THE HISTOLOGICAL EFFECTS OF ANNONA MURICATA (SOURSOP) ETHANOLIC LEAF EXTRACT ON THE KIDNEYS OF ADULT WISTAR RATS.

1EZEJINDU DN, 1UDEMEZUE OO, 1CHUKWUJEKWU IE, 2UCHEFUNA RC, 2MADUKA SO, 1AKINGBOYE AJ, 1EZEJINDU CN

1Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.
2Department of Physiology, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.
3Department of Microbiology, Abia State University, Uturu, Abia State, Nigeria.
Corresponding Authors Email:ezejindudamian@gmail.com

ABSTRACT

The objective of this study is to evaluate the histological effect of Annona muricata ethanolic leaf extract on the kidneys of adult wistar rats. Twenty adult wistar rats weighing 180-205g 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 received 0.3ml of distilled water; the experimental group B, C & D were orally administered 0.2ml, 0.4ml and 0.6ml of Annona muricata ethanolic leaf extract respectively for twenty eight days. Both the control and experimental groups were weighed, and sacrificed under chloroform anaesthesia at the end of the period of administration. Kidney tissues were removed and fixed in 10% formaline for histological studies. The body weight result showed reduction in the groups C and D animals treated with 0.4ml and 0.6ml of Annona muricata ethanolic leaf extract when compared with the control while group B increased significantly relative with the control. Histopathological results showed that group B has normal histoarchitecture while Groups C and D showed area of mild peri-capsular inflammation and nephrotoxicity. The result of relative organ weight showed significant increase in group B relative with the control while groups C and D increased significantly when compared with the control. This study suggests that high doses of administration of Annona muricata ethanolic leaf extract may cause adverse effects on the kidney cells.

Keywords: Annona muricata, Nephrotoxicity, Kidney weight, Body weight, Wistar rats.

1. INTRODUCTION

Annona muricata is a broadleaf, flowering, evergreen tree native to Central America South America, and some parts of Africa, Southeast Asia and the Pacific. It is in the same genus as the Chirimoya and the same family as the pawpaw.[1]

Annona muricata is adapted and related to area of high humidity and relatively warm winters; temperature below 5°C (41°F) will cause damage to leaves and small branches and temperatures below 3°C (37°C) can be fatal.[2]

Other common names include ebo in Yoruba, tuwon biri in hausa, sawonsop in igbo, corosol in french, guanabana in spanish.[3]

With the widespread cultivation and popularity in parts of Latin America, Southeast Asia, the Caribbean and Pacific, its derivative products are consumed across the world through branded food and beverage products available in many countries including the U.K, Ireland, Continental Europe, Indonesia and Vietnam.[4,5,6,7,8,10,11]

Laboratory research suggests that Annona muricata derived substances may have potential for various future applications since they have shown antinociceptive, antinoceptive and anticancer effects in laboratory experiments.[12,13,14]

With the essential properties discovered from Annona muricata, there is need to investigate its
renoprotective effects on the kidneys of adult wistar rats.

2. MATERIALS AND METHODS

Breeding of Animals

Twenty wistar rats were purchased from the animal house of faculty of Pharmacy, Agulu, Nnamdi Azikiwe University, Anambra state. 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). They were fed ad-libitum with water and guinea feed pallets from Agro feed Mill Nigeria Ltd.

Drug Preparation

*Annona muricata* leaves were plugged from Okofia, Nnewi, Anambra state and dried in an oven at a temperature of 50°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 0.2ml of distilled water; the experiment groups B, C & D were orally administered 0.2ml, 0.4ml, and 0.6ml of *Annona muricata* ethanolic leaf extract for twenty eight days. Twenty four hours after the last administration, the animals were weighed and there weights recorded. The animals were then anaesthetized under the influence of chloroform vapor and dissected. Kidney 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.

3. RESULTS

3.1. Morphometric Analysis of Body Weight

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>F-Ratio</th>
<th>Prob. of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial body weight</td>
<td>180.10±2.50</td>
<td>183.20±3.10</td>
<td>186.50±2.80</td>
<td>190.40±2.40</td>
<td>60.140</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Final body weight</td>
<td>200.10±3.40</td>
<td>196.30±2.90</td>
<td>172.20±4.20</td>
<td>170.30±1.40</td>
<td>40.100</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight change</td>
<td>20.00±0.90</td>
<td>13.10±0.20</td>
<td>14.30±2.60</td>
<td>20.10±1.00</td>
<td>7.140</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Figure 1: Bar chart showing the mean initial body weight, final body weight and weight changes in all the groups.

3.2. Morphometric Analysis of Kidney Weight

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

(Means ± SEM given for each measurement)

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
<th>F-Ratio</th>
<th>Prob. of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver weight</td>
<td>5.00±0.210</td>
<td>5.20±0.420</td>
<td>5.39±0.260</td>
<td>5.44±0.160</td>
<td>53.10</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Figure 2: Bar chart showing the organ weights of all the groups.
3.3. Histopathological Findings

Micrograph 1 (control A) showing normal histoarchitecture of the kidney.

Fig 1:

Micrograph 2 (group B treated with 0.2ml of *Annona muricata* ethanolic leaf extract) showing normal histoarchitecture of the kidney.

Fig 2:
4. DISCUSSION

*Annona muricata* leaf extract is used in the treatment of various bacterial infectious diseases such as pneumonia, diarrhea, urinary tract infection and even some skin disease \[15\].

In the present study, *Annona muricata* ethanolic leaf extract was administered to adult wistar rats to investigate whether this plant leaf extract could be toxic to the kidneys of adult wistar rats. A reduction in body weight of the wistar rats were observed in the groups C & D with the highest doses of ethanolic leaf extract of *Annona muricata*. The reduction in weight may be due to reduced food intake which may be secondary to feeling of fullness and loss of appetite after administration of the extract \[16,17\].

In the histopathological examinations, the extent of kidney damage was assessed. The animals in group D showed nephrotoxicity, this is evidenced by the presence of inflammation and tubules dilation within the renal cortex. Group C also showed area of mild peri-capsular inflammation. The group B result showed normal histoarchitecture of the kidney tissue.

Also the relative organ weight result showed significant increase in the groups C and D, this could
be as a result of inflammation of the organ while group B was statistically similar with the control.

Our results suggest that consumption of *Annona muricata* ethanolic leaf extract at high doses could cause damage to the kidney cells.

5. CONCLUSION

Our study suggests that oral administration of *Annona muricata* ethanolic leaf extract at high doses could cause adverse histopathological changes in the kidney cyto-architecture.

6. REFERENCES

2. "Can graviola cure cancer?". Cancer Research UK