Morphometric Study of Testes of Adult Wistar Rats Treated With Aqueous Extract of Boswellia Dalzielii Stem Bark

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Abstract: This study was designed to determine the morphometric changes induced by aqueous extract of Boswellia dalzielii stem bark on the testes of Adult Wistar Rats. Thirty six (36) male Adult Wistar Rats weighing between 199-290g were randomly divided into four (4) groups of nine(9) rats each containing five(5) experimentals and four (4) controls. The experimental rats in all the four groups were administered 200mg/kg of the plant extract for different period. Group 1, 2 3 and 4 were sacrificed on the 2nd, 4th, 6th and 8th weeks of the experiment.

The morphometric studies showed a very significant increase in the seminiferous tubules of those treated with the plant extract for six and eight weeks when compared to the control (p<0.01) however, insignificant increase in the interstitial cell of Leydig when compared to the control(p>0.05) was observed.

The present study indicated that the aqueous extract of Boswellia dalzielii stem bark significantly increased the size of the seminiferous tubule which suggest that it may have the ability to enhance the activities of the cells within the seminiferous tubule.

Keywords: Morphometric, Boswellia dalzielii, stem bark, testes, aqueous extract

I. Introduction

Herbal medicine is the use of herbs for their therapeutic and medicinal values.

Herbalism is becoming more mainstream as improvements in analysis and quality control along with advances in chemical reserach show their value in the treatment and prevention of disease1.

Boswellia dalzielii (B. dalzielii) hutch is from the genus Boswellia and the family of Burseraceae. It is a tree plant abundantly found in North- western Nigeria and very common among the locals as a potent source of ethnomedicine2.

Boswellia dalzielii has various names which is been identified for. It is commonly known in English as the frankincense tree while the French calls it bouquet. In Nigeria, the Hausa speaking people calls it Hano or Harrabi,3. Fulfulde calls it juguli, the Kanuri people calls it kafi- dukkan. In Niger, the fula-fulfulde calls it adakehi gorki while in Ghana, it is generally called piauwogu4.

The genius Boswellia has about twenty five (25) species spread all over the world but the specie B. dalzielii is basically found in the West-African region, concentrated more in Nigeria5.

B. dalzielii is a tree plant of about 13m high of the wooden savanna4. It has a characteristic smooth papeiy patches which on rapping exudes a whitish fragrant resin.

The gum resin gotten from B. Dalzieliis used along with other medicines as a stomachic and for the treatment of veneral diseases6. The roots and barks are used for antidote to arrow poisons. The fresh bark is eaten in Adamawa State of Nigeria to induce vomiting after a few hours and thus relieve symptoms of giddiness and palpitation4. The extract from it leaves is used for the treatment of diarrhoea in poultry7 and humans2.

The resin gotten from B. Dalzieli in combination with Stegantedenia aralia have anti-inflammatory activity due to the pressure of Acetylketoboswellic acid (KABA)7.

The aqueous extract of Boswlia dalzielii was used to investigate its effect on the liver of albino rats and found that there was no significant effect on total protein and albumin content within the short period of five (5) days the investigation was carried out1.

Phytochemical screening of the extract of B. Dalzieli was investigated and tannin was detected, it was also investigated for antimicrobial effect using 200mg/kg and there was no antimicrobial effect on the tested organisms. The result obtained shows that the extract probably contains active ingredient that could be developed for gastrointestinal problems6.

A further investigation was carried out on the antidiarrhoe effect of Boswellia dalzielii stem bark extract in albino rats on castor induced diarrhoea using graded doses of 100, 200 and 300mg/kg before induction in diarrhoea with castor oil. The extract produced a significant inhibition of the castor induced diarrhoea2.

The aqueous stem bark of B. Dalzieli possesses anti-inflammatory effect which may be related to anticholinergic mechanism7.

DOI: 10.9790/0853-141087679 www.iosrjournals.org
A further investigation was carried out by Etuk et al (2006) on the weight of the various organs in the body. The organs were the liver, kidney, heart and lungs, a significant decrease in the weight was observed. It was suggested that the prolonged oral administration of very high dose of the aqueous stem bark extract of B. Dalzielii may be associated to increased risk of toxicity.

The Boswellic acid which is a component of the resin from the bark of Boswellia dalzielii have shown some promises as a treatment for asthma and various inflammatory conditions and in West Africa, the bark have been reported to be used for the treatment of fever, rheumatism and gastrointestinal problems.

Boswellia dalzielii have been proven to be very effective (bacteriostatic) when the stem bark is grounded and mixed with alcohol to heal this lingua villosa.

Aims And Objectives
Various works have been done on the plant to know its uses and effects on various organs of the body but there was no research done studying its effect on the testes. This investigation is aimed at determining the morphometric effects of aqueous extract of Boswellia dalzielii stem bark on the testes.

Materials and Method

Plant Collection and Authentication
The stem bark of Boswellia dalzieliihutch was collected from its natural habitat of Portiskum, Yobe state which is located in the North-Western part of Nigeria in the month of November, 2009. The plant was identified and authenticated by Prof. S.S Sanusi, a botanist in the department of Biological Sciences, University of Maiduguri.

Preparation of Plant Extract
The method described by Nwinyi et al, (2004) was adopted. The plant stem bark was cleaned, cut into pieces and air-dried under shade for seven (7) days avoiding direct sunrays on it. After which, it was pulverised to powder. 200g of the powder was cold macerated with 1.5litres (1500ml) of water for twenty four (24) hours. The macerated product was filtered and the filtrate was evaporated to dryness at a constant range of temperature between 50-60˚C.

On every experimental day, a fresh solution was prepared using the dry powder at the required concentration before administration.

Animals and Diet
Male albino rats weighing between 199g to 290g were gotten from the national Research Institute, Vom, Plateau State and were kept in a well ventilated cages to acclamatized for three (3) weeks before investigation began.

Experimental Design
Thirty six (36) male albino rat ranging from 199g and 290g were used for the experiment. They were divided into fours of nine rats each containing five (5) experimental rats four (4) control groups. The experimental rats were given 200mg/kg/p.d of body weight while the control were given comparable volume of distilled water. Groups 1, 2, 3 and 4 were sacrificed on the 2nd, 4th, 6th and 8th weeks respectively through cervical dislocation. The testes were immediately removed, measured, and weighed.

Morphometry Study
The morphometric studies of the testes was carried out where the diamtres of the seminiferous tubule and the interstitial cells of Leydig were taken using stage and occular micrometres according to the method described by Anissimov, 2010 and Caprette, 2005.

Statistical Analysis
Data collected were expressed as mean±SEM and analysed using the Instat software programme. One way analysis of variance (ANOVA) with Dunnette test was used to determine the level of significance at confidence of 95% (p value <0.05 was considered significant).

Phytochemical Test
The plant stem bark was subjected to phytochemical screening to test for its chemical constituents and their proportions in the plant.
II. Materials
The following material were used during the course of the study; triple beam balance, knife, beakers, measuring cylinder, disposable syringe, vernier calliper, metre rule, razor blades, forceps, pins, clipboard, specimen bottles, cages, drinkers, oven, paraffin, slide glasses, stage and ocular micrometre, chemical balance.

IV. Results

IV. I Behavioural Observation
All through the period of the investigation, there was no observable changes of behaviour as a result of the administration of the plant extract of Boswellia dalzieii.

IV. II Phytochemical Result
Table 1 shows the phytochemical screening of the aqueous extract of the stem bark of the plant yielded the following constituents with its proportional percentage.

Table 2 shows the mean weight of the rats treated with aqueous extract of Boswellia dalzieii in comparison with the control. There was an initial reduction in weight but later stabilized. The change of weight was not significant (p>0.05)

Table 3 shows the length, diameter and the weight of the testes comparing the mean values of treated rats with the control. The length and diameter of the treated rats showed no significant variation when compared to the control (p>0.05). The weight of the testes for rats treated with the aqueous extract of the plant for 2nd, 4th and 6th showed no significant decrease or increase when compared to the control (p>0.05) while the rats treated with the extract for 8wks showed a significant increase in the right testes only, (p<0.05).

IV. III Morphometric Studies
Table 4 shows the mean diameters of the seminiferous tubule and the mean diameter of the Leydig cells (interstitial cells) of rats treated with the aqueous extract of Boswellia dalzieii stem bark measured in microns. Rats treated with the extract for 2 and 4 weeks did not show any significant increase in the size of their seminiferous tubule when compared with the control (p>0.05) while the rats treated with the extract for 6 and 8 weeks showed a very significant increase in the size of the seminiferous tubule when compared to the control(p<0.01). The mean diameter of the Leydig cells in rats treated with the plant extract did not show any significant change when compared to the control (p>0.05).

Morphometric studies shows that Leydig cell still retained it size considerably while there was very significant increase in the size of the seminiferous tubule of the rats treated with the aqueous extract of B.dalzieii for 6 and 8weeks. A reduction in size could be as result of degeneration of the spermatids but an increase in sertoli cells could suggest increase in their activities.

V. Tables

Table 1: Result for the phytochemical screening of aqueous extract of Boswellia dalzieii stem bark.

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Proportion(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentose</td>
<td>2</td>
</tr>
<tr>
<td>Ketose</td>
<td>4</td>
</tr>
<tr>
<td>Monosacharrides</td>
<td>2</td>
</tr>
<tr>
<td>Phlobatannins</td>
<td>4</td>
</tr>
<tr>
<td>Tannins</td>
<td>10</td>
</tr>
<tr>
<td>Combined reducing sugar</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2: Effect of Boswellia dalzieii aqueous extract on the mean body weight of rats.

<table>
<thead>
<tr>
<th>Group</th>
<th>Duration (weeks)</th>
<th>Initial weight (g)</th>
<th>Final weight (g)</th>
<th>Weight difference (g)</th>
<th>Percentage weight diff(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2</td>
<td>133.25±22.531</td>
<td>177.38±18.248</td>
<td>44.13</td>
<td>24.88</td>
</tr>
<tr>
<td>I.</td>
<td>4</td>
<td>211.50±30.695</td>
<td>207.13±25.248</td>
<td>4.37</td>
<td>2.11</td>
</tr>
<tr>
<td>II.</td>
<td>6</td>
<td>185.05±9.517</td>
<td>18.45±16.27</td>
<td>29.60</td>
<td>16.31</td>
</tr>
<tr>
<td>III.</td>
<td>8</td>
<td>204.95±18.407</td>
<td>234.88±15.710</td>
<td>29.93</td>
<td>12.71</td>
</tr>
</tbody>
</table>

Values are expressed as Mean±SEM of 29 rats in treated groups and 16 rats in the control. (p>0.05).
VI. Conclusion

This study showed that the aqueous extract of the stem bark of *Boswellia dalzielii* significantly increased the size of the seminiferous tubule which suggest that it may have the ability to enhance the activities of the cells within the seminiferous tubule.

VII. Recommendation

The morphometric study was restricted to the size of the Leydig and seminiferous tubule. Further studies should be carried out on the sperm count and testosterone level in the body. It should also extend to the female reproductive organs to see the effect of the plants’ aqueous extract on the ovary.

References


[2] Etuk EU, Agaie BM, Onyeyili PA, and Otta CU Anti-diarrhoea effect of *Boswellia dalzielii* stem Bark Extract n Albino Rats; Journal of Pharmacology and Toxicology, 2006. 1(6); Academic Journals Inc, USA; Pp 591-596.


