Hypolipidaemic and Hypoglycaemic Effects of Aqueous Extracts of *Vernoniaamygdalina* (Bitter Leaf) on the Blood of *Caviaporcellus* (Guinea Pig)

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ABSTRACT

This study investigates the effects of aqueous extract of the leaves of *Vernoniaamygdalina* (Bitter leaves) on blood glucose level and lipid profiles of normoglycaemic and normolipidaemic guinea pigs. The animals whose weights ranged between 350-500g (400g) were placed in four groups labelled A-D. Groups A-C respectively received 375mg/kg/day, 750mg/kg/day and 1125mg/kg/day of *V. amygdalina* aqueous extract for two weeks while group D served as the control. The animals were tested for their glucose level at two days interval, while the lipid profile was estimated after the animals were humanely sacrificed at the end of two weeks treatment. The extract was found to evince significant difference in the treatment over the control at ($P < 0.05$) and a progressive time and dose dependent reduction of blood glucose concentration was observed. Similarly, the extract caused a significant reduction in total cholesterol (TC), low density lipoprotein (LDL) and triglyceride (TG) levels in the treatment groups at ($P < 0.05$). The increase in high density lipoprotein (HDL) was also found to be significant ($P < 0.05$) with respect to the control. This study therefore indicates that *Vernoniaamygdalina* aqueous extract will be effective in the control of blood glucose and the lipid levels in normoglycaemic and normolipidaemic individuals.

Keywords:

Vernoniaamygdalina, *Caviaporcellus*,
hypolipidaemic hypoglycaemic

INTRODUCTION

Several studies have been carried out on the hypoglycaemic and hypolipidaemic properties of *Vernonia amygdalina*. This paper reports the efficacy of *V. amygdalina* crude aqueous extract on blood glucose level and lipid profile of normoglycaemic and normolipidaemic guinea pigs.

The antithrombotic, hypoglycaemic and hypolipidaemic effects of the leaf extract in diabetic-hyperlipidaemic and normoglycaemic rats have been reported (Adaramoye et al., 2008). Ethanol extract of the plant is found to reduce body weight by decreasing triglyceride level (Ekpo et al., 2007). Abosi and Raseroka, (2003) and Iwalokun, (2008) also separately reported the Medicinal applications of *V. amygdalina* to include its use as laxative, antihelminthic and antimalarial.

Osinubi (2005) reports that the aqueous leaf extract produces significant ($P < 0.05$) reductions in the blood glucose concentrations of normal (normoglycaemic) and diabetic (hyperglycaemic) rats 1-12hrs after acute treatment compared with the control.

In a comparative study of the effects of the leaves of *Vernonia amygdalina* and *Telfairia occidentalis*, Ugwu et al., (2011) reported a significant effect of the vegetable leaves on the serum cholesterol and triglycerols levels over the control and between each other at ($P < 0.05$). According to them, *T. occidentalis* diet induces a significantly higher serum HDL concentration compared to *V. amygdalina* diet at the same concentration.

Ijeh et al. (2008), studied the effects of *V. amygdalina* aqueous extract on the contraction of the mammary gland and uterus of guinea pig Dams and report a significantly lesser litter-weight in control, than the treatments after five weeks.

Akai et al., (2004) also reported that *V. amygdalina* extract (80mg/kg) causes a significant ($P < 0.05$) reduction in blood glucose level in normoglycaemic and alloxan-induced diabetic rats.

Oruambo et al. (2010) opined that unboiled water extract of *V. amygdalina* clears the excess blood glucose molecules more rapidly and quantitatively than either the boiled water *V. amygdalina* extract or glucophage, under various conditions.

MATERIALS AND METHODS

Fresh leaves of *Vernonia amygdalina* were obtained from Choba market, Choba, Rivers State, Nigeria. The leaves were washed, sun dried, pulverized and measured into 30g, 60g and 90g. These were respectively macerated in 1L of distilled water for 3 days and then stirred and filtered. The residues were further boiled in 400ml of water for 20mins and filtered. The process was repeated with 300ml of water in 10mins. The filtrate of each concentration was mixed together stirred thoroughly, then

evaporated to one litre volume and stored in a clean coverable container.

Twelve (12) female guinea pigs weighing on average 0.4kg were obtained from Creek road market, Rivers State. The animals were allowed to acclimate for two weeks at the major's laboratory of the Department of Animal and Environmental Biology, Faculty of Science, University of Port Harcourt.

The animals were grouped into four groups (A-D) with three animals per group. Each group was daily administered 5ml of *Vernonia amygdalina* extract orally. Groups A-C were treated with concentrations of 375, 750 and 1125mg/kg/day, while group D was daily administered 5mls of distilled water orally. The treatment was for a period of 2 weeks, during which, Blood glucose level was monitored at two days interval with the aid of a glucometer (a glucose testing kit).

At the end of the two weeks, the animals were fasted over-night, anaesthetised under chloroform and sacrificed. Then the blood was collected in a lithium heparin bottle for lipid profile and Blood glucose analysis. The total cholesterol (TC) was determined by the enzymatic end-point method using Cholesterol Oxidase – Peroxidase (CHOD-PAP) reagent for hydrolysis and oxidation. Triglycerides were determined after enzymatic hydrolysis with lipases by the Glycerol-3-phosphate Oxidase– Peroxidase (GPO-PAP) method.

Low density lipoprotein (LDL), very low density lipoproteins (VLDL) and chylomicron fractions were precipitated quantitatively by the addition of phosphotungstic acid in the presence of magnesium ions. After centrifugation, the cholesterol fraction, which remained in the supernatant, was determined.

Low density Lipoprotein concentration in the blood was calculated thus,

$$\text{LDL} = \text{Total Cholesterol} - (\text{Triacylglycerol} \div 2.2 + \text{HDL}).$$

Values were presented as mean $\pm$ standard deviation (S.D). One way ANOVA was used to analyze the data at $P = 0.05$.

RESULTS AND DISCUSSION

Blood sugar was reduced in group A and B from initial values of 5.40 ± 0.60 to 4.60 ± 0.17 and 5.43 ± 0.59 to 4.10 ± 0.10 in two weeks, i.e. a 14.81% and 24.49% reduction respectively, while that in group C was reduced from 5.47 ± 0.25 to 3.73 ± 0.22 mmol/L i.e. a 31.81% reduction. However, the control had a normal rise and fall of blood glucose levels with an initial value of 4.67 ± 0.35 , and rose to a peak of 4.80 ± 0.10 on the 9th day and fell to 4.70 ± 0.27 on the final day. With an increase of 0.64% (fig 1) *V. amygdalina* aqueous extract was observed to cause a significant ($P < 0.05$) reduction in blood glucose level of normoglycaemic Guinea pig in all

treatment groups as against the control which was not significantly ($P > 0.05$) different from the initial value.

Regarding the effect of *V. amygdalina* aqueous extract on the lipid profile of guinea pigs, the extract evinced a significant difference ($P < 0.05$) with respect to the control in the parameters of lipid profile, causing the highest change in the group fed with the highest *V. amygdalina* concentration (fig2).

The results from this study reveal significant reduction in the blood glucose concentrations of normoglycaemic guinea pigs treated with various concentrations of *Vernoniaamygdalina* aqueous extract. The findings of this investigation therefore, suggest that the plant extract could stimulate insulin production and glucose utilization to cause anti-hyperglycaemic effect on the mammalian experimental model.

This result agrees with the findings of Akahet *et al.*, (2004) who report that *V. amygdalina* extract (80mg/kg) causes a significant ($P < 0.05$) reduction in blood glucose level in normoglycemic and alloxan-induced diabetic rats. It also has similarities with the results of Oruambo *et al.* (2010) who opined that unboiled water extract of *V. amygdalina* clears the excess blood glucose

molecules more rapidly and quantitatively than either the boiled water *V. amygdalina* extract or glucophage, under various conditions.

The results of lipids assayed in this study show that there was a significant difference ($P < 0.05$) in TC, TG LDL and HDL in the experimental groups as compared to the control. Therefore, the administration of aqueous extract of *Vernoniaamygdalina* to normolipidaemic guinea pigs decreases plasma TC, TG and LDL, and increases the HDL levels. There was a dose response decrease in the levels of TC, TG, and LDL, with respect to increasing aqueous extract concentration. Thus the 1125mg/kg/day extract evinced the highest reduction in the three parameters, while HDL levels was shown to be high in treatment with the highest concentration of extract. The results showed that the extract significantly lowered the serum LDL concentrations relative to the control. A similar result was also reported by Ugwu *et al.*, (2011) who said that there was a significant effect of *V. amygdalina* leaves on the serum cholesterol and triglycerols levels, over the control and between each treatment at ($P < 0.05$).

Fig. 1: Changes in the blood glucose level of the treated and control groups at the different stages of experiment

Fig. 2: Changes in the lipid profile of the experimental and control groups

CONCLUSION

The results from the study showed that *V. amygdalina* aqueous extract is effective in the control and reduction of blood glucose and greatly influence the lipids profile of normoglycaemic and normolipidaemic albino rats and by extrapolation, it will be a good therapeutic agent against these two life-threatening pathological conditions in man.

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