

Assessment of administration of aqueous extract of *Telfairia occidentalis* and vitamin B complex on haematological parameters and lipid profiles in sprague dawley rats

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Abstract

Objective: This study evaluated the effects of *Telfairia occidentalis* and Vitamin B complex on hematological parameters and lipid profile in *Sprague Dawley* rats.

Methodology: Twenty adult male rats were used. These were divided into four groups; Group A served as control, Group B received *Telfairia occidentalis* extract 25mg/kg orally, Group C received vitamin B complex 9.036 mg/kg and Group D received *Telfairia occidentalis* extract 25mg/kg and vitamin B complex 9.036 mg/kg. All groups were treated for 2 weeks.

Results: Comparatively, there were significant increase in PCV, Hgb, RBC and platelets count in groups treated with *Telfairia occidentalis* compared with control, vitamin B complex increases only the platelets count and no significant difference ($p < 0.05$) in plasma lipids across the groups.

Conclusion: The result of this study indicates that aqueous extract of *Telfairia occidentalis* has the potential to boost hematinic properties but neither *T. occidentalis* nor Vit B Co. has any effect on lipid profile.

Évaluation de l'administration d'un extrait aqueux de *Telfairia occidentalis* et d'un complexe de vitamine B sur les paramètres hématologiques et les profils lipidiques chez les rats sprague dawley

Abstrait

Objectif : Cette étude a évalué les effets de *Telfairia occidentalis* et du complexe de vitamines B sur les paramètres hématologiques et le profil lipidique de rats *Sprague-Dawley*.

Méthodologie : Vingt rats mâles adultes ont été utilisés. Ils ont été répartis en quatre groupes : le groupe A a servi de témoin, le groupe B a reçu 25 mg/kg d'extrait de *Telfairia occidentalis* par voie orale, le groupe C a reçu 9,036 mg/kg de complexe de vitamines B et le groupe D a reçu de l'extrait de *Telfairia occidentalis*. 25 mg/kg et complexe de vitamines B 9,036 mg/kg. Tous les groupes ont été traités pendant deux semaines.

Résultats : Comparativement, il y a eu une augmentation significative du PCV, de l'Hb, des globules rouges et du nombre de plaquettes dans les groupes traités avec *Telfairia occidentalis* par rapport au groupe témoin, le complexe de vitamine B n'a augmenté que le nombre de plaquettes et aucune différence significative ($p < 0,05$) dans les lipides plasmatiques entre les groupes.

Conclusion : Le résultat de cette étude indique que l'extrait aqueux de *Telfairia occidentalis* a le potentiel de stimuler les propriétés hématiniques, mais ni *T. occidentalis* ni Vit B Co. n'ont d'effet sur le profil lipidique.

Mots clés : *Telfairia occidentalis*, complexe vitaminique B, paramètres hématologiques, profil lipidique.

INTRODUCTION

Virtually, all parts of many plants were put to one use or the other on account of their medicinal value. The flowers, stems, berries, back, leaves and seeds of these plants are usually of great value to prevent, relieve and treat illnesses. While many plants are beneficial to man, some others are poisonous, even among the useful ones are side effects in the form of toxicity to one organ, physiological process or the other. More than 50% of all modern clinical drugs are derived from natural products and natural products play an essential role in the development of drug in industry (1-3). Research on biological and chemical activities of plants in the last two centuries have produced compounds necessary for development of modern systemic organic chemistry and the forth coming of medicinally chemistry as a major route for the novel and more potent therapeutic agents (4). As we speak, many scientists and organizations are in quest of local remedies as alternate medicine (5). *Telfairia occidentalis* is one of such plants that has been extensively studied and reported to have great potential and it is of interest in this study.

Telfairia occidentalis is grown in the forest zone of West and Central Africa, especially in Benin, Nigeria and Cameroon (6). Because of its numerous nutritional and medicinal values, the leaf is consumed in different parts of the country (7). The herbal preparation of the plant is being involved in the treatment of several ailments including sudden attack of convulsion, gastrointestinal disorders, malaria and anaemia (8). Free radical scavenging ability and antioxidant property in *Telfairia occidentalis* have been reported by several researchers in the field of medical sciences. *Telfairia occidentalis* leaf has also been reported to lower lipid peroxidation status and elevates antioxidant enzymes both in vitro and in vivo (9-13).

Considering the medicinal and nutritional potential of *Telfairia occidentalis* and the value of Vitamin B complex as a maturation factor essential for development and maturation of red blood cells (RBC) in erythropoiesis; this research was designed to investigate their combined effects on hematological parameters and lipid profile in *Sprague Dawley* rats.

MATERIAL AND METHOD

Plant Materials and Drug

Telfairia occidentalis leaves were obtained locally at Ekpoma Market and certified at

the herbarium in the Department of Botany, Ambrose Alli University. Vitamin B complex was obtained from a local pharmaceutical store.

Extraction of *Telfairia occidentalis* Extract

The preparation of extract was as described by Ekpenyong with little modifications (14). Fresh leaves of the *Telfairia occidentalis* was plucked from the stalk and rinsed to get rid of debris and sand. Thereafter the leaves were air dried in an aerated but shaded area. The dried leaves were ground by an electrical grinder and then sieved to obtain 60 µm powder. The powdered sample was soaked in distilled water (20% W/V) for 48 hours (2 days) with intermittent stirring/shaking. At the end of the extraction, the extract was filtered using muslin cloth to remove all unextractable matters, including cellular materials and other constituents that are insoluble in the extraction solvents. Afterward, the filtrate was concentrated by air drying in a container with wide surface area placed on a water bath set at 40°C.

Experimental Animal

The animals were obtained from the animal house of the college of medicine, Ambrose Alli University, Ekpoma. A total of 20 pubertal male rats weighing between 200 to 250g were used. The rats were kept in cages in the animal house and were allowed acclimatization for 2 weeks before the commencement of the experiment. Room temperature was between 30-31°C while room barometric pressure was 750-760mmHg. The rats were fed with mash bought from Animal Feeds and had free access to water. The rats were weighed for the period of the experiment.

The 20 male rats were divided into 4 groups as follows:

Group A, given distilled water as control

Group B, given *T. occidentalis* extract 25mg/kg (15).

Group C, given vitamin B complex 9.036 mg/kg (16)

Group D, given *T. occidentalis* extract 100mg/kg and vitamin B complex 9.036 mg/kg.

Administration was done orally through the means of a metal cannula for two weeks. The animals were weighed weekly.

Sample Collection

The animals were sacrificed by sedating with chloroform after which dissection and blood sample collection were carried out. They were cut open from linea alba of the abdominal cavity to the

thoracic cavity. Blood sample (5ml) was collected from all the rats through the retro-orbital venous plexus into EDTA tubes for determination of the haematological parameters and for biochemical assays.

Determination of Hematological Parameters

From the blood samples, the hematological parameters were determined using the automated hematologic analyzer SYSMEX KX21, a product of SYSMEX Corporation, Japan employing the methods described by Dacie and Lewis (17).

Biochemical assays

Plasma analysis for total cholesterol (TC), triglycerides (TAG), and HDL cholesterol (HDL-C) were determined by enzymatic method coupled with spectrophotometry using assay kit (Randox Lab. Ltd., Co. Antrim, UK). LDL cholesterol was estimated with the use of Friedewald's formula (18).

Statistical Analysis

The Statistical Package for Social Sciences (SPSS version 20) was used for data analysis. The one-way analysis of variance (ANOVA) was employed for data analysis and where applicable LSD was determined and confidential interval of $p \leq 0.05$ considered statistically significant. Results were presented as mean $\pm$ standard error of mean using suitable tables and charts.

RESULTS

Effect of *Telfairial occidentalis* and Vitamin B Complex on Hematological Parameter

There was significant increase ($p < 0.05$) in pack cell volume (PCV), hemoglobin (Hgb), red blood cell (RBC) and platelets count in the *T. occidentalis* treated group compared with control, and a significant increase ($p < 0.05$) in PCV, RBC and platelets count in group treated with *T. occidentalis*+vit B co. compared with control. The result also showed a significant increase ($p < 0.05$) in platelets count in group treated with vitamin B complex, but significant decrease ($p < 0.05$) in PCV, Hgb and RBC compared with control. However, there was no significant difference in mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) across the groups (Table1).

Effect of *Telfairial occidentalis* and Vitamin B Complex on Plasma Lipids

The result on plasma lipid shows that there was no significant difference in plasma lipids across the groups compared with control (Table 2).

DISCUSSION

Hematological parameters are most consistently affected by dietary influence including RBC, PCV, and plasma proteins (19). The result of this study showed that *Telfairial occidentalis* significantly increased the PCV, Hgb and the platelets count. This is an indication that aqueous extract of *Telfairial occidentalis* has the potential to stimulate increase erythropoiesis in the *Telfairial occidentalis* treated rat. The result of this study is consistent with the report that *Telfairia occidentalis* increased PCV, Hgb and RBC in experimental animals (20-25). It is also in line with the report of an increase in PCV, Hgb and RBC when *Telfairia occidentalis* extract sweetened with milk were served on two severely anaemic paediatric patients (26). However, report credited to Adias *et al.* assert a significant increase in Hgb concentration with no significant difference in the mean PCV level following their study on the effect of *Telfairia occidentalis* extract on routine haematological parameters in acetone-Induced oxidative stress albino rats (27).

The result of this study also showed that *Telfairial occidentalis* as well as vitamin B complex had no significant effect on WBC count compared with control. This findings is similar to the report of Adias *et al.* and Obeagu *et al.*, who had earlier reported no significant increase in the mean level of white blood cell concentration in their studies (22,27).

The result of this study further revealed that both *Telfairial occidentalis* and vitamine B complex significantly increased the platelet count, but had no significant effect on MCV, MCH, MCHC. This is in contrast with the findings of Jovita *et al.*, who repoted a significant increase in MCV, MCH and MCHC in experimental rabbits treated with Telfairial occidentalis for a period of fifty six days (20). Higher platelet count recorded in this study is an indication that the extract and vitamin B complex have the potential to boost the blood haemostatic mechanism. This asertion is in contrast to that reported by Obeagu *et al.*, who reported no significant increase in platelet count in experimental rats treated with Telfairial occidentalis for one week (22).

Telfairial occidentalis has been documented to contain substantial amounts of essential amino acids and iron and this perhaps

explains the mechanism behind the current findings (28,29).

On lipid profile, there was no significant difference in plasma lipids across the groups. Therefore neither *Telfairia occidentalis* nor vitamin B complex appeared to have any possible effect capable of alteration in the lipid profile or control of lipid metabolism. The finding of this study however is not in line with that of Akindele *et al.*, who reported an increase in HDL suggesting a potential cardioprotective ability of the extract at the supra-therapeutic dose (30). The inconsistency in these reports may be attributed to the difference in dosage, method and duration of administration.

CONCLUSION

In conclusion, the results of this study showed that *Telfairia occidentalis* extract significantly increase PCV, Hgb, RBC, platelets count while vitamin B complex increased platelets count only in male sprague dawley rats. The extract and Vitamin B, however had no significant interference on lipid metabolism in sprague dawley rats.

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REFERENCES

1. Stuffness M, Douros J. Current status of the NCI plant and animal product program. *J. Nat. Prod.* 1982; 45: 1-14.
2. Baker JT, Borris RP, Carte B, Cordell GA, Soejarto DD, Cragg GM, Gupta MP, Iwu MM, Madulid DR, Tyler VE. Natural product drug discovery and development: New perspective on international collaboration. *J. Nat. Prod.* 1995; 58: 1325-1357.
3. Cordell GA. Changing strategies in natural products chemistry. *Phytochemistry.* 1995;40: 1585-1612.
4. Roja G, Rao PS. Anticancer compounds from tissue cultures of medicinal plant. *J Herbs, Spices. Med. Plants.* 2000; 7: 71-102.
5. Cortello AR, Pocheltino ML. Plants employed for infusions in urban areas of Argentina. *Pharm. Biol.* 1999; 37: 97-104.
6. Kayode A.A.A. and Kayode O.T. Some medicinal values of *Telfairia occidentalis*: a review. *Am. J. Biochem. Mol. Biol.* 2011; 1:30-38.
7. Akoroda, M.O. Seed production and breeding potential of the fluted pumpkin, *Telfairia occidentalis*. *Euphytica.* 1990; 49: 25-32.
8. Gbile, Z.O. Ethnobotany, taxonomy and conservation of medicinal plants. In *The State of Medicinal Plants.*
9. Kayode, A.A.A., O.T. Kayode and Odetola, A.A. *Telfairia occidentalis* ameliorates oxidative brain damage in malnourished rats. *Int. J. Biol. Chem.* 2010; 4: 10-18.
10. Kayode, O.T., A.A. Kayode and A.A. Odetola. Therapeutic effect of *telfairia occidentalis* on protein energy malnutrition-induced liver damage. *Res. J. Med. Plant.* 2009, 3: 80-92.
11. Oboh, G., E.E. Nwanna and C.A. Elusiyan. Antioxidant and antimicrobial properties of *Telfairia occidentalis* (Fluted pumpkin) leaf extracts. *J. Pharmacol. Toxicol.* 2006; 1: 167-175.
12. Oboh, G. and Akindahunsi, A.A. Change in the Ascorbic Acid, Total Phenol and Antioxidant Activity of Some Sun-Dried Green Leafy Vegetables in Nigeria. *Nutrition and Health.* 2004; 18: 29-36.
13. Oboh, G. Hepatoprotective property of ethanolic and aqueous extracts of *Telfairia occidentalis* (Fluted Pumpkin) leaves against garlic-induced oxidative stress. *J. Med. Food.* 2005; 8: 560-563.
14. Ekpenyong C.E., Akpan E.E., Udoh N.S. Phytochemistry and Toxicity Studies of *Telfairia Occidentalis* Aqueous Leaves Extract on Liver Biochemical Indices in Wistar Rats. *Am J Med Med Sci.* 2012; 2(5): 103-110.
15. Adisa W.A., Otamere H.O., Adesina A.A., Bankole J.K. Attenuating Effect of *Telfairia occidentalis* on Oxidative Stress in Indomethacin-induced Gastric Ulcer in Male Rats. *Niger. J. Physiol. Sci.* 2020; 35: 195 - 201
16. Bassant Ibrahim Bassant Ibrahim Hanan F Al-Saeed Aziza Shalby Aziza Shalby. Cardioprotective effects of vitamin B complex and Ethinyl Estradiol in ovariectomized rats. *J Arab Society Med Res.* 2017; 12(2):39
17. Dacie, J.V. and Lewis SM. *Practical Haematology.* 11th Edn. Elsevier, London, UK. 2002; 380-382.
18. Friedewald WT, Levy R I, Fredrickson D S. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem.* 1972; 18(6):499-502.
19. El-Ratel, I. T., El-Kholy, K. H., Mousa, N. A., & El-Said, E. A. Impacts of selenium nanoparticles and spirulina alga to alleviate the deleterious effects of heat stress on reproductive efficiency, oxidative capacity and immunity of doe rabbits. *Animal Biotechnology.* 2023; 23, 1–14.
20. Jovita Oghenenyerhovwo Sanubi a, Onyeka Marvellous Chukwuma , Ifo Alex Amata , Ijeoma Jane Onwumelu , Ade Samson , Ighobesuo Oghenemarho Benedict , Osuzoka Ngozi Emeka, (2023). Effect of different levels of fluted pumpkin leaf (*Telfairia occidentalis*) in grower rabbit diets: Assessing growth parameters, haematological profiles, and serological responses. *J Agric Rural Devt Tropics*

- Subtropics. 2023; 124 No. 2:189–196.
21. Eze Blessing Chiamaka , Ezejindu Damian Nnabuihe , Ogbodo Emmanuel Chukwuemeka , Ezeugwunne Ifeoma Priscilla, Amah Akuma Kalu, Agada Uchekchukwu Nelson, Onuora Ifeoma Joy, Obi-Ezeani Chikaodili Nwando, Egwuatu Francis Onyedika, Odumodu Ifeakandu Onyedikachukwu. The effects of aqueous leaf extract of *Telfairia occidentalis* (fluted pumpkin) on some hematological parameters in adult female wistar rats. *J Prev Med Holistic Health*. 2019; 5(2):106-109.
22. Obeagu EI, Chikelu IM, Obarezi TN, Ogbuabor BN, Anaebio QB. Haematological effects of Fluted Pumpkin (*Telfairia Occidentalis*) Leaves in Rats. *Int J Life Sci Biotechnol Pharma Res*. 2014; 3(1):1-11.
23. Toma I, Victory NC, Kabir Y. The effect of aqueous leaf extract of fluted pumpkin on some hematological parameters and liver enzymes in 2,4-dinitrophenylhydrazine- induced anemic rats. *Afr J Biochem Res*. 2015; 9(7):95-8.
24. Bashir L, Oluwatosin KS, Agboola AR, Ibrahim AO, Adeniyi AK, Prince CO. Effect of Methanol Extract of *Telfairia occidentalis* on Haematological Parameters in Wistar Rats. *J Med Sci*. 2015; 15(5):246-250.
25. Etim O E, Akpan H D, Usuah J A. Effects of CoAdministration of Aqueous Extracts of *Telferia occidentalis* and *Ageratum conyzoides* On Haematological Indices, Urea and Creatinine in Albino Wistar Rats. *Eur J Biol Med Sci Res*. 2015; 3(4):1-10.
26. Oyedele AO. The Efficacy of Ugu (*Telfairia occidentalis*) In the management of childhood Anemia: A Report of 2 Cases. *Int J Altern Med*. 2007; 4:1540–2584.
27. Adias TC, Ajugwo AO, Erhabor T, Nyenke CU. Effect of Pumpkin Extract (*Telfairia occidentalis*) on Routine Haematological Parameters in Acetone-Induced Oxidative Stress Albino Rats. *Am J Food Sci Technol*. 2013; 1(4):67-9.
28. Mosha TC, Gaga HE. Nutritive value and effect of blanching on trypsin and chymotrypsin inhibitor activities of selected leafy vegetables. *Plant Foods Human Nutr*. 1999; 54:271-83.
29. Fasuyi, A.O. and A.D. Nonyerem. Biochemical, nutritional and haematological implications of *Telfairia occidentalis* leaf meal as protein supplement in broiler starter diets. *Afr. J. Biotechnol*. (2007; 6: 1055-1063.
30. Akindele A. J., Oladimeji-Salami J. A., Oyetola R. A. and Osiagwu D. D. Sub-Chronic Toxicity of the Hydroethanolic Leaf Extract of *Telfairia occidentalis* Hook. f. (Cucurbitaceae) in Male Rats. *Medicines*. 2018; 5(4): 1 – 22.

Table 1: Effect of *Telfairia occidentalis* and Vitamin B complex on Hematological Parameters

Hematological Parameters	Group A (control)	Group B (T. occ)	Group C (Vit B co.)	Group D (T.occ+Vit B co.)
PCV (%)	40.80±1.82	47.60±0.75	37.00±1.87	45.80±1.65 ^c
HB (g/dl)	13.86±0.076	16.08±0.11	12.32±0.65	15.12±0.46
WBC (103/ul)	94.20±9.98	107.20±20.55	20.827±9.314	34.40±15.386
RBC (106/ul)	4.08±0.2596	4.92±0.06	3.72±0.166	4.60±0.1581 ^c
Platlets (103/ul)	115.4±14.20	220.6±17.19	222.8±26.91	298.2±45.51
MCV (fl)	101.40±1.17	98.80±1.02	98.60±1.47	99.20±1.66
MCH (pg)	33.20±0.86	32.60±0.40	32.60±0.40	32.80±0.735
MCHC (%)	33.20±0.20	32.20±0.80	33.40±0.25	32.00±0.00

Values are means ± SEM. superscript indicates significant difference at P<0.05 compared with Control A; indicate significant difference at P<0.05 compared with Group B; indicate significant difference at P<0.05 compared with Group C.

Table 2: Effect of *Telfairia occidentalis* and Vitamin B complex on Plasma Lipoids

Plasma Lipids	Group A (control)	Group B (T. occ)	Group C (Vit B co.)	Group D (T.occ+Vit B co.)
T.cholesterol(mg/dl)	61.40±18.93	140.20±31.31	146.40±11.94	149.31±15.32
TAG (mg/dl)	167.80±15.15	121.40±16.19	133.80±28.55	141.02±13.22
HDL (mg/dl)	35.20±2.85	42.60±2.96	38.60±3.36	38.8±3.25
LDL (mg/dl)	108.00±6.92	83.00±12.42	80.00±13.07	90.33±11.65

Values are means ± SEM.