The Histological Effect of Aqueous Extract of Ginger on the Kidneys of Adult Wistar Rats.

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ABSTRACT

This study is aimed at investigating the effects of aqueous extract of ginger on the kidneys of adult 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 served as the control and were orally administered 0.2ml of distilled water; the experimental groups received 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. The kidneys were harvested, weighed and trimmed down to a size of 3mm x 3mm and fixed in 10% formalin for histological studies. The final body weight result revealed significant decrease (P>0.05) in groups C & D when compare with the control Group A while group B increased significantly (P>0.05) relative to the control group A. The mean relative organ result revealed significant increase (P>0.05) in groups C & D when compare with the control group A while group B were statistically similar with the control group A. Histological results showed distortion in cyto-architecture of the kidneys in groups C & D while group B showed normal histological appearance of the kidney tissues. From the present study, high consumption of ginger could cause damage to the kidney.

Keywords: Ginger, Kidney, Body weight, Wistar rats, Organ weight.

INTRODUCTION

The use of herbs to treat disease is almost universal among non-industrialized societies [1].

Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies including opium, aspirin, digitalis and quinine. The World Health Organization (WHO) estimates that 80% of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care [2].

Pharmaceuticals are prohibitively expensive for most of the world's population, half of which lives on less than $2US per day [3].

The use of and search for drugs and dietary supplements derived from plants have accelerated in recent years. Pharmacologist, Microbiologist, Botanist and natural products chemists are combing the earth for phytochemicals and leads that could be developed for treatment of various diseases. Infact, according to the World Health Organization, approximately 25% of modern drugs used in the United States have been derived from plants [4].

Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived [5].

More than two third of the worlds plants species, at least 35000 of which are estimated to have medicinal value. At least 7000 medical compound in the modern pharmacopoeia are derived from plants [6].

In many medicinal and aromatic plants, significant variations of plants characteristics have been ascertained with varying soil traits and the selective recovery and subsequent release in food of certain elements have been demonstrated [7].

Ginger is one of the plants with medicinal values. It is consumed as a delicacy, medicine or spice. It lends its name zingiber officinale to its genus and family zingiberaceae. It originates from Southern China after which it spread to Asia, West Africa, and Caribbean and appeared in Europe via India in the 1st century as a result of the lucrative spice trade [8, 9].

If consumed in reasonable quantities, it has few negative side effects though it does interact with some medications [10].

There are also suggestions that ginger may affect blood pressure, heart rhythms and affect individuals with gallstones [11, 12].

Therefore, from the negative side an effect of ginger, there is need to investigate its effects on the kidneys of 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. 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. Kidney tissues were removed, weighed, trimmed down to a size of 3mmx3mm and fixed in 10% formalin for histological studies.

Tissue Processing

Kidney 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

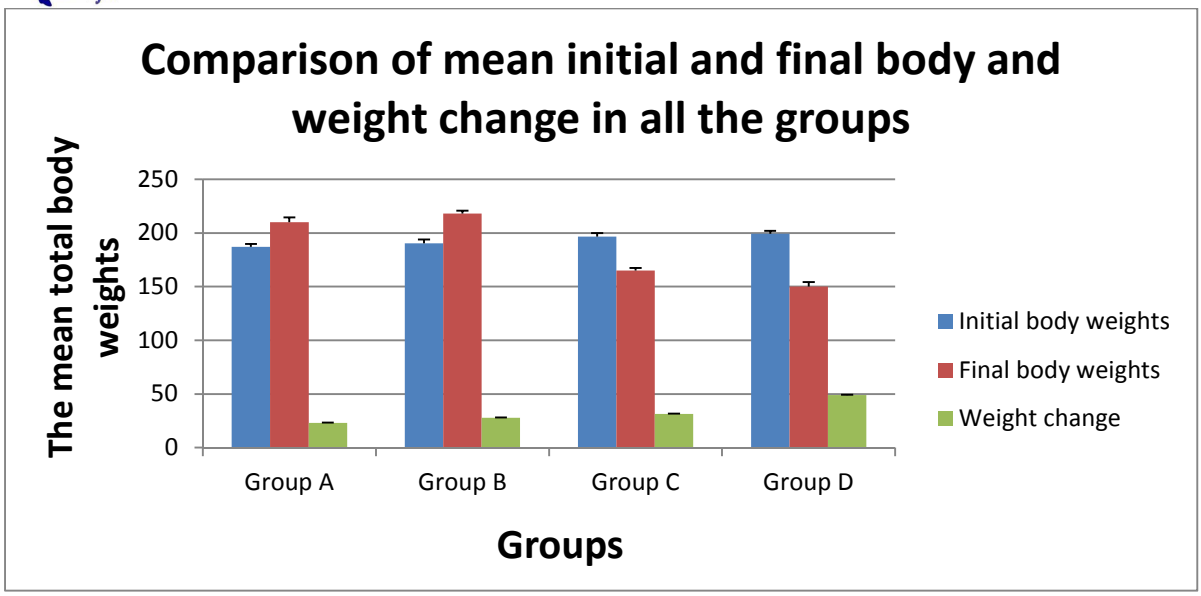

Figure 1: Bar chart showing the mean initial body weight, final body weight and weight changes in all the groups.

Morphometric Analysis of kidney Weight

Table 2: Comparison of Mean relative kidney 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
kidney weight	4.80±0.120	4.84±0.140	5.60±0.260	5.95±0.320	51.40	<0.05

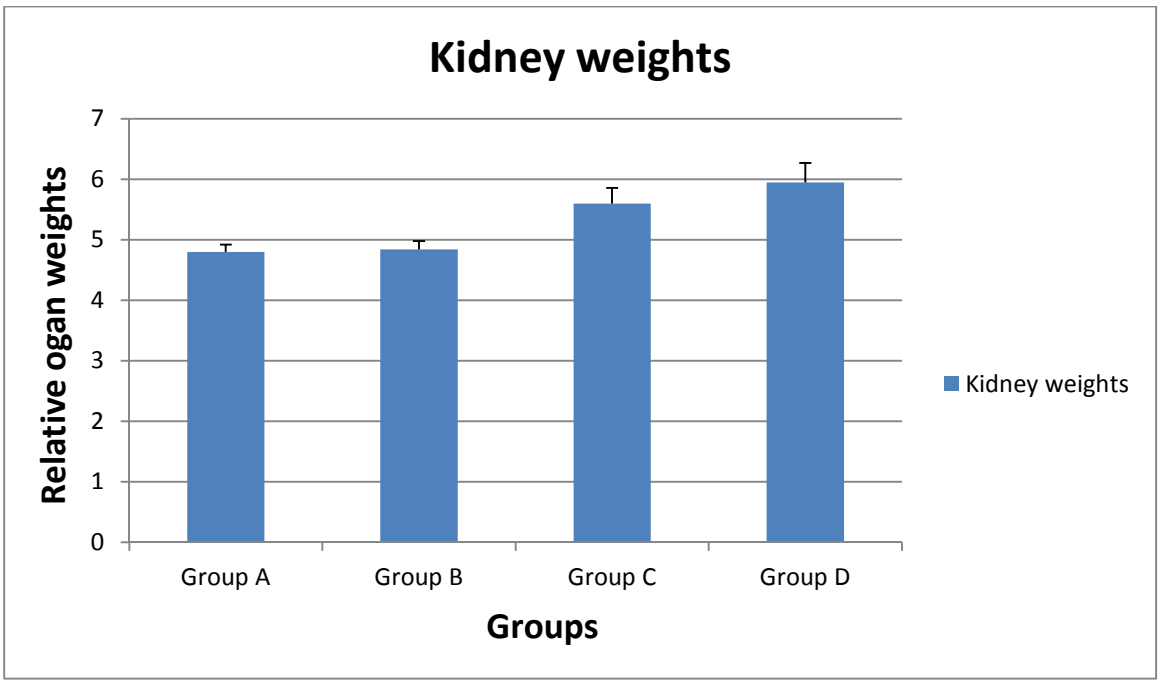

Figure 2: Bar chart showing the organ weights of all the groups

Histological Findings

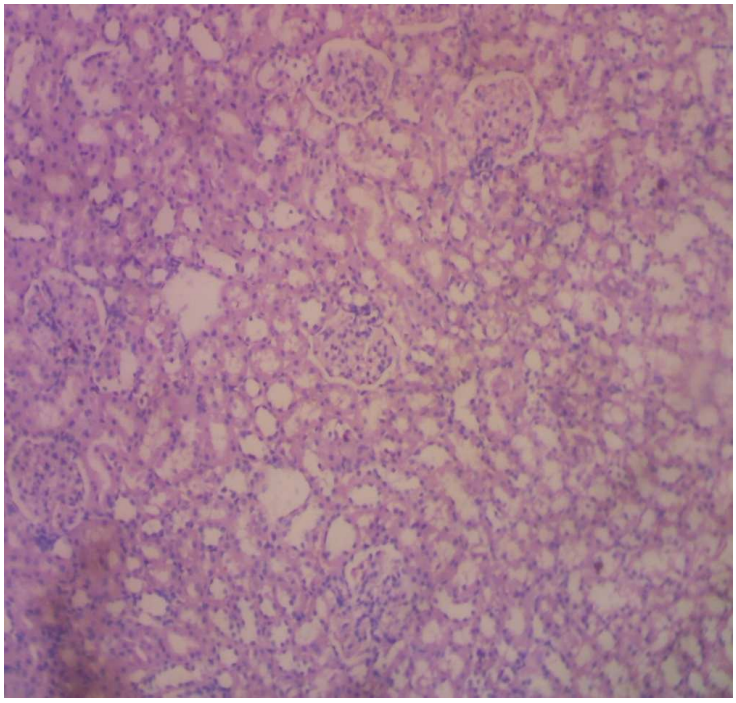

Fig 1: Micrograph 1 (control) showing normal histology of the kidney.

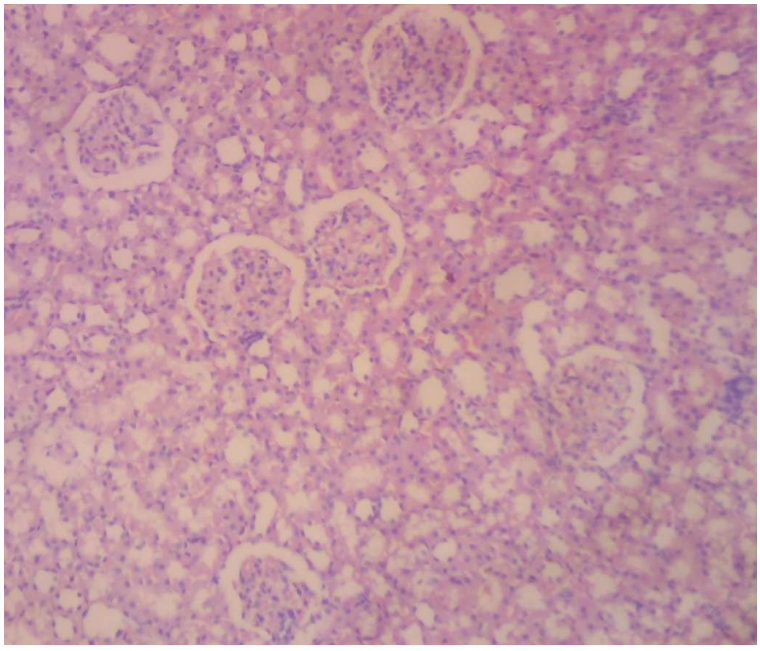

Fig 2: Micrograph 2 (Group B treated with 0.3ml of aqueous extract of ginger) showing normal histology of the kidney.

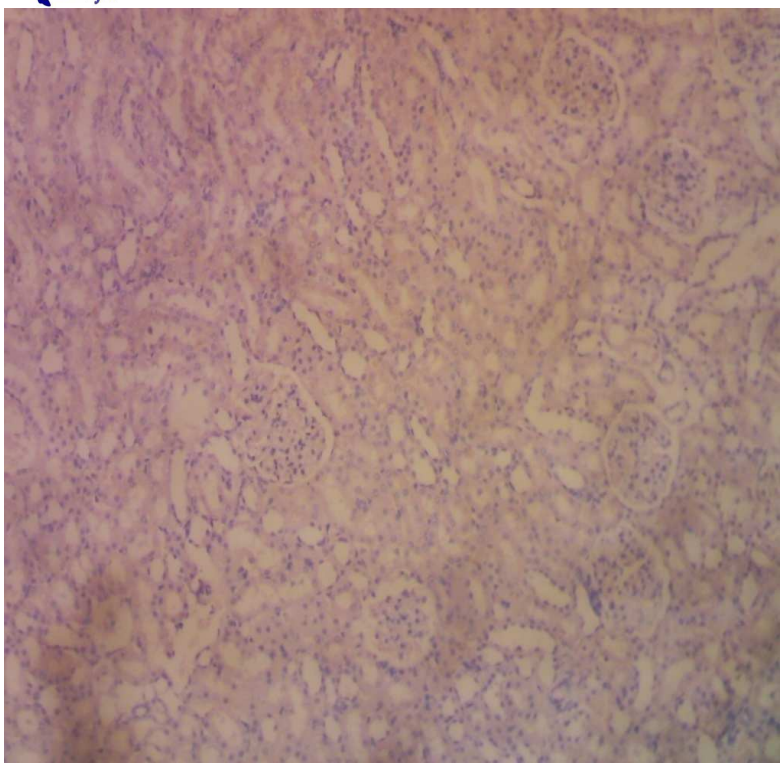

Fig 3: Micrograph 3 (Group C treated with 0.6ml of aqueous extract of ginger) showing peri-capsular inflammation.

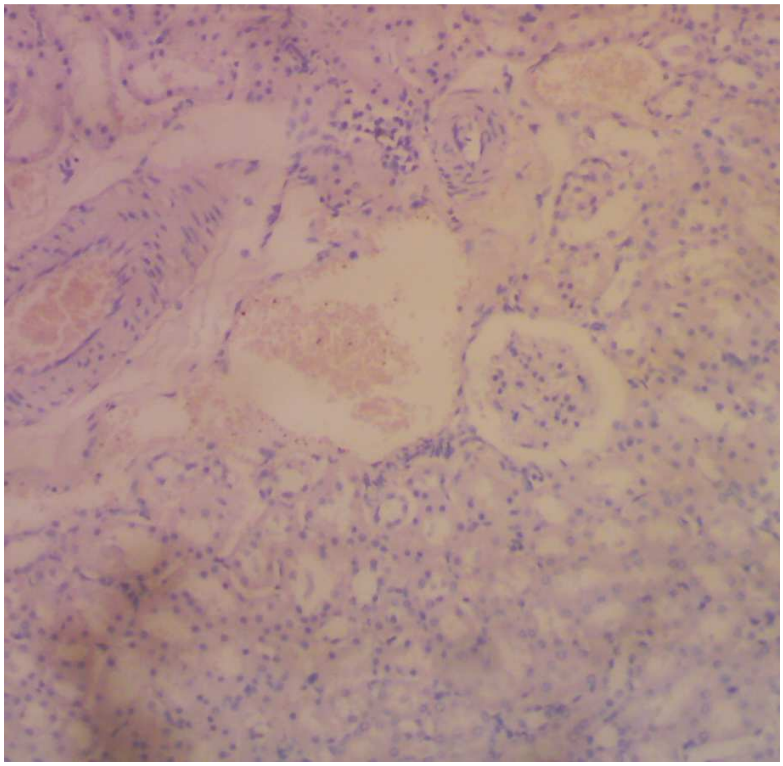

Fig 4: Micrograph 4 (Group D treated with 0.9ml of aqueous extract of ginger) showing tubular dilation within the renal cortex.

Discussion

A 2013 in vivo evaluation demonstrated ginger extract showed a hepatoprotective effect in rats [13].

A review found that ginger is a free radicals scavenger, antioxidant thus inhibits lipid peroxidation and that these attributes could be contributing to its known gastroprotective effects [14].

Some studies indicated that ginger may provide short term relief of pregnancy related nausea and vomiting. Studies are inconclusive about effect for other forms of nausea or in treating pain from rheumatoid arthritis, osteoarthritis or joint and muscle injury [15].

In the present study, the mean body weight result showed that groups C and D were significantly ($P<0.05$) lower than the control group A, while group B increased significantly ($P<0.05$) with the control.

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

The histological result revealed peri-capsular inflammation and tubular dilation of the kidney tissues of groups C and D while group B showed normal histology of the kidney.

The present result disagrees with the previous work though the previous works did not indicate the graded doses.

Conclusion

From the present study, consumption of ginger at high doses may cause histopathological lesions to the kidney tissues.

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