Pharmacological Assessment of Anti-anaemic Activity of Aqueous Leaves Extracts of *Telfairia occidentalis* and *Spondias mombin* in Rats

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**Abstract**

To investigate the anti-anaemic activity of aqueous leaves extracts of *Telfairia occidentalis* and *Spondias mombin* on experimental rats. The aqueous leaves extracts of *T. occidentalis* and *S. mombin* were obtained by cold maceration and processed for 48 h. The chloramphenicol model for experimental induction of anaemia in rats was employed. Anti-anaemic activity was determined by measuring haematological parameters of packed cell volume (PCV), haemoglobin count (Hb) and white blood cell count (WBC). The PCV and Hb levels of extracts treated rats were significantly (*p* < 0.05) increased compared to control group. The aqueous extract of *T. occidentalis* produces higher anti-anaemic activity compared to *S. mombin*. The decrease in WBC level was recorded with both extracts. The leaves extracts of *T. occidentalis* and *S. mombin* possess anti-anaemic activity, and validated their uses as haematinics by traditional healers.

**Keywords:** *Telfairia occidentalis*, *Spondias mombin*, aqueous extract, hematological parameters, anti-anaemic activity

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1 Introduction

Many plants have been listed as remedies for anaemia in the Nigerian traditional medicine including *Spondias mombin*, *Khaya grandifoliola*, *Telfairia occidentalis*. These plants extracts are sometimes prepared as polyherbal mixtures. Though most of the remedies have shown positive pharmacological activities with European scientific method, yet a lot of them lack scientific proof and are used superstitiously. For instance, despite being listed as remedy for anaemia, *Khaya grandifoliola* has been scientifically proven to lack anti-anaemic effect. In view of the economic importance of this disease in developing countries prompted by lack of good diet, the aim of the study was to investigate the scientific basis for the folkloric use of, as well as compare *T. occidentalis* and *S. mombin* in the treatment and prevention of anemia by traditional healers.

*Spondias mombin* belongs to the family Apacardiaceae, and it is a tropical tree up to 20 m tall, bearing blunt spines or knobs, growing easily from stakes for making fence and enclosure. *S. mombin* leaves have been reported to be excellent anthelmintic, anxiolytic, sedative, antiepileptic and antipsychotic effects; antiviral, antibacterial; a common midwife’s remedy during and after birth. In Peru, the leaves and bark powder are applied on wounds and inflammations. *S. mombin* has been shown to contain various constituents, saponins, terpenoids, Fe, Mg, K, and others which are implicated for its numerous pharmacological activities.

*Telfairia occidentalis* is a vegetable crop and belongs to the family Curcubitaceae. The common name of *T. occidentalis* is fluted pumpkin, and “ugu” in South eastern Nigeria where it is extensively cultivated. The leaves of *T. occidentalis* are rich sources of Fe, Mg, K, Carotene and Vitamin C for pregnant women and patients suffering from anaemia. The aim of this work therefore was to investigate the anti-anaemic activity of aqueous leaves extracts of *Telfairia occidentalis* and *Spondias mombin*. 
2 Materials and Methods

2.1 Plant materials

The fresh leaves of the *T. occidentalis* and *S. mombin* were collected from Owerri, Imo State, Nigeria; and authenticated by Osuala, F.N. of Pharmacognosy Department, Madonna University, Elele, Nigeria. The leaves were chopped into pieces by knife separately, and sun dried the plant material. The small pieces of leaves were pulverized for further study. The aqueous extracts were prepared by macerating powders of *T. occidentalis* and *S. mombin* separately in cold water for 48 h. After filtration, the extracts were concentrated separately using rotary evaporator.

2.2 Animals

Adult Wister rats (160-230 g) of both sexes were kept in the Laboratory Animals facility of the Department of Pharmacology and Toxicology, Madonna University, Elele, Nigeria, and used for studies. The animals were maintained under standard laboratory situations and had free access to standard pellets (Vital Feeds Plc, Nigeria) and clean water.

2.3 Induction of anaemia

Prior to experimental uses, the animals were transferred to work area and allowed for two weeks of acclimatization. Haematological parameters were initially determined for untreated rats according to established method. Anaemia was induced by orally administration of chloramphenicol (50 mg/kg) for 2 weeks in four groups and each contains five rats. The Anaemia was confirmed by the markedly low PCV compared to untreated rats.

2.4 Anti-anaemic screening

Anaemic groups of rats received oral administration of *T. occidentalis* and *S. mombin* respectively thus: Groups A-100 mg/kg, B-200 mg/kg, C-400 mg/kg extracts once daily for 7 days. The positive control (reference drug), ferrous gluconate (900 mg/kg) and negative control, distilled water were similarly given to the two control groups D and E respectively. All the treated animals were fed with water and pellets for a week. Animals were bled for determination of PCV, Hb, WBC parameters before and after administration of the extracts and reference drug. Percentage recovery was calculated for each haematological parameter, using the following formula typical of PCV:

\[
\text{% Recovery} = \frac{(\text{PCV post treatment}) - (\text{PCV pre treatment})}{(\text{Normal PCV pre treatment})} \times 100
\]

2.5 Statistical analysis

Data were expressed as mean ± standard error of mean (SEM). Statistical comparisons were performed by one-way ANOVA, followed by Tukey-Kramer multiple comparisons test and student-Newman-Keuls multiple comparisons test and the values were considered statistically significant when p-value is less than 0.05 (p<0.05).

3 Results

Aqueous leaves extracts of *T. occidentalis* and *S. mombin* showed dose-dependent increase in PCV, Hb and WBC after 7 days of oral administration of extracts to the experimental rats (Tables 1 and 2). Percentage recoveries showed dose-dependent decrease in all the haematological parameters in both plants.

However, post-administration of extracts of both plants resulted in decrease in the WBC count as against their pre-administration count. The negative control consisting of untreated rats showed the highest PCV (42.3 %) and Hb (12.8 g/dL) values. None of the tested doses of extracts of the two plants restored fully the PCV (26-283 % for *T. occidentalis*, and 24-26.8 % for *S. mombin*) and Hb (9-9.8 g/dL for *T. occidentalis*, and 8.9 g/dL for *S. mombin*) for the treated rats when compared with the untreated rats.

4 Discussions

The results obtained in this study showed that aqueous leaves extracts of *T. occidentalis* and *S. mombin* exhibited dose-dependent increase in PVC and Hb. These corroborated previous studies which have shown that such increase in PCV and haemoglobin count of rats after treatment with extracts were obvious indices for recovery from anaemia. Documented report also has found a progressive increase in PCV values after an initial fall, following sub-chronic administration of *Murraya koenigii* extract.

Post administration of extracts of both plants resulted in fall in the WBC values which might be expected recognizing that chloramphenicol which was used to induce anaemia is noted as a high risk drug which obviously affects the immune system of the experimental rodents leading to a fall in WBC. Prolonged administration of the extract beyond 7 days might restore the WBC. This is in agreement with the report that full recovery of experimental animals from biochemical effects of plant extracts could be achieved by chronic administration of the extracts.

The anti-anaemic properties of both plants may not be unconnected with reported phytochemical constituents but the leaves of *T. occidentalis* are richer sources of Fe, Mg, K, carotene and Vitamin C, hence accounts for its slightly higher anti-anaemic activity than *S. mombin*.

5 Conclusions

The leaves extracts of *T. occidentalis* and *S. mombin* exhibited anti-anaemic effect in chloramphenicol-induced anaemic rats.

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This gives credence to the folkloric use of both plants as haematinic.

6 Acknowledgements

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Table 1: Effect of *Telfairia occidentalis* leaf extract on haemotological parameters in rats

<table>
<thead>
<tr>
<th>Group</th>
<th>Doses of extract (mg/kg)</th>
<th>Packed cell volume (%)</th>
<th>Haemoglobin Count (g/dL)</th>
<th>White Blood Cell Count (x10^3/mm^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-treatment</td>
<td>Post-treatment</td>
<td>Recovery (%)</td>
</tr>
<tr>
<td>A</td>
<td>100</td>
<td>15.25±1.80</td>
<td>26.00±0.50</td>
<td>39.7</td>
</tr>
<tr>
<td>B</td>
<td>200</td>
<td>21.80±2.05</td>
<td>27.30±0.65</td>
<td>26.8</td>
</tr>
<tr>
<td>C</td>
<td>400</td>
<td>24.70±0.48</td>
<td>28.33±0.86</td>
<td>20.6</td>
</tr>
<tr>
<td>D</td>
<td>Ferrous gluconate (0.9 g/kg)</td>
<td>20.00±2.80</td>
<td>21.70±2.75</td>
<td>7.6</td>
</tr>
<tr>
<td>E</td>
<td>DW</td>
<td>---</td>
<td>42.30±5.5</td>
<td>--</td>
</tr>
</tbody>
</table>

p<0.05; (--) not treated, where D is the positive control and E is the negative control, DW - Distilled Water

Table 2: Effect of *Spondias mombin* leaf extract on haemotological parameters in rats

<table>
<thead>
<tr>
<th>Group</th>
<th>Doses of extract (mg/kg)</th>
<th>Packed cell volume (%)</th>
<th>Haemoglobin Count (g/dL)</th>
<th>White Blood Cell Count (x10^3/mm^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-treatment</td>
<td>Post-treatment</td>
<td>Recovery (%)</td>
</tr>
<tr>
<td>A</td>
<td>100</td>
<td>16.05±1.68</td>
<td>24.01±0.40</td>
<td>30.2</td>
</tr>
<tr>
<td>B</td>
<td>200</td>
<td>22.70±2.20</td>
<td>25.03±0.57</td>
<td>11.8</td>
</tr>
<tr>
<td>C</td>
<td>400</td>
<td>24.70±0.45</td>
<td>26.80±0.78</td>
<td>11.4</td>
</tr>
<tr>
<td>D</td>
<td>Ferrous gluconate (0.9 g/kg)</td>
<td>20.00±2.80</td>
<td>21.70±2.75</td>
<td>7.6</td>
</tr>
<tr>
<td>E</td>
<td>DW</td>
<td>---</td>
<td>42.30±5.5</td>
<td>--</td>
</tr>
</tbody>
</table>

p<0.05; (--) not treated, where D is the positive control and E is the negative control, DW - Distilled Water

7 Conflict of interests

No conflict of interest declared.

8 Author’s contributions

I approved the final manuscript for publication.

9 References


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