



## **Preliminary biochemical and haematological effects of aqueous suspension of pulp of *hyphaene thebaica* (L) mart in rats.**

**A. B. Kamis, S. Modu, H. Zanna\* and T. A. Oniyangi**

*Department of Biochemistry, College of medical sciences, University of Maiduguri, Nigeria.*

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### **Abstract**

Some biochemical and haematological parameters were assayed in rats fed aqueous pulp suspension of *hyphaene thebaica* (L) mart. Sixteen white albino rats of the wistar strain weighing between 90-110g were grouped into four groups of four rats each. Group 1 served as control while groups 2, 3 and 4 were given 0.5g/kg, 1.0g/kg and 2.5g/kg body weight of the suspension by intubation and in addition maintained on growers mash (ECWA Feeds, Jos) and water ad libitum. The daily oral administration lasted for three weeks and the following biochemical and haematological parameters were assayed: blood glucose, urea, albumin, triglycerides, cholesterol, total lipids, total proteins, globulins, sodium, potassium and chloride ions, haemoglobin concentration, red and white blood cells counts, packed cell volume and platelet count. Results revealed a significant ( $p < 0.05$ ) decrease in the levels of triglycerides, cholesterol and total lipids in addition to total proteins and albumin compared to the control. Also the levels of potassium (K) and chloride (Cl) ions were significantly ( $p < 0.05$ ) decreased and increased respectively compared to control. There was also an increase in the levels of urea, haemoglobin (Hb) concentration, red blood cells (RBC) count and packed cell volume (PCV) compared to control. However, the suspension did not show any significant effect ( $p > 0.05$ ) on glucose, globulin, sodium ion, white blood cells and platelet counts. This study revealed possible hypolipidemic and haematinic potentials of the pulp suspension.

**Keywords:** *Hyphaene thebaica*, Toxicity, Aqueous pulp suspension.

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\*Correspondence Author, **E-mail** address: [zannahaasan@yahoo.co.uk](mailto:zannahaasan@yahoo.co.uk)

## INTRODUCTION

Phytochemical studies in medical research in recent times are the new frontiers, involving a whole lot of diseases such as cancer, hypertension, diabetes and gastrointestinal disorders.

Ethnomedical preparations are rapidly gaining acceptance and are patronised by the people, probably because of their accessibility and affordability. To complement the orthodox medicine in achieving the target goal of the World Health Organisations health care for all, the introduction of ethnomedicine into the main stream of the health care delivery has achieved tremendous success (Abdulraman 1992).

*Hyphaene thebaica* (L) Mart belongs to the family *palmae* and subfamily *Borassoideae*. This plant is commonly known as A doum palm which means permanence in allusion to the persistence of the tree under abnormal condition (Amin and Paleologu, 1973). In local medicine, *Hyphane thebaica* extracts are being used in the treatment of bilharzia, haematuria, bleeding especially after childbirth and also as a haematinic agent (Adaya *et al*, 1977; Von Maydell, 1986). The tree is found in countries such as Egypt, Senegal, Sudan, Central Africa, Nigeria, Tanzania and Mauritania (Walter, 1971).

In a similar study using ethanolic pulp extract of the plant, Kamis, *et al* (200) reported that at high concentration, the plant is hypolipidemic, hepatotoxic and nephrotoxic. However, Modu. *et al* (2000/2001) using aqueous pulp extract of *hyphaene thebaica* (L) Mart found the extract to be hypolipidemic but nontoxic to both liver and kidney. the aim of this study is to investigate the effect of various doses of the aqueous suspension on some

biochemical and haematological parameters in rats to establish safety or otherwise as well as its haematinic potentials.

## MATERIALS AND METHODS

### Plant material

The fruit of the plant was obtained from the Maiduguri Monday market. Maiduguri, Nigeria and was authenticated by Dr. S.S. Sanusi, a plant taxonomist in the department of biological sciences University of Maiduguri, Nigeria. A voucher specimen was deposited in the herbarium of the University.

### Preparation of suspension

The fruit was cleaned, debris removed and then separated into pulp and seed. The pulp was dried and ground into powder. The fine powder was sieved through a 0.25mm sieve (Endicott= s Test Sieves Ltd, London, UK). Aqueous suspension was made by suspending 10g of the powdered pulp in 100ml of distilled water and stored at low temperature.. The suspension was vigorously shaken to obtain a homogenous mixture before administration.

### Experimental animals and treatment

Sixteen white Albino rats of Wistar Strain weighing between 90 - 110g were used for the experiment. The rats were divided into four (4) groups of four (4) rats each. All rats were fed normal diet (ECWA feed, Jos) and water ad-libitum. Rats in group 1 were the control, groups 2, 3 and 4 were administered the aqueous suspension daily by intubation for three (3) weeks, with single dose of 0.5g/kg, 1.0g/kg and 2.5g/kg body weight respectively. The rats were kept under normal breeding condition at room temperature for the period of the study.

They were then sacrificed by decapitation twenty four (24) hours after the last treatment; blood was collected, allowed to clot, centrifuged at 3000g and serum harvested.

### **Biochemical Indices**

Blood glucose levels were determined by glucose oxidase method as described by Trinder (1969) and urea by the method of Marsh (1965). Estimation of albumin was done according to the method of Doumas et al (1982) and that of total proteins was according to the biuret method as described by Treitz (1970). Globulin was also determined using the method of treitz (1970). Triglycerides were estimated using the colorimetric method (Jacob *et al* 1960) and total cholesterol and total lipids were estimated according to the methods of Richmond *et al* (1973), and Chaudhary (1989) respectively Packed Cell Volume (PCV) was estimated according to the method of Cole (1974), while haemoglobin concentration was determined using the method of van Assendelf (1972). Red and White blood cells count were estimated using the methods of Schalm *et al* (1975) while platelets were determined according to the method of Pflanzner (1990). Electrolytes 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 Scheffe's multiple comparison.

## **RESULT AND DISCUSSION**

Table 1. Shows the effects of administration of the aqueous suspension of pulp of *Hyphaene thebaica* (L) Mart on some

biochemical parameters. The oral administration of the various doses of the aqueous suspension did not produce any significant difference in the levels of blood glucose and globulins compared to control. However total lipids, total cholesterol, total protein, Albumin and Triglycerides levels were significantly ( $p < 0.05$ ) reduced, while urea level was significantly ( $p < 0.05$ ) increased compared to control group respectively. Table (2) shows the haematological parameters. A significant increase ( $p < 0.05$ ) in haemoglobin concentration, red blood cell count as well as packed cell volume was observed compared to control groups; while the difference in white blood cells and platelet counts did not show any significant change ( $p > 0.05$ ) compared to control. The administration of the aqueous pulp suspension did not produce any significant change ( $p > 0.05$ ) in the level of sodium ion ( $\text{Na}^+$ ) but potassium ( $\text{K}^+$ ) and chloride ions ( $\text{Cl}^-$ ) were significantly ( $p < 0.05$ ) decreased and increased respectively when compared to the control group. The effect observed was dose dependent (Table 3). The results in Table 1 show hypolipidemic properties of the aqueous pulp suspension. This could be partly due to the presence of glycosides (Modu *et al* 2000). Saponins have been reported to form complexes with cholesterol and bile in the intestine thereby indirectly reducing the cholesterol level in the blood (Milgate and Robert 1995). The reduction of triglycerides level might be due to the decreased lipogenesis or increased lipolysis and subsequent oxidation of fatty acids into acetyl Co.A which could alleviate demand for the synthesis of cholesterol and bile acid (Modu *et al* 2000-2001). This result is consistent with earlier report by (Modu *et al* 2000-2001) and Kamis *et al* (2000) where aqueous and methanolic pulp extracts were used respectively. Treatments that lower blood lipid especially cholesterol levels have

Table 1. Effects of crude suspension of pulp of *Hyphaene thebaica* (L) mart on some Biochemical parameters in rats.

Parameters	Group 1 (0mg/kg)	Group2. (5.0mg/kg)	Group3 (1.0mg/kg)	Group4 (2.5mg/kg)
Glucose mmol/l	3.377±0.08	3.08±0.23	2.27±0.63	3.2±0.49
Urea mmol/l	4.97 ± 0.69 <sup>a</sup>	8.8± 3.3 <sup>b</sup>	8.13 ± 2.34 <sup>b</sup>	10.6 ± 2.25 <sup>b</sup>
Albumin g/l	45.25 ± 4.23 <sup>a</sup>	28.00 ± 3.27 <sup>b</sup>	28.25 ± 2.24 <sup>b</sup>	27.75 ± 2.05 <sup>b</sup>
Triglycerides mg/l	0.35 ± 0.4 <sup>a</sup>	0.23 ± 0.05 <sup>b</sup>	0.23 ± 0.05 <sup>b</sup>	0.20 ± 0.047 <sup>b</sup>
Cholesterol mmol/l	2.46 ± 0.9 <sup>a</sup>	1.25 ± 0.25 <sup>b</sup>	0.98 ± 0.13 <sup>b</sup>	1.91 ± 0.94 <sup>b</sup>
Total lipids mmol/l	4.98 ± 0.90 <sup>a</sup>	4.25 ± 0.74 <sup>b</sup>	3.35 ± 0.39 <sup>b</sup>	2.44 ± 0.49 <sup>b</sup>
Total protein g/l	68.80 ± 1.20 <sup>a</sup>	63.80 ± 2.30 <sup>b</sup>	61.40 ± 4.43 <sup>b</sup>	55.40 ± 2.14 <sup>b</sup>
Globulin g/l	23.55 ± 2.17 <sup>a</sup>	45.80 ± 3.38 <sup>b</sup>	32.15 ± 2.90 <sup>b</sup>	27.65 ± 65 <sup>b</sup>

Values with different superscript horizontally along a column significantly different. Each value represents the mean ± SD

Table 2. Effect of crude aqueous suspension of *Hyphaene thebaica* (L) Mart on some haematological parameters in rats.

Parameters	Group 1 (0g/kg)		Group 2 (0.5g/kg)		Group 3 (1.0g/kg)		Group 4 (2.5g/kg)	
	pre.	post.	pre.	post.	pre.	post.	pre.	post.
Hb (g/dl)	8.8±2.3	7.2±1.2	8.7±2.3	12±2.4	7.9±3	12.2±1.6	8.9±1.4	11±1.3
RBC(×10 <sup>6</sup> mm <sup>3</sup> )	3.5±2.0	3.8±00.3	3.6±20	5.1±0.7	4.1±2.3	5.1±1.0	4.5±2.1	6.6±.5
WBC (×10 <sup>3</sup> mm <sup>3</sup> )	5.9±0.9	6.0±0.9	7.4±1.4	7.6±1.9	8.1±0.9	6.7±1.3	6.6±1	9.1±1.4
PCV (%)	46.3±1.5	45.7±1.4	46±1.5	47.3±5.4	44.3±1.4	50.5±7	45.7±1.5	54.3±3
Platelets (×10 <sup>3</sup> )mm <sup>3</sup>	425.0±	425.0±	431.3±	421.3±	481.3±	493.8±	492.5±	457.5±
	49.80	49.80	87.50	57.50	58.60	56.77	91.42	57.51

Values are means ± SD. Values with different superscript horizontally along a column are significantly ( $p < 0.05$ ) different.

Table 3. Effect crude aqueous suspension of pulp of *Hyphaene thebaica* (L) Mart on some serum electrolytes in rats.

Parameters	Group 1(0g/kg)	Group 2 (0.5g/kg)	Group 3 (1.0g/kg)	Group 4 (2.5g/kg)
Sodium	110.5 ± 2.52	140 ± 0.00	123.5 ± 29.05	123.3 ± 22.53
Potassium	10 ± 0.00 <sup>a</sup>	2.58 ± 0.05 <sup>b</sup>	2.00 ± 0.57 <sup>b</sup>	2.3 ± 0.22 <sup>b</sup>
Chloride	67.5 ± 5.72 <sup>a</sup>	110.75 ± 0.96 <sup>b</sup>	91.00 ± 31.43 <sup>b</sup>	89.25 ± 23.79 <sup>b</sup>

Values with different superscript horizontally along a column significantly different. Each value represent the mean ± SD.

been reported to prevent myocardial infarction and cerebrovascular accidents (Lansky, 1993).

The increase in the levels of urea might be as a result of impairment of normal kidney function. Malfunction in the glomerular filtration results in the retention of substances including urea and this might be responsible for the high level of urea seen in this study. The statistically significant ( $p < 0.05$ ) decrease in the levels of total protein and albumin may be suggestive of impairment in the normal liver function. During liver damage, levels will be decreased because of impaired synthetic process in the liver (Debruin, 1976).

The significant decrease and increase respectively in the levels of potassium and chloride, ions is suggestive of an effect the aqueous suspension has on the permeability of the tissues.

The statistically significant increase ( $p < 0.05$ ) in the Hb concentration reported in this study with a corresponding increase in the red blood cells counts as well as the p.c.v, is suggestive of the haematinic nature of the plant. this strengthens the earlier report by Barnard *et al*, (1989). The administration of the aqueous suspension has degenerative effect on body tissues. It has also shown toxicity to the liver and kidney. this finding is consistent with earlier report by Kamis *et al* (2000); Modu *et al* (2000) . It may be concluded that the toxicity of the plant is not dose dependent on the medium (solvent) of extraction.

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