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Short Communication

Toxicological studies of *Ceiba pentandra* Linn

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The toxicity profile of aqueous methanol extract of *Ceiba pentandra* leaves was investigated in mice. Two parameters were determined; acute toxicity and chronic toxicity. For acute toxicity test, the LD_{50} was found to be over 5000 mg/kg. For chronic toxicity test, the mice were injected with graded doses (250 - 500 mg/kg) of the leaves extract daily for 21 days and the effects on body weight, hematological and serum biochemical parameters were determined. The results revealed that there was no significant change in body weight, meaning that the extract is relatively safe for oral medical use. In fact there were no variable changes in the body weight of the mice from day zero (D_0) to day twenty one (D_{21}) in all the groups. The parameters determined during chronic toxicity test reveals that the concentrations of urea, chloride ion sodium ion, potassium ions and bicarbonate were 11.2, 83.2, 131.6, 8.44 and 38 mMol/L respectively for the test animals. The result shows that apart from urea, all other parameters were within physiological acceptable range. The results further reveals, that there was a decrease in Craetinine (88 uMol/L) and Total Protein (57.4 g/L), while AST (19 IU/L), ALT (10 IU/L) and ALP (204 IU/L) concentrations has significantly increased .While there was no significant change in PCV and bilirubin concentrations The finding reveals that *C. pentandra* has very low toxicity profile in all the tested animals and the plant is relatively safe for herbal oral medication.

Key words: *Ceiba pentandra*, toxicity, plant.

INTRODUCTION

Ceiba pentandra plant is widely spread around the world and is a very popular plant in Northern Nigeria. It was reported that fresh bark of the plant has antibacterial activity (Odoemena, 2004). Sawhnery et al. (1978) has shown that the plant has antifungal activity. *C. pentandra* (Bombacacease) dried bark is used for chest pains and as a diuretic in Nicaragua (Coe and Anderson 1996). Coe and Anderson (1996) revealed that human adult use the dried back orally for the treatment of respiratory and pulmonary disorders. In a related development the dried back is used orally for treatment of diarrhea, fever, gonorrhea and parasitic infections (Noreen, et al., 1998). It has been reported that in Senegal it is used for abscesses, mouth sores and tooth ache as well as stomach ache (Le-Grand, 1989). It has been demonstrated that leaves extract of *C. pentandra* was used in Indonesia for treatment of fever (Grosvenor et al., 1995). *C. pentandra* (part not specified) is used in Cameroon for the treatment of hypertension (Kandem et al., 1986). Research findings in Nigeria revealed that the extract of *C. pentandra* has antifungal activity (Sawhney et al., 1978). In Congo, the dried back of *C. pentandra* has been shown to have antiameobic activity and antibacterial activity (Tona et al., 1999). The biological activities of the extract of *C. pentandra* have shown that it affects central nervous system generally in mouse (Cox et al., 1989). In Nigeria it was also reported that fresh bark of the plant has antibacterial; activity (Odama et al., 1997).

Basis for the medicinal uses of *C. pentandra* and assess whether the plant has some toxicological effects on mice.

The rationale for the utilization of medicinal plants has rested largely on long-term clinical experience with little or no scientific data on their efficacy and safety (Zhu et al., 2002). Sofowora (1989) reported that, with the upsurge in the use of herbal medicine, a thorough scientific investigation of these plants is comparative, based on the need to validate their folkloric usage. It is in view of the fact that *C. pentandra* plant is used in the treatment of diseases, it would be of paramount importance to validate the scientific basis for the medicinal uses of *C. pentandra* and assess whether the plant has some toxicological effects

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Table 1. Result of average weight of mice and dosage given for chronictoxicity test.

Group	Dosage	D_0 (g)	D_7 (g)	D_{14} (g)	D_{21} (g)
Group 1	250 mg/kg	25.08	24.88	25.28	25.69
Group 2	500 mg/kg	23.30	23.20	23.35	23.68
Group 3	Saline 0.9%	21.10	21.00	21.00	22.00

on mice. During the course of investigation of the toxicity profile, two major parameters were assessed. Vide the acute toxicity test and chronic toxicity test. This study was therefore undertaken in order to assess the toxicity profile of plant *C. pentandra* that will provide information on the safety or otherwise of the use of *C. pentandra* in medicine and its continual ethno medicinal applications.

MATERIALS AND METHODS

Collection of test material

Fresh leaves of *C. pentandra* were obtained from Zaria metropolitan. The plant collected was brought to the Department of Biological Science of Ahmadu Bello University, Zaria and identified by officer in charge of the herbarium.

Extraction of test material

Aqueous methanol (60/40) v/v would extract most of the water soluble compounds. This solvent system offers the best opportunity to evaluate both water soluble and the constituents present in *C. pentandra*. Soxhlet extraction method was used. And it was carried out in two steps, first, defatted with petroleum ether, then extracted with aqueous methanol 60/40 v/v. Briefly, 200g of the powder leaves in tumble placed in the Soxhlet extractor, and extracted continuously until all the leaves powder was extracted. The evaporator machine was used to recover the solvent. The extract was dried at room temperature and stored at 4°C.

Animals

Adult albino mice (20 - 30 g) of either sex were used for the research. They were procured from Animal house of Faculty of Pharmaceutical Science ABU. Zaria. The animals were acclimatized for one week before commencement of investigation.

Chemicals

Kits and reagents for AST, ALT, ALP and craetinine, total protein, total bilirubin, urea were obtained from Barau Dikko Hospital Kaduna.

Methodology

There were two toxicity tests that were carried out and these were:

1.) Acute toxicity test
2.) Chronic toxicity test

Acute toxicity test: The acute toxicity (LD_{50}) was estimated in mice following Lork's 1983 method slightly modified. Dose levels used range from 100 - 5000 mg/kg, number of death in each group of mice within 24 h were monitored.

Chronic toxicity test: 15 mice were selected and then divided into three groups 5 mice each group, the first group served as control, given only saline, while the remaining 2 groups received 250 and 500 mg/kg of *C. pentandra* extract orally for 21 days. The first day of dosing was taken as D_0 where as the day of sacrifice was designated as D_{21} and the body weight of each mice was assessed once every seven days during the dosing period and the day of sacrifice.

The following parameters were analyzed;

(a) Estimation of blood urea
(b) Estimation of serum bilirubin
(c) Estimation of alkaline phosphatase (ALP)
(d) Determination of packed cell volume (PCV)
(e) Determination of total protein (TP)
(f) Determination of craetinine (Cr)
(g) Estimation of aspartate transaminase (AST)
(h) Estimation alanine transaminase (ALT)

RESULTS AND DISCUSSION

Acute toxicity studies

At the dose levels tested there were no clinical signs observed in the treated mice. No Mortality was observed in all the groups of mice that were given *C. pentandra* orally after 24 h. Therefore the LD_{50} value of *C. pentandra* was estimated to be above 5000 mg/kg body weight.

Chronic toxicity studies

Chronic toxicity test of the leaves extract *Ceiba pentandra* was determined and are given as follows.

DISCUSSION

The present research has provided first hand information on Acute and chronic toxicity studies on *C. pentandra*. The Acute toxicity studies revealed that *C. pentandra* has LD_{50} 5000 mg/kg in mice, indicating that the plant is relatively not toxic to the experimental animals. The fresh back of the plant has anti bacterial activity (Odama et al, 1997).The result of the chronic toxicity revealed that there was no significant change in body weight of mice fed for 21 days with 250 mg/kg - 500 mg/kg of *C. pentandra* leaves extract, suggesting that the plant relatively not toxic to mice as shown in Table 1.

The parameters determined during chronic toxicity studies reveals that potassium, urea chlorine ions and bicarbonate has increased, revealing that increase in serum chloride and bicarbonate levels may not pose a great danger in mice treatment with *C. pentandra as* illustrated in Figure 1. In some situation, liver cell damage is characterrized by a rise in plasma enzymes, AST, ALT and ALP. From our findings ALP concentration was consistently higher but AST, ALT and Cr are within physiological acceptable

Table 2. Results of serum biochemical changes in mice following the chronic toxicity test of *C. pentandra* leaves extract for 21 days.

	Parameters determined						
Group	**Cr (μ mol/l)**	**AST (I.U/l)**	**ALT (I.U/l)**	**ALP (I.U/l)**	**Bilirubin (μmol/l)**	**TP (g/l)**	**PCV (%)**
Control	130	25.5	5.5	7	< 17	71	45
250 mg/kg	117.8	25.6	8.8	14	< 17	71.6	46.4
500 mg/kg	88	19	10	20.4	< 17	57.4	47.8

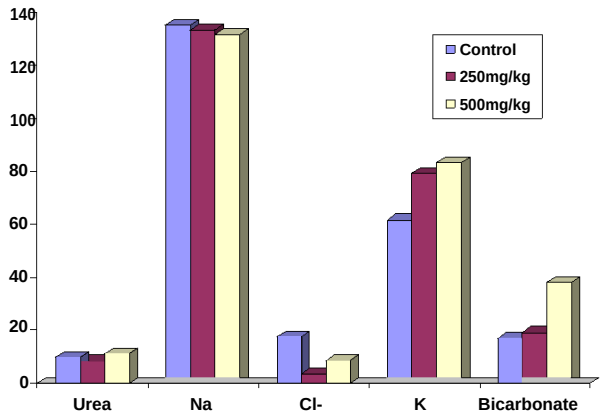

Figure 1. Effects of *C. pentandra* leave extract on renal functions.

range as given in Table 2. In a related development Ladeji et al. (2003) reported that the extract of *C. pentandra* administered to rats for 28 days appeared non-toxic as evidenced by normal serum levels of AST, ALT, ALP and bilirubin.

A rise in plasma alkaline phospholase level is usually a characteristic finding in obstractive hepatobiliary disease as found in cholestrolic liver diseases (Kanaeko, 1989). Indicating that there was no disrurbances in the carbohydrate, protein and fat metabolism. Klaassen (2001) reported that lost of weight in animals is due to disturbance in carbohydrate, protein and lipid metabolism. Since concentrations are consistently decreasing, thus suggest that there was no significant liver cells damage. The AST concentration is higher than ALT concentration which is expected, since body cells contain more AST than ALT (Mayne, 1996). The present research findings also revealed that there was no significant change in the PCV but there was significant reduction of total protein levels in the tested animals.

Conclusion

The toxicity profile studies shows that, the aqueous methanol leaves extract of *C. pentandra* has very low toxicity profile in all the tested animals and the plant is therefore considered relatively safe for herbal oral use medication in treatment of diseases.

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