

Microscopic Features of the Testes Following Oral Administration of Ethanolic Extract of *Alchornea Cordifolia* Leaves to Wistar Rats

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Abstract: Background of the study: Infertility is considered one of the main public health issues, as it affects about 15% of the couples of reproductive age. The male factor is involved in 40% - 50% of infertility cases. In the recent times the use of herbal plants to enhance fertility is on the increase. Objectives: this study investigated the effects of *Alchornea cordifolia* leaf extract on the histology of testes in the adult wistar rats. Materials and methods: twenty adult male wistar rats were divided randomly into four groups marked A, B, C, and D. Group A and B served as the controls and received normal saline and olive oil respectively. Group C and D received 500 and 1000mg/kg bd.w of the extract respectively for fourteen (14) days. The animals were sacrificed on the fifteen day using chloroform inhalation method. The testes were harvested and processed using routine H and E staining method. Results: The tissue sections of the testes in control groups (A and B) expressed normal presentations while groups C and D that were given 500mg/kg bd.w and 1000mg/kg bd.w of ethanolic extract of *A. cordifolia* showed increased proliferating spermatogonia at various stages of maturation with intervening sertoli cells. Conclusion: *A. cordifolia* increased spermatogonia proliferation therefore may be considered as a supplement to increase production of spermatozoa.

Keywords: *Alchornea cordifolia*, infertility, spermatogonia, medicinal plants

1. Introduction

Herbs are as old as human civilization and have provided a complete store house of remedies to cure acute and chronic diseases. Scientific evaluation of herbal product has been limited, yet herbal medicines are the most commonly consumed health care remedies. In herbal medicine, herbs/plants are being used in their unaltered form for the treatment of diseases (Ikechukwu and Riman, 2009). The World Health Organization (WHO) estimates that nearly 70% of the world population depend on traditional medicine, especially medicinal plants for the primary health care needs.

Alchornea cordifolia is a shrub found along the coastal areas of West Africa. The leaves are simple, ovate, basically cordate, acuminate with sessile glands at the base close to the petiole (Nyananyo, 2006). Udedibie and Opara, (1998) and Okoli, (2003) indicated that the leaves are cherished by ruminant and used by subsistence farmers who harvest them for livestock. Over the years, medicinal plants have formed the basis of health care throughout the world in both developing and developed nations of the world for various chemotherapeutic purposes (Ahmad *et al.*, 2006). Example of such medicinal plant is *Alchornea cordifolia*. Reports have shown that *Alchornea Cordifolia* has been used in the treatment of several diseases including sore throat, cough, and bronchitis, genital urinary problems (Agbor *et al.*, 2004). In Africa, *Alchornea cordifolia* has been proven of being a herbal plant in ethnomedicinal purposes against wounds, ulcers and sores (Ajali, 2000). *Alchornea Cordifolia* is known to have flavonoids (Ogungbamila and Samuelsson, 1990). Reports on the biological activity of *Alchornea* suggest that it is spasmolytic (Ogungbamila and Samuelsson, 1990), hepato-protective (Olaleye *et al.*, 2006), anti-diarrhoeal (Agbor *et al.*, 2006) and anti-oxidant (Olaleye and Rocha, 2008).

Some early researchers in the basic medical and pharmaceutical sciences have studied *Alchornea cordifolia* extracts on several organs like the kidney and liver (Manga *et al.*, 2004,

Olaleye, *et al.*, 2006). Also, there are hypertrophic presentations of the gonads in birds that appeared in increased testosterone level (Olaleye, *et al.*, 2006). Impotency in human males in the Congo Republic have been reportedly cured and high increase of sperm counts when the bark of *Alchornea cordifolia* extract was used (Igbeneghu *et al.*, 2007).

Infertility is one major problem in the society among couples. About 40% of the issue involved with infertility are due to man, another 40% due to the woman and 20% result from complications with both partners (Hudson, 1987). A number of rural physicians and fertility experts have noticed a combination of exotic herbs from the amazon jungle, India, China, Malaysia, and Africa that promotes male and female sexual activity (Sahelian, 2004). The use of all these substances to improve sexual performances especially among males is not without adverse effects. Studies have also shown that, despite the high prevalence and psychological consequences of infertility disorder, relatively few men had sought for orthodox treatment prior to the introduction of sildenafil (Mackinely *et al.*, 1999). This research seeks to establish if there is any effect of *Alchornea Cordifolia* leaf on the testes of male albino wistar rats.

2. Materials and Methods

Experimental Design: This study was carried out at the Department of Anatomical Sciences, University of Calabar, Nigeria. A total of twenty adult male wistar rats were pre-conditioned for seven days in wooden cages at 27-30 °C in the Animal House of the College of Medical Sciences.

Animals were randomly allocated into four groups of five animals each, labeled as group A, B, C, and D. The animals were fed with grower's marsh and tap water *ad libitum*

The groups per dosage was done in the following order of: Group A-control normal saline(0.5ml), Group B-control olive oil (0.5ml), Group C- alchornea cordifolia extract (500mg/kg of body weight) and Group D alchornea cordifolia extract (1000mg/kg of body weight) daily. The duration of administration was fourteen (14) days after which the animals were then sacrificed 24hours after the last administration. They were sacrificed using chloroform inhalation method and a plane dissection carried out to harvest the testes for routine H and E histological procedure.

3. Results

The histological appearance of each group of rats were demonstrated using H and E staining technique and the slides were viewed under microscope of magnification of ×400 and photomicrographs obtained. Group A and B expressed normal appearance of primary and secondary spermatocytes, intact basement membrane, clearly presented rim of cytoplasm and spermatids under Plate 1 and 2. Also, Group C showed attenuated appearance there was slight increase in sertoli thickness (Plate 3). Whereas, Group D appeared to have increased /sertoli cells, thickened wall of cytoplasmic presentation and lumen perforated with spermatozoa. Hence, there was an effective response to alchornea cordifolia extracts on the testes increasing the spermatozoa contents in Plate 4.

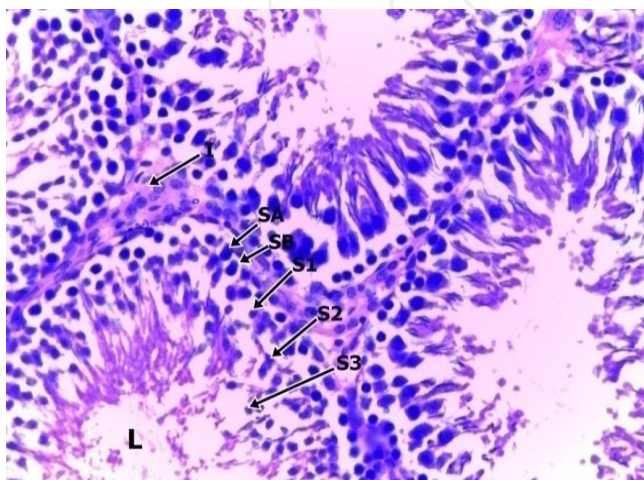


Figure 1: CONTROL TESTIS (X400): Section of the testis shows seminiferous tubules of various sizes lined by an intact basement membrane and containing proliferating spermatogonia cells at various stages of maturation. The cells are 3 to 5 layers thick with numerous spermatozoa within their lumen. The spermatogonia cells include the spermatogonia A and B, primary spermatocytes (S1), secondary spermatocytes (S2) and spermatids (S3). The cells have prominent oval to round deeply stained basophilic nuclei and thin rim of cytoplasm.

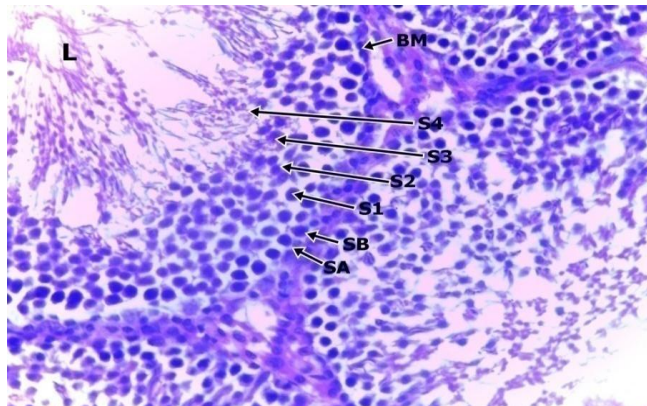


Figure 2: OLIVE OIL TESTIS (X400): Section of the testis shows prominent seminiferous tubules with intact basement membrane (BM), containing proliferating spermatogonia cells at various stages of maturation. The spermatogonia are of 3 to 5 cell layer thick with deeply stained round to oval nuclei and a thin rim of cytoplasm. The supporting sertoli cells are intact. The luminal cavities are filled with spermatozoa.

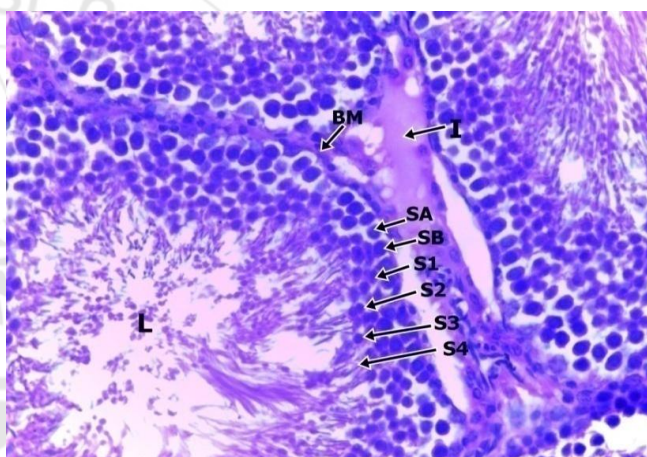


Figure 3: LOW DOSE TESTIS (X400): Section of the testis shows prominent seminiferous tubules with intact basement membrane (BM), containing proliferating spermatogonia cells at various stages of maturation. The spermatogonia are of 3 to 5 cell layer thick with deeply stained round to oval nuclei and a thin rim of cytoplasm. The supporting sertoli cells are intact. The intervening interstitium contains clusters of round leydig cells. Their lumen contains numerous spermatozoa.

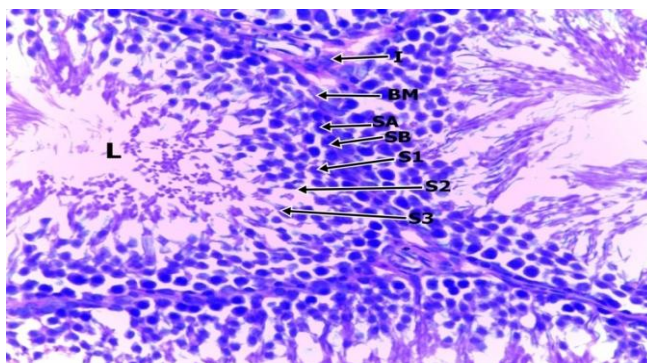


Figure 4: HIGH DOSE TESTIS (X400): Section of the testis shows proliferating spermatogonia at various stages of maturation with intervening sertoli cells. The cells are more than three layers thick with regular cytoplasmic and nuclei outline. Their lumen are filled with spermatozoa.

4. Discussion

According to World Health Organization (WHO), about 80% of world population depend chiefly on the plant based tradition medicine especially for their primary health care needs. Plants are rich sources of various secondary metabolites such as tannins, alkaloids, terpenoids, and flavonoids having been found in vitro with known therapeutic and anti-plasmodial properties which can be used as an alternative treatment of diseases (Kumar *et al.*, 2007). Recently the scientific conference in Geneva, Switzerland gave startling discovery of traditional plants in contributing 70% remedies for our ailments. This research interest to ascertain the effectiveness of *Alchornea cordifolia* extracts on the testes proved positive. The lumens of the rats retained its structures after administration of *Alchornea cordifolia* extracts on the testes. This study showed that the *Alchornea Cordifolia* leave extract had no adverse effect on the histology of the testes when compared with the control animals as seen in the photomicrographs. This research also showed numerous spermatozoa in the lumen of the animals administered with *Alchornea Cordifolia* extract which is in line with Igbeneghu *et al.*, (2007) who reported high increase of sperm counts when the bark of *Alchornea cordifolia* extract was used in human males in the Congo Republic.

This result collaborates the work documented by Timibitei *et al.*, (2014), which showed that the impact of *Alchornea Cordifolia* root bark, seeds and pod husk on the gonads has no significant adverse effects. The histological findings of the control and olive oil group showed a normal arrangement of the histological features of the testes ranging from normal seminiferous tubules, interstitial tissues and germinal epithelium. The testes showed proliferating spermatogonia at various stages of maturation with intervening sertoli cells. The cells are more than three layers thick with regular cytoplasmic and nuclei outline. Their lumen are filled with spermatozoa. These effects however was not significantly different between the rats in Group C and D. This agreed with the work that *Alchornea cordifolia* extracts may not be dose dependent. However, the increase proliferation in spermatogonia maybe responsible for the increased weight of the gonads as reported by Wekhe and Njoku, (2000) and hypertrophic presentations of the gonads in birds that appeared in increased testosterone level by Olaleye, *et al.*, (2006).

This study was yet to identify the actual ingredients in the *alchornea cordifolia* extracts to better the histomorphological appearance of testes but agreed with reports on the usefulness of the leave as ethno medicinal (Agbor *et al.*, 2004; Ajali, 2000; Ogungbamila and Samuelsson, 1990)

5. Conclusion

This study was able to show that *Alchornea cordifolia* leave extract on the testis of adult wistar rat increased the proliferation of spermatogonia. Therefore, may be considered as a supplement to boost production of spermatozoa

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