



## HISTOLOGICAL EFFECTS OF AQUEOUS EXTRACT OF *BOSWELLIA DALZIELII* STEM BARK ON THE TESTES OF ADULT WISTAR RATS

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### ABSTRACT

*Boswellia dalzielii* (Bursaceae) is widely taken as herbal medicine in North-eastern part of Nigeria. This study was designed to determine the effect of the aqueous extract of *Boswellia dalzielii* stem bark on the histology of the testes. Thirty six (36) male albino 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 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 histological investigation showed that the aqueous extract of *Boswellia dalzielii* stem bark has no significant effect on the histology of the testes.

**Keywords:** *Boswellia dalzielii*, stem bark, aqueous extract, histology, testes

### INTRODUCTION

Herbal medicine, also called botanical medicine or phytomedicine refers to the use of a plants' seeds, berries, roots, bark or flowers for medicinal purpose and this have been long practiced outside conventional medicine<sup>1</sup>. Alternatively, herbal medicine is the use of herbs for their therapeutic and medicinal values.

*Boswellia dalzielii* (*B. dalzielii*) hutch is from the genus *Boswellia* and the family of Bursaceae. It is a tree plant abundantly found in North-western Nigeria and very common among the locals as a potent source of ethnomedicine<sup>2</sup>.

*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<sup>3</sup>, 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 pianwogu<sup>4</sup>.

The genus *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 Nigeria<sup>5</sup>.

*B. dalzielii* is a tree plant of about 13m high of the wooden savanna<sup>4</sup>. It has a characteristic smooth papey patches which on rapping exudes a whitish fragrant resin. It is found in savanna region often in rocky situations<sup>4</sup>.

The gum resin gotten from *B. Dalzielii* is used along with other medicines as a stomachic and for the treatment of venereal diseases<sup>6</sup>. The roots and barks are used for antidote to arrow poisons. The fresh bark is eaten in Adamawa to cause vomiting after a few hours and thus relieve symptoms of giddiness and palpitation<sup>4</sup>. The extract from it leaves is used for the treatment of diarrhoea in poultry<sup>3</sup> and humans<sup>2</sup>.

The resin gotten from *B. Dalzielii* in combination with *Steganotaenia aralicia* have anti-inflammatory activity due to the pressure of Acetylketoboswellic acid (KABA)<sup>7</sup>.

The aqueous extract of *Boswellia 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 out<sup>3</sup>.

Phytochemical screening of the extract of *B. Dalzielii* 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 problems<sup>6</sup>.

A further investigation was carried out on the antidiarrhoea 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 diarrhoea<sup>2</sup>.

The aqueous stem bark of *B. Dalzielii* possesses anti-inflammatory effect which may be related to anticholinergic mechanism<sup>2</sup>.

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. Further more, *Boswellia* incense may even serve as a relieve to some of these 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<sup>9</sup>.

### Aims of Study

*Boswellia dalzielii* is known to be one of the important herbal plants in North-western part of Nigeria and used widely in traditional medicine. 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 effects on the testes. This investigation is aimed at

determining the effects of the aqueous extract of *Boswellia dalzielii* stem bark on the histology of the testes.

## MATERIALS AND METHOD

### Plant Collection and Authentication

The stem bark of *Boswellia dalzielii hutch* 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)<sup>6</sup> 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 acclimatized 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 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and 8<sup>th</sup> weeks respectively through cervical dislocation. The testes were immediately removed, measured, weighed and fixed in Bouin's fluid. The testes were processed for histomorphometric studies after H and E staining<sup>10</sup>.

### Materials

The following material were used during the course of the study; tripple beam balance, knife, beakers, measuring cylinder, disposable syringe, razor blades, forceps, pins, clipboard, specimen bottles, Bouin's fluid, cages, drinkers, oven, paraffin, cover slips, slide glasses, haematoxylin, eosin, compound microscope, chemical balance.



Figure 1: Micrograph of section of rat testis showing normal histological features: seminiferous tubule (ST), interstitial cell of Leydig (I), Sertoli cells (arrows) and spermatogonia (S). H&E x100

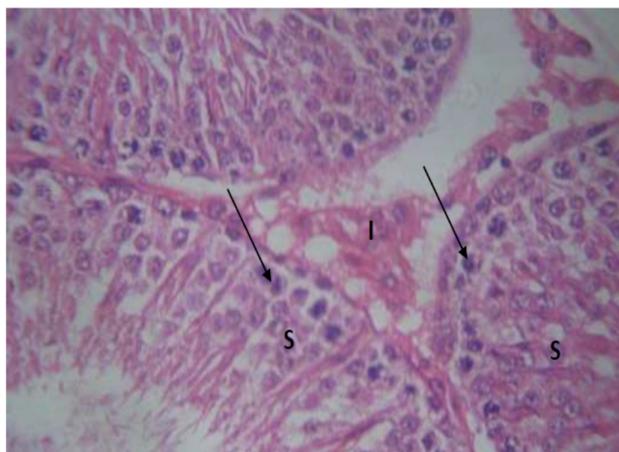


Figure 2: Micrograph of section of rat testes treated with 200mg/kg aqueous extract of *Boswellia dalzielii* extract for 2wks showing the interstitial cells of Leydig (I), Sertoli (arrows) and spermatogonia cells(S). H&E (x400)

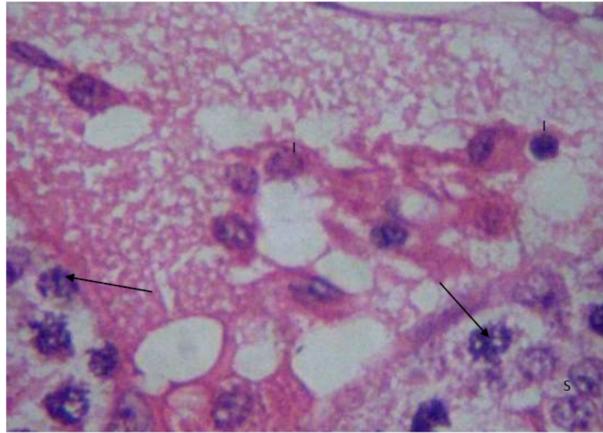


Figure 3: Micrograph of section of rat testes treated with 200mg/kg aqueous extract of *Boswellia dalzielii* extract for 4wks showing the interstitial cells of Leydig (I), Sertoli (arrows) and spermatogonia cells(S) H&E (×400)

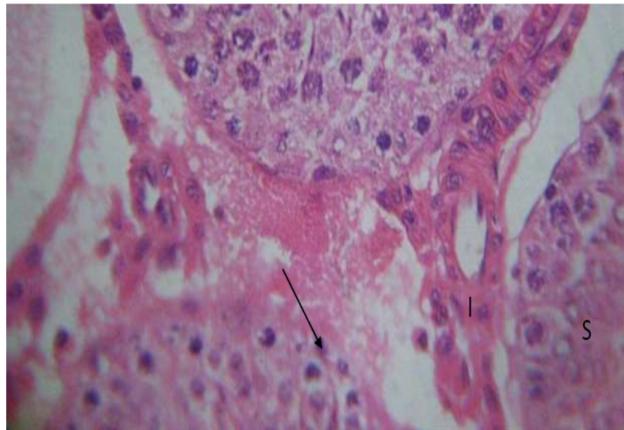


Figure 4: Micrograph of section of rat testes treated with 200mg/kg aqueous extract of *Boswellia dalzielii* extract for 6wks showing the interstitial cells of Leydig (I), Sertoli (arrows) and spermatogonia cells(S)H&E(×400)

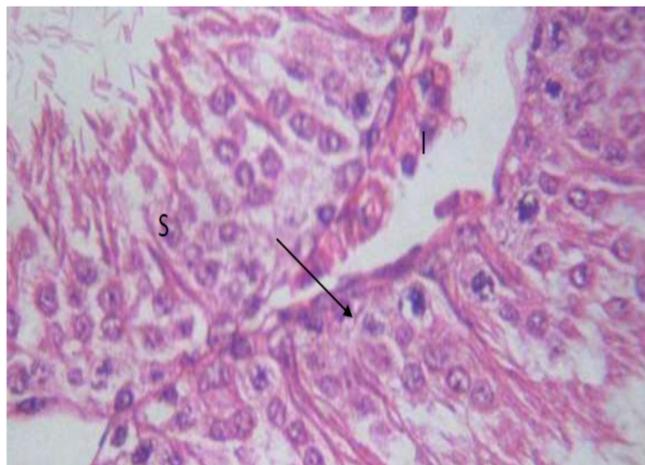


Figure 5: Micrograph of section of rat testes treated with 200mg/kg aqueous extract of *Boswellia dalzielii* extract for 8wks showing the interstitial cells of Leydig (I), Sertoli (arrows) and spermatogonia cells(S) H&E(×400)

## RESULTS

### 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 dalzielii*.

### Histopathological Studies

Histology for the testes of the rat in control shows the seminiferous tubule at low magnification also in it is the spermatogonia at different level of differentiation and in close association with the Sertoli cells. Between the seminiferous tubule are the interstitial cells. (Figure 1) The paraffin section of the rats treated with the extract for 2,4,6 and 8 weeks showed the same characteristics with little or no changes in the appearance of the interstitial cells, spermatid cells and the Sertoli cells. (Figure 2, 3, 4, and 5 respectively).

The histological result of the rats treated with aqueous extract of *Boswellia dalzielii* stem bark showed no effect on the testes, there was general development of the spermatozoa all through the study which implies that the plant has no effect either on sperm development.

It is clear that to maintain normal spermatogenesis, it is necessary to deliver adequate levels of testosterone to the seminiferous tubule<sup>11</sup> since it prevents the degeneration of germ cells<sup>12</sup> but depletion in number or complete destruction of the Leydig cell leads to decline in the testosterone level and seminiferous tubule<sup>13</sup>. Histological examination of the Leydig cells still retain its integrity.

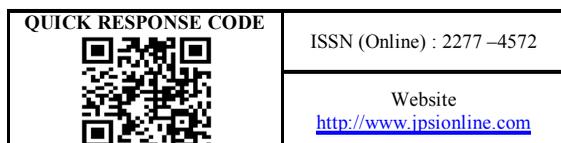
## CONCLUSION

The findings from this study revealed that aqueous extract of *Boswellia dalzielii* stem bark did not have effect on the testes and on sperm development.

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