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HYPOLIPIDEMIC ACTIVITY OF *ALBIZIA AMARA* (ROXB.) BOIV. (FABACEAE) BARK

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ABSTRACT

Hypolipidemic activity of ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) bark was evaluated in male Wistar albino rats. The test and standard drugs were administered orally to rats of the respective groups two times at an interval of 12 hours. Prior to treatment, the hyperlipidemia was induced by providing high fat diet daily in the place of normal food for 7 days. Then the treatment was given for 15 days, on 15th day lipid profile (TC, TG, LDL and HDL) was analysed. High fat diet showed significant increase in LDL, TG, TC and a significant decrease in HDL in serum. The Ethanol extract of *Albizia amara* and atorvastatin treated groups showed significantly increased HDL levels and decreased TC, TG and HDL-LDL ratio. The Ethanol extract of *Albizia amara* has showed significant hypolipidemic activity.

Key words: Hyperlipidemia, *Albizia amara* (Roxb.) Boiv. Lipid profile.

INTRODUCTION

Hyperlipidemia refers to elevated levels of lipids and cholesterol in the blood and is also identified as dyslipidemia, to describe the manifestations of different disorders of lipoprotein metabolism (Lucy B Adams, 2005). Hyperlipidemia is associated with many important complications such as diabetes and coronary heart disease, sleep apnea and pulmonary dysfunction, stroke, diseases of the gall bladder, liver and the musculoskeletal system, reproductive dysfunction, venous insufficiency, deep vein thrombosis, poor wound healing and more. Hyperlipidemia may be the underlying reason of cancers of the breast, endometrium, colon and prostate. Hyperlipidemia is an increasing problem in modern societies, due to the adoption of rapid lifestyle which results in high dietary intake of carbohydrates and fat accompanied by reduced energy consumption (Abu-Abid *et al.*, 2002; Pi-Sunyer, 2002). Among the drugs available to treat dyslipidemia, statins are often the first choice for lowering total and LDL cholesterol levels. Other drugs that lower cholesterol include cholesterol-absorption blockers, bile acid sequestrants and nicotinic acid. These may be used in combination if a single drug is not effective in reaching target levels (Manrique *et al.*, 2009).

Plants have been the major source of drugs in Indian system of medicine and other ancient systems in the world. Earliest description of curative properties of medicinal plants was found in Rig Veda. Charaka Samhita and Sushruta Samhita give extensive description on various medicinal herbs. Information on medicinal plants in India has been systematically organized (Sathyavati *et al.*, 1987). Medicinal plants have the advantage of having little or no side effects. Some of them are being used in traditional systems of medicine from hundreds of years in many countries of the world.

Albizia amara (Roxb.) Boiv. (Fabaceae) is a small to moderate-sized, much-branched deciduous tree with smooth, dark green and scaly bark. It is commonly known as bitter albizia. It has a wide distribution in Africa, occurring from Sudan and Ethiopia southwards to Zimbabwe, Botswana and the Transvaal, growing mainly in sandy woodlands. In India, it is one of the characteristic trees of the dry regions of Tamil Nadu, Andhra Pradesh and Karnataka. The tree yields a gum used against ulcers; fruits are said to cure malaria and coughs. It is reported

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that soap can be made from the roots and leaves can be used for washing hair (Murugan and Uma, 2009). Hence in this study *Albizia amara* (Roxb.) Boiv. (Fabaceae) bark was evaluated for its effects on hyperlipidemia.

MATERIALS AND METHODS

Plant collection and Authentication

The bark of *Albizia amara* (Roxb.) Boiv. (Fabaceae) was collected from the forest region of Thirumala hills, Tirupati, Chittoor District, Andhra Pradesh, India, in the month of December, 2011. The plant was authenticated by Prof. K Madhava Chetty, Botanist, SV University, Tirupati, Andhra Pradesh. The voucher specimen of the plant was deposited in the college for further references.

Extraction of plant material

The freshly collected bark of the plant dried under shade and powdered mechanically. The air dried powder of the plant (100gm) was subjected to continuous hot extraction with ethanol by using Soxhlet apparatus for 48 hrs.

Animals used

Male Wistar albino rats (150-200g) were obtained from Sainath Enterprises CPCSEA (769/CPCSEA/2010) approved breader, Sainath Nagar, Uppal, Hyderabad, Andhra Pradesh. The animals were maintained in a well-ventilated room with 12:12 hour light/dark cycle in polypropylene cages. The animals were fed with standard animal food and water was given *ad libitum*.

Acute toxicity study

The acute toxicity ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) was determined as per the OECD guideline no. 423 (Acute Toxic Class Method). It was observed that the test extract was not produced mortality and morbidity even at 2000mg/kg dose. Hence, 1/8th (250mg/kg) and 1/4th (500mg/kg) of this dose were selected for further study (OECD, 2002).

Induction of hyperlipidemia

The hyperlipidemia was induced by giving high fat diet to the rats. Initially, rats were fed with standard animal feed. Later, isoenergic high fat induced diet is consisting of 30% calories from animal fat (210kcal/100gm/day) was prepared and necessary vitamins and minerals are added. For fatty diet; the animal food pellets, in powder form, was mixed with added 30% melted animal abdominal fat until become homogenous in a dough-like consistency. This dough was shaped. Obtained pellet blocks were dried and used for feeding (Zuhal, 2005).

Experimental design

The hypolipidemic activity was evaluated by using the high fat diet induced hyperlipidemia model described by Zuhal Altunkaynak (2005). Rats were divided into five groups, each consisting of six rats and were subjected to the following treatments.

- **Group-I:** Served as normal control.
- **Group-II:** Served as untreated group (high fat fed).
- **Group-III:** Served as treated group; which has high fat diet induced hyperlipidemia and were received ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) dissolved in DMSO (Di-methyl sulphoxide), at the dose of 250mg/kg, p.o.
- **Group-IV:** Served as treated group; which has high fat diet induced hyperlipidemia and were received ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) dissolved in DMSO (Di-methyl sulphoxide), at the dose of 500mg/kg, p.o.
- **Group-V:** Served as treated group; which has high fat diet induced hyperlipidemia and were received standard drug Atorvastatin at a dose of 100mg/kg, p.o.

The extracts (250 and 500mg/kg) and the standard drug were given orally to rats of the respective groups (III, IV and V) two times at an interval of 12 hours. Prior to treatment the hyperlipidemia was induced by providing high fat diet daily in the place of normal food for 7 days to the four groups (II, III, IV and V). Group-I was given normal diet. Then the treatment was given for 15 days. On 15th day, blood was collected by retero orbital sinus puncture, under mild ether anaesthesia after 8hrs fasting and serum was separated by centrifugation at 3000rpm for 15min and analysed for biochemical parameters.

Biochemical estimation

The biochemical parameters like triglycerides (TG), low density lipids (LDL), high density lipids (HDL), total cholesterol (TC) as well as LDL/HDL ratio were estimated using auto analyser on 15th day.

Statistical analysis

The data were expressed as mean ± standard error mean (S.E.M.). The significance of differences among the group was assessed using one way and multiple way analysis of variance (ANOVA). The test followed by Turkey-Kramer multiple comparison tests, the p values less than 0.05 were considered as significance.

RESULTS AND DISCUSSION

Hyperlipidemia is associated with heart disease, which is the leading cause of death in the world. The currently used hyperlipidemic drugs lag behind the desired properties such as efficacy and safety on long term use, cost and simplicity of administration. These

factors fulfill conditions for patient complication. Herbs are mines of medicinal agents and needs for researchers are felt to find efficacious, cheap and safe hyperlipidemic agents from among the natural products (Ram, 1996).

The rats fed with high fat diet for seven days exhibited significant increase in TC, TG, LDL and significant decrease in HDL, LDL-HDL ratio as compared to normal animals. Rats were treated with atorvastatin (100mg/kg) shown significant decrease in elevated TC, TG, LDL with significant increase in HDL ($p<0.05$) as compared to high fat diet control. Whereas rats treated with ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) (EEAA) (250 and 500mg/kg) shown significant decrease in elevated TC, TG and LDL with significant increase in HDL ($p<0.05$) as compared to high fat diet control.

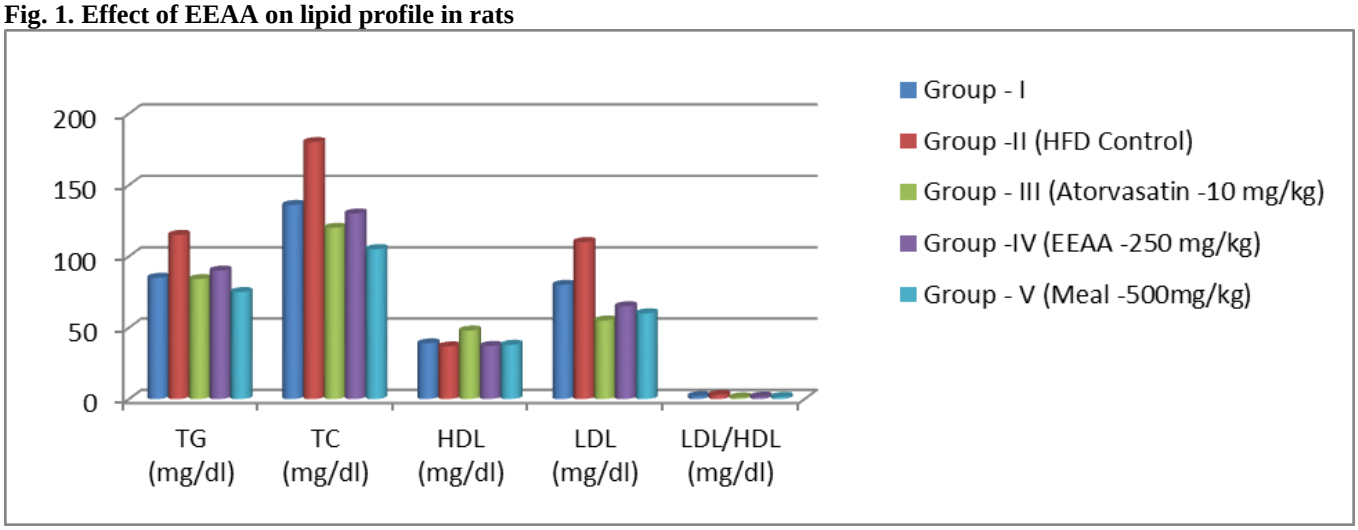
The effect of ethanol extract of *Albizia amara* (Roxb.) Boiv. (Fabaceae) (EEAA) on hyperlipidemia of rats were represented in table no. 1.

Table 1. Effect of EEAA on lipid profile of rats

Groups (n=6)	Biochemical Parameters				
	TG (mg/dl)	TC (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	LDL/HDL
Group-I (Normal control)	85±0.71***	136±0.62***	39±0.24***	80±0.83***	2.05±0.31***
Group-II (HFD control)	115±2.25	180.5±4.7	36.9±3.29	110±4.86	2.98±1.53
Group-III (Atorvastatin)	84±0.63***	120±0.41***	48±0.46***	55±0.91***	1.14±0.26***
Group-IV (EEAA-250mg)	90±0.27***	130±0.58***	37.2±0.89***	65±0.49***	1.74±0.18***
Group-V (EEAA-500mg)	75±0.67***	105±0.54***	38±1.61***	60±0.48***	1.57±0.72***

Values are represented as mean ± SEM of 6 rats in each group.
*** $p<0.001$, as compared to HFD control group.

Fig. 1. Effect of EEAA on lipid profile in rats



CONCLUSION

In conclusion, it can be said that the ethanol extract of the bark of *Albizia amara* (Roxb.) Boiv. (Fabaceae) exhibited a significant hypolipidemic effect at the doses of 250 and 500mg/kg body weights. Efforts should be made to isolate and characterize the active principle, which is responsible for the hypolipidemic efficacy of this valuable medicinal plant and further studies are required to establish the efficacy of the bark of *Albizia amara* (Roxb.) Boiv. (Fabaceae) as a hypolipidemic drug.

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