



Original Research Article

## The Histological Effect of Ethanolic Leaf Extracts of *Annona Muricata* (Soursop) on Liver of Adult Wistar Rats

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### ABSTRACT

The objective of this study is to investigate the effects of ethanolic leaf extract of *Annona muricata* on the liver cells of adult wistar rats. Twenty adult wistar rats weighing 180-205g 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 received 0.3ml of distilled water; the experimental groups B, C & D were orally administered 0.2ml, 0.4ml and 0.6ml of ethanolic leaf extract of *Annona muricata* extract for twenty eight days. At the end of administration, the animals were sacrificed under the influence of chloroform vapour, and dissected. Liver were harvested, weighed and trimmed down to a size of 3mm×3mm and fixed in 10% formaline for histological studies. The mean final body weight showed significant decrease in groups C and D treated with 0.4ml and 0.6ml of ethanolic leaf extract of *Annona muricata*. The relative organ (liver) weight result revealed significant increase in groups C and D animals compared with the control. Histopathological results showed fibrosis around the central vein in a background of hepatocellular hypertrophy in groups C and D. This study suggests that high doses of administration of ethanolic leaf extract of *Annona muricata* extract may cause adverse effects on the liver cells.

**Keywords:** *Annona muricata*, Body weight, Liver weight, Hypertrophy, Wistar rats.

### INTRODUCTION

*Annona muricata* is the fruit of an evergreen tree native to Mexico, Cuba, Central America, Puerto Rico, Ecuador and, and South America. *Annona muricata* is also produced in some parts of Africa, especially in Eastern Nigeria. <sup>[1]</sup>

Other common names include anonna in European Portuguese, corossol in french, ekitafeeli in Uganda, aluguntugui in greater Accra region, Ghana, ebo in Yoruba, tuwon biri in hausa and sawansop in igbo. <sup>[2]</sup>

The plant is grown as a commercial herb crop for its 20-30cm long, prickly green fruit which can have a mass of up to 6.8kg making it probably the biggest annona after the junglesop. <sup>[3]</sup>

Due to the fruits widespread cultivation and popularity in parts of latin America, Africa, Southeast Asia and the pacific *Annona muricata* and its derivative products are consumed across the world via branded food and beverage products available in many countries including

Mexico, Canada, United States and Malaysia. [4-11]

The fruits contain significant amounts of vitamin C, vitamin B1 and vitamin B2. [12]

Field research suggests that *Annona muricata* derived substances have potential properties which include anti-inflammatory, anti-diabetic, anticancer and cytotoxic effects in laboratory experiments. [13-17]

In the absence of reliable liver protection in modern medicine, a number of medicinal preparations are recommended for the treatment of liver disorders. [18]

Hence, this study is aimed at investigating the protective effects of ethanolic leaf extract of *Annona muricata* on the liver of adult wistar rats.

## MATERIALS AND METHODS

### Breeding of Animals

Twenty wistar rats were purchased from the Animal House of Faculty of Pharmacy, Nnamdi Azikiwe University, Agulu, Anambra state. They were allowed to acclimatize in the animal house of Department of Anatomy, Nnamdi Azikiwe University, Nnewi Campus under normal temperature (27<sup>0</sup>C-30<sup>0</sup>C). They were fed ad-libitum with water and guinea feed pellets from Agro feed Mill Nigeria Ltd.

### Drug Preparation

*Annona muricata* leaves were plucked from Okofia, Nnewi, Anambra state and dried in an oven at a temperature of 50<sup>0</sup>C and crushed using laboratory blender. Extraction was done using ethanol. 200mg of this extract/kg body weight was dissolved in 10mls of distilled water and administered to the animals.

### Experimental Protocols

The twenty wistar rats were weighed and allocated into four groups [A, B, C & D] of five animals each. Group A served as the control and administered 0.3ml of distilled water; the experiment groups B, C & D were orally administered 0.2ml, 0.4ml, and 0.6ml of ethanolic leaf extract of *Annona muricata* for twenty eight days. Twenty four hours after animals were weighed and their weights recorded. The animals were then anaesthetized under the influence of chloroform vapor and dissected. Liver tissues were removed and weighed. The tissues were trimmed down to a size of 3mmx3mm thick and fixed in 10% formaline for four hours for histological studies.

### Tissue Processing

For easy study of sections under microscope, the tissues passed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and stained using haematoxyline 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)

	Group A	Group B	Group C	Group D	F-Ratio	Prob. of Sig
Initial Body Weight	180.10±2.50	183.20±3.10	186.50±2.80	190.40±2.40	60.140	<0.001
Final Body weight	200.10±3.40	196.30±2.90	172.20±4.20	170.30±1.40	40.100	<0.001
Weight change	20.00±0.90	13.10±0.20	14.30±2.60	20.10±1.00	7.140	<0.001

### Morphometric Analysis of Liver Weight

Table 2: Comparison of Mean relative liver 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
Liver weight	5.20±0.120	5.26±0.210	5.59±0.400	5.72±0.310	52.30	<0.001

## Histological Findings

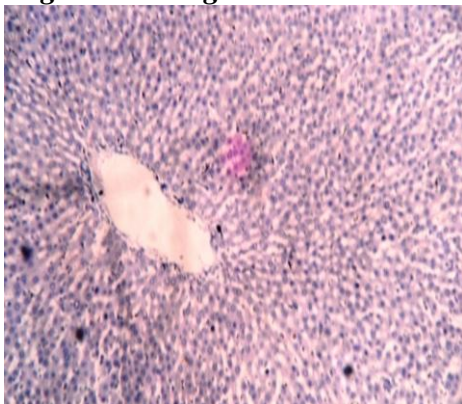


Fig 1: Micrograph 1 (Group A control) showing portal tract surrounding hepatocytes arranged in plates. Hepatic plates are separated by spaces called sinusoids. Normal liver.

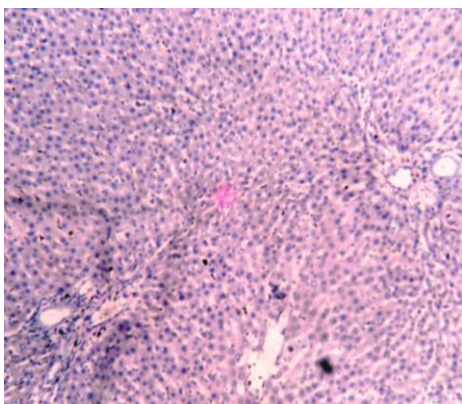


Fig 2: Micrograph 2 (Treated with 0.2ml of ethanolic leaf extract of *Annona muricata*) hepatocellular cytoarchitecture normal and portal tract centrally placed.

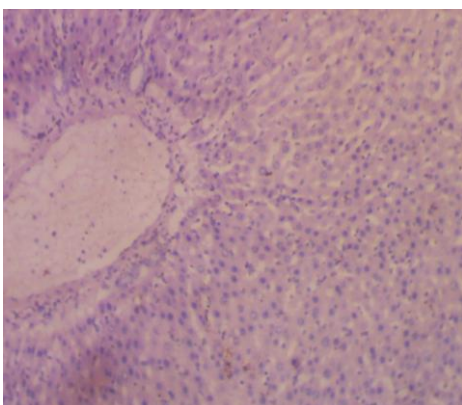


Fig 3: Micrograph 3 (Treated with 0.4ml of ethanolic leaf extract of *Annona muricata*) showing mild fibrosis around the central vein in a background of hepatocellular hypertrophy.

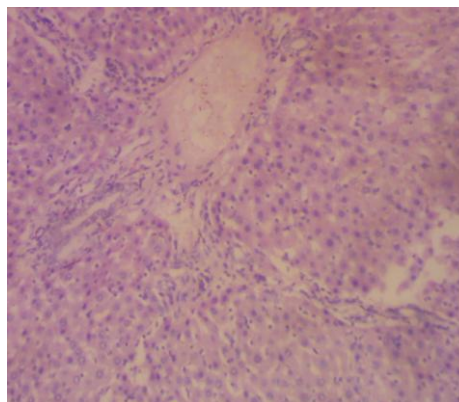


Fig 4: Micrograph 4 (Treated with 0.6ml of ethanolic leaf extract of *Annona muricata*) showing fibrosis around the portal tract and hypertrophied hepatocytes. Periportal fibrosis.

## DISCUSSION

*Annona muricata* has been reported to contain significant amount of vitamin C, vitamin B1 and vitamin B2. [19]

In the present study, the mean final body weight for the experimental groups C and D treated with 0.4ml and 0.6ml of ethanolic leaf extract of *Annona muricata* decreased significantly ( $P < 0.001$ ) when compared with the control and the least graded dose group B.

Also the mean relative organ (liver) weight of the experimental groups C and D increased significantly ( $P < 0.001$ ) when compared with the control and group B.

The histopathological results revealed hepatocellular cytoarchitecture normal in group B treated with 0.2ml of *Annona muricata* ethanolic leaf extract. Mild fibrosis around the central vein in a background of hepatocellular hypertrophy was observed in the group treated with 0.4ml of ethanolic leaf extract of *Annona muricata*. In the group treated with 0.6ml of ethanolic leaf extract of *Annona muricata*, there were fibrosis around the portal tract and hypertrophied hepatocytes thus periportal fibrosis.

These results reveal that high consumption of ethanolic leaf extract of *Annona muricata* ethanolic could be harmful to the liver cells.

## CONCLUSION

The administration of ethanolic leaf extract of *Annona muricata* in low doses may not be harmful to the liver cells but could be harmful at high doses.

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