

Original Research Article

Anti anaemic and Nephrotoxic effect of Ethanolic Extract *Eremomastax speciosa*

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Abstract

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The ethanolic leaf extract of *Eremomastax speciosa* was evaluated for its anti-anaemic activity and its possible adverse effect on the kidney function of Wistar albino rats. The effect of ethanolic extract on haemoglobin concentration, red blood cell count, packed cell volume, white blood cell count and platelet count was investigated. The extract 100 – 300 mgKg⁻¹ demonstrated antianaemic property by significantly ($p < 0.05$) increasing the levels of red blood cell count, haemoglobin level, packed cell volume and white blood cell counts of treated animals. The ethanolic extract of the plant also indicated no adverse effect on the kidney function by non-significantly increasing serum creatinine and urea levels.

Keywords: Anti-anaemic, Extract, Haemoglobin, Nephrotoxic, Platelet Counts

INTRODUCTION

The use of botanicals for the management of health problems dates back to the origin of man. It is widely known in ethnomedicine that the parts of a plant or the whole plant can possess healing properties (Imaga, 2010). The growing sophistication in life style among the world's population makes it imperative to refer to herbal practice as alternative medicine to appeal to a cross section of people irrespective of their cultural affiliation. Two-third of the population in the developing countries rely solely on herbalism as their primary form of health care (Oggbunugafor, 2008). The use of ethnomaterials cannot fade out in the treatment and management of an array of diseases in the African continent (Elujoba *et al.*, 2005). This was attributed to Africa's socio-cultural, socio-economic heritage, lack of basic health and personnel to take charge of every nook and cranny of the continent's rural areas.

The bioactive ingredients that have the therapeutic activity in plants used in traditional practice are mostly unidentified and traditional healers believe in holistic nature of their treatment. Although there have been spattering of individual research attempts to investigate the phytochemical composition of medicinal plants in Nigeria, efforts have remained just that: the research

efforts of individuals, rather than a concerted, sponsored effort generated by the federal and state government for official use (Etuk, 2010). There is paucity of sufficient information to collate a national or even state wide standardized data bank of medicinal plants.

Anaemia is perhaps one of the worst health problems affecting a large population in the world today. It is present in about 25% of the world's population (WHO, 2008). It has been estimated that about 245 million children between the ages of 0-59 months are anaemic in the world (Sanghvi *et al.*, 2007). The quest for naturally occurring compounds of plant origin that could benefit as antianaemic agents hence, our interest in this plants. *Eremomastax speciosa* belongs to the family of tropical plants called *Acanthaceae*, it is a perennial herb by habit commonly grown on forest farmlands (Heine, 1996). *Eremomastax speciosa* is locally called *edem iduodut* or *ndadad edem* in Ibibio land.

Enquiry from herbalist revealed that this plant is used to treat anaemia, the root extract is taken as enema in the management of spleen problems. The leaf juice when mixed with egg and drink is believed to treat diabetes. Decoction of the plant is also thought to be potent in the treatment of internal heat especially in pregnant women.

Table 1a. Effect of leaves extract of *E. Speciosa* on red blood cell Count (RBC), haemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and Mean corpuscular haemoglobin concentration (MCHC)

Group	RBC x 10 ⁶ (μL)	Hb (g/dL)	PCV (%)	MCV (fL)	MCH (pg)	MCHC (g/dL)
I	7.1 ± 0.17	13.0 ± 0.19	45.2 ± 0.90	62.6 ± 1.16	16.4 ± 0.40	28.8 ± 0.48
II	6.9 ± 0.07	12.7 ± 0.32	40.8 ± 0.20	57.4 ± 1.70	13.3 ± 0.56	31.1 ± 0.26
III	7.4 ± 0.19	13.0 ± 0.14	45.0 ± 2.84	61.1 ± 2.48	17.3 ± 0.39	28.3 ± 0.77
IV	8.3 ± 0.20	13.9 ± 0.91	49.5 ± 3.23	61.5 ± 5.40	17.4 ± 0.54	28.2 ± 0.62
V	7.7 ± 0.51	13.3 ± 0.00	46.0 ± 0.00	60.1 ± 1.87	17.3 ± 0.52	28.6 ± 0.60
VI	7.6 ± 0.03	13.3 ± 0.00	43.0 ± 2.43	59.8 ± 1.89	17.3 ± 0.35	29.7 ± 0.28
VII	7.6 ± 0.01	13.3 ± 0.16	46.9 ± 3.03	59.5 ± 1.89	17.3 ± 0.28	29.6 ± 0.42

Values expressed as mean ± S.E.M, N= 5

Table 1b. Effects of leaves extract of *E. speciosa* on white blood cell count (WBC), lymphocyte (LYM), neutrophil (NEUT) and platelet count (PLT) of Wistar albino rats

Group	WBC x 10 ³ (μL)	LYM (%)	NEUT (%)	PLT x 10 ³ (μL)
I	12.1 ± 1.23	94.4 ± 2.30	6.7 ± 1.48	925 ± 169.8
II	10.9 ± 0.64	91.1 ± 0.42	4.0 ± 0.97	699 ± 35.0
III	13.2 ± 0.35	93.7 ± 1.72	4.5 ± 2.93	987 ± 13.3
IV	15.2 ± 3.20	94.6 ± 2.38	6.0 ± 1.30	1009 ± 0.10
V	14.4 ± 2.80	93.9 ± 1.29	6.1 ± 0.57	1080 ± 2.20
VI	11.5 ± 2.40	91.7 ± 1.38	7.7 ± 0.00	1188 ± 0.00
VII	15.0 ± 1.59	91.7 ± 1.38	8.3 ± 0.00	1021 ± 0.00

Values expressed as mean ± S.E.M, N= 5

Table 2. Effect of leaves extract of *E. speciosa* on kidney function parameter

Group	Creatinine (mg/L)	Urea (mg/dL)
I	0.78 ± 0.11	21.9 ± 3.25
II	0.87 ± 0.12	27.3 ± 9.00
III	0.90 ± 0.08	34.3 ± 7.81
IV	0.87 ± 0.07	23.9 ± 3.14
V	0.94 ± 0.06	31.3 ± 3.28
VI	0.84 ± 0.11	24.5 ± 4.40
VII	0.86 ± 0.02	34.2 ± 5.91

Values expressed as mean ± S.E.M, N= 5

Aerial parts of this plant are used in the treatment of irregular menstruation and spurious labour pains. The leaves are also used to treat fracture, hemorrhoids and urinary tract infection (Adjanohoun, 1996; Oben, 2006). The aim of this research is to evaluate the anti-anaemic and effect of the leaves extract of *Eremomastax speciosa* on kidney function.

METHODS

The crude extract (0.4g) was reconstituted in 20% tween 80 before administering to Wistar albino rats. Thirty five animals were divided into seven groups of five animals each. Group I served as control, Group II was kept as

anaemic control, Group III administered with 0.37mL of reconstituted extract, Groups IV and V received 0.53 and 0.98 mL reconstituted extract respectively after seven days of induction of anaemia while Groups VI and VII which served as extract control was administered with 0.36 and 1.04 mL of extract respectively.

After seven days experimental period, the animals were sacrificed and blood samples collected by cardiac puncture into EDTA bottles for haematological test and plain tubes for serum creatinine and urea measurements.

Haematological Tests: Haematological evaluations were done using the automated haematology analyzer (Sysmex KT720).

Estimation of Serum Creatinine and Urea: Blood samples were collected into plain bottles and centrifuged

at 1600 rpm for 10 Mins. The serum was collected and the levels of creatinine urea estimated using the methods of Agappe (2004).

RESULTS AND DISCUSSION

The results of the effect of ethonolic extract of *E. speciosa* on anaemic indices, serum creatinine and urea of Wistar albino rats are presented in Tables 1 and 2. The result showed that there was improvement in haematological indices that are indicative of anaemia in tested groups ($p < 0.05$) when compared to the anaemic control.

It can be deduced from Tables 1 and 2 that the administered plant extract was able to alleviate induced anaemia in experimental animals. The world health organization (WHO, 2008), defines anaemia as haemoglobin levels less than 13 g/dL. Groups III and IV animals treated with 100 and 150 mg/Kg body wt of the extract respectively had a significantly increased haemoglobin levels ($p < 0.05$) when compared to the anaemic control group (II). Also, the increased RBC, PCV, MCH, and MCV in the extract treated groups when compared to both anaemic and normal control is an indication that the extract improved anti-anaemic indices in the experimental animals. This effect could be due to the presence of some phytochemicals in the plant extract. Alkaloids in plant have been reported to exhibit pharmacological effect on humans and other animals. Conine, an alkaloid is effective in preventing blood loss during cuts and also brings about blood clot (Clause *et al.*, 1971) while vinorelbine, melphelan and temozolomide are used in the treatment of induced anaemia (Falcone *et al.*, 1997). Anaemia is a major health problem in tropical region (Sanghvi, 2007), hence this ethnobotanical which is in abundance can be utilized as an alternative to available high cost orthodox supplement by the low income earners of the tropical rural communities. Additionally, the extract improved the WBC counts and its differentials suggesting immune boosting potentials of the phyto-extract.

Creatinine is a waste product from creatinine phosphate, since the production is continuous, the blood level fluctuate much, making creatinine an ideal substance for clearance test. Clearance value up to 75% of the average normal indicates adequate renal function (Vasudevan, 2007). The importance of creatinine clearance is in early detection of functional impairment of the kidney without overt signs and symptoms. The normal

range of creatinine in males is 0.7 – 1.4 mg/dL and 0.6 – 1.2 mg/dL in females (Agape, 2004). From the result presented in Table 2, the creatinine level of all the groups were within the normal range, indicating no functional impairment of the kidney by the extract. Also, elevated levels of urea are seen in renal disorders like glomerular nephritis nephritic syndrome while decreased levels are found in liver failure and pregnancy (Agappe, 2004). The normal range for adult is 10 – 50 mg/dL. This range was not exceeded by treated groups indicating no harmful renal or liver disorder.

CONCLUSION

Evaluation of the anti-anaemic property of *Eremomastax speciosa* was carried out in this research. Standard analytical methods were used to ascertain the potency of the plant extracts in managing anaemia. The results obtained showed improvements in key parameters indicative of anaemia such as the increased RBC, PCV, MCH, and MCV in the extract treated groups. The respective indices were lower in negative control groups. The extracts did not however exhibit harmful effects on the nephrons as key indicators of nephrotoxicity were within normal ranges of safety.

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