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## Histological and Hormonal Assessment of the Testes of Albino Wistar Rats Administered with Aqueous *Ricinus Communis Linn* Leaves Extract

<sup>1</sup>Fischer CE, <sup>2</sup>Ujah WO, <sup>2</sup>Makanjuola VO, <sup>2</sup>Oluwayinka PO,

<sup>1</sup> University of Calabar, Department of Anatomical Sciences, Calabar, Cross River State, Nigeria.

<sup>2</sup>Department of Anatomy, Faculty of Basic Medical Sciences, Bingham University Karu. Nasarawa State, Nigeria

**Corresponding Author:** Fischer CE

E-mail: christiefischer2407@gmail.com

### ABSTRACT

People are becoming more and more dependent on herbal products rather than the chemical drugs due to their residual effects on the long run. The individual parts of plant that forms herbs like the seed, seed oil, leaves and the roots showed their importance in pharmacology. *Ricinus Communis Linn* is a specie from the family Euphorbiaceae, this plant is reported to possess antioxidant, anti-inflammatory, anti-diabetic, central analgesic, antitumor, antinociceptive, anti-asthmatic activity and other medicinal properties. These activities of the plant are due to the presence of important phytochemical constituents like flavonoids, glycosides, alkaloids, steroids, terpenoids etc. Twenty (20) albino wistar rats weighing 118g-190g were grouped randomly into four groups. With the aim to assess the testes of albino wistar rats treated with Aqueous *Ricinus communis linn* extract histologically and check fertility potentiate of the semen parameters. Control Group were given only food with water 31days, Group A (low dose), Group B (Medium dose), Group C (High dose), were administered with 200mg/kg, 400mg/kg, 800mg/kg Aqueous *Ricinus Communis linn* for 31days respectively. Evaluation of body weight, histology of the testes and hormonal analysis were conducted. The data was analysed using ANOVA. Results show significant increase in male reproductive hormone across the experimental group when compared to the control group.

**Key words:** Histology, Hormonal Assessment, Testes, *Ricinus Communis Linn*, Wistar Rat

## INTRODUCTION

Plants contain many biological active compounds which have potential for the development as medicinal agents<sup>1</sup> Herbal medicines have already formed the basis of therapeutic use in the developing countries, but of recent, there has been an increase in the use of herbal medicines in the developed world<sup>1</sup> Castor is botanically named as *Ricinus communis* Linn belong to the family Euphorbiaceae. It is also known as 'Eranda' in Sanskrit<sup>3</sup>. The plant is a tall, stout and glaucous perennial shrub. The plant is a native of Africa <sup>2</sup>. It is extensively cultivated for its oil bearing seeds. It has become naturalized in many parts of India. The castor oil and its uses are well known to all, but the use of leaves as medicine is less known<sup>5</sup>. The leaf juice is given as an emetic in narcotic poisoning. The decoction of leaves is a purgative, lactagogue and emmenagogue<sup>8</sup> A poultice of the leaves is applied to boils and swellings. The hot leaves are applied over the abdomen of children to relieve flatulence. In women the leaves promote menstrual flow. Tender leaves cure pain in bladder<sup>7</sup>. The castor seeds are studied for its pharmacognostic but, there are no reports on leaves of the said plant. The present study was therefore undertaken to put forth the pharmacopeia standards for the Castor leaves. Male are exposed continuously to compounds that affect their reproductive biology which makes them prone to infertility symptoms after a particular period of time<sup>10</sup>. Infertility often creates one of the most distressing life crisis for couples and can create a deep feeling of loss. These can have devastating effects on the mental health, and general wellbeing of the couple. The aim of this work is to assess the testis of an albino wistar rat treated with *Ricinus communis* linn aqueous extract.

## MATERIALS AND METHODS

Authentic leaf samples of *Ricinus communis* Linn. Were collected from nearby farms and bushes in a local

community in Zhewun iloh masaka karu local government Nassarawa state Nigeria. The sample was authenticated for its botanical identity with the help of the botanical lab in Ahmedu Bello University, Zaria state.

The animals used in experimental protocol were all male albino wistar rats, grouped randomly with body size weighed in grams (g), each having five (5) rats in it. The animals were allowed to acclimatise for 14days in comfortable well-ventilated cages at room temperature 25C in hygienic condition under natural light and dark schedule in the Animal House of Faculty of Basic Medical Sciences, College of Health Science, Bingham University, Karu, Nassarawa state, Nigeria. These animals were maintained on a regular common rat feed throughout the course of administration.

Administration was given for the total of 31days, and the animals were sacrificed and experimental organs (testes) were harvested from them and immediately fixed. Histological assessment was conducted immediately as soon as fixation was over.

Stock solution

- LD50-1587mg/kg
- Average weight of rats in three groups (A, B and C)
  1. A-145g
  2. B-167g
  3. C-198g
- Selected Group dose from LD50
  1. Low dose-200mg/kg
  2. Medium dose-400mg/kg
  3. High dose-800mg/kg
- Dosage in mg =  $\frac{\text{body weight of animal (g)} \times \text{dose (mg)}}{1000\text{g}}$
- $\frac{\text{Maximum average weight} \times \text{maximum dose}}{1000\text{g}}$ 

$$\frac{198\text{g} \times 800\text{mg}}{1000\text{g}} = 158.4\text{mg}$$

$$\frac{(198 \times 10 = 1.98\text{ml}), \text{ for 20 rats for 21 days } (20 \times 21 = 420)}{1000}$$

$$(158.4\text{mg} \rightarrow 1.98\text{ml}) \times 420$$

$$66,528\text{mg} \rightarrow 832\text{ml}$$
- So, 66,528mg-> 66.528mg of the castor plant extract will dissolved in 832ml of distilled water.

- Calculation of dosage volume from 832ml stock solution at 800mg/kg for high dose

Based on 10ml/kg volume selection

$$\frac{100g}{1000g} * 10ml = 1ml$$

Therefore, a 100g rat would be administered with 1ml of aqueous extract.

- Calculation of dosage volume for 400mg/kg medium dose from 832ml stock solution (takes 400ml from 832ml of high dose and diluted with 400ml distilled water to give 800ml of medium dose).

Based on 10ml/kg volume selection

$$\frac{100g}{1000g} * 10ml = 1ml$$

Therefore a 100g rat would be administered with 1ml of aqueous extract.

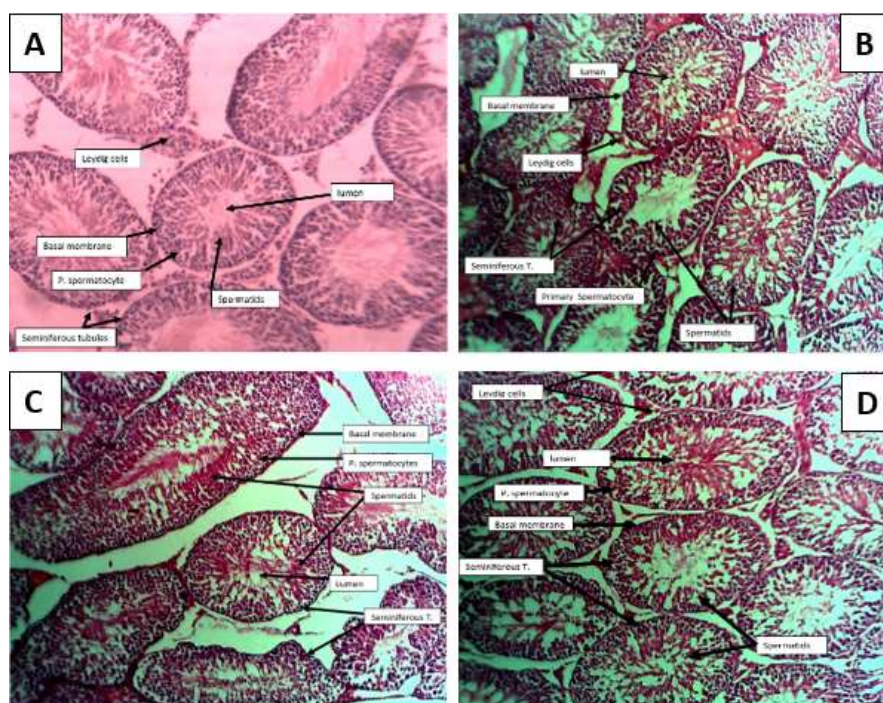
- Calculation of dosage volume for 200mg/kg low dose from 800ml medium dose (takes 200ml from medium dose and diluted with 200ml distilled water to give 400ml of low dose).

Based on 10ml/kg volume selection

$$\frac{100g}{1000g} * 10ml = 1ml$$

Therefore a 100g rat would be administered with 1ml of aqueous extract.

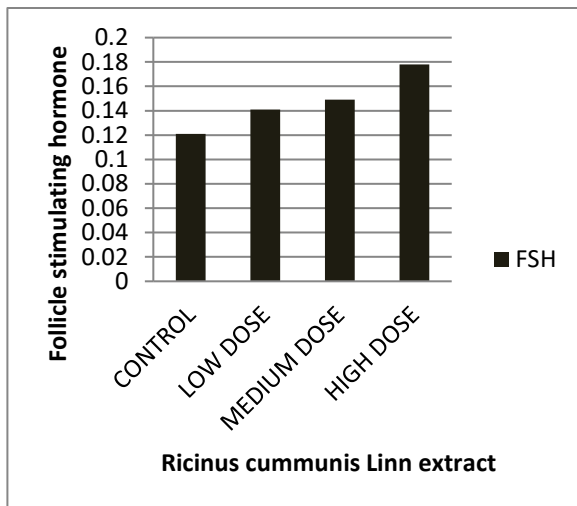
## RESULTS: Histological Results



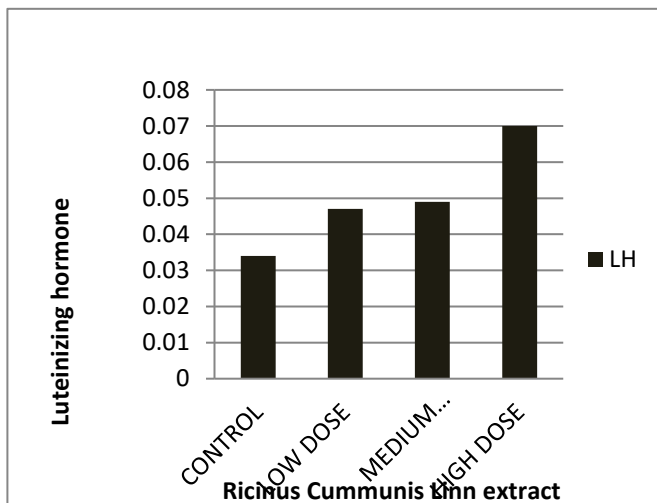
**Figure1:** Photomicrograph of the testis from control

(A) showing normal spermatogenic activities of the testis. Shows well defined circular and arranged seminiferous tubules with different stages of spermatogenic cells. Photomicrograph of testis from group (B) administered with low dose of extract showing more active of cellular activities with more defined basement membrane, Sertoli cells and Leydig cells. Photomicrograph of testis from group (C) showing moderate increase in spermatogenic activities of the testis around the lumen, well defined basement membrane and increase in numbers of Sertoli cells. Photomicrograph of the testis from group (D) administered with high dose of extract showing, prominent activities of spermatogenic activities of the cells within the lumen. Increase in Sertoli cells and Leydig cells. Well defined basement and undissorted cyto-architecture.

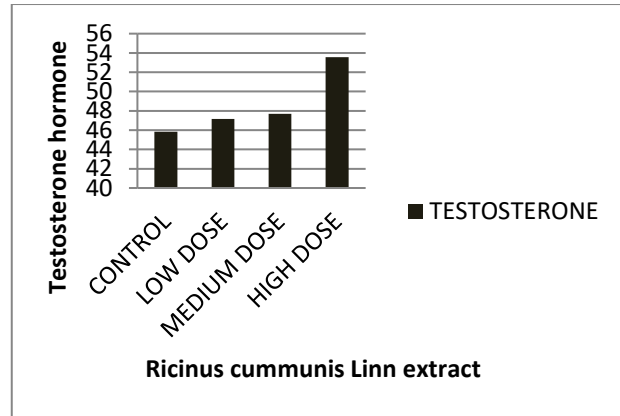
### Hormonal Analysis Result Represented in Graph:



**Figure 1:** Graphical presentation of the effect of *Ricinus communis linn* on the male reproductive hormone (FSH) of control and experimental groups. The experimental groups show significance increases SEM ( $P > 0.05$ )



**Figure 2:** Showing graphical presentation of the effect of aqueous *Ricinus Communis Linn* on the male reproductive hormone (LH) of control and experimental groups are showing increment at P value of 0.05. between high dose and control but no difference between medium and low.



**Figure 3:** Showing graphical presentation of the effect of aqueous *Ricinus communis linn* on the male reproductive hormone (Testosterone) of control and experimental groups. Showing increment at P value of 0.05. between high dose and control but no difference between medium and low.

### DISCUSSION

The histological result shows normal histology of an adult wistar rat with presence of prominent seminiferous tubules, sertoli cells leydig cells, spermatogenic cells. The results and interpretation of the histological slides from the experiment indicates that rats administered with Low dose of 200mg/kg per body weight have more active cellular activities with more defined basement membrane and sertoli cells and leydig cells. Rats administered with Medium Dose of 400mg/kg per body weight showing moderate increase in spermatogenic activities of the testis around the lumen and increase numbers of sertolic cells and Ledyig cells. Rats administered with a High Dose of 800ml/kg per body weight showing prominent activities of spermatogenic activities of the cells within the lumen. Increase in sertoli cells and leydig cells. Well defined basement and un-disssorted cyto-arctecture. Hormonal analysis of the adult wistar rats indicate an increment in male reproductive hormones which are the; Follicle stimulating and luteinizing hormone, Testosterone and this can be said due to the increase activities of spermatogenic activities and cells responsible for gametogenic and endocrine

functions of the testes induced by the administration of the extract aqueous *Ricinus Communis* Linn<sup>11</sup> says throughout the process of spermatogenesis, the spermatogenic cells have cytoplasmic attachment with Sertoli cells. Sertoli cells supply all the necessary materials for spermatogenesis through the cytoplasmic attachment<sup>9</sup>

## CONCLUSION

This study demonstrates that aqueous extract of *Ricinus communis* linn within the LD50 1587mg/kg has positive effects on the histology of testes of albino Wistar rat. It's also shows that the extract is favourable and promote the anatomical and physiological function of the testes with increase in spermatogenic cells and hormones and their activities.

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