American Journal of Engineering Research (AJER)
e-ISSN : 2320-0847 p-ISSN : 2320-0936
Volume-03, Issue-02, pp-157-161
www.ajer.org

Research Paper Open Access

Renoprotective effects of moringa oleifera leaf extract on the kidneys of adult wistar rats

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Abstract: - Moringa oleifera is one of several nutritional supplements giving wide spread popularity in Nigeria and many other countries of the world. The leaves and flowers are being used by the population with great dietary importance. The aim of this study is to investigate the effects of oral administration of Moringa oleifera leaf extract on the kidneys of adult wistar rats. 24 apparently healthy adult wistar rats weighing between190-230kg were divided into four groups of six animals each. Group A served as the control and received 0.3ml of distilled water orally. The experimental groups B, C & D received 0.5ml, 0.6ml &0.7ml of Moringa oleifera extract orally respectively. The administration lasted for twenty one days. The animals were weighed, sacrificed using chloroform vapour. The kidney tissue were removed, weighed and trimmed down for histological studies. Result of this study showed non-distortion of the kidney cells. The findings of this study suggest that chronic Moringa oleifera consumption may not put the kidneys at risk of adverse histopathological conditions.

Keywords: - *Moringa oleifera, kidney weight, Body weight, Hepatoprotective, Wistar rat.*

I. INTRODUCTION

Moringa oleifera is the most widely cultivated species of the genus Moringa, which is the only genus in the family Moringaceae. The English common names include Moringa, drumstick tree from the appearance of the long slender, triangular seed pods, horseradish tree from the taste of the roots which resembles horseradish, and ben oil tree from the oil derived from the seed [1]

It is a fast-growing drought-resistant tree native to the sourthern foothills of the Himalayas in northwestern India, but widely cultivated in tropical and sub-tropical areas.

In developing countries, Moringa has potential to improve nutrition, boost food security, foster rural development and support sustainable landcare [2]. It may be used as forage for livestock, a micronutrient liquid, a natural anthelmintic and possible adjuvant [3, 4]

In some regions the young seed pods are most commonly eaten, while in others, the leaves are the most commonly used part of the plant. The flowers are edible when cooked and are said to taste like mushrooms. The bark, sap, roots, leaves, seeds, oil and flowers are used in traditional medicine in several countries [5]

The leaves are the most nutritious part of the plant, being a significant source of B vitamins, vitamin C, provitaminA as beta-carotene, vitamin K, manganese and protein, among other essential nutrients [6, 7].

When compared with common foods particularly high in certain nutrients per 100g fresh weight, cooked Moringa leaves are considerable sources of these same nutrients [8, 9].

Moringa is especially promising as a food source in the tropics because the tree is in full leaf at the end of the dry season when other foods are typically scarce [10].

Moringa oleifera is undergoing preliminary research to investigate the potential properties of its nutrients and phytochemicals. [11, 12, 13, 14].

Therefore, there is need to investigate the hepatoprotective effects of Moringaa oleifera leaf extract on the kidneys of adult wistar rats. Hence this study aims at investigating the effects of Moringa oleifera leaf extract on the kidneys of adult wistar rats.

II. MATERIALS AND METHODS

2.1: Breeding of animals

Twenty four apparently healthy adult wistar rats were purchased from the animal house of Anatomy Department, University of Calaber, Cross River State, Nigeria and bred in the animal house of University of Uyo, Akwa Ibom State. They were allowed for seven days for acclimatization under normal temperature (27℃ - 30℃) before their weights were taken. They were fed ad-libitum with water and guinea feed pallets from Agro feed mill Nigeria Ltd.

2.2: Drug preparation

Moringa oleifera leaves were collected from Mbaise in Imo State and was dried in an oven at a temperature of 50℃ and crushed using laboratory blender. Extraction was done using ethanol. 250mg of this extract/1kg body weght was dissolved in 10mls of distilled water and administered to the animals.

2.3: Experimental protocols

The twenty four apparently healthy animals were weighed and allocated into four groups (A, B, C, & D) of six animals each. Group A served as the control and were administered 0.3ml of distilled water; the experimental groups B, C & D were administered 0.5ml, 0.6ml and 0.7ml of Moringa oleifera leaf extract respectively for twenty one days. Both the control and experimental groups were sacrificed using chloroform inhalation method. Kidney tissues were removed, weighed and trimmed down and fixed in zenkers fluid for histological studies.

2.4: Tissue Processing

The tissues were transferred into an automatic processor where they went through a process of fixation, dehydration, clearing, infiltration, embedding, sectioning and staining.

Fixation was carried out in zenkers fluid. The tissues remained in the fluid for four hours. After fixation, the tissues were washed overnight under a stream tap water. Dehydration of the fixed tissues were carried out in different percentages of alcohol 50%, 70% and 90% absolute. The tissues were then cleared in xylene and embedded in paraffin wax. Serial sections of 5micron thick were obtained using a rotatory microtome. The tissue sections were deparaffined hydrated and stained using the routing haematoxylin and eosin method (H&E). The stained sections were then examined under the light microscope.

III. RESULTS

3.1 Morphometric Analysis of Body Weights

Table 1: Comparison of mean initial and final body weight and weight change in all the groups (A, B, C & D) (Mean ±SEM given for each measurement)

	GP A	GP B	GP C	GP D	F-RATIO	PROB OF SIG
INITIAL BODY INT	198.20±4.50	206.80±3.60	219.10± 5.10	226.20±3.30	66.140	< 0.001
FINAL BODY INT	218.00±4.10	220.30±5.30	228.50±2.50	235.40±5.40	34.220	< 0.001
WEIGHT CHANGE	19.80±2.30	13.50±4.60	9.40±2.70	9.20±4.80	6.340	< 0.001

The final body weight for the experimental groups increased significantly ($P< 0.001$) relative to the control

3.2 Morphometric analysis of kidney weight

Table 2: Comparison of mean relative kidney weight of all the groups (A, B, C & D) (Mean $\pm$ SEM given for each measurement)

	GP A	GP B	GP C	GP D	F. RATIO	PROB OF SIG.
KIDNEY WT	5.30±0.200	5.25±0.310	5.26±0.500	5.27±0.410	52.10	< 0.001

The relative kidney weights for the experimental group increased significantly ($p< 0.001$) with the control.

3.3 Histopathological Findings:

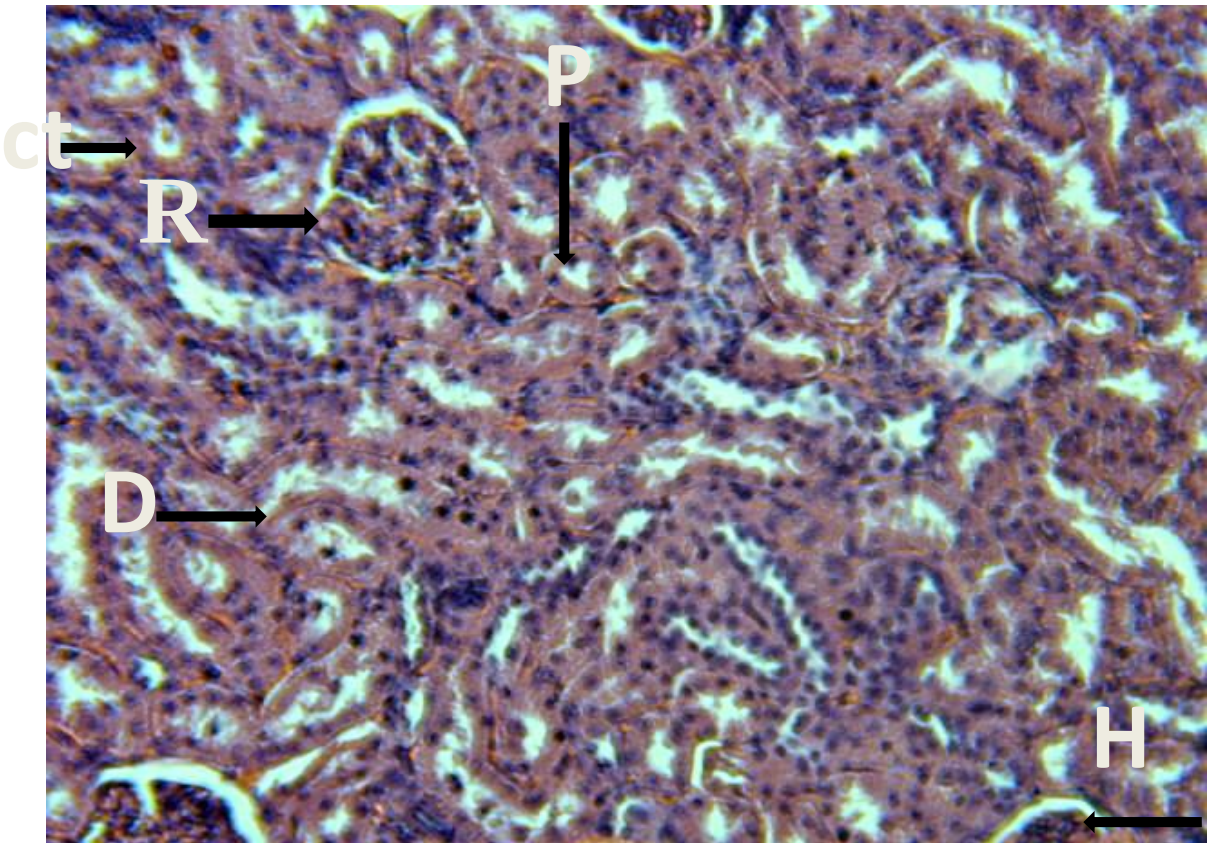

Fig. 1, Micrograph 1(control),showing normal histological structure of renal corpuscle (R), proximal convoluted tubule (P),distal convoluted tubule (D), henles loop (H), and collecting tubule (ct), stained by H & E technique, x 200.

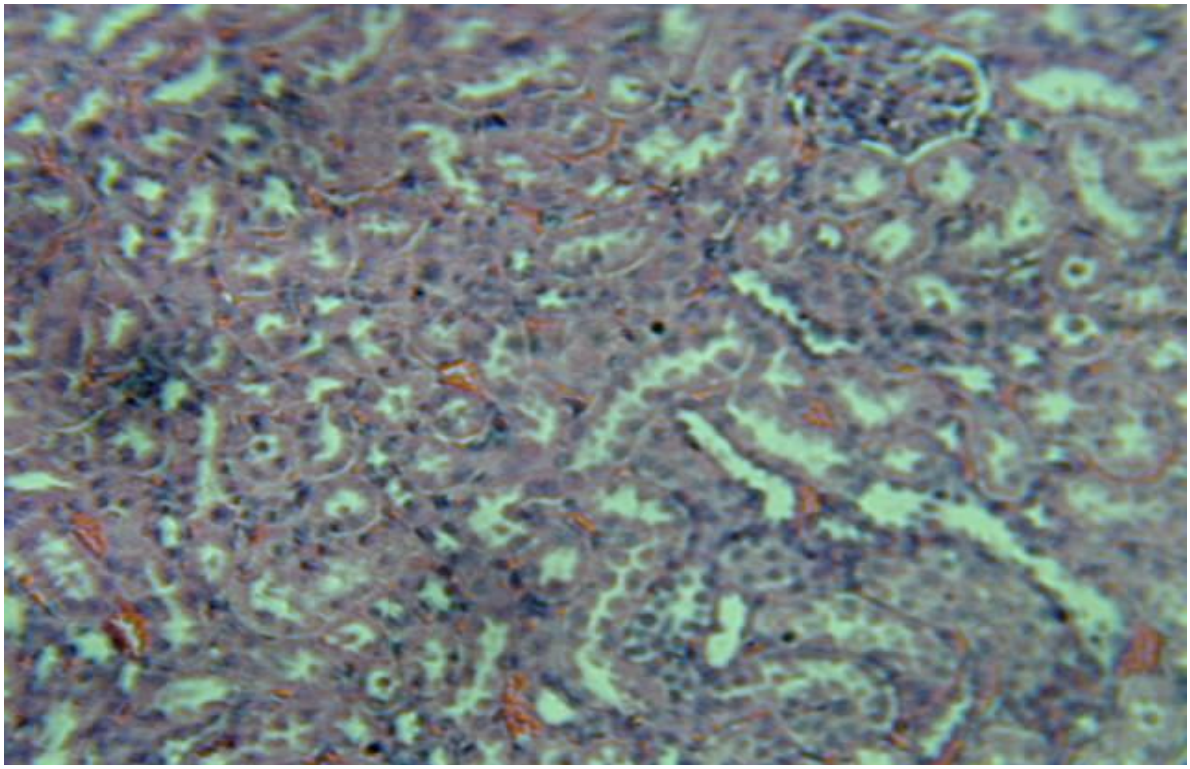

Fig 2, Micrograph 2 Group B, (treated with 0.5ml of Moringa oleifera leaf extract), shows normal histological structure of the kidney, stained by H & E technique, x 200.

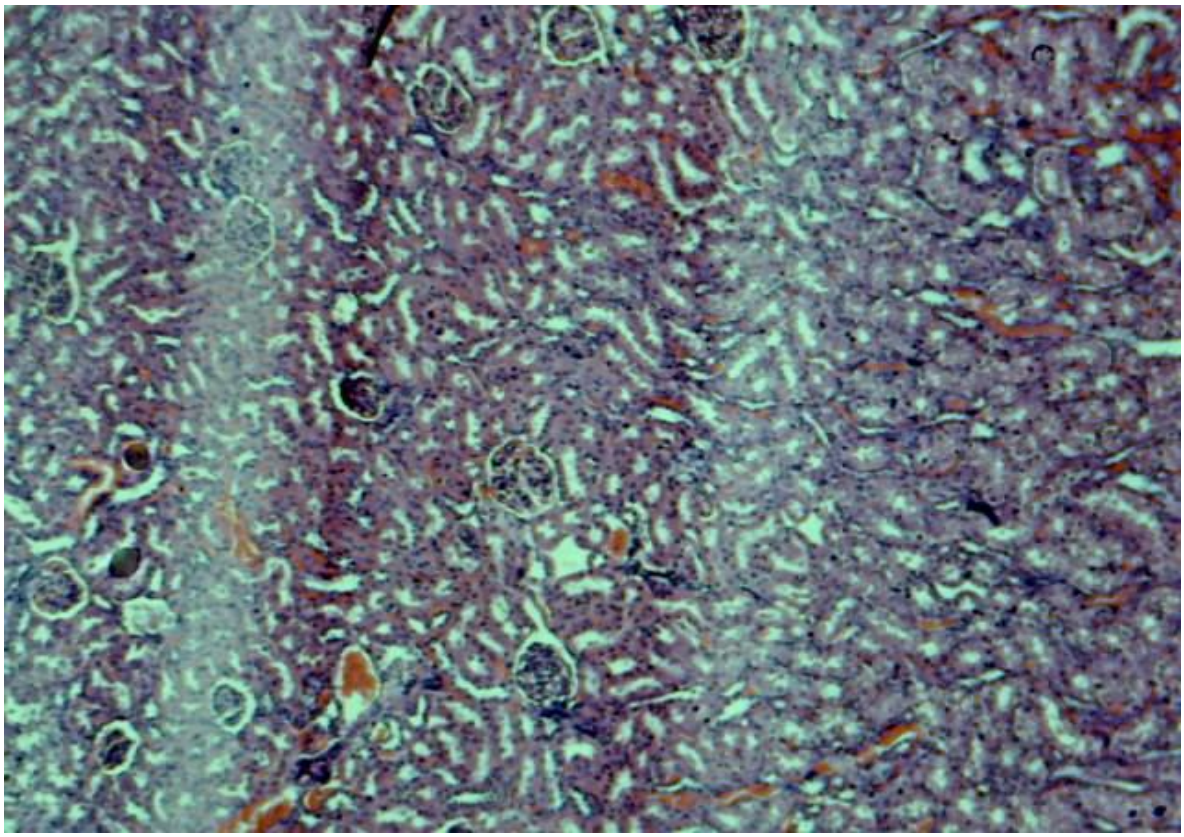

Fig 3, Micrograph 3 Group C,(treated with 0.6ml of Moringa oleifera leaf extract), showing normal histoarchitecture of the kidney, stained by H & E technique, x 100.

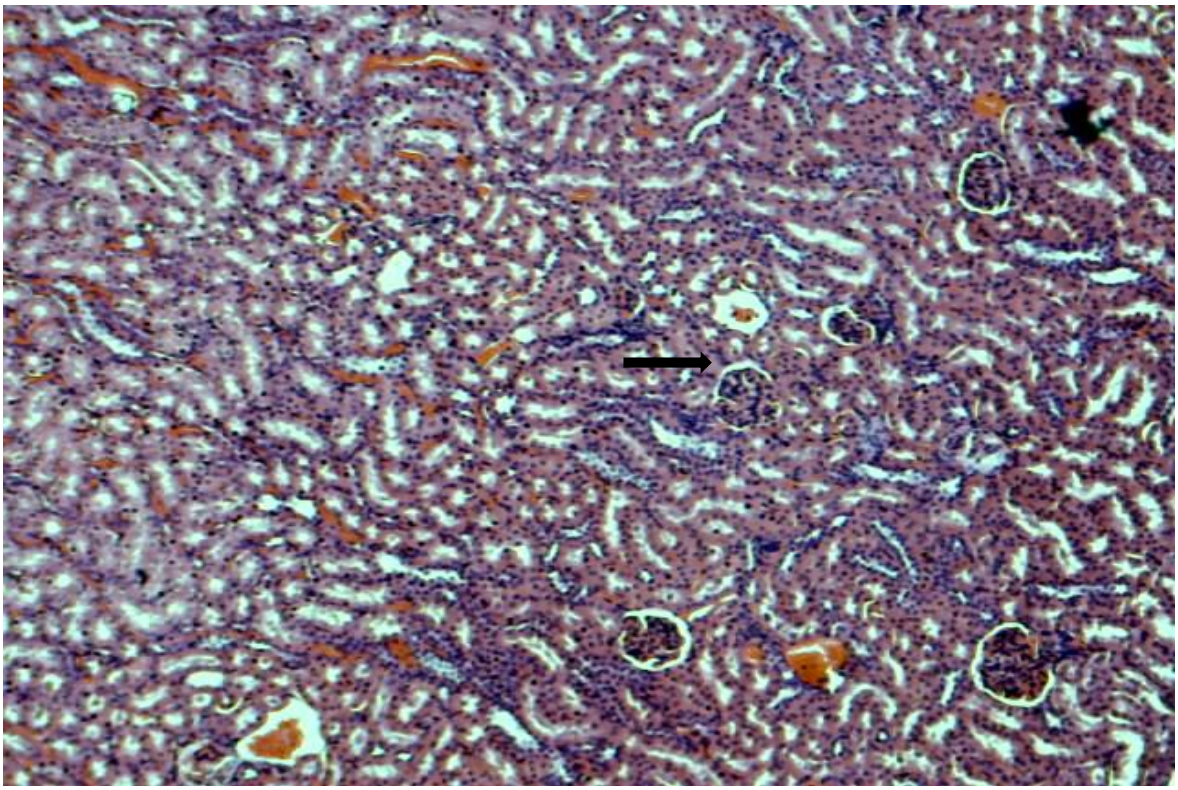

Fig 4, Micrograph 4 Group D, (treated with 0.7ml of Moringa oleifera leaf extract) showing normal histoarchitecture of the kidney, though, there is a homogeneous material at the centre(Arrow), which has a mild or no effect on the kidney, stained by H & E technique, x 100.

IV. DISCUSSION

Twenty four (24) apparently healthy adult wistar rats feed with low and high doses of leaf extract of Moringa oleifera were used in the present study. The final body weights of the experimental animals increased significantly relative to the control. The leaf extract of Moringa oleifera in this instance functions primarily as a dietary supplement enhancing growth;

The relative kidney weights of the experimental animals were statistically similar to the control as seen in table 2. There were no histopathological lesions observed in the kidney tissues.

This could be as a result of its hepatoprotective and antioxidant properties of Moringa oleifera leaf extract.

Jaiswal et al reported that in mice subject to DMBA-induced kidney who received 200-400mg/kg of a hydroalcoholic extract of Moringa oleifera for two weeks prior to DMBA, supplementation was able to dose-dependently reduce changes in oxidative status (with the higher dose normalizing GST and glutathione transferase and fully normalized changes in renal enyzmes (AST, ALP, ALT)[15]. The protective effect of Moringa oleifera was greater than 0.5-1% butylated hydroxyanisole (BHA; antioxidant) [15]

When measuring urinary proteins and sugar in rats model of diabetes, Moringa oleifera appears to abolish all urinary proteins and sugars with 14 day of treatment with 200mg/kg of water extract of the leaves [16].

The antioxidant properties appear two underlie a reduction in urinary proteins and glucose in diabetic animals, suggesting protective effects that may attenuate the rate of kidney failure in diabetes.

Therefore, the result present study agrees with previous researches in hepatoprotective and antioxidant properties possessed by Moringa oleifera leaf extract.

V. CONCLUSION

From this study, we therefore inferred that leaf extract of Moringa oleifera has nutritional effects and ability to prevent damage to the kidney cells in low and high doses.

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