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Research Article

Histomorphological Effects of *Xylopia aethiopica* on the Liver and Kidney of Albino Wistar Rats

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Abstract: This study evaluated the effect of *Xylopia aethiopica* on the histology and morphology of the liver and kidneys, using Albino Wistar rat as experimental model. Twenty-four rats irrespective of gender were used for the study and were divided into four groups of six rats each. Group 1 served as control and were fed with rat chows and distilled water, groups 2, 3 and 4 were treated with 100mg/kg, 200mg/kg, 300mg/kg of the aqueous extract of *Xylopia aethiopica* alongside rat chow and distilled water for 21 days. The result shows significant decrease in total body weight, liver weight, and kidney weight of the three *Xylopia aethiopica* treated groups. Histopathological findings examination of liver reveals a mild to acute hepatitis in treated rats. On the other hand, that of the kidney reveals a dose dependent interstitial nephritis in the treated rats. Findings of this study revealed that aqueous extract of *Xylopia aethiopica* possess some toxic effect on the liver and kidney. Indiscriminate ingestion of the extract of Xylopia aethiopica should be avoided.
Keywords: *Xylopia aethiopica*, Liver, Kidney, Histopathology.

INTRODUCTION

The use of plants and its extracts for the treatment and management of diseases has been in existence all over the globe especially in Africa, since ancient times [1], herbal medicine has played a significant role in the prevention and treatment of various human ailments since time immemorial [2, 3], and has served from the onset as the most important therapeutic approach available to man. Many synthetic drugs in use also originate from plant source. Examples include Aspirin (a chemical copy of the analgesic chemical in the bark of willow tree), Digoxin (from fox glove), morphine (from Opium Poppy) etc. [4] .However there was decline in the usage of herbal medicine due to the introduction of modern synthetic medicine which started at about the beginning of 20th century up to the 1970s [5]. Although factors such as poverty and illiteracy still militate against availability and accessibility of conventional medical services in most developing countries, larger number of these tropical plants and their extract have shown beneficial therapeutic effects [6], and with the huge success recorded, it has therefore been employed as an alternative to orthodox pharmacotheraphy [7, 8].

Although Herbal medicines tend to look primitive and unscientific when compared to synthetic (conventional) drugs [9], about 80% of the world population relies on traditional medicine for primary health care and more than 30% of plant species has been used medicinally [10]. Though it is believed by many people that products labeled "natural" are always safe and good for them, this is not necessarily true because some herbs such as comfrey and ephedra, can cause serious harm [11].

Plants have the ability to synthesize a wide variety of chemical compounds (phytochemicals). Many of these compounds have beneficial effect on long term health when consumed by humans, and also can be used to effectively treat human diseases [12]. Chemical compounds in plants mediate their effect on the human body in the same way like conventional drugs; thus they do not differ from conventional drugs in term of how they work. It enables them to be as effective as conventional medicine, and also gives them the same potential to cause harmful side effects) [12, 13].

In contrast to the uses of synthetic drugs in modern medicine, the potential toxicity investigation due to herbal remedies has not been fully scientifically done [14]. There is limited scientific evidence in regards to the safety and efficacy to back up the continued therapeutic application of these remedies [8, 15]. The use of herbs requires good knowledge regarding the toxicity, dosage, purity, suitable solvent for extraction and adverse effects [16].

Xylopia aethopica is one of the medicinal plants with high medicinal value in most countries of Africa [17]. It has also been used in conjunction with other medicinal plant in polyherbal mixtures for the treatment of varying disease conditions.

The liver and kidneys are very important and crucial organs of the body. The liver for example is a very important organ that performs a multitude of essential functions including metabolism of foreign compounds among all other functions. Also the function of the kidney in homeostasis among others cannot be over emphasis. However several factors can alter the normal function of these organs. Hence the study of the histomorphological effect of *Xylopia aethiopica* on the liver and kidney using Albino Wistar rats as experimental models.

METHODOLOGY

Animal housing/ diet

Experimental animals (Albino Wistar rats) were obtained from and kept at the Animal Care Unit of the College of Health Sciences, Delta State University, Abraka. The animals were allowed to acclimatize to the laboratory condition (temperature 24-28°C and 12 hour light-dark cycle) for two weeks before commencement of the experiment with free access to rat chow (Top feeds Nigeria) and water throughout the study. All the animals were treated according to the declaration of Helsinki on guiding principles in the care and use of animals, approval was received from a local research ethical committee of the university.

Collection of *Xylopia aethiopica*

The fruits of *Xylopia aethiopica* were used for this study, and were purchased from the central market of Abraka, Delta state. They were authenticated in the Department of Botany, Faculty of Science, Delta State University, Abraka, Nigeria.

Preparation of extract

The fruits of *Xylopia aethiopica* were sundried for some days, after which they were grinded into powdered form using an electric blender for the preparation of the extract. The powdered fruits were extracted from distilled water by percolation for 48 hrs. The mixtures were filtered and the filtrate evaporated at 6000C using vacuum Rotary evaporator. The wet residues were freeze-dried using a vacuum freeze drier and stored in a desiccator. An aliquot portion of the crude extract residue was dissolved in distilled water for use each day of the experiment.

Experiment Design

Twenty four albino wistar rats were randomly divided into four groups I, 1, 2 and 3 of six (6) rats each, with their initial body weight (150-200g) measured. Group I served as the control, groups 1, 2 and 3, and rats were given 100mg/kg, 200mg/kg, and 300mg/kg respectively of *Xylopia aethiopica* fruit aqueous extract. The extract was given orally once daily for 21 days.

Preparation of samples for histological study

The rats were sacrificed by cervical dislocation, 24 hours after last administration of the extract. The liver and kidneys were harvested for the histological and morphological evaluations. The organs were fixed in buffered formalin.

RESULTS

Table 1: Effect of *Xylopia aethiopica* fruit extract on the body weight of adult Wistar rats

	Day 1 (g)	Day7(g)	Day 14(g)	Day 21(g)
Group I (Control)	148.33±10.67	155±8.66	160.83±7.86	166.67±7.45
Group 1 (100mg/kg)	158.33±8.50	158.33±17.24	150±16.83	146.67±19.93
Group 2 (200mg/kg)	165±13.54	167±16.46	166±14.83	156±14.83
Group 3 (300mg/kg)	175±18.70	165.83±25.89	185±21.40	171.25±12.19

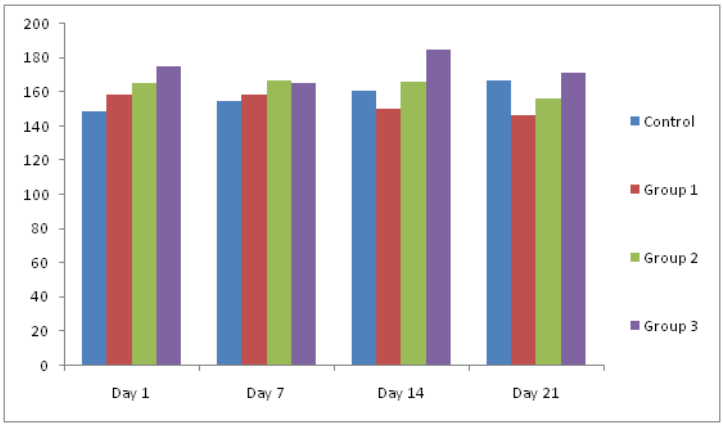

Fig. 1: Effect of *Xylopia aethiopica* fruit extract on the body weight of adult Wistar rats

Table 2: Effect of the *Xylopia aethiopica* on the liver and kidney weight of Albino Wistar rats

Parameter	Group I (Control)	Group 1 (100mg/Kg)	Group 2 (200mg/Kg)	Group 3 (300mg/Kg)
Liver	5.65±0.20	4.71±0.75	5.01±0.77	5.89±0.44
Kidney	0.67±0.13	0.53±0.10	0.53±0.08	0.55±0.04

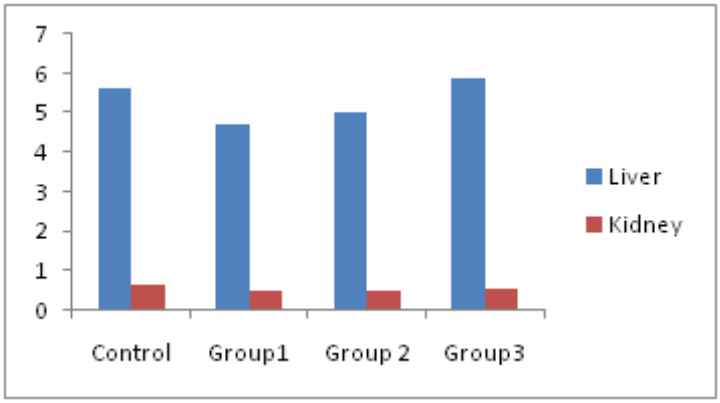

Fig. 2: Effect of the *Xylopia aethiopica* on the liver and kidney weight of Albino Wistar rats

Liver Histopathology

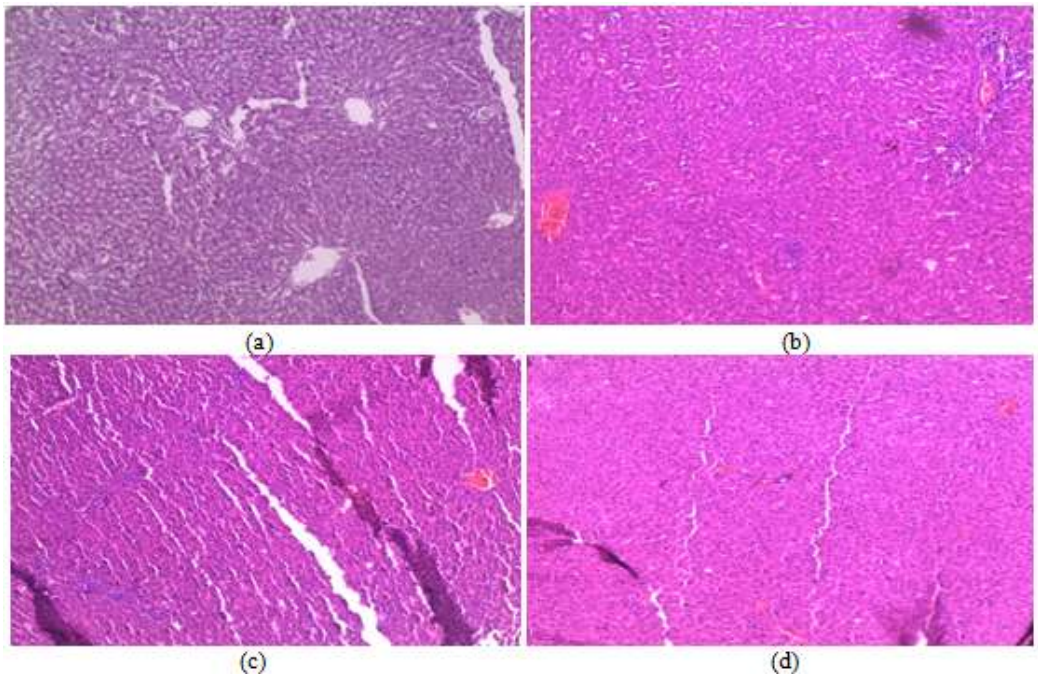

Fig. 3 (a): Group I Control liver, showing normal hepatocyte architecture with conspicuous nucleus and obvious sinusoids, central vein and portal triad; (b) Group 1 treated rats (100mg/kg) showing hepatocytes that are congested, filled with eosinophillic materials. Periportal inflammatory infiltrate is seen. The central vein is filled with erythrocyte. x 100 H&E; (c) Group 2 treated rats (200mg/kg) showing congested central blood vessels, and mild periportal inflammatory infiltrate. x 100 H&E; (d) Group 3 treated rat (300mg/kg) showing essentially normal blood vessels, sinusoids, normal architecture. In another area there is mild inflammatory infiltrates. x 100 H&E

Kidney histopathology

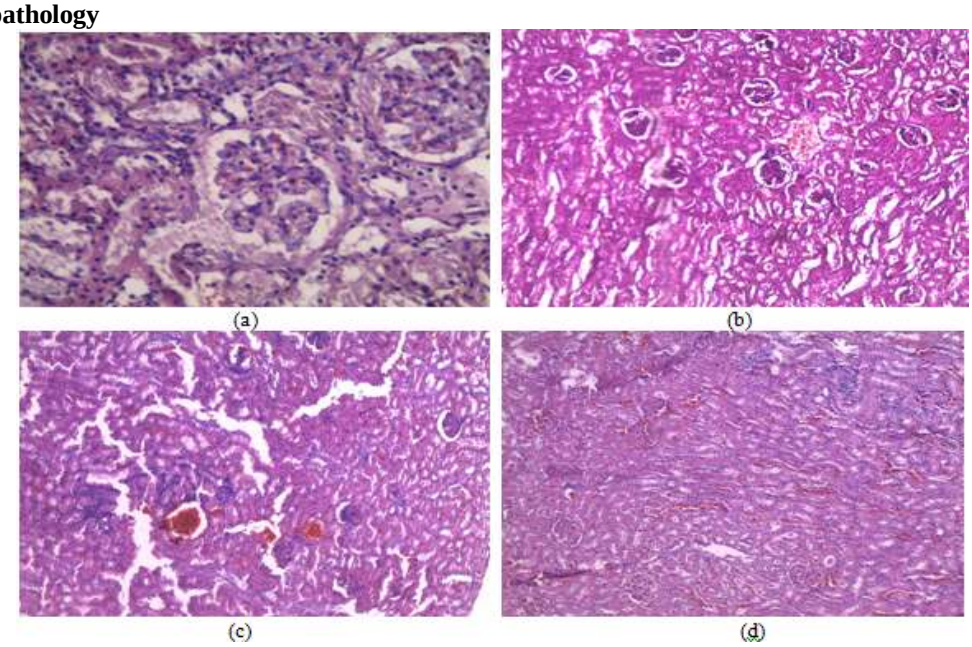

Fig. 4 (a): Group I **Control kidney section showing a renal tissue composed of glomeruli and tubules separated by interstiti-um. X 100 H&E; (b) Group 1 (100mg/kg) renal tissue showing normal blood vessels, glomerulus and interstitial space. X 100 H&E; (c) Group 2 (200mg/kg) renal tissue showing vascular congestion, and infiltration of interstiti-al space by chronic inflammatory cells. The glomeruli appear congested and the tubules essentially normal X 100 H&E; (d) Group 3 (300mg/kg) renal tissue showing vascular congestion, essentially normal glomeruli, and interstitial inflammatory cell infiltrate. X 100 H&E**

DISCUSSION

A good knowledge is required regarding the toxicity, dosage, purity, suitable extraction solvent and adverse effect for the use of herbal drugs [16]. Medicinal effect of *Xylopia aethiopica* has be reported some researchers this include the works of Nwozo *et al*. [18], Obodo *et al*. [18, 20], Woode *et al*.. [1], The result of the present study on the histological effect of *Xylopia aethiopica* on the liver and kidney shows the following features.

Morphological Effect

Decrease in the Total body weight of treated rat compared to control, is an indication that intake of *Xylopia aethiopica* could possibly assist in lipid metabolism which is in agreement with Obodo *et al*. [18].

The findings from this study revealed a statistically dose dependent reduction in the renal organ weight. This could be as a result of some bioactive ingredient in the plant of study having weight reducing properties. Liver weight variation among treated groups and the control was not significant and as such unremarkable.

Histopathological study of the liver

The findings from this study are in line with the report by Obodo *et al*. [20] that the administration of *Xylopia aethiopica* leaves can induce hepatic cell damage resulting from the elevation of liver enzymes because of the present of xylopic acid in its constituent. This study is also in line with the report by Abass [21] that xylopic acid content in *Xylopia aethiopica* induces significant reduction in serum total protein and albumin, this is because the level of albumin reflects the synthetic function of the liver. However, the report by Woode *et al*. [1] is a contradiction to this.

Histopathological study of the kidney

The findings of the kidney include vascular congestion and infiltration of the interstitial space by chronic inflammatory cells which may be due to drug reaction. This being present in the two higher dose group of the rats treated with *Xylopia aethiopica* aqueous extract indicate a dose dependent toxic effect of the aqueous extract of *Xylopia aethiopica* on the kidney that increases with increase in dose.

CONCLUSION

The findings of the histopathological examination of hepatic cells clearly reveal a mild or acute hepatitis in treated rats. These observations suggest that the aqueous extract of *Xylopia aethiopica* possess some hepatotoxic properties.

On the other hand, that of the kidney reveals a dose dependent interstitial nephritis in the two groups of the treated rats (group 2, 200mg/kg and group 3, 300mg/kg) suggest that the aqueous extract of *Xylopia aethiopica* triggered inflammatory responses on the kidney which are dose dependent. However, we suggest that caution be taking to avoid excessive and indiscriminate ingestion of these plant.

We recommend further studies to investigate the mechanism by which *Xylopia aethiopica* exert its effect on the liver and kidney and also, to carefully weigh the potential effect of *Xylopia aethiopica* as a therapeutic agent against the
reported a diverse effect.

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