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**A STUDY OF EFFECTS OF *COMMIPHORA WIGHTII* EXTRACT ON
LIPID PROFILE IN RABBITS AND ITS COMPARISON WITH
ATORVASTATIN**

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ABSTRACT

Hyperlipidemia is a major cause of atherosclerosis. A lot of experiments & epidemiological evidence suggests a relationship between atherosclerosis and elevated levels of plasma lipids. Present study was undertaken to evaluate hyperlipidemic activity of *Commiphora wightii* extract and also to compare lipid lowering activity of *Commiphora wightii* extract with Atorvastatin. New Zealand white rabbits of either sex (800-1000 gm) were divided into 4 groups of six animals each. Group one normal control group, group two hyperlipidemic control groups, group three hyperlipidemic test drug groups and group four hyperlipidemic standard drug group. All the drugs were given orally once daily. Blood samples were collected from lateral marginal ear vein of rabbit. The serum of each animal was estimated for different lipid parameters like serum triglyceride, total serum cholesterol, serum HDL, serum LDL and serum VLDL. After 8 week of treatment extract of *Commiphora wightii* lowers total cholesterol, triglycerides, LDL, VLDL level at the same time it raise HDL which is protective. Atorvastatin also significantly lowers lipid parameters. But the fall in lipid parameters is more with Atorvastatin when compared to extract of *Commiphora wightii* showing more effectiveness. The results of present study indicate that extract of *Commiphora wightii* in dose of 20 mg/kg of body weight has significant hypolipidemic activity compared to that of Atorvastatin.

Keywords: *Commiphora wightii*, Atorvastatin, Hyperlipidemia.

INTRODUCTION

Hyperlipidemia is one of the major culprits for various cardiovascular and central nervous system disorders. It is a silent killer. Both genetic disorders and diets enriched in saturated fat and cholesterol contribute to the elevated lipid levels in our population and many other developed countries around the world. It is a major cause of atherosclerosis and atherosclerosis associated conditions such as coronary heart disease, ischemic cerebrovascular disease and peripheral vascular disease [1].

The Indian knowledge of the therapeutic properties of

plants dates back to the Vedic age. It is well known that India, the cradle of ancient civilization had acquired a high degree of knowledge on the nutritional and medicinal properties of large number of plant products. Apart from Ayurveda the ancient medical system of India which uses potent plants, the common man in India used many common plants or plant products as household remedies.

The use of plants in the treatment of disease occupies an important place in Ayurveda, the traditional medicine of India. The Sushruta Samhita (600 B.C.), a well-known Ayurvedic medical text, describes the usefulness of the gum resin from the tree *Commiphora wightii* in the treatment of a number of ailments, including obesity, arthritis and disorders of lipid metabolism [2].

In present day, statins are being used as a standard therapy for hyperlipidemia. Keeping in view the above ideas, the present study has been carried out to evaluate the lipid

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lowering effect of *Commiphora wightii* extract on lipid profile. Also effects of the same are compared with today's standard treatment of atorvastatin.

MATERIAL AND METHODS

The present study was carried out in Dept of Pharmacology at Govt. Medical College nanded one of the district of Maharashtra, after taking permission from Institutional Animal Ethics Committee.

Drugs used in the study

Extract of *Commiphora wightii*: 20 mg/kg given by oral route, in two divided doses [3]. (gift sample from Himalaya healthcare, Bengluru).

Atorvastatin : orally, once a day, 3 mg/kg [4]

High cholesterol diet: 1% cholesterol powder

Experimental animals used in the study

Young New Zealand White rabbits are being used for the study.

Animals used of either sex.

Body weight of all animals was selected between 800-1000 gms each.

Total number of animals used: 24

Source: Animals were procured from Central Animal House.

Diet: Animals were maintained on standard animal diet consisting of Bengal gram, wheat, maize and carrot in sufficient quantity for the entire period of the experiment. Water was given ad libitum during the entire period of the experiment.

Animals were kept in cage under temperature regulated condition of 12 hours light/ 12 hours dark cycle .

Method of Inducing Hyperlipidemia

A high fat diet, using 1% cholesterol powder⁵ is fed along with normal diet, orally daily, for 8 weeks.

Experimental Design

This is a prospective, randomized, analytical, interventional type of study. The experiment was carried out for a period of 8 weeks. For this purpose, thirty healthy New Zealand White rabbits of either sex or weighing approximate 800-1000 gm were selected from the Central Animal House of medical college. Before starting the experiment, the animals were allowed to acclimatize to the laboratory environment for one week and they were provided with a standard diet and water in sufficient quantity, as per the recommendation of CPCSEA (Committee for the purpose of control and supervision of experiment on animals) for laboratory animal facilities. For the experiment, the animals were weighed, recorded, numbered and randomly divided into four groups of 6 animals each.

Grouping and Treatment Schedule

Group-A: Normal Control Group: standard balanced diet.

Group-B: Hyperlipidemic Control Group: high fat diet.

Group-C: Hyperlipidemic Test Drug Group : high fat diet and guggul extract

Group-D: Hyperlipidemic Standard Drug Group: high fat diet and Atorvastatin.

All the animals used for the experiment were kept under observation for daily food intake. The drugs were administered to the animals in the doses mentioned before for 8 weeks, by means of an intragastric feeding tube.

At the end of the 8th week, all the animals were taken group wise and blood collected from each of them for assessing the various parameters of lipid profile.

Collection of Blood sample

Blood sample was collected from lateral marginal vein of ear of rabbit. The serum of each animal was estimated for different biochemical parameters.

Biochemical Estimation

After overnight fasting 2ml blood was collected in plain bulbs without anticoagulant from marginal ear veins of all rabbits. Plain bulbs containing blood are kept at room temperature for 30-45 minutes for serum separation. After separation of serum from blood, the various biochemical parameters were estimated in the Biochemistry Lab. of medical college. Instrument used for lipid profile estimation is TRANSASIA fully automated random access clinical chemistry analyzer.

Lipid profile

Total cholesterol-CHOD-PAP method

Triglyceride-GPO-PAP method

HDL-Cholesterol-CHOD-PAP method

LDL-Cholesterol-by Friedwald equation

VLDL – Cholesterol-by Friedwald equation

Statistical tests used to compare the groups is ANOVA i.e. analysis of variance followed by Dunnett's multiple comparison test. Analysis of Variance (ANOVA) is a statistical test used to determine if more than two population means are equal. The test uses the F-distribution (probability distribution) function and information about the variances of each population (within) and grouping of populations (between) to help decide if variability between and within each populations are significantly different [6] .

Dunnett's test compares group means. It is specifically designed for situations where all groups are to be pitted against one "Reference" group. It is commonly used after ANOVA has rejected the hypothesis of equality of the means of the distributions. Its goal is to identify groups whose means are significantly different from the mean of this reference group. It tests the null hypothesis that no group has its mean significantly different from the mean of the reference group.

RESULTS

The results obtained were summarized in table below.

The values obtained were expressed in specific units of those parameters as mentioned in the table. Results of estimation were reported as Mean \pm SEM (standard error of mean) of 6 animals at a time from each group.

The statistical significance between groups was analyzed by using one way ANOVA followed by Dunnet's multiple comparison test, The significance was expressed by 'p' values, as mentioned in the tables. 'p' values of < 0.01 was considered significant.

Table 1. Showing Total Serum Cholesterol, Serum Triglyceride Level, Serum High Density Lipoprotein Level, Serum Low Density Lipoprotein Level, Serum Very Low Density Lipoprotein Levels

Group	Treatment Given	Serum Cholesterol (mg/dl)	Serum TG (mg/dl)	Serum HDL (mg/dl)	Serum LDL (mg/dl)	Serum VLDL (mg/dl)
Group A	Normal Control Group	53.3 \pm 8.4	49.6 \pm 8.6*	20.8 \pm 2.3	22.7 \pm 6.5	9.9 \pm 1.7
Group B	High Fat Diet Control Group	832.3 \pm 106.4*	213.5 \pm 42*	36.3 \pm 11*	931.6 \pm 124*	42.7 \pm 8.4*
Group C	High Fat Diet Plus Guggul Extract Group	475.6 \pm 79.9@	110 \pm 10.6@	44 \pm 4@	440.1 \pm 53.3@	22 \pm 2.1@
Group D	High Fat Diet Plus Atorvastatin Group	313 \pm 31.3@	102.3 \pm 23.9@	51.3 \pm 5.8@	241.2 \pm 34.3@	20.4 \pm 4.7@

Results expressed in mean \pm SEM (n=6)

(statistical test used: ANOVA followed by Dunnet's multiple comparison test)

(* : p value < 0.05, when compared with group A)

@ : p value < 0.05, when compared with group B)

DISCUSSION

The purpose of the present study was to evaluate the effect of *Commiphora wightii* Extract on serum lipids in New Zealand White rabbits fed with high cholesterol diet, in comparison to a standard hypolipidemic agent Atorvastatin.

Hyperlipidemia was induced by administering high fat diet to the rabbits. High fat diet was prepared by adding 1% cholesterol powder to diet. Hyperlipidemia is the result of an oxidative abuse due to free radicals, formed by the interaction of high fat diet. Also, enhancement in concentrations of serum cholesterol and triglycerides of hyperlipidemic rabbits may be as a result of lipid peroxidation evoked by high fat diet.

In this study hyperlipidemia produced by high fat diet was confirmed by analysis of different levels of lipid parameters when compared with the control group. Here the high fat diet treated group (Group-B) showed a significant rise in the level of total serum cholesterol 832.3 \pm 106.4 (p<0.01), serum triglyceride 213.5 \pm 42 (p<0.01), serum LDL 931.6 \pm 124 (p<0.01), serum VLDL 42.7 \pm 8.4 (p<0.01) as well as a significant rise in serum HDL level 36.3 \pm 11 (p<0.01), when compared to the normal control group.

Group-C, which was treated with high fat diet supplemented with guggul, when compared with the hyperlipidemic control group (Group - B), showed a significant decrease in the levels of the total serum cholesterol 475.6 \pm 79.9 (p<0.01), serum triglyceride 110 \pm 10.6 (p<0.01), serum LDL 440.1 \pm 53.3 (p<0.01), serum VLDL 22 \pm 2.1 (p<0.01) while there was a significant

increase in the level of serum HDL cholesterol 44 \pm 4 (p<0.01) at the end of the experimental period of 8 weeks. The reduction in serum lipids has shown significant fall (p<0.01) which confirms that guggul has got significant antihyperlipidemic activity.

The group receiving high fat diet along with Atorvastatin simultaneously (Group-D), showed a significant decrease in the levels of total serum cholesterol 313 \pm 31.3 (p<0.01), serum triglyceride 102.3 \pm 23.9 (p<0.01), serum LDL 241.2 \pm 34.3 (p<0.01), serum VLDL 20.4 \pm 4.7 (p<0.01) while there was a significant increase in the level of serum HDL cholesterol 51.3 \pm 5.8 (p<0.01) at the end of the 8th week of experiment.

At the end of study it is observed that, guggul extract lowers lipid parameters i.e. total cholesterol, chylomicrons, LDL, VLDL. But, at the same time it raises HDL, which is protective. Atorvastatin also significantly lowers total cholesterol, chylomicrons, LDL, VLDL, against which it raises HDL. But, the fall in lipid level of these parameters is more with atorvastatin when compared to guggul extract, showing more effectiveness.

The first animal study on guggul was conducted in rabbits over a period of 2 years [7]. Rabbits were fed with hydrogenated vegetable oil to raise their cholesterol levels. While in our study, cholesterol 1% is used to raise the cholesterol level. One group of rabbits was given guggul, whereas the other group served as a control. At the end of the study, rabbits receiving guggul had normal serum cholesterol and lipid levels, whereas in the control rabbits serum cholesterol and lipids were elevated. While our study shows significant decrease in serum cholesterol, serum

triglyceride, serum LDL, serum VLDL against the rise in HDL level.

In one study guggulsterone, 25 mg/kg p.o., lowered serum cholesterol and triglycerides by 27% and 30%, respectively, after a treatment period as short as 10 days [8], which conducted on rats. While in our study dose of guggulsterone used is 20 mg/kg for 8 weeks, Consistent with this study, by using new Zealand white rabbits our study also shows significant decrease in serum cholesterol, serum triglyceride, serum LDL, serum VLDL level.

In another study, Fisher rats were fed a diet containing 1–5.6% gugulipid for 10 days. Gugulipid dose-dependently decreased serum triglycerides by 22–70%, whereas total serum cholesterol was increased by 8–23%. Further analysis of the serum lipoproteins indicated that the increase in total cholesterol was due to increase in high-density lipoprotein (HDL), whereas LDL and VLDL were actually decreased [9].

In one study, hyperlipidemia was induced by feeding rats with triton WR-1339 at a dose of 200 mg/kg body weight. One group of rats received guggulsterone, 100 mg/kg p.o. At the end of the experiment, guggulsterone reduced total serum cholesterol by 42%, triglycerides by 24%, and phospholipids by 34% [10].

In another study, rats received gugulipid at 50 mg/kg p.o. for 45 days [11] Guggulsterone significantly reduced serum cholesterol, triglycerides, phospholipids, and atherogenic index.

30 white leg horn chicks were used in study for 1 month to induce hyperlipidemia. Guggul is used at the dose of 3 g/kg. with that decrease in serum cholesterol and triglyceride levels falls rapidly [12].

In one study, mice were fed a high fat diet containing 2% cholesterol to raise their cholesterol levels. One group of mice received guggulsterone at a dose of 100 mg/kg p.o. for 7 days, whereas the other group was treated with vehicle. Mice receiving guggulsterone showed significantly decreased hepatic cholesterol levels in comparison with the control mice that received the cholesterol-containing diet only [13].

In rats using triton WR-1339 induced hyperlipidemia, effects of guggul and gemfibrozil on serum lipids were compared. In that, treatment with guggul and gemfibrozil significantly reduced levels of VLDL lipids (22-38% and 34-39%) as well as LDL (37% and 36%), PL (30% and 31%), TG (26% and 32%), while HDL is slightly decreased¹⁴ In contrast to this, we use atorvastatin for comparison. In our study, both guggul and atorvastatin shows significant decrease in serum cholesterol, serum triglyceride, serum LDL, serum VLDL level. But, there has been rise in HDL level is observed in both guggul and atorvastatin group.

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