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An Assessment of Effects of Root Bark Extracts of *Cissampelos Owariensis* on Body Weight and Liver Parameters in Albino Rats

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A B S T R A C T

Secondary metabolites of plants origin are the richest source of active therapeutics with. *Cissampelos owariensis*is (English name: lungworth, Hausa: *damaraji*, Yoruba: *Jokoje* and Jenjo: *Kinkeh*) infusion of rhizomes have been used for treatment of various ailments and maladies. Despite the reports on the medicinal benefits of the plant, there are scanty reports on its toxicity. This study wishes to assess the effects of *C. owariensis* root bark on some liver parameters in adult albino rats in its attempt to elucidate its toxicity. Four experimental groups of Albino Rats were (control, low medium and high doses) administered with oral doses of 0mg/kg 200mg/kg, 400mg/kg and 600mg/kg per body weight of the methanolic extract dissolved in distilled water respectively. The weights of the animals were monitored over a period of two weeks. The experiment was done in replicates and the data generated analysed using one-way ANOVA using SPSS version 20. The result showed a significant weight gain in the 200mg/kg body weight treatment group, whereas the 400mg/kg and 600mg/kg body weight treatments did not differ significantly to the control. Also, serum AST and ALT levels is not significant when compared to the control group but increasing ALT activity of 15.75±2.50IU to 20.00±3.83IU was observed in the 200mg/kg and 600mg/kg body weight treatment groups respectively. On the other hand, the serum ALP showed significant levels of activities in the higher dose treatment group. The levels of total serum protein in the 600mg/kg bwt and 400mg/kg bwt as significantly lower when compared to the control and 200mg/kg bwt treatment group. There was also significant elevation in levels of total and conjugated bilirubin in the 600mg/kg bwt group compared to the control and 200mg/kg bwt groups. In conclusion, methanolic extract of *C. owariensis* has no toxic effects on hepatic cell consequent of the normal values of AST and ALT whereas the elevation in ALP and bilirubin in disproportion to ALT and AST could denote a cholestatic pattern of liver toxicity.

Keywords: *Cissampelos owariensis*is, lungworth, *damaraji, Jokoje, Kinkeh, liver function*

1. Introduction:

The biodiversity of secondary metabolites of plants origin has being one of the richest source of active principles which have been used as therapeutic, lead compounds and derivatives of so many pharmaceutical (Ghirga *et al.*, 2021). A larger percentage of the world population depends on plants material for treatment and management of conditions (El-Ghani, 2016; Atawodi *et al.*, 2010).

*Cissampelos owariensis*is classified thus; kingdom: plantae, phylum: tracheophyta, class: magnoliopsida, order: ranunculales, genus: *Cissampelos* and specie: *Cissampelos owariensis*. It is commonly known as lungworth, damaraji in Hausa (Amujoyegbe *et al.*, 2016; Kankara *et al.*, 2022), *Jokoje* in *Yoruba* (Aiyeloja *et al.*, 2022) and *Kinkeh* in *Jenjo* (Taraba State). Its origin has been traced to west and central sub-Saharan African countries (Omotoso *et al.*, 2019). *C. owariensis* is a dioecious shrub with ground penetrating rhizome; the stems and branchlets have hair-like spikes that make the feel of the leaf rough. The Leaves are in simple spiral arrangement and produces flowers at the unset of rainy season, and fruits mature during the dry season (Earnest *et al.*, 2015).

Different part of the plant have been used for treatment of various ailments; the leaves have been used to treat metrorrhagia, wounds, snake bites, circulatory and reproductive diseases, amnesia and psychosis, prevention of miscarriage and treatment of sterility (Omotoso *et al.*, 2015). The infusion of the better rhizomes has been used to treat gastrointestinal complaints such as diarrhoea, dysentery, colic, intestinal worms, and digestive complaints, and also urogenital problems such as menstrual problems, venereal diseases and infertility (Ekeanyanwu *et al.*, 2012), Lung diseases, skin diseases; emmenagogue, antipyretic, diuretic, blood tonic (Olowokudejo *et al.*, 2008). Olutayo *et al*. (2013) also isolated 11 components of the essential oil from *C. owariensis* roots (Silva *et al.*, 2020).

Despite the reports on the medicinal benefits of the plant, there are scanty reports on the safety and toxicity (Efiom, 2010; Ekeanyanwu *et el*., 2012, Noe & Lehmann, 2012; Akande *et al.*, 2013; Earnest *et al.*, 2015). This study wishes to assess the effects of *C. owariensis* on liver and some haematological parameters in adult albino rats. The significance of this study lies in its attempt to identify the potential toxic effect of *C. owariensis* on liver in normal

adult albino rats so as to provide broad base for further investigation of the pharmacokinetics thereby reducing conflicts of interest and ignorance to an acceptable level.

2. Materials and methods

The Albino rats used in this study were obtained from the National Veterinary Research Institute (NVIR), Von and transported to the Department of Biochemistry, Modibbo Adama University, Yola. The animals were allowed to acclimatize for a period of two weeks before the commencement of the research.

The Root bark of *C. owariensis* was harvested in a farm land in Jenpetel, Karim-Lamido Local Government of Taraba State. It was identified by a botanist in the Department of Biological Sciences, Modibbo Adama University, Yola.

Root bark of *C. owariensis* was dried under shade in ambient temperature. It was then crushed using pistil and mortar into small bits. About 50g of the crushed root bark was soaked in 200ml methanol and water and allowed to stand for 48 hours. Muscilien cloth was then used to filter out the methanol solution. The filtrate was then dried using rotary evaporator.

The experimental animals were divided into four groups of fives; each group in a separate cage. The groups are categorized as control and three treatment administered with food (Starter mash) and water ad-libetum with the treatment group receiving oral administration of 200mg/kg, 400mg/kg and 600mg/kg per body weight of methanolic extracts of *C. owariensis* dissolved in distilled water respectively using 2ml syringe.

The weights of the animals were monitored daily using a chemical balance to determine the quantity of extract to administer to each rat in the group. The experiment was conducted for a period of two weeks at the end of which the animals were sacrificed humanely and blood samples were collected by jugular puncture in sterile bottles for analyses.

Standard aspartate aminotransferase (AST), alanine tranferase (ALT), alkaline phosphatise (ALP), total protein, total bilirubin and conjugated bilirubin kits purchased from Sigma Aldrich was used for the assay according to the manufacturer's instructions. The data generated were analysed using ANOVA using SPSS version 20 and Microsoft excel spreadsheet.

3. Results

Table 1: percentage body weight increase of experimental animals

Treatment Group	Percentage Weight Increase
Control	11.95
200mg/kg of body weight	21.54
400mg/kg of body weight	14.82
600mg/kg of body weight	13.16

Table 2: Levels of Liver Injury Enzyme Markers in Albino Rats Treated with *C. owariensis* Methanolic Extracts

	AST (U/I)	ALT (U/I)	ALP (U/I)	Total Protein (g/L)	Total Bil. (µmol/L)	Conjugate Bil. (µmol/L)
Control	20.00±2.00	21±3.27	386.37±40.47	50.75±6.29	10.58±3.75	5.08±0.81
200mg/kg	18.50±3.32	15.75±2.50	414.00±39.03	69.12±3.13	9.84±4.28	7.86±1.31
400mg/kg	20.00±4.08	18.00±2.00	469.20±67.13	58.62±5.75	9.22±5.06	7.40±2.44
600mg/kg	20.50±3.14	20.00±3.83	503.50±61.10	52.75±4.79	16.30±2.75	13.87±2.89

4. Discussion

There was a significant weight gain in the 200mg/kg body weight treatment group, whereas the 400mg/kg and 600mg/kg body weight treatments did not differ significantly to the control.

AST and ALT are tissue enzymes that catalyze the exchange of amino and keto groups between α-amino acids and α-keto acids (Giannini *et al.*, 2003). AST is widely distributed in tissue principally cardiac, hepatic, muscle and kidney whereas ALT together with AST are found in many body tissues include the heart, muscle, kidney, brain and lung (Ozer *et al.*, 2008). When body tissue or an organ especially the liver is damaged, they leaked into the blood in same proportion to the extent of the tissue damage (George *et al*., 2011) where they can be measured as indicator of cell injury (Prat and Kaplan, 2000).

From this, study, serum AST and ALT levels is not different when compared to the control group. Although the ALT showed no significant difference in activity in all the treatment groups, it was lower in the 200mg/kg bwt treatment group with an increase from 15.75±2.50IU to 20.00±3.83IU in the 200mg/kg bwt and 600mg/kg bwt treatment groups respectively. On the other hand, the serum ALP showed significant levels of activities in the higher dose treatment group when compared to the control and 200mg/kg bwt treatment groups. This result show root bark methanolic extracts of *C. owariensis* posses no injury to the hepatic cells (Ribeiro *et al*., 2019). The elevated levels of ALP in the higher dose treatment group could be possibly by a different mechanism such as bone marrow disorder possibly by the extract.

The use of AST, ALT, ALP and serum bilirubin as universal markers of liver injury is well understood hence the use of these enzyme in clinical diagnoses and investigations (Lala *et al*., 2021). Elevated levels of these enzymes have been associated with different kinds of conditions. They have been used extensively to determine areas of the liver where damage may be taking place and hence, depending on the pattern of elevation, a differential diagnosis can be organised (Ferrell, 2000; Giannini *et al*., 2005, Lala *et al.*, 2021). Elevations in ALT and AST in disproportion to elevations in alkaline phosphatase and bilirubin denotes a hepatocellular disease. Whereas, an elevation in alkaline phosphatase and bilirubin in disproportion to ALT and AST would denote a cholestatic pattern (Lala *et al.*, 2021).

The levels of total serum protein in the 600mg/kg bwt and 400mg/kg bwt as significantly lower when compared to the control and 200mg/kg bwt treatment group. There was also significant elevation in levels of total and conjugated bilirubin in the 600mg/kg bwt group compared to the control and 200mg/kg bwt groups. Hence, it is worthy of note that higher percentage of the bilirubin are in the conjugated form an indicative of obstructive liver damage, since low total protein levels can suggest a liver obstructive disorder, a kidney disorder, or a disorder in which protein is not digested or absorbed properly. Low levels may be seen in severe malnutrition and with conditions that cause malabsorption, such as Celiac disease or inflammatory bowel disease (IBD) (Nelson and Cox, 2005).

5. Conclusions

In conclusion, the results of this study demonstrate that methanolic extract of *C. owariensis* has no toxic effects on hepatic cell consequent of the normal values of AST and ALT whereas the elevation in ALP and bilirubin in disproportion to ALT and AST could denote a cholestatic pattern of liver toxicity. However, further investigations are required to identify the mechanism of toxicology of the root bark extract of the plant.

6. Conflict of Interest

All authors declare that they have no conflicts of interest.

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