World Journal of Pharmacy and Biotechnology

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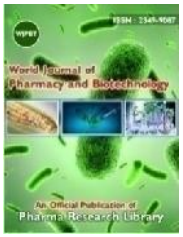

Research Article Open Access

Anti-Hyperlipidemic Activities of Modified Diet in Wistar Rats Fed with High at Diet

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A B S T R A C T

The aim of the present study was to investigate the evaluate anti hyperlipidaemic activity of modified diet in wistar rats fed with high fat diet. The elevated levels of total cholesterol, phospholipids, triglycerides and low-density lipoprotein due to HFD. Administration of modified diet was significantly (P<0.001) reduced the lipid profile and lipoprotein levels. A significant reduction in HDL-cholesterol was noticed in HFD fed groups (II); however, a significant increased the HDL level was produced by the administration of modified diet. Therefore, it was concluded that modified diet has definite cardio protective effect against hyperlipidaemic.

Keywords: Modified diet, hyperlipidaemic effect, HFD.

A R T I C L E I N F O

CONTENTS

Article History: Received 15 April 2016, **Accepted** 25 May 2016, **Available Online** 29 June 2016

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Manuscript ID: WJPBT3056

PAPER-QR CODE

Citation: A. Ravi kumar, *et al.* Anti-Hyperlipidemic Activities of Modified Diet in Wistar Rats Fed with High at Diet. *W. J. Pharm. Biotech.*, 2016, 3(1): 07-09.

1. Introduction

Atherosclerosis, the most important pathologic process leading to cardio- and cerebrovascular diseases, is suggested to be mediated by the increase in the serum lipid, thrombosis, and injuries of the endothelial cells [1, 2]. Generally the therapeutic purpose of using hyperlipidaemic drugs is to reduce the elevated levels of plasma lipids, notably cholesterol established [3]. Some of the major limitations in the effective pharmacological treatment of hyperlipidaemic are the constraints imposed on health care resources, particularly in the low-and middle-income countries [4]. There is a need to tackle this physiological problem as it is attaining grave proportions globally. In

recent times, much research interest has been focused on modified diets that possess hyperlipidaemic properties that may be useful in reducing the risk of cardiovascular diseases. The goal of diabetes management is to keep blood glucose levels as close to normal as safely possible. Since diabetes may greatly increase risk for heart disease and peripheral artery disease, measures to control blood pressure and cholesterol levels are an essential part of diabetes treatment as well [8]. People with diabetes must take responsibility for their day-to-day care. This includes monitoring blood glucose levels, dietary management, maintaining physical activity, keeping weight and stress under control, monitoring oral medications and, if required, insulin use via injections or pump. To help patients achieve this, UCSF's Diabetes Teaching Center offers self-management educational programs that emphasize individualized diabetes care. The program enables patients to make more consistent and appropriate adjustments in their therapy and lifestyle [8,9].

Dietary Management and Physical Activity

Modifying eating habits and increasing physical activity are typically the first steps toward reducing blood sugar levels. At UCSF Medical Center, all patients work with their doctor and certified dietician to develop a dietary plan. Our Teaching Center conducts workshops that provide patients with information on food nutrient content, healthy cooking and exercise

Animals and treatment

Male Wister rats of 16-19 weeks age, weighing 150-175g were procured from the Central Animal House, Sree Vidyanikethan College of Pharmacy, and Thirupathi. The animals were kept in cages, 2 per cage, with 12:12 hr light and dark cycle at 250 ± 20C. The animals were maintained on their respective diets and water ad labium. Animal Ethical Committee's clearance was obtained for the study. Animals were divided into following 4 groups of 6 animals each:

2. Material and Methods

Animal diet

The compositions of the two diets were as follows [6]: Control diet: Wheat flour 22.5%, roasted Bengal gram powder 60%, skimmed milk powder 5%, casein 4%, refined oil 4%, salt mixture with starch 4% and vitamin & choline mixture 0.5%. High fat diet: Wheat flour 20.5%, roasted Bengal gram 52.6%, skimmed milk powder 5%, casein 4%, refined oil 4%, coconut oil 9%, salt mixture with starch 4% and vitamin & choline mixture 0.5%, cholesterol 0.4%.

Experimental Design

Group I : Standard chow diet (Control).
Group II : High Fat Diet.
Group III : High fat diet + Modified diet
Group IV : High fat diet + Standard drug Atorvastatin (1.2 mg/kg b.w.)

The modified diet as well as standard Atorvastatin were suspended in 2% tween 807 separately and fed to the respective rats by oral intubation. Rats of groups III and IV were orally fed with modified diet and standard drug Atorvastatin. At the end of 9 weeks all the animals were sacrificed by cervical dislocation under light ether anesthesia. Blood was collected retro-orbitally from the inner canthus of the eye using capillary tubes in fresh in heparinised tubes and plasma was separated.

Biochemical estimation

Plasma samples were analyzed for total cholesterol, triglycerides, phospholipids and HDL cholesterol by using Boehringer Mannheim kits by Erba Smart Lab analyzer USA. LDL-cholesterol was calculated by using Friedwald method.

Statistical Analysis

The results are expressed as mean ± SEM. Comparison between the treatment groups and control were performed by one-way analysis of variance (ANOVA) followed Turkeys multiple Comparison tests.

3. Results and discussion

Plasma Lipid Profile

Table-1 shows the effect of modified diet on plasma lipid profile in control and experimental rats in each group. Total cholesterol levels were increased in high fat diet fed rats (group II) as compared to control rats (group I). Results show that treatment with high fat diet significantly ($p<0.001$) increased the concentration of plasma lipids as reported earlier revealing that significant elevation of plasma lipid parameters in response to atherogenic diet and cholesterol feeding [9]. Treatment of modified diet to rat fed with HFD significantly ($p<0.001$) decreased in the concentration of total cholesterol as compared to HFD rats (group II). Administration of modified diet treated rats with HFD had showed that plasma cholesterol levels were restored to near normal as that of Atorvastatin. Effect of the modified diet on plasma triglyceride and phospholipids are presented in Tables-1. The concentration of plasma triglyceride and phospholipids was elevated in rats fed with high fat diet (group II) as compared to control rats (group I). HFD rats had significant increase in the level of plasma triglyceride due to decrease in the activity of lipoprotein lipase [10]. The plasma triglyceride and phospholipids levels were reduced in rats treated with modified diet and as well as standard drug Atorvastatin along with HFD when compared with rats fed with high fat diet (group II). The plant extract may have stimulation of lipoprotein lipase activities resulting in decrease of plasma triglyceride and might increase the uptake of triglyceride from plasma by skeletal muscle and adipose tissues [11]. The reduced concentration of phospholipids may also be due to the enhanced activity of phospholipases [12].

Plasma Lipoprotein Profile

Table-2 were shows the levels of HDL cholesterol in plasma of control and experimental rats in each group. The HDL cholesterol levels increased in high fat diet rats (Group II) as compared to control rats (group I). Administration of modified diet had significantly raised the levels of HDL-cholesterol levels than that of other extracts treatment groups. The increased HDL-C facilitates the transport of TG or cholesterol from serum to liver by a pathway termed 'reverse cholesterol transport' where it is catabolised and excreted out of the body. Effect of modified diet on plasma LDL cholesterol levels was depicted in table-3. HFD fed rats (group II) are elevated levels of LDL-

cholesterol when compared with control rats (group I). The increase in the concentrations of LDL observed is mainly due to the dietary carbohydrates and cholesterol [13]. Studies show that both LDL have a positive role in atherogenesis. Treatment of modified diet markedly reduced the levels of LDL-cholesterol. Reduced levels of LDL-cholesterol in modified diet on HFD fed rats may be possibly due to

Table 1: Effect of modified diet on plasma lipid profile in control and experimental rats in each group.

Groups	Total cholesterol (mg/dl)	Phospholipids (mg/dl)	Triglyceride (mg/dl)
Group I	112.98± 0.04b*	107.76 ±0.98 b*	81.05 ±0.17 b*
Group II	175.33± 0.44a*	145.48 ±0.40 a*	150.08 ±0.17 a*
Group III	101.12 ±0.75 a*,b*	106.16 ±0.61 a*,*b*	79.10±0.72 a*, b*
Group IV	99.82 ±0.11 a*, b*	108.04 ±0.42 a*, b*	74.39 ±0.96 a*,b*

Values are expressed as mean SE (n=6 rats), P values: * < 0.001, ** < 0.05, NS: Non Significant;
a → group I compared with groups II, III & IV.
b → group II compared with groups I, III & IV.

Table 2: Effect of modified diet on plasma lipoprotein in control and experimental rats in each group

Groups	HDL cholesterol (mg/dl)	LDL cholesterol (mg/dl)
Group I	59.12±0.02 b*	36.51±0.13 b*
Group II	36.41±0.17 a*	99.20 ± 0.63 a*
Group III	57.40±0.71 a*, b*	26.10 ±0.47 a*, b*
Group IV	56.02 ±0.55 a*, b*	27.20 ±0.73 a*, b*

Values are expressed as mean SE (n=6 rats),
P values: * < 0.001, ** < 0.05
NS : Non Significant
a → group I compared with groups II, III & IV.
b → group II compared with groups I, III & IV.

4. Conclusion

The concentrations of cholesterol, phospholipids, triglyceride and LDL were significantly increased and HDL level was significantly decreased in plasma of rats fed HFD when compared with the control group of rats. Plasma cholesterol, phospholipids and triglyceride were elevated in rats treated with HFD. Administering the modified diet along with HFD significantly reduced both plasma lipid level and significantly increased HDL level in plasma.

5. Reference

[1] Goldschmidt-Clermont PJ, creager MA, Losordo DW, Lam GK, Wassef M, Dzau VJ. Atherosclerosis 2005: Recent discoveries and novel hypothesis. Circulation 2005; 112: 3348-53.

[2] Pratico D. Antioxidants and endothelium protection. Atherosclerosis 2005; 181: 215-24.

[3] Lipid Research Clinics Program, 1984a. The lipid research clinics coronary primary prevention trial results: 11. The relationship of reduction in incidence of coronary heart disease to cholesterol lowering. J. of American Medical Association 1984; 251:365-374.

[4] Bergman, M. B., Kranjcevic, K., Reiner, Z., Milakovic, B. S., Stojanovic, S. and pehar, S. Drug therapy of cardiovascular risk factors: guidelines versus reality in primary health care service. Croat. Med. 2005; 46: 984-989.

[5] Craig, W. J. Health-promoting properties of common herbs. Am. J. Clin. Nutr 1999; 70: 491.

[6] B.H. Waynforth. Injection techniques. Experimental and surgical techniques in the rats, Academic Press, London, 1980; 3.

[7] A. Kottai Muthu, S. Sethupathy, R. Manavalan, and P.K. Karar. Hypolipidemic effect of methanolic extract of Dolichos biflorus Linn in high fat diet fed rats. Ind.J.Exp.Biol.2005; 43:522-525.

[8] Freidewald W. T., Levy R. I. and Frederickson D.S. Estimation of the concentration of low density lipoprotein cholesterol in plasma without use of the preparative ultracentrifuge. Clin. Chem 1972; 18: 499-502.

[9] Ogur R, Coskun O, Korkmaz A, Oter S, Yaren H, Hadse M. High nitrate intake impairs liver functions and morphology in rats; protective effects of α-tocopherol. Environmental Toxicology and Pharmacology 2005; 20: 161–166.

[10] De La Cruz JP, Quintero L, Villalobos MA and Sanchez.de.la Cuesta F. Lipid peroxidation and glutathione system in hyperlipedemic rabbits influence of olive oil administration. Biochem. Biophys. Acta, 2000; 1485: 36.

[11] Kavitha R and Nalini N. Hypolipidemic effect of green and red chilli extract in rats fed high fat diet. Med. Sci. Res 2001; 17-21.

[12] Mirhadi SA and Sudarshan Singh. Effect of garlic supplementation to cholesterol rich diet on development of atherosclerosis in rabbit. Ind. J. Exp. Biol 1991; 29:162.

[13] Tamme, E.H., Van, H.P.G., Schouten, E.G and Kesteloot, H. Effect of a plant sterol enriched spread on serum lipid and lipoproteins in mildly hypercholesterolemia subjects. Acta Cardiology, 2002; 66: 7A-1DA.