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 bean 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.

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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[1].

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 methods and TC by cholesterol esterase- oxidase – perioxidase method. HDL-C was measured in the supernatant following precipitating apolipoprotein B containing chylomicrom, 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.

Parameter mg/*dl*	**Before**	**After**	**P-value**
TC	203 (3.5)	196.4 (3.6)	<0.0001
HDL	46.6 (3.1)	49 (3.1)	<0.0001
LDL	132.7 (5.2)	125.6 (3.9)	<0.0001
TG	122 (10.3)	114 (10.5)	<0.0001

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 linoliec 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.

References:

1. د.فوزي طه قطب حسين "النباتات الطبية، زراعتها ومكوناتها". دار المريخ للنشر.
2. محمد بن إسماعيل أبو عبد الله البخاري الجعفي "الجامع الصحيح المسمى صحيح البخاري". باب مطبعة نهضة مصر . الرياض 1981. ص 150 العلم/التداوي بالحبة السوداء . بيروت. كثير–اليمامة. بيروت . الطبعة الثالثة 1407هـ1978م. تحقيق: د. مصطفى ديب البغا. ج 5/ح 5364/ص 2154
3. Moris NM. Antimicrobial effect of crude extracts of Nigella sativa on multiple antibiotic resistant bacteria. Acta Microbiologica Plonica 2000; 49:63-74.
4. Worthorn DR, Ghasheh OA. The in vitro anti-tumor activity of some crude and purified components of black seed, Nigella sativa L. Anticancer Research 1998; 18:1527-32.
5. Haq A, Abdullatif M. Nigella sativa: Effect on human lymphocyte and polymorphonuclear leukocyte phagocytic activity. Immunopharmacology 2000; 30: 147-155.
6. Al H, Aqel M. Hypoglycaemic effects of the volatile oil of Nigella sativa seeds. International Journal of Pharmacognosy 1993. 31:96-100.
7. Kasonia K, Ansay M. Plants used in ethnomedicine for asthma in Kivu (Zaire). Belgian Journal of Botany 1993; 126:20-28.
8. Inernet: www.blackseedinc.yahoo.com.
9. Internet: www.blackseedusa.com.
10. Hassanien MF. Investigation on lipid composition and functional properties of some exotic oilseeds. Thesis for doctoral dissertation accepted by: Technical University of Berlin, School of process sciences and engineering, 2004.
11. Nickavar B, Majab F, Jaridnia K, et al. Chemical composition of the fixed and volatile oils of Nigella sativa L. from Iran. Z Naturforsch [C]. 2003; 58:629-31.
12. Criqui MH: Epidimiology of cardiovascular disease. In: Goldman L, Ausiella D eds. Cecil Textbook of Medicine. 22nd ed. Philadelphia, Saunders; 2004: 251-52.
13. Boon N, Fox K, Bloomfield P, et al: Cardiovascular disease. In: Haslett C, Chilver E, Boon N. Davidson's Principle and Practice of Medicine. 19th ed. Edinburgh, Churchill Livingstone; 2002: 424.
14. Radar D, Hobbs H. disorders of lipoprotein metabolism. In: Kasper D, Fauci A, Longo D, Harrison's Principles of Internal Medicine. 6th edition. New York McGraw-Hill; 2005, 228-98.
15. German JB, Dillard CJ. Saturated fats: What dietary intake? Am J Clin Nutr 2004; 80: 550-9
16. Wolfram G. Dietary fatty acids and coronary heart disease. Eur J Med Res 2003; 8: 321-4.
17. Haban P, Klvanova J, Zidekova E, Nagyova A. Dietary supplementation with olive oil leads to improved lipoprotein spectrum and lower n-6 PUFAs in elderly subjects. Med Sci Monit 2004; 10: 149-53.
18. Sabate J, Haddad E, Tanzman JS, et al. Serum lipid response to the graduated enrichment of a step with almonds: a randomized feeding trial. Am J Nutr. 2003; 77: 1379-84.

20. Stein EA, Myers GL. Lipid, Apolipoprotiens and Lipoproteins. In: Tietz Textbook of Clinical Chemistry. Burtis ER, Ashwood ER 2nd ed. Philadelphia, Saunders, 1996: 394-397.

21. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma without use of the preparative ultracentrifuge. Clin Chem 1972; 18:499-502.

22. Niazi AD. Statistical Analysis in Medical Research. Saddam University. Iraq 2000: 39-47.

23. Zaoni A, Cherrah Y, Mahassini N, et al. Acute and chronic toxicity of Nigella Sativa fixed oil. Phytomedicine 2002; 9:69-74.

24. Zaoni A, Cherrah Y, Alaoni K, et al. Effects of Nigella sativa fixed oil on blood homeostasis in rat. J Ethnopharmacol. 2002; 79; 23-6.

25. Le PM, Benhaddou-Andaloussi A, Elimadi A, et al. The petroleum ether extract of Nigella sativa exerts lipid lowering and insulin-sensitizing actions in rat. J Ethnopharmacol. 2004; 94:251-9.

26. El-Dakkakhny M, Mady NI, Halim MA. Nigella sativa L. oil protects against indulged hepatotoxicity and improves serum lipids in rats. Arzneimittelforschung 2000; 50:832-6.

27. Internet: www.barakaoil.com clinical trials of Baraka oil.

28. Morikawa T, Xu F, Ninomiya K, Matsuda H, et al. Nigellamines A_3, A_4, A_5, and C, new dolabellane- type diterpene alkaloids, with lipid metabolism promoting activities from the Egyptian medicinal food black cumin. Chem Pharm Bull (Tokyo). 2004; 52: 494-7.

29. Wijendran V, Hayes KC. Dietary n-6 and n-3 fatty acids balance and cardiovascular health. Annu Rev Nutr. 2004; 24:597-615.

30. De Lorgeril M. Nutritional trials for the prevention of coronary heart disease. Asia Pac J Clin Nutr. 2004; 13(suppl): S2.

31. Khor GL. Dietary fat quality: a nutritional epidemiologist's view Asia Pac J Clin Nutr. 2004; 13(suppl): S22.

32. Ramadan MF, Kroh LW, Morsel JT. Radical scavenging activity of black cumin (Nigella Sativa L.), coriandar (coriands sativum L.) and niger (Guizotia abyssinica cass.) crude seed oils and oil fractions. J Agric Food Chem 2003; 51: 6961-9.

33. Badary OA, Taha RA, Gamal el-Din AM, et al. Thymoquinone is a potent superoxide anion scavenger. Drug Chem Toxicol 2003; 26: 87-98.