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Hematological Impact of Ethanolic Extract of Cocos Nucifera in Apparently Healthy Albino Rats

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Abstract | **Background:** Cocos nucifera is widely utilized as a medicinal plant due to its accessibility and diverse therapeutic applications. This study aimed to evaluate the hematological effects of its ethanolic extract in apparently healthy albino rats. **Methods:** Fifty albino rats were randomly assigned into five groups (A–E), with ten animals per group. Groups B, C, D and E received oral doses of 100, 200, 400 and 800 mg/kg body weight of ethanolic extract of Cocos nucifera daily for 14 days, while Group A served as the untreated control. Animals were monitored for physical and behavioral changes throughout the experimental period. At the end of the study, blood samples were collected into Ethylenediaminetetraacetic Acid (EDTA) tubes for hematological analysis and lithium heparin tubes for biochemical assays. Evaluated hematological parameters included Hemoglobin (Hb), Packed Cell Volume (PCV), White Blood Cell Count (WBC), Red Blood Cell Count (RBC), differential Leukocyte Count and Red Cell Indices (MCV, MCH, MCHC). Serum biochemical analyses were performed using commercially available Randox kits. **Results:** Administration of the ethanolic extract of Cocos nucifera husk resulted in a non-significant increase ($p>0.05$) in the evaluated hematological parameters across treated groups compared to controls. These findings suggest that the extract did not produce any adverse alterations in the hematological profile of the animals. **Conclusion:** The ethanolic extract of Cocos nucifera was well tolerated in apparently healthy albino rats and did not significantly affect hematological parameters, indicating its relative safety following oral administration.

Key Words Cocos Nucifera, Ethanolic Extract, Hematological Parameters, Albino Rats, Toxicological Assessment, Red Cell Indices, Experimental Pharmacology, Safety Evaluation

INTRODUCTION

Cocos nucifera (Linn) is an important fruit tree in the world providing food for millions of people especially in the tropical and sub-tropical regions and its many uses [1]. Cocos nucifera is called Kwakwa in Hausa, Agbon in Yoruba, Aki in lgbo and famously known as Coconut in English [2]. Coconut is composed of an epicarp an internal endocarp embryo and endosperm [3]. Coconut husk is full of long, coarse fibres, all running in one direction and embedded in coir dust-like matrix of material [4]. The husk absorbs and retain water due to their porous nature consisting of cellulose, lignin, pyroligneous acid, gas, charcoal, tar, tannin and potassium while the coconut dust content is rich in lignin and cellulose [5]. Coconut milk on the other hand contained a high amount of protein and amino acids as glutamine, arginine, leucine and proline [6]. The coconut palm (Cocos nucifera L.) is a member of the family Arecaceae (palm family), subfamily Arecoideae and the only accepted species in the genus Cocos [7]. This plant has been shown to have many beneficial health potentials amongst which are: antidiabetic [8], cytoprotective, antihyperglycemic [9]. Antithrombic, antioxidant, antiherosclerotic, hypolipidemic [7]. Antimicrobial, antiviral [10] properties etc. Imo *et al.* [11], reported that Cocos nucifera nuts are a good source of energy and could play immunological, physiological, nutritional and pharmalogical roles.

Materials and Methods

The plant material coconut was obtained through purchase from the main market at Akure and also that of Akungba akoko Ondo state. The plant material was

identified by the department of Crop, Soil and Pest management of the Federal university of Technology, Akure. The parts were selected and cleaned. They were sun–dried and pulverized to powder using blender. Extraction process was carried out using modified methods of Odey *et al*. [12].

Experimental Animals

Albino rats weighing 165-224gm were obtained from Department of Animal production and Health of the School of Agriculture and Agricultural Technology of the Federal university of Technology Akure. The animals were kept in 12hrs light and 12hrs dark condition and provided animal feeds and water at 25±20 C till the end of the study. The animal feeds were purchased commercially.

Blood Collection

Following the administration of ethanolic extracts of husk of Cocos nucifera on the experimental animals for 14 days they were starved overnight and sacrificed after anesthesia with chloroform. Two different blood samples were used. Blood collected into Ethylene Diamine Tetra Acetic Acid (EDTA) bottles and used for the haematological analysis while the other bottle was lithium heparin bottle for the serum biochemical parameters. The biochemical tests were performed using RANDOX (UK) commercially manufactured reagent kit.

Statistical Analysis

Statistical analysis of inhibition was subjected to one-way Analysis of Variance (ANOVA) using SPSS software. The result of zones of inhibition were expressed as means and Standard Error of Mean (SEM) Analysis of variance was obtained and the means were separated using DUNCAN new multiple range at $p<0.05$.

Discussion

The results of the study are illustrated in the Tables 1,2. From Table 1, the haemoglobin level and the Packed Cell Volume (PCV) drops when the extracts were introduced this was expected because of displacement and obstruction of the immune system of the albino rats by the introduction of the extracts which was a foreign body. This causes reduction in the delivery of oxygen to tissues cell thereby resulting to tiredness, weakness and inability to effectively engage in physical exercise. This condition correlates with report of Janz, T *et al.* [13]. The study was not in agreement with the report of Imo, C. *et al.* [14], that increase in red blood cell resulted in increase in haemoglobin level. Though the red blood cell is reported to be the animal major means of transporting oxygen as indicated by Oguwike *et al.* [15] that role was not actively performed because of the effect of the extracts on albino rats. The white blood cells increased non-significantly ($p>0.05$) compared to the control animals (Table 2). Imo, C. [16-18] attested to the release of production of white blood cell aided the animal body system to fight infection or ingestion of foreign materials. It has been reported that haematology investigations provide information on the general state of blood including the reticuloendothelial system [19]. Consumption of coconut husk extract in our study is presumed to regulate weight in albino rats considering the difference in weight in treatment and thereafter which is dose-related. This finding is in consonance with the report of 4 that coconut husk may be responsible for the loss in body weight that has been observed in this study. This study negates the report of Costa, C. T.C. [17], who observed a significant increase. Coconut husks is rich in fibre and we are aware that fibre containing diets helps to ease digestion and prevents accumulation of fats in the system it therefore means that the fibre contained in the coconut husk may be partly responsible for the loss in body weight that has been observed in this study. It has also been reported that an animal body mass may be used to monitor and assess the toxicity of any substance which is a vital indicator in toxicity study as attested to by Essien, N.M. *et al.* [19]. The result of the liver marker, enzymes and protein confirm that extracts have liver supporting function as they were within the normal range [20].

Table 1: Effect of Cocos Nucifera Extracts on Blood Parameters of Apparently Healthy Albino Rats

Groups	Erythroytes (x103/µl)	Leucocytes (x103/µl)	Platelets (x103/µl)	Haemoglobin (g/dl)	Haematocrit (%)
Grp 1 (control)	7.73±0.03^{e}	7.63±0.01^{c}	523.00±1.00^{e}	15.50±0.50^{c}	45.50±0.50^{c}
Grp 2 (100mg extract)	6.22±0.02^{b}	8.45±0.03^{e}	464.00±1.00^{b}	12.82±0.18^{ab}	38.50±0.50^{a}
Grp 3 (200mg extract)	6.72±0.02^{c}	6.91±0.02^{b}	475.00±1.00^{c}	13.26±0.26^{ab}	39.21±0.21^{ab}
Grp 4 (400mg extract)	7.42±0.02^{d}	8.06±0.01^{d}	485.50±0.50^{d}	13.44±0.40^{b}	40.50±0.50^{b}
Grp 5 (800mg extract)	6.12±0.02^{a}	6.41±0.01^{a}	456.00±1.00^{a}	12.35±0.05^{a}	37.50±0.50^{a}

Table 2: Mean Value of Serum Biochemical Parameters of Cocos Nucifera Extracts Treatment on Apparently Healthy Albino Rats

Groups	Alanine aminotransferase (µ/L)	Aspartate aminotransferase (µ/L)	Alkaline phosphatase (µ/L)	Total protein (g/L)	Albumin (g/L)	Globulin (g/L)	Urea (mg/dL)
Grp 1 (control)	20.67±0.03^{d}	54.76±0.02^{a}	66.56±0.01^{a}	60.42±0.03^{a}	38.36±0.02^{b}	22.67±0.02^{b}	16.86±0.06^{a}
Grp 2 (100mg extract)	17.54±0.04^{b}	59.36±0.02^{b}	70.61±0.01^{b}	67.69±0.02^{d}	36.72±0.02^{a}	31.27±0.02^{e}	17.39±0.04^{c}
Grp 3 (200mg extract)	17.88±0.02^{c}	59.63±0.01^{d}	73.47±0.02^{d}	65.46±0.01^{c}	40.55±0.01^{c}	25.64±0.04^{d}	17.23±0.03^{b}
Grp 4 (400mg extract)	17.40±0.02^{a}	59.55±0.01^{c}	71.64±0.02^{c}	68.74±0.01^{e}	44.21±0.01^{e}	24.50±0.02^{c}	17.08±0.03^{b}
Grp 5 (800mg extract)	17.92±0.02^{c}	63.43±0.02^{e}	76.77±0.02^{e}	63.82±0.02^{b}	43.65±0.01^{d}	20.39±0.02^{a}	16.82±0.02^{a}

Data are presented as Mean±S.E (n = 3). Values with the same superscript letter(s) along the same column are not significantly different ($p<0.05$)

CONCLUSIONS

This study revealed that the effect of ethanolic extracts on apparently healthy albino rats when administered orally was tolerated and safe it therefore means that husk of coconut extracts can further be processed and exploited for novel research purposes.

Authors Declaration

The authors hereby declare that the work presented in this manuscript is original and that any liability for claims relating to the content of this manuscript will be borne by them.

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