

Hypolipidemic Effect of Ethanolic Seeds Extract of *Baccaurea ramiflora* in Wister Albino Rats

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Abstract— *Baccaurea ramiflora* is an evergreen medicinal plant which is also known as Burmese grape. In rural and remote areas in Bangladesh as well as other south Asian countries, it is commonly used as a rich nutritional source of vitamin C. Hyperlipidemia is a condition which is characterized by elevated levels of serum lipid profile which is a major risk factor for cardiovascular diseases and diabetes. The aim of the current study was to evaluate the therapeutic effect of oral administration of ethanolic seed extract of *B. ramiflora* on serum lipid profile in Wister albino rats. Effect of alcoholic seed extract of *B. ramiflora* on lipid profile was conducted. Thirty albino rats were divided into six groups of 5 rats each. Among thirty rats, twenty five rats were given high cholesterol diet for six weeks to increase body weight. Group I was normal control, group II hyperlipidemic control, groups III, IV, and V were hyperlipidemic rats orally administered with 150 mg/kg, 250 mg/kg, and 500 mg/kg of ethanolic seed extract of *B. ramiflora*, respectively, for 4 weeks, and group VI were hyperlipidemic rats orally administered with 10 mg/kg of Rosuvastatin for 4 weeks. Significant ($P < 0.05$) increase in the serum Total Cholesterol, Triglycerides, and LDL-cholesterol were observed in groups II, III, IV, V, and VI when compared with that of the group I. Significant ($P < 0.05$) decrease in mean serum Triglyceride, total cholesterol and LDL-cholesterol levels were found in rats orally administered with 500 mg/kg of ethanolic seed extract of *B. ramiflora* and those orally administered with 10 mg/kg of rosuvastatin when compared with test control group. From the study, it could be suggested that ethanolic seed extract of *B. ramiflora* at 500 mg/kg can be used as antihyperlipidemic agent against dietary-induced hyperlipidemia.

I. INTRODUCTION

Hyperlipidemia is a disorder of lipid which is characterized by elevated levels of one or more plasma lipids like cholesterol, phospholipids, LDL cholesterol, VLDL cholesterol, and free fatty acids, as well as by decreased levels of HDL cholesterol^{1,2}. Ethnic group, genetic predisposition, sedentary lifestyle, diabetes, high alcohol consumption and oxidative stress are some key factors which induce the prevalence of hyperlipidemia^{3,4}. It is a major risk factor which contributes to the development as well as progression of cardiac complications like atherosclerosis, angina pectoris, Coronary artery disease, strokes and heart attack³. For treating hyperlipidemia a number of therapeutic medications are used including statins, nicotinic acid derivatives, fibrates, bile acid binding resins and cholesterol absorption inhibitors^{2,5}. But those therapeutic agents may cause adverse effects like hepatotoxicity, hyperuricemia and myositis⁶.

In recent years, there has been a rapid interest in the use of traditional medicines globally including different plant parts like seeds, berries, leaves, roots, barks or flowers for development of new drug candidates which will be used to serve therapeutic purposes⁷. In recent years, medicinal plants with hypolipidemic or antihyperlipidemic properties have studied due to their therapeutic potential in the effective management of cardiovascular health. Acquired scientific knowledge on the medicinal plants can be used in the development of novel lipid-lowering therapeutics as well as nutraceuticals/functional foods⁸.

Baccaurea ramiflora (*B. ramiflora*) also known as Burmese grape; a member of Euphorbiaceae family, is an evergreen tree which is found throughout Asia, most

commonly cultivated in south Asian countries like Bangladesh, India as well as Malaysia. Due to its enriched vitamins and minerals, the fruits of *B. ramiflora* are one of the valuable nutritional sources among the south Asian people and the woods of the tree are used in furniture manufacturing because of its durability⁹. According to traditional Chinese Dai medicine, the plant possess anti-inflammatory properties and can be used as anodyne against several diseases like rheumatoid arthritis, cellulitis, and abscesses to treat injuries. The fruit juice of *B. ramiflora* has the efficacy to treat constipation¹⁰. Hence, the aim of the current study was to evaluate the antihyperlipidemic properties of alcoholic extract of seed of *B. ramiflora* on albino wistar rats.

II. MATERIALS & METHODS

A. Plant Material

B. ramiflora seeds were collected from Botanical garden of Jahangirnagar University (Bangladesh). Plant authentication was confirmed by Dr. Khairul Kabir, from the laboratory of plant physiology, department of Botany, Jahangirnagar University. A voucher specimen was deposited at the central herbarium of this University (reference number: JU 15.318). Seeds were cleaned, air dried and ground, and the particles obtained were sieved to obtain a homogeneous powder.

B. Extraction

At first the seeds of *B. ramiflora* were sun-dried and then dried in an oven at reduced temperature ($< 700^{\circ}$ C) to make the item suitable for grinding. Later the fine powdered plant seeds were submerged in sufficient volume of ethanol & methanol in an air-tight flat bottomed container for a week, with occasional shaking and stirring. The seed extracts were then filtered and dried on electrical water bath.



Fig. 1. *Baccaurea ramiflora* tree with fruits

C. Experimental Animals

Thirty male and female albino rats weighing between 90 g and 130 g were obtained from the animal house of laboratory of Pharmacological science, Jahangirnagar University. The rats were housed in cages in a well-ventilated room at room temperature under standard condition ($24 \pm 1^\circ\text{C}$, $50 \pm 5\%$ humidity and a 12-h light: 12-h dark cycle) and also maintained free access to water and standard diet throughout the period of the experiment. They were fed with standard vital feed diet (growers pelletized manufactured by Promi cereals Ltd, Bangladesh). The animal care and all experimental methods were performed according to the principles of animal care in the laboratory.¹¹

D. Preparation of Cholesterol Enriched Diet

High Cholesterol diet was formulated according to the model described by Hossam and Arafa¹². In 1 liter of coconut oil, 100 gm Cholesterol and 50 g cholic acid as well as supplementation of egg yolk were properly mixed with the grower mash feed.

E. Experimental Animal Model

For 6 weeks a high cholesterol diet was given in daily basis to twenty-five albino rats with during which time remarkable increase in weight (i.e., sign of obesity) was observed. Standard vital feed diet (growers pelletized manufactured by Promi cereals Ltd, Bangladesh) was provided to rest five rat and they served as the normal control group in the experiment. The former twenty five rats were then divided into five equal groups consisting of five rats each.

- Group I: Normal control group (Only vehicle was administered)
- Group II: Hypercholesterolemic control group (no Plant extract was administered)
- Group III: Orally administered with 150 mg/kg ethanolic seed extract of *B. ramiflora* daily for 4 weeks
- Group IV: Orally administered with 250 mg/kg ethanolic seed extract of *B. ramiflora* daily for 4 weeks
- Group V: Orally administered with 500 mg/kg aqueous leaf extract of *B. ramiflora* daily for 4 weeks

- Group VI: Orally administered with 10 mg/kg rosuvastatin daily for 4 weeks.

Animals in all the groups were anesthetized by with diethyl ether and sacrificed 24 hours after the last treatment. Blood samples of the sacrificed animals were collected for further analysis of serum lipid profile total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), and low density lipoprotein (LDL).

F. Statistical Analysis

All the obtained results were expressed as mean \pm SEM and analyzed using one-way analysis of variance (ANOVA) using the Statistical Package for Social Sciences (SPSS) version 20. P value of 0.05 or less was considered to be significant.

III. RESULT AND DISCUSSION

Effect of alcoholic seed extract of *B. ramiflora* on body weight gain of hyperlipidemic rats after 4 weeks of oral administration are represented in Figure 2. No significant difference was observed between the weights of all the different groups before the induction of hypercholesterolemia. Significant increase ($P < 0.05$) in weight was observed followed by hypercholesterolemic induction in all the groups except normal control group. The results after treatment with 150 mg/kg (group III), 250 mg/kg (group IV), and 500 mg/kg (group V) *B. ramiflora* as well as 10 mg/kg rosuvastatin (group VI) were compared with hyperlipidemic control group, and no significant difference ($P < 0.05$) was detected.

Results of the effect of ethanolic seed extract of *B. ramiflora* on lipid profile (HDL-Cholesterol, LDL-Cholesterol, Total Cholesterol, and Triglyceride) of hyperlipidemic rats after 4 weeks of the treatment are shown in Table I. Significant escalation ($P < 0.05$) in serum Tri glyceride, LDL-Cholesterol, as well as Total Cholesterol was observed in hypercholesterolemic control group (group II) when compared with the normal control (group I). Significant reduction ($P < 0.05$) in serum Total Cholesterol level and LDL-cholesterol level were observed in rats orally administered with alcoholic seed extract of *B. ramiflora* in a dose-dependent pattern (500 mg/kg $>$ 250 mg/kg $>$ 150 mg/kg) when compared with hypercholesterolemic control group. There was also a significant decrease in serum Triglyceride in group V (500 mg/kg alcoholic seed extract of *B. ramiflora*) and group VI (10 mg/kg dose of rosuvastatin) rats when compared with test control group. From the results [Figure 2], no significant difference ($P < 0.05$) was observed in serum HDL-cholesterol level between hypercholesterolemic control and alcoholic seed extract of *B. ramiflora* treated rats. The antihyperlipidemic effect was dose-dependent. All the groups showed significant elevated level ($P < 0.05$) in Total Cholesterol, LDL-Cholesterol, and Triglyceride when compared with normal control group (in group I) and no significant difference ($P < 0.05$) was found in HDL-Cholesterol level. 500 mg/kg ethanolic seed extract of *B. ramiflora* -treated rats (group V) as well as 10 mg/kg rosuvastatin-treated rats (group VI) showed significant decrease ($P < 0.05$) in Total Cholesterol, LDL cholesterol, and

Tri-glyceride and produced insignificant increase ($P < 0.05$) in HDL-Cholesterol level (good cholesterol) when compared with hyperlipidemic control rats (group II).

constituents derived from *B. ramiflora* seeds extract in lowering lipid profile among hyperlipidemic patients.

ACKNOWLEDGEMENT

The authors wish to thank Prof. Dr. Hossain, department of Botany for identifying the plant material.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest

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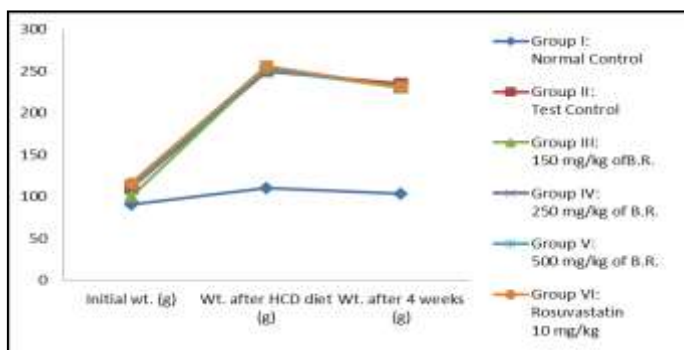


Fig. 2. Effect of ethanolic seed extract of *B. ramiflora* on rats body weight

TABLE I. The effect of ethanolic extract of *B. ramiflora* seeds extracts on lipid profile of Wistar albino rats

Groups	TC	TG	HDL-C	LDL-C
Group I	145±5.61	150±5.23	28±3.46	100±5.81
Group II	260±4.54*	270±12.45*	25±8.35*	210±9.42*
Group III	250±17.45*#	260±8.57*#	23±1.42*#	200±5.31*#
Group IV	230±15.25*#	245±6.45*#	15±6.46*#	188±9.23*#
Group V	160±14.93*#	155±5.5*#	20±2.33*#	125±4.56*#
Group VI	140±8.5*#	135±6.38*#	25±1.35*#	110±3.43*#

* Significantly different from control group.

*# significantly different from positive control group.

IV. CONCLUSION

Ethanolic seed extract of *B. ramiflora* at 500 mg/kg could exert potential antihyperlipidemic effect against dietary induced hyperlipidemia. Several reports suggest that the antihyperlipidemic potential of the plant seeds could be attributed to some phytochemical contents like phenolic content of the plant. Additional in vivo studies and clinical trials would be needed to evaluate the potential use of isolated