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Anti-Dyslipidemic Effects of *Buchholzia Coriacea* Ethanol Seed-Extract on Alloxan-Induced Diabetic Albino Rats

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ABSTRACT

The management of diabetes is handled paying attention to other risk factors such as dyslipidemia. Therefore alternative medications that can reduce plasma glucose level as well as addressing dyslipidemia are sought. This study was aimed at investigating the anti-dyslipidemic effects of *Buchholzia coriacea* ethanol seed-extract in alloxan-induced diabetic albino rats. Fifty (50) albino rats were grouped into 5 (A-E), each group containing 10 albino rats. Diabetes was induced in rats in groups A-D through intra-peritoneal administration of alloxan at the dose of 100mg/kg body weight. Group E served as the normal control. Rats in groups A, B and C received *B. coriacea* ethanol seed extract at the doses of 100, 200 and 400 mg/kg body weight respectively daily for 14 days through oral intubation. The rats in group D were not treated and served as negative control. The lipid profile was measured at the end of the study using spectrophotometric methods. The results showed that the triacylglycerol (TG), total cholesterol (TC) and low density lipoprotein (LDL) concentrations decreased significantly ($p < 0.05$) while high density lipoprotein (HDL) concentration increased significantly ($p < 0.05$) in rats treated with 400mg/kg body weight of *B. coriacea* extract. The reductions in TG, TC and LDL, and increase in HDL were dose dependent. *B. coriacea* ethanol seed-extract at higher doses effectively improved lipid profile under diabetic condition in rats. *B. coriacea* ethanol seed-extract could serve as an effective medication for addressing dyslipidemia in diabetes.

Keywords: *Buchholzia coriacea*, Diabetes, Alloxan, Dyslipidemia and Albino Rats.

INTRODUCTION

The use of herbs to treat disease is very common in developing countries (Edgar *et al*, 2002)[1] and is often more affordable than purchasing expensive modern pharmaceuticals. The World Health Organization (WHO) estimates that 80 percent of the populations of some

Asian and African countries presently use herbal medicine for some aspect of primary health care. Studies in the United States and Europe have shown that their use is less common in clinical settings, but has become increasingly more common in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available. Many herbs have shown positive results *in vitro*; animal model or small-scale clinical tests [2] while studies on some herbal treatments have found negative results [3].

Buchholzia coriacea belongs to the family, Capparaceae and is widely distributed in several tropical countries. *B. coriacea* is commonly known as “wonderful kola” (Keay, 1989)[4]. The leaves and seeds are known scientifically to possess antihelmintic, antibacterial and hypoglycemic [5],[6],[7].

Several biochemical markers could serve as good indicators in monitoring and management of diabetes. Among the key parameters monitored is the lipid profile. Lipid profile is the collective term given to the estimation of fundamentally, total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and triacylglycerols. A derangement in any or all of the above lipid parameters leads to dyslipidemia. Insulin resistance is associated with elevated free fatty acid levels (Blucher *et al.*, 2001)[8], which leads to dyslipidemia commonly seen in diabetes. Dyslipidemia, as a risk factor of CVD, is manifested by elevation or lowering of plasma concentration of lipoproteins [9].

Though different types of oral hypoglycemic agents are available along with insulin for the treatment of diabetes, there is an increasing demand by patients to use herbal drugs even when their biologically active compounds are unknown, because of their effectiveness, fewer side effects and relative low cost (Ezeigbo, 2010)[10]. These have been the rationale behind the search for very effective and nearly encompassing therapy that will also address other risk factors in diabetes such as dyslipidemia.

MATERIALS AND METHOD

MATERIALS

The fresh fruits of *B. coriacea* were gotten from Ndibe, Afikpo North LGA in the month of August while the adult albino rats were gotten from Abakaliki, both in Ebonyi State, Nigeria

CHEMICALS/REAGENTS

The chemicals and reagents used were of analytical standard.

METHODS

EXTRACTION OF PLANT MATERIALS

The powdered plant material (800 g) was macerated in 1600ml of ethanol for 48 hours. The mixture was filtered with muslin cloth. The filtrate was concentrated by evaporation to dryness using a rotary evaporator.

ANIMAL GROUPING AND INDUCTION OF DIABETES

The animals were grouped into 5 (A-E), each group containing 10 albino rats. Groups A - D were injected alloxan 100mg/kg body weight via intra-peritoneal route to induce diabetes. Group E was given water and fed without restriction and served as the normal control.

ADMINISTRATION OF *BUCHHOLZIA CORIACEA* ETHANOL SEED-EXTRACT

The animals in groups A, B, and C received 100, 200 and 400mg/kg body weight of the extract respectively and group D received normal saline solution and served as negative control. The treatment was administered by oral intubation twice daily for 14 days.

COLLECTION OF BLOOD SAMPLES AND DETERMINATION OF LIPID PROFILE

The blood samples were collected by vein puncture technique. The lipid profile was measured using spectrophotometric methods.

STATISTICAL ANALYSIS

Data was expressed as mean $\pm$ Standard Deviation and subjected to one way analysis of variance (ANOVA) followed by Post-hoc LSD using SPSS.

RESULTS

The result in Figure 1 showed that the triacylglycerol levels in diabetic rats treated with *B. coriacea* ethanol seed extract decreased significantly ($p < 0.05$) in a dose dependent manner. The result in Figure 2 showed that total cholesterol levels in diabetic rats treated with *B. coriacea* ethanol seed-extract decreased significantly ($p < 0.05$) in a dose dependent fashion. The result in Figure 3 showed that low density lipoprotein levels in diabetic rats treated with *B. coriacea* ethanol seed-extract decreased significantly ($p < 0.05$) in a dose-dependent manner. The high density lipoprotein levels increased significantly ($p < 0.05$) in the diabetic rats treated with *B. coriacea* ethanol seed extract as shown in Figure 4. The increase in HDL was dose-dependent.

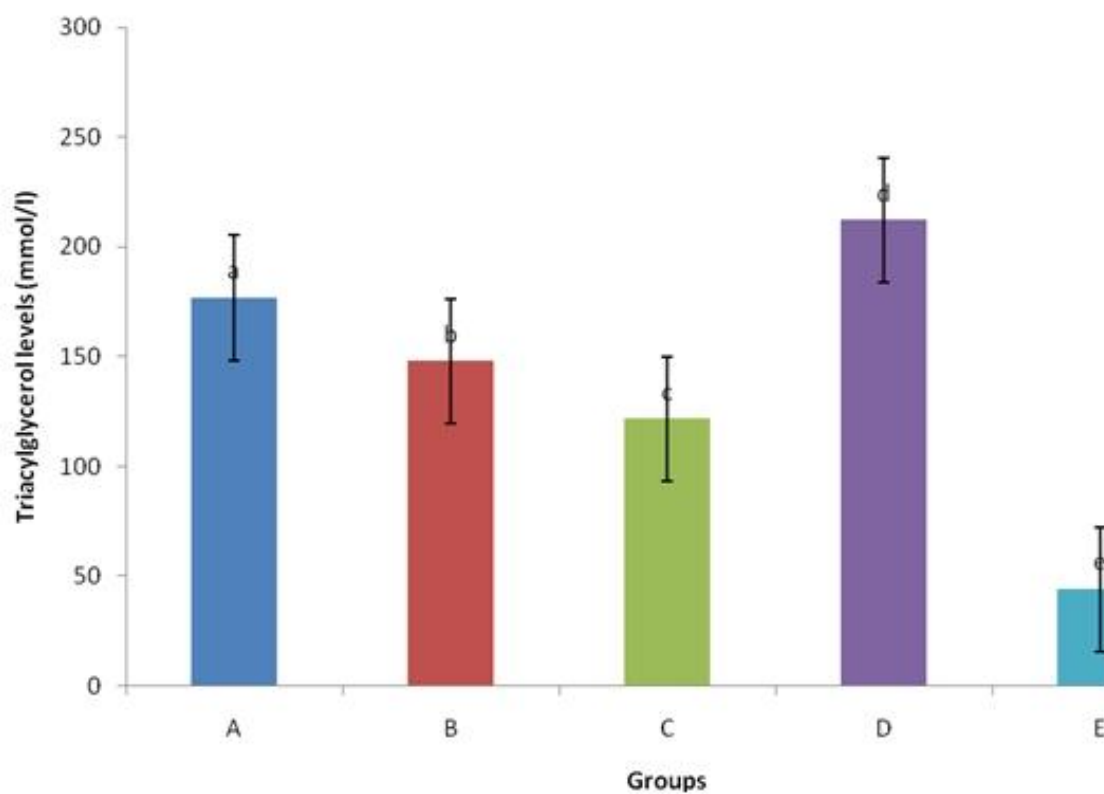


Figure 1: Triacylglycerol levels in alloxan-induced diabetic albino rats treated with *B. coriacea* ethanol seed-extract. Bars with different letters are significantly ($p < 0.05$) different

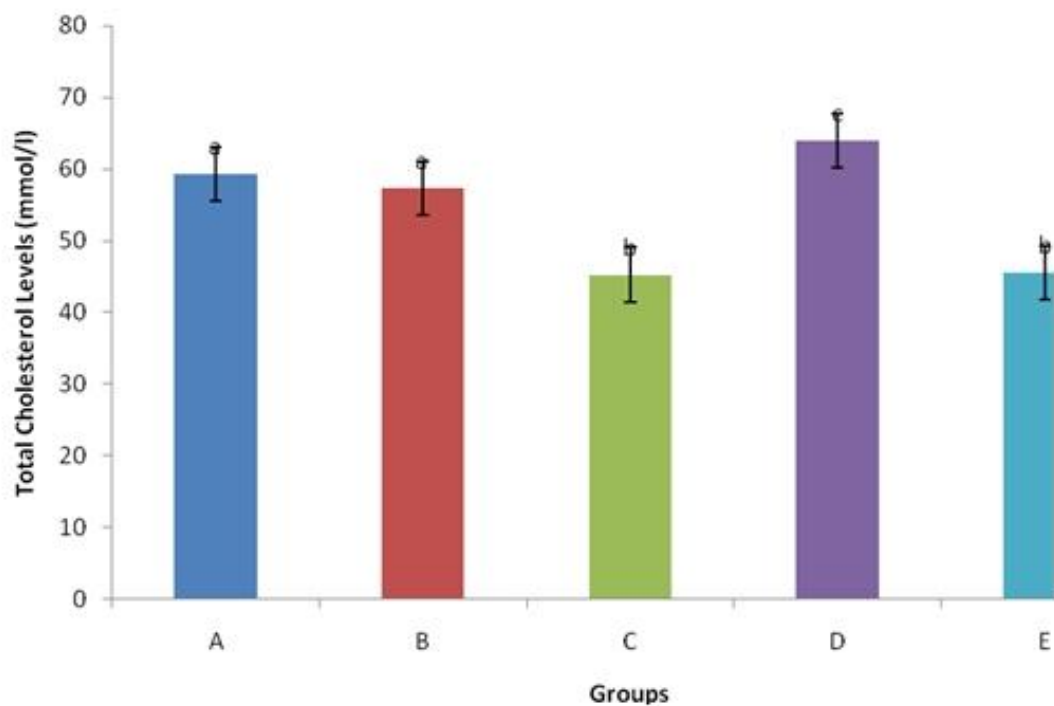


Figure 2: Total cholesterol levels in alloxan-induced diabetic albino rats treated with *B. coriacea* ethanol seed-extract. Bars with different letters are significantly ($p < 0.05$) different

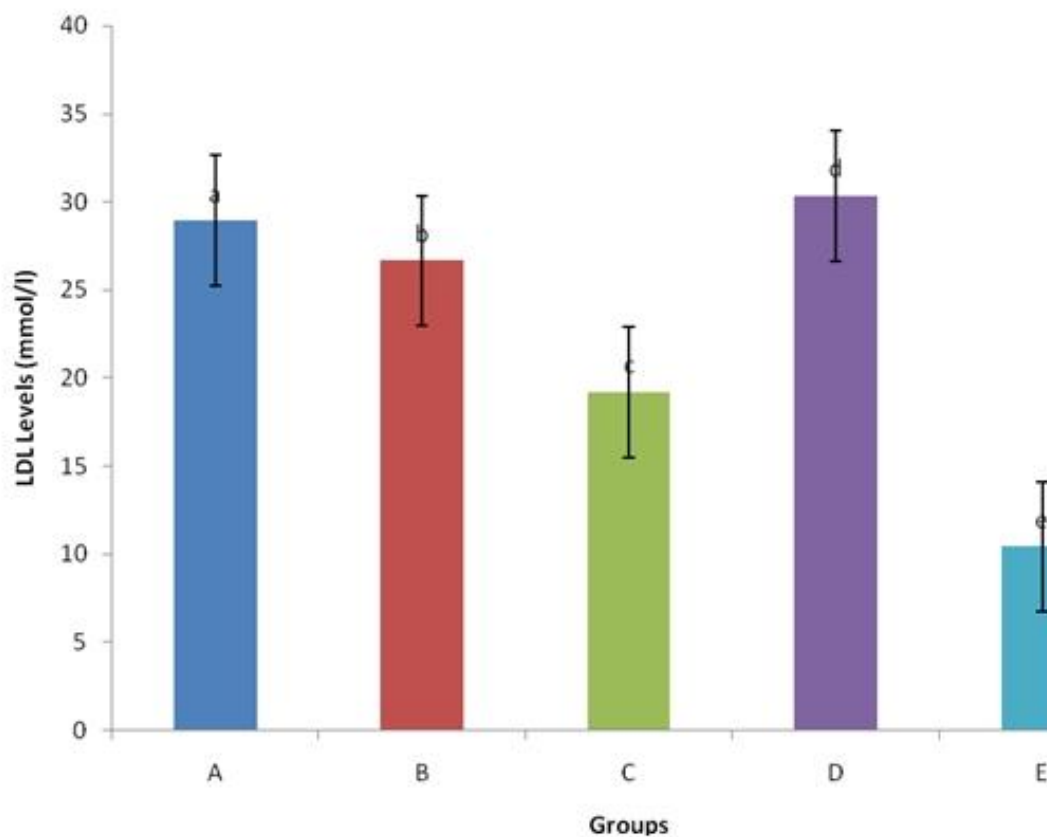


Figure 3: LDL Levels in alloxan-induced diabetic albino rats treated with *B. coriacea* ethanol seed-extract. Bars with different letters are significantly ($p < 0.05$) different

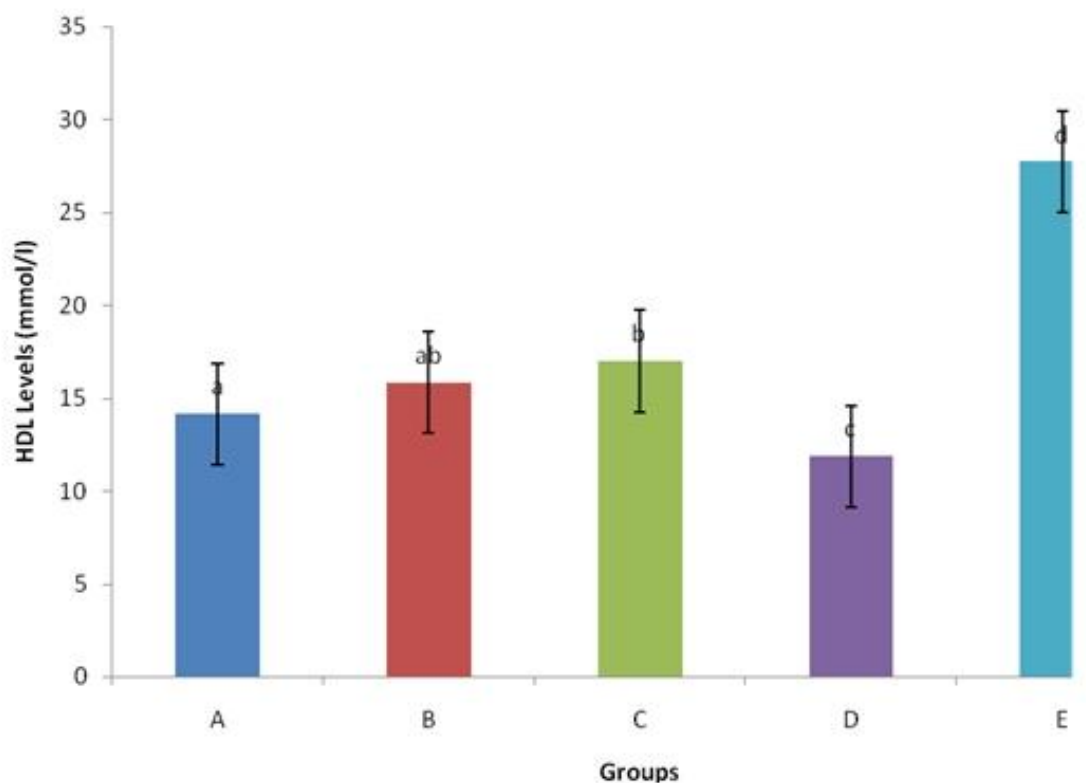


Figure 4: HDL Levels in alloxan-induced diabetic albino rats treated with *B. coriacea* ethanol seed-extract. Bars with different letters are significantly ($p < 0.05$) different

Key:

A-Group that received *B. coriacea* ethanol seed-extract at 100mg/kg body weight
B-Group that received *B. coriacea* ethanol seed-extract at 200mg/kg body weight
C-Group that received *B. coriacea* ethanol seed-extract at 400mg/kg body weight
D-Group that received alloxan without treatment
E-Normal control

DISCUSSION

The diabetic animals treated with *B. coriacea* seed-extract showed significant ($p < 0.05$) reductions in TG, TC, LDL and significant ($p < 0.05$) increase in HDL as shown in Figures 1, 2, 3 and 4. This showed an overall improvement in the lipid profile of the diabetic animals treated with *B. coriacea* seed-extract. Olaiya and Omolekan (2013)[11] reported the antihypercholesterolemic activity of *B. coriacea* ethanol seed-extract in treating hypercholesterolaemia and its attendant complications. Adisa *et al.* (2011)[7] reported a significant ($p < 0.05$) decrease in total cholesterol and triacylglycerol in streptozotocin-induced diabetic albino rats treated with both ethanol and butanol extracts of *B. coriacea* seeds. Lenka *et al.* (2016)[12] also reported significant ($p < 0.05$) reductions in total cholesterol, and triacylglycerol in alloxan-induced diabetic rats treated with aqueous seedextracts of *B. coriacea*. The observed antilipidemic effect of *B. coriacea* seed extract could be due to the presence of saponins which has been reported to have hypocholesterolic effect (Price *et al.*, 1987)[13]. The improvement in lipid parameters in diabetic animals implies that *B. coriacea* ethanol seed-extract can confer protection from microvascular and macrovascular complications of diabetes associated with dyslipidemia. Dyslipidemia is one of the secondary predictors of diabetes which if not checkmated, may lead to secondary complications of diabetes. Insulin resistance (one of the pathological defaults in diabetes) is associated with elevated free fatty acid levels (Bluher *et al.*, 2001)[8], which leads to dyslipidemia. Therefore an improvement in lipid profile will confer great health benefits in the management of diabetes mellitus.

In conclusion, both *B. Coriacea* ethanol seed-extract at higher doses effectively regressed dyslipidemia in diabetic albino rats; hence *B. coriacea* ethanol seed-extract could serve as an effective medication for addressing dyslipidemia in diabetes.

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