

Full Length Research Paper

The Histological Effects of Aqueous Extract of Ginger on Adrenal Gland of Adult Wistar Rats

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Abstract

This study is aimed at evaluating the histological effects of aqueous extract of ginger on the adrenal gland of adult wistar rats. Twenty adult wistar rats weighing 190-215g were used for the study. They were allocated into four groups (A, B, C and D) of five animals each. Group A animals were served as the control and were orally administered 0.2ml of distilled water; the experimental groups B, C and D were given 0.3ml, 0.6ml and 0.9ml of aqueous extract of ginger respectively for twenty one days. Both the control and experimental groups were weighed, sacrificed under the influence of chloroform vapour and dissected after the last administration. Adrenal gland were harvested, weighed and fixed in 10% formalin for histological studies. The mean final body weight of groups C and D decreased significantly ($P<0.05$) compare with the control while group B final body weight increased significantly ($P<0.05$) in comparison with the control group A. The mean relative organ weight of groups C and D increased significantly ($P<0.05$) when compared with the control while group B was statistically similar with the control group A. Histopathological result revealed abnormality in zona glomerulosa and rearranged cells of steroids in groups C and D. This study therefore suggests that high consumption of ginger may distort the adrenal gland.

Keywords: Ginger, Adrenal gland, Organ weight, Body weight, Wistar rats.

INTRODUCTION

The use of herbs to treat disease is almost universal among non-industrialized societies (Edgar *et al.*, (2002).

Many of the pharmaceuticals currently available to physicians have long history of use as herbal remedies. The World Health Organization (WHO) estimates that 80% of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care (Stepp, 2004).

Pharmaceuticals are prohibitively expensive for most of the world's population, half of which lives on less than

\$2 per day. In comparison, herbal medicines can be grown from seed or gathered from nature for little or no cost (Edgar *et al.*, (2002).

Many herbs have shown positive result in-vitro, animals model or small scale clinical test (Srinivasan, 2005) while studies on some herbal treatment have found negative result (Abbot *et al.*, (2000).

In 2002, the US National Center for Complementary and Alternative Medicine of the National Institute of Health began to fund clinical trials into the effectiveness of herbal medicine. (National Institute of Health, 2002).

In 2010 survey of 100 plants, 356 clinical trials had been published evaluating their pharmacological activities and therapeutic applications while 12% of the plants, although available in the western market had no

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substantial studies of their properties (Cravotta *et al.*, (2010)).

Some herbalists criticize the manner in which many scientific studies make insufficient use of historical knowledge which have been shown useful in drug discovery and development in the past and present (Fabricant and Farnsworth, 2001).

They mentioned that this traditional knowledge can guide the selection of factors such as optimal dose, species, time of harvesting and target population (Eric Yarnell and Kathy Abascal, 2002).

Ginger is one of the medicinal plants. The traditional medical form of ginger historically was called Jamaica ginger. It was classified as a stimulant and carminative and used frequently for dyspepsia, gastroparesis, slow motility symptoms, constipation and colic (Wood, 1867).

In China, ginger is included in several traditional preparations. A drink made with sliced ginger cooked in water with brown sugar or a cola is used as a folk medicine for the common cold (Jakes, 2007).

Hence ginger has medicinal properties, there is need to evaluate its effects on the adrenal gland cells using adult wistar rats.

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°C-30°C) for one week and fed ad-libitum with water and guinea feed pellets 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. Extraction was done using ethanol. 200mg of the extract of 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 and D) having five animals in each group. Group A served as the control and were orally administered 0.2ml of distilled water; the experiment groups B, C, and 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. Adrenal gland were harvested, weighed, trimmed down to a size of 3mmx3mm and fixed in 10% formalin for histological studies.

Tissue Processing

For easy study of sections under microscope, the adrenal gland tissues were passed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and stained using haematoxyline and eosine method.

RESULTS

Table 1 and figure 1 below shows the morphometric analysis of body weight

Table 2 and figure 2 shows the morphometric analysis of organ (Adrenal gland) weight

Histological Findings

Figure 2 to 6 shows the histological findings

DISCUSSION

A survey released in May 2004 by the National Center for Complementary and Alternative Medicine focused on who used complementary and Alternative medicines, what was used and why it was used. The survey was limited to adults aged 18 years and over during 2002, living in the United States. According to this survey, herbal therapy or use of natural products other than vitamins and minerals was the most commonly used therapy (18-19%) (Barnes *et al.*, (2004) and National Center for Complementary and Alternative Medicine.

A number of herbs are thought to be likely causing adverse effects (Taladay, 2001). Furthermore adulteration, lack of understanding of plants and drug interactions have led to adverse reactions that are sometimes life threatening or lethal (Elvin-Lewis, 2001).

Proper double-blind clinical trials are needed to determine the safety and efficacy of each plant before they can be recommended for medical use (Vickers, 2007).

In the present study, the morphometric analysis of body weight showed that groups C and D treated with high doses of ginger aqueous extract had significant decrease ($P < 0.05$), while group B treated with low dose

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

	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

(Mean ± SEM given for each measurement)

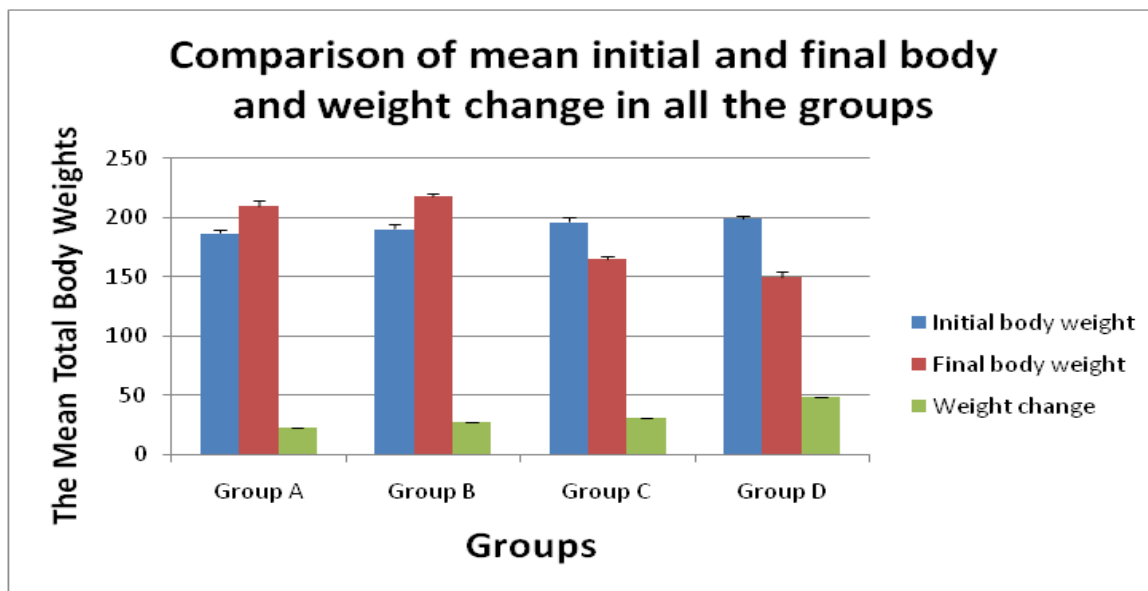


Figure 1. Bar chart showing mean initial and final body and weight change in all the groups (A, B, C and D)

Table 2. Comparison of Mean relative adrenal gland weight of all the groups (A, B, C and D)

	Group A	Group B	Group C	Group D	F-Ratio	Prob. of Sig
Adrenal gland Wt.	3.12±0.20	3.16±0.420	3.80±0.310	4.20±0.320	3.570	<0.05

(Mean ± SEM given for each measurement)

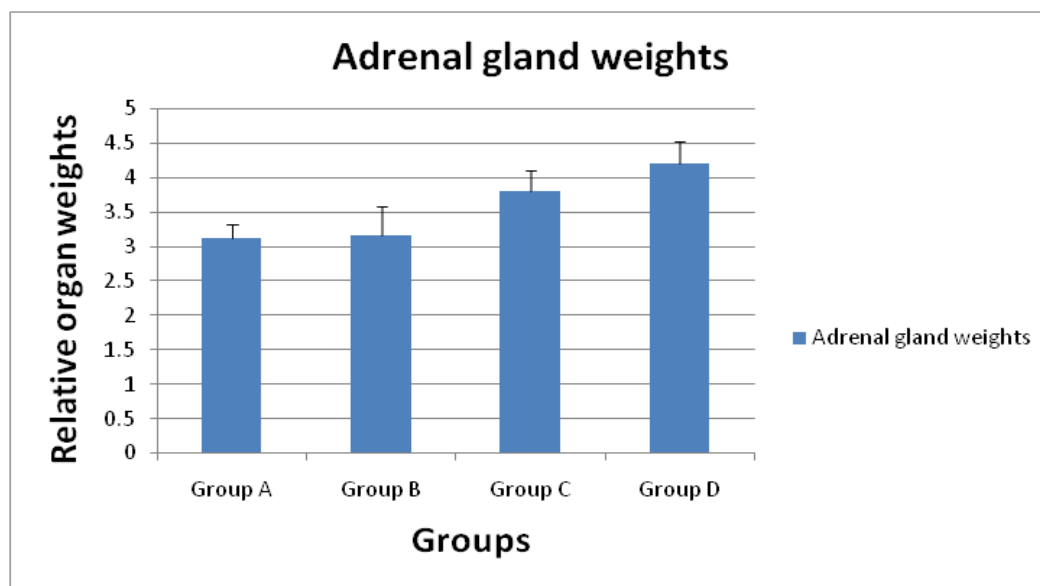


Figure 2. Bar chart showing Mean relative adrenal gland weight of all the groups (A, B, C and D)

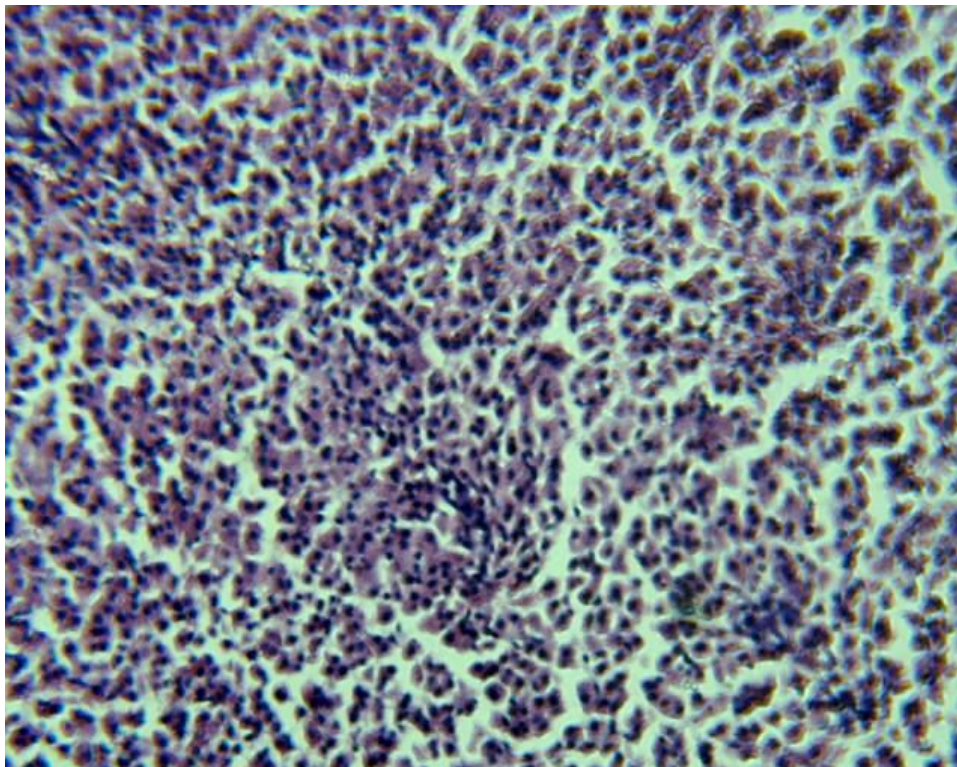


Figure 3. Micrograph 1 (control) showing normal histology of the adrenal gland.

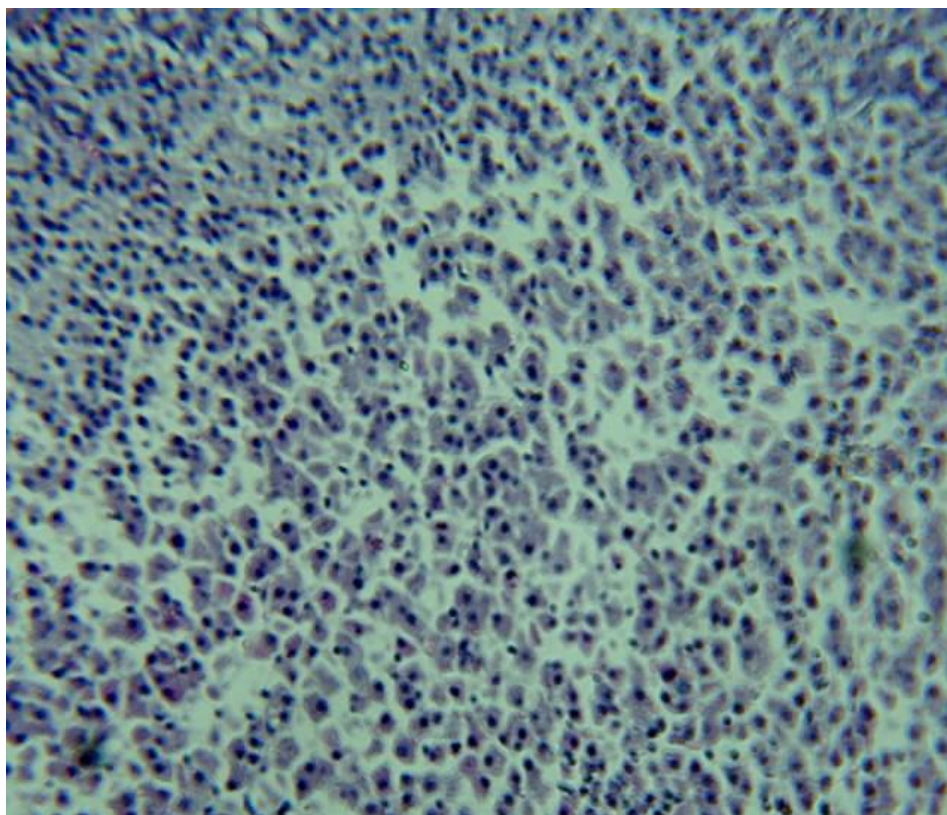


Figure 4. Micrograph 2 (Group B treated with 0.3ml of aqueous extract of ginger) showing normal histology of the adrenal gland.

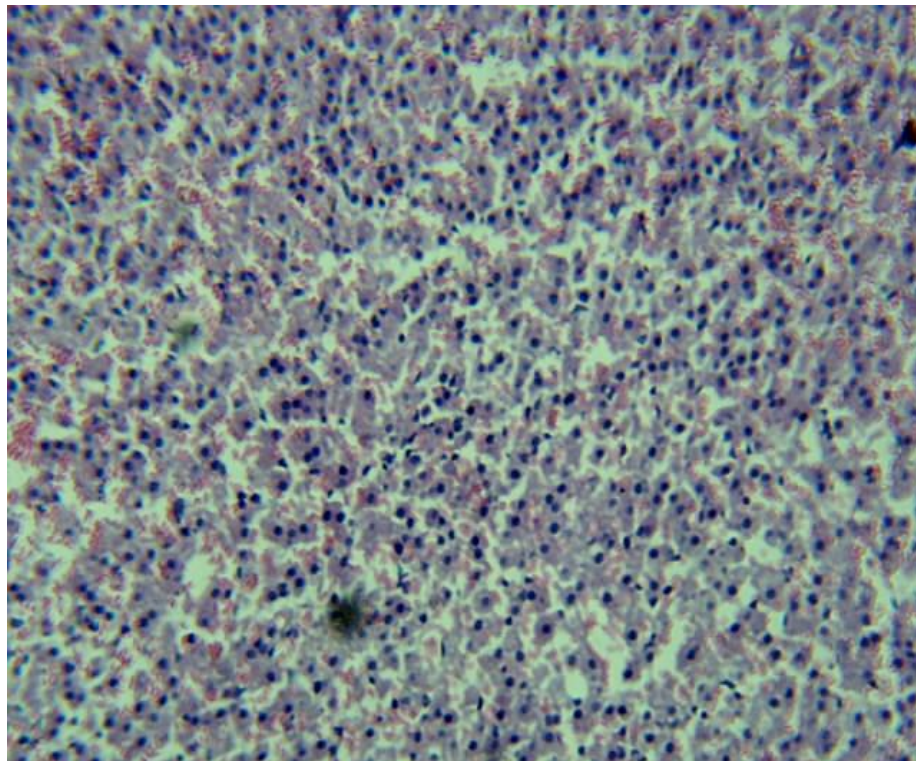


Figure 5. Micrograph 3 (Group C treated with 0.6ml of aqueous extract of ginger) showing distortion of zona glomerulosa and mild distortion of zona reticularis.

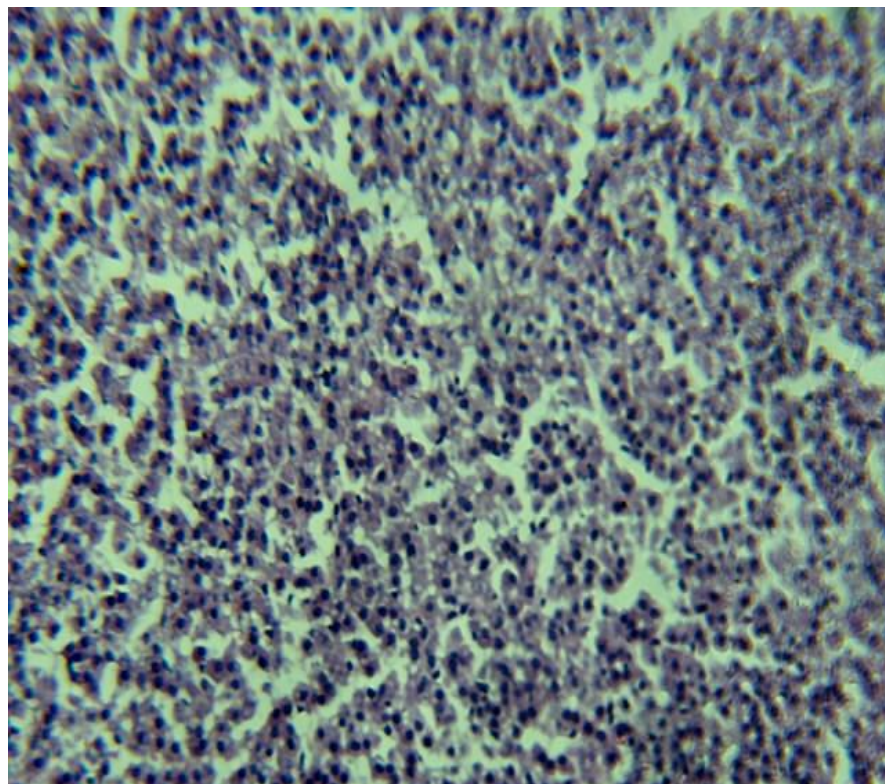


Figure 6. Micrograph 4 (Group D treated with 0.9ml of of aqueous extract of ginger) showing distortion of zona glomerulosa and mild distortion of zona reticularis.

of aqueous ginger extract increased significantly ($P < 0.05$) when compared to the control group A.

The morphometric analysis of organ weight showed that groups C and D had significant increase ($P < 0.05$) while group B was statistically similar with the control A.

The histological result revealed that groups C and D treated with high doses of ginger aqueous extract had distortion of the histology of the adrenal gland tissues while group B showed non-distortion of the adrenal gland tissues.

The present study may be in line with previous studies that high or reasonable consumption of ginger has negative side effects (Marcello, 2001).

CONCLUSION

From the present study, high consumption of ginger may cause adverse histopathological lesion to the adrenal gland.

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How to cite this article: Ezejindu DN, Udemezue OO, Chukwujekwu IE, Anyabolu AE, Uchefuna RC, Maduka SO, Ezejindu CN, Ndukwe GU (2014). The Histological Effects of Aqueous Extract of Ginger on Adrenal Gland of Adult Wistar Rats. *Int. J. Med. Med. Sci.* Vol. 1(11): 172-177