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Articles

Toxicological Effects of Aqueous Leaf Extract of Dinya (*Vitex Dodianna*) on Liver Enzymes of Albino Rats

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Abstract

The research was piloted to establish the hepatotoxic potentials of the leaf extract of Vitex dodiana on liver enzymes of apparently healthy albino rats. A total of sixteen (16) albino rats were clustered into four (4) groups of four (4) rats each designated as group A – D, Group A served as control while groups B, C and D were treated with 200 mg/kg, 300 mg/kg, and 400 mg/kg aqueous leaves of extract of Vitex dodiana respectively for a period of two weeks. The liver enzymes were determined using spectrophotometric methods. The activity of AST was slightly decreased to 6.5±0.20 in the rats treated with 200 mg/kg body weight of the extract and slightly decreased to 5.2±0.12 and 5.0±0.33 in the rats treated with 300 and 400 mg/kg body weight of the extracts respectively when compared with untreated group (5.6±0.15) with no significant ($P > 0.05$) differences. The activity of ALT was slightly decreased to 2.5±0.11 in the rats treated with 300mg/kg body weight of the extracts and slightly increased to 2.64±0.17 and decreased to 2.4±0.04 in the rats treated with 200 and 400 mg/kg body weight of the extracts respectively when compared with untreated group (2.8±0.31) with no significant ($P > 0.05$) difference. The result of ALP also showed no significant ($P < 0.05$) difference of serum ALP activity, though it was observed in the rats treated with 400 mg/kg body weight of the extracts the serum concentration decreased to 100.06±0.66, and 102.44±2.34 at 300 mg/kg body weight and 104.56±1.20 at 200 mg/kg body weight of the extracts, but no significant ($P > 0.05$) difference was observed when compared with untreated group (106.26±8.51). The results revealed no significant ($P < 0.05$) decrease in the activity of serum liver enzymes of the rats treated with the three different doses of Vitex dodiana extract when compared with control rats. In conclusion, acute oral administration of aqeous extract of Vitex dodiana was found to be relatively safe.

Keywords: Vitex dodiana, hepatic, ALP, AST, ALT, liver and enzymes.

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1. Introduction

Vitex doniana belongs to the family of verbenaceae. It is widely distributed in the Northern parts of Nigeria (Tadzabia et al., 2013; Jima, Megersa, 2018). It is called Dinya in the native Hausa language of the North. It is a medium-sized deciduous tree, 8-18 m high, with a heavy rounded crown and a clear bole up to 5 m. It has a rough bark, pale brown or greyish-white, rather smooth with narrow vertical fissures. The leaves are opposite, glabrous, 14-34 cm long, usually with 5 leaflets on stalks (Bello et al., 2018). It is dark green above and pale greyish-green below. The flower petals are white except on the largest lobe, which is purple. The flowers are small, blue or violet, 3-12 cm in diameter (Bello et al., 2018; Oyeyemi et al., 2018). The fruits are oblong, about 3 cm long. They are green when young and purplish black when ripe (Oyeyemi et al., 2018).

The plant has been used in the management of many diseases by traditionalists. Some of these ailments include, diabetes, cancer, hypertension, gastrointestinal disorders, rheumatism, jaundice, leprosy and many more (Ozkaya et al., 2013; Ibisi et al., 2017).

Plant leaves are generally eaten as vegetables or salad in many African countries. They are eaten as a part of staple food daily in many areas and are quite rich in nutrients (Beyene et al., 2016; Olufunmilayo, 2017).

Though many studies have been conducted on the medicinal uses of the plant, little have been reported on its toxicological effects (Billah, Kabir, 2015).

This study was designed to investigate the toxicological effects of Vitex dodiana with the intention of providing valuable data which may lead to the development of alternative drugs and therapeutic strategies with little or no side effects.

2. Materials and methods

Plant Materials

The fresh leaf of *Vitex dodiana* was purchased from Muda Lawal market in Bauchi State, Nigeria and was taken to the Biological Science Department, Abubakar Tafawa Balewa University Bauchi.

Preparation of the Extract

The leaves were sorted out separately to obtain only fresh leaves and washed with distilled water without squeezing to remove debris and dust particles. They were air-dried and ground into coarse powder using pestle and mortar and sieved to fine powder. 150 g of the fine powder was extracted or cold macerated into 900ml of distilled water for 24 hours and the macerated mixture was then filtered through muslin cloth. It was then filtered to obtain the *Vitex dodiana* and mixture aqueous extract through filter paper. The filtrate was concentrated in an electric oven at 50^{o}C until a semisolid residue dark solid extract was obtained.

Experimental Animals

Sixteen (16) white albino rats weighing between 80-100 g were purchased from National Veterinary Research Institute (NVRI) Vom, Plateau state. The animals were placed in cages and fed appropriately at the biological science department, Abubakar Tafawa Balewa University Bauchi.

Experimental Design

At the end of the seven days' acclimatization period, the animals were randomly assigned into four different groups of four rats each, designated as groups of A – D. Group A received water and feed only and serves as control, group B were administered orally with 200 mg/kg, group C were administered orally with 300 mg/kg and group D were administered orally with 400mg/kg doses of the extract for the period of fourteen days. On the 15th day all the rats were sacrificed and blood samples collected.

Administration of the Extract

Administration of the extract was done via oral route with the aid of oral cannula and syringe. Animals received their doses once per day for the period of two weeks. They were observed daily for clinical signs of toxicity or pharmacological signs, throughout the period of study.

Collection of Blood

At the end of the two weeks of extract administration, the albino rats were slaughtered to obtain blood from the jugular vein. The collected blood samples from each rat were allowed to clot and then centrifuged at 3000 rpm for 10 minutes. Serum was obtained for the assay of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), and Alkaline phosphatase (ALP).

Blood Analysis

Hepatic analysis of the serum enzymes for ALT and AST was done by the method of Reitman and Frankel (1957), ALP was assayed according to the method of Rec (1972).

Estimation of Parameters

Aspartate Aminotransferase (AST) assayed using the Colorimetric method of Reitman and Frankel, 1957.

Alanine Aminotransferase (ALT) assayed by Colorimetric method of Reitman and Frankel, 1957.

ALKALINE PHOSPHATASE (ALP) assayed by method of Rec, 1972.

3. Results and discussion

From the results it appears that the extract had no significant effect ($P < 0.05$) on the activity of the liver enzymes assayed at all the doses when compared with control rats.

Table 1. Effect of aqueous leaf extract of *Vitex dodiana* on liver enzymes in normal albino rats

Grouping	AST(IU/L)	ALT(IU/L)	ALP(IU/L)
Group A **(Control)**	5.6±0.15	2.8±0.31	106.26±8.51
Group B (**200 mg/kg)**	5.5±0.20	2.5±0.11	104.56±1.20
Group C (**300 mg/kg)**	5.2±0.12	2.6±0.17	102.44±2.34
Group D (**400 mg/kg)**	5.0±0.33	2.4±0.04	100.06±0.66

Table 1 showed the effect of aqueous leaf extract of *Vitex dodiana* on liver enzymes in normal albino rats. The activity of AST was slightly decreased to 6.5±0.20 in the rats treated with 200 mg/kg body weight of the extract and slightly decreased to 5.2±0.12 and 5.0±0.33 in the rats treated with 300 and 400 mg/kg body weight of the extracts respectively when compared with untreated group (5.6±0.15) with no significant ($P > 0.05$) differences. The activity of ALT was slightly decreased to 2.5±0.11 in the rats treated with 300 mg/kg body weight of the extracts and slightly increased to 2.64±0.17 and decreased to 2.4±0.04 in the rats treated with 200 and 400 mg/kg body weight of the extracts respectively when compared with untreated group (2.8±0.31) with no significant ($P > 0.05$) difference. The result of ALP also showed no significant ($P < 0.05$) difference of serum ALP activity, though it was observed in the rats treated with 400 mg/kg body weight of the extracts the serum concentration decreased to 100.06±0.66, and 102.44±2.34 at 300 mg/kg body weight and 104.56±1.20 at 200 mg/kg body weight of the extracts, but no significant ($P > 0.05$) difference was observed when compared with untreated group (106.26±8.51).

4. Conclusion

Acute oral administration of the extracts was found to be relatively safe at all dosage levels. Hence no alteration in activity was observed.

5. Recommendations

Further studies should be carried out by increasing the number of experimental animals, so that larger data could be obtained so as to reach a better conclusion. Biochemical parameters associated with liver function tests such as bilirubin, albumin and total protein should also be analyzed so as to find out the detailed hepatotoxic effect of *Vitex dodiana*.

Histological analysis of the liver of albino rats should also be conducted.

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