Biochemical and Haemopoietic Effects of Aqueous Extract of *Gnetum Africanum* (Ukazi) on Male and Female Albino Wistar Rats

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**Abstract**

*Gnetum africanum*, a good source of protein, strong in essential and non-essential amino acid was studied to know its haemopoietic and biochemical effects on male and female wistar rats. Thirty (30) adult male and female wistar rats were grouped into four (4) viz: Group A (6 rats, male control), Group B (6 rats, female control), Group C (9 rats, male test rats), and Group D (9 rats, Female test rats). At the end of 2 weeks acclimatization to the environment, the test rats were fed 1.0ml of aqueous extracts of *gnetum africanum* (ukazi) daily while the control rats received the normal rat feed; all the rats received drinking water ad libitum. The feeding process lasted 30 days after which 5.0mls of blood was collected from the rats by cardiac puncture for haematological and biochemical analysis. The result from the analysis showed a significant increase (P<0.05) in the haemoglobin concentration, packed cell volume, platelet count and total white blood cell count. The extract also had a slight effect on the liver enzymes such as alkaline phosphate, total bilirubin and conjugated bilirubin causing their increase. It could be concluded that consumption of *gnetum africanum* (ukazi) will have a positive effect on haemopoietic and biochemical profile of albino wistar rats.

**Keywords:**  
Haemopoiesis, amino acids, liver enzymes, albino rats, extract
INTRODUCTION

Gnetum africanum (ukazi) is a vine gymnosperms species that belong to Gnetaceae family. It is an edible humid tropical forest plant, native in south Eastern part of Nigeria. It can be found in other African countries.

Traditionally, gnetum africanum is a wild vine and is considered to be a wild vegetable (Chindong et al, 2011). It is a perennial plant that grows approximately 10 meters long with thick papery-like leaves growing in groups of three, the leaves may grow approximately 8cm long and at maturity the vine will produce small cone-like reproductive structures.

Gnetum africanum has numerous common names in different African nations where they are grown; in Cameroon, it is called “Eru”, in Angola “Koko” as well as Gabon, Central Africa republic and Congo. In Democratic Republic of Congo, it is called “Fumbua” and in Nigeria, “Ukazi”. This leaf has also been referred to as a form of “wild spinach” in English (Ali et al, 2011).

Nutritional and Medicinal Benefits of Gnetum africanum

Primarily, ukazi leaves are used as vegetables for soups and stews commonly called ukazi soup or Afang soup, the leaves are sold in market throughout the year and may also be eaten raw apart from its use in soup and stew. (Tekwe et al 2003).

The leaves may further be used as a remedy for nausea, sore throats or as a dressing for warts. The stem of the plant may also be eaten for medicinal purposes including the reduction of pain during child birth. Gnetum africanum is a good source of protein and is strong in essential and non-essential amino acids. It is high in glutamic acid, leucine and aspartic acid, with low levels of histidine and cysteine while there appears to be trace amount of tryptophan in the plant. It has also been found that the level of iodine are also high in the vine, fibre levels average approx. 33.4g/100g of dried leaves of ukazi has been noted as an anti- inflammatory, anti-carcinogenic and antioxidant. (Ali et al, 2011). Other chemical contents are sodium (45%), potassium (1.7%), phosphorous (2.1%), calcium (2.0%), magnesium (2.3%), zinc (2.1%) and iron (4.4%).

The curiosity to carry out this study is based on the fact that it is commonly used by the people of the south eastern part of Nigeria as vegetable for soup hence to find out if this plant extract has any effects in south eastern part of Nigeria as vegetable for soup the fact that it is commonly used by the people of the

MATERIALS AND METHODS

Selection of animals:

Thirty albino wistar rats weighing 180-200g were randomly selected and kept in a metal cage with iron netting in a laboratory environment. They were kept in the animal house for 14 days for acclimatization, before starting an acute feeding with the extracts for 30 days.

Experimental Design:

Thirty male and female albino wistar rats weighing 180-200g were placed in four groups namely: Groups A, B, C and D. Group A is the male control (6 rats), Group B is the female control (6 rats), Group C (9 male rats) were the male test rats and finally Group D (9 female rats) were the female test rats.The test rats were fed with rat feed in addition to the oral administration of 1.0ml of the leaf extract of gnetum africanum and water ad libitum while the control rats received only the rat feed and water ad libitum.

Preparation of Extracts:

Leaves of gnetum africanum were purchased from Uli daily market near the university botanical garden and it was identified by a botanist in the botany department of the university. The botanical identification and authentication was confirmed by a botanist from the biological science department of Chukwuemeka Odumegwu Ojukwu University (formerly Anambra State, uli campus). The crude extract was prepared according to the method described by Obiefuna et al (1998).The dried leaves of gnetum africanum were oven dried at 45°C and 100g of the dried leaves were pulverized and soaked for 72 hours in 800mls of distilled water. It was then filtered with Whatman no.1 filter paper and the residue discarded. The filtrate was subsequently evaporated to dryness in an aerated oven at 45°C. The resulting slurry was stored in closed cap bottles until needed. 5mg/g of the slurry was prepared and used for oral administration of the test animals in groups C and D.

Phytochemical Analysis of Leaves:

The leaves of the plant were screened for the presence or absence of various secondary metabolites using
standard phytochemical screening procedures as described by Harbourne (1973), Trease and Evans (1996) respectively. The extracts were tested for glycosides, flavonoids, alkaloids, acidic compounds, resins, fats and oil, carbohydrates and steroids.

Toxicity Study:

The lethality dose of the leaves of *Gnetum africanum* in albino wistar rats was determined using Lorke’s method (1983).

**Obtaining a blood samples for test:**

At the end of 30days administration of the crude extract of *Gnetum africanum*, the animals were anaesthetized with chloroform. 5.0mls of blood samples were collected from every one of the rats using cardiac puncture. 2.0mls was placed in anticoagulant (E.D.T.A) tubes for haematological tests, while 3.0ml of the samples were placed in plain tubes for biochemical studies (liver function tests). The samples were stored in the refrigerator (4°C) until when needed for the tests.

**Haematological Studies:**

The packed cell volume estimation was estimated by method of Alexander et al, (1993), haemoglobin estimation was determined by methods described by Baker et al, (1998). The platelet counts was done with the method described by Brecher and Cronkite (1950).

**Biochemical Analysis:**

The liver function tests were done by method described by Baker et al, (1998).

**Statistical Analysis:**

The results got from the analysis of the blood samples were presented in mean and standard deviation (Mean ± S.D), students –t- test was used to determine the level of significance, testing at P<0.05 or P<0.05.

**RESULTS:**

**Table 1: The phytochemical studies of *Gnetum africanum***

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Calcium</th>
<th>Carbohydrate</th>
<th>Alkaloids</th>
<th>Tanins &amp; Glucoside</th>
<th>Fats &amp; oils</th>
<th>Flavonoids, phenols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorous &amp; steroids</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Degree of Concentration</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>

Key: - Negative (absent)
+ Present in small concentration
++ Present in, moderate high concentration
+++ Present in very high concentration.
Table 2: Haemopoietic potential effect of aqueous leaf extract of *Gnetum africanum* (ukazi) in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Hbg/dl ± S.D</th>
<th>PCV% ± S.D</th>
<th>WBC per mm³ ± S.D</th>
<th>Platelet count 10³ ± S.D</th>
<th>P. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control male Group A, n=6</td>
<td>11.8 ± 0.6</td>
<td>33.6 ± 2</td>
<td>4,117 ± 147</td>
<td>198 ± 13.2</td>
<td>-</td>
</tr>
<tr>
<td>Control female Group B, n=6</td>
<td>10.9 ± 0.5</td>
<td>32.7 ± 1.8</td>
<td>3,983 ± 1.72</td>
<td>190 ± 12.6</td>
<td>-</td>
</tr>
<tr>
<td>Test rats 28 days after <em>Gnetum africanum</em> extracts. Group C, male n=9</td>
<td>11.8 ± 0.3</td>
<td>35.2 ± 0.9</td>
<td>4,300 ± 150</td>
<td>214 ± 20.6</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Group D, female n=6</td>
<td>12.9 ± 0.3</td>
<td>38.7 ± 0.7</td>
<td>4,767 ± 112</td>
<td>213 ± 8.6</td>
</tr>
</tbody>
</table>

Table 3: Effects of *Gnetum africanum* on the liver function profile of albino wistar rats after 28 days extract feed

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total bilirubin mg/dl ± S.D</th>
<th>Conjugated bilirubin mg/dl ± S.D</th>
<th>Alkaline phosphate iu/L ± S.D</th>
<th>Aspartate transaminase iu/L ± S.D</th>
<th>Alanin transaminase iu/L ± S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control male Group A, n=6</td>
<td>0.1 ± 0.04</td>
<td>0.2 ± 0.0</td>
<td>37.0 ± 1.6</td>
<td>8.0 ± 0.2</td>
<td>7.6 ± 0.3</td>
</tr>
<tr>
<td>Control female Group B, n=6</td>
<td>0.1 ± 0.0</td>
<td>0.2 ± 0.0</td>
<td>36.0 ± 1.2</td>
<td>7.5 ± 0.2</td>
<td>6.8 ± 0.4</td>
</tr>
<tr>
<td>Test rats 28 days after <em>Gnetum africanum</em> extracts. Group C, male n=9</td>
<td>0.7 ± 0.0</td>
<td>0.3 ± 0.02</td>
<td>66.8 ± 1.2</td>
<td>8.2 ± 0.2</td>
<td>7.0 ± 0.2</td>
</tr>
<tr>
<td>Group D, female n=6</td>
<td>0.6 ± 0.0</td>
<td>0.3 ± 0.01</td>
<td>64 ± 1.3</td>
<td>8.0 ± 0.1</td>
<td>7.2 ± 0.3</td>
</tr>
<tr>
<td>P. value</td>
<td>P&gt;0.05</td>
<td>P&gt;0.05</td>
<td>P&gt;0.05</td>
<td>P&gt;0.05</td>
<td>P&gt;0.05</td>
</tr>
</tbody>
</table>

Fig. 1: Lethality dose of *G. africanaum* (ukazi)
DISCUSSION

The biochemical and haemopoietic effect of the aqueous extract of *Gnetum africanum* on male and female albino wistar rats have been elucidated. The results from the study indicates that *Gnetum africanum* leaf extract has a significant haemopoietic effect in the albino wistar rats.

The phytochemical analysis of the extracts of *Gnetum africanum* shows that the leaf contain iron, phosphorous, calcium etc. in the moderate quantities. Iron is an essential element in the development of blood cells during haemopoiesis. Iron and protein found in *Gnetum africanum* along with other elements are essential for body build up in growing children. In children, haemopoiesis occurs in the marrow of the long bones such as femur and tibia. In adults, it occurs mainly in the pelvis, cranium, vertebrae, and sternum (Fernandes et al, 2013). The values of results indicated in table one (Table 1) shows a marked increase in the haemoglobin concentration, (P<0.05), and packed cell volume (P<0.05) in test rats fed with extracts of *Gnetum africanum* in both males and females.

The normal values of results obtained in the liver function analysis (Table 2) after administration of *Gnetum africanum* extract in the albino wistar rats shows the safe use of the leaf in human dishes among the less privileged in the society. There was no significant variable (P>0.05) in the result of liver function test of control rats compared with the test rats.

REFERENCES