International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Comparative Study of the Effects of Crude Extract of *Telfairia Occidentalis*, Ferrous Sulphate and Folic Acid on Haematologic Indices in Albino Rats

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ABSTRACT

Background: *Telfairia Occidentalis* (Fluted Pumpkin) fondly referred to as "Ugwu" by the people of South Eastern part of Nigeria is highly cherished for its leave and seed in Nigeria. It is claimed that fluted pumpkin leaves have some medicinal values. Objective: The aim of this study is to compare the haematological effects of *Telfairia Occidentalis* (Fluted Pumpkin) with those of Fersolate (Ferrous Sulphate) and Folic acid.
Method: Twenty Albino rats weighing between l50-180 grams were randomly divided into five groups of four animals each. After one week in the Laboratory, group I (control) animals received animal feeds and tap water, Group II animals received animal feeds mixed with crude extract of leaves of T *Occidentalis*, group III received Ferrous Sulphate with animal feed. Group IV received folic acid with animal feed, Group V received a combination of fersolate (32mg/g b.w) and Folic acid (0.8mg b.w) with the animal feeds. Blood was collected from all the animals on day 0 (pretreatment), days 14 and 30 and analyzed for RBC, WBC, PCV and Hemoglobin Concentration.
Results: *Telfairia Occidentalis* caused a significant increase (P<0.05) in red blood cell concentration. The effect on RBC was statistically higher (P<0 05) on day 14 than day 0. *T. Occidentalis* also caused a significant increase in RBC, WBC, PCV and HB concentration on day 30 of the experiment (P<0.05). The result also showed that *T Occidentalis* significantly increased haematopoiesis than either Fersolate or Folic acid singly or combined. (P<0.05).
Conclusion: *T Occidentalis* has a definite and significant haematopoietic function which is better than the effect of either of the conventional haematinics (Fersolate and Folic acid). Red blood cell concentration was the most sensitive to the effect of *T Occidentalis*.

Keywords: *Telfairia Occidentalis*, haematopoietic, Fersolate, folic acid

1. INTRODUCTION

Telfairia Occidentalis (Fluted Pumpkin) fondly referred to as "Ugwu" by the people of South Eastern part of Nigeria is highly cherished for its leave and seed in Nigeria. [1] It is claimed that fluted pumpkin leaves have some medicinal values [2,3] and due to its high iron content, is also helpful in pregnancy and patients with sickle cell anaemia [4] and other anaemias. [3,5] Anaemia has become a major public health problem and is the most frequently observed nutritional diseases in the world, especially prevalent in women of reproductive age, especially in pregnancy. [6] Some known causes are; inadequate intake and poor

absorption of iron, malaria, hookworm infestation, diarrhoea, HIV/AIDS and other infections, genetic disorders such as sickle cell and thalassemia, heavy menstrual bleeding, pregnancy and frequent child birth and haemorrhage as a result of labour and delivery. [7] Iron deficiency anaemia afflicts large population groups in the world. It is prevalent amongst vulnerable infants, adolescent girls and pregnant women particularly in populations subsisting largely on plant food sources. [5] While folic acid deficiency has been implicated as a modulating factor in renal anaemia [8] and as such it is usually recommended in patients suffering from anaemia, while iron deficiency can be easily corrected with fersolate. [9] Folic acid, an essential B vitamin is important for cell division, neural development and maternal intake of folic acid supplements can reduce risk of children born with neural tube defects [10] Other rich sources of folic acid are yeast, liver, kidney and green vegetables. [11] Haematopoiesis is the process by which the cellular elements of the blood are formed. The three main types of cells are the red cells (erythrocytes), which serve to carry oxygen, the white cells (leukocytes), which function in the prevention of and recovery from disease, and the thrombocytes (platelets), which function in blood clotting. [12] Studies have been carried out on the phytochemistry and composition of fluted pumpkin. [13-17]

The proximate composition of *Telfairia occidentalis* is:

Composition	Moisture	Ash	CrudeFibre	Crudelipid	CrudeProtein	CHO
Mg/100g	83.3	1.50	1.99	0.64	5.67	5.51

CHO - Carbohydrate [17]

Microelement and vitamin composition of *Telfairia occidentalis*

Composition	Iron	Mn	Nickel	Vit. A	Vit. B	Vit. C
Mg/100g	0.60	0.20	0.30	0.024	0.038	2.73

Mn – Manganese, Vit. A – Vitamin A, Vit. B – Vitamin B, Vit. C - Vitamin C [17]

Percent dry weight concentration of Calcium, Iron, Phosphorus, Potassium and Nitrogen of *Telfairia occidentalis*:

Macroelement	Calcium	Iron	Potassium	Phosphorus	Nitrogen
% Dry Weight	0.97	0.023	1.22	0.047	3.83

[16]

[18] reported a significant increase in haematocrit and reticulocyte count in rabbits following a two weeks administration of crude extract of fluted pumpkin. There is still paucity of literature on the haematological effects with existing or known haematinics. Consequently it was devised to further investigate the haematological effects of the dry leave of the plant on the blood cells of Albino rats and also to compare such effects with those of popular haematinics (ferrous sulphate and Folic acid)

2. METHODOLOGY

Experimental Animals

Twenty Albino rats weighing between 150-180gm were used for the experiment. They were divided into five groups of four animals each (Groups i - v).

All groups were fed initially with commercial feed daily and tap water provided ad *libitum* prior to the commencement of the experiment they were preconditioned for one week.

Preparation of *Telfairia occidentalis* leaves

Fluted pumpkin leaves with voucher number 22628 and collected from the herbarium of the Biological Science Department of Ahmadu Bello University Zaria was sundried and then crushed and grinded with mortar and pestle. Measured dried weight of the leaf was then mixed with feed of the animals in group II.

Drugs Used

Folic acid (5mg) (Juhel Nigeria Limited, Enugu, Nigeria) and Fersolate (200mg) (Siglet Pharmaceuticals, Bombay) were of analytical grade.

Experimental Design

Twenty albino rats of both sexes were divided at random into five groups of

four animals each. Rats in group one were fed with only normal pelletised growers mash and tap water for 30 days. Rats in group two were administered with 10mg/kg body weight of dry *Telfairia occidentalis* mixed in their feed for 30 days. Rats in group three were administered with 30mg/kg of Fersolate mixed in their feed (Siglet Pharmaceutical India) daily for 30 days. Rats in group four were administered with 0.8mg/gram body weight of Folic acid (Juhel Pharmaceutical Nigeria) mixed in their feed for 30 days. Rats in group five had their feed mixed with both Folic acid (0.8mg/kg body weight) and ferrous Sulphate (32mg/gram body weight) daily for 30 days.

Ethical Consideration

Ethical clearance was received from the Faculty of Veterinary Medicine, Ahmadu Bello University Zaria.

Preparation of Fersolate and Folic Acid

200mg tablets of Ferrous Sulphate (Siglet Pharmaceuticals, Bombay, India) and 5mg tablets of Folic acid tablets (Juhel Pharmaceutical, Enugu, Nigeria) were also grinded and mixed with feed for animals in group III and IV at a dose of 32mg/gram body weight and 0.8mg/gram body weight respectively.

Blood Sample Collection

At the end of initial similar feeding, three blood samples were collected from the tails of all the animals on day 0 (Pretreatment) 14^{th} and 30^{th} days. About 5ml of blood samples were collected into EDTA containers by cruelty little portion at the end of the tail with a sharp scissors.

Sample Analysis

Red blood cell counts, and white blood cell count, were estimated using Neubauer Haemocytometer as described by, [19] Packed cell volume and Haemoglobin concentrations were estimated using the method of. [20]

STATISTICAL ANALYSIS

The mean values RBC< WBC<PCV and HB obtained for all the groups and days were analysed using Analysis of Variance (ANOVA) and All Pair Wise Multiple Comparison Procedure (Tukey test).

RESULTS

The results obtained from this study are presented in figures 1 to 4.

Effect on Red Blood Cell Indices

There was no significant difference in the red blood cell indices between the controls and experimental animals on day 0. However on the 14^{th} day, RBC concentration of $5.89\pm0.08x10^6/mm^3$ in *T. Occidentalis* (TO) treated group was significantly higher than values obtained in control group and group treated with fersolate and folic acid ($p<.001$). Red blood cell concentration significantly increased to $7.08\pm0.26x10^6/mm^3$, $p<0.001$ on the 30^{th} day of administration of TO. This value is also significantly higher than RBC values in the control and groups treated with folic acid and fersolate separately or combined ($p<0.001$) (see figure 2 and table 3).

Packed Cell Volume and Haemoglobin

Figures 1 and 3 and table 2 show that Packed cell volume (PCV) and haemoglobin concentration were similarly increased by TO from day 0 to day 30 while folic acid and fersolate singly or combined also significantly increase PCV and Hb concentration on day 30.

White Blood Cell Concentration

Administration of crude extract of TO significantly increased total WBC from 6,980.46±250.40 on day 0 to 9,550.165± 786.65 on day 14 and 11,550.52±332.3 on day 30 ($p<0.001$) these increases are significantly higher than values obtained in control and animals treated with folic acid and fersolate administered singly or combined $p<0.001$. In addition, fersolate and folic acid singly or combined significantly increased total white blood cells when compared with values obtained from the control, $p<0.05$. See table 1 and figure 3

Table 1: Menu + (SEM) of Haematological indices on Day 0 Groups

Indices	I Control	II T.occidentalis	III FS	IV FA	V FS+FA	VI P.Value	Remarks
RBC ($x10^6$/mm)	4.20 (0.07)	4.17 (0.07)	4.22 0.07	4.30 0.08	4.24 0.07	0.443	N/S
WBC (xmm3)	7775 (209)	6980 (250)	6612 (313)	7349 (356)	6738 (422)	0.180	N/S
PCV (%)	37.8 (0.9)	35.0 (1.8)	38.0 (1.1)	35.8 (0.3)	38 (0.9)	0.245	N/S
Hb (9/01)	14 (0.41)	13.9 (0.3)	14.3 (0.3)	13.8 (0.5)	13.9 (0.5)	0.890	N/S

N/S- Not Significant

Table 2: Menu + (SEM) of Haematological indices on Day 14 Groups

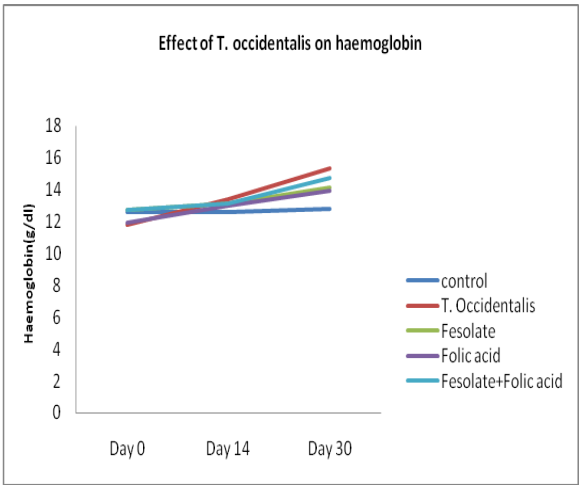
Indices	I Control	II T.Occidentalis	III FS	IV FA	V FS+FA	VI P. Value	Remarks
RBC ($x10^6$/mm)	5.09 (0.06)	5.89 (0.08)	4.44 (0.19)	4.80 (0.16)	5.19 (0.27)	<0.001	S
WBC (xmm^3)	7775 (236.7)	9550a (786)	8700a (363)	8763a (432)	8300 (209)	0.137	N/S
PCV (%)	37.8 (0.63)	40.3 (0.63)	39.0 (0.48)	39.0 (0.65)	39.3 (0.48)	0.079	N/S
Hb (9/01)	14 (0.41)	14.6 (0.24)	14.3 (0.14)	14.4 (0.24)	14.5 (0.20)	0.370	N/S

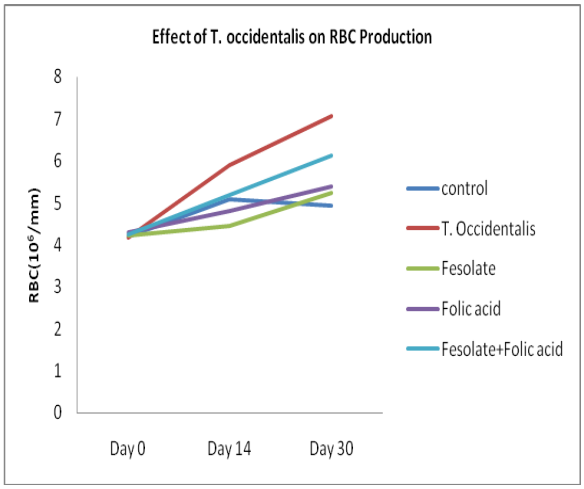
FS, FA. II & III, II & IV, II & I, V & III

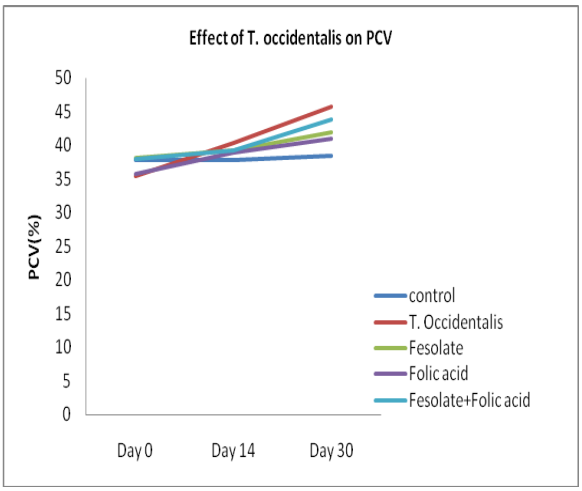
Table 3: Menu + (SEM) of Haematological indices on Day 30 Groups

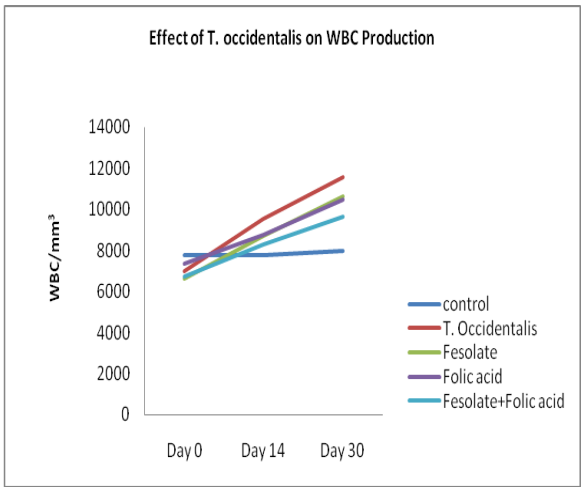
Indices	I Control	II T.Occidentalis	III FS	IV FA	V FS+FA	P.Value	Remarks
RBC ($x10^6/mm^3$)	4.93a (0.10)	7.08a (0.26)	5.24a (0.19)	5.40a (0.16)	6.12 (0.06)	<0.001	S
WBC (xmm^3)	7988b (208.9)	11550b (332.3)	10638b (438)	10488b (354.3)	9625 (863.7)	0.002	S
PCV (%)	38.5c (10.65)	45.8 (1.11)	42.3 (0.08)	41.6 (1.49)	43.8 (0.49)	0.009	S
Hb (g/dl)	12.83d (0.24)	15.27 (0.41)	14.1 (0.29)	13.87 (0.31)	14.66 (0.63)	0.010	S

RBC: II>I, II>III, II >IV, (P<0.05) II V>I (p<0.05)
WBC: II >I, = III>I, =IV>I (p<0.05)
PCV: II>I (P<=0.05)
Hb: II>I (P<0.05)









DISCUSSION

Our result shows that *T Occidentalis* significantly increased RBC concentration in the animals. This increase becomes noticeable on day 14 of the experiment. Red blood cell concentration appears to be the most sensitive blood parameter to the effect of T. *Occidentalis.* By day 30 of the experiment, all the parameters studied (RBC, WBC, PCV, HB) were significantly increased by T. *Occidentalis.* The results also showed that *T Occidentalis* significantly increased haematopoiesis than either Fersolate or Folic acid.

A combination of Fersolate and Folic acid caused a significant increase in haematopoiesis. The increase caused is lower than that of T. *Occidentalis* (though not statistically significant). Studies in Phytochernistry and composition of T. *Occidentalis* showed that it contains high concentration of protein (30-37.3%) in addition to Folic acid and Fersolate. [17,16] The above findings confirmed that preliminary findings of [18] and the observation of. [4]

CONCLUSION

We conclude that T. *Occidentalis* has a definite and significant haematopoietic function, which is better than the effect of either of the traditional haematinics - (Fersolate and Folic acid). Red blood cells are most sensitive to the effect of T. *Occidentalis.*

ACKNOWLEDGMENT

The authors wish to acknowledge the assistance of the staff of department of Human Physiology Ahmedu Bello University, Zaria, Nigeria.

Conflicts Of Interest

All the authors do not have any possible conflicts of interest.

REFERENCES

1. Okoli, B.E and Mbeogu, L.M. (1983). The fibre content of fluted pumpkin *Telfairia. Occidentalis.* Tropical crops in Economic Botany 37 (2) 145-149.
2. Ladeji, O. Z., Okoye, S. C and T. Ojobe. (1995). Chemical evaluation of the nutritive value of leaf of fluted pumpkin (*Telfairia occidentalis*). Food Chemistry, 53:353-355.
3. Ajibade, S. R., Balogun, M. O., Afolabi, O. O and. Kupolati, M. D. (2006). Sex differences in biochemical contents of *Telfairia occidentalis* Hook F. J of Food. Agric and Envt, 4 (1): 155-156.
4. Kafaru, E., (1998). Medical values of fluted pumpkin *Telfairia occidentalis.* Guardian Newspaper. Vol. No.26.
5. Hamlin, F and Latunde, G. O. (2011). Iron bioavailibity from a tropical leafy vegetable in anaemic mice, *Nutr Metabolism* (Lond) 8:9
6. Nadeem A. (2010) The prevalence of anaemia and associated factors in pregnant women in a rural Indian community Australasian Medical Journal (Online) Author: Ahmad. Published April 15, 2012
7. Tolentino K and Friedman, J. F. (2007). An Update on Anemia in Less Developed Countries. *Am. J. Trop. Med. Hyg*,; 77(1): 44-51
8. Drueke, T. (2001). Hyporesponsiveness to recombinant human erythropoietin. *Nephrol Dial Transplant* 16 [Suppl 7]: 25–28
9. Beaudin, A. E., Abarinov, E. V., Malysheva, O., Caudill, M and Stover, P. J. (2012). Dietary folate, but not choline, modifies neural tube defect risk in *Shmt1* knockout mice. *Am J Clin Nutr* 95 (1): 109-114
10. Goodman, L. S and Gilman, A. (1990). Folic acid, vitamin B_{12} and ferrous sulphate in the pharmacological basis of therapeutics (Palmer T, Alan S, Theodore W, Alfred G and Gilman eds) 8^{th} edition printed in U. S. A 1289 - 1306
11. Rebollo, A and Schmitt, C. (2003). Ikaros, Aiolos and Helios: Transcription regulators and lymphoid malignancies. *Immunology and Cell Biology* 81 (3): 171–175.
12. Ade-Ademilua O. E., and Adesanya, O. A. (2009). Growth and Nutritional Content of *Telfairia occidentalis* in Response to Irrigation Regime. *Intl. J. Veg. Sci.*, 15 (3): 293 - 302
13. Fasuyi, A. O. (2007). Bio-nutritional evaluations of three tropical leaf vegetables (*Telfairia occidentalis, Amaranthus cruentus and Talinum triangulare*) as sole dietary protein sources in rat assay. *Food Chemistry*, 103 (3) 757 – 765

14. Agatemor, C, (2006). Nutritional Composition of Fluted Pumpkin (*Telfairia Occidentalis* Hook F.) Seed. Electron. *J. Environ. Agric. Food Chem*, 3 (1): 7-10
15. Ndiokwere. L. (l984). Analysis of various Nigerian foodstuffs, crude protein, mineral contents by neutron activation. *Food Chemistry* (9) 100
16. Ogundapo, S. (1998). Phytochemistry of fluted pumpkin *Telfairia occidentalis.* In proximate composition and micronutrient analysis of fluted pumpkin (*T. occidentalis*). *Leaves.* 2 24- 25.
17. Ajayi, O. I., Ajayi, T. C., Omokaro, E. U and Halim, N. K. D. (2000)*:* Erythropoietic value of pumpkin leaves Extract *(Telfairia occidentalis)* in, Rabbits - A preliminary Study. *Nigerian. Journal of Physiological Sciences* 16(1 -2): 1-3.
18. Adelaiye A. B. (1998): Determination of Red Blood Cell Count. White Blood Cell Count, Haemoglobin concentration and packed cell volume in. Review of Medical Physio1ogy practical. REMI Int. Ltd. Zaria, Nigeria.
19. Dacie, J.V. and Lewis, S.M. (1991). Practical Haematology. 7th Edition, Churchill Livingstone, London, pp. 659-661.
20. Esaba, R.A. (1982). Vegetative Propagation of Fluted Pumpkin *(Telfairia occidentalis). Bulletin* 6.

How to cite this article: Avidime OM, Goji ADT, Olorunshola KV et al. Comparative study of the effects of crude extract of *telfairia occidentalis,* ferrous sulphate and folic acid on haematologic indices in albino rats. Int J Health Sci Res. 2018; 8(5):17-22.

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