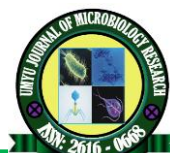




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Phytochemicals and Haematological Studies of Aqueous Crude Extract of Whole Plant of *Euphorbia heterophylla* Administered to Wistar Albino Rats

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Abstract

Changes in blood parameters are often triggered when toxic doses of plant extracts are administered to animals thereby calling for the haematological studies. Standard techniques were used for the phytochemical and haematological studies. Tannins, steroids, cardiac glycosides, flavonoids, alkaloids, terpenoids, phenols, reducing sugars and saponins were found in the aqueous crude extract obtained from *Euphorbia heterophylla*. Dosage increment of the aqueous extract from 10-600 mg/kgbw led to increments in all the haematological parameters (Total white blood cell, red blood cell, packed cell volume, red blood indices, platelets and differential white blood cell) checked in the blood of the experimental Wistar albino rat. The implication of this study is that the extract can be used as therapeutic agents and the haematological parameters were dose-dependent.

Keywords:

Aqueous extract, *Euphorbia heterophylla*, Haematological studies, Phytochemical, Wistar albino rats

INTRODUCTION

Access to good health and veterinary services are limited in developing countries (Nalule *et al.*, 2017). This therefore triggers researchers to search for new medicinal plants with therapeutic properties that can play vital and positive roles in the lives of the rural dwellers (Nalule *et al.*, 2017). *Euphorbia heterophylla* Linn (Spurge weed) is known locally in Nigeria as *egele* by the Igbos, *nono-kunchiya* by Hausas and *adimeru* by the Yorubas. Medicinal plant such as *Euphorbia heterophylla* Linn (Euphorbiaceae) contains phytochemicals that can effects therapeutic activities when used traditionally to treat viral warts, skin infections, tumours, diseases of viral origin, gonorrhoea, migraine, respiratory tract infection. It can also be used as a laxative. The latex is useful for treating

constipation, bronchitis and asthma conditions (Oso and Ogunnusi, 2017; Oloninefa *et al.*, 2018; Kone and Onifade, 2020; Wellington *et al.*, 2020; Elemo *et al.*, 2022). *E. heterophylla* is accessible, affordable and efficacious and as a result it is used in Uganda and other developing countries to effect the treatment of different diseases and constipation in livestock and man (Nalule *et al.*, 2013; Illamola *et al.*, 2020). It can also be used to feed pigs and rabbits and to treat helminthic conditions (Nalule *et al.*, 2013). Furthermore, the use and safety of aqueous extracts of whole plant of *E. heterophylla* and herbal medicine in general is very important in order to safeguard the lives of the users thereby calling for toxicological studies (Nalule *et al.*, 2017; Elemo *et al.*, 2022).

Haematological studies are very important as they reveal the health status of the animals when the plant extracts are administered (Etim *et al.*, 2014; Nalule *et al.*, 2017). Toxicological studies help to check the safety of administered drugs and likely effects they can have on the users (Arome and Chinedu, 2013; Saganuwan, 2017). Phytochemicals and haematological studies of aqueous extract from *E. heterophylla* administered to Wistar albino rats is the focus of this study.

MATERIALS AND METHODS

Samples Collection

The aqueous extract of the whole plant of *Euphorbia heterophylla* used for the study was obtained from the Microbiology Laboratory of Federal University of Technology, Minna.

Determination of the Phytochemicals

The phytochemical screening was determined as outlined by Trease and Evans (1989) and Harborne (1998).

Laboratory animals

The experimental Wistar albino rats comprising of males and females used for the study were obtained from Animal House of School of Life Sciences, Federal University of Technology, Minna where they were kept in a controlled environment (Temperature: 28°C ± 3°C and relative humidity: 45-50% ± 5%). The experimental rats were fed with pelleted diet once daily with supply of water *ad libitum* for 28 days. The rats were sacrificed on the 29th day (Olaniyan *et al.*, 2015).

Sub-Acute Toxicological Studies of Aqueous Extract

Sub-acute toxicological studies of the aqueous extract was carried out with little modifications

(Olaniyan *et al.*, 2015). The Wistar albino rats were divided into 4 groups (A-D) with each group comprising of four experimental rats to make a total of 16 rats. Using oral administration, three levels of doses involving low (10 mg/kgbw), mid (300 mg/kgbw) and high (600 mg/kgbw) of aqueous extract were administered to the four Wistar albino rats in each group A-D respectively along with control (2 ml/kgbw of normal saline). The rats were checked daily for any signs of toxicity during the experimental period that lasted for 28 days (Olaniyan *et al.*, 2015).

Dissection of Wistar Albino Rats

On the 29th day of the study, the rats were sacrificed after overnight fast of 8 hours. Diethyl ether was used to anesthetize the rats and the blood samples were collected by cardiac puncture and then stored into EDTA bottles for haematological studies (Olaniyan *et al.*, 2015).

Determination of Haematological Parameters

Haematological parameters such as red blood cell indices, differential white blood cell, haemoglobin concentration, mixed (basophils, monocytes and eosinophils), packed cell volume, red blood cell, white blood cell and platelets were determined using Perlong Medical FA 6000 Intelligent Haematological Analyzer.

RESULTS

Phytochemical Components of Aqueous Crude Extract

The aqueous crude extract of whole plant of *E. heterophylla* was found to contain phytochemicals such as: reducing sugars, alkaloids, tannins, saponins, cardiac glycosides, phenols, flavonoids, steroids and terpenoids (Table 1).

Table 1: Phytochemical Components of Aqueous Extract of Whole Plant of *Euphorbia heterophylla*

Phytochemicals Components								
Reducin g Sugars	Alkaloid s	Tannin s	Saponin s	Cardiac Glycoside s	Phenol s	Flavonoid s	Steroid s	Terpenoid s
+	+	+	+	+	+	+	+	+

KEY: + = Positive

Haematological Parameters of Aqueous Crude Extract Administered to Wistar Albino Rats

Table 2 shows the result of the haematological parameters. Haemoglobin concentration counts obtained ranged from 10.13-12.35 g/dl and the packed cell volume was from 31.00-37.00%. Mean cell volume had values that ranged between 46.25 and 57.50 Fi while that of mean cell hemoglobin ranged from 17.00-18.75 pg.

Furthermore, Table 2 reveals that the values of mean cell haemoglobin concentration ranged from 34.50-37.75 g/dl while that of the red blood cell count ranged from 5.78-7.05%.

The values obtained for platelet count were between 202.75 and 238.50% but the values obtained for total white blood cell count ranged from 6.98-6.93%. The values of the mixed (i.e. monocytes, eosinophils and basophils) ranged

between 20.50 and 28.25. Neutrophils values were between 15.50 and 33.00 while the lymphocytes values were between 45.25 and 56.25 (Table 2).

Table 2: Haematological Parameters of Aqueous Crude Extract Administered to Wistar Albino Rats

Treatments	Parameters									DWBCC (%)	
	MCV (Fi)	MCHC (g/dl)	HB (g/dl)	RBCC (%)	PCV (%)	MCH (pg)	TWBC C (%)	PLTC (%)	MIXED (%)	NT	LY
10 mg/kg bw AQEW	46.25± 1.30 ^a	36.50± 2.66 ^a	10.18± 0.48 ^a	5.78± 0.31 ^a	31.00± 1.00 ^a	17.50± 0.65 ^a	3.70± 0.47 ^a	202.75± 7.78 ^a	20.50± 7.90 ^a	24.50± 9.74 ^a	45.25± 9.72 ^a
EH											
300 mg/kg bw AQEW	47.50± 1.00 ^a	37.25± 1.31 ^a	12.08± 0.72 ^a	6.65± 0.81 ^a	35.75± 1.65 ^a	17.75± 2.42 ^a	3.88± 0.61 ^a	211.75± 49.82 ^b	23.25± 5.50 ^a	28.25± 10.78 ^a	48.25± 7.98 ^a
EH											
600 mg/kg bw AQEW	57.50± 7.51 ^b	37.50± 3.28 ^a	12.35± 0.88 ^a	7.05± 1.00 ^a	37.00± 2.97 ^a	18.75± 1.49 ^a	6.93± 1.80 ^b	238.50± 34.97 ^c	23.50± 3.23 ^a	33.00± 9.35 ^b	52.25± 9.96 ^a
EH											
2 mg/kg bw NS (Control)	49.75± 2.50 ^a	34.50± 2.02 ^a	10.13± 1.31 ^a	6.00± 0.66 ^a	31.00± 3.49 ^a	17.00± 0.58 ^a	1.98± 0.26 ^a	202.00± 36.82 ^a	28.25± 6.70 ^b	15.50± 6.59 ^a	56.25± 8.37 ^a

Results represent mean ± standard error of mean of triplicate determination. Values with the same superscript in the same column are not significantly different at p<0.05

KEY:

AQEW: Aqueous Extract of Whole plant of *Euphorbia heterophylla*; NS: Normal Saline; MCV: Mean Cell Volume; Concentration; MCHC: Mean Cell Haemoglobin Concentration; HB: Haemoglobin; RBCC: Red Blood Cell Count; PCV: Packed Cell Volume; MCH: Mean Cell Haemoglobin; TWBCC: Total White Blood Cell Count; PLTC: Platelet Count; DWBCC: Differential White Blood Cell Count; Mixed (Monocytes, Eosinophils and Basophils); NT: Neutrophils; LY: Lymphocytes

DISCUSSION

Phytochemicals (reducing sugars, alkaloids, steroids, flavonoids, terpenoids, cardiac glycosides, tannins and phenols) obtained from this study are in agreement with the studies reported by [Oloninefa et al. \(2018\)](#) in aqueous extract of whole plant of *E. heterophylla*. [Oyedum \(2022\)](#) and [Wadankar et al., \(2022\)](#) obtained similar results in the aqueous extract obtained from the stem and leaf of *E. heterophylla*. [Mamta et al. \(2013\)](#); [Mann and Kuta \(2014\)](#); [Abalaka et al. \(2016\)](#); [Oloninefa et al. \(2018\)](#) and [Wadankar et al. \(2022\)](#); [Mondal and Roy \(2022\)](#) reported that phytochemicals

have astringents, anti-inflammatory, anti-tumour, anti-depressant, anti-oxidant, antiseptic, anti-spasmodic, diuretics, antimicrobial, nutraceutical and healing properties that useful for the developing new drugs and treating diseases in both animals and in humans. In addition, [Ajuru et al. \(2017\)](#) said that phytochemicals have protective and disease preventive properties. [Mondal and Roy \(2022\)](#) and [Oyedum \(2022\)](#) reported that phytochemicals are beneficiary to man and in the manufacturing of antibiotics.

Furthermore, the increment recorded in all the haematological parameters as the doses were

increased aligned with the studies by Akomas *et al.* (2015) that had similar results because no harm was recorded in the blood of the animals used for the haematological studies. The increment in platelets and white blood cells agreed with the study by Akomas *et al.* (2015) that opined that white blood cells increase as a result of their defensive activities against injuries cause to tissue and by infectious agents. The counts obtained from the mixed cells, neutrophils and lymphocytes agreed with the study by Akomas *et al.* (2015) who obtained similar results.

CONCLUSION

The aqueous extract contained phytochemicals which are of great benefits to man. The values of the haematological parameters increased as

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