ORIGINAL ARTICLE

Physiological and Biochemical Role of Nigella Sativa in Hyperlipidemic Albino Rats A Comparative Study

SHAHZAD AHMAD[1] , ANEEQA CHUGHTAI[2], RIZWANA HUSSAIN[3], SHAZIA IQBAL[4]

ABSTRACT

This is a comparative study described role of nigella sativa as an alternative medicine in the hyperlipidemic albino rats. The mean values of given serum cholesterol, Triglycerides, LDL and HDL levels of Group A, B and C were (72.30±4.45, 108.41±1.86, 8.51±0.34, 6.36±0.36), (189.10±5.16, 287.03±4.17, 71.11±0.81and 3.36±0.24), (107.48±11.56, 138.98±15.23, 35.72±12.30, 4.88±0.87) respectively. The findings are similar and in same order which has been described in many other studies by different researchers. The results of this study were significant< 0.05.

Keywords: Hyperlipidemia, hypercholesterolemia, hypertriglyceridemia, Nigella sativa, albino rats.

INTRODUCTION

Hyperlipidemia is an abnormality in which concentration of lipids become increased in the blood (Bamosa et al., 2002). Lipoproteins are biochemical compounds formed by lipid and protein. Lipids in the blood travel in the form of lipoproteins all over the body (Badary et al., 2000). Lipoproteins are water-soluble carrier molecules and characterized by their density,high density lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) (Jones., 1999). There are many causes of hyperlipidemia but most common are hereditary factors, obess smoking and steroid use (Jaffar et al.,2004).

Hyperlipidemia classified further into hypercholesterolemia and hypertriglyceridemia (Burits and Bucar 2000). Cholesterol and triglycerides jointly combine with other fats formed a hard sticky material called plaque inside blood vessels (Jaffar et al., 2004). Due to this plaque deposition in the blood vessels makes them narrower and proper flow of blood become difficult through these vassals. Ultimately blood pressure increase. In this way number of blood clots is formed. When these blood clots breaks off and travels towards heart, it causes a heart attack and if it goes towards brain, it can cause a stroke (Brown et al., 1999).

Nigella sativa is a herb of family of Ranunculaceae (Akhondian et al.,2007). Commonly it is called black seed or black cumin. The seeds of nigella sativa used in all over the world for the treatment of many diseases as an alternative medicine (Akram., 1999). The seed of nigella sativa has more than one hundred chemical components (Ali and Blunden 2003). Mucilage, crude fiber, reducing sugars, resins, alkaloids, flavonoids, organic acids, sterols, tannins, saponins, linoleic acid and oleic acid are major constituents of a seed. These studies describe scientific evidences that black seeds are very effective in their mode of action against hyperlipidemia (Dakhakhny et al., 2000; Zaoui et al., 2002; Kalus et al., 2003). A study proved in its findings that a significant decrease in the concentration of total cholesterol, low density lipoprotein and triglyceride levels occurred with the regular use of nigella sativa (Badary et al.,2000).

[1]Asst pro of Oral Pathology, FMH College of Medicine, Lahore
[2]Asst Proff Anatomy, CMH Lahore Medical CollegeLahore-
[3]Assistant professor Department of Physiology , FMH College of Medicine and Dentistry, Lahore-Pakistan
[4]Asst Prof Obs.& Gyne Alfarabi College of Medicine, Riyadh KSA. Correspondence to Dr. Aneeqa Chughtai Email: aneeqa65@gmail.com cell no: 03314319507

MATERIALS AND METHODS

In this study albino rats were divided into three groups and in each group there were 10 rats. Group A was control; Group B was rats only taken cholesterol supplement food while the rats of Group C, were treated with nigella sativa seeds powder (500mg/kg body weight). The nigella sativa seeds were purchased from a local herb store and were authenticated at the Faculty of Pharmacy the University of Lahore. Where as pure cholesterol powder taken from Sinopharm Chemical Reagent Co., Ltd, China. All the rats were housed in individual cages under standard laboratory conditions. At the end of experiment the blood samples were withdrawn and collected in glass tubes. Serum was separated by centrifugation for 10 minutes at 3000 rpm for biochemical analysis. The concentrations of cholesterol, HDL, LDL and triglyceride were measured by enzymatic colorimetric methods with commercial kits. Raw data was analyzed by using SPSS. P value of < 0.05 was considered as significant.

RESULTS

The mean values of given serum cholesterol, Triglycerides, LDL and HDL levels of Group A were (72.30±4.45, 108.41±1.86, 8.51±0.34, 6.36±0.36).

Whereas the mean values of given serum cholesterol, Triglycerides, LDL and HDL levels (189.10±5.16, 287.03±4.17, 71.11±0.81and 3.36±0.24) of Group B showed a significant ($p<0.05$) increased than the control relatively. The lipid profile of Group B rats increased because of induced mechanism by cholesterol supplement. While the mean values of given serum cholesterol, Triglycerides, LDL and HDL levels of Group C (107.48±11.56, 138.98±15.23, 35.72±12.30, 4.88±0.87) showed a significant ($p<0.05$) decreased as compared with the Group B respectively, in which albino rats were treated with nigella sativa seeds. The lipid profile levels in each group showed remarkable variation.

Group A, control (n=10)

Parameters	Serum levelsmg/dl	Mean values±SD
Cholestero	68. 71±2.09	72.30±4.45
Triglycerides	109.22±2.09	108.41±1.86
LDL	8.67±0.26	8.51±0.34
HDL	6.53±0.08	6.36±0.36

p<0.05

Group B, cholesterol supplement (n=10)

Parameters	Serum levels mg/dl	Mean values±SD
Cholesterol	186.65 ±4.38	189.10±5.16
Triglycerides	289.82±1.77	287.03±4.17
LDL	71.63±0.89	71.11±0.81
HDL	3.26±0.35	3.36±0.24

p<0.05

Group C, Nigella sativa treated (n=10)

Parameters	Serum levelsmg/dl	Mean values±SD
Cholesterol	93.76±4.70	107.48±11.56
Triglycerides	120.74±1.55	138.98±15.23
LDL	22.62±2.28	35.72±12.30
HDL	5.74±0.30	4.88±0.87

p<0.05

DISCUSSION

Cholesterol is a sterol molecule. Its biosynthesis occurs in all animal tissues because it is the structural component of animal plasma membrane (Kanter et al., 2005). Cholesterol in the cells work as a precursor of steroidal hormones, bile acids and vitamin D (Kaleem et al.,2006). Cholesterol does not dissolve in the blood it is carried in the blood by different lipoproteins (Jones.,1999). Triglycerides are ester of glycerol and fatty acids, its levels play an important role in the diagnosis and treatment of different medical problems (Djoussé et al., 2003). LDL is called low-density lipoprotein due to its smaller particle size and low density as compared to the other forms of cholesterol particles (Dehkordi and Kamkhah 2008). LDL cholesterol is called bad cholesterol because it is deposited in the blood vessels and these become narrow or even blocked. The LDL levels are the major biomarker of cardiovascular diseases. High-density lipoprotein (HDL) is a lipid containing protein and it acts as a transporter of cholesterol in the body. High HDL levels may be helpful in reducing the risk of cardiovascular diseases (Beshbishy et al., 2006). The mean values of given serum cholesterol, Triglycerides, LDL and HDL levels of Group A, B and C were (72.30±4.45, 108.41±1.86, 8.51±0.34, 6.36±0.36), (189.10±5.16, 287.03±4.17, 71.11±0.81 and 3.36±0.24), (107.48±11.56, 138.98±15.23, 35.72±12.30, 4.88±0.87) respectively. The findings are similar and in same order which has been described in above and many other studies by different researchers.

REFERENCES

1. Akhondian J, Parsa A, Rakhshande H (2007). The effect of Nigella sativa L. (black cumin seed) on intractable pediatric seizures. Med. Sci. Monit. 13: 555
2. Akram KM (1999). Chemical composition and medicinal properties of Nigella sativa Linn. Inflammopharmacol. 7(1):15.
3. Ali BH, Blunden G (2003). Pharmacological and toxicological properties of Nigella sativa. Phytother. Res. 17 (4): 299–305.
4. Badary OA, Abdel-Naim AB, Abdel-Wahab MH (2000). The influence of thymoquinone on doxorubicin-induced hyperlipidemic nephropathy in rats. Toxicol. 143 (3): 219-26.
5. Bamosa AO, Ali BA, al-Hawsawi ZA (2002). The effect of thymoquinone on blood lipids in rats. Indian. J. Physiol. Pharmacol. 46 (2): 195-201.
6. Beshbishy HA, Singab ANB, Sinkkonen J, Pihlaja K (2006). Hypolipidemic and antioxidant effects of Morus alba L. (Egyptian mulberry) root bark fractions supplementation in cholesterol-fed rats. Life Sci. 78: 2724 – 2733.
7. Brown L, Rosner B, Willett WW, Sacks FM (1999). Cholesterol-lowering effects of dietary fiber: a meta-analysis. Am. J. Clin. Nutr. 69 (1): 30– 42.
8. Burits M, Bucar F (2000). Antioxidant activity of Nigella sativa essential oil. Phytother. Res. 14 (5): 323–
9. Dehkordi FR, Kamkhah AF (2008). Antihypertensive effect of Nigella sativa seed extract in patients with mild hypertension. Fundam. Clin. Pharmacol. 22 (4): 447-52.
10. Dakhakhny M, Mady NI, Halim MA (2000). Nigella sativa L. oil protects against induced hepatotoxicity and improves serum lipid profile in rats. ARZNEIMITTEL. FORSCH. 50 (9): 832-6.
11. Djoussé L, Hunt SC, Arnett DK (2003). Dietary linoleic acid is inversely associated with plasma triacylglycerol: the National Heart, Lung, and Blood Institute Family Heart Study. Am. J. Clin. Nutr. 78(6): 1098-102.
12. Jaffar AR, Babb J, Movahed A (2004). Optimal management of hyperlipidemia in primary prevention of cardiovascular disease. Int. J. Cardiol. 97 (3): 355-366.
13. Jones PJ (1999). Cholesterol-lowering action of plant sterols. Curr. Atheroscler. Rep. 1 (3): 230–235.
14. Kaleem M, Kirmani D, Asif M, Ahmed Q, Bano B (2006). Biochemical effects of Nigella sativa L seeds in diabetic rats. Indian. J. Exp. Biol. 44 (9): 745-8.
15. Kalus U, Pruss A, Bystron J, Jurecka M (2003). Effect of Nigella sativa (black seed) on subjective feeling in patients with allergic diseases. Phytother. Res. 17: 1209-14.
16. Kanter M, Coskun O, Budancamanak M (2005). Hepatoprotective effects of Nigella sativa L and Urtica dioica L on lipid peroxidation, antioxidant enzyme systems and liver enzymes in carbon tetrachloride-treated rats. World. J. Gastroenterol. 11 (42): 6684-8.
17. Zaoui A, Cherrah Y, Mahassini N, Alaoui K, Amarouch H, Hassar M (2002). Acute and chronic toxicity of Nigella sativa fixed oil. Phytomedicine. 9(1): 69-