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SUB-CHRONIC ADMINISTRATION OF AQUEOUS LEAF EXTRACT OF *FICUS SYCOMORUS* ON SOME LIVER AND KIDNEY FUNCTION INDICES IN RATS

***¹Ashade, N. O., ²Kabara, H.T., ³Yunusa, I., ¹Bala S., ¹Ibrahim, A., ¹Ibraheem, A. S. and ¹Inekwe, U. V.**

¹National Research Institute for Chemical Technology, P.M.B. 1052, Zaria, Nigeria.

²Department of Biochemistry, Bayero University Kano, P.M.B. 3011, Nigeria.

³Department of Biochemistry, Kano University of Science and Technology, Wudil P.M.B 3244, Kano, Nigeria.

*Correspondence author: ashadenoah3@gmail.com

ABSTRACT

The stem bark of Ficus sycomorus is used traditionally for cure of fungal infection, jaundice and dysentery in some parts of northern Nigeria. The leaves of Ficus sycomorus were collected, dried and extracted to screen for some phytochemicals and study its effect on liver and kidney functions in experimental rats. Phytochemical screening of leaf extract of F. sycomorus indicates the presence of alkaloids, tannins, saponins, flavonoids and reducing sugars. Animals were divided into two sets (A&B) of five groups each and were administered 0.00, 200, 400, 800 and 1600 mgkg⁻¹ body weight of the aqueous leaf extract for 14 days orally with set A administered once daily and set B administered twice daily. Serum activities of ALT, AST, ALP and concentration of urea and creatinine of both sets show no significant difference (p<0.05) compared to the control group; except in ALP (148.00±0.77 and 175.80±0.45U/L) and urea (41.20±0.09 and 53.38±0.17mg/dL) at higher doses (1600mgkg⁻¹) of the extract. Base on this study, the extract show neither liver nor kidney toxicity, however, it should be use with caution especially at higher dose and long time exposure.

Keyword: *Ficus sycomorus, phytochemical screening, kidney indices, liver indices.*

INTRODUCTION

In some parts of northern Nigeria, the stem bark of *F. sycomorus* (known as *Baure* in Hausa) is used traditionally to treat fungal infection, jaundice and dysentery (Hassan *et al.*, 2007). *F. sycomorus* is a large, semi-deciduous spreading savannah tree, up to 21metres - or maximum 46metres height, occasionally buttressed. Its leaves are valuable fodder in overstocked semi-arid areas where the trees occur naturally and its fruits are eaten by livestock wild animals and birds (Von Maydell, 1986; Berg, 2003). Globally, there are over 750 species of *Ficus* (Moraceae). The use of higher plants and their extracts to treat infections is an age-old practice in traditional African medicine. Traditional medical practice has been known for centuries in many parts of the world (Sofowora, 1984). However, the common use of medicinal plants in treatment of disease and other afflictions of the populace by herbalists are due to high cost and limited availability of conventional pharmaceuticals (Sanganuwan, 2009).

Despite the acknowledged importance of medicinal plants to global economy and local household economies, their use are generally poorly organized, regulated and are still exploited with little or no regard to the future (Srivastava *et al.*, 1996). Hence, the popular use of *F. sycomorus* in herbal therapy demands scientific information on its toxicity risk assessment on liver and kidney. This study is aimed at investigating the effect of sub-chronic administration of aqueous leaf extract of *F. sycomorus*

on some liver and kidney function indices in rats with a view to establish possible causes of toxicity.

MATERIALS AND METHODS

Sample Collection

The fresh *Ficus sycomorus* Linn (Moraceae) leaves used for this study were collected during August 2009 from a bush around Dambatta, Kano State, Nigeria (Latitude: 12°24'56"N; Longitude: 8°31'12"E). The plant material was first identified at the specie level at Biological Sciences Department, Bayero University Kano, but later authenticated with voucher number 1446 at herbarium unit of Biological Sciences Department, Ahmadu Bello University Zaria.

Extract Preparation

The leaves were detached from the stem, and carefully washed in distilled water to remove extraneous substances. The leaves were allowed to dry at room temperature – i.e. open air dried at the laboratory – then pulverized into a moderately coarse powder (using a wooden pestle and mortar) and macerated in distilled water and subjected to brief boiling prior to extraction. After cooling, it was decanted and filtered and the filtrate was evaporated to dryness in an oven set at 45°C. The thick semi-powdered extract was stored in a sealed plastic container until required and was further reconstituted in distilled water at different concentrations (0.00, 200, 400, 800 and 1600 mgkg⁻¹) for oral administration to the experimental rats.

Experimental Animals and Design

The standard conditions employed met the guidelines for Good Laboratory Practice (GLP) regulations of World Health Organization. Apparently healthy Albino rats; 45 (Wister strain) of both sexes weighing 180 - 220g obtained were kept for one week to acclimatize and thereafter for the study in well ventilated laboratory cages with 12h day/night cycles. The rats were maintained on a ration containing commercial poultry feed (Vital feeds®, Jos, Nigeria) made up of 54% carbohydrate, 20% protein, 2% mineral, 10% fibre, 1% vitamin and 13% fat; and water *ad libitum*. Rats divided into two sets of 20 each plus 5 (control group). Set A: morning oral administration and Set B: morning and evening oral administrations. Each group was administered 0.00, 200, 400, 800, and 1600mgkg⁻¹ body weight of aqueous leaf extract for 14 days orally.

Blood Sample and Biochemical Parameter Analysis

Animals were sacrificed and blood samples were collected for biochemical analyses. The blood samples collected were allowed to clot at room temperature and centrifuged to obtain sera. Serum Alanine Transaminase (ALT) and Aspartate Transaminase (AST) were determined using Randox Kit by standard

methods of Reitman and Frankel (1957). Alkaline Phosphatase (ALP) activity was estimated by the Randox Kit (colorimetric) of Rec (1972). Urea (Randox assay kit) was determined by Weatherburn (1967) and creatinine (Randox assay kit) analyzed by the method of Bartels and Bohmer (1972).

Statistical Analysis

Values for liver and kidney functions (mean±S.E.M) in set A and B rats were determined by one-way ANOVA using InStat3 statistical software for windows 2003.

RESULTS

The result of the qualitative phytochemical screening of the *Ficus sycomorus* aqueous leaf extract is presented in Table 1. The results of serum activities of ALT, AST and ALP; and levels of urea and creatinine in rats following respective oral administration of aqueous leaf extract of *Ficus sycomorus* for both sets: Set A morning oral administration (i.e., once daily administration) and Set B morning and evening oral administration (i.e., twice daily administration) for a period of 14 days did not show any significant difference; except in ALP and urea at higher doses of the extract (Tables 2 and 3).

Table 1: Qualitative phytochemical contents of *Ficus sycomorus* leaf aqueous extract.

Phytochemical	Present/Absent
Alkaloids	+
Tannins	+
Saponins	+
Flavonoids	+
Reducing Sugar	+

+ = present and □ = absent.

Table 2: Serum activities and levels of liver and kidney functions indices in rats administered once daily with *Ficus sycomorus* leaf extract for 14 days

DOSAGE (mgkg ⁻¹ b.w.)	ALT (U/L)	AST (U/L)	ALP (U/L)	UREA (mg/dL)	CREATININE (mg/dL)
0.00	8.75±0.06 ^a	9.49±0.01 ^a	96.71±0.77 ^a	10.88±0.06 ^a	0.52±0.02 ^a
200	8.98±0.13 ^b	9.50±0.77 ^b	98.50±1.84 ^b	12.50±0.29 ^b	0.52±0.02 ^b
400	9.40±0.23 ^c	9.58±0.67 ^c	105.75±0.40 ^c	15.20±0.01 ^c	0.54±0.02 ^c
800	9.85±0.04 ^d	10.00±0.11 ^d	128.50±1.96 ^a	28.00±0.21 ^a	0.65±0.02 ^d
1600	10.78±0.31 ^e	11.50±0.10 ^e	148.00±0.77 ^a	41.20±0.09 ^a	0.86±0.01 ^e

Values are mean ± standard error of the mean (SEM); b.w. = body weight. Values in the same column with different superscript are considered not significant.

Table 3: Serum activities and levels of liver and kidney functions indices in rats administered twice daily with *Ficus sycomorus* leaf extract for 14 days

DOSAGE (mgkg ⁻¹ b.w.)	ALT (U/L)	AST (U/L)	ALP (U/L)	UREA (mg/dL)	CREATININE (mg/dL)
0.00	8.75±0.06 ^a	9.49±0.01 ^a	96.71±0.77 ^a	10.88±0.06 ^a	0.52±0.02 ^a
200	8.99±0.08 ^b	9.92±0.05 ^b	110.00±0.82 ^b	13.20±0.16 ^b	0.55±0.02 ^b
400	9.46±0.07 ^c	10.15±0.05 ^c	122.50±3.10 ^a	16.10±0.09 ^c	0.58±0.02 ^c
800	10.33±0.10 ^d	11.32±0.09 ^d	149.50±0.31 ^a	30.25±0.24 ^a	0.72±0.02 ^d
1600	12.02±0.12 ^e	12.75±0.09 ^e	175.80±0.45 ^a	53.38±0.17 ^a	1.03±0.03 ^e

Values are mean ± standard error of the mean (SEM); b.w. = body weight. Values in the same column with different superscript are considered not significant.

DISCUSSION

Diseases represent a critical problem to human health and are one of the main causes of morbidity and mortality worldwide (Hassan *et al.*, 2007). Oral administration of aqueous leaf extract of *F. sycomorus* at dosage (1600mgkg^{-1}) to Wistar albino rats of set B twice per day showed that animals experienced reduced feed and water intake. This may either be attributed to the twice heavy load of the aqueous leaf extract which subside their hunger or the presence of phytochemicals which depressed their appetite when present in high concentration in the extract. The presence of flavonoids and tannins in extracts has been reported to be of importance in the management of some ailments such as acting as an analgesic and anti-inflammatory agent (Ahmadiani *et al.*, 1998; 2000). Antimicrobial activities of tannins and flavonoids of *Allium cepa* (Izo *et al.*, 1995) and *Thymus serpyllum* (Janssen *et al.*, 1987) have been reported. By limiting fluid losses and by preventing external aggressions, tannins also enhance tissue regulation in case of superficial wounds or burns (Evans, 1989; Izo *et al.*, 1995). Hence, the stem bark extract of *F. sycomorus* is used traditionally to treat fungal disease in northern Nigeria (Hassan *et al.*, 2007).

Biochemical knowledge revealed that tissue damage is usually associated with the increased release of enzymes from the affected organ or tissue into circulation. Moreover, tissue enzymes assay can also indicate tissue cellular damage long before

structural damage is revealed by some other convectional techniques (Hassan *et al.*, 2007). Measurement of the activities of various enzymatic and non-enzymatic indices in tissues and body fluids play a significant and well-known aid in disease investigation and diagnosis. Mean serum activities of ALT and ALP did not show any evidence of liver injury which is in line with the report of Benichou (1990) and Andrade *et al.* (2007), who reported that liver injury occurs when there is three times and twice rises of the upper limit of normal of ALT and ALP respectively. So, within the therapeutic doses of this study, aqueous leaf extract of *F. sycomorus* had not resulted in significant change in hepatorenal cellular indices at any of the concentrations given to both set A and B Wistar rats.

CONCLUSION AND RECOMMENDATION

Oral administration of aqueous leaf extract of *F. sycomorus* may be non-toxic within the dose-range in this study based on the no significant difference observed in the activities of ALT, AST, and ALP; And levels of urea and creatinine between control and test groups. However, it is recommended that further study should be carried out on the extract long term effect on hepatorenal indices at higher doses.

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