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Effects of methanolic extracts of *Vitex doniana* leaves on the liver of adult wistar rats

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Abstract

The aim of this study is to investigate the effects of methanol leaf extract of *Vitex doniana* (MEVd) on the liver of an adult Wistar rats. Twenty adult Wistar rats were acclimatized for two weeks and subsequently randomized into four groups: Group 1 rats were administered daily 1 ml distilled water (control group); group 2 were administered the extract of (10 mg/kg b.w.) only; groups 3 and 4 were administered MEVd (200 and 400 mg/kg b.w. respectively). The experiment lasted six weeks and all administration was carried out orally. The final body weights of the rats were recorded at the end of the experiment and afterwards the rats were sacrificed, blood was collected and the serum was subsequently prepared.The serum was used for the determination of bilirubin. The results showed that there is almost no change in the architecture of the liver of the rats when they are exposed to the MEVd although there is mild improvement of the architecture of the liver in group 2. There is also body weight loss in all the groups.

Keywords: *Vitex doniana*, leaves, liver, adult wistar rats

Introduction

Various parts of the plants are used by traditional medicine practitioners in the management and treatment of several disorders which include cancer, rheumatism, hypertension and inflammatory diseases among others [1]. Leaf extracts or infusion of Vitex doniana plant has been claimed by many traditional medicine practitioners to be effective in the treatment and management of many ailments, such as diabetes mellitus, ulcer, and gastrointestinal tract infections among others. Vitex doniana, a member of Verbenaceae family is a medium-sized

deciduous tree with a heavy rounded crown and a clear bole up to 5m. It is widely distributed in the Eastern and Western parts of Nigeria. The bases of old trees have oblong scales. Leaves are opposite, glabrous, 14-34cm long, usually with 5 leaflets on stalks 6-14cm long. Leaflets distinctly stalked, ovate, obovate-elliptic or oblong. Flowers on petals are white except on the largest lobe, which is purple, in dense opposite and auxiliary cymes. Vitex doniana has numerous applications in traditional medicine. Leaf sap is used as an eye drop to treat conjunctivitis and other eye complaints. A leaf decoction is applied externally as a galacatagogue and against headache, stiffness, measles, rash, fever, chickenpox and hemiplegia, and to treat respiratory diseases. The therapeutic applications of this plant's parts in ethno-medicine for the treatment and management of numerous diseases calls for a high thorough put investigations of the safety and wholesomeness. Therefore, this research is aimed at evaluating the effects of aqueous and methanolic extract of Vitex doniana leaf on the serum lipid profile and liver enzyme levels in normal and alloxan induced diabetic albno rats.

Materials and Methods

Methods

Collection and Identification of Plant Materials

Fresh leaves of Vitex doniana were collected in the Botanical Garden of the Department of Plant Biology, Bayero University Kano, Nigeria. The fresh Plant sample were immediately taken to the Herbarium unit of Department of Plant Biology, Bayero University Kano, Nigeria; where it was thereafter identified and authenticated.

Extraction of methanolic plant leaves extract

The plant leaves were rinsed inwater to remove dirt. It was air dried under shade and pulverized to fine particles. To obtain the methanolic leaf extract of Vitex doniana (MEVd), 1000 g of the plant material were soxhleted in 1 litres of methanol for 8 hours using Soxhlet apparatus. The extract was concentrated at 40°C using a rotary evaporator and water bath to dryness. The crude extracts obtained was stored in a screw and capped bottle at 4°c.

Obtaining animals for the experiment

Twenty Adult male wistar albino rats of different body weights ranging from 45.00g ± 5.00g were obtained from the Animal Room of the Department of Applied Biology, Bayero University Kano, Nigeria. The wistarrats were kept in standard rat cages at room temperature (25 ± 2°C) with a normal 12-hour light/dark cycle and received standard commercial pelleted rat chow and water ad libitum. The rats were housed in the animal house facility of Department of Applied Biology, Bayero University, Kano, Nigeria.
Handling and treatments of the wistar rats was in accordance with standard guideline for laboratoryanimal care and use. The rats were allowed to acclimatize for a period of 14 days.

Treatment and grouping of experimental animals

The plant extract of Vitex doniana was dissolved in distilled water and orally given to the male wistar albino rats at a dose of 100 mg/kg, 200mg/kg and 400mg/kg body weight (b.wt) using a feeding needle. The vitex doniana extract (MEVd) was dissolved in distilled water and was administered in groups II, III and IV.
Twenty male Wistar rats were randomly divided into four groups of five rats each. All treatments were done orally. The different dosage of MEVd adopted was to determine the more effective dose. Group I served as control and received I ml distilled water. Group II received Vitex doniana methanolic extract dissolvd in distilled water MEVd (100 mg/kg b.wt). Group III rats were treated with MEVd (200 mg/kg b.wt) daily. Group IV rats were treated with MEVd (400 mg/kg b.wt) daily.

After 7 days of treatment, the rats were deprived of food overnight. And the following day, the rats were anesthetized and sacrificed by jugular puncture. Immediately after the blood was collected, the liver was quickly excised, trimmed of connective tissues, rinsed with saline to eliminate blood contamination, dried with

blotting paper, weighed (so as to calculate the relative weight) and stored in 10% formalin for histological investigation.

Preparation of serum

The blood samples collected into plain sample tubes were allowed toa clot and the serum was separated by centrifugation at 1000g for 15 minutes using a Bench type centrifuge. The clear supernatant, the serum was used for assay of Bilirubin concentrations.

Determination of bilirubin concentrations

The serum Total bilirubin concentration was determined according to the method described by Sherlock (1951) as outlined in Randox Kit.

Histological examination

The histopathology examination of the liver of the rats was done using the method adopted by Drury and Wallington [2].

The histopathology was carried out in the department of biochemistry, Bayero University Kano.

Results

Bilirubin concentration in the control group was determined to be 5.85+0.12. The bilirubin concentration in groups 2,3 and 4 are 6.44+0.05, 7.10+0.08 and 7.84 +0.05 respectively

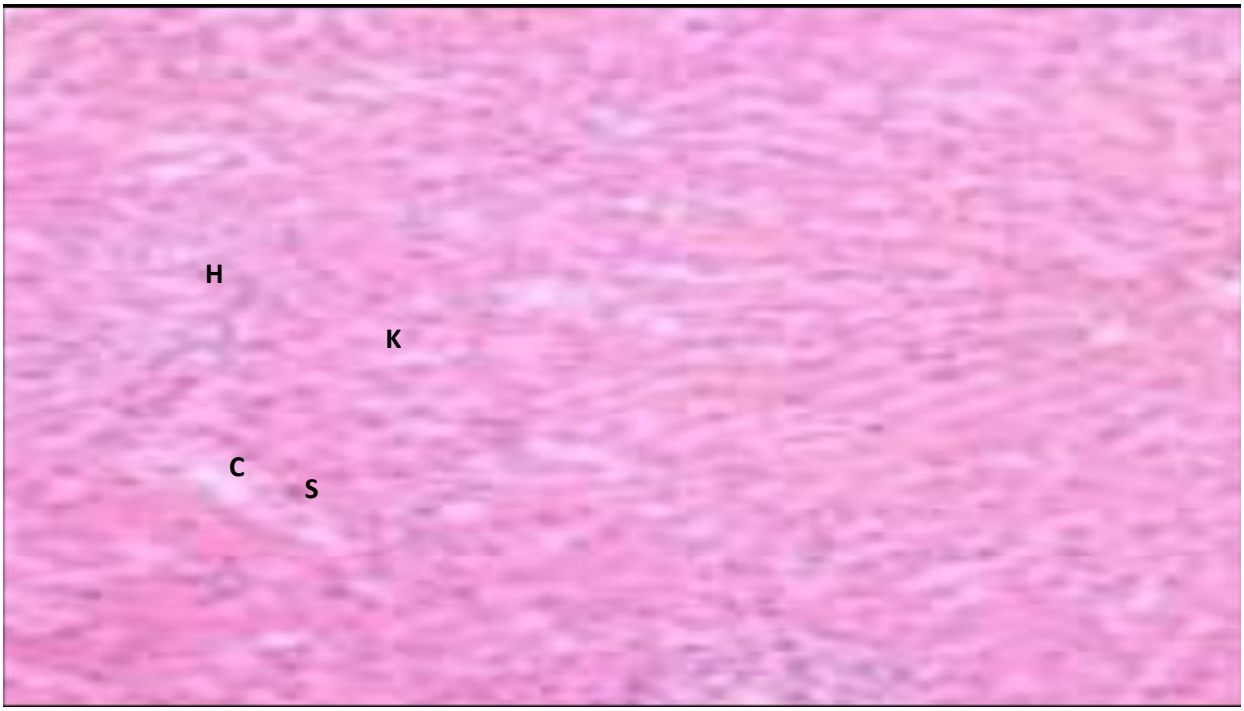

Plate 1 (×100) For liver administered with 1ml distilled water, the histology of the liver of rats administered distilled water showed normal hepatocytes, kupffer cells and sinusoid opening to the central vein and showed normal lobular architecture.

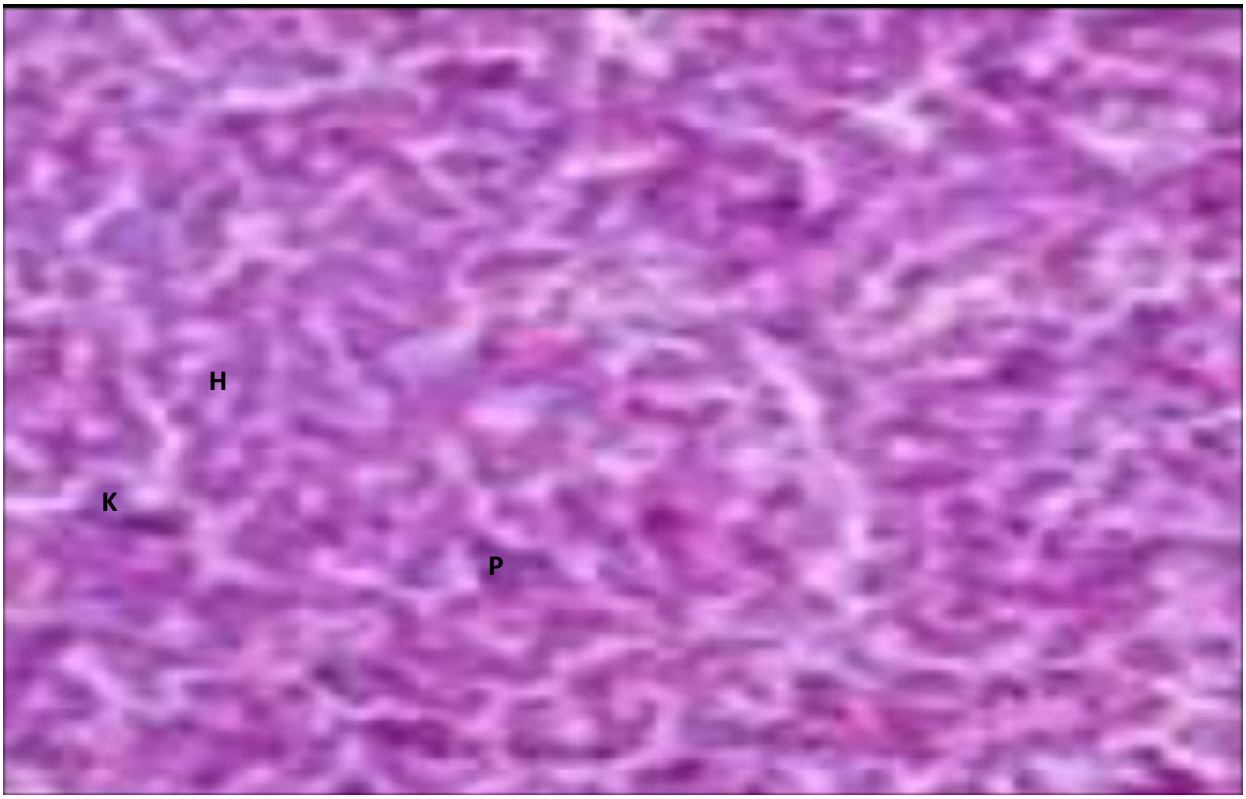

Plate 2 (×100)For liver administered with 100mg/kg MEVd, it showed normal architecture of the liver. Hepatocytes and kupffer cells are normal, it also showed mild improvement of the architecture of the liver given the infilteration of macrophage and lymphocyte in the portal vein compared with the rats administered 1ml distilled water (control).

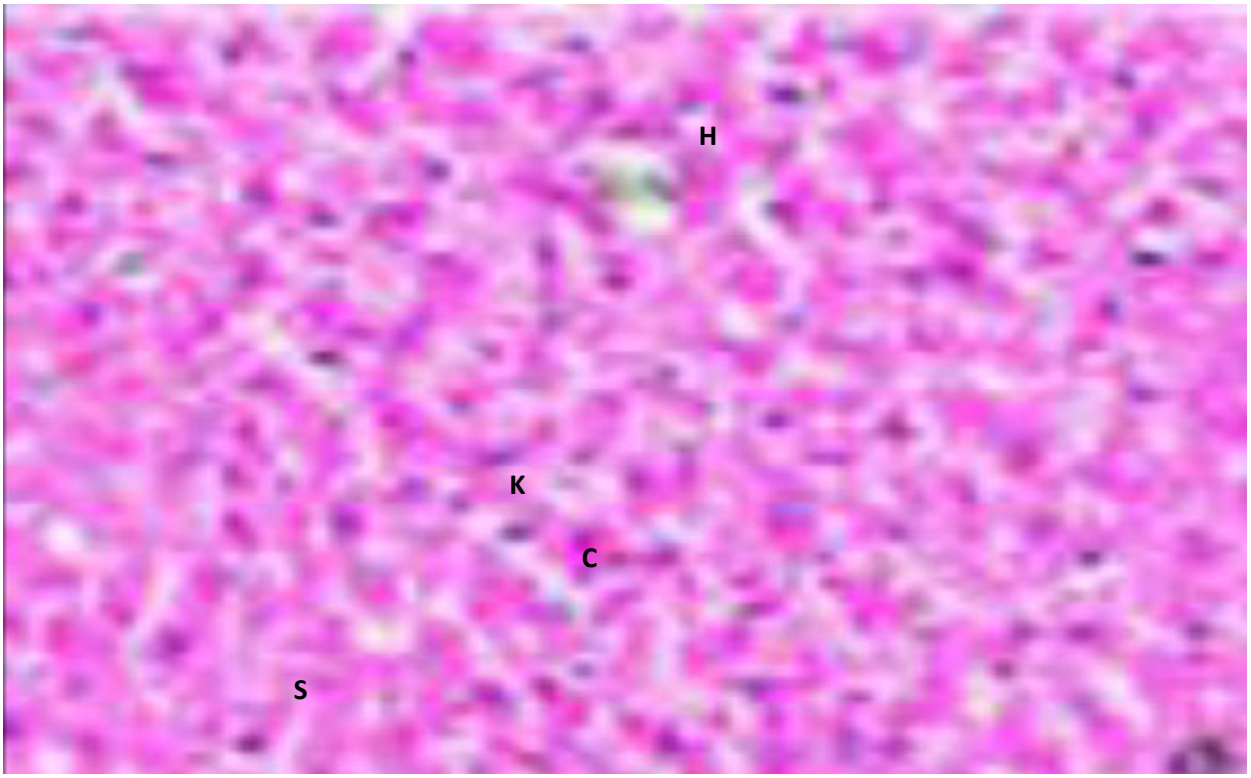

Plate 3 (×100) For liver administered with 200mg/kg MEVd, it showed normal architecture of the liver. Normal hepatocytes, normal kupffer cells, normal sinusoid and increase in lymphocytes.

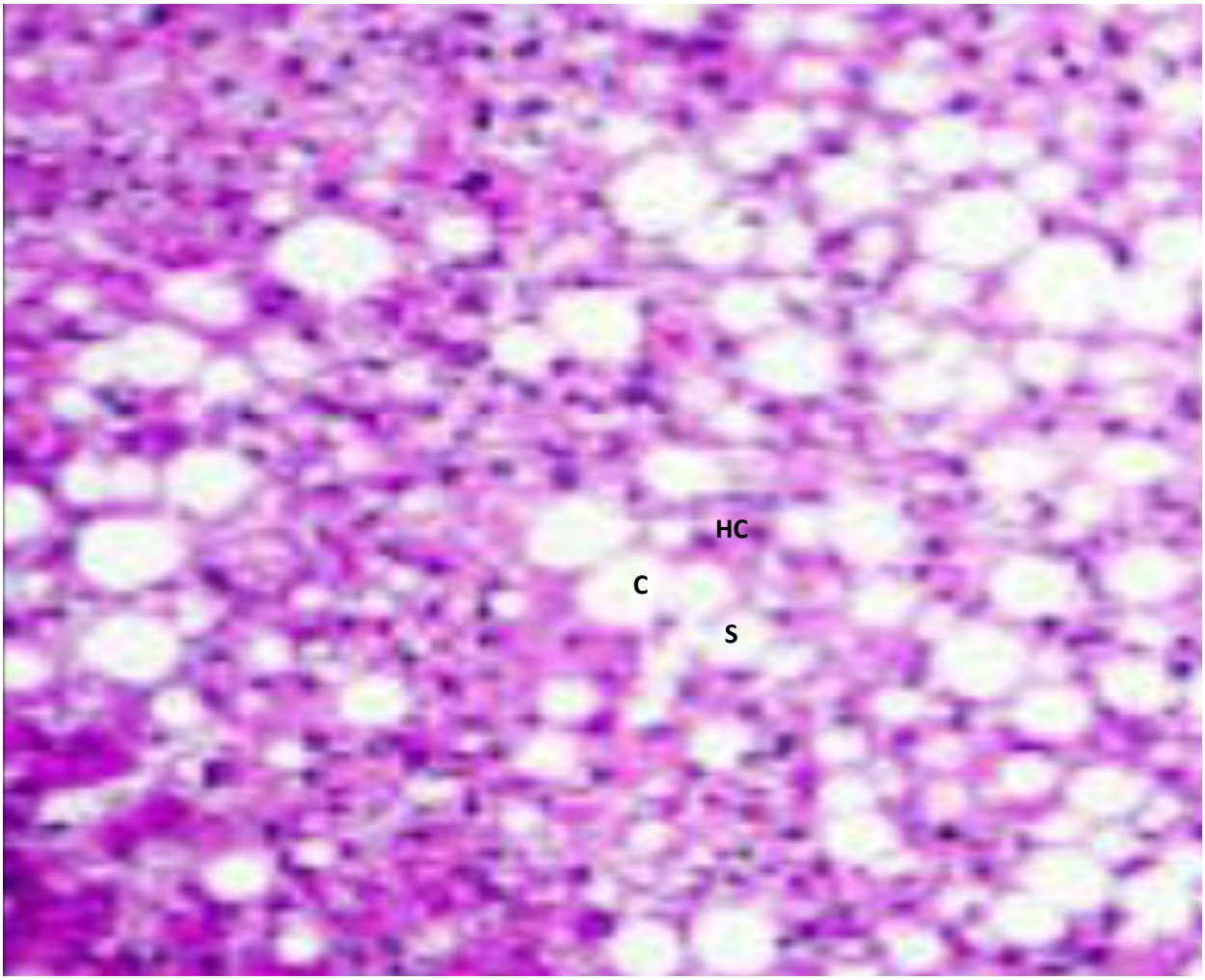

Plate 4 (×100) For liver administered with 400mg/kg of MEVd, section of rat liver administered 400mg/kg body of methanol leaf extract showed normal architecture. The sinusoid leading to the central vein which is surrounded by hepatic cords radiating towards the periphery.

Table 1 showing the percentage yield of the plant extract

Plant	Quantity of plant sample used (g)	Quantity of Solvent used (ml)	Quantity of Plant Extract Obtained (g)	Colour	Odour	Texture	Percentage yield (%)
Vitex Donian a	300	3000	57	Brown	Woody	Soft	19

Table 2 showing the body weights

	IBW	FBW
GROUP 1	**8.06±3.75[a]**	**57.2±4.12[b]**
GROUP 2	**94.8±4.76[a]**	**53.4±4.11[b]**
GROUP 3	**86.8±7-37[a]**	**37.6±5.99[b]**
GROUP 4	**95.4±6.73[a]**	**31.2±3.24[b]**

Data are ± SEM, values in the same row bearing different superscript are different at 5%

Table 3 showing the bilirubin concentration

	G1	G2	G3	G4
BILL. CONCEN.	**5.85±0.12[a]**	**6.44±0.05[b]**	**7.10±0.08[c]**	**7.84±0.05[d]**

Data are ±SEM, values in the same row bearing different superscript are different at 5%

Discussion

The extraction of vitex doniana was carried out using soxlet method. 300g of vitex doniana was used to obtain the yield of 19g extract. This yield is in contradiction with the results obtained by [3, 4] in which 1000g of vitex doniana leaf was macerated and a yield of 8.25g was obtained. These differences might be due to the difference in the method of extraction.

This research also obtained conflicting results regarding the body weights as compared to the findings of (Olajide etal, 2018). Olajide obtained body weight gain in the groups administered vitex doniana extract.
Vitex doniana extract did not cause much cytological changes in the liver tissue. This is attributable to its high nutritional value [5-6]s.

Conclusion

Vitex doniana extract caused decrease in body weight of adult wistar rats.It also caused increase in bilirubin concentration in rats.It did not cause much cytological changes in rats.

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