



## Effect of Ethanol Leaves Extract of *Anthocleista vogelii* and *Cocos nucifera* Water on Some Haematological Indices in Wistar Rats

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### Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

### Article Information

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### ABSTRACT

**Aim:** To evaluate the effect of ethanol leaves extract of *Anthocleista vogelii* and *Cocos nucifera* water on haematological parameters in wistar rats.

**Study Design:** Haematology.

**Place and Duration of Study:** Department of Pharmacology and Therapeutics, Delta State University, Abraka Delta State, Nigeria, between July and August, 2015.

**Methodology:** Thirty rats divided into six groups of five were used for the study. Doses of 10 ml/kg of *Cocos nucifera*, 200 mg/kg, and 400 mg/kg of *Anthocleista vogelii*, and 200 mg/kg and 400 mg/kg of *Anthocleista vogelii* combination with *Cocos nucifera* (1:1) were administered to the animals, while the control group received normal saline (10 ml/kg). The experimental animals were administered the extracts orally once daily for 2 weeks according to their body weights, after which blood samples were obtained for haematological analysis.

**Results:** *Anthocleista vogelii* and *Cocos nucifera* extracts showed significant ( $P < 0.05$ ) increase in RBC, WBC, and PCV values.

**Conclusion:** The ethanol leaves extract of *Anthocleista vogelii* and its combination with *Cocos nucifera* water has positive haematopoietic effects.

**Keywords:** *Anthocleista vogelii*; *Cocos nucifera*; haematological parameters; anaemia.

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## 1. INTRODUCTION

The immense potential of medicinal plants used in various traditional systems in treating ailments has resulted in an increased focus on plant research. This has led to recognition of plants as a possible alternative and rich source for new drugs discovery and development. *Anthocleista vogelii* planch (*Loganiaceae*) is a common tree that grows around the edges and banks of rivers or in marshy areas of the tropical humid forest of West Africa [1]. This plant is found more in Cameroon and Gabon [2]. In Africa traditional medicine, the stem bark of *Anthocleista vogelii* plant has and still being recruited for the treatment of ailments such as gastro- intestinal disorders, fever, stomach ache and purge (as a laxative), while a combination of *Anthocleista vogelii* stem bark and the leaves is used as anti-inflammatory and anti- diabetic agents [2]. Decoctions of the leaves of *Anthocleista vogelii* are known to prevent malaria, reduce symptoms of malaria such as fever, and treat jaundice [3].

*Cocos nucifera* Linn (coconut) water is an ancient tropical beverage that is found in inner part of the coconut fruit. Coconut water has a low matter content comprising mainly sugars and minerals, and is a sweet refreshing drink taken directly from the inner part of the coconut fruit [4,5]. Coconut water has nutritional and medicinal effect as it serves as food and drink and is used to increase semen production, promotes digestion and clearing of the urinary path. Coconut water is traditionally prescribed for burning pain during urination, dysuria, gastritis, burning pain of the eyes, indigestion, hiccups, and even expelling of retained placenta [6].

Blood act as a pathological reflector of the status of exposed animals to toxicant and other conditions [7]. Haemtological studies are useful in the diagnosis of many diseases as well as investigation of the extent of damage to the blood [8,9].

The study was carried out to investigate the effect of the ethanol leaves extract of *Anthocleista vogelii* leaves and its combination with *Cocos nucifera* water on the haematological parameters in wistar rats.

## 2. MATERIALS AND METHODS

### 2.1 Animals

Thirty wistar rats (100-120 g) of either sex were obtained from the Animal Facility of the

Department of Pharmacology and Therapeutics, Delta State University, Abraka. The animals were housed in cages with wooden frames and metal nettings under standard conditions with a 12 hour light/dark cycle, and were acclimatized for a period of 14 days. They were fed with growers mash and were allowed free access to pure drinking water throughout the experimental period. Good hygiene was maintained by constant cleaning of the cages and removal of faeces and spilled feed from the cages.

### 2.2 Plants

Fresh leaves of *Anthocleista vogelii* plant was collected in the school environment and was authenticated in the Department of Pharmacognosy, Faculty of Pharmacy, Delta State University, Abraka. *Cocos nucifera* fruits were bought from the school market. The coconut fruit was split open by hitting it hard on a concrete floor and the water was filtered into a container and stored in the refrigerator. The fresh leaves of *Anthocleista vogelii* plant was air dried for three (3) days after its collection and was blended to powdered form. The powdered form (400 g) was soaked and macerated in aqueous ethanol for 48 hours, at room temperature in a well closed container with constant stirring and agitation. The mixture was then filtered with the aid of sieves and filter papers to obtain a filtrate that was concentrated to dryness with the aid of a water bath at a temperature of 40 – 50°C. The final weight of the extract was recorded and placed in a Petri dish after which it was stored in a refrigerator prior to use.

### 2.3 Experimental Designs

Animals were randomly grouped into six of five rats per group. The stock of ethanol leaves extract of *A. vogelii* was constituted in normal saline to give doses of 200 and 400 mg/kg and in *C. nucifera* to give 200 and 400 mg/kg of its combinations. The control group was administered 10 ml/kg normal saline. The various groups included:

- Group A – Normal saline 10 ml/kg
- Group B – *C. nucifera* 10 ml/kg
- Group C – *A. vogelii* 200 mg/kg
- Group D – *A. vogelii* 400 mg/kg
- Group E – *A. vogelii* 200 mg/kg + *C. nucifera* 10 ml/kg
- Group F – *A. vogelii* 400 mg/kg + *C. nucifera* 10 ml/kg

The experimental animals were administered the extracts orally once daily for 2 weeks via oral cannula according to their body weights.

### **2.3.1 Body weight**

The weights of the animals were recorded prior to the commencement of the experiment (day 0 – initial) and at the end of the experiment (day 14 – final).

### **2.3.2 Haematology**

At the end of the 2 weeks treatment, the animals were anesthetized using chloroform. Blood samples were collected by cardiac puncture and the blood was placed into labeled EDTA bottles for haematological analysis.

## **2.4 Statistical Analysis**

All data obtained were expressed as Mean  $\pm$  SEM (standard error of mean). Statistical differences were evaluated using a one-way analysis of variance (ANOVA) followed by Dunnet's t-test. *P*-values  $<0.05$  were considered significant.

## **3. RESULTS AND DISCUSSION**

Anaemia is a medical condition wherein there is deficiency of circulating red blood cells. Improvement of the human immune system is necessary as white blood cells (leucocytes) play a vital role in defence mechanism of body and protect the body from invading organisms by acting like soldier [10]. Haematological analysis can be used to determine the degree of toxic effects of foreign compounds on the blood constituents of the body. This assessment can be used to explain the effects of chemical compounds of plant extracts on the blood and its physiology [11].

In the present study, there was in-significant ( $P>0.05$ ) increase in body weight of the animals when compared with the control group (Table 1). This is an indication that the extracts are unlikely to cause obesity since the feeding patterns of the animals were normal [12].

The percentage yield of the *A. vogelii* extract was 7.23% (w/w). *A. vogelii* extract at doses of 200 mg/kg and 400 mg/kg, and its combinations with *C. nucifera* water produced a significant ( $P<0.05$ ) increase in the red blood cell (RBC) count when

compared with the control (Table 2). *Cocos nucifera* 10 ml/kg administered alone had a non-significant ( $P>0.05$ ) increase in RBC count. The significant ( $P<0.05$ ) increase in RBC count was more profound with the group administered *A. vogelii* and *C. nucifera* combination at 400 mg/kg. This implies that *A. vogelii* extract increases the production of red cells (erythropoiesis) and can be useful in the treatment of anaemia, which will be more effective when used in combination with *C. nucifera* at a higher dose.

There was an insignificant ( $P>0.05$ ) increase in the white blood cell (WBC) count of rats that were administered 200 and 400 mg/kg of *A. vogelii*, and its 200 mg/kg combination with *C. nucifera* water when compared with the control. Combination of ethanol leaves extract of *A. vogelii* and *C. nucifera* at 400 mg/kg had a significant ( $P<0.05$ ) increase in WBC count (Table 2). This is an indication that the combination of *A. vogelii* and *C. nucifera* especially at a higher dose promotes the synthesis of leucocytes.

Furthermore, the result on effect of *A. vogelii* and *C. nucifera* on packed cell volume (PCV) level showed that there was an increase in PCV level of animals in the treated group when compared with the control group (Table 2). *A. vogelii* 200 mg/kg dose had a non-significant ( $P>0.05$ ) increase in PCV whereas the 400 mg/kg dose had a significant ( $P<0.05$ ) increase. The combination of *A. vogelii* with *C. nucifera* at both 200 and 400 mg/kg also showed a significant ( $P<0.05$ ) increase in PCV.

The significant ( $P<0.05$ ) increase in RBC count and PCV level exerted by *A. vogelii* extract in this present study supports a recent study carried out Sunday *et al.*, but opposes their report of a significant ( $P<0.05$ ) decrease in WBC count [13]. Sub-chronic toxicity test of *C. nucifera* on haematological indices have been shown to significantly ( $P<0.05$ ) increase white blood cell, neutrophil, red blood cell, haematocrit, and platelet counts [14].

The results of this study implies that ethanol leaves extract of *A. vogelii* and in combination with *C. nucifera* water will increase blood indices (RBC, WBC, PCV) value, and thus can be very useful in the traditional management of anaemia [15,16].

**Table 1. Effect of the combination of *Anthocleista vogelii* ethanol extract and *Cocos nucifera* water on body weight of wistar rats**

Groups	Initial (g)	Final (g)	% Increase
Normal saline 10 ml/kg	105 ± 1.58	119 ± 1.87	13.39
<i>C. nucifera</i> 10 ml/kg	104 ± 1.87	127 ± 3.39	22.43
<i>A. vogelii</i> 200 mg/kg	113 ± 3.74	129 ± 5.79	14.06
<i>A. vogelii</i> 400 mg/kg	108 ± 2.00	128 ± 2.00	18.67
<i>A. vogelii</i> 200 mg/kg + <i>C. nucifera</i> 10 ml/kg	105 ± 3.16	130 ± 4.47	23.94
<i>A. vogelii</i> 400 mg/kg + <i>C. nucifera</i> 10 ml/kg	102 ± 1.22	128 ± 3.39	25.52

All values are expressed as Mean ± SEM (where n=5); \* = P<0.05 was taken to be significant

**Table 2. Effect of the combination of *Anthocleista vogelii* ethanol extract and *Cocos nucifera* water on red blood cell (RBC), white blood cells (WBC) counts and packed cell volume (PCV) of wistar rats**

Groups	RBC (×10 <sup>6</sup> )	WBC (×10 <sup>3</sup> )	PCV (%)
Normal saline 10 ml/kg	4.46±0.36	9.81±1.56	40.60±3.31
<i>C. nucifera</i> 10 ml/kg	5.64±0.48	10.08±1.44	48.40±3.40
<i>A. vogelii</i> 200 mg/kg	5.90±0.31*	10.64±1.39	51.20±2.84
<i>A. vogelii</i> 400 mg/kg	6.42±0.09*	12.46±0.93	56.80±1.24*
<i>A. vogelii</i> 200 mg/kg + <i>C. nucifera</i> 10 ml/kg	5.84±0.23*	14.24±0.72	53.80±1.88*
<i>A. vogelii</i> 400 mg/kg + <i>C. nucifera</i> 10 ml/kg	6.52±0.37*	15.96±2.11*	58.40±3.36*

All values are expressed as Mean ± SEM (percentage decrease), where n=5, all data were analyzed by using one way ANOVA followed by Dunnet's test. \* = P<0.05 was taken to be significant

#### 4. CONCLUSION

The ethanol leaves extract of *Anthocleista vogelii* and its combination with *Cocos nucifera* water are non-haematotoxic and has positive haematopoietic effects.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

I hereby declare that "Principles of laboratory animal care" (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the Delta State University's ethics committee for the use of laboratory animals.

#### COMPETING INTERESTS

Author has declared that no competing interests exist.

#### REFERENCES

- Irvine FR. Woody plant of Ghana. Oxford University Press, London; 1961.

- Leeuwenberg AJM. Flore du Cameroon. 1972;12:5-22.
- Alaribe CSA, Coker HAB, Shode FO, Ayoola G, Adesegun SA, Bamiro J, Anyim EI, Anyakora C. Antiplasmodial and phytochemical investigations of leaf extract of *Anthocleista vogelii* (Planch). Journal of Natural Products. 2012;5:60-67.
- Steiner I, Desser A. Coconut water – composition, properties and processing. Ernähr. 2008;32:513–516.
- Prades A, Dornier M, Diop N, Pain JP. Coconut water, uses composition and properties: A review. Fruits. 2012;62:87-107.
- Ediriweera ERHSS. Medicinal uses of coconut. Coco info In. 2003;10:11-21.
- Olafedehan CO, Obun AM, Yusuf MK, Adewumi OO, Oladefedehan AO, Awofolaji AO, Adeniji AA. Effects of residual cyanide in processed cassava peel meals on haematological and biochemical indices of growing rabbits. Proceedings of 35<sup>th</sup> Annual Conference of Nigerian Society for Animal Production. 2012;212.
- Onyeyili PA, Egwu GO, Jibike GI, Pepple DJ, Ohaegbulam JO. Seasonal variation in haematological indices in the grey-breasted guinea fowl (*Numida mealagris Gallata pallas*). Nigerian Journal of Animal Production. 1992;18(2):108-110.

9. Togun VA, Oseni BSA, Ogundipe JA, Arewa TR, Hammed AA, Ajonijebu DC, Mustapha F. Effects of chronic lead administration on the haematological parameters of rabbits – a preliminary study. Proceedings of the 41<sup>st</sup> Conferences of the Agricultural Society of Nigeria. 2007;341.
10. Sembulingam K, Perma S. Essentials of medical physiology, 5<sup>th</sup> edition, Jaypee Brother Medical Publishers Ltd.; 2010.
11. Ashafa AOT, Yakubu MT, Grierson DS, Afolayan AJ. Effects of aqueous extract from the leaves of *Chrysocoma ciliate* L. on some biochemical parameters of Wistar rats. African Journal of Biotechnology. 2009;8(8):1425-1430.
12. Obi HI, Ildigwe EE, Ajaghaku DL, Okonta JM. An evaluation of acute and subchronic toxicities of a Nigerian polyherbal antidiabetic remedy. International Journal of Pharmaceutical Science and Research. 2012;3(9):3131-3135.
13. Sunday RM, Ilesanmi OR, Obuotor EM. Acute and sub-chronic oral toxicity of *Athocleista vogelii* (cabbage tree) root hydroethanolic extract in albino rats. British Journal of Pharmaceutical Research. 2016;12(1):1-9.
14. Lima EBC, Sousa CNS, Meneses LN, Ximenes NC, Santos Junior MA, Vasconcelos GS, Lima NBC, Patrocinio MCA, Macedo D, Vasconcelos SMM. *Cocos nucifera* (L.) (Arecaceae): A phytochemical and pharmacological review. Brazilian Journal of Medical and Biological Research. 2015;48(11):1414-431.
15. Akah PA, Okolo CE, Ezike AC. The haematinic activity of the methanol leaf extract of *Brillantasia nitens* Lindau (Acanthaceae) in rats. African Journal of Biotechnology. 2009;8(10):2389-2393.
16. Okonkwo CC, Njoku UO, Mbah AM. Anti-anaemic effect of methanol seed extract of *Sphenostylis stenocarpa* (African yam bean) in Wistar albino rats. African Journal of Pharmacy and Pharmacology. 2013; 7(45):2907-2913.

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