

The effects of aqueous leaf extract of *Telfaira occidentalis* (fluted pumpkin) on some hematological parameters in adult female wistar rats

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Abstract

Telfaira occidentalis (fluted pumpkin) has been shown to contain bioactive substances which may possess medicinal potentials. The aim of this study was to assess the effect of aqueous leaf extract of *Telfaira occidentalis* on the levels of packed cell volume, Hemoglobin, Red blood cell and White blood cell in wistar rats. A total of sixteen female rats weighing between 140-240g were divided into four groups (1-4) comprising of four (4) rats each. Group 1 (control), received normal rat feed with water only, while group 2-4 were administered with 150mg/kg, 300mg/kg and 600mg/kg body weight of aqueous leaf extract of *Telfaira occidentalis* orally for 28days respectively. Thereafter, blood samples from the experimental animals were assayed for the packed cell volume (PCV), Hemoglobin (Hb), Red blood cell (RBC) and White blood cell (WBC) concentrations using Mythic 22 automated hematology analyzer. The result indicates that the concentrations of blood indices of the rats in the experimental groups were significantly increased than in the control in each case ($p < 0.05$). Hence, *Telfaira occidentalis* may be useful as an acceptable blood booster in an anaemic condition as it possess haematinic properties.

Keywords: *Telfaira occidentalis*, Packed cell volume, Hemoglobin, White blood cell, Red blood cell, Haematinic properties.

Introduction

Telfaira occidentalis are important component of many Nigerian diets and forms an essential source of valuable nutrients such as protein, mineral, vitamins, and fibre especially in rural areas.¹ It is one of the most commonly consumed leafy vegetables in Nigeria and belongs to the plants family called Cucurbitaceae which thrives well in many parts of West Africa, and is mainly cultivated in Igbo-land, southeastern Nigeria, where it is used primarily in soups and herbal medicines.² Previously, the consumption of fruits and vegetables has been linked with reduced risk of chronic diseases,³ and *T. occidentalis* is one of such plants with so much acclaimed medicinal potentials. The leaves of this plant are rich in mineral elements as well as antioxidants.^{4,5} Phytochemically, it contains tannins, alkaloids, terpenoids, and flavanoids, saponins.⁶⁻⁹ *Telfaira occidentalis* has also been implicated in the treatment and management of some chronic and inflammatory conditions.¹⁰⁻¹⁴

Anaemia is a serious health problem in many tropical countries like Nigeria due to the fact that malaria is endemic in this region. Importantly, a number of studies have shown the ameliorative effect of *T. occidentalis* in combating anemia via its haematopoietic potentials.¹⁵⁻¹⁸ Hence, the need for the study.

Materials and Methods

Site of the Study

This study was carried out in the Animal House of Human Anatomy Department, Nnamdi Azikiwe University, Nigeria.

Collection of *Telfaira occidentalis*

Fresh *Telfaira occidentalis* leaves were hand-picked randomly from different local farms in Nnewi, Anambra state of Nigeria in the Month of June, 2018. It was air dried at room temperature and was ground until a fine powder was obtained to ensure homogeneity. The powder was sieved through mesh sieves to remove any coarse/unwanted particles. The sieved powder was then stored in airtight plastic containers.

Preparation of *Telfaira occidentalis* aqueous leaves extract

The fresh leaves were rinsed to ensure that it was free of sand and potential dirt and oven dried at 40°C and grinded into fine powder using electric blender giving a weight of 865g. This was soaked in 2 liters of distilled water and allowed overnight for about 12 hours and stirred at intervals. The mixture was then sieved and the filtrate heated in water bath at 40°C to obtain a solid extract. The solid extract was weighed with an electronic weighing balance and the stock solution was prepared by dissolving 2g of extract in 10ml of water. The solution was refrigerated and preserved at 4°C until required for use, with appropriate labelling.

Experimental animals and study design

The research was done with 16 adult female wistar rats. The rats were bought from a local farm at Nnewi, Nigeria. They were housed in four standard cages containing 4 animals each. The animals were provided with food and water at intervals as much as necessary. Prior to the commencement of the experiment, the animals were pre-conditioned for one week. The animals in group 1, served as the Control group whereas group 2-4 served as the Test groups respectively.

Exposure of the animals to test substance

The administration of aqueous *Telfaira occidentalis* leave extract was done as follows

Group 1-(Control) received only water and feed for four weeks

Group 2 received only 150mg/kg body weight everyday for four week

Group 3 received only 300mg/kg body weight everyday for four week

Group 4 received only 600mg/kg body weight everyday for four week

All administration was done with syringe and oral cannula.

The rats were sacrificed after 28 days of administration. Blood samples for the assaying of PCV, Hb, RBC and WBC were obtained into an EDTA container and were assayed for using Mythic 22 automated hematology analyzer.

Data analysis

The data obtained was presented as mean \pm SEM and were compared by one way analysis of variance and t-test using Statistical package for social sciences (SPSS) (Version 23) software and was deemed significant at $P<0.05$.

Results

The result of analysis of variance showed that the mean concentrations of PCV and Hb were significantly different amongst the group ($F=1.047$; 0.832), ($P<0.05$) respectively. The mean (\pm SEM) concentration of PCV in the animals in the treatment groups 2 to 4 were significantly increased than in control animals ($p<0.05$). Also, there were significant increases in the mean Hemoglobin (Hb) concentration of the animals in the treatment groups; 2 (12.06 ± 0.20), 3 (12.50 ± 0.46) and 4 (13.00 ± 0.75) respectively than in control (11.00 ± 1.24), ($p<0.05$). See table 1.

Collection of blood Samples and laboratory analysis

Table 1: Effect of *Telfaira occidentalis* on packed cell volume and hemoglobin levels after 28 days of treatment

| | | Mean | \pm SEM | P-value | F-value |
|----------------------|-------------------|-------|------------|---------|---------|
| Pack Cell Volume (%) | Group 1 (control) | 37.66 | ± 3.75 | | |
| | Group 2 | 38.00 | ± 0.57 | 0.022* | 1.047 |
| | Group 3 | 37.70 | ± 1.45 | 0.000* | |
| | Group 4 | 39.00 | ± 2.30 | 0.004* | |
| Hemoglobin (g/dL) | Group 1 (control) | 11.00 | ± 1.24 | | |
| | Group 2 | 12.06 | ± 0.20 | 0.021* | 0.832 |
| | Group 3 | 12.50 | ± 0.46 | 0.010* | |
| | Group 4 | 13.00 | ± 0.75 | 0.000* | |

*Statistically significant at $p<0.05$.

The result of analysis of variance showed that the concentration of RBC and WBC were significantly different amongst the group ($F=13.820$ and 200.112), ($P<0.05$) respectively. The mean (\pm SEM) of RBC (%) levels of the rats in the treatment groups 2, 3, and 4 were significantly increased than in the control group ($p<0.05$) respectively. Also, there were significant increases in the mean WBC concentration of the animals in the treatment groups; 2 (6.50 ± 0.17), 3 (7.25 ± 0.14) and 4 (9.05 ± 0.08) compared to control (5.80 ± 0.34), ($p<0.05$). See table 2.

Table 2: Effect of *telfaira occidentalis* on red blood cell and white blood cell levels after 28 days of treatment.

| | | MEAN | \pm SEM | P-Value | F-Value |
|--------------------------------------|-------------------|------|------------|---------|---------|
| Red Blood Cell ($\times 10^6/L$) | Group 1 (control) | 3.26 | ± 0.45 | | |
| | Group 2 | 4.01 | ± 0.05 | 0.001* | 13.820 |
| | Group 3 | 4.03 | ± 0.13 | 0.015* | |
| | Group 4 | 4.33 | ± 0.33 | 0.002* | |
| White Blood Cell ($\times 10^9/L$) | Group 1 (control) | 5.80 | ± 0.34 | | |
| | Group 2 | 6.50 | ± 0.17 | 0.000* | 200.112 |
| | Group 3 | 7.25 | ± 0.14 | 0.000* | |
| | Group 4 | 9.05 | ± 0.08 | 0.000* | |

*Statistically significant at $p<0.05$.

Discussion

The use of plants as source of remedies for the treatment diseases can be traced back to the prehistoric times.¹⁹ According to the World Health Organization (WHO), between 65% and 80% of the populations of developing countries currently use medicinal plants as remedies,²⁰ and medicinal plants would be the best source to obtain a variety of drugs.²¹

In this study, the PCV and Hb concentration in experimental animals were significantly higher than in control. This is in keeping with previous findings of similar studies,^{16-18,22} Also, the work of Oyediji,²³ who reported an increase in PCV of two severely anaemic paediatric patients when served with *Telfairia occidentalis* extract sweetened with milk is also in consonance with the present finding. Again, it has been documented to contain substantial amounts of essential amino acids and iron and this perhaps explains the mechanism behind the current findings.^{1,24} However, Adias *et al.* had earlier recorded a significant increase in Hb concentration with no significant difference in the mean PCV level following their study on the effect of pumpkin extract (*Telfairia occidentalis*) on routine haematological parameters in acetone-Induced oxidative stress albino rats.¹⁵

Furthermore, the white blood cell and red blood cell concentrations raised in groups administered with *T. occidentalis* extract than in the control. The present study results are congruent with the works of some previous similar studies.^{17,18} However, in contrast to our present finding, some authors had earlier reported no significant increase in the mean level of white blood cell concentration in their studies.^{15,16} The increase in haematological parameters investigated could be as a result of some constituents such as iron and some B complex vitamins which it possesses.²⁵

Conclusion

The PCV, Hb, RBC and WBC levels of the experimental animals were significantly increased than in the control after the duration under study. Hence, *Telfairia occidentalis* may be useful as an acceptable blood booster in an anaemic condition as it possess haematinic properties.

Source of funding

None.

Conflict of interest

None.

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