THE HISTOLOGICAL EFFECTS OF GUAVA LEAF AQUEOUS EXTRACT ON KIDNEYS OF ADULT WISTAR RATS.

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ABSTRACT

The Young Leaves of Guava have been used as a tonic to treat digestive conditions such as dysentery and diarrhea in the indigenous medical system of Brazil and Mexico. This work is aimed at evaluating the effect of guava leaf extract on the kidneys of adult wistar rats. Twenty adult wistar rats with weight range of 160 to 300g were used for this study. They were designated into four groups (A, B, C & D) of five animals each. Group A served as the control and received 0.5ml of distilled water. The experimental groups B, C & D were orally administered with 250mg/kg, 500mg/kg and 750mg/kg of guava leaf extract respectively for fourteen days. The animals were anaesthetized under chloroform vapor and dissected. Kidney tissues were removed, weighed and fixed in 10% formal saline for histological studies. The experimental groups (B, C & D) showed no abnormality in cytoarchitecture of the kidney tissues.

Keywords: Wistar rats, Cytoarchiteture, Body weight, Kidney weight, Guava.

1. INTRODUCTION

Guava is large evergreen shrub or small tree that grows up to 15m in height. It is native to and widely distributed in Mexico and Central America and is common throughout all warm areas of tropical America and the West Indies. Today, the plant is cultivated from Asia to the West coast of Africa with varieties originally introduced over the past 300 years from the United States [1,2].

Phytochemical analysis of guava leaf revealed that guava has the following components alkaloids, anthocyanins, carotenoids, triterpenes and vitamin C [3,4,5,6,7,8,9].

Guava leaf extracts decreased spasms associated with induced diarrhea in rodents. Reduced defecation, severity of diarrhea and intestinal fluid secretion reductions has been demonstrated [10,11].

In an animal model, a water alcohol extract of R. guajava depressed guinea pig atrial contractility in a concentration – dependent manner.

The negative inotropic effect of the extract was blocked by atropine sulfate. In hypertensive rats, intravenous administration of guava leaf aqueous extracts produced a dose – dependent reduction in systemic arterial blood pressure and heart rate [12,13].

Aqueous extracts from guava leaves have antioxidant or radical-scavenging activity. Most of the activity is associated with polyphenols, however, the guava extract also contain antioxidants such as ascorbic acid and carotenoids [16,17].

The kidneys are essential in the urinary system and also serve homeostatic functions. They serve the body as a natural filter of the blood and remove wastes which are diverted to the urinary bladder. The kidney is prone to injury due to the chronic exposure to drugs, environmental toxicants and other xenobiotics [18].

Therefore, this work is aimed at investigating the effect of guava leaf extract on the kidney of adult wistar rats.

2. MATERIALS AND METHOD

Breeding of Animals

Twenty adult wistar rats weighing between 100 – 300g were purchased from animal house of department of pharmacy, Nnamdi Azikiwe University, Agulu Campus, and housed in the animal house of department of Anatomy, Nnamdi
Azikiwe University, Nnewi Campus. They were acclimatized for a period of seven days under standard laboratory conditions and fed with water and diet (normal rat chow).

**Collection of Plant Material**

The fresh specimens of guava leaves were plucked from Okoafia in Nnewi Anambra State and authenticated in herbarium unit of botany department Nnamdi Azikiwe University, Awka. They were air dried and grounded with laboratory blender. 250g of the extract were dissolved in 200ml of distilled water and administered to the animals.

**Experimental Design**

The twenty adult Wistar rat were randomly divided into four groups of five animals each. Group A served as the control and received 0.5ml of distilled water, the experimental groups B, C & D received, different oral doses of drugs as follows: Group B received 250mg/ kg of guava leaf extract, group C received 500mg/kg of guava leaf extract and group D received 750mg/kg of guava leaf extract respectively for fourteen days. The animals were sacrificed under the influence of chloroform, inhalation method. Kidney tissues were removed, weighed and fixed in 10% formaldehyde for histological studies.

**Tissue Processing**

The tissues passed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and stained using Hacmatoxyline and eosine method.

### RESULTS

#### 3.1 Morphometric Analysis of Body Weight

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

<table>
<thead>
<tr>
<th>Group</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial body weight (g)</td>
<td>180.40 ± 2.40</td>
<td>200.00 ± 4.60</td>
<td>220.40 ± 2.60</td>
<td>240 ± 10 ± 4.20</td>
</tr>
<tr>
<td>Final body weight (g)</td>
<td>191.10 ± 3.60</td>
<td>215.80 ± 2.80</td>
<td>225.20 ± 4.10</td>
<td>249 ± 20 ± 7.10</td>
</tr>
</tbody>
</table>

**Figure 1:** Bar chart showing the mean initial and final body weight
3.2 Morphometric Analysis of Organ (Kidney) Weight

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

(Mean + 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>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney Weight</td>
<td>5.10 ± 0.210</td>
<td>5.25 ± 0.320</td>
<td>5.38 ± 0.290</td>
<td>5.42 ± 0.400</td>
</tr>
</tbody>
</table>

3.3 Histopathological Findings:

**Micrograph 1** control (treated with 0.5ml distilled water) the glomerulus and convoluted tubules are in place. The cortex showed no inflammation.
Micrograph 2 (treated with 250mg/kg of guava extract) it has the same features with the control group, showing normal kidney.

Micrograph 3 (treated with 500mg/kg of guava extract) Showing normal kidney

Micrograph 4(treated with 750mg/kg of guava extract) showing normal cytoarchitecture of the kidney.
4. DISCUSSION

The young leaves of guava have been used as a tonic to treat digestive conditions such as dysentery and diarrhea in the indigenous medical system of Brazil and Mexico. Mexico medicinal date document the treatment of acute diarrhea, flatulence gastric pain by using leaf water decoction for oral administration 3 times daily. A decoction and young leaves and shoots have been prescribed as a febrifuge and spasmolytic. In Bolivia and Egypt, guava leaves have been used to treat cough and pulmonary diseases, they have also been used to treat cough in India and as anti-inflammatory and haemostatic agent in China [2-3].

In the present study, the final body weight of the experimental groups increased significantly relative to the control. The mean relative organ (kidney) weight increased statistically with the control. The histopathological findings of the experimental groups revealed no distortion of the kidney cyto architecture.

The extract in this instance served as a dietary supplement enhancing growth. This could be as a result of the phytochemical constituents possessed by guava leaf extract.

5. CONCLUSION

Our results suggest that oral administration of extract of guava leaves at high and low doses did not induce any histopathological lesion to the kidney tissues.

6. REFERENCES


