



Journal of
**Pharmacology and
Toxicology**

ISSN 1816-496X



Academic
Journals Inc.

www.academicjournals.com

Effects of Aqueous Suspension of the Root of *Hyphaene thebaica* (L.) Mart on Some Indicators of Liver and Kidney Function in Rats

H. Zanna, S. Adeniji, B.B. Shehu, S. Modu and G.M. Ishaq
Department of Biochemistry, College of Medical Sciences, University of Maiduguri,
P.M.B. 1069, Maiduguri, Nigeria

Abstract: The effect of crude aqueous suspension of the root of *Hyphaene thebaica* (L.) mart on some indices of liver and kidney function in rats were studied. Sixteen white albino rats of wistar strain were divided into 4 groups of 4 rats each. Groups 1, 2 and 3 were administered daily orally by intubation, 0.25, 0.5 and 1.0 g kg⁻¹ body weight of the aqueous suspension of the root respectively while group 4 served as control and was given 0.0 g kg⁻¹ body weight. All the rats were kept under normal breeding condition and fed with normal diet (sanders seepc Nig. Ltd., Nigeria) and water *ad libitum* for 4 weeks. Results revealed a dose-dependent increase in body weight compared to the control. There was also no statistically significant ($p < 0.05$) change in the levels of alanine aminotransferase (ALT), Total protein, urea, potassium and chloride ions in the treatment groups while aspartate aminotransferase (AST), globulins and triglyceride levels showed a significant ($p < 0.05$) increase in the groups administered 0.5 and 1.0 g kg⁻¹ body weight. However, levels of cholesterol, albumin and sodium ions decreased and that of creatinine increased significantly ($p < 0.05$) in all the groups compared to the control. Levels of total lipids showed no alteration. Hence, results revealed that aqueous root suspension of the plant could be hyponatremic, hypocholesterolemic, hepato and nephrotoxic.

Key words: *Hyphaene thebaica* (L.) mart, hyponatremic, hepatotoxic, hypocholesterolemic, nephrotoxic

INTRODUCTION

Medicinal plants and plant products are the oldest and tried health-care products. Their importance is growing not only in developing countries but in many developed countries.

Hyphaene thebaica (L.) mart is one of the plants used in ethnomedicine and belongs to the family palmae and subfamily Borassoideae. It grows commonly in both sahel and sahara regions of Africa (Vonmaydell, 1986). Locally, various extracts and decoction of hyphaene thebaica are used in the treatment of bilharzia, haematuria, hypertension and as a haematinic agent (Adaya *et al.*, 1977; Vonmaydell, 1986; Kamis *et al.*, 2003).

In recent study using ethanolic pulp extract of the plant, Kamis *et al.* (2000) reported that at high concentration, the plant is hypolipidemic, hepato and nephrotoxic. Modu *et al.* (2000-2001) using aqueous pulp extract of *Hyphaene thebaica* (L.) mart reported however that the extract was hypolipidemic but not toxic to both liver and kidney.

The major issues of concern as far as ethnomedicine is concerned are safety quality and efficacy. Thus the aim of this study is to investigate the effects of the aqueous root suspension of the plant on some indices of liver and kidney function in rats to establish safety or otherwise.

MATERIALS AND METHODS

Plant Material

The root of *Hyphaene thebaica* (L.) mart was obtained from within the campus of the University of Maiduguri, Maiduguri, Nigeria after the plant was authenticated by Dr. S.S Samusi, a plant taxonomist of the Department of Biological Sciences, University of Maiduguri.

Preparation of Suspension

The root of the plant was treated according to the method of Joslyn (1970). It was then dried in an oven for about six hours at 60°C followed by sun drying for days.

The dried roots was ground into fine powder using mortar and pestle. The powder was sieved through a 0.25 mm sieve (Endicott's test sieves Ltd., London, UK). Aqueous suspension was constituted by dissolving 5 g of the powdered root in 100 mL of distilled water and stored at low temperature. The suspension was shaken vigorously to obtain a homogenous mixture before administration.

Animals and Experimental Treatments

Sixteen white Albino rats of wistar strain weighing between 135-190 g were used for the experiment. The rats were divided into 4 groups of 4 rats each. Rats in group 1, 2 and 3 were administered once daily, by intubation, with single dose of 0.25, 0.5 and 1.0 g kg⁻¹ body weight of the suspension respectively for 4 weeks while rats in group 4 served as control and received 0.0 g kg⁻¹ body weight of the suspension. All the rats were kept under normal breeding condition at room temperature and were fed normal diet (Sanders seepc Nig. Ltd., Nigeria) and tap water *ad libitum*.

The rats were sacrificed 24 h after the last treatment, blood collected, allowed to clot and serum harvested by centrifugation.

Biochemical Analysis

Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were estimated by the colorimetric method of Reitman and Frankel (1957) while estimation of total protein (biuret method), chloride (titrimetric method) and globulins were done as described by Harold (1988). Estimation of albumin was according to the method of Doumas *et al.* (1982) while diacetylmonoxime and Jaffe reactions described by Kaplan *et al.* (1988) were used in assaying urea and creatinine levels, respectively.

Triglycerides were estimated using the colorimetric method of Jacobs and Van Denmark (1960) while total lipids and cholesterol were assayed according to the methods of Chaudhary (1989) and Richmond *et al.* (1973), respectively. Sodium and potassium ions were determined using Flame photometry.

Statistical Analysis

Test of significance of difference between treatment means was carried out by analysis of variance and means were calculated and compared by Duncan's multiple range test.

RESULTS

The average weekly body weight showed a dose dependent increase following the administration of the aqueous suspension. The 0.25 g kg⁻¹ body weight treatment showed a significant increase compared to the control and the body weight increased progressively as the doses were increased to 0.5 and 1.0 g kg⁻¹ body weight, respectively (Table 1).

The administration of the various doses of the root aqueous suspension of the plant did not produce any significant difference in the levels of alanine aminotransferase (ALT) when compared to the control. However, the groups administered 0.25 and 0.5 g kg⁻¹ body weight showed statistically significant (p<0.05) increase in the level of aspartate aminotranferase (AST) compared to the control while the 1.0 g kg⁻¹ body weight treatment group did not produce significant change in the activities of AST. Moreover, the levels of total protein remained unaffected. There was also a significant (p<0.05) decrease and increase in the levels of serum albumin and globulins, respectively. However, the increase seems to be dose dependent (Table 2).

Urea levels did not show any significant change following the administration. However, creatinine and cholesterol levels were significantly (p<0.05) increased and decreased respectively in all the groups compared to the control. Triglyceride levels were significantly (p<0.05) decreased in the group given 0.25 g kg⁻¹ body weight and increased in group given 1.0 g kg⁻¹ body weight compared to the control while there was no significant change in the levels of total lipids (Table 3).

Na⁺ levels were significantly lowered in the groups administered 0.25 and 1.0 g kg⁻¹ body weight compared to the control while there was no statistically significant change in the levels of K⁺ and Cl⁻ in all the groups compared to the control (Table 4).

Table 1: Effects of various doses of aqueous suspension of root of *Hyphaene thebaica* (L.) mart on average body weight in rats

Age (weeks)	Average body weight (g)			
	Group 1 0.25 (g kg ⁻¹)	Group 2 0.5 (g kg ⁻¹)	Group 3 1.0 (g kg ⁻¹)	Group 4 0.0 (g kg ⁻¹)
Zero	146	176	194	135
1	154	186	195	152
2	156	191	194	146
3	157	194	195	148
4	155	195	196	148

Table 2: Effects of various doses of aqueous suspension of root of *Hyphaene thebaica* (L.) mart on some indices of liver function in rats

Parameters	Treatment groups			
	Control	0.25 (g kg ⁻¹)	0.05 (g kg ⁻¹)	1.0 (g kg ⁻¹)
AST (IUL ⁻¹)	74.7±1.9*	96.9±15.8 **	117.50±6.8***	80.9± 3.2*
ALT (IUL ⁻¹)	71.7±2.9	45.0±5.9	46.10±0.1	73.8±4.1
Total protein (g L ⁻¹)	63.9±3.8	61.2±3.3	63.30±2.4	75.0±5.2
Albumin (g L ⁻¹)	55.9±4.1****	45.4±3.4*	44.00±2.2*	50.0±4.7**
Globulins (g L ⁻¹)	15.7±0.5*	17.5±0.9**	19.03±0.6**	21.9±0.6***

*: Significantly lower than ** and ***, **: Significantly lower than ***, Values are mean±SEM from 4 rats. Values with different superscript asterisk in the same horizontal row are significantly (p<0.05) different

Table 3: Effects of various doses of aqueous suspension of root of *Hyphaene thebaica* (L.) mart on some biochemical parameters in rats

Parameters	Treatment groups			
	Control	0.25 (g kg ⁻¹)	0.5 (g kg ⁻¹)	1.0 (g kg ⁻¹)
Urea (mmol L ⁻¹)	43.0±3.7	41.0±3.5	34.0±1.9	49.0±4.9
Creatinine (umol L ⁻¹)	39.0±4.2*	89.0±12.5***	59.0±4.2**	71.0±7.1***
Cholesterol (mmol L ⁻¹)	7.0±0.4***	3.1±0.3**	1.9±0.2*	3.4±0.9**
Triglycerides (mg mL ⁻¹)	9.7±2.4**	1.5±0.8*	9.3±0.9**	24.3±0.6***
Total lipids (g L ⁻¹)	3.5±0.08	4.0±0.03	3.7±0.4	4.0±0.04

*: Significantly lower than ** and ***, **: Significantly lower than ***, Values are mean±SEM from 4 rats. Values with different superscript asterisk in the same horizontal row are significantly (p<0.05) different

Table 4: Effects of various doses of crude aqueous suspension of root of *Hyphaene thebaica* (L.) mart on some electrolytes in rats

Electrolyte	Treatment groups			
	Control	0.25 (g kg ⁻¹)	0.5 (g kg ⁻¹)	1.0 (g kg ⁻¹)
Chloride (mmol L ⁻¹)	54.90±6.90	79.30±1.70	58.40±1.70	50.00±0.90
Potassium (mmol L ⁻¹)	0.08±0.004	0.09±0.004	0.08±0.004	0.08±0.004
Sodium (mmol L ⁻¹)	0.52±0.04**	0.42±0.03*	0.52±0.04**	0.40±0.04*

*: Significantly lower than **, Values are mean±SEM from quadruplicate determination. Values with different superscript asterisk in the same horizontal row are significantly (p<0.05) different

DISCUSSION

The results in Table 1 show a dose dependent increase in body weight gain in rats following the administration of the aqueous suspension. This suggests that the plant affects body weight and hence enhances nutrient utilization in rats.

The elevation in the levels of AST and globulins and a decrease in albumin is suggestive of liver damage. Elevation of AST levels is seen in patients with acute myocardial infarction, skeletal muscle damage, acute hepatic necrosis, intrahepatic cholestasis, post hepatic jaundice or cirrhosis while high globulin and low albumin levels is indicative of diseases with hypergammaglobulinemia and includes the myeloproliferative diseases such as multiple myeloma etc. (Odotola, 1992; Gidado *et al.*, 2001). This result is consistent with earlier report by Kamis *et al.* (2000) where ethanolic pulp extract was used.

The increase in the levels of serum creatinine could be due to impaired urine formation or excretion, irrespective of whether the causes are prerenal, renal or postrenal in origin (Kaplan *et al.*, 1988; Gidado *et al.*, 2001).

The decrease in the levels of total cholesterol might be as a result of the presence of glycosides (saponins). Glycosides form complexes with cholesterol and bile in the gastrointestinal tract leading to reduced blood cholesterol levels (Milgate and Robert, 1995). This result is consistent with earlier report by Hetta and Yassin (2006) where different fractions of *Hyphaene thebaica* fruit were used. The decrease in triglycerides might be a result of increased lipolysis and oxidation of fatty acids into acetyl-coA molecules which could then be channeled into the synthesis of cholesterol. These results are also in agreement with the earlier report by Kamis *et al.* (2000) and Modu *et al.* (2000-2001) where ethanolic and aqueous pulp extracts were used, respectively.

The low sodium ion levels following the administration of the aqueous suspension could be due to dilution of serum sodium or total body depletion of sodium (Odotola, 1992).

CONCLUSION

Although the aqueous root suspension of the plant is hypolipidemic nonetheless it appears to be toxic to both liver and kidney. It is recommended that other parts of the plant and different medium of extractions be tried to ascertain safety.

REFERENCES

- Adaya, A.L., H. Bdliya, H. Bitrus, M. Fanjaji, D. Eaton, M.B. Gambo, M. Goggobe, A. Makinta, D. Okoli, A.D. Omoluabi, G. Polet, M. Salisu, S.S. Sanusi, M.T. Sach and M. Shuaibu, 1977. Hidden Harvest project. In: Research series, Compiled by IIED and HNNCP., 3 (3): 14-27, 47-53.

- Chaudhary, K., 1989. Total Lipids and Urea. In: Biochemical Techniques. Taypee and Bross, New Delhi, India, pp: 24-25 and 74-25.
- Doumas, B.T., W.A. Watson and H.G. Burgg, 1982. Bilirubin Total and Conjugated Modified Methods. In: Selected Methods of Clinical Chemistry, Faulker, W.R. and S. Mates (Eds.). Vol. 9, Washington DC., pp: 114.
- Gidado, A., J.Y. Bashirat, G.M. Gana, A.A. Ambi, M.A. Milala and H. Zanna, 2001. Effects of aqueous Extract of the seeds of *Datura stramonium* on some indices of liver and kidney function in Rats. Nig. J. Exp. Applied Biol., 2 (2): 123-127.
- Harold, S., 1988. Practical Clinical Biochemistry. CBS Publishers, New Delhi, India, pp: 132.
- Hetta, M.H. and N.Z. Yassin, 2006. Comparative studies on hypocholesterolemic effect of different fractions of *Thebaica* (doum) in experimental animals. Pharmazie, 61 (3): 230-232.
- Jacobs, N.J. and P.J. Van Denmark, 1960. Strategies for the prevention of coronary heart disease. Arch. Biochem. Biophys., 88: 25-225.
- Joslyn, M.A., 1970. Methods in Food Analysis. Academic Press Inc., New York, pp: 50-53.
- Kamis, A.B., S. Modu and P.Y. Markus, 2000. Some Biochemical effects of various doses of ethanolic pulp extract of *Hyphaene thebaica* (L.) mart in rats. Nig. J. Exp. Applied Biol., 1 (1): 33-36.
- Kamis, A.B., S. Modu, H. Zanna and T.A. Oniyangi, 2003. Preliminary biochemical and haematological effects of aqueous suspension of pulp of *Hyphaene thebaica* (L.) mart in rats. Biokemistri, 13: 1-7.
- Kaplan, L.A., L.L. Szabo and E.K. Opherin, 1988. Clinical Chemistry. Interpretation and Techniques. 3rd Edn. Lea and Febiger, Philadelphia, pp: 112-231.
- Milgate, J. and D.C.K. Robert, 1995. The nutritional and Biological significance of saponins. Nutr. Res., 15: 1225-1225-1249.
- Modu, S., A.B. Kamis and P.Y. Markus, 2000-2001. Some Biochemical effects on aqueous pulp extract of *Hyphaene thebaica* (L.) mart determination in rats. J. Life Environ. Sci., 2/3 (1): 139-143.
- Odutola, A.A., 1992. Rapid Interpretation of Routine Clinical Laboratory Test. S. Asekome and Company, Zaria, Nigeria, pp: 4: 26-28.
- Reitman, S. and S. Frankel, 1957. A colorimetric method for the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminase. Am. J. Clin. Pathol., 28: 56.
- Richmond, F.B., P. Roeschan, E. Bent, W.J. Grubber and P. Trinder, 1973. The hypolipidemic, clinical and laboratory practice Clin. Chem., 19: 1350-1356.
- Vonmaydell, H., 1986. Trees and Shrubs of Sahel: Their Characteristics and Uses. Eschborn, Germany, pp: 113-175.