

EFFECT OF VARYING LEVELS OF *Vernonia amygdalina* LEAF MEAL ON LIPID PROFILE AND SERUM METABOLITES OF BROILER CHICKENS

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ABSTRACT

The study was carried out to determine the effects of *Vernonia amygdalina* on some serum metabolites of broiler chicken in a 6-week feeding trial. A total no of 72, day old unsexed abor-acre broiler chicks were randomly distributed to 3 replicates of 6chicks in a Completely Randomised Design (CRD). Four starter diets and finisher diets were formulated to be D1, D2, D3 and D4 to contain *V. amygdalina* leaf meal at 0g/kg, 100g/kg, 200g/kg and 300g/kg dietary level, respectively and were fed *ad-libitum*. The serum total cholesterol, triglyceride, glucose, high density lipoprotein, low density lipoprotein, creatinine and total protein were determined at the end of the study. The serum level of cholesterol was significantly ($p<0.05$) higher in the control group when compared to the treated groups. The diets with *V. amygdalina* at 100g/kg, 200g/kg and 300g/kg reduced the cholesterol level by 13.31%, 15.47% and 23.74%, respectively. There were significant ($p<0.05$) higher levels of triglyceride, glucose and low density lipoprotein in the control group. The percentage reduction in triglyceride levels was 8.74%, 25.5%, 30.20% and in glucose level was 19.78%, 20.96% and 23.48% for diet with *V. amygdalina* at 100g/kg, 200g/kg and 300g/kg, respectively. However, there was significant ($p<0.05$) increase in the level of high density lipoprotein in both diet 3 (200g/kg) and diet 4 (300g/kg). The levels of creatinine and total protein were significantly ($p<0.05$) lower in diets containing *V. amygdalina* leaf meal. The inclusion of *V. amygdalina* leaf meal reduced the levels of cholesterol, triglyceride, glucose, low density lipoprotein. It further increased the levels of the high density lipoprotein numerically at all levels of inclusion. This study confirms the clinical importance of *V. amygdalina* which can reduce the risk factors for cardiovascular diseases and also useful in the enthnotherapy of diabetes mellitus.

Keywords: *Vernonia amygdalina*, lipid profile, biochemical parameters, broiler chickens.

INTRODUCTION

An important risk factor in the development of coronary artery disease is hypercholesterol (Nagra *et al.*, 2003). The clinical manifestation of atherosclerosis in arteries servicing the heart muscle cause more death and disability than all types of cancer combined (Lioyed-jones *et al.*, 2009; Daniels *et al.*, 2009). This is an important outcome for a common polycyclic lipid with the humble function of maintaining the permeability and fluidity of cell membrane. The atherosclerotic process involves the build-up of a waxy plaque on the inside of blood vessels and it involves an on-going inflammatory response. It can involve the entire vascular system and is (Farombi, 2003). It is also used in the treatment of cough and hypertension (Amira and Okubadejo, 2002). Phytochemicals contained in *V. amygdalina* include saponins, tannins, flavonoids and alkaloids. Some studies have reported that plant which lower serum lipid values are rich in flavonoids and tannis. These

characterised by plaques in the intima layer of arteries. High level of serum lipids is related to increased oxidative damage, which affects antioxidant status and lipoprotein levels (Weber and Noels, 2011; Owen *et al.*, 2011). A number of African indigenous plants have been known with a lot of chemotherapeutic potentials (Farombi, 2003). *Vernonia amygdalina* also called bitter leaf in Nigeria because of its bitter taste is a shrub that grows predominantly in tropical African. The leaves have found relevance in traditional folk medicine as an anti-helminth, a laxative herb and an anti-malaria as they are known as quinine substitute

compounds play a significant role in the mobilization and metabolism of lipids. This study aimed to examine the effect of *V. amygdalina* (bitter leaf meal) on the serum lipid profile and the haematological indices in broilers chickens.

MATERIALS AND METHODS

The study was carried out at the poultry unit of the Department of Agricultural Technology, Federal Polytechnic, Ado-Ekiti. Fresh leaves of *V. amygdalina* were collected from the premises of Federal Polytechnic, Ado-Ekiti. The *V. amygdalina* was prepared by harvesting daily, fresh and matured leaves. The leaves were chopped manually using kitchen knives and then air dried. Air-drying was done for seven days and the chopped leaves were manually turned using rake so as to guarantee even drying to 12-13% moisture content. The composition of the four experimental diets used for this study were compounded on the floor at the premises of the Teaching and Research farm, Federal Polytechnic, Ado-Ekiti. Four diets were formulated such that diet 1 served as the control diet i.e 0g/kg while diets 2, 3 and 4 contained 100g/kg, 200g/kg and 300g/kg of bitter leaf meal, respectively. The experimental diets were offered to the birds *ad-libitum*. This study which lasted for 42 days was performed with 72 day-old arbor-acre strain. The birds were divided into 4 groups of 18 birds each. Each treatment group was further subdivided into 3 replicates of 6 birds each in a Completely Randomised Design (CRD). The birds were assigned to treatments as T1 (0g/kg), T2 (100g/kg), T3 (200g/kg), T4 (300g/kg) of *V. amygdalina* leaf meal. At the end of the study, prior to blood collection, the birds were starved of feed, 3 birds per treatment were randomly selected and bled by severing the jugular vein. About 5ml of blood samples were collected from each bird in labelled vacutainer tubes without anticoagulants and taken to the laboratory for analysis. The lipid profiles were total cholesterol, triglycerides, high density lipoprotein and low density lipoprotein was calculated using (Tietz, 1999) method. Glucose, creatinine and total protein were determined. Data were analysed statistically using one-way analysis of variance (ANOVA) and significant means were compared using Duncan's Multiple Range Test at 5% significant level. The analysis was done using SPSS17.windows.

RESULTS AND DISCUSSION

Table 1 shows the effect of graded levels of *V. amygdalina* leaf meal on the lipid profile of broiler chickens. The serum concentration of

cholesterol was significantly ($p < 0.05$) higher for birds on control diet when compared to the treated groups. The cholesterol levels of birds on diets supplemented with *V. amygdalina* leaf meal at 100g/kg, 200g/kg and 300g/kg were reduced by 13.31%, 15.47% and 23.74%, respectively. Also there existed significant ($p < 0.05$) higher concentrations of triglyceride and glucose in the control group. The percentage reduction in triglyceride levels were 8.74%, 25.51% and 30.20% while in glucose were 19.78%, 20.96% and 23.48%, respectively for treatments 2 (100g/kg), 3 (200g/kg) and 4 (300g/kg). The high density lipoprotein of birds on treatments 3 and 4 were similar ($p > 0.05$) but significantly ($p < 0.05$) higher than birds on control diet and treatment 2. The low density lipoprotein and creatinine levels of birds on T1 and T2 were similar ($p > 0.05$) but significantly ($p < 0.05$) higher than the levels of birds on T3 and T4. Total protein levels of birds on control diet was significantly ($p < 0.05$) higher when compared to other treatment groups.

The lipid profile (which involves levels of total cholesterol, triglyceride, high density lipoprotein (HDL) and low density lipoprotein (LDL)) serve as diagnostics indices in conditions such as chronic jaundice, coronary heart disease and atherosclerosis. Hyperlipidaemia is one of the risk factor for cardiovascular disease while cholesterol is the major lipid constituent of atherosclerotic plaque (Ekpo *et al.*, 2007). The use of *V. amygdalina* significantly lowered the cholesterol and triglyceride levels of the broiler chickens indicating that the use of the plant did not contribute to any disease associated with atherosclerosis. The elevated levels of triglyceride and cholesterol obtained in the broiler chickens not fed with *V. amygdalina* leaf meal may be as a result of increased level of serum lipids which is related to increase oxidative damage, which affects antioxidant status and lipoprotein levels. (Weber and Noels, 2011; Owen *et al.*, 2011). Inclusion of *V. amygdalina* leaf meal into broiler chicken diets increased high density lipoprotein (HDL) indicating its protective role against cardiovascular disease. The protective roles of HDL from cardiovascular disease have been suggested to occur in various ways (Nofer *et al.*, 2002). HDL exerts part of its anti-atherogenic effect by hindering low density lipoprotein

(LDL) oxidation. Inclusion of *V. amygdalina* at 100g/kg, 200g/kg and 300g/kg significantly lowered LDL levels. low density lipoprotein (LDL) may be used in monitoring the treatment of patients with elevated blood cholesterol levels (Adaramoye *et al.*, 2008). In this study, *V. amygdalina* elicited beneficial effects by lowering the levels of LDL of the broiler chickens. The creatinine and total protein levels of treated groups were lower when compared to control diet. Peter and Susan (1991) reported that decreased values of creatinine is not clinically significant. The test ingredient may not have effect on the kidney since the creatinine levels were low. The decreased in total protein level may be due to decrease in feed intake or absorption as a result of bitterness of the leaves. This study shows that inclusion of *V. amygdalina* leaf meal positively influenced the lipid profile. This confirms that bitter leaf meal can reduce the risk factors for cardiovascular diseases.

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Table 1 Lipid profile and serum metabolites of broiler chicken (0-42days) fed experimental diets

Parameters	Levels of <i>Vernonia amygdalina</i> Leaf Meal				SEM
	0g/kg	100g/kg	200g/kg	300g/kg	
Cholesterol (mg/dl)	92.67 ^a	80.33 ^{ab}	78.33 ^{ab}	70.67 ^b	3.14
Cholesterol reduction (%)	0	13.31	15.47	23.74	-
Triglyceride (mg/dl)	49.67 ^a	45.33 ^a	37.00 ^b	34.67 ^b	2.11
Triglyceride reduction (%)	0	8.74	25.51	30.20	-
Glucose (mmol/L)	13.50 ^a	10.83 ^b	10.67 ^b	10.33 ^b	0.47
Glucose reduction (%)	0	19.78	20.96	23.48	-
HDL (mg/dl)	75.00 ^b	76.00 ^b	87.33 ^a	90.33 ^a	2.20
LDL (mg/dl)	13.00 ^a	10.67 ^a	7.80 ^b	7.67 ^b	0.75
Creatinine (mg/dl)	0.19 ^a	0.17 ^a	0.13 ^b	0.12 ^b	0.01
Total protein (g/d)	29.67 ^a	27.17 ^b	25.90 ^{bc}	23.83 ^c	0.71

Means with different superscripts on the same row differ significantly ($P < 0.05$) HDL- High density lipoprotein; LDL-Low density lipoprotein.