

The Effects of Ethanol Leaf-extract of *Anacardium occidentale* on Haemoglobin and Packed Cell Volume of Albino Rats

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Abstract: The effects of ethanol-leaf extract of *Anacardium occidentale* on haemoglobin and packed cell volume in albino rats were investigated through spectrophotometric and centrifugation methods. The experimental animals were grouped into A, B and C with four animals in each group. The ethanol-leaf extract of *Anacardium occidentale* was administered to the animals through oral intubation at the doses of 200, 600 and 0mg/kg of body weights respectively for 14days. The haemoglobin concentrations (g/dl) recorded as follows: 14.38±0.52, 13.71±0.08, 15.25±0.14 for animals in groups A, B and C respectively with corresponding values for packed cell volume (PCV) (%) as 43.15±1.65, 41.13±0.76 and 45.68±1.27. There was also a significant reduction in the body weights of the rats. The ethanol leaf-extract of *Anacardium occidentale* exerted significant ($p < 0.05$) dose-dependent reductions in the haemoglobin levels, packed cell volume and body weights of the rats.

Key words: Leaf-Extract • *Anacardium Occidentale* • Haemoglobin • Packed Cell Volume And Albino Rats

INTRODUCTION

Plants of various origins have been exploited effectively over many generations for therapeutic purposes. In local traditional settings, plant parts such as the leaves or roots are used for isolation of phytochemical substances. The argument is that the synergy of the combined substances enhances the efficacy and dilutes toxicity [1]. Herbal medicine have great importance in maintaining the health of every person. Demands of herbal medicine are increasing in both developed and developing countries due to growing recognition of natural plants with less number of side effects and its low cost [2].

Anacardium occidentale is a tree that grows with thick tortuous trunk and woody branches. It belongs to the family "Anacardiaceae", is native to Brazil and has a great economic and medicinal value. *Anacardium occidentale* is commonly called cashew in English, "Kashu" in Hausa and Kaju in Yoruba [3]. This plant is a multi-purpose tree whose leaves, stems and bark extracts are used extensively for the treatment of certain diseases/infections. Cashew apple juice is said to be effective for the treatment of syphilis. Root infusion is an excellent purgative. Cashew apple is anti-scorbutic, astringent and diuretic and is used against cholera and

kidney troubles. Cashew nut shell oil is anti-hypertensive and purgative. It is used for blood sugar problems, Buds and young leaves are used for skin diseases [4].

Haemoglobin deficiency is, in general, strictly distinguished from hypoxemia, defined as decreased partial pressure of oxygen in blood, although both are causes of hypoxia (insufficient oxygen supply to tissues). Decrease of haemoglobin leads to symptoms of anaemia. Anaemia has many different causes, although iron deficiency and its resultant iron deficiency anaemia are the most common causes in the Western world. As absence of iron decreases heme synthesis, red blood cells in iron deficiency anaemia are hypochromic (lacking the red haemoglobin pigment) and microcytic (smaller than normal). In haemolysis, associated jaundice is caused by the haemoglobin metabolite bilirubin [5].

Packed cell volume (PCV) is the proportion of blood volume that is occupied by red blood cells. It is normally about 48% for men and 38% for women. It is considered an integral part of a person's complete blood count results, along with haemoglobin concentration, white blood cell count and platelet count [6]. The detection of PCV is a simple and reliable method for detecting the presence or absence of anaemia or polycythaemia. Indeed the PCV measured by centrifugation is more reliable for monitoring patients with polycythaemia than

is the PCV calculated from many automated cell counters [7]. There is an unspoken assumption that the loss of red cells does not lead to long-term decrease in blood volume. Both increase and decrease in the concentration of haemoglobin can compromise oxygen delivery. For example, in the long-term an increased PCV is a recognised risk factor in cardiovascular and cerebral disease. In a clinical situation, it is necessary to strike an appropriate balance between the ideal of maximum efficiency during prolonged physical activity and that of optimum microcirculatory flow in the affected tissue. This balance depends on the oxygen requirement [8].

There are reported cases of adverse effects on the use of many medicinal plants. Most of these medicinal plants exert their effects on target sites like liver, kidney and other vital organs. Thus, this research project investigated the effect of ethanol leaf-extract of *Anacardium occidentale* on haemoglobin (Hb) and packed cell volume (PCV) in albino rats.

MATERIALS AND METHODS

Materials: The leaves of *Anacardium occidentale* were collected from Umuezoka community in Ezza North L. G. A. of Ebonyi State in the month of March, while the albino rats were gotten from Nnamdi Azikiwe University, Awka. All chemicals and reagents were of analytical grade.

Methods

Extraction of Plant Materials: The *Anacardium occidentale* leaves were collected and dried under room temperature for 7 days. The dried leaves were ground and soaked in 1 litre of ethanol for 48hours. The mixture was filtered with muslin cloth to get a greenish filtrate and the solvent was allowed to evaporate till a slurry paste (the extract) was gotten [9].

Administration of the Extract: After acclimatization, the animals were grouped into three different groups: A, B and C. Group C served as control and they were fed with only the grower's mash and water. Groups B and C were administered different doses of the extract at 200 and 600mg/kg body weight respectively through oral intubation for 14 days.

Collection of Blood Sample: After the fourteen days of administration of ethanol-leaf extract of *Anacardium occidentale*, the blood samples were collected through ocular vein puncture using capillary tubes into labelled EDTA bottles.

Determination of Haematological Parameters: The haemoglobin level and packed cell volume were determined by the methods of Cheesbrough [10].

Determination of Body Weight of Rats: The weights of albino rats were determined daily using weighing balance.

DISCUSSION

The level of haemoglobin in the animals administered ethanol leaf-extract of *Anacardium occidentale* significantly ($p > 0.05$) reduced dose-dependently (Fig. 1). Although leaves of *Anacardium occidentale* contain tannins and polyphenols with other micronutrients which sometimes cause haemolysis of the red blood cells and interfere with the iron absorption thereby influencing red blood cell production, Ajayi *et al.* [11] reported that *Anacardium occidentale* nut oil probably had no significant adverse effect on the haemoglobin (Hb) of rats. It was also reported that animals showed appreciable fluctuations in their haematological parameters as a result of changes in nutrition and/or the environment with rats treated with *Anacardium occidentale* [12]. The leaf-extract of *Mucuna pruriens* significantly increased haemoglobin levels [13]. *Anacardium occidentale*, *Psidium guajava* and *Terminalia catappa* were found to alter polymerization of sickle cell haemoglobin. The aqueous extracts of the three medicinal plants caused significant reduction in polymerization of deoxy HbS molecules [14].

The level of packed cell volume (PCV) in the animals administered ethanol leaf-extract of *Anacardium occidentale* also reduced significantly ($p < 0.05$) and dose-dependently (Fig. 2). Saidu *et al.* ([15] reviewed that the PCV of the experimental rats fluctuates which may be an indication that the fluid intake by the rats as a result of extract administration was irregular and there was no complete dehydration that would lead to constant increase in the PCV values.

The ethanol extract of *Anacardium occidentale* exerted a significant decrease in the weights and physical activities of the albino rats treated with the extract (Fig. 3). The decrease in weights of the treated animals might have resulted from reduced availability of nutrients for growth purpose due to reduced consumption of the feed by animals. Dare *et al.* [12] observed that there was no significant increase in body weights of rats treated with aqueous extract of *Anacardium occidentale* Leaves. Sognle *et al.* [14] also reported that there was a decrease in weights of rats treated with cassava peel meal supplemented with *Anacardium occidentale* nut meal.

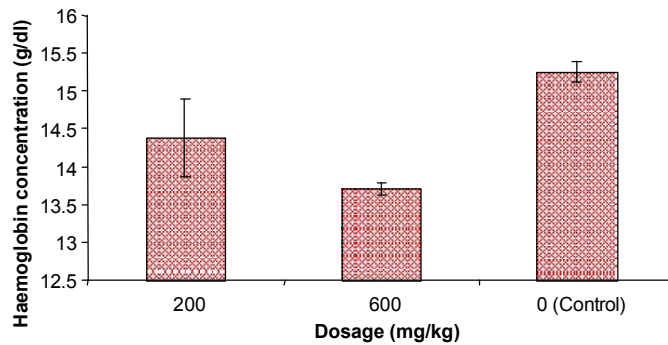


Fig. 1: Bar chart representation of the effect of ethanol leaf-extract of *Anacardium occidentale* on haemoglobin

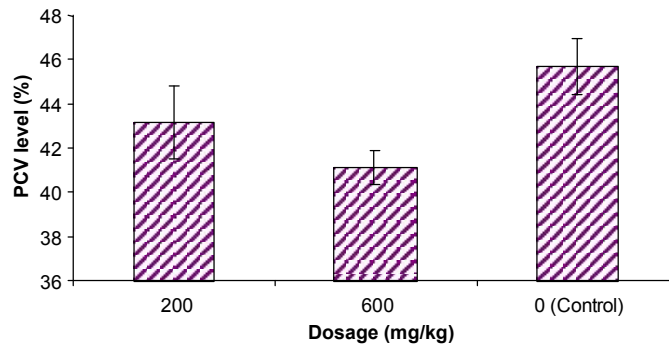


Fig. 2: Bar chart representation of the effect of ethanol leaf-extract of *Anacardium occidentale* on packed cell volume (PCV)

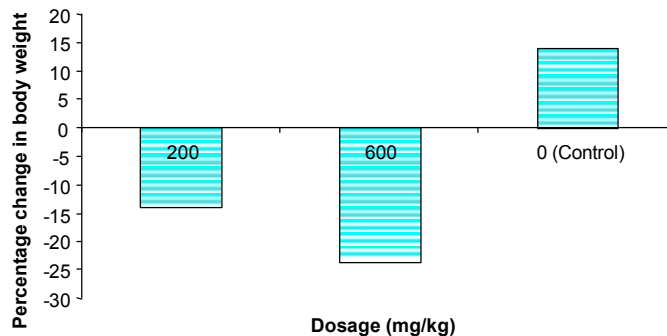


Fig. 3: Bar chart representation of the percentage change in body weights of rats administered ethanol leaf-extract of *Anacardium occidentale*

In conclusion, the ethanol leaf-extract of *Anacardium occidentale* exerted significant ($p < 0.05$) dose-dependent reductions in the haemoglobin levels, packed cell volume and body weights of the rats.

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