

EFFECT OF AQUEOUS STEM AND BARK EXTRACTS OF *HYPHAENE THEBAICA* (L) MART ON SOME HAEMATOLOGICAL PARAMETERS IN NORMAL WISTER STRAIN ALBINO RATS

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ABSTRACT

Background: Medicinal plants have long been effective in the treatment of many diseases in Asian communities and throughout the world and it also has a lot to offer in the treatment and prevention of many diseases such as anaemia. The effect of aqueous stem and bark extracts of *Hyphaene thebaica* (L) Mart on some haematological indices in normal albino rats were investigated. **Method:** Thirty five normal white albino rats were divided into seven groups of five rats each. Group one served as the control group, group 2, 3 and 4 served as the test groups for the stem extract and group 5, 6 and 7 served as the test groups for the bark extract to which oral intubation of 200mg/kg, 400mg/kg and 800mg/kg dosages of the extracts were administered. All the rats were fed with normal diet Vital feed Jos, Nigeria Ltd and normal water ad-libitum for 21 days and blood samples collected from the animals were assayed for haemoglobin, red blood cell count and white blood cell count. **Results:** The phytochemical screening of both extracts reveals the presence of saponins, carbohydrates, flavonoids and terpenoids. Haematological parameters showed significant ($p < 0.05$) decrease in haemoglobin and red blood cell at the dose of 800mg/kg of both extracts at first week of extracts administration when compared to the control group. However, significant ($p < 0.05$) increase was observed in second and third weeks. However, significant ($p < 0.05$) increase was observed compared to the control in white blood cell count throughout the duration of treatment (3 weeks). There was no effect in feed intake for the entire duration of treatment in all the groups. **Conclusion:** The aqueous stem and bark extracts of *Hyphaene thebaica* could boost immune system and may be useful in the management of anaemia.

Keywords: Stem, Bark, *Hyphaene thebaica*, Haematological parameters

INTRODUCTION

Plants and plant products are the oldest and tried health care product. Herbal preparations have been applied to boost wide range of primary health care delivery due to biochemical content of plant in Africa and other parts of the world.¹ Roots, seeds, fruits,

leaves, flowers, stem and bark of plants can all constitute herbal medicines. The medicinal values of these plants lies in there phytochemical components which produce definite and various physiological action on human body. Some of the most important of these components are alkaloids, flavonoids

and phenolic compounds.² Phytochemicals are extensively present at different level in various medicinal plants and used in herbal medicines to treat diverse ailment such as cough, hypertension, cancer, diabetes and various forms of bacterial infections.³ *Hyphaene thebaica* (L) Mart is a desert palm native to Egypt, Sub-Saharan Africa and West India. It is commonly called African doum palm.⁴ It belongs to the family of *Aracacea*. Various extracts of *Hyphaene thebaica* (L) Mart are used in the treatment of hypertension, bilharzias and as a haematinic agent.⁵ The aqueous extract of the doum fruit showed an antioxidant activity, this is due to their substantial amount of water soluble phenolic contents.⁶ The aqueous fruit pulp extract is used in the treatment of diabetes mellitus.⁷ This study investigated the effect of aqueous stem and bark extracts of *Hyphaene thebaica* (L) Mart on some haematological parameters in normal Wister strain albino rats.

METHOD

All chemical reagents and materials used were of analytical grade quality.

Collection of plant materials

The bark and stem of *Hyphaene thebaica* (L) Mart were obtained from University of Maiduguri and were identified by a plant taxonomist of the Department of Biological Sciences University of Maiduguri. The stem and bark were shade dried, ground with mortar and pestle and sieved using ordinary sieve into fine powder.

Preparation of extracts

Aqueous extracts were prepared by soaking 500g of the bark in 5litres of water and 500g of the stem in 10litres of water and left at room temperature for three hours. The extracts were filtered and then concentrated to dryness at temperature 35-40°C and the yields were 83.2g for stem and 45.8g for bark.

Experimental animals

Wister strain albino rats (120-200g) were used.

The animals were obtained from University of Maiduguri Department of Biochemistry animal house.

Experimental design

Effect of aqueous stem and bark extracts of *Hyphaene thebaica* (L) Mart on some haematological parameters were studied. Thirty five albino rats of Wister strain weighing 120-200g were used for the experiment. The rats were divided into seven groups of five rats each of which group 1 served as the normal control group, group 2, 3 and 4 were the test groups for the stem extracts and group 5, 6 and 7 were the test groups for the bark extract which were administered as once daily oral intubation of 200mg/kg, 400mg/kg and 800mg/kg body weight of stem and bark extracts for twenty one days (3 week). All rats were kept under breeding condition at temperature 37°C and were fed of intubation for three weeks before sacrifice and then the parameters were assayed for haemoglobin, red blood cell count and white blood cell count.

Statistical analysis

The data obtained were presented as Mean and Standard error of mean (Mean \pm SEM). Differences among mean were analysed using analysis of variance (ANOVA), by computer statistical software graphpad instat[®] (2003). Probability value (P Value) 0.05 was considered significant.

RESULTS

Phytochemical screening

The phytochemical screening of the aqueous stem and bark extracts of *Hyphaene thebaica* (L) Mart reveals the presence of carbohydrates, saponins, flavonoids and terpenoids.

Feed intake

The result showed no significant ($p > 0.05$) difference at 200, 400 and 800mg/kg body weight dosages of both the stem and bark extracts at first, second and third weeks of

extracts administration when compared to the control group.

Haemoglobin estimation

At 200mg/kg body weight dosages of both stem and bark extracts at first, second and third weeks of extracts administration, the results showed no significant ($p>0.05$) difference in haemoglobin concentration. At 400mg/kg, there was no significant ($p>0.05$) increase in Hb concentration observed in the groups administered both stem and bark extracts at first week of administration but significant increase ($p<0.05$) was observed (10.52±0.10 and 10.72±0.25 g/ml) respectively at second week. At third week, there was significant ($p<0.05$) increase in the group administered 400mg/kg body weight of the stem extract (12.16±0.27 g/ml) and no significant ($p>0.05$) increase in the group administered the same dosage of the bark extract. At 800mg/kg dosages of both stem and bark extracts, there was significant ($p<0.05$) decrease of Hb concentration (10.96±0.41 g/ml) noted at first week of administration compared with control group (12.72±0.18 g/ml), significant ($p<0.05$) increase was observed at second (10.40±0.20 g/ml) and third (11.16±0.34 g/ml) weeks of administration of the stem extract. However, there is a significant ($p<0.05$) increase in Hb concentration observed (10.32±0.50g/ml) at second week of bark extract administration. Surprisingly and no significant ($p>0.05$) difference was seen at third week when compared to the control group.

Red blood cell (RBC) count

The results showed no significant ($p>0.05$) difference in red blood cell count and at 200mg/kg body weight dosages of both aqueous stem and bark extracts at first, second and third weeks of administration when compared to the control group. At 400mg/kg body weight dosage, there was no significant ($p>0.05$) difference in RCC among groups administered both stem and bark extracts at

first and second weeks of administration. At third week however, there was significant ($p<0.05$) increase in RCC among the group administered with 400mg/kg body weight of the stem extract (11.24±0.26 /mm³) and no significant ($p>0.05$) difference (9.96±0.17/mm³) in the group administered 400mg/kg of the bark extract. At 800mg/kg dosage, there was significant ($p<0.05$) decrease in the group administered with the stem extract at first week (9.40±0.06/mm³) and paradoxically, there is no significant ($p>0.05$) difference in RCC at second week but there is significant ($p<0.05$) increase (11.80±0.20/mm³) at third week of stem extract administration. There was no significant RCC ($p>0.05$) differences in the group administered 800mg/kg dosage of the bark extract at first, second and third weeks of extract administration when compared to the control.

White blood cell (WBC) count

The result showed significant ($p<0.05$) increase in white blood cell (16160 ± 47.80 and 17160±106.66 /mm³) at 200mg/kg dosage of both stem and bark extracts respectively at first week of extract administration. At second week, there was no significant ($p>0.05$) difference in the group administered the stem extract and a significant ($p<0.05$) increase (16360±203.96 /mm³) in the group administered with the bark extract. However, there was no significant ($p>0.05$) difference at third week of extracts administration in both groups administered 200mg/kg dosage of stem and bark extracts. At 400mg/kg and 800mg/kg body weight dosages of both the stem and bark extracts, there were significant ($p<0.05$) increase in the groups at first, second and third weeks of extracts administration when compared to the control group.

Table 1. Phytochemical Constituent of Aqueous Stem and Bark Extracts of *Hyphaene thebaica* (L) Mart.

Test	bark extract	stem extract
1. carbohydrates		
General test- Molisch test	+	+
Barfoed	-	-
Free reducing sugar	+	-
Combined reducing sugar	+	-
Ketosis	+	+
Pentosis	-	-
2. Saponins		
Frothings	+	+
3. Flavonoids		
Shinoda	+	+
Ferric chloride	-	-
Lead acetate	-	-
Sodium hydroxide	+	-
4. Tannins		
Ferric chloride	-	-
Lead acetate	-	-
5. Alkaloids		
Dragendroff's reagent	-	-
Mayer's reagent	-	-
6. Terpenoids		
	+	+

Keys: + Presence _ Absence

Table 2. Effect of Aqueous Stem and Bark Extracts of *Hyphaene thebaica* (L) Mart on Feed Intake (Mean \pm SEM) in Normal Wister Strain Albino Rats for 21 Days (g/100/day).

Aqueous extracts (mg/kg)	Groups	Duration of treatment(weeks)		
		1	2	3
	Normal control	31.41 \pm 1.58	32.64 \pm 2.02	32.64 \pm 2.02
200	Stem	28.87 \pm 1.73	28.70 \pm 1.15	20.51 \pm 1.72
	Bark	31.02 \pm 1.98	31.27 \pm 2.48	29.10 \pm 1.17
400	Stem	27.61 \pm 0.40	26.32 \pm 1.20	23.33 \pm 6.77
	Bark	30.98 \pm 0.82	31.02 \pm 1.98	32.77 \pm 1.27
800	Stem	26.86 \pm 1.86	27.31 \pm 1.21	24.14 \pm 1.28
	Bark	33.71 \pm 1.33	32.97 \pm 1.71	33.52 \pm 2.19

n=5

Table 3: Effect of Aqueous Stem and Bark Extracts of *Hyphene thebaica*(L) Mart on some Haematological Parameters in Normal Wister Strain Albino Rats for the Three Weeks of Extracts Administration

(mg/kg)	Haemoglobin (g/ml)			Red blood cell count (/ mm ³)			White blood cell count (/ mm ³)		
	1 st week	2 nd week	3 rd week	1 st week	2 nd week	3 rd week	1 st week	2 nd week	3 rd week
Normal control	12.72±0.18	9.38±0.24	10.00±0.17	10.56±0.11	10.28±0.24	10.12±0.13	15600±137.84	15160±74.80	12760±74.83
Stem	1.36±0.33	8.80±0.40	10.04±0.07	10.12±0.24	10.00±0.44	10.76±0.24	16160±74.80*	15340±107.70	12480±48.99
Bark	11.88±0.24	9.92±0.18	10.18±0.14	10.36±0.29	9.44±0.47	10.28±0.24	17160±106.66*	16360±203.96*	12520±48.99
Stem	11.68±0.41	10.52±0.10*	12.16±0.27*	9.52±0.10	9.64±0.07	11.24±0.26*	16440±160.00*	16600±89.44*	14640±46.97*
Bark	11.28±0.10	10.72±0.25*	10.28±0.04	10.04±0.31	10.92±0.13	9.96±0.17	17360±67.82*	16480±101.98*	13520±48.99*
Stem	10.96±0.41*	10.40±0.20*	11.16±0.34*	9.40±0.06*	9.16±0.24	11.80±0.20*	17560±67.82*	16480±48.99*	14480±48.99*
Bark	10.40±0.37*	10.32±0.50*	10.22±0.11	9.52±0.32	10.12±0.20	9.72±0.04	18360±97.98*	16860±77.76*	14720±48.99*

DISCUSSION

Medicinal plants form the background of medical practice in most developing and some developed countries of the world. However, despite the increasing popularity of herbal treatment, the safety and effectiveness of alternative medicines remain largely unknown. Some are blighted with problems of multiple organ toxicity.⁸ The administration of aqueous stem and bark extracts of *Hypheane thebaica* at the limit dose of 200mg/kg body weight orally to Wister albino rats did not cause death in the treated animals, hence the lethal dose (LD₅₀) of the extracts were not calculated. Researchers reported that substance with lethal dose of 50-500mg/kg body weight are regarded as highly toxic, those with lethal dose of 500-1000mg/kg body weight are moderately toxic and those with lethal dose above 1000mg/kg body weight are regarded as being of low toxicity and therefore relatively safe to be applied for treatment.⁹ Administration of 200mg/kg, 400mg/kg and 800mg/kg body weight of aqueous extracts of both stem and bark of *Hypheane thebaica* (L) Mart showed no significant ($p>0.05$) difference on feed intake, this may be due to the absence of tannin in both the stem and bark extracts. Decrease in feed intake was observed at higher dose of 800mg/kg of the methanolic fruit pulp extract of the same plant this may be due to tannin content of the methanolic fruit pulp extract of the plant.¹⁰ Medicinal plants such as *Aegel marmelos*, *Carissa congesta*, *Eugenia jambolana*, *Ficus carica*, *Pheonix sylvestris*, *Phyllanthus emblica*, *Vitus vinefera* and *Moringa oleifera* experimentally tried on rats have been found to significantly increase haematological parameters.^{11,12}

Orally administered aqueous stem and bark extract of *H. thebaica* at various dosages for the period of three weeks significantly ($p<0.05$) increased various haematological parameters. Dosages of 400mg/kg and 800mg/kg of each of

both stem and bark extracts of *Hypheane thebaica* showed significant ($p<0.05$) increase in haemoglobin and red blood cell count, however there was significant ($p<0.05$) increase in white blood cell at first week of extract administration at dosage 200mg/kg, 400mg/kg and 800mg/kg body weight of both stem and bark extracts. Increased in the level of these haematological parameters observed could be as a result of saponins and flavonoids as exhibited by seeds and crude mesocarp on Wister albino rats.^{13,14} The most significant function of red blood cell is to transport oxygen. Haemoglobin carries oxygen from the lungs to other tissues of the body.

In this study, increased in some haematological parameters especially white blood cell count is an indication of stimulatory effect of both stem and bark extracts. The presence of leucocytosis could explain the ability of aqueous stem and bark extracts of *Hypheane thebaica* to improve immunity and can help fight infections. Increase in red blood cell count and haemoglobin concentration is an indication of the extract having a haematinic effect, thus increasing oxygen carrying capacity to the tissue and carbon dioxide transport capacity from tissue to the lung. The presence of some important plant chemicals that improves haematological parameters have been reported in plants such as *Viscum album* (mistletoe) and others commonly prescribed plant extracts.^{15,16}

CONCLUSION

The increase in haematological parameters resulting from the effect of aqueous stem and bark extracts of *Hypheane thebaica* (L) mart might be due to the presence of flavonoids and saponins. Therefore, it may be used in the management of anaemia and some infections.

REFERENCES

1. Elujoba A.A, Odeleye.O.M, Ogunyemi.C.M. Traditional medicine development for medicinal and dental health care delivery system in Africa. *Afr J Trad Compl Alt* 2005;2: 46-61.
2. Shariff, Z.U. Modern herbal therapy for common ailment. Nature pharmacy series. Volume 1, spectrum books limited Ibadan Nigeria. In association with safari books limited UK 2001: 9-84.
3. Di Carlo, G., Autore. G., Izzo. A.A., Maichino.P, Mascola.N. Inhibition of intestinal motility and secretion of flavonoids in mice and rats: structure activity relationship. *J Pharmacol* 1993; 45:1054-1059.
4. Dosumu, O.O., Nwosu. F.O, Nwajo.C.J. Phytochemical screening and antimicrobial studies of extracts of *Hyphaene thebaica* (L) Mart *Palmae*. *Int J Trop Med* 2006;1(4):186-189.
5. Adaya. A.L., Bdliya. H., Fanjaji.M., Eaton. D., Gambo. M.B., Goggobe. M et al. Hidden harvest project in research series compiled by H. ED and HNNCP 1977;3:14-53.
6. Hsu, .B., Conpa.I.M and Ng. K. Antioxidant activity of hot water extract from the fruit of the doum palm, *Hyphaene thebaica*. *Food chemistry* 2006; 98: 317-328.
7. Shehu, B.B.,Gidado.A and Buratai.L.B . Hypoglycaemic effect of extract of *Hyphaene thebaica*(L) Mart fruit pulp in normal and alloxan induced diabetic rats. *J Med Appl Biosc* 2014;6(1): 6-15.
8. Udem,.S., Obidike.R and Onyejekwe. O. Preliminary investigation into the acute and chronic ingestion of aqueous leaf extract of *Swietenia mahagoni* (Maliceae) in rats. *Aca J Compar Clin Path* 2012;21(5): 813
9. Clarke, E.G.C , Clarke.M.L. Veterinary Toxicology 1st edition BailliereTrindall, London 1977: 55-75.
10. Shehu, B.B.,Gidado. A., Buratai.L.B, Benisheikh.AAG. Sub-acute toxicity studies of methanol extract of *Hyphaene thebaica*(L) Mart fruit pulp on normal Wister albino rats. *Intl J Res* 2015; 2(6): 460-467
11. Alada, A.R. The haematological effect of *Telfairia occidentalis* diet preparation. *Afr Biomed Res* 2000;3:185-186.
12. Dina, O., Adedapo. A., Oyinloye.P., and Saba.A . Effect of *Telfariaoccidentalis* extract on experimentally induced anaemia in domestic rabbit. ,2000, Volume3, Pp 181-183
13. Sumanti, A, Kapoor.W. Influence of dietary iron on blood and haemoglobin concentration *Dietetics* 1986; 23: 257-261.
14. Auwal, M.S., Sanda. K.A., Mairiga .I.A., Lawan. F.A., Mutah. A.A., Tijjani. A.N., et al. The phytochemical, elemental and haematologic evaluation of crude mesocarp extract of albino rats. *Asian J Biochem* 2013;8(1): 14.
15. Bendich, A. Physiological role of antioxidant in the immune system. *Diary Science*. 1993;76: 2789-2794.
16. AL-Mamary, M. Antioxidant activity of commonly consumed vegetables in Yemen. *J Nutri* 2002;8: 179-189
17. Graphpad Instant . GraphPad version 3.00 for 95 2003, Graphpad software San Diego , California , U.S.A. www.graphpad.com