International Journal of Medical Science and Applied Biosciences
ISSN: 2536-7331 (Print): 2536-734x (Online)
Volume 3, Number 2, March 2018
http://www.casirmediapublishing.com

HISTOMORPHOLOGICAL EVALUATION OF THE KIDNEY FOLLOWING ORAL ADMINISTRATION OF NEEM LEAF ON ADULT MALE WISTAR RATS

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ABSTRACT

The plant, Azadirachtaindica, is a native of Asia but has now naturalized in West Africa and is widely cultivated in Nigeria as an ornamental as well as medicinal plant. The plant is used extensively in Nigeria for the traditional treatment of malaria and other associated conditions in the form of decoction, in which unspecified quantities are usually consumed without due regards to toxicological and other adverse effects. In the present study an attempt was made to investigate the histological and biochemical effects of aqueous extract of the leaves of neem (Azadirachtaindica) on the kidney of adult wistar rats for the period of 21 days. 16 animals weighing 100-163g were used and grouped into 4 groups of four (4) rats each. Group 1 served as the control and was fed with diet and tap water. Group 2, 3, 4 were the test groups and received 200mg/kg, 300mg/kg and 400mg/kg body weight of aqueous extract of neem leaf respectively. At the end of the experiment, the animals were sacrificed and their kidneys excised. The organ was processed for the normal hematoxylin and eosin staining. Histological examination of the kidneys of the test groups 2 and 3 revealed no distortion of the cytoarchitecture, but the group 4 revealed necrosis and decrease in the numbers of glomeruli. However, the control group revealed normal histological features of the kidney. It could therefore be suggested that large dose consumption of the leaves of Aazadirachtaindica (Neem) for long term should be avoided as it may cause malformation of some vital organs, like the kidney.

Keyword: *Neem leaf, kidney, necrosis, wistar rats*

INTRODUCTION

All over the world the herbal medicine acts as the representative of the most important fields of traditional medicine. The study on the medicinal plant like Azadirachtaindica is essential to promote the proper use of herbal medicine in order to determine their potential as a source for the new drugs (Parekh and Chanda, 2007). Herbal treatment is very popular because it is easily available, cheap and less toxic. Azadirachtaindica (Neem) is a herbal plant widely distributed in our subcontinent during all seasons. Each part of the neem tree has some medicinal property. Neem leaf, bark extracts and neem oil are commonly used for therapeutic purpose (Tewari, 1992). Many workers had in the past established the relationship between the use of herbal medicine, their curative potentials, beneficial importance and adverse effects. Extracts from neem leaves has provided various medicinal preparations (Ekanem, 1971; Udeinya, 1993). A fractionated acetone water-extract also known as IRAB has been showing safer medicinal properties (Mbah et al.,

2007). In Nigeria, herbal medicine is commonly used by people in the rural area without foreknowledge of its adverse effects and accurate dose and Udeinya et al (2004) suggested that safety of the dose and the method of neem extraction should be checked and confirmed. The kidney serves several essential regulatory roles in humans. They remove excess organic molecules from the blood, and it is by this action that their best-known function is performed; the removal of waste products of metabolism. Severe injuries to the kidney will result in distortion of its cytoarchitecture i.e. the histological arrangement. Diseases like malaria poses serious problems on human well being especially in tropical countries where the environment provides conducive ground for the parasite to thrive. Through undocumented, illiteracy, financial constraint, has significantly contributed to the populace resorting to using herbal remedies or medicines, amongst which neem leaf extract in treating their various ailments. They do this without the knowledge of its adverse effect. Neem is the mother of all therapeutical plant and it poses variety of pharmacological effects such as antipyretic, antiviral, analgesic and many more. Due to these pharmacological effects of neem, the populace indiscriminately uses the plant without knowing the actual or suitable dosage for their body. This research will therefore establish the effects of graduating doses of neem extract on the histology of the kidney.

MATERIALS AND METHOD

Animal Use

A total of sixteen (16) adult Wister weighing between 100-163g were used for this study. The experimental animals were obtained from the Animal Holding of the college of medical and health sciences Abia state University, Uturu Nigeria. The animals were housed in cages in an environment with normal room temperature (27°C-30°C) and 12hr light-dark cycle. They were divided into four (4) groups containing four animals per group.

Extract Preparation

Fresh neem leaves were harvested from the old medical block garden of Abia State University, duly identified and authenticated by the chief Herbarium of the department of Botany Abia State University, Uturu. They were washed with water to remove debris and sand and spread under shed to remove excess water. The leaves were oven-dried and milled using wooden mortar and pestle. 50gm of the powder was mixed with 1000ml of distilled water and the mixture was allowed to stand overnight in a refrigerator. The following morning, the mixture was stirred and filtered. The filtrate was evaporated to dryness using a hot water bath regulated to 60°C.

Experimental Design

Sixteen (16) adult wistar rats weighing 100-163g were divided into four groups of four animals each. The groups were designated as group 1, 2, 3 and 4. Group 1 animals served as control group and were fed with diet and tap water throughout the experimental period. Group 2 rats were given 200mg/kg of aqueous neem extract. Group 3 rats were given 300mg/kg and group 4 rats were given 400mg/kg of aqueous Neem leaf extract. The treatment of the animals with aqueous extract of Neem lasted for twenty one (21) days consecutively.

RESULTS

Histological Results

Plate 1: Histology of the kidney of wistar rats which served as the control shows normal kidney architecture normal cells structures such as the Distal convoluted tubules (DCT) and Proximal Convoluted tubules (PCT) at different magnifications.

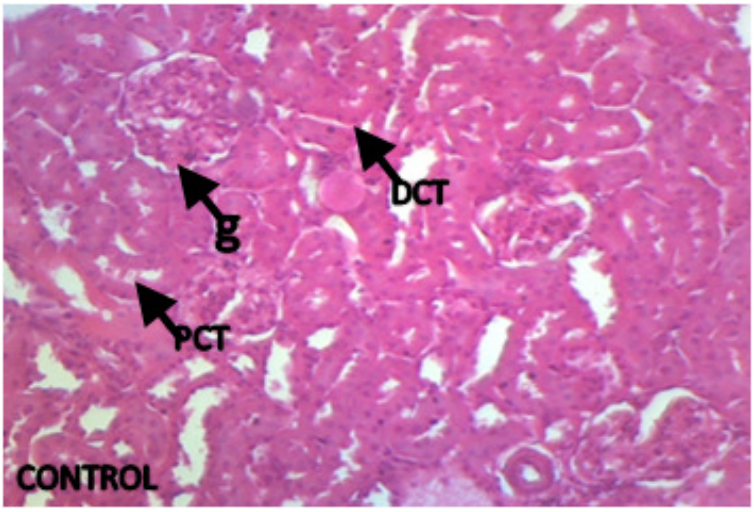

Plate 1: Photomicrograph of the kidney of adult wistar rat (control). Stains: haematoxylin & Eosin. Mag x 150

Plate 2: Histology of the Kidney of wistar rats treated with a single dose of 200mg/kg body weight of aqueous extract of Azadirachtaindica orally, Shows normal kidney architecture, normal cell arrangement.

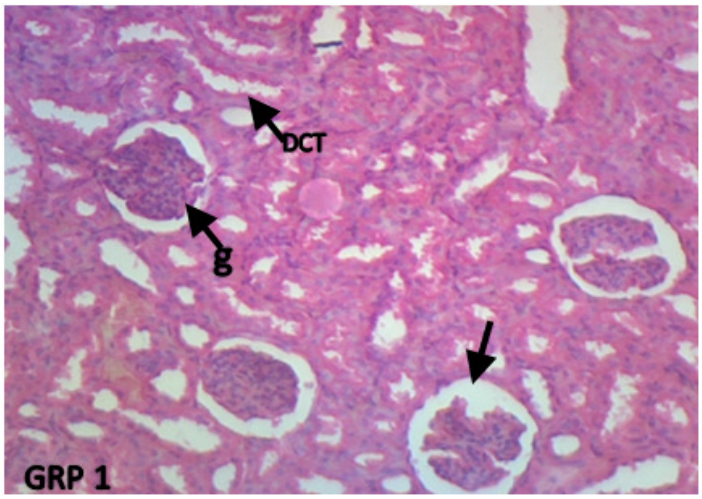

Plate 2: Photomicrograph of the kidney of adult wistar rat treated with 200mg/kg body weight of aqueous extract of neem leaf. Stains: haematoxylin & Eosin. Mag x 150

Plate 3: Histology of the kidney tissue of adult wistar rats treated with a single dose of 300mg/kg body weight of aqueous extract of *Azadirachtaindica*orally, shows normal kidney architecture normal cell arrangement with increased capsular or urinary space (white arrow).

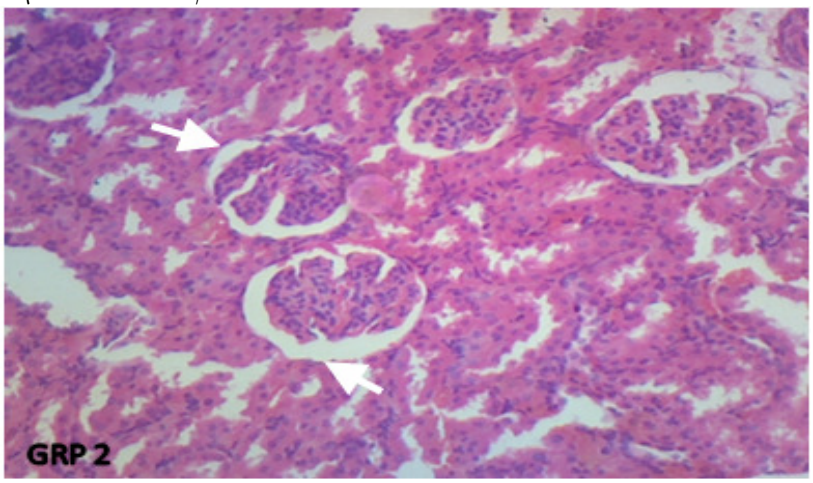

Plate 3: Photomicrograph of the kidney of adult wistar rat treated with 300mg/kg body weight of aqueous extract of neem leaf. Stains: haematoxylin & Eosin. Mag x 150

Plate 4: Histology of the kidney tissue treated with a single dose of 400mg/kg body weight of aqueous extract of *A. indica* orally, shows coagulative necrosis (n), indistinct cells and decrease numbers of glomeruli (black arrow).

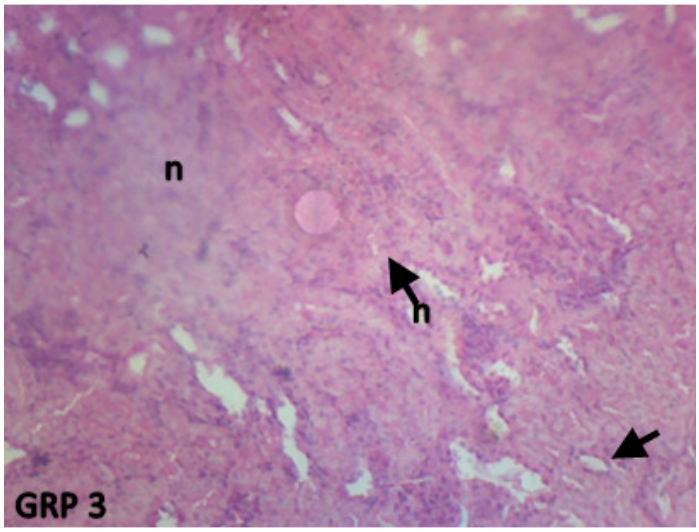

Plate 4: Photomicrograph of the kidney of adult wistar rat treated with 400mg/kg body weight of aqueous extract of neem leaf. Stains: haematoxylin & Eosin. Mag x 150

DISCUSSION

Evidence of kidney damage, usually manifest as a result of architectural disarray, renal necrosis, vascular congestion, apoptosis or inflammatory cell infiltration in either acute or chronic conditions. Some of these features were observed in the rats administered with the highest dose of the extract. Generally, cell die as a result of necrosis or an apoptosis when they are challenged with toxins, noxious agents or injuries (Erochenko, 2000). The histology of the photomicrograph study reveals a dose dependent effect of aqueous extract of neem leaf on the histology of the kidney. The animals that were administered 200mg/kg and 300mg/kg body weight of aqueous extract did not show clear distortion or derangement of the cyto-architecture of the kidney as evident on the photomicrograph. But there was a marginal increase in the capsular or urinary space as compared with the control. This is in consistent with the assertion that natural products in correct forms and dosage are less harmful than synthetic products (Olatunji, 2005). The animals that received 400mg/kg body weight showed necrosis and decreased number of glomeruli. However, this is in conformity with the report by Malanie (2004) that the major problem associated with the use of herbal medicine is overdose which can cause toxicity to the major organ. Secondly, this findings is in total agreement with reports by several authors such as Malanie et al., (2004) that all natural products are made up of substances or chemicals, which when taken can interact and alter the normal biological system of the body, and should be regarded as drugs.

CONCLUSION

The aqueous extract of neem leaves was found to cause kidney histopathological damages of adult wistar rats, when administered with the extract at a dose (>300mg/kg body weight) for 21 days. Oral dosing of the extract was considered in this study, to replicate the ethnomedical method of administration by the traditional medical practitioners and the likely route of administration during clinical evaluation. Most patients in the rural areas strongly believe that medical consultation is both time consuming and costly, so they dread going to hospital for their ailments and resort to trado-medical practitioners. It is therefore necessary for the Ayuryedi medical practitioners to be wary of the adverse effect of aqueous neem leaf extract especially at a dose (>300mg/kg body weight).

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