Effect of Nigella Sativa (Black seed) on the serum lipids of healthy individuals.

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Abstract:
Black seed (Nigella Sativa) is a common dietary element and has been traditionally used as a treatment for a variety of health complains over centuries. Dyslipidaemia is an important and common medical problem.

Objective: To assess the effect of N. sativa on the serum lipids of normal individuals.

Design: Prospective study.

Setting: Domain of the College of Medicine and IbnSina Teaching Hospital.

Patients and methods: 10 healthy volunteers (8 males and 2 females) received 750 mg of powdered grains of Nigella sativa enclosed in a capsule twice daily for 28 days. Their fasting lipid profile, including triglycerides, total, LDL and HDL cholesterol were measured, before and after treatment.

Results: Serum triglycerides, total and LDL cholesterol decreased significantly after treatment with Nigella sativa, P. value <0.0001. While HDL cholesterol increased significantly, P. value <0.0001.

Conclusion: N. sativa exerts a favorable effect on lipid profile of healthy individual.
Introduction:

*Nigella sativa* is a favorable edible dietary element, which is popular in the middle east, and has been used for centuries traditionally for the treatment of a variety of health complaints including breathlessness, cough, flatulence and pain\(^{(9)}\).

The plant has gained a particular interest after being recommended by the prophet of Islam “Mohammed” “SAW” as being “A cure of every illness, except death”, \(^{(2)}\) stressing its versatile benefits.

Recent scientific research in many parts of the world has shown *N. sativa* to have a unique wide range of benefit in a variety of unrelated medical problems including an antibacterial activity,\(^{(3)}\) an anti-tumor\(^{(4)}\) effect, as an immunomodulatory\(^{(5)}\), a hypoglycemic for diabetics\(^{(6)}\) and as a treatment for asthma\(^{(7)}\).

*N. sativa* is a small elongated black grain of 3mm average length \(^{(8)}\). Fat makes up about 40% of the black seed composition. Carbohydrates in the form of non-starch polysaccharides and protein comprise 35% and 20%, respectively \(^{(9)}\). Neutral lipids (mainly triacylglyceral) constitute the main lipid class followed by glycolipids and phospholipids, respectively \(^{(10)}\). Linoleic acid is the predominant fatty acid component, followed by oleic acid and palmitic acid \(^{(11)}\). Hyperlipidaemia is a well recognized risk factor for coronary heart disease (CHD) \(^{(12)}\), which is regarded as the leading cause of death in many parts of the world \(^{(13)}\).

The strong association of elevated low density lipoprotein cholesterol (LDL-C) with atherosclerosis and the protective effect of high density lipoprotein cholesterol (HDL-C) have been firmly established \(^{(12)}\).

Hyperlipidaemia together with the other risk factors for coronary heart disease (CHD) has gained an extensive evaluation and stimulated a thorough study. Different approaches have been adopted to manage hyperlipidaemia, including weight reduction, exercise, dietary control and drug therapy \(^{(14)}\). Dietary management has included both restriction of foods rich in cholesterol and saturated fatty acids \(^{(15)}\) (which have been shown to increase LDL-C) \(^{(16)}\), and advises on increasing consumption of other foods which were shown to improve lipid profile like olive oil \(^{(17)}\) and almond \(^{(18)}\).

The aim of this work is to study the effect of *N. sativa* on the lipid profile of normal individuals.

Subjects and Methods:

Ten apparently healthy volunteers (8 males and 2 females), who’s ages range form 20-49 years accepted to participate in the study. They were all non-smokers (except one), and they were free from hypertension, diabetes and coronary heart disease. None of them was alcohol drinker, or currently receiving any drug known to influence lipid metabolism.
Powdered grains of black seed were packed in capsules, each containing 750 mg. Every volunteer received one capsule twice daily for 28 days. They were asked not to alter their dietary habits during the study period, and to report any new symptoms.

After an overnight fasting of 12-14 hours, two sets of blood samples were obtained, one before starting treatment, and the other after completing 28 days. Serum samples were examined for total cholesterol (TC), LDL-C, HDL-C and triglycerides (TG).

Triglyceride was measured by lipase glycerol kinase-glycerol 3 phosphate oxidase-peroxidase method. HDL-C was measured in the supernatant following precipitating apolipoprotein B containing chylomicron, VLDL, IDL and LDL using phosphotungstic acid and magnesium chloride (19). These lipid components were measured using kits purchased from biomerieux (France). LDL-C was calculated according to Friedewall formula (20).

Statistical analysis was performed using paired t-test to compare within subjects changes of lipid profile before and after treatment with Nigella sativa. A p-value <0.05 is considered significant (21).

Results:
The mean age (±SD) of the subjects enrolled in the study was 30.5±7.5 years ranging from 20-49 years of whom 8 were males (80%), and 2 were females (20%). Table (1) shows the mean (±SD) of different lipoproteins before and after treatment with N. sativa including TC, LDL-C, HDL-C and TG. A significant reduction in the mean value was noted for TC, LDL-C and TG (P< 0.0001); while a significant increase in the mean value for HDL-C (P< 0.0001) was found. None of the participants reported any new symptoms during the period of the study.

Table (1): Mean (SD) of different lipoproteins before and after treatment with Nigella sativa in (10) healthy individuals.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before</th>
<th>After</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>203 (3.5)</td>
<td>196.4 (3.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>HDL</td>
<td>46.6 (3.1)</td>
<td>49 (3.1)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LDL</td>
<td>132.7 (5.2)</td>
<td>125.6 (3.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>TG</td>
<td>122 (10.3)</td>
<td>114 (10.5)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Discussion:
The highly significant results noted on the lipids obtained during this study support the benefit of a simple dietary element in improving lipid profile in normal people. N. sativa was shown to reduce TC, LDL-C and TG, while increasing HDL-C. All these effects are in favor of reducing the risks of atherosclerosis (12).
Zaoni et al studied the toxicity of *N. sativa* on rats. They found that *N. sativa* fixed oils have no effect on hepatic enzymes and other organ integrity, and have a wide range of safety (22). The dose of *Nigella sativa* used in our study however, was approximate to the amount consumed habitually by many people in the community.

Studies have been conducted on the lipid lowering effects of *N. sativa* on rats. At least three studies have concluded that *N. sativa* oil (or its petroleum ether extract) exerts a lipid lowering effect on TC, LDL-C and TG, while increasing HDL-C (23-25). The results of these studies on rats were in agreement with the results of our study on humans.

No similar study on the effect of *N. sativa* on lipid profile in humans was published. However, investigators at the University of Colombo in Sri Lanka have shown in their web site the results of two unpublished works, one of them was a placebo-controlled study on the effect of 7-day treatment with 2.5 ml of black seed oil on the lipid profile of 16 healthy volunteers. The favorable effect was not statistically significant.

The other study was conducted on 17 patients with dyslipidaemia whom were treated with 2.5 ml of black seed oil twice daily for 28 days. *N. sativa* oil was significantly useful in reducing TC and LDL-C and increasing HDL-C, but the effect on TG was not statistically significant.

The later was rather unusual as investigators on cultured mouse hepatocytes found that nigellamine (methanolic extract of *N. sativa*) was equivalent to clofibrate in lowering TG production form the cultured hepatocytes (27).

The fatty acid composition of the black seed, including a predominance of linoleic acid (n6 polyunsaturated fatty acid) (11), may explain its lipid lowering activity. Epidemiological and clinical studies have established that n6 fatty acids protect against CHD (28).

Linoleic acid regulates LDL-C metabolism by down-regulating LDL-C production and enhancing its clearance and the available mass of linoleic acid in diet is a critical factor determining the hyperlipidaemic effect of other dietary lipid components such as saturated and Tran's fatty acids as well as cholesterol (29).

Oliec acid, the second fatty acid in black seed is a monounsaturated fatty acid. Current evidence suggests that this fatty acid also exerts a hypolipidaemic effect, lowering LDL-C (30).

*N. sativa* components were also shown to have a free radical scavenging activity (31, 32) which may have an additional role in protecting from CHD, as antioxidants.

The favorable results of this study on normal people should stimulate a further work on large number of persons and in studying the effect of *N. sativa* as a lipid lowering remedy in dyslipidaemic patients on a wider scale.
Proving similar effect would open the way toward using a simple, safe and inexpensive dietary element in treating a common and important medical problem for which expensive medications are currently used, yet not free from side effects.

**Conclusion:**

*N. sativa* have a useful effect on lipid profile of normal people and can be further studied for similar effect in dyslipidaemic patients.

1. **References:**
   2. Fozri, M. (1981). "N. sativa: A useful effect on lipid profile of normal people and can be further studied for similar effect in dyslipidaemic patients." (in Arabic).
   8. Internet: [www.blackseedinc.yahoo.com](http://www.blackseedinc.yahoo.com).
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