Comparative Analyses on the Effects of Ethanol Leaf-Extracts of *Vernonia amygdalina* and *Azadirachta indica* on Lipid Profile in Albino Rats

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**Abstract:** The comparative analyses on the effects of ethanol leaf-extracts of *Vernonia amygdalina* and *Azadirachta indica* on lipid profile were conducted using albino rats. The albino rats were grouped into seven groups (A, B, C, D, E, F and G) containing ten rats per group. Groups A, B and C were administered *Vernonia amygdalina* extract by oral intubation at the doses of 200, 400 and 600 mg/kg body weights respectively for two weeks with corresponding doses of the extract of *Azadirachta indica* administered to groups D, E and F. Animals in group G served as the control. The serum levels (mg/dl) of total cholesterol, LDL-cholesterol, HDL-cholesterol and triacylglycerol were studied spectrophotometrically. Total cholesterol, triacylglycerol and LDL-cholesterol levels were significantly ($p<0.05$) reduced by both extracts while HDL-cholesterol levels were increased significantly. There were dose-dependent reductions in the body weights of all the animals that received the extracts. The results showed that the leaf-extract of *Vernonia amygdalina* was more effective as a cardioprotective agent than that of *Azadirachta indica*.

**Key words:** Ethanol leaf-extracts • *Vernonia amygdalina* • *Azadirachta indica* • Lipid profile and albino rats

**INTRODUCTION**

Medicinal plants are part and parcel of human society to combat diseases. *Azadirachta indica* (Neem) and *Vernonia amygdalina* (Bitter leaf) are well known as versatile medicinal plants having a wide spectrum of biological activities both nutritionally and pharmacologically. Neem is an evergreen tree, cultivated in various parts of the world. Every part of the tree has been used as traditional medicine for house hold remedy against various human ailments from antiquity [1]. Neem has been extensively used in ayurveda and homoeopathic medicine and has become a cynosure of modern medicine. The importance of the neem tree has been recognized by the US National Academy of Sciences which published a report in 1992 entitled “Neem - a tree for solving global problems”. The advancement of neem research has been documented [2].

Crude extracts of different parts of neem have been used as traditional medicine for the treatment of various diseases. Neem bark, leaf, root, flower and fruit, together cure blood morbidity, biliary afflictions, itching, skin ulcers, burning sensations and phthisis [3]. Apart from these common uses, there are several reports on the biological activities of neem and bitter leaf based on modern scientific investigations.

The chloroform extract of neem stem bark is effective against Carrageenan - induced paw edema in rat and mouse ear inflammation. A methanol extract of the leaves exerts antipyretic effect in male rabbits [4]. The aqueous extract of the leaves also possesses potent immunostimulant activity as evidenced by both humoural and cell - mediated responses [5]. The hypoglycemic effect of neem was observed with leaf extract and seed oil in normal as well as alloxan - induced diabetic rabbits [6]. Aqueous leaf extract from *Vernonia amygdalina* induces blood sugar lowering effect in rabbits and rats [7,8]. An active fraction from hexane extract of neem seed has been found to completely abrogate pregnancy in rodents when given orally up to a concentration of 10% with no apparent side effect [9]. Neem seed and leaf extracts are effective against malarial parasites. Components of the
alcoholic extracts of leaves and seeds are effective against both chloroquine-resistant and sensitive strains of malaria parasite [10]. Aqueous leaf extract from *Vernonia amygdalina* also elicited an enhanced antimalarial effect of chloroquine in mice infected with chloroquine resistant and sensitive *Plasmodium berghei* strains [11]. An aqueous extract of *Vernonia amygdalina* demonstrated a measles virucidal property [12].

The lipid profile measures total cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), very low density lipoprotein (VLDL) and triacylglycerol levels to assess the risk of cardiovascular disease [13]. Cholesterol is the major sterol in animal tissues and its amphipatic nature enables it to occur in cell membranes [14]. It is abundant in the brain, liver, adrenal glands and nervous system. Dietary cholesterol is obtained from animal products. The liver produces sufficient cholesterol in the absence of enough dietary cholesterol for all normal body functions [15].

It is carried in the blood in the form of lipoprotein [16]. Cholesterol and triacylglycerol are transported in the body in combination with protein to form lipoproteins. High-density lipoprotein is also called “good” or healthy lipoprotein. It helps to clear cholesterol deposits in the blood vessels left by another blood component called LDL [17]. The LDL contains mainly cholesterol and when the amount of cholesterol exceeds the amount metabolized by the body, the excess fat floats around in the blood stream and attaches itself to the inner wall of blood vessels to form plaques or a block known as arteriosclerosis. As LDL-cholesterol initiates the formation of plaque, it is known as “bad” cholesterol [18].

This work was aimed at investigating the comparative effects of ethanol leaf-extracts of *Vernonia amygdalina* and *Azadirachta indica* on serum liver enzymes and lipid profile in albino rats.

**MATERIALS AND METHODS**

Fresh leaves of *Vernonia amygdalina* and *Azadirachta indica* were collected from Abakaliki in Ebonyi State, Nigeria. Seventy male albino rats were obtained from University of Nigeria, Nsukka. All the chemicals and reagents used were of analytical standard.

**Methods**

**Extraction of the Plant Material:** About 900g of dried and ground *Vernonia amygdalina* and *Azadirachta indica* leaves were each soaked into 1700ml of ethanol for 24 hours. The solution of the extract was gotten after several squeezing and filtrations into a graduated beaker and allowed to dry under mild sunlight until a semi-solid extract was gotten.

**Administration of Plant Extract:** Extracts of *Azadirachta indica* at 200, 400 and 600 mg/kg of body weights were administered for two weeks to animals in groups A, B and C respectively, with corresponding concentrations of *Vernonia amygdalina* extract given to animals in groups D, E and F through oral intubation while those in group G served as the control.

**Blood Sample Collection:** The blood samples were collected on the fifteenth day following the last day of administration through heart puncture into labeled sterile specimen containers.

**Lipid Profile Assay:** Total Cholesterol, Triacylglycerol, HDL- Cholesterol and LDL -cholesterol assays were done by the methods of [2,4,8,10] respectively.

**Data Analysis:** All the tested parameters were subjected to statistical analysis using t-test. Differences between means were regarded significant at \( p < 0.05 \) [12].

**RESULTS AND DISCUSSION**

There was a general decrease in physical activities of the animals treated with organic extract. This observation could be as a result of an upset in the body metabolism of the animals treated with the extract due to some chemical components of the extract [19]. Okafor [20], observed that an ethanol extract of *Ocimum basilicum* decreased the physical activities of the animals.

The extracts from both *Azadirachta indica* and *Vernonia amygdalina* leaves decreased the serum total cholesterol and LDL-cholesterol levels significantly. Crude saponin extract of *Vernonia amygdalina* leaves reduced serum cholesterol levels in albino rats [19]. Datta [6], discovered that ethanol extract of *Nigella sativa* in ten days decreased the cholesterol levels of the animals. Okafor [20] showed that an extract from *Oryza sativa* decreased cholesterol and LDL levels significantly. The decrease could be that the extract inhibits sodium ion efflux leading to higher Na⁺-Ca²⁺ antiporter which prevents the accumulation of Ca²⁺ which could have chellated with cholesterol to form plaques [21]. Triacylglycerol levels were also decreased. HDL-cholesterol concentrations were significantly \( p < 0.05 \) elevated by both extracts dose-dependently. HDL was raised higher than...
Fig. 1: Total cholesterol concentrations (mg/dl) in animals that were treated with extracts of Azadirachta indica and Vernonia amygdalina.

Fig. 2: LDL-cholesterol concentrations (mg/dl) in animals that were treated with extracts of Azadirachta indica and Vernonia amygdalina.

Fig. 3: HDL-cholesterol concentrations (mg/dl) in animals that were treated with extracts of Azadirachta indica and Vernonia amygdalina.

Fig. 4: Triacylglycerol concentrations (mg/dl) in animals that were treated with extracts of Azadirachta indica and Vernonia amygdalina.

LDL-cholesterol concentrations in rats fed with the extracts. This is due to the decrease in total cholesterol concentration in the animals administered with the extract [22, 23]. The results also showed that the average body weights (g) of the treated animals also decreased significantly. This could be because the extract delays stomach emptying leading to more slow absorption of food substance which results to loss of appetite and decrease in the weight [24-27] found out that both ethanol and ether extracts of fresh leaves of the African marine plant caused reduction in the average weights of guinea pigs treated with the extracts. The decrease in body weights may be linked to an observed reduction in feed and water intake [29,30].
Fig. 5: Percentage change in mean body weights of animals that received Azadirachta indica and Vernonia amygdalina extract.

CONCLUSION

These observations suggest that the ethanol leaf-extract of *Vernonia amygdalina* was more effective as a cardioprotective agent than that of *Azadirachta indica*, but high concentrations of these extracts could be toxic.

REFERENCES