

Histological Evaluation of Ethanoic Extract of Watermelon Seed on the kidney of Alloxan Induced Diabetic Wistar Rat

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ABSTRACT

The effect of ethanoic extract of watermelon seed was studied in alloxan induced diabetic rats. Diabetes mellitus is a chronic, lifelong condition that affects the body's ability to use energy found in food. This led to the study of its effect on the kidney. Twenty adult female wistar rats 150g to 250g were assigned to four groups (A, B, C, and D) consisting of five rat each. Group A was the negative group induced with diabetes with no treatment. Group B was the high dose induced with diabetes and was given 0.8ml of the extract. Group C was the low dose induced with diabetes and was given a low dose of extract 0.3ml. Group D is the control fed with food and water. Alloxan was injected at three dose interval; the blood sample was collected to determine the glucose level in all the experimental groups. At three days interval blood was collected from the different group to determine their glucose level. At the end of the fifth week the animals were sacrificed. The kidney were collected and processed for histological studies using H and E technique. Biochemical result of this study revealed increase in urea and creatinine level in the negative group, there is no significant different across the group $P < 0.5$. Histological result interstitial congestion in the negative group, with unremarkable glomeruli in the group treated with watermelon extract. In conclusion, these results showed that *Citrullus lanatus* has hypoglycaemic properties and can therefore be employed in the treatment of diabetics.

Keyword: *Citrullus lanatus*, Alloxan, Diabetes, Kidney

INTRODUCTION

Ethnobotanical surveys of plants traditionally used in diabetes management in different parts of Nigeria have been carried out (Abo et al., 2008, Etuk and Mohammed, 2009). These medicinal plant are used either alone as a primary therapeutic choice, or in conjunction with convectional medicines. Unfortunately, clinicians are either unaware of their potentials herb use or the identity of the herbal product being taken. To complicate matters further, herbal practitioners are usually

unwilling to divulge the identity of the constituents of their preparations to patients. Most patient are also not interested in finding this out as they consider herbal preparations to be safe, thereby making it difficult to ascertain if the herbal may have a significant contributory role to the efficacy or failure of the treatment. Clinically used for glycemic control, Amumsativum, Aloe Vera and Momordicacharantia were the only identified plants used in Nigeria. This inclusion was however based on clinical studies carried out

outside Nigeria (Yeh et al., 2003). This indicates the lack of information about the clinical use (or monitoring thereof) of plants in diabetes management in Nigeria despite wide spread traditional use. Diabetes mellitus is a chronic disease that requires long term medical attention to limit the development of its devastating complication and to manage them when they occur. It is a disproportionately expensive disease, in the United States in 2007, the direct medical costs of diabetes were 716 billion and the total costs were 174 billion, people with diabetes had average medical expenditure 2.3 times those of the people without diabetes. Unfortunately, pharmacological and toxicology evidences validating the safety and efficacy of these medicinal plants are not really available. The objective of this paper is to collate as much as available information about medicinal plants traditionally used in diabetes management in Nigeria. In doing so, we aim to promote the rational use of these plants based on pharmacological evidence for their therapeutic use and their toxic / interaction profile. A study by Sumam et al., (2013) work on the evaluation of hypoglycemic effect of ethanolic seed extracts of *citrullus lanatus*, they concluded that ethanolic seed extract of *citrullus lanatus* controls the blood glucose level and also help to prevent the organ from oxidative damage. Hence it can be used in the management of diabetes mellitus.

Deshmukh and Jain (2015) worked on the antidiabetic effect of methanolic extract of *citrullus lanatus* seeds in rats. They found out that 572-induced rats shows marked hyperglycemia, hypertriglyceridemia and hypercholesterolemia. Body weight was reduced and the blood sugar level was significantly elevated in diabetic rats. The four week treatment with MECL in a contraction of 200,400 and 600 mg/kg significantly level of fasting blood glucose, serum, liver glycogen, glycosylated hemoglobin with increased body weight of diabetic rat. This study arose given that diabetes is now considered as one of the main threats to human health in the 21st Century (Zimmet et al., 2001), there might be an even greater reliance by diabetic patients in Nigeria in herbal medicines used in its management.

MATERIALS AND METHOD

Experimental design

Twenty adult female wistar rats weighing 150g to 250g were assigned to four groups (A, B, C, and D) consisting of five rat each. Group A served as the negative group which was induced with diabetes with no treatment. Group B served as the high dose induced with diabetes and was given 0.8ml of the extract. Group C served as the low dose induced with diabetes and was given a low dose of extract 0.3ml. Group D is the control fed with food and water. Alloxan was injected at three dose interval; the blood sample was

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collected to determine the glucose level in all the experimental groups. At three days interval blood was collected from the different group to determine their glucose level. At the end of the fifth week the animals were sacrificed. The kidney were collected and processed for histological studies using H and E technique.

Preparation of Ethanolic Extract of Water Melon Seed

Fresh seed of water melon which was bought from a local market in uli was washed and dried under ambient temperature. The dried seed of watermelon was grounded using laboratory mill to a coarse form 100g of ground seed was macerated and soaked in 500mls of ethanol sealed and allow to stay for 48 hours inside mechanical shaker. After 48hours, the mixture was sieved using a porcelain clothe and was further filtered using filter paper into a clean glass beaker.

The filtrate was concentrated using rotary evaporator and was further filtered using laboratory oven to a gelly like or paste like form and store in a refrigerators for further use.

Biochemical Analysis

Before the rats were sacrificed, blood was collected from the abdominal aorta for serum assay. The concentrations of creatinine and urea were determined in the serum following standard procedures as described in the respective assay kits.

RESULTS

Histological results

The result of the histological analysis revealed that the animals in the normal group showed normal histological features compared to interstitial congestion and mild focal interstitial hemorrhage observed in the experimental group.

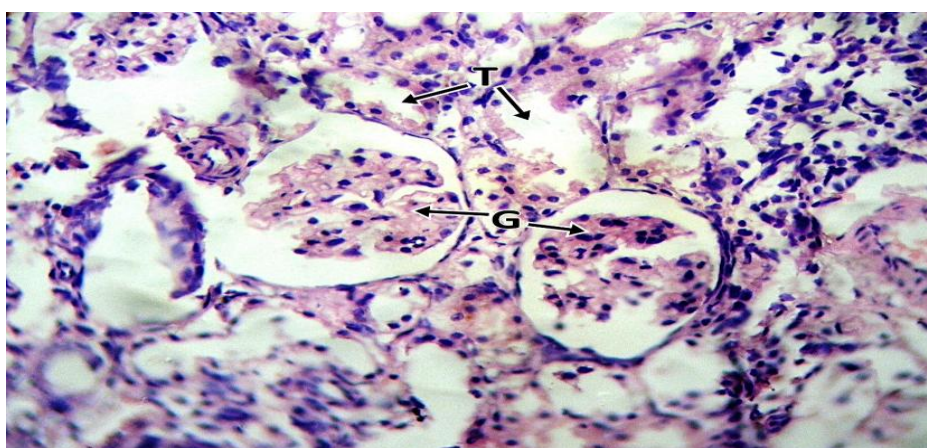


Fig. 1 Photomicrograph of kidney section of control group showing

normal glomerular (G), with renal tubules (T) (H & E stain x 400).

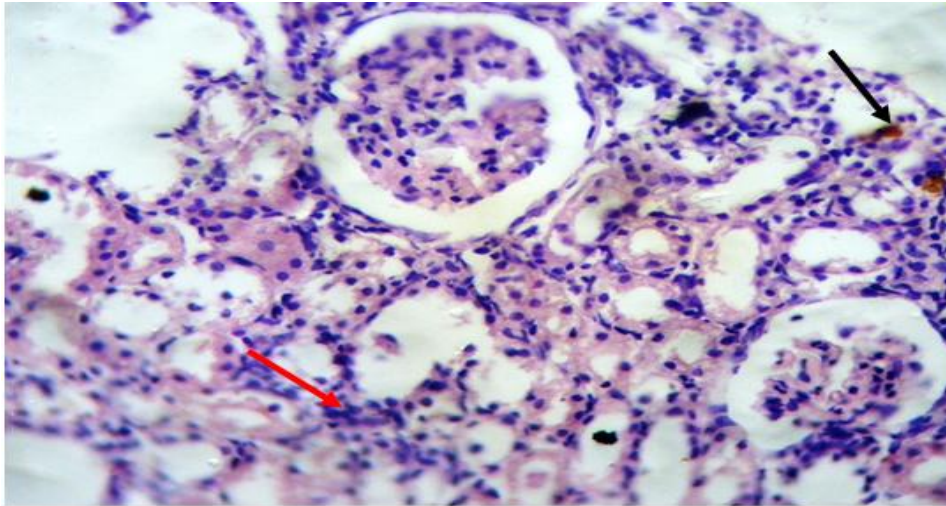


Fig. 2 Photomicrograph of the kidney section of low dose alloxan induced diabetes treated with 0.3ml of citrullus lanatus showing mild interstitial congestion (red arrow) with mild focal

hemorrhage (black arrow), (H & E stain x 400).

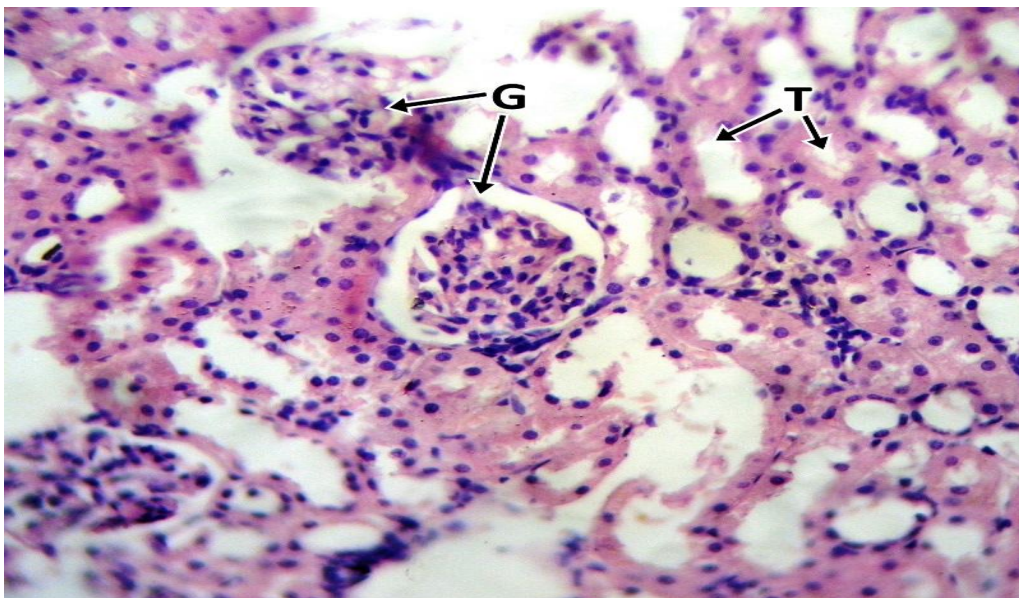


Fig. 3 Photomicrograph of the kidney section of high dose alloxan induced diabetes treated with 0.8ml of citrullus

lanatus showing focal glomerular infiltration (G) with remarkable renal tubules (T), (H & E stain x 400).

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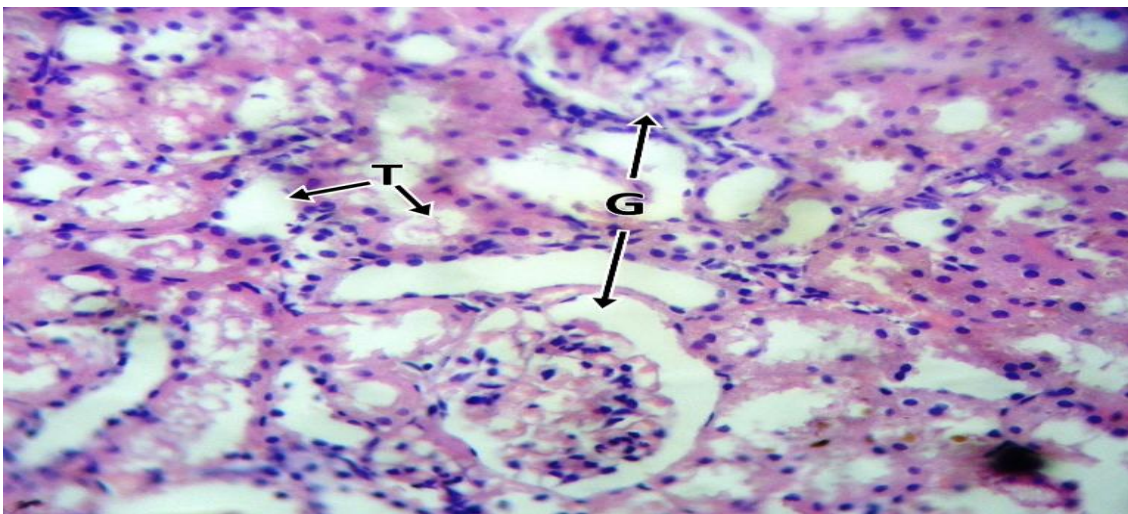
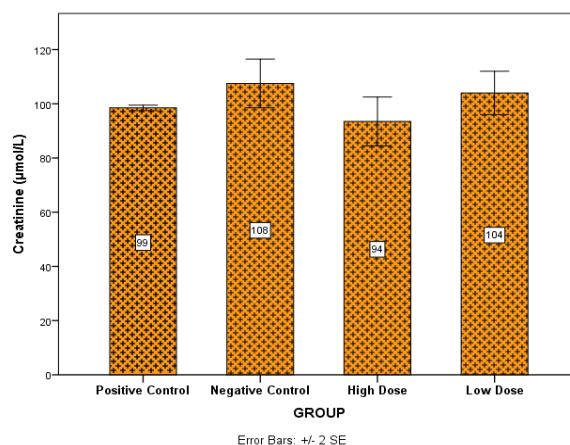
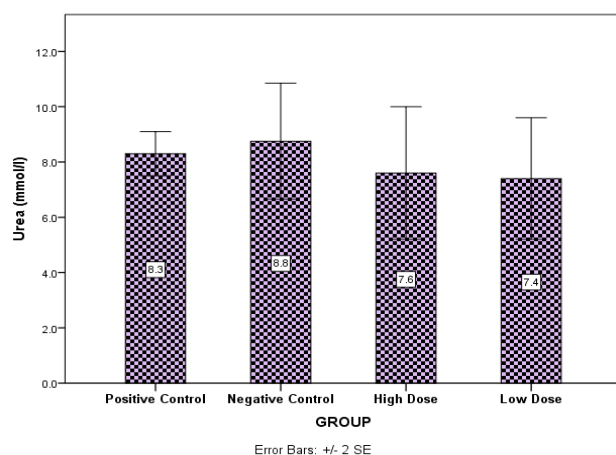


Fig. 4 Photomicrograph of the kidney section of negative group induced with diabetes with no treatment showing glomerular necrosis (G) with interstitial infiltration (T).

Administration of ethanolic extract of *Citrullus lanatus* showed significant change in the serum levels of urea and creatinine concentration compared with the control (1)

KIDNEY FUNCTION INDICES



DISCUSSION

The functional integrity of the kidney is to maintain the body homeostasis through its role in the excretion of metabolic wastes and regulation of intracellular fluid volume, electrolytes composition, and acid-base balance (Orisakwe et al., 2004). Thus, any harmful effect on the body's metabolism could be toxic to the kidney (Abubakar et al., 2010). Diabetes mellitus is one of the numerous metabolic diseases affecting people of different walks in life, of varying ages and sex (Marx, 2002) that pose a challenge to the medical field in the area of production of drugs that can be used in the treatment and management of diabetes without adverse effects. The histological result of kidney sections from the experimental animals showed dose dependent disease condition such as focal interstitial hemorrhage, and glomerular infiltration. The figures also showed that there are mild indications of renal tissue distortion as seen in the test groups, whereas the histological appearance of the control group is constant with normal histology. It can also be seen that the activity of *Citrullus lanatus* extract on the kidney is dose dependent considering the increase in the level of mild tissue distortion in the negative group which reduced with increase in the extract administration. Focal interstitial hemorrhage was entirely absent in the sections of the control group.

However, the focal interstitial hemorrhage is seen to decrease across group with increase in the dosage of the administration of the extract. Glomerular hemorrhage is entirely absent in the control group, but interstitial hemorrhage is seen to occur in test group II. These features demonstrate an extent of renal damage which is not in concert with the results obtained from a similar study by Kolawole et al. (2014). Assessing the levels of excretory metabolites like electrolyte, urea, and creatinine can be used to evaluate renal function (Adebayo et al., 2003). Creatinine is hydrolysed from creatine phosphate and has been reported to be a marker of renal function. Urea is a waste product of protein metabolism and can be used as a test of renal function (Adedapo et al., 2009). The observed increase in urea and creatinine level shows significant change compared to control group. This suggests that renal function was compromised following the administration of the extract. These results agreed with the findings of Orisakwe et al. (2004) and Abubakar et al. (2010).

CONCLUSION

From our findings, we suggest that consumption of *Citrullus lanatus* can be beneficial effect on diabetes due to remarkable change on the kidney of treated group.

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