Effects of Crude Aqueous Stem Back Extract of \textit{Mangifera indica} on the Histology of the Kidney of Wistar Rats

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Abstract

The genus Mangifera (anacardiaceae) consists of numerous species of tropical fruiting trees. *Mangifera indica* which is commonly known as Mango tree is grown widely, especially in the southern Nigeria. *Mangifera indica* is cultivated as a fruit tree in frost-tree and warmer subtropical climate. It is used on the treatment of ailments such as asthma, cough, diarrhea, dysentery, leucorrhea, jaundice, pains and malaria. Oral administration of aqueous stem bark extract of *mangifera indica* at dose of 1.0ml/kgbw, showed normal glomerulus, proximal tubules, cortex and medular. The glomerulus is intact and the connecting tubules as well the epithelia linings. There is no lysis of the cell. At dose of 1.5ml/kgbw Group B, shows fibrous glomerulus with epithelia lining becoming simple squameous. There is also an odematus of the glomerulus, odematus of the cell which becomes more prominent where the connective tissues looks like connecting tubules the upper parts of the medular part of the kidney. At dose of 2.0ml/kgbw Group C, in this group there are clumps of lymphoid tissue at the glomerulus the enlargement of the cell and fibrosis of the glomerulus. Also there is an enlargement of the medular rays this area shows a great lysis of the tissue. The results of the present study suggest that aqueous stem bark extract of mango tree (*mangifera indica*) may have effect on a kidney in a high dose but in a low dose may not have any effect, which might explain its use in traditional medicine.

Key words: *Mangifera indica*, mango, kidney, extract, odematus

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Introduction

In developing countries of the world, most of the people depend on herbal medical care (Ekpe et al., 1990; Nwinuka et al., 2008). Higher plants are employed as medicine by different people of both rural and urban areas all over the world who have been using them as sources of food and medicines since the dawn of civilization (Sofowora, 1992). Medicinal properties of plants are hinged on the presence of bioactive principles such as alkaloids, phenols, tannins, glycosides and essential oils amongst others. This necessitates the need for continued screening of medicinal plants, not only to determine the scientific basis for their usage, but also to discover new active principles (Karou et al., 2006; El-Mahmood, 2009).

The primary benefits of using plant derived medicines are that they are relatively cheaper than synthetic alternatives, offering profound therapeutic benefits and more affordable treatments. Many of the plant materials used in traditional medicine are readily available in rural areas and this has made traditional system of medicine relatively cheaper than modern medicine (El-Mahmood, 2009). The popularity of traditional medicine is due to the belief that some diseases only respond to traditional treatment (Bannerman et al., 1975) this could also be as a result of the high cost of orthodox health care, or lack of faith in it (2010).

The genus Mangifera (anacardiaceae) consists of numerous species of tropical fruiting trees. Mangifera indica which is commonly known as Mango tree is grown widely, especially in the southern Nigeria (Nwinuka et al., 2008). In Nigeria Mango is called … in Edo; to the Efik it is; Fula-Fulfulde, mangoro (the fruit), mangorohi (the tree); Hausa, m…; Ibibio, m…; Idoma, umango; Igala, mangolo; Igbo, mangulo or Tiv, c…gh; and Yoruba mangoro or oro Oyinbo (June 19, 2008. Guardian News Paper, Lagos, Nigeria) Mangifera indica is cultivated as a fruit tree in frost-free and warmer subtropical climate. It is rich in a variety of nutrients that qualifies it as a model “super fruit” a term used to height potential value of certain edible fruits. It is also rich in prebiotic dietary fiber, vitamin C, polyphenol and provitamin A and carotenoids. Mango scores 57.3 mg of vitamin C and offers impressive numbers for vitamins B1, B2, B3, and B6.

Mangifera indica is used medicinally to treat ailments such as asthma, cough, diarrhea, dysentery, leucorrhoea, jaundice, pains, malaria (Madunagu et al., 1990; Gilles, 1992) and diabetes (Ojewole, 2005; Muruganandan et al., 2005) Previous studies have suggested that mango possess anti-inflammatory, analgesic and hypoglycemic (lowers blood sugar) effects in man and mammalian experimental animals. However, a recent study has confirmed the anti-inflammatory, analgesic and anti-diabetic properties of the stem-bark aqueous extract of mango in rats and mice (June 19, 2008. Guardian News Paper, Lagos, Nigeria).

Studies on the chemical composition of the back of Mangifera indica has lead to the isolation of beta carotene, lutein and alpha carotene, Polyphenols (Mahattanata et al., 2006), quercetin, kaempferol, gallic acid, caffeic acid, catechins, tannins, xanthone and mangiferin. Although Phytoconstitents with pharmacological properties play a significant role in the health-economy of man often times, not much information is known about their possible toxic side effects. Thus, the study on the effects on kidney becomes imperative in order to appraise adequately their suitability for the use by man. The purpose of this study is therefore to evaluate the effects of Mangifera indica on the kidney.

Materials and Methods

Plant collection and extraction

The bark of Mangifera indica were collected from a large tree in the premises of Ladoke Akintola University of Technology (LAUTCH), Ogbomoso, Nigeria and identity of the plant was confirm by a taxonomist in the Department of Pure and Applied Biology LAUTCH, Ogbomoso in November 2009.

The Mangifera indica bark was cut into smaller pieces and dried in an oven. Blended into powdered form. The powdered sample weighing 55g was put in a measuring cylinder, about 100ml of distilled water added. The mixture was stirred for about 5 minutes left to stand for 24hrs after which the solute was filtered into a beaker (Ekpe et al., 1990).
Twenty wistar rats of both sexes (150-200g) were used. Animals were obtained from LAUTCH, Ogbomoso. They were acclimatized to the standard laboratory conditions (12hrs day/night cycle) for 2 weeks prior to initiation of the study. Standard laboratory feeds and water supplied ad libitum. The animal experiment was performed according to the approved guidelines of LAUTCH research ethics committee.

**Experimental Design**

Twenty wistar rats of both sexes were randomly divided into 4 groups of 5 each and tested as follows:

- Group O - control (distilled water)
- Group A - *M. indica* extract (1.0 ml/kg, orally)
- Group B - *M. indica* extract (1.5 ml/kg, orally)
- Group C - *M. indica* extract (2.0 ml/kg, orally)

After 21 days of treatment the livers and kidneys will be dissected for Histological examination.

**Histopathology**

Immediately after dissection, the sections of the livers and kidneys were placed in a tissue cassette and fixed in 10% buffered formalin for 24 h after which they were processed using standard histopathological methods. The processed tissues were then embedded in paraffin. Sections of 6 µm thickness were cut on a rotary microtome and stained with haematoxylin and eosin (Drury and Wallington, 1973) for microscopic assessment.

**Slide 1:** Control rat kidney (H & E X100) Bowman’s capsule BC, Tubule T, Interlobular vein V

**Slide 2:** (0.1 ml/kg) Kidney (H&E X100) Glomerulus G with normal proximal convoluted tubules PCT, the cortex and the medular are okay

**Slide 3:** (1.5ml/kg bw) Kidney (H & E X400)

Odematus of the cell are more prominent where the connective tissue CT looks like connecting tubules. Medulla M but the Glomerulus G is not visible.

**Slide 4:** (2.0 ml/kg bw) Kidney (H & E X100) Fibrous of glomerulus G
EFFECTS OF CRUDE AQUEOUS STEM BACK EXTRACT OF MANGIFERA INDICA ON ...

Results and Discussion

Oral administration of aqueous stem bark extract of *mangifera indica* at dose of 1.0ml/kg bw Group A, showed normal glomerulus, proximal tubules, cortex and medular. The glomerulus is intact and the connecting tubules as well the epithelia linings. There is no lysis of the cell (Slide 2).

Aqueous stem bark extract of *maqngifera indica* at dose of 1.5ml/kg bw Group B, shows fibrous glomerulus with epithelia lining becoming simple squameous. There is also an odematus of the glomerulus, odematus of the cell which becomes more prominent where the connective tissues looks like connecting tubules the upper parts of the medular part of the kidney (Slide 3).

Aqueous stem bark extract of *mangifera indica* at dose of 2.0ml/kg bw Group C. In this group there are clumps of lymphoid tissue at the glomerulus, the enlargement of the cell and fibrosis of the glomerulus. Also there is an enlargement of the medular rays this area shows a great lyses of the tissue (Slide 4).

The histological examination of the kidney in the control group show a distinct and well organized arrangement of the glomerulus’s with its bowman capsule and the normal cells of the medular Slide 1. Comparing the low dose administration of the extract in group A, to that of the control group O, there is no distortion in the normal organization of the tissue, the glomerulus, medular and cortex are intact with greater enhancement of the cells around the epithelia lining the cortex and glomerulus.

Control group O in comparism with the high dose group C, there was an enlargement of the medulary rays this area shows a great lyses of the tissue and there is clumps of lymphoid tissue at the cell change may due to the exposure at higher concentrations. (Rodeirol et al 2007). This corresponds to the investigation carried out on the Effect of T. Arjuna Stem Bark Extract on Histopathology of Liver, Kidney and Pancreas of Alloxan-Induced Diabetic Rats, where the kidney showed hemorrhage, shows red cells spillage in suffused capillary loops with RBCs and expansion by to Bowman’s space (Ragavan and Krishnakumari, 2006).

Low dose group A, The glomerulus, connecting tubules and the epithelia linings are normal when compared with the control. There is no lysis of the cell which also has been reported from the past work that aqueous stem bark extract of *mangifera indica* (Vimang) to have anti-inflammatory, immunodulatory and antioxidant activities (sanchez, 2003).

Conclusion

The results of the present study suggest that aqueous stem bark extract of mango tree (*mangifera indica*) may have effect on a kidney in a high dose but in a low dose may not have any effect, which might explain its use in traditional medicine.

References


