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Effects of ethanolic extract of *Rauwolfia vomitoria* root bark on serum lipid profile in Wistar rats

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ABSTRACT: The quest for save herbal remedy for the management of cardiovascular diseases prompted this investigation and it is aimed at determining the effect of ethanolic extract of *Rauwolfia vomitoria* root bark on serum lipid profile - a risk factor in the development coronary artery disease (CAD). Twenty four adult Wistar rats of both sexes were randomly selected into four groups. Group I was given normal saline ad libitum while groups II and III were given 500mg/kg body weight and 1000mg/kg body weight of the extract respectively once daily for three weeks after which the serum lipid profile was determined using diagnostic kits. The result showed a significant reduction ($p < 0.05$) in weights of the treated animals when compared with the control. The extract at 500mg/kg and 1000mg/kg body weight produced a significant reduction ($P < 0.05$) in serum Triglycerides (TRG), total Cholesterol (CHL) and Low-Density Lipoprotein (LDL) while High-Density Lipoprotein (HDL) was significantly increased. The dose dependent effects of the extract on serum lipid profile is very crucial, at it may reduce the risk of developing CAD. However, users should be advised against excessive application because of the attendant weight reduction effect.

Key words: High-Density Lipoprotein, *Rauwolfia vomitoria*, Triglycerides, Cholesterol, Serum, Cardiovascular diseases.

Introduction

Herbal therapies have taken the central role in the management of debilitating diseases in recent times in many parts of the world especially Africa. Several plant extracts have been employed in the management of cardiovascular and cerebrovascular diseases [1, 2] of which plasma lipid profile form part of risk factors. Among such herbal remedies is the extract of *Rauwolfia vomitoria* (genus: apocyanaceae) which holds its unique position of being a source of therapeutically active alkaloids as far back as sixteenth century. About 200 alkaloids have so far been reported from *Rauwolfia* species [3]; alkaloids of pharmacological interests include ajmaline and ajmalicine [4] while reserpine which is another alkaloid has been known to be its active principle [4]. Reserpine has been isolated from certain species of *Rauwolfia* family, usually *Rauwolfia serpentina* and *Rauwolfia vomitoria* and can also be synthesized [5].

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Extracts from *Rauwolfia vomitoria* has profound traditional applications, it has been used as tranquilizer and as an antihypertensive agents [6], the anti-hypertensive actions of reserpine has been reported to be through its ability to deplete catecholamines store from peripheral sympathetic nerve endings [7]. The leaf extract has also been found to be antipyretic [8]. *Rauwolfia vomitoria* has been associated with CNS depression [9], reduce neurobehavioural activity and distort the cytoarchitecture of the cerebellum [10]. The leaf and root extract of *Rauwolfia vomitoria* have been reported to have untoward effects (safe) on kidney and liver functions in rats [11]. The aim of this study therefore is to evaluate the effects of the graded doses of the extract of *Rauwolfia vomitoria* on plasma lipid profile being one of the risk factors in the development of cardiovascular diseases.

Materials and Methods

Plant extraction

The root bark of *Rauwolfia vomitoria* was cut into pieces, oven-dried at 40 °C to a constant weight. The dried pieces were then pulverized using an electric blender (Blender/Miller III, model MS-223, Taiwan, China) and the powder obtained was stocked in a plastic container from which varying amounts were taken and extracted in ethanol (analytical grade) for 72 h at room temperature (26 °C–28 °C). This was then filtered using filter paper (Whatman No. 1). The filtrate was then concentrated in steam bath and the resulting brownish yellow residue was reconstituted in distilled water to give the equivalent of 500 and 1000mg/kg body weight. The reconstituted ethanolic extract were then administered orally using oral canula to all animals in the test groups.

Animals

Adult Wistar rats of both sexes weighing 120-160g were used in the study. All animals were kept in the preclinical animal house of Ladoke Akintola University of Technology, Ogbomoso. They were maintained at the temperature of 23±2°C and 12hr light/dark cycle. All the experimental procedures were done following the experimental guidelines of Institutional Animal Ethics Committee (IAEC).

Experimental protocol

Three groups with 8 rats in each group were formed. Animals in group I (control group) were allowed access to normal saline while animals in group II and III (treatment groups) were administered with 500 and 1000mg/kg body weight /p.o of extract daily for four weeks.

Sample collection

Blood samples were collected under the deep ether anesthesia by heart puncture with sterile disposable syringe at the end of 4 weeks. Lipid profile was estimated in the in the samples, consisting of triglycerides (TRG), total cholesterol (tCHL), high-density lipoprotein (HDL) and low-density lipoprotein (LDL).

Biological assay

The serum was analyzed for total cholesterol[12], triglycerides(TRG)[13], high- density Lipoproteins (HDL)[14] and low- density lipoproteins (LDL)[15] by using “Diagnostic kit Syntropic: UV-VIS Spectrophotometer 117.

Statistical analysis

Student t-test was used to analyse the data [16]. The difference of the means were considered significant at $P<0.05$

Results

The root bark extract of *Rauwolfia vomitoria* caused a notable weight reduction in the treatment groups especially at the 4th week as can be seen in Table 1.

Table 1 Effects of ethanolic extract of *Rauwolfia vomitoria* on weights of animals.

Groups	Week 1	Week 2	Week 3	Week 4
Control	125±0.1	126.5±0.2	127.5±0.1	128.3±0.3
500mg/kg	122±0.1*	121±0.1*	120±0.1*	117.8±0.1*
1000mg/kg	119±0.3*	118±0.2*	115.5±0.1*	113.2±0.1*

Values are expressed as Mean ± S.E.M *P<0.05 N=8

The administration 500mg/kg and 1000mg/kg body weight of *Rauwolfia vomitoria* extract for 28 days significantly (P<0.05) lower the serum concentration of triglycerides (TRG), total cholesterol (tCHL) and low-density lipoprotein (LDL) when compared with the control while the extract at these doses significantly (P<0.05) increase the serum concentration of high-density lipoprotein as depicted in Table 2.

Table 2 The effect of administration of ethanolic extract of *Rauwolfia vomitoria* at 500 and 1000mg/kg body weight for 4 weeks on serum lipid profile.

Groups	TRG(mg/dl)	HDL(mg/dl)	tCHL(mg/dl)	LDL(mg/dl)
Control	124±0.05	54.4±0.03	76.6±0.05	45.1±0.05
500mg/kg	101.8±0.04*	60±0.02*	70.3±0.03*	36.7±0.02
1000mg/kg	90.2±0.03*	75.3±0.01*	60.5±0.04*	25.3±0.03

Values are expressed as Mean ± S.E.M *P<0.05 N=8

Discussion

Oral administration of ethanolic extract of *Rauwolfia vomitoria* to Wistar rats at the doses of 500mg/kg and 1000mg/kg body weight significantly decrease the weight of the animals during the four weeks of exposure. This result which is a peculiar characteristic of the extract is consistent with the report of earlier researchers [17, 18].

In this study, the extract caused a significant dose dependent reduction in serum concentration of triglycerides, total cholesterol and low-density lipoprotein while it also caused a significant increase in serum concentration of high-density lipoprotein. It is well known that hyperlipidemia is one of the major risk factors for atherosclerosis. An increase in the concentration of lipids results in liberation of lysosomes and triggers cell degeneration. Major component of total cholesterol is LDL which is directly related to CAD. It is recognized as major arterogenic lipoprotein and primary target of lipid lowering therapy [19]. The serum LDL was lower in the extract treated group as compared to the control. HDL has protective role in CAD, it has been shown to reduce the endothelial incorporation of lysophosphatidylcholine (Lyso-PC) [20]. The HDL level was significantly raised in a dose dependent fashion in the treated group as compared to the control group. High level of total CHL and TRG have also been reported to be important risk factor in hypertension [21] and both were significantly lower in the treated group as compared with the control.

It has been reported that reserpine which is the active principle of *Rauwolfia vomitoria* has antihypertensive property by reducing the catecholamine store in the peripheral nerve endings [7]. This study further strengthens the

antihypertensive claims of this plant extract but by a different mechanism – modifying the serum lipid profile. The extract can be seen to have beneficial effects on the cardiovascular system however application of this extract should be done with caution because of the weight loss associated with its use.

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