2: Nigella sativa supplement Dosage:

Nigella sativa L. Supplement	2g
Frequency	Two capsule of 500mg Twice a Day
Duration	8 weeks
Target Group	Overweight Hyperlipidemic women

Follow up: The follow up for patients were conducted twice in a month. The anthropometric measurements of experimental group were collected in each follow up. Participants were asked for facing any constraints and barrier to follow the study procedure.

Post study data: After 8 weeks of study the same protocol of baseline visit were conducted for experimental group. The baseline and post-test study data were compared to test the study hypothesis

RESULTS:

Table 1: Proximate composition of Nigella sativa L. seed

Macronutrient	%per 2g
Protein	22.8%
Fat	36.24%
Moisture	5.41%
Ash	3.30%
Carbohydrates	30.95%

Nigella sativa seed contain Protein, Fat, Moisture, Ash and carbohydrates in Percent of 22.8%, 36.24%, 5, 41%, 3.30% and 30.95% respectively.

Table 2: Average age distribution of Hyperlipidemic patients enrolled in study

	Mean± SD	Minimum	Maximum
Age	32.5±0.34	26	35

In this study 46.7% participants were belonged to upper middle class and 26.7% from lower middle class while remaining 26.7% were from upper class.

The mean HDL of patients was 49.5±8.38mg/dl before the treatment, whereas the mean HDL after treatment was 51.81±10.21mg/dl. Findings showed statistically significant difference in pre and post treatment with p-values 0.00.

Table 3: Comparison of average High-Density Lipoprotein (HDL) pre and post treatment

Treatment		Mean± Standard Deviation	Paired sample t-test (p-value)
Nigella sativa seed powder supplementation	Pre	49.5±8.38	0.000
	Post	51.81±10.21	

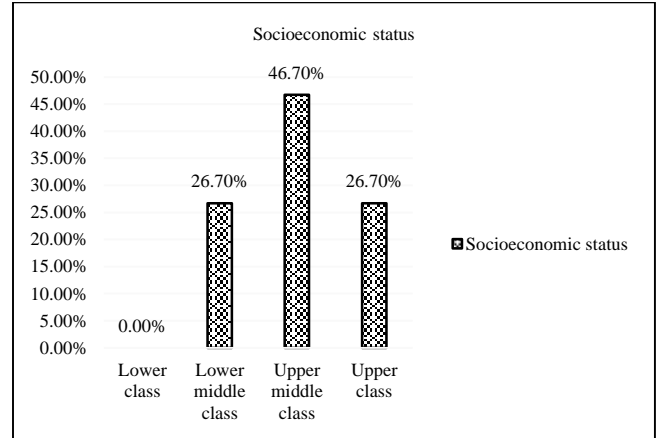


Figure 1: Average socioeconomic status among hyperlipidemic patients

Table 4: Comparison of average Low-Density Lipoprotein (LDL) pre and post treatment

Treatment		Mean± Standard Deviation	Paired sample t-test (p-value)
Nigella sativa seed powder supplementation	Pre	162.84±30.20	0.000
	Post	158.84±22.56	

The mean LDL of patients was 162.84±30.20mg/dl before the treatment, whereas the mean LDL after treatment was 158.84±22.56mg/dl. Findings showed statistically significant difference in pre and post treatment with p-values 0.00.

Table 5: Comparison of average Total cholesterol (TC) pre and post treatment

Treatment		Mean± Standard Deviation	Paired sample t-test (p-value)
Nigella sativa seed powder supplementation	Pre	227.81±11.95	0.000
	Post	224.93±18.75	

The mean TC of patients was 227.81±11.95 mg/dl before the treatment, whereas the mean TC after treatment was 224.93±18.75mg/dl. Findings showed statistically significant difference in pre and post treatment with p-values 0.00.

Table 6: Comparison of average Triglycerides (TG) pre and post treatment

Treatment		Mean± Standard Deviation	Paired sample t-test (p-value)
Nigella sativa seed powder supplementation	Pre	201.78±27.55	0.000
	Post	197±27.84	

The mean TG of patients was 201.78±27.55mg/dl before the treatment, whereas the mean TG after treatment was 197±27.84mg/dl. Findings showed statistically significant difference in pre and post treatment with p-values 0.00.

DISCUSSION

It is estimated that more than half of all individuals in the United States have high LDL levels, with only about a third of those

patients control their high LDL levels well, implying that the condition is undertreated. In both the developed and developing countries, hyperlipidemia is the major cause of mortality, accounting for 16.7 million deaths each year¹³. Hyperlipidemia affects 63 percent of the Pakistani population. At least one major lipid-fraction, such as total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), or triglycerides (TG), was abnormal in the study population. Low HDL-C was the most prevalent kind of isolated dyslipidemia (17.3 percent)¹⁴, there are many interventions that have done to improve hyperlipidemia and major influence have been given to the dietary interventions. Different plants are approved to improve lipid ameliorating effects nigella sativa is one of them. Existing analysis shows that active components in nigella sativa improve many health complications especially thymoquinone helps in prevention of lipid per oxidation and niacin improve weight management results. In another study Razamposh and his colleagues determine that. N.S capsules raised serum HDL cholesterol, decreased serum LDL cholesterol, decreased the TC/HDL-C ratio¹⁵. In the present study the nigella sativa seed powder capsule were prepared for the evaluation of proximate composition and its effective role in improvement of lipid profile among hyperlipidemic women visiting University of Lahore teaching hospital. The proximate analysis of Nigella sativa L. shows the presence of Protein, Fat, Moisture, Ash and carbohydrates in Percent of 22.8%, 36.24%, 5, 41%, 3.30% and 30.95% respectively determined by extraction method used by khoddami and his colleagues¹⁸. The formulation of seed powder capsule was developed by following the similar work performed by Ibrahim RM and his colleagues. On analyzing the potential of therapeutic impact of nigella sativa on different disease it has been evaluated that Nigella Sativa L. helps to improve lipid profile¹². In current study it has been evaluated that after consuming Nigella Sativa L. seed powder capsules the lipid profile and antioxidants levels improved as compare to initial results. LDL- cholesterol level were reduced from 162.84±30.20 to 158.84±22.56mg/dl with p-value less than 0.05. Total cholesterol levels were also reduced (227.81 ± 11.95 to 224.93 ± 18.75) with p-value less than 0.005.

In a randomised, double-blind, controlled study performed in Kerman, Iran, 20 physically inactive overweight females were categorized into two groups and given either 2g N. sativa supplementation (N. sativa capsules) or a placebo for eight weeks. During that time, both groups enrolled in an aerobic training programme (3 times per week). At the start of the study and at end of the eight weeks, blood lipids as well as VO₂ max were measured. Supplementing with N. Sativa reduced total cholesterol (TC), triglycerides, low-density lipoprotein (LDL), and the body mass index while increasing HDL and VO₂ max. A high-intensity aerobic training programme reduced TC and LDL while increasing VO₂ max.³¹

In another study the impact of crushed Nigella sativa on blood lipids, anthropometric factors and glucose homeostasis, in individuals with Hashimoto's thyroiditis were investigated by MA Farhangi and colleagues. After 8 weeks administration of nigella sativa seed powder, blood concentrations of LDL cholesterol and triglyceride (TG) reduced with p value less than 0.05, whereas serum HDL cholesterol rise considerably³³. In the present study the LDL cholesterol, Total cholesterol and Triglycerides were reduce with p value less than 0.05 as well as the HDL cholesterol of patient considerably increase from 49.5±8.38 to 51.81 ±10.21 with p value less than 0.05.

CONCLUSION

The study concluded that Nigella sativa L. seed powder supplementation showed a significant improvement in hyperlipidemic condition. The study found an increase in high density lipoprotein among patients.

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