HISTOMORPHOLOGICAL EFFECT OF AQUEOUS EXTRACT OF WATER MELON ON THE TESTIS OF ADULT MALE WISTAR RATS

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ABSTRACT

Medicinal plants contain substances that could be used for therapeutic purposes and constitute a significance portion of our daily diet. This study was designed at investigating the effects of aqueous extracts of Citrullus lanatus seed on histomorphology of testis in matured wistar rats. The rats were acclimatized for two weeks, weighed and sorted into five groups (A- E) of five animals in each group. Aqueous extract of Citrullus lanatus was administered orally to each animal in groups B, C and D at the rate of 100mg/kg, 200mg/kg, 300mg/kg, of seed extract and 3ml of water melon juice to group E. Group A served as the control group and was served with water and feed liberally. This administration lasted for 21 days after which the animals were sacrificed by chloroform anaesthesia, the testes carefully removed fixed with Bouin’s fluid and processed to obtain routine paraffin. Histological findings of the testis reveals testicular and leydig cell hyperplasia, interstitial hydrolysis and decrease spermatogenesis that were dose dependent, however group E revealed a normal testicular histoarchitecture. Weight differences showed a non-statistically significant effect on the total body weight. Consumers of this fruit should do that with caution as this research report on the possible antifertility effects of Citrullus lanatus. Further studies on other fertility profile are recommended.

INTRODUCTION

*Citrullus lanatus* is among the variety of fruits and vegetables consumed in the world and most especially in Nigeria (Erhardt et al., 2013). *Citrullus lanatus* has both Greek and Latin origin. Lanatus is its name word which means being wholly, referring to the small hairs on its stem and leaves while the Citrullus part is a Greek derivative meaning fruit.

El – Adaway and Taha (2001), had reported the biochemical components of the seed oil to be made up of 59.6% linoleic acid, palmitic acid and stearic acids. On phytochemical screening, water melon seeds have been shown to be made up of lycopene, saponin, alkaloid, cyanogenic glycoside, flavonoid, oxalate and tannin (Catar and Chengappa, 1991).

A study has demonstrated water melon to be a fruit which had a very low calorie and did not predispose one to obesity despite it nutritious value. Lycopene an antioxidant had been reported to be present in water melon (Dahl and Jeffry, 2010). It was associated with reduced incidence of coronary heart disease, prostate cancer but affected sexual and reproductive function (Riccioni et al., 2005).

Water melon has been shown to contain a very vital amino acid “Citruline-L-arginine” which had been demonstrated in diverse population with effects in reproduction, pulmonary, renal, gastrointestinal, liver function and body immunity (Laban and Njeru, 2011).

Oyewo et al., (2012), conducted a study which aimed at determining the effects of aqueous extract of *citrullus lanatus* on kidney of adult wistar rats which showed dose dependent histomorphological alternatives in the kidney as compared to the weight gained in experimental animals. The testes, genital ducts, accessory glands and penis together makeup the male reproductive system. The testes have, like the ovaries two functions: they produce the male gametes or spermatozoa, and they produce male sexual hormone, testosterone, which stimulates the accessory male sexual organs and causes the development of the male external genital sex characteristics *Citrullus lanatus* had been reported as one major fruits consumed excessively in Nigeria which tended to produce no severe health effects, hence the present study was aimed at assessing the effects of aqueous extracts of *citrullus lanatus* seed and juice on the histomorphology of testis of matured male wistar rats to access it affects on male fertility.
MATERIALS AND METHOD
Twenty five adult male wistar rats weighing between 150-270kg purchased from the animal house of Delta State University were used for this study. *Citrullus lanatus* was purchased from a local market in Abraka market Delta State. Its flesh was sliced, seeds removed and blended into juice. Seeds were air dried and ground into a powdery form which was made into an aqueous extract. Experimental rats were handled in strict compliance to recommendation in the guideline or the care and use of laboratory animals (NIH, 1985).

SAMPLE EXTRACTION
Seeds were air dried and ground into a powdered form which was soaked in water for 48 hours at the ratio of 1g to 20ml of water. Mixture was stirred at 1 hour interval and kept overnight. Mixture was separated by filtering it with a balt to get a clear solution. Solutes were dried at 40°C to get the extract. These procedures were in compliance with the methods approved and used by Adesanya et al.(2011).

EXPERIMENTAL PROCEDURES
Twenty five adult wistar rats were randomly divided into five groups (group A-E) with a particular group comprising five rats. Animals were housed in separate cages and were acclimatize for two weeks. Administration of extract was done with the aid of an orogastric tube orally for the period of 21 days.
Group A – served as the control group and received rat chow and water ad Libitum.
Group B – received Feed, water and 100mg/kg of watermelon seed extract.
Group C – received feed, water and 200mg/kg of watermelon seed extract.
Group D – were administered feed, water and 300mg/kg of aqueous seed extract of watermelon.
Group E – Feed water and were administered 3ml juice of *Citrullus Lunatus* fruit.

RESULT
Body Weight (table 1 showing the effect of watermelon on the total body weight)

<table>
<thead>
<tr>
<th>Animal Group / Body weight</th>
<th>Mean Initial Weight (g)</th>
<th>Mean Final Weight (g)</th>
<th>Mean Weight Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A control</td>
<td>171.83±8.33</td>
<td>188.23±8.67</td>
<td>8.80</td>
</tr>
<tr>
<td>Group B – 100mg/kg</td>
<td>201.67±17.40</td>
<td>200.13±20.34</td>
<td>-0.77</td>
</tr>
<tr>
<td>Group C – 200mg/kg</td>
<td>253.33±16.67</td>
<td>239.27±19.27</td>
<td>2.29</td>
</tr>
<tr>
<td>Group D – 300mg/kg</td>
<td>218.33±25.87</td>
<td>233.70±20.10</td>
<td>6.58</td>
</tr>
<tr>
<td>Group E – 3ml of juice</td>
<td>201.67±17.40</td>
<td>236.20±9.18</td>
<td>14.62</td>
</tr>
</tbody>
</table>
HISTOPATHOLOGICAL FINDINGS

Group A Control

Sections of the testis show variably sized seminiferous tubules enclosed by a dense connective tissue stroma.

The tubules are separated by a loosed connective tissues in which are sheets of leydig cells and blood vessels.

Each seminiferous tubule is composed of germ cells at various levels of maturity and within their lumen are cytoplasmic remnants.

Group B

Section of the testis show variably sized seminiferous tubules separated by a loose connective tissues in which are sheets of moderately abundant leydig cells and blood vessels. Germ cells at various levels of maturity are seen within a lumen of cytoplasmic remnant.
Section of the testis show variably sized seminiferous tubules separated by a loose connective tissues in which are sheets of leydig cells and blood vessels. Germ cells at various levels of maturity are seen within a lumen of cytoplasmic remnant. features are in keeping with seminiferous tubular hypertrophy.

Section of the testis shows several variably sized seminiferous tubules separated by loose connective tissue in which are a few congested blood vessels. The intervening spaces between the tubules show marked hydrolysis (necrosis) of the interstitial cells.

There is also severe disruption of most of the seminiferous tubules with only the basal layers of the germinal cells retained.
Section of the testis show variably sized seminiferous tubules enclosed by a dense connective tissue stroma.

The tubules are separated by a loose connective tissues in which are sheets of Leydig cells and blood vessels.

Each seminiferous tubule is composed of germ cells at various levels of maturity within their lumen are cytoplasmic remnant.

**DISCUSSION**

Medicinal plants are plants which contain substances that could be used for therapeutic purposes or which are precursors for the synthesis of useful drugs (Abolaji, 2007). There was a progressive dose dependent, increase in body weight in all test groups from their initial and final group. As the dose of the extract increased, there was a resultant increase in percentage body weight from a very low value of -0.77 to 14.62. This possible increase in weight could be as a result of its highly nutritive value and Fibres content of Citrulluslanatus (Protein 35%, oil (50%) and dietary fibre (5%) with contributions from the rat chow whose highly nutritive properties have been reported (Perkins et al., 2006). Similarly, this research agreed with studies conducted by Oyewo et al. (2013) who noted significant dose dependent weight gain after oral administration of CitrullusLanatus extract. In addition Eladawy et al. (2001), demonstrated these extract to contain nutritive components such as magnesium, calcium, potassium, iron, phosphorous and zinc which could progressively lead to increase in weight. The Histology of the testis of the test group administered 100mg/kg showed marked hyperplasia with abundant interstitium. Group 3 rats showed mild hypertrophy with enlarged
leydig cells which indicated a continuous proliferation, enlarged testicular and leydig cells. With a higher concentration of the extract, testis exhibited marked necrosis.

Hyperplasia of testicular cells, necrosis and spermatogenic arrest may be as a result of drug interaction on the testis or due to the chemical components of Citrullus Lanatus which has not been reported to have any adverse effect but had been showed to provoke reproductive function (Riccioni et al., 2009).

Abundance of interstitial cells of leydig suggested hypercellularity of the extract on the testicular interstitium that could uncontrollable grow and form a leydig cell tumour as reported by Al – Agha and Axiotis (2007). Leydig tumour hyperplasia could be caused by the phytochemical constituents of water melon extract such as glycoside which has been reported to exert a toxic effect on tissues (Catar and Chengappa, 1991; Sunam et., 2013).

This present study showed Weight gain, testicular and leydig cell hyperplasia which could be responsible for spermatogenic arrest. Further studies, should be carried out using the isolated chemical constituents of water melon to detect the actual compound that caused testicular hypercellularity, Also, cell dimensions should be carried out to provide a stereological base for pathological diagnosis.

REFERENCES


