



Effect of Aqueous Leaf Extracts of *Telfeiria Occidentalis* and *Talinum Triangulare* on Some Haematological Parameters of Albino Rats.

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ABSTRACT

The effects of aqueous leaves extracts of *Telfeiria occidentalis* and *Talinum triangulare* on haematological parameters in albino rats were studied using Auto Haematology Analyzer by Mindray BC 2800. Twenty (20) albino rats were randomly distributed into four (4) groups of five (5) rats each. Group 1 served as control and received only standard feed and water, group 2 received 250 mg/Kg of aqueous leaf extract of *T. Occidentalis*, group 3 received 250 mg/Kg of *T. triangulare* and group 4 received 250 mg/Kg mixture of *T. occidentalis* and *T. triangulare* of 1:1 weight by weight for 21 days. Administration of the extracts were done orally. At the end of the treatment period, haematological parameters such as white blood cell count, red blood cell count, platelet count, haematocrit, haemoglobin concentration, mean corpuscle volume, mean corpuscle haemoglobin and mean corpuscle haemoglobin concentration were determined. The results showed no significant change ($p>0.05$) in all haematological parameters except white blood cell count ($p<0.05$) in group 2, 3 and 4 as compared to the control group. In conclusion, the results of the study shows that, the leaf extract of *T. Occidentalis* and *T. Triangulare* administered through the period of this study has positive effect only on the white blood cell count, there was no increase on the other Haematological parameters (RBC, PCV, Hb Conc. and platelet) in the treated rats when compared with the control group ($p>0.05$).

Introduction

Blood and Haematological Parameters

Blood is a vital special circulatory tissue composed of cells suspended in a fluid intercellular substance (plasma) with the major function of maintaining homeostasis (Isaac *et al.*, 2013). Haematological parameters, which consists of red blood cells, white blood cells or leucocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration are valuable in the prognosis, diagnosis and treatment of disease that affects the blood as well as the health status of Wister albino rats (Oyawoye and Ogunkunle, 2004). Red blood cells (erythrocytes) serve as a carrier of haemoglobin. It involved in the transport of oxygen and carbon dioxide in the body. White blood cells and its differentials fight infections, defend the body by phagocytosis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response. Blood platelets are implicated in blood clotting. Low platelets concentration suggest that the process of clot formation (blood clotting) will be prolonged resulting in excessive loss of blood in the case of injury. Packed cell volume (PCV) which is also known as hematocrit (HCT or HT) or erythrocyte volume fraction (EVF) is the percentage (%) of red blood cells in blood (Pieces *et al.*, 2003). Packed cell volume is involved in the transport of oxygen and absorbed nutrients (Isaac *et al.*, 2013). Increased packed cell volume show a better transportation and thus results in an increased primary and secondary polycythemia. Hemoglobin is the iron-containing oxygen transport metalloprotein in the red blood cells of all vertebrates (Martin *et al.*, 1993) with the exception of the fish family, channichthyidae (Sidell and O'Brien, 2006) as well as tissue of invertebrate. Hemoglobin has the physiological function of transporting oxygen to tissue of the animal for oxidation of ingested food so as to release energy for the body functions as well as transport carbon dioxide out of the body of animals (Soetan *et al.*, 2013).

Previous reports stated that packed cell volume, hemoglobin and mean corpuscular hemoglobin are major parameters for evaluating erythrocytes, and are significant in the diagnosis of anemia and also serve as useful indices of the bone marrow capacity to produce red blood cells as in mammals (Awodi *et al.*, 2006). Furthermore, high packed cell volume reading indicated either an increase in number of red blood cells or reduction in circulating plasma volume (Chineke *et al.*, 2006). Mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration indicate blood levels condition. A low level is indication anemia (Aster, 2004).

Ethnomedicine

Regular consumption of plant foods are associated with numerous health benefits rooted in their various physiological effects as a result of their phytochemical and nutritional constituents (Hunter and Fletcher, 2002).

Telfairia occidentalis (family cucurbitaceous) is a typical vine grown in West Africa and highly reputed in traditional medicine (Badifu *et al.*, 1995). Common names for this plant include fluted gourd, fluted pumpkin, and ugwu (in the Igbo language). *T. occidentalis* is traditionally used by an estimated 30 to 35 million indigenous people of Nigeria. However, it's predominantly used by the Igbo ethnic group who cultivate it for food source and traditional medicine. The fluted gourd is noted to have blood tonic property. The leaf of *T. Occidentalis* is rich in essential and non-essential amino acids, vitamins and minerals (Fasuyi, 2006). The nutritional content of this plant makes it desirable as dietary supplements for human. The leaves are widely consumed and used in preparation of soups and salads and also in ethno medicine; the fresh leaves are used in the treatment of anemia, convulsion and malaria. The wide spread consumption of *T. occidentalis* reflect a substantive measure of its nutritional acceptability as a health promoting plant food (Iweala, E.E.J. and Obidoa, O., 2009).

Water leaf, which is botanically known as *Talinum triangulare* is an edible leafy vegetable that belong to the portulacea family. It's an herbaceous perennial plant that normally has its stem evident above ground. The seed usually sprouts as a tiny, aqua colored plant before growing into a more conspicuous plant with larger leaves, this green leafy vegetable is referred to as water leaf due to its high moisture content of approximately 90.8g per 100g of the leaves. This vegetable contain a lot of water and nutrients such as minerals, vitamins, crude fiber, lipids, crude protein and other Which make them nutritious and medicinal in several ways such as;

Enhance cognitive ability because of the presence of certain constituents which helps to improve cerebral blood flow and cognitive function, the presence of iron (Fe) which is a micronutrient found in *Talinum triangulare* help also in the strengthening of the brain muscles and tissues, it also acts as an antioxidant as it prevents oxidative stress caused by the free radicals from damaging the body cells and tissues.

Materials and Methods

Plant Material

The whole plant of both *Talinum Triangulare* and *Telfairia Occidentalis* was purchased from Maggi market Sokoto Nigeria and was identified by a botanist at the Department of Biological Sciences, Usmanu Danfodio University, Sokoto.

The leaves of both *Talinum Triangulare* and *Telfairia Occidentalis* were carefully removed and air dried for some days and was grinded using mortar and pestle into powered form. It was then stored under dry condition until required.

Experimental Animals

A total of twenty (20) Wister albino rats weighing between 150-180g were used for this research. The animals were purchased from Chibuzor a local distributor here in Sokoto, and then it was transported down to Usmanu Danfodio University under good care. The rats were housed in the Animal House of The Department of Biochemistry, Faculty of Science, Usmanu Danfodio University, Sokoto. The animals were kept in cages under normal environmental temperature and were fed with plated feed growers (Vital feeds, UAC foods) and tap water. The rats were allowed to acclimatize before being used for this research work.

Plant Material Extraction

Exactly 30g of grinded leaves of *Talinum triangulare* and *Telfairia occidentalis* were dissolved separately in 800ml of distilled water and left in an air tight aspirator container for 24 hours. The preparation was filtered using muslin cloth and the filtrates were concentrated with the aid of rotary evaporator and drying cabinet at a temperature of 45°C. The extracts were stored in an air tight container properly labeled.

Treatment

A concentration of 50mg/ml of the aqueous plant extract of *Talinum Triangulare* and *Telfairia occidentalis* was prepared by dissolving 1g in 20ml of distilled water. A dose of 250mg/kg body weight was administered in different groups' ad-libitum (orally) daily for 21 days. The blood samples were collected in EDTA containers, Taken to the Haematological department of UDUTH for the estimation of Haematological parameters.

Sample Collection

Standard heparinized micro hematocrit capillary tubes are used for the blood collection, the animals are held by the back of the neck and the loose skin of the head is tightened with the thumb and middle finger. The tip of the capillary tube is placed at the medial canthus of the eye under the nictitating membrane, as soon as the sinus is punctured blood enters the tube by capillary action. When the allowable amount of blood is collected, the tube is withdrawn and slight pressure with a piece of gauze on the eyeball is used to prevent further bleeding. This process is called Retro-orbital Bleeding procedure. The samples were then taken to Haematology Department of Usmanu Danfodio University Teaching Hospital where the assay was carried out.

Result

Table 1, Haematological Parameters of Control and Albino Rats treated with *T. occidentalis* and *Talinum triangulare*.

Group	WBC ($\times 10^3/\mu\text{L}$)		RBC ($\times 10^6/\mu\text{L}$)		HGB (g/dL)	HCT (%)	MCV (fL)	MCH (pg)	MCHC(g/ dL)	PLT ($\times 10^4/\mu\text{L}$)
NC	7.73 \pm	0.46	7.26 \pm	0.41	12.75 \pm 0.9	42.83 \pm 3.59	65.30 \pm 1.79	18.7 \pm 0.49	28.87 \pm 0.22	74.70 \pm 5.73
TO (250mg/Kg)	14.04 \pm	1.65 [*]	7.03 \pm	0.42	12.73 \pm 0. 26	46.07 \pm 1.74	63.63 \pm 1.96	17.87 \pm 0.73	28.27 \pm 0.27	45.73 \pm 8.70
TT (250mg/Kg)	11.21 \pm	1.16 [*]	7.54 \pm	0.74	10.87 \pm 0. 22	41.40 \pm 2.18	60.37 \pm 1.05	16.00 \pm 1.02	26.54 \pm 1.20	57.63 \pm 10.12
M (250mg/Kg)	14.20 \pm	2.16 [*]	8.76 \pm	0.81	14.21 \pm 0. 38	48.63 \pm 1.73	60.50 \pm 1.76	17.23 \pm 0.49	29.23 \pm 0.3 9	70.87 \pm 8.02

KEY: White blood cell (WBC), Red blood cell (RBC), haemoglobin (HGB), Hematocrit (HCT), Mean corpuscles volume (MCV), Mean corpuscles haemoglobin (MCH), Mean corpuscles haemoglobin concentration (MCHC), Platelet (PLT). The values are expressed as Mean Standard error of Mean. Values with superscript (*) are significant different at $p < 0.05$. Statistical analysis of variance (ANOVA) was carried out using Microsoft excel 2010.

NC- Normal control,

TO- *Talfeiria occidentalis*,

TT: *Talinum triangulare*,

M: Mixture of both *Talfeiria occidentalis* and *Talinum triangulare*.

Result Interpretation

The results effects of the aqueous extract of *T. occidentalis* and *T. triangulare* on red blood cell count, white blood cell count, packed cell volume, haemoglobin concentration and platelet count are shown in Table 1. Oral administration of the aqueous extract of *T. Occidentalis* and *T. Triangulare* for three weeks caused gradual but significant increases in the mean RBC count in the treated groups of rats (7.03 \pm 0.42, 7.54 \pm 0.74 and 8.76 \pm 0.81 $\times 10^6$ cells/ul for groups II, III and IV, respectively). There were significant increases in the mean total WBC count in groups II (14.04 \pm 1.65 $\times 10^6$ cells/ul), III (11.21 \pm 1.16 $\times 10^6$ cells/ul) and group IV (14.2 \pm 2.16 $\times 10^6$ cells/ul) when compared with the control group (7.73 \pm 0.46 $\times 10^6$ cells/ul). The mean PCV in the treated rats shows no significant change when compared with the control group. The mean Hb concentration, the mean platelet count in group IV was not significantly different from the control. The results of the study shows that, the leaf extract of *T. Occidentalis* and *T. Triangulare* administered through the period of this experiment has positive effect only on the white blood cell count ($p < 0.05$). There was no increase on the other Haematological parameters (RBC, PCV, Hb Conc. and platelet) in the treated rats when compared with the control group ($p > 0.05$).

Discussion

The use of medicinal plants in treatments of various illness is increasing globally, as it is widely accepted that the use of plants-derived principles will offer access to effective medical care for the treatment and managements of diseases through self-medication (Lawal *et al.*, 2015). It is however, recommended that safety should be the overriding criterion in the selections of these plants for health care needs (Shittu *et al.*, 2015).

The examination of Haematological parameters including the red cells (erythrocytes), white cells (leucocytes) and the platelets (thrombocytes) and factors relating to them, provide information on inflammation, necrosis, various infections of visceral organs and the presence of stress factors (Jurcik *et al.*, 2007; Melillo, 2007; Betancourt-Alonso *et al.*, 2011). It also plays a vital role in the physiological, nutrition and pathological status of an organism (Odeghe *et al.*, 2012). The major functions of the white blood cell and its differentials are to fight infections, defend the body by phagocytosis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response (Lawal *et al.*, 2015).

The significant increase of the white blood cells count caused by the plants extract reflect possible immunomodulatory effects of the extracts which augmented the production of more WBC (Bashir *et al.*, 2015). This will increase the animal's capability of generating antibodies in the process of phagocytosis and have high degree of resistance to diseases and enhance adaptability to local environmental and disease prevalent conditions (Okunlola *et al.*, 2012). While other Haematological parameters shows no significant change.

Conclusion

The result obtained from this experiment show insignificant change in all the Haematological parameters of the treated rats except the White Blood Cell count that shows great change when compared with the control group, these aqueous extracts (*Talfeiria occidentalis* and *Talinum triangulare*) have effects on only the immune system at this oral dosage of 250 mg/kg of body weight.

Recommendations

More research should be carried out using another set of rats to check for Haematological parameters, hepato protective properties, management of cardiovascular diseases using extracts of *Telfairia occidentalis* and *Talinum triangulare*.

Reference

- Al Meslmani, B., Mahmoud, G., Strehlow, B., Mohr, E., Leichtweiß, T. and Bakowsky, U., 2014. Development of thrombus-resistant and cell compatible crimped polyethylene terephthalate cardiovascular grafts using surface co-immobilized heparin and collagen. *Materials Science and Engineering: C*, 43, pp.538-546.
- Apgar, V., 1952. A proposal for a new method of evaluation of the newborn. *Classic Papers in Critical Care*, 32(449), p.97.
- Arayanunes, O., Ganning, B. and Buckleramirez, F., 1991. Gonad maturity, induction of spawning, larval breeding, and growth in the american pearl-oyster (peria-sterina, gould). *california fish and game*, 77(4), pp.181-193.
- Ballard, B.D., Luczak, H.L. and Nowak, C.A., northeastern shrub and short tree identification.
- Bamidele, O., Akinnuga, A.M., Olorunfemi, J.O., Odetola, O.A., Oparaji, C.K. and Ezeigbo, N., 2010. Effects of aqueous extract of *Basella alba* leaves on haematological and biochemical parameters in albino rats. *African Journal of Biotechnology*, 9(41), pp.6952-6955.
- Betancourt-Alonso, M.A., Orihuela, A., Aguirre, V., Vázquez, R. and Flores-Pérez, F.I., 2011. Changes in behavioural and physiological parameters associated with *Taenia pisiformis* infection in rabbits (*Oryctolagus cuniculus*) that may improve early detection of sick rabbits. *World Rabbit Science*, 19(1), pp.21-30.
- Campbell, T. and Ellis, C.K., 2013. *Avian and exotic animal Haematology and cytology*. John Wiley & Sons.
- Etim, N.N., Williams, M.E., Akpabio, U. and Offiong, E.E., 2014. Haematological parameters and factors affecting their values. *Agricultural Science*, 2(1), pp.37-47.
- Frandsen, R.D. and Elmer, H.W., 1981. Anatomy of the male Reproductive system In: Frandsen RD. *Anatomy and Physiology of farm Animals*, pp.430-442.
- Hoffbrand, A.V., Moss, P.A.H. and Pettit, J.E., 2006. *Essential haematology*. Malden, Mass.
- Iweala, E.E.J. and Obidoa, O., 2009. Some biochemical, haematological and histological responses to a long term consumption of *Telfairia occidentalis*-supplemented diet in rats. *Pakistan Journal of Nutrition*, 8(8), pp.1199-1203.
- Jaime, S. and Howlett, J.C., 2008. *Avian Medicine*. Mosby Elsevier (2nd Edition) pp, 46.
- Kay, A.B., 2015. The early history of the eosinophil. *Clinical & Experimental Allergy*, 45(3), pp.575-582.
- Lawal, B., Shittu, O.K., Rotimi, A.A., Olalekan, I.A., Kamooru, A.A. and Ossai, P.C., 2015. Effect of methanol extract of *Telfairia occidentalis* on haematological parameters in wister rats. *Journal of Medical Sciences*, 15(5), p.246.
- Morrison, S.J., Wandycz, A.M., Akashi, K., Globerson, A. and Weissman, I.L., 1996. The aging of hematopoietic stem cells. *Nature medicine*, 2(9), p.1011.
- Onasanya, G.O., Oke, F.O., Sanni, T.M. and Muhammad, A.I., 2015. Parameters influencing haematological, serum and bio-chemical references in livestock animals under different management systems. *Open Journal of Veterinary Medicine*, 5(08), p.181.
- Osho, I.B., Adebayo, I.A. and Ajayi, O.I., 2016. Immunological Evaluation of Antiviral Activity of Methanolic Extract of *Piper guineense* against Newcastle Disease in Experimentally Infected Broiler Chickens. *International Journal of Molecular Veterinary Research*, 6.
- Rifkind, J.M. and Nagababu, E., 2013. haemoglobin redox reactions and red blood cell aging. *Antioxidants & redox signaling*, 18(17), pp.2274-2283.
- Stenesh, J., 1975. *Dictionary of biochemistry* (No. C QP512. S73 1975.). J. Wiley.
- Swarna, J., Ravindhran, R. and Lokeswari, T.S., 2015. Characterization of *Talinum triangulare* (Jacq.) Willd. germplasm using molecular descriptors. *South African Journal of Botany*, 97, pp.59-68.
- Van Besien, K., Bartholomew, A., Stock, W., Peace, D., Devine, S., Sher, D., Sosman, J., Chen, Y.H., Koshy, M. and Hoffman, R., 2000. Fludarabine-based conditioning for allogeneic transplantation in adults with sickle cell disease. *Bone marrow transplantation*, 26(4), p.445.