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

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ABSTRACT

The objective of this study is to evaluate the effect of aqueous extract of ginger on the liver of adult wistar rats. Twenty adult wistar rats weighing 190-215g were used for the study. They were divided 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 B, C & D were orally administered 0.3ml, 0.6ml and 0.9ml of aqueous extract of ginger respectively for twenty one days. Twenty four hours after the last administration, the animals were weighed, sacrificed under the influence of chloroform vapour and dissected. The liver organ 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 showed that groups C & D reduced significantly (P>0.05) when compared with the control while Group B final body weight increased significantly (P>0.05) relative to the control. The mean relative organ weight in groups C and D increased significantly (P>0.05) when compare with the control while group B had a similar weight with the control group A. Histological result showed that groups C and D tissues showed mild fibrosis around the central vein, congested sinusoids in a background of hepatocellular hypertrophy while group B showed normal cyto-architecture of the liver. From these findings, aqueous ginger extract administered in high doses may cause histopathological lesions to the liver.

Keywords: Ginger, Cyto-architecture, Liver weight, Body weight, Wistar rats.

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INTRODUCTION

The use of plants as medicines predates written human history. Ethnobotany is recognized as an effective way to discover future medicine. In 2001, researchers identified 122 compounds used in modern medicine which are derived from ethnomedical plant sources; 80% of these have had an ethnomedical use identical or related to the current use of the active elements of plants [1]. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies including aspirin, digitalis, quinine and opium[2]. Medicinal plants have been identified and used throughout human history. Plants have the ability to synthesize a wide variety of chemical compound that are used to perform important biological functions and to defend against attack from predators such as fungi, insect and herbivorous mammals. Chemical compound in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compound in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects [3, 4]. A number of herbs are thought to be likely to cause adverse effects [5]. Adulteration, inappropriate formulation or lacks of understanding of plant and drug interactions have led to adverse reactions that sometimes are life threatening or lethal [6]. Ginger is the rhizome of the plant zingiber officinale consumed as a delicacy, medicine. It is indigenenous to Southern China, from whence it spread to the spice Island and other parts of Asia and subsequently to West Africa and Caribbean [7]. According to the American Cancer Society, ginger has been promoted as a cancer treatment "to keep tumour from developing" but available scientific evidence does not support this. Recent preliminary studies in animals showed some effect in showing or preventing tumour growth. Therefore, while these results are not well understood, they deserve further studies [8]. Therefore from these preliminary result, there is need to evaluated its effects on the liver cells using animal models.

MATERIALS AND METHODS

Breeding of Animals

Twenty wistar rats were procured from the Animal House of Departmentof 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 procured 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 different doses of 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. Liver organs were harvested, weighed, trimmed down to a size of 3mmx3mm and fixed in 10% formalinfor histological studies.

Tissue Processing

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

RESULTS AND DISCUSSION

Morphometric Analysis of Body Weight

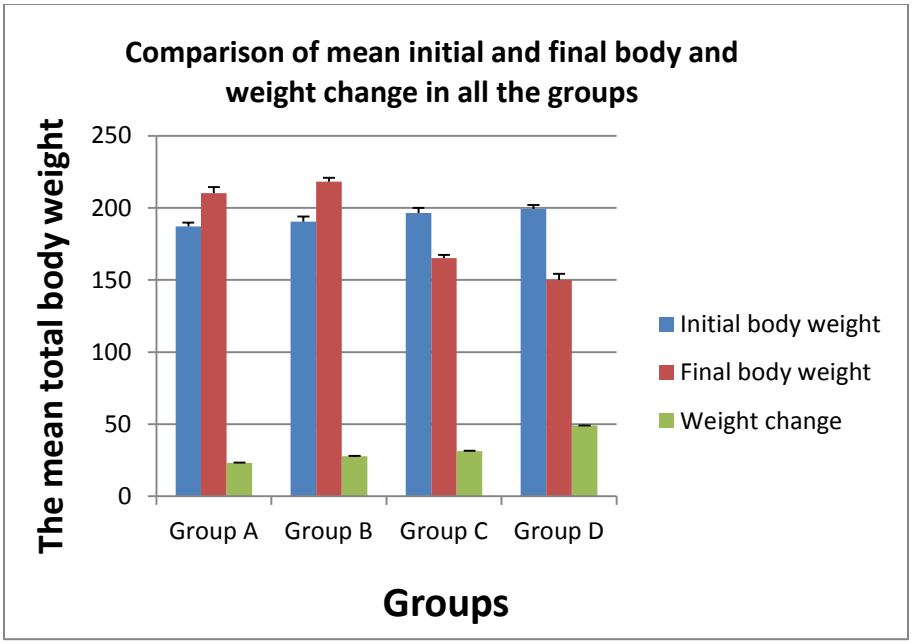

Figure 1: Bar chart showing the mean initial body weight, final body weight and weight changes in all the groups.

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

Morphometric Analysis of Liver Weight

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

	Group A	Group B	Group C	Group D	F-Ratio	Prob. of Sig
Liver weight	5.10±0.216	5.12±0.420	5.60±0.160	5.98±0.130	53.20	<0.05

(Mean ± SEM given for each measurement)

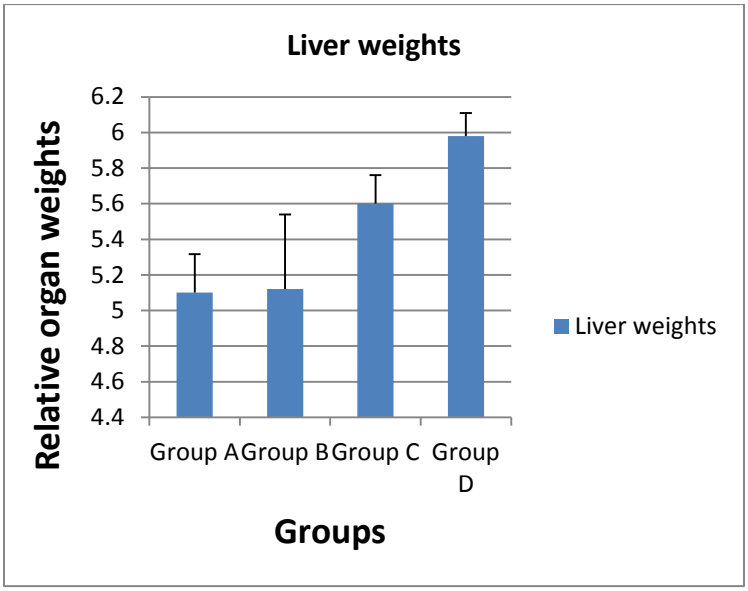

Figure 2: Bar chart showing the organ weights of all the groups

Histological Findings

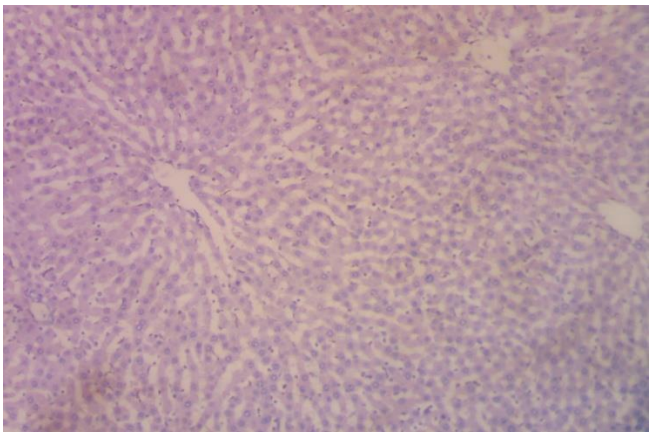

Figure 3: Micrograph 1 (Group A control) showing normal cyto-archetecture of the liver.

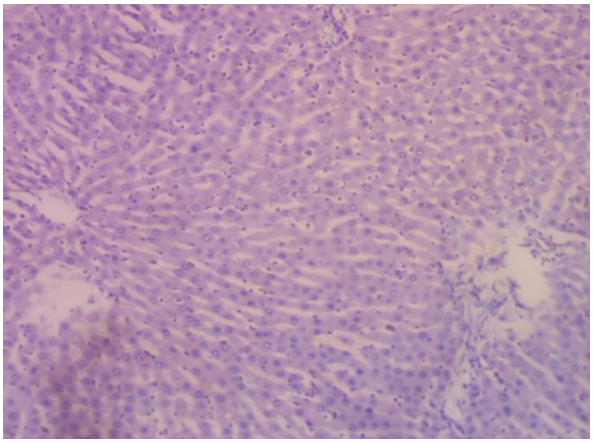

Figure 4: Micrograph 2 (Treated with 0.3ml of aqueous extract of ginger) showing normal histology of the liver.

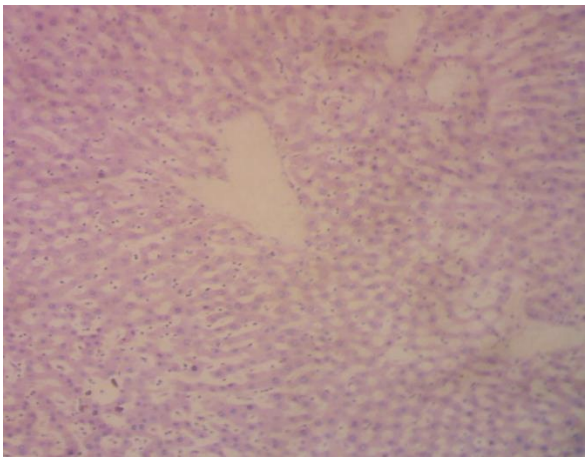

Figure 5: Micrograph 3 (Treated with 0.6ml of aqueous extract of ginger) showing fibrosis and hepatocellular hypertrophy of the liver tissues.

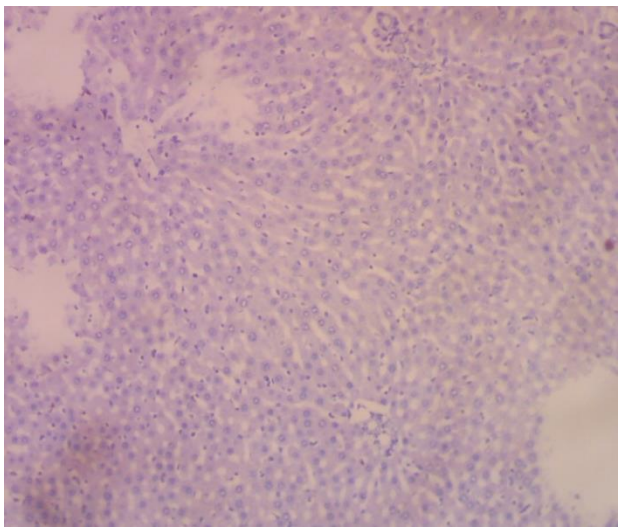

Figure 6: Micrograph 4 (Group D treated with 0.9ml of of aqueous extract of ginger) showing periportal fibrosis and hypertrophied hepatocytes of the liver tissues.

The traditional medical form of ginger historically was called Jamia caginger; it was classified as a stimulant and carminative and used frequently for dyspesia, gastroparesis, slow motility symptoms, constipation and colic[9]. It was also frequently employed to disguise the taste of medicines[10]. Ginger has also been historically used to treat inflammation which several scientific studies support, though one arthritis trial showed ginger to be not better than placebo or ibuprofen for treatment of osteoarthritis[11]. In the present study, the final body weight of groups C and D decreased significantly ($P<0.05$) when compared with the control while group B increased significantly ($P<0.05$) 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. The histopathological results revealed fibrosis, hepatocellular hypertrophy and hypertrophied hepatocytes of liver cells in groups C and D when compare with the control group A while group B showed normal cyto-architecture of the liver tissue. These results agreed with previous results which stated that if ginger is consumed in reasonable quantities will have few negative side effects[12].

CONCLUSION

Ginger extract consumed in high doses may cause adverse hisptopathological lesions to the liver cells.

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