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THE EFFECTS OF AQUEOUS LEAF EXTRACT OF *Tridax procumbens* ON THE HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF WISTAR ALBINO RATS

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ABSTRACT

The effects of different doses of aqueous leaf extract of *Tridax procumbens* were evaluated in Wistar albino rats. The leaf extract of *T. procumbens* was administered orally for 14 days. Changes in the haematological and serum biochemical parameters were observed as indices of toxicity of the extract. The 100 and 400 mg/kg doses of the leaf extract of *T. procumbens* caused significant (P<0.05) decrease in the levels of the packed cell volume (PCV) (21.5±2.5 versus 37.3±1.5), and (20*±1.5 versus 37.3±1.5)%, respectively. The 100 and 400 mg/kg doses also significantly reduced haemoglobin concentration (Hb), (7.1*±2.4 versus 12±0.4)g/dl and (6.4*±12 versus 12±0.4)g/dl, respectively and red blood cell counts (RBC) (1.82*±0.11 versus 5.7±0.4) and (2.7±5.7 versus 5.7±0.4) respectively. These changes are reflected in the significant increase in the mean corpuscular volume for rats in the 100 and 400 mg/kg, suggesting that the aqueous crude extract of *T. procumbens* adversely affected the erythron of rats and may cause a normocytic normochromic anaemia in the animals consuming them. This study also revealed that the extract caused statistically significant (P<0.05) decrease in the level of circulating lymphocyte but significant (P<0.05) increase in the level of circulating neutrophil (41*±2.6 versus 25.7±3.9) at the doses of 400mg/kg b.w treatment group. The lymphopaenia (i.e. reduction in lymphocyte count) observed may indicate immunosuppression and the neutrophilia observed may imply inflammatory reactions and defense against microbial infections. The aqueous crude extract of *T. procumbens* leaf also caused a statistically significant (P<0.05) increase in the level of serum aspartate aminotransferase (AST) (2.81*±4.1 versus 30.3±14) and (27.8*±6 versus 220.3±14) respectively at two different dosages, i.e., at 100 and 400 mg/kg b.w. The elevation observed in the serum AST values may indicate haemolysis, which implies that the aqueous extract of *T. procumbens* caused anaemia in Wistar Albino rats and therefore has toxic potential.

Keywords:

INTRODUCTION

Tridax procumbens Linn belonging to the family Asteraceae, is a thin, crawling plant regarded as a weed, and is found in most parts of the world. In Nigeria, *T. procumbens* is widely used as feed in poultry and rabbitary. It is also used as medicinal plant. Many herbs and other variety of plants have been useful in the treatment of various medical ailments including cough, laryngitis, diarrhea, dysentry, hepatitis, plasmodiasis and helminthiasis. Such me-

dicinal plants include the following *Garcinia Kola* (Iwu and Igboko, 1982: Iwu 1985), *Tithonia diversifolia* (Fakunle and Abatan 2007), *Acalypha wikesiana* (Akinyemi *et al*., 2000). *T. procumbens* has been reported to promote wound healing in folk medicine, which includes excision, incision and dead space wound (Lee, 1968). Diwan *et al.*, (1989) also reported that the leaf extract of *Tridax procumbens* promotes normal and steroid - depressed wound healing.

T. procumbens is reported to induce significant reduction in volume of exudates and cell migration and is comparable to phenylbutazone and Ibuprofen, indicating a good anti-inflammatory property and having less severe ulcerogenic activity when compared with aspirin and phenylbutazone (Abad *et al*., 1996; Diwan *et al*., 1989).

Due to its wide usage as animal feed and also as a medicinal herb, the present study is designed to evaluate the haematological and serum biochemical effects of extract of the leaf of *T. procumbens* in Wistar albino rats.

MATERIALS AND METHODS

Twenty-four (24) healthy Wistar albino rats comprising of 12 males and females were used in the study. They were aged between 12 – 16 weeks and weighed between 150 – 250 grammes. They were maintained at the Experimental Animal House of The Faculty of Veterinary Medicine, University of Ibadan, Ibadan South Western part of Nigeria. They were fed rat cubes (Guinea Feeds Nigeria Limited), and allowed free access to clean fresh tap water.

Preparation of Leaf extracts

100 grammes of the fresh leaves of *T. procumbens* were harvested daily for preparation of the crude extract. The leaves were milled using an electric blender (Philip), for 20 minutes with the addition of 1000mls of water to ensure proper maceration. Thereafter, the solution was filtered using one clean whatman filter paper to the produce aqueous crude leaf extract of *T. procumbens*.

Experimental Design and Administration of Extract

The animals were divided into four groups A, B, C and D, each consisting of six (6) rats per group. The groups labelled A, B and C were administered with doses of 100, 200 and 400 mg/kg of the *T. procumbens* extract respectively while group D was administered with distilled water and served as control group. The crude aqueous extract was administered orally on a daily basis for 14 days using clean sterile stomach canula.

Sample Collection and Processing

Blood was collected by cardiac puncture from diethylether anaethesized rats, into heparinized and non-heparinized (for serum collection) bottles for haematological and serum biochemical studies respectively. PCV was assesed according to the method described by Schalm *et al.* (1975); RBC was determined by the haematocytometry method of Jain (1986), and the erythrocyte indices were obtained by calculation, using established formulae.

Total protein (TP) was determined by the Biuret reaction (Gornall *et al.,* 1949); the bilirubin concentration by diazo reaction (Jendrassi and Goff, 1938; Nosslin, 1960 and Michealson, 1961). Alkaline phosphatase (ALP), aspartate amino transferase (AST) and alanine amino transferase (ALT) were determined according to the improved methods by Sigma Diagnostics (Sigma Diagnostics, 1985).

Statistical Analysis

Results obtained are expressed as the mean ± standard error of the mean. Significant differences between mean values were determined by the student' t test (Bradford and Hill, 1991; Bailey, 1992).

RESULTS

Effect of crude extract of T. procumbens on haematological parameters of rats

The aqueous crude leaf extract of *T. procumbens* at the dose of 100 mg/kg of body weight (b.w.) and 400 mg/kg b.w. caused significant ($P<0.05$) reduction in the PCV (21.5*±2.5) and 20*±1.5) and haemoglobin (Hb) concentration (7.1*±2.4) and (6.4*±1.2) as well as RBC count (1.82*±0.11) and (2.7*±5.7), respectively) (Table 1).

The leaf extract caused a significant ($P<0.05$) increase in the values of mean corpuscular volume MCV the values of (126*±3.7 and 132*±2.6) at the dosage level of 100 and 400 mg/kg b.w., respectively.

The haematological analysis further revealed that the crude leaf extract of *T. procumbens* caused a significant ($P<0.05$) reduction in the level of the blood lymphocyte (59*±1.8) and an elevated circulating neutrophil (41*±2.6) at 400 mg/kg b.w. (Table 1)

Effects of crude extract of T. procumbens on serum biochemistry of rats

The crude extract of *T. procumbens* caused a significant ($P<0.05$) increase in the level of serum AST (281*±4.1) and (278*±6.0) ALP at 100 and 400 mg/kg b.w., respectively (Table 2).

DISCUSSION

The decrease in packed cell volume (PCV), haemoglobin concentration (Hb) and red blood cell count (RBC) caused by aqueous crude extract of *T. procumbens* leaf may suggest that the aqueous crude leaf extract of *T. procumbens* has adverse effect on the erythron of Wistar albino rats and may cause anaemia of normocytic normochromic and of the haemolytic type. (Guyton and Hall 1994).

The decrease observed in the lymphocyte counts caused by the administration of the extract of this plant signifies lymphopaenia which may suggest immuno-suppressive effect, because Abad *et. al.,* (1996), Diwan *et al.* (1989) and Forestieri *et. al.* (1996) reported that *T. procumbens* has a potent anti-inflammatory effect. It has been reported that the steroidal anti-inflammatory drugs produce their effects through inhibition of migration of lymphocytes and granulocytes into inflammatory sites (Meech; 1985). This implies that rats that are rigorously placed on *T. procumbens* diet might be susceptible to infections very easily.

The elevated level of AST in this study is an indication that it may have toxic effects

on parenchymatous organs and other non-hepatic cells of the body (Kaneko, 1980). This is evident in this study by the observed haemolysis of the red blood cells of the treated Wistar albino rats and supports earlier reports that serum AST increases when there is haemolysis. (Calson, 1996; Fakunle and Abatan, 2007) also reported anaemia due to haemolysis in rats placed on *Tithonia diversifolia*. These further lend credence to the observation that the crude aqueous extract of *T. procumbens* caused anaemia in Wistar Albino rats and therefore has toxic potential.

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Table 1: Effects of *T. procumbens* on haematological parameters of rats (Means ± Standard error of mean)

DOSAGES	PCV	HB	RBC	MCV	MCH	MCHC	WBC	LYMP	NEUT
100	21.5* ± 2.5	7.1* ± 2.4	1.82* ± 0.11	126* ± 3.7	38 ± 13	29.5 ± 1.5	7 ± 0.4	65.5 ± 11.0	34.5 ± 11.0
200	37.5 ± 0.4	11.6 ± 0.8	5.5 ± 2.4	95 ± 5.1	30.5 ± 17.5	31 ± 2.0	12.3 ± 0.8	73 ± 2.5	27 ± 2.5
400	20* ± 1.5	6.4* ±1.2	2.7* ± 5.7	132* ±2.6	10.0±2.5	32 ± 1.1	10.6 ± 1.8	59* ±1.8	41* ±2.6
CONTROL	37.3 ± 1.5	12 ± 0.4	5.7 ± 0.4	66.3 ± 4.7	21.3 ± 1.6	32.3 ± 0.4	9.35 ± 1.4	74.3 ± 3.8	25.7 ± 3.9

PCV = packed cell volume (%)
HB = haemoglobin concentration (g/dl)
RBC = red blood cell ($X10^6/mm^3$)
WBC = white blood cell ($X10^3/mm^3$)
LYMP = lymphocyte
NEUT = neutrophils
MCV = mean corpuscular volume (fl)
MCH = mean corpuscular haemoglobin (pg)
MCHC = mean corpuscular haemoglobin concentration (%)

Note: * = asterisked values in the table 1 are statistically significant at $P<0.05$.

Table 2: Effects of *T. procumbens* on serum biochemical parameter of rats (Mean ± Standard error of the mean)

DOSAGES	TB	ALP	AST	ALT	TP	ALB	TRIG	UREA	GLUC
100	0.35±0.1	822±141	281*±4.1	100±20	5.8±1.3	1.95±0.3	77±6.5	49±8.12	78±12
200	0.65±0.1	320±125	236±28	90±11.9	6.3±0	2.3±0.3	107±0	51±0	47±0
400	0.65±0.1	563±70.2	278*±6	106±70	6.95±0.2	2.85±0.3	96.5±14	52±5	89±18.50
CONTROL	0.47 ± 03	490 ± 113	220.3 ± 14	110.7 ± 7.2	6.53 ± 0.4	2.53 ± 0.1	97.67 ± 7.8	52.67 ± 7.8	78 ± 19.0

TB = total bilirubin (μm/L)

ALP = alkaline phosphatase (U/L)

AST = aspartate aminotransferase (U/L)

ALB = albumin (g/dl)

TP = total protein (g/dl)

GLUC = glucose (mg/dl)

TRIG = triglyceride (mg/dl)

UREA = urea (millimole/L)

Note : * = asterisked values in the table 2 are statistically significant at $P<0.05$.