

The Efficacy of Bitter Leaf (*Vernonia amygdalina*) Extract in Reducing Blood Sugar

C. K. Ojebah¹, A. Uwague² and A. U. Igbuku³

Department of Science Laboratory Technology Delta State Polytechnic, P. M. B. 5 Ozoro
Corresponding Email: ckojebah@gmail.com

ABSTRACT: This study investigated the efficacy of different dosages of *Vernonia amygdalina*, a common Nigerian plant on blood sugar. 20 Wistar rats were used for this study. The rats were induced with diabetes by intraperitoneal injection of 150mg/kg body weight of alloxan monohydrate. The rats were divided into four groups of five rats each. Group 1 diabetic but not treated as control; Group 2 diabetic and treated with 50mg metformin; Group 3 diabetic and treated with 500mg *Vernonia amygdalina*; Group 4 diabetic and treated with 1000mg *Vernonia amygdalina*. The mean result shows a steady increase of blood sugar in the untreated rats (control) from 76.5 – 585.5mg/dL and rats treated with 500mg and 1000mg of *Vernonia amygdalina* showed a significant decrease in blood sugar from 395-239mg/dL and 361-209.5mg/dL respectively confirming the efficacy of *Vernonia amygdalina* plant extract in reducing blood sugar. The result compared favorably with metformin- a conventional blood sugar reduction drug. Regular consumption of the *Vernonia* plant is thus highly recommended.

KEYWORDS. Blood sugar, diabetic, dosage, rat, *Vernonia amygdalina*

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I. INTRODUCTION

Medicinal plants have greatly formed the basic foundation of health care in the world since the earliest days of humanity and are still in use and have considerable importance in International trade (Ahmad et al., 2006; Owen et al., 2011). About 90% of the population of some African countries still relies exclusively on plants as a source of medicines (Hostettmann et al., 2000).

Vernonia amygdalina is a medicinal plant and fresh bitter leaf is of great importance in human diet because of the presence of vitamins and mineral salts (Sobukola and Dairo 2007). It is a very important protective food and useful for the maintenance of health and prevention and treatment of various diseases. The plant (especially the leaf) has been found useful in the ethnotherapy of diabetes (Akah and Okafor, 1992; Uhegbu and Ogbuehi 2004; Nwanjo, 2005; Akah et al., 2002), asthma, headache (Oboh, 2003), skin infections such as ringworm, rashes and eczema, schistosomiasis, malaria (Masaba, 2000), measles, diarrhea, tuberculosis, abdominal pain and intestine complaints as well as fevers, cough (Akinpelu, 1999), induction of fertility in barren women (Kafaru, 1994; Erasto et al., 2007; Nwanjo, 2005) and hyperlipidemia (Adaramoye et al., 2005). Bitter leaf also helps to cleanse vital organs of the body like the liver and the kidney (Tonukari et al., 2015).

The conventional use of insulin and oral drugs to control diabetes mellitus is costly, inadequate, boring and lack compliance; thus the patient's exposure to long term complication remains a risk (Okolie et al., 2008). The use of herbal medicine has been of great importance to the health of individuals and communities (Adebanjo et al., 2006). This study was embarked upon to determine the efficacy of varying bitter leaf (*Vernonia amygdalina*) extract dosage in reducing blood sugar.

II. MATERIALS AND METHODS

Study Area

The study was conducted in Ozoro, South-South, Nigeria. Ozoro is located at latitude 5°32'18"N and longitude 6°12'58"E (www.wikipedia.org). Ozoro is one of the fastest developing communities in Delta state, South-South, Nigeria.

Sampling and Sample Preparation

Fresh leaves of *Vernonia amygdalina* commonly known as bitter leaf were collected from a local farm and transported to the laboratory using a sterile polythene bag. The leaves were removed from the stalk/stem and rinse with distilled water to remove all debris. The leaves were air dried and weighed using a weighing balance. The leaves were then blended using an electronic blending machine. The juice of the leaves were

extracted and concentrated using a soxhlet extractor to a paste like solid and stored with a universal container in a refrigerator at 4°C. 0.50g and 1.00g of the paste-like leaf extract were weighed and dissolved in 500ml and 1000ml of water differently to produce a standard dosage of 500mg and 1000mg of the extract respectively.

Chemicals

Metformin was purchased from a Pharmacy shop, in Ozoro. The tablets were crushed into powder and concentrations of it made in distilled water to be administered to the experimental animals. Alloxan monohydrate was used for the induction of diabetes on the rats.

Animal experimentation

Twenty Wister rats were purchased from an animal house in Abraka and transported to the laboratory for analysis. The rats were divided into four (4) groups of five (5) rats each. Three(3) groups were used for blood sugar reduction experiment and the other as control.

III. METHODS

Diabetic Induction of animals

The rats were fed for 7days and allowed to get used to the environment. The diabetic groups were fasted for 12hours and 10% glucose solution was offered to the animals to prevent hypoglycemia (Katsumata et al., 1992; Szkudelski, 2001). The weight of the animals and their glucose level were taken using electronic weighing balance and glucometer respectively. The rats were induced with diabetics by intraperitoneal injection of 150mg/kg body weight of alloxan monohydrate freshly prepared with sterile 0.9% saline as described by Diniz et al., (2008). Three days later diabetes was confirmed using glucometer when a blood sample was withdrawn from the tail vein with a needle prick and tested using glucose test strips. Animals presenting glucose levels above 200 mg/dL were included in the diabetic group (N=20). The examinations were repeated every 7 days to confirm maintenance of the glucose levels.

Administration of Vernoniaamygdalina

Vernoniaamygdalina containing different dosages were administered orally to the experimental rats.
 Group 1 – Diabetic and not treated(control);
 Group 2 – 50mg of metformin;
 Group 3 – 500mg of Vernoniaamygdalina;
 Group 4 – 1000mg of Vernoniaamygdalina;

IV. RESULT

The results of the analysis are presented in table 1 and 2.

Table 1: Level of glucose (mg/dL) and body weight (kg) of the Wister rats before and after treatment.

	Sample Label	Body Weight	Blood Glucose	Body Weight	Blood Glucose	Body Weight	Blood Glucose	Body Weight	Blood Glucose
		Before Diabetics Induction		After diabetics Induction		Week 1		Week 2	
NEGATIVE CONTROL NOT TREATED	1BT	109.8	92	108.0	222				
	2BT	110.7	68	118.9	344	112.9	431	109.3	571
	3BT	109.6	62	103.2	519	100.1	357	113.2	600
	4BT	114.6	76						
	5BT	120.7	83	113					
METFORMIN DOSAGE (50mg)	H1BT	111.6	76	96.6	600	91.6	569		
	H2BT	124.9	79						
	H3BT	109.3	69	99.2	445	107.0	373	100.3	350
	H4BT	190.5	81						
	H5BT	133.4	101	125.3	514	124.3	540		
500mg VERNONIA DOSAGE	HND1BT	123.6	66						
	HND2BT	166.9	86	153.4	219	152.2	178	150.4	168
	HND3BT	113.5	82	102.2	589	99.6	600	92.5	421
	HND4BT	129.0	81	95.6	377	153.0	124	153.2	128
	HND5BT	128.1	91						
1000mg VERNONIA DOSAGE	ForL1BT	87.2	84	82.2	234	98.2	259	91.5	208
	ForL2BT	99.4	67	99.3	415				
	ForL3BT	124.1	81						
	ForL4BT	154.2	118	142.2	434	138.4	273	156.2	211
	ForL5BT	95.3	85						

Table 2: Mean concentration of glucose level ((mg/dL) and body weight (kg)

TREATMENT	Body Weight	Blood Glucose	Body Weight	Blood Glucose	Body Weight	Blood Glucose	Body Weight	Blood Glucose
	Before Diabetics Induction		After diabetics Induction		Week 1		Week 2	
NEGATIVE CONTROL (NOT TREATED)	113.08	76.2	110.55	361.67	106.5	394	111.25	585.5
METFORMIN DOSAGE (50mg)	133.94	81.2	107.03	519.67	107.63	494	100.3	350
500mg VERNONIA DOSAGE	132.22	81.2	117.06	395	134.93	300.7	132.03	239
1000mg VERNONIA DOSAGE	112.04	87	107.9	361	118.3	266	123.85	209.5

V. DISCUSSION

The analytical results presented in table 1 and 2 shows that there was decrease in the body weight and increase in blood sugar of the animals. The loss in weight could be as a result of the diabetics. Most of the animals died probably because they could not withstand the diabetic state. The result from the present investigation showed that *Vernoniaamygdalina*, a plant commonly used for dietary and medicinal purposes caused an overall glucose lowering effects on the treated rats when compared to the control group as shown in table 1 and 2. The mean result shows a steady increase of blood sugar in the untreated rats from 76.5 – 585.5mg/dL and that of induced and treated rats with 500mg and 1000mg of *Vernoniaamygdalina* showed a significant decrease in blood sugar from 395-239mg/dL and 361-209.5mg/dL respectively (Table 2). The result is a clear indication that *Vernoniaamygdalina* administered at varying levels produced hypoglycemic effects (Modu et al., 2013; Owen et al., 2011). Many bioactive chemicals present in the leaves could be responsible for the observed effect. Flavonoids in *Vernoniaamygdalina* may confer hypoglycemic property on the leaf extract of this plant (Ezekwe and Obiodoa, 2001). The steady decrease in the sugar level of the experimental rats compared with the conventional metformin drugs indicates that *Vernoniaamygdalina* could be an alternative source of combating the menace of high blood sugar.

VI. CONCLUSION/ RECOMMENDATION

Vernoniaamygdalina have successfully been used to reduce blood sugar. This can be seen from the results of the untreated rats and those treated. Whereas those untreated had their glucose level increased, those administered with *Vernoniaamygdalina* at varying concentration had their sugar level reduced thus confirming the efficacy of *Vernoniaamygdalina* in blood sugar reduction. Regular consumption of the *Vernoniaamygdalina* plant is thus highly recommended.

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