The Histological Effects of Aqueous Extract of Ginger on the Testes of Adult Male Wistar Rats

[1]Ezejindu DN, [1]Udemezue OO, [1]Chukwujekwu IE, [1]Anyabolu AE, [2]Uchefuna RC, [2]Maduka SO, [1], [3]Ezejindu CN, [4]Ndukwe GU

[1]Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

[2]Department of Physiology, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

[3]Department of Microbiology, Abia State University, Uturu, Abia State, Nigeria.

[4]Department of Anatomy, Faculty of Basic Medical Sciences, Abia State University, Uturu, Abia State, Nigeria

Corresponding Authors Email:ezejindudamian@gmail.com

Phone Number: +2348032715300

Abstract

This study was carried out to evaluate the effects of aqueous extract of ginger on the testes of adult male wistar rats. Twenty adult wistar rats weighing 190-215g were used for the study. They were designated into four groups (A, B, C & D) of five animals each. Group A animals served as the control and were orally administered 0.2ml of distilled water; the experimental groups (A, B, C & D) received 0.3ml, 0.6ml and 0.9ml of aqueous extract of ginger respectively for twenty one days. After the last administration, both group A and the experimental groups were weighed, sacrificed under the influence of chloroform vapour and dissected. The testes were harvested, weighed and fixed in10% formalin for histological studies. The final body weight of groups C & D decreased significantly ($P<0.05$) compare with the control Group A. The mean relative organ weight of groups C & D animals increased significantly ($P<0.05$) when compare with the control group A while group B had similar mean weight with the control group A. Histological findings revealed necrotic changes in the interstitial tissues, loss of spermatide and multinucleated gaint cells in groups C and D. From this study, aqueous extract of ginger consumed at high doses may cause histopathological lesions in the testicular cells.

Keywords: Testes, Body weight, Organ weight, Wistar rats, Histopathological lesions.

Introduction

In the written record, the study of herbs dates back over 5,000 years to the sumerians, who created clay tablets with lists of hundreds of medicinal plants. In 1500 B.C, the ancient Egytians wrote the Ebers Papyrus which contains information on over 850 plants medicines include

garlic, juniper, cannabis, castor bean, aloe and mandrake [1].

In india, Ayurveda medicine has used many herbs such as turmeric possibly as early as 1900 BC [2, 3]. Earliest Sanskit writings such as the Rig Veda and Atharva Veda are some of the earliest available documents detailing the medical knowledge that formed the basis of the Ayurveda system [1]. Many other herbs and minerals used in Ayurveda were later described by ancient Indian herbalists such as Charaka and Sushruta during the 1st millenium BC.The Sushrutu samhita attributed to sushruta in the 6th century BC describes 700 medicinal plants, 64 preparations based on animals' sources [4].

The use of herbs and spices in cuisine developed in part as a response to the threat of food-borne pathogens. Studies show that in tropical climates where pathogens are the most abundant, recipes are the most highly spiced. Further, the spices with the most potent antimicrobial activity tend to be selected [5].

In all cultures vegetables are spiced less than meat, presumably because they are more resistant to spoilage [6]. Flowing plants were the original source of most plant medicines [7].

A large amount of arthaeological evidence exist which indicates that humans were using medicinal plants during the paleolithic, approximately 60,000 years ago. Further more, other non-human primates are also know to ingest medicinal plants to treat illness [8]. Plant samples gathered from prehistoric burial sites are an example of the evidence supporting the claim that Paleolithic peoples had knowledge of herbal medicine. For instance,a 60,000-year old Neanderthal burial site "Shanidar IV" In northern Iraq has yielded large amount of pollen from 8 plants species, 7 of which are used now as herbal remedies [9].

Ginger is one of these medicinal plants. It is a perennial reed-like plant with annual leaf stems about a meter (3-4 feet) tall. Traditionally, the rhizome is gathered when the stalk withers, it is immediately scalded or washed and scraped to kill it and prevent sprouting. The fragrant perisperm of zingiberaceae is used as sweetmeats by Bantu, also as a condiment and sialogogue [10].

It is traditionally used for dyspepsia, gastroparesis, slow motility symptoms, constipation and colic [11].

Some studies indicate ginger may provide short-term relief of pregnancy related nausea and vomiting [12].

Studies are inconclusive about effects, mostly associated with powdered ginger are gas, bloating, heartburn and nausea [12].

From the medicinal indications of ginger, there is need to investigate its effects on the testes using animal model.

Materials and methods

Breeding of Animals

Twenty wistar rats were procured from the Animal House of Department of Pharmacy, Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Agulu, Anambra State, Nigeria. They were allowed to acclimatize in the animal house of Department of Anatomy, College of

Health Sciences, Nnamdi Azikiwe University, Nnewi Campus under normal temperature (27℃-30℃) for one week and fed ad-libitum with water and guinea feed pallets from Agro feed Mill Nigeria Ltd.

Drug preparation

Fresh ginger rhizomes were bought from Onitsha market. They were dried in an oven and grinded using laboratory blender. 200mg of the grinded ginger rhizomes was dissolved in 10ml of distilled water and administered to the animals.

Experimental protocol

The animals were divided into four groups (A, B, C & D) of five animals each. Group A served as the control and administered 0.2ml of distilled water; the experiment groups B, C, & D were orally administered 0.3ml, 0.6ml, and 0.9ml of aqueous extract of ginger respectively for twenty one days. Immediately after the last administration, the animals were weighed, sacrificed using chloroform inhalation method and dissected. Testes were harvested, weighed, trimmed down to a size of 3mm x 3mm and fixed in 10% formalin for histological studies.

Tissue Processing

Testes tissues processed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and stained using haematoxylene and eosine method

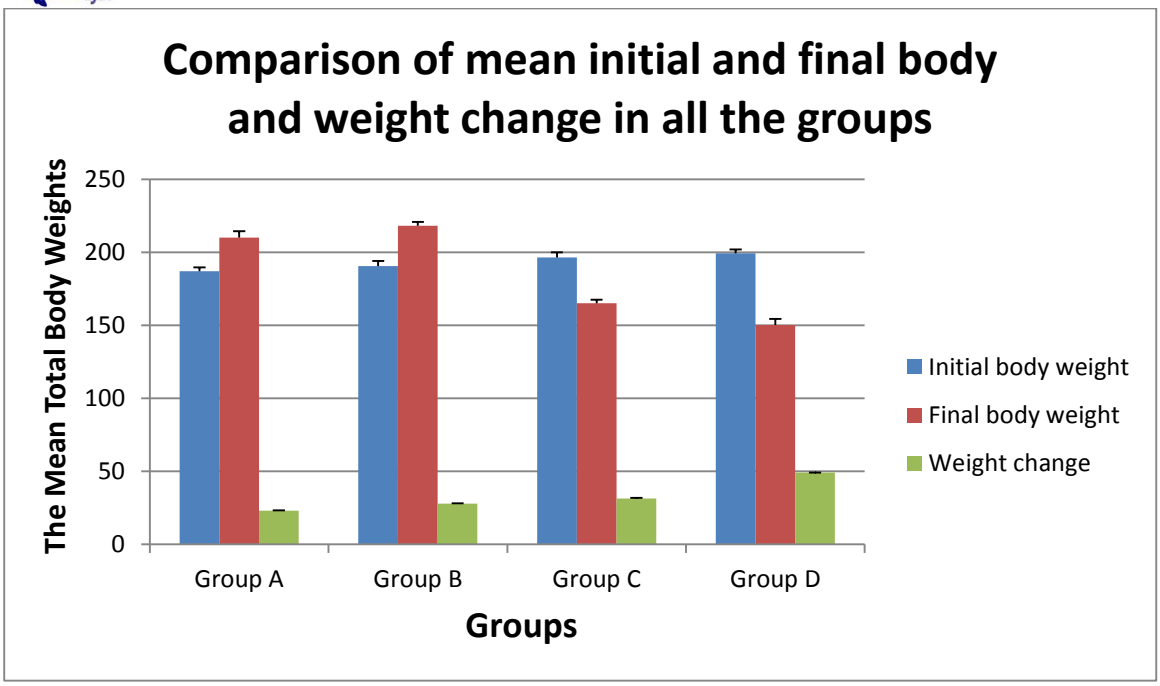
RESULTS

Morphometric Analysis of Body Weight

Table 1: Comparison of mean initial and final body and weight change in all the groups (A, B, C & D)

(Mean ± SEM given for each measurement)

	Group A	Group B	Group C	Group D	F-Ratio	Prob. of Sig
Initial Body Weight	187.10±2.60	190.50±3.50	196.50±3.50	199.30±2.70	58.120	<0.005
Final Body eight	210.20±4.30	218.10±2.70	165.10±2.40	150.20±4.10	38.200	<0.005
Weight change	23.10±0.240	27.90±0.200	31.40±0.320	49.10±0.140	30.40	<0.005

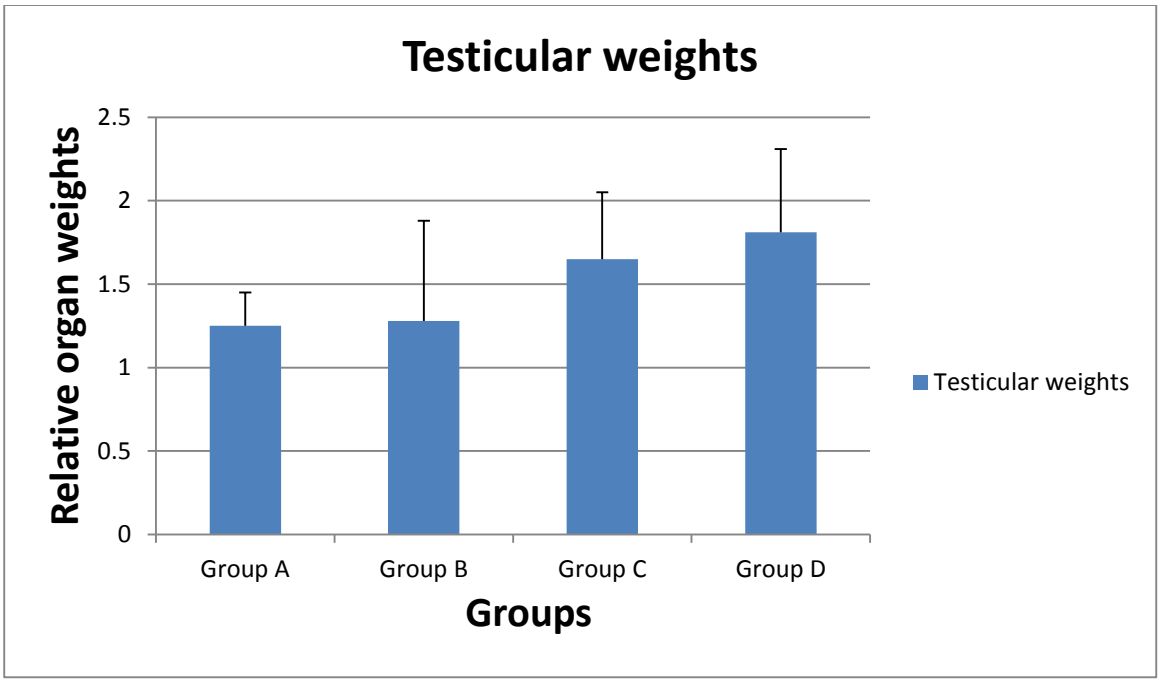


Morphometric Analysis of Organ Weight

Table 2: Comparison of Mean relative testes weight of all the groups (A, B, C & D)

(Mean ± SEM given for each measurement)

	Group A	Group B	Group C	Group D	F-Ratio	Prob. of Sig
Testicular weight	1.25±0.20	1.28±0.60	1.65±0.40	1.81±0.50	0.490	<0.05



Histological Findings

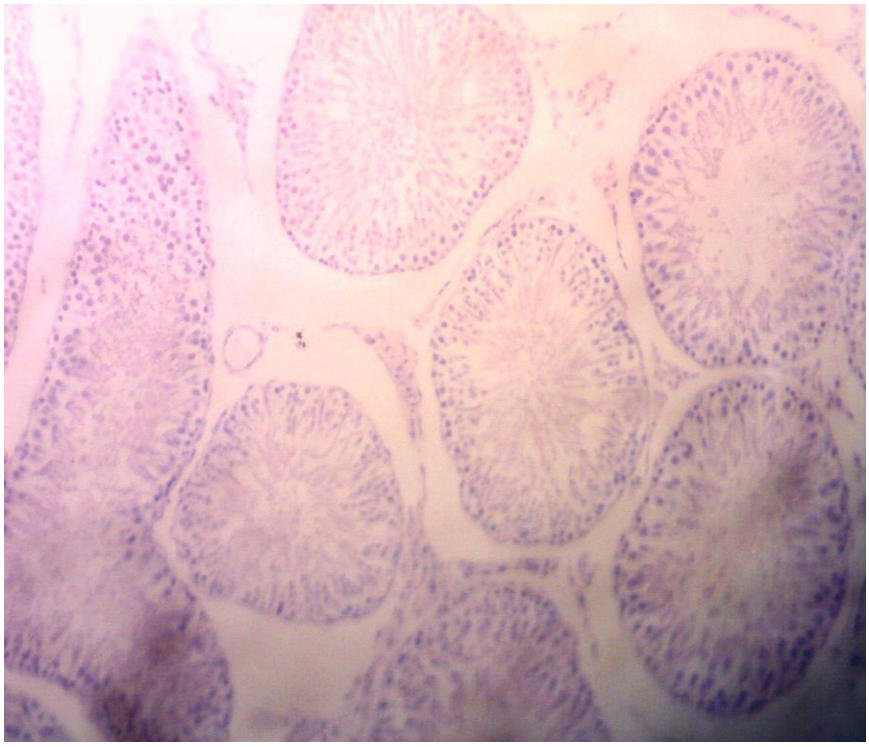


Fig 1: Micrograph 1 (control) showing normal histology of the testes.

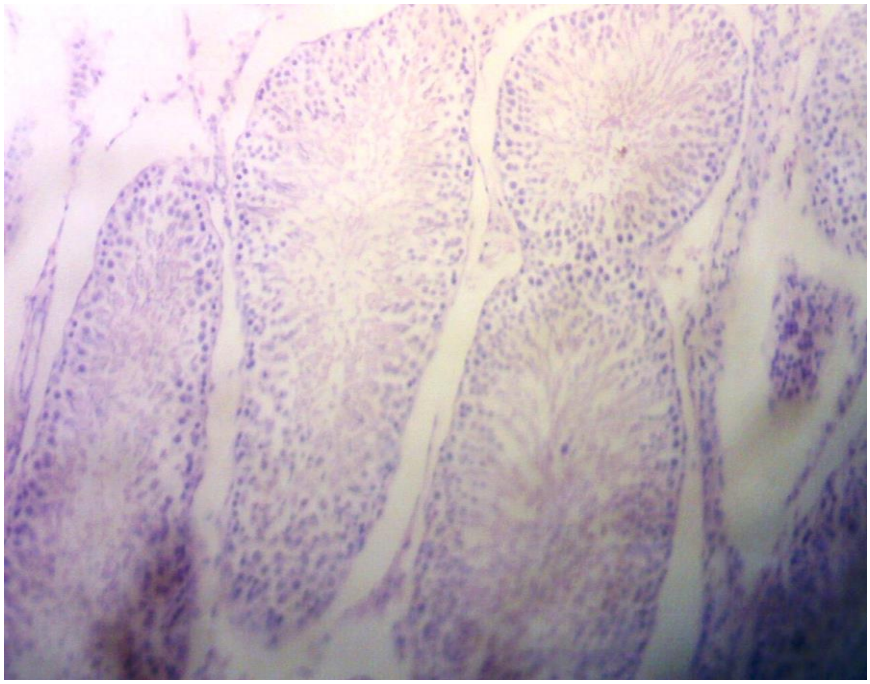


Fig 2: Micrograph 2 (Group B treated with 0.3ml of aqueous extract of ginger) showing normal histology of the testes.

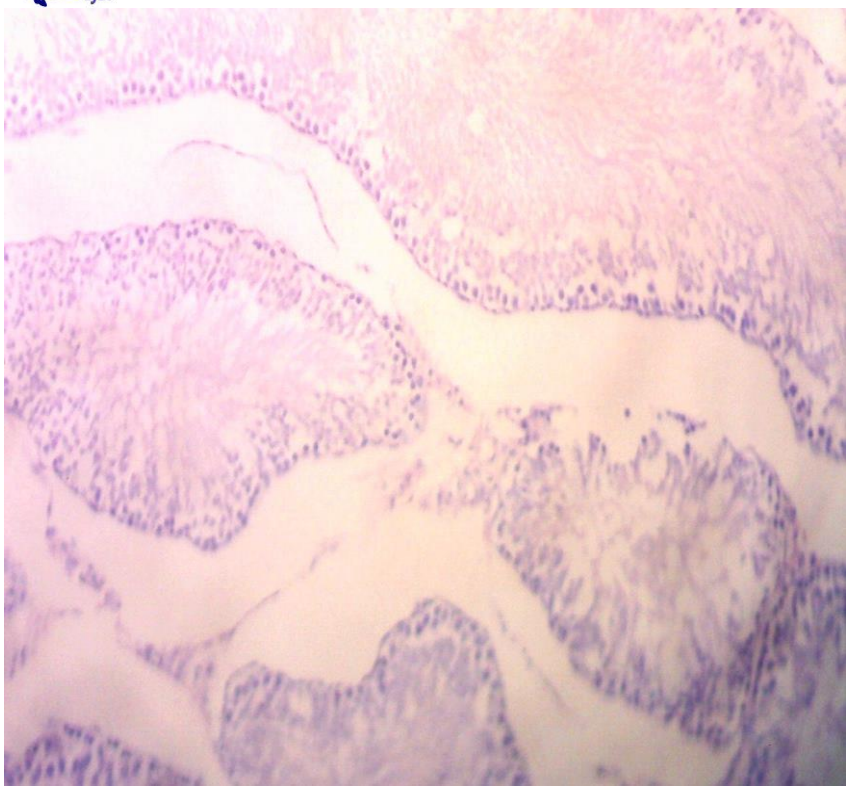


Fig 3: Micrograph 3 (Group C treated with 0.6ml of aqueous extract of ginger) showing distortion of the spermatid cells.

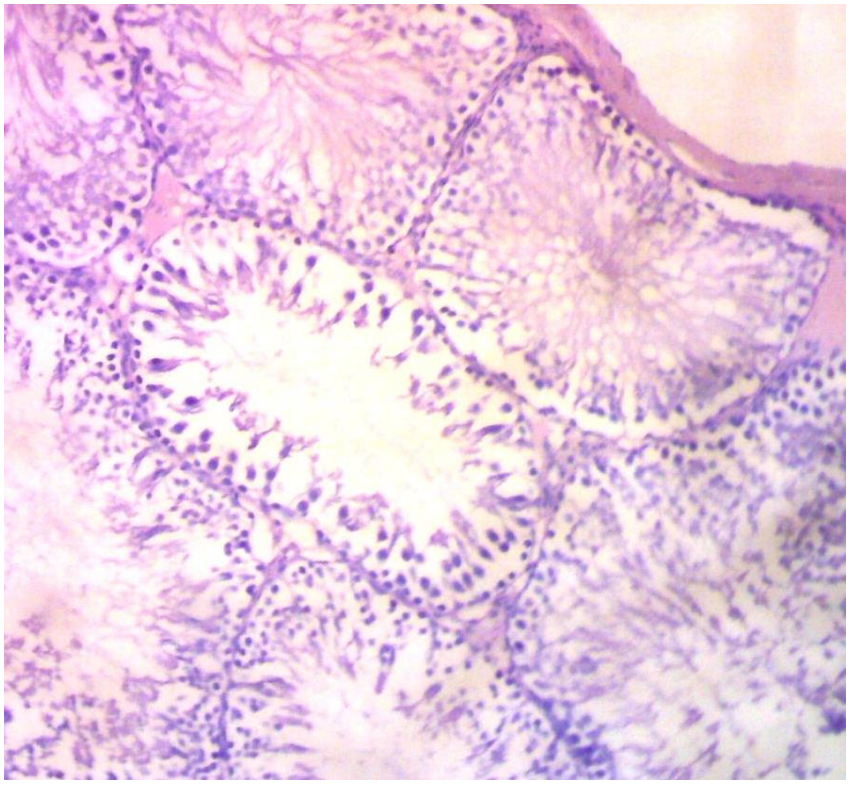


Fig 4: Micrograph 4 (Group D treated with 0.9ml of of aqueous extract of ginger) showing distortion of the spermatid cells.

Discussion

A 2012 review found ginger extracts and ginger juice possesses anti-emetic effects against chemotherapy- indeed nausea and vomiting in experimental animals [13].

A 2012 review found the radioprotective properties of ginger extract might be effective to protect against gamma radiation induced side effects from cancer treatment in mice [14].

A 2011 review found ginger displays chemopreventive and antineoplastic effects. The same review found that ginger appears to be promoting for cancer prevention though further research is necessary to evaluate the efficacy and safety of ginger [15].

In the present study, the mean body weight result revealed that groups C and D had decreased final body weight when compared with the control group A while group B increased significantly ($P>0.05$) relative to the control.

The relative organ weight showed that groups C and D increased significantly ($P<0.05$) when compare with the control group A while group B is statistically similar with the control group A.

The histological result revealed distortion of the spermatid in groups C and D while group B showed normal cyto-architecture of the testes relative to the control.

This present study therefore disagrees with previous works though there was not dose dependent in the previous studies.

Conclusion

From the present study, consumption of ginger extract at high doses may cause histopathological lesions to the testicular cells.

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