

Reproductive Potential of Male Wistar Rat Treated for Short-Term with Graded Concentration of *Talinum Triangulare* (Water Leaf) Crude Extract

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Abstract: The reproductive potential of male Wistar rats treated with graded concentration of *Talinum triangulare* extracts was investigated. Twenty four rats (210-235g) of about 16-20 weeks were randomly distributed into 4 groups of 6 rats each. The group A (control) were given normal saline while the Groups B, C and D were given 200, 300 and 400mg/kg of the extract respectively. Rats in each group were treated for 7 consecutive days. Samples were collected after the 7th day. Increased ($P<0.05$) gonadosomatic index of the testes and the epididymes in the treated groups when compared with the control were observed. There was also reduction ($P<0.05$) in the percentage of spermatozoa motility and livability as well as increased ($P<0.05$) percentage of abnormal spermatozoa when compared with the control. These results were not concentration-dependent. It was concluded that *Talinum triangulare* at these concentrations reduces reproductive potential; hence, it should be served with caution especially to the breeding male.

Key words: Gonadosomatic index • Spermogram • *Talinum triangulare*

INTRODUCTION

Talinum triangulare is from the family Portulacaceae popularly known as water leaf, a terrestrial perennial deciduous herb which has woody stems and succulent leaves [1]. It is mostly found in Western Africa and Western North America [2]. It is an edible plant with nutritive values [3]. The constituents i.e protein, carbohydrates, steroids, oil content, crude fibres, flavonoids, alkaloids, phytic acid, oxalate, saponins and tannins vary depending on the season [4- 6] and the part of the herb [7].

The presence of minerals including calcium, magnesium and potassium, Omega-3 fatty acid and vitamins C, E and Betacarotene have been identified to be responsible for the antioxidant activity of the leaf [7, 8]. Conventionally, it is used for the treatment of internal heat, measles, sexually transmitted diseases [9]. It has also been observed to have tonic [10], anti-inflammatory [11], cardioglycosidic [12], hepatoprotective [13], neuroprotective and central nervous system excitatory [2] effects.

Conversely, *Talinum triangulare* was observed to have hemolytic and hyperglycemic effects and recommended to be used with caution by diabetic patient [14].

In the light of these positive and negative influences of *Talinum triangulare* on the normal functions and dearth of information on its effects on the reproductive system, this study was designed to evaluate the reproductive potential of the male wistar rat treated for short-term with graded concentration of *Talinum tirangulare* crude extract.

MATERIALS AND METHOD

Experimental Animal: Twenty four (24) sexually mature male Wistar rats were used to study the reproductive parameters i.e gonadosomatic index, motility, livability and morphological characteristics of spermatozoa of male Wistar rats treated with graded concentration of *Talinum triangulare* extract. Each weighed between 210 and 235 grams and was 16 to 20 weeks of age.

Experimental Animal Management: These rats were housed in the Experimental Animal Unit of the Faculty of Veterinary Medicine, University of Ibadan, Oyo State, Nigeria; under the same ambient temperature (27-31°C) and relative humidity of about 80%.

They were kept in cages made of circular plastic of about 60cm in diameter and depth of about 20cm with wooden and wire meshes on top. Wood shaven was used as bedding and was replaced every week. The rats were fed *ad libitum* with commercially prepared rat feed containing 21% protein, 3.5 fat, 6% fibre and 0.8% phosphorus by Ladokun feeds Limited, Ibadan; and water from hygienic source was given *ad libitum*. These feeds and water were supplied using the earthen troughs.

Talinum Triangulare Crude Extracts Preparation: The *Talinum triangulare* leaves were harvested on each day of administration. These were thoroughly washed and rinsed under flowing tap water. It was then finally rinsed with distilled water.

The leaves were air-dried and mashed with laboratory pestle and mortar. The pasty crude extracts was carefully collected into a beaker (which had its weight predetermined) and weighed. 2.0, 3.0 and 4.0grams of the leaves were weighed using a digital micro-sensitive weighing scale. Each of these was then diluted with 100ml of distilled water (measured by the measuring cylinder) to prepare 200, 300 and 400mg/kg concentration, respectively. These were gently stirred with spatula to achieve homogenous solution.

Extracts Administration: These rats were randomly grouped into 4 groups (A to D) of 6 rats each. The group A was used as control given distilled water while the treatment Groups B, C and D were given 200mg/kg, 300mg/kg and 400mg/kg of the extracts respectively. These rats were dosed orally in the morning (between 0700hour and 0900hour) using oral cannula and tuberculin syringe.

Sample Collection: Samples Were Collected after 7 Days of Extracts Administration. Rats from each group were weighed and euthanized by decapitation. The testes were immediately exteriorized through a mid-caudoventral abdominal incision with a sterile scalpel blade for evaluation of reproductive parameters:

Gonadosomatic Index: The two testes and the epididymis were immediately weighed using a sensitive electronic weighing machine.

Motility: Sperm cells were collected from the cauda epididymis onto a warm slide. This was buffered with warm 2.9% sodium citrate solution, covered with cover slip and examined under the microscope as previously described [15]

Livability: Sperm cells were collected from the caudal epididymis, Smears were prepared from the collected epididymal sample and stained with Eosin and Nigrosin stain. This was followed immediately by examination under the microscope as previously described [15].

Morphological Characteristics: Sperm cells were also collected from the caudal epididymis; smears were also prepared from this collected epididymis sample and stained with Wells and Awa stain. Examination under the microscope as previously described [15] was then carried out.

Data Analysis: The mean percentages and standard error of means were calculated for Gonadosomatic index (calculated as Gonad weight/body weight x100%); and motility, livability and morphological characteristics (percentage abnormalities) of the spermatozoa. One way ANOVA (Analysis of Variance) and Duncan^a multiple comparison test of the statistical package for social sciences (SPSS) were used to establish any significant difference at 95% confidence interval. P values less than 0.05(P<0.05) were considered significant.

RESULTS

The results are presented as mean $\pm$ standard error of the mean as shown in Table 1

Gonadosomatic Index (GSI) The Testes: There was increase (P<0.05) in the GSI of the treated group when compared with the control and this appear to be different (P<0.05) in the 300mg/kg group.

The Epididymis: Increased GSI (P<0.05) also exist between that of the control group and those of groups B, C and D. There was, however, significant increase (P<0.05) in the GSI of the groups C and D when compared with group B.

Table 1: Showing the reproductive potential of male Wistar rats treated with graded concentration of *Talinum triangulare* crude extract

	A (control)	B (200mg/kg)	C (300mg/kg)	D (400mg/kg)
Right Testis	0.601 ± .024 ^C	0.767 ± 0.01 ^b	0.905 ± 0.02 ^a	0.78 ± 0.01 ^b
Left Testis	0.606 ± 0.02 ^C	0.785 ± 0.03 ^b	0.882 ± 0.03 ^a	0.77 ± 0.08 ^b
Epiddymis	0.097 ± 0.01 ^C	0.13 ± 0.01 ^b	0.173 ± 0.01 ^a	0.165 ± 0.00 ^a
Motility (%)	92.5 ± 1.12 ^a	85 ± 2.24 ^{ab}	80 ± 4.47 ^b	82.5 ± 1.11 ^b
Livability (%)	96.5 ± 0.67 ^a	85 ± 2.24 ^b	82.5 ± 3.35 ^b	77.5 ± 3.35 ^b
Morphological characteristics (%)	10.42 ± 0.08 ^d	22.46 ± 0.42 ^a	12.69 ± 0.50 ^c	15.39 ± 0.57 ^b

Motility: A decrease ($P < 0.05$) in percentage of this parameter exist, especially when the group A (control) is compared with the groups C (300mg/kg) and D (400mg/kg).

Livability: Decreased ($p < 0.05$) percentage livability was observed in the treatmentt groups-B,C and D when compared with the control-A.

Morphological Characteristics: The percentage of spermatozoa abnormalities observed was increased ($p < 0.05$) in the treatment groups when compared with the control.

DISCUSSION

Although there are several reports of the beneficial effects of water leaf [2,11,13], this work observed that these benefits are equally accompanied by decline in reproductive potential of the male wistar rat, similar to Ekpo *et al.* [14].

The observed increase in the gonadosomatic index may not be unconnected with the extensive water intake(polydypsia) that follow hyperglycemia resulting from *Talinum triangulare* consumption [14]. The rapid increase in the extracellular fluid volume due to increase fluid intake could cause slight or gradual increase in the intracellular fluid level while the kidney works to attain homeostasis. This may also be due to increased concentration of potassium ions in the intracellular fluid following *Talinum triangulare* intake [7]. Increased extracellular potassium ions trigger a mobilization to increase the sodium ions in the intracellular fluid in order to maintain osmotic balance. The intracellular migration of these sodium ions is usually accompanied by extracellular migration of fluid leading to the observed increased gonadal weight.

The reduction in the percentages of motility and livability with increase in the percentage of abnormal spermatozoa observed could be linked to the osmotic imbalance that occurred in the testes and epididymis. Osmotic change affects the structure and the function of

the spermatozoa, hence, reduction in reproductive potential. These effects did not appear to be concentration-dependent probably because of the variation in response of the individual rat to the administered extracts.

It can be concluded that daily intake of *Talinum triangulare* extracts up to 200mg/kg for 7 consecutive days could reduce the reproductive potential of the mature male animals and it should be given with caution to the breeding buck.

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