

## Effect of Ethanolic Extract of *Bryophyllum pinnatum* Leaves On Haematological Parameters of Albino Wistar Rats Exposed to Cadmium Chloride

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**Abstract:** This study was undertaken to investigate the effect of ethanolic extract of *Bryophyllum pinnatum* leaves on haematological parameters of male albino Wistar rats exposed to cadmium chloride. seventeen (17) male albino Wistar rats were divided into five (5) groups consisting of five (5) rats each: Those in groups 1 and 2 were labelled as normal and negative control respectively. Experimental animals from groups 2 to 5 were treated with groups 1ml of 26mg/kgbw of cadmium chloride for seventeen (17) days. Those animals in test groups (3, 4 and 5) were also treated with 1ml of 100 mg/kgbw, 200mg/kg/bwt and 300mg/kgbw ethanolic extract of *Bryophyllum pinnatum* respectively for twenty-one (21) days. After the exposure to CdCl<sub>2</sub> solution for 17 days. The result obtained showed that there was no significant increase ( $P>0.05$ ) in red blood cell (RBC), and PCV, non-significant while a slight decrease ( $P>0.05$ ) in HGB and MCHC parameters were observed for the animals in group 1 (the normal control group) compared to those in the negative control group (group 2). There was a significant increase in PLT in the negative control group compared to the normal and test group members. Therefore the plant extract has the potency of treating menorrhagia, haemorrhoids and hematemesis and can be employed after satisfactory pre and post-clinical screenings.

**Keywords:** Toxicity, cadmium, hemoorhoids, hematemesis treatment, *Bryophyllum pinnatum*.

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### 1.0 Introduction

Cadmium forms one of the heavy metal ions that are toxic, non-biodegradable and common in several ecosystems (Eddy and Ekop, 2005; Garg *et al.*, 2022). Several studies have linked the availability of cadmium ion in human systems to the growing rate of generation and disposal of cadmium-rich wastes and subsequent bioaccumulation and transfer

through the food chain or the consumption of contaminated drinking water (Eddy and Ukpong, 2005). Studies conducted by Andjelkovic *et al.* (2019) using experimental animals indicated that cadmium ions tend to cause tissue oxidative damage while the haematological and biochemical indices were unfavourably distorted. Mekkawy *et al.* (2011) also observed that cadmium ions induced free radicals in fishes, and affected the activities of alanine aminotransferase and aspartate aminotransferase in serum. Also observed were the enhancement of lipid peroxidation as well as the fragmentation of liver DNA, total lipid and serum glucose. Reduction in blood haemoglobin, red blood cell count, mean corpuscular volume and in serum protein was also observed. However, treatment with tomato paste and vitamin E revealed some positive results. Donmex *et al.* (2019) also found that quercetin exhibited a significant protective effect on some hematological parameters of rats exposed to cadmium ions. Similar changes were also reported by Demir and Oner (1995) who also observed the fragility of some cells in the experimental animals (rat) as a consequence of cadmium presence. Some plant extracts have been reportedly used to cushion the effect of cadmium toxicity in some animals such as rat. For example, Onwuka *et al.* (2010) found that cabbage extract can suppress the manifestation of cadmium toxicity in rat. It is known that not all plant extract can play protective roles against cadmium toxicity and that their chemical constituents have dominant roles in this direction. Therefore, the present study seeks to investigate the effect of ethanol extract of *Bryophyllum pinnatum* leaves on the haematological indices of Wister rats exposed to cadmium.

The major chemical constituents of *Bryophyllum pinnatum* leaves have been reported to include hexadecanoic acid, methyl ester, 10, 13-octadecadienoic acid, methyl ester, tetracosanoic acid, methyl ester, methyl stearate, cis-methyl-1-eicosenoate, docosanoic

acid and others (Asiwe *et al.*, 2021). Some useful functions of this plant have been reported. For example, Ekwumemgbo *et al.*, (2013) and Ojewole (2005) reported that the plant has a strong phytoremediation potential against heavy metal ions. Worobetz *et al.* (2005) reported the medicinal role of the plant leaves. The leaves of *Bryophyllum pinnatum* generally contain organic acids (Ojewole, 2005), hydrocarbons (Frim, 2006), phenolic compounds, flavonoids and sterols (Rajagopal and Sasikala, 2008). Bruneton (1995) examined the crude extract of the leaves and found them to have two or more of the common phytochemicals like alkaloids, tannins, phenols, glycosides and flavonoids.

## 2.0 Materials and Methods

### 2.1 Sample collection and preparation

Fresh leaves of *Bryophyllum pinnatum* locally called Ndodop were collected from Ndiya, a village located in NsitUbiom L.G.A of Akwa Ibom State, Nigeria. The leaves were identified by a Botanist at the Botany Department of the University of Uyo, Uyo, Akwa Ibom State, Nigeria with an identification number, Ekpo, UUH1481 (NsitUbiom). The leaves were washed and dried in shade at room temperature for seven weeks. The dried leaves were powdered by using a grinder. This was packed into a soxhlet column and extracted using 70% ethanol for 72 hours. The excess solvent was removed using a rotatory flash evaporator maintained at 45°C and the concentrate was further dried at the same temperature in an oven. After drying the extract was sealed in a 250 cm<sup>3</sup> beaker and stored in the refrigerator below 10°C until required for use.

### 2.2 Preparation of Cd ion

Based on the report, 88.0mg/kg body weight oral LD<sub>50</sub> for rats (Kotosonis, 1997 and Klaassen, 2009), 30% of the LD<sub>50</sub> (26.4mg/kg body weight) was weighed out using the mean body weight of the respective groups for each of the groups to be treated with cadmium chloride. Each of the cadmium chlorides was dissolved with 5ml of distilled water and 1ml

of the cadmium chloride was obtained from the well-mixed solution and administered to each of the rats in the treatment groups.

### 2.3 Experimental animals

Twenty-five male albino rats (75-139g), age 3 (three months old) were used throughout the experiment. The animals were procured from the animal house of the Department of Biochemistry, University of Uyo, Akwa Ibom State, Nigeria. Before initiation of the experiment, the rats were acclimatized in the Biochemistry Departmental animal house of Akwa Ibom State Polytechnic, IkotOsuru for 7 days in clean wooden cages before being used. Standard environmental conditions such as temperature ( $26 \pm 2^\circ\text{C}$ ), relative humidity (45 – 55%) and 12hrs dark/light cycle were maintained in the quarantine. All the animals were fed with commercial pelleted rat chow (purchased from IkotEkpene market, Akwa Ibom State), and water was allowed ad-libitum under strict hygienic conditions.

### 2.4 Experimental design

Twenty-five male albino Wistar rats (77-139 g), age 3 (three months old) were delivered to the animal house to be quarantined for the experiment. To study the haematological parameters in experimental rats exposed to cadmium chloride using an extract of *Bryophyllum pinnatum* leaves, grouping and dosing schedules in the rats were followed. Twenty (20) of these rats were exposed to cadmium chloride for 17 days. The animals were randomly distributed into five groups of five animals each.

The five groups were labelled as follows:

- a) **Group I:** Normal (control)
- b) **Group II:** Negative control (Rats treated with cadmium chloride)
- c) **Group III:** Rats were treated with cadmium chloride and 100 mg/kgbw of ethanol extract of *Bryophyllum pinnatum* leaves.
- d) **Group IV:** Rats were treated with cadmium chloride and 200 mg/kgbw of

ethanol extract of *Bryophyllum pinnatum* leaves

e) **Group V:** Rats were treated with cadmium chloride and with 300 mg/kgbw ethanol extract of *Bryophyllum pinnatum*. Group I was the normal control group, the rats were not treated with cadmium chloride but were given food and water without the extract for thirty-four (34) days.

Group II was the negative control group, the rats were exposed to cadmium chloride for seventeen (17) days and were fed with food and water without the extract for thirty-four (34) days.

Group III rats were with cadmium chloride for 17 days, in addition to food, water and 100 mg/kgbw of the extract for another 17 days.

Group IV rats were exposed to cadmium chloride for 17 days, and given food and water plus 200mg/kgbw of extract for another 17 days.

Group V rats were exposed to cadmium chloride for 17 days, and given food and water plus 300 mg/kgbw of extract for another 17 days.

The animals were properly fed twice a day and water was ad-libitum made available to all the treated animals in their cages.

### 2.5 Animal sacrifice and sera preparation

All the experimental animals were sacrificed 24 hours after the last administration of the extracts. They were starved 18 hours before the sacrifice.

#### 2.5.1 Procedure

A little knock was given to the rat on the head to daze it and this was placed on the dissecting board with pins fastened to its hands and legs to hold it to the board. Blood samples for sera preparation were collected by cardiac puncture into EDTA bottles for haematological analysis.

#### 2.5.2 Haematological test

Whole blood samples were used in the determination of Red Blood cells (RBC), Platelet (PLT), Haemoglobin (HGB), Packed Cell Volume (PCV), and Mean Cell

Haemoglobin Concentration (MCHC). An automated haematological analyser, 2016 model, number (SYSMEC XP 300) was used for the analysis of the haematological parameters.

### 3.0 Results and Discussion

The results of the effect of *Bryophyllumpinnatum* leaf extract on haematological parameters of male albino Wistar rats treated with cadmium chloride are shown in Fig I, which reveals that all the rats treated with the leaf extract showed a non-significant increase in the levels of RBC, PCV and for the decrease ( $P>0.05$ ) in HGB and

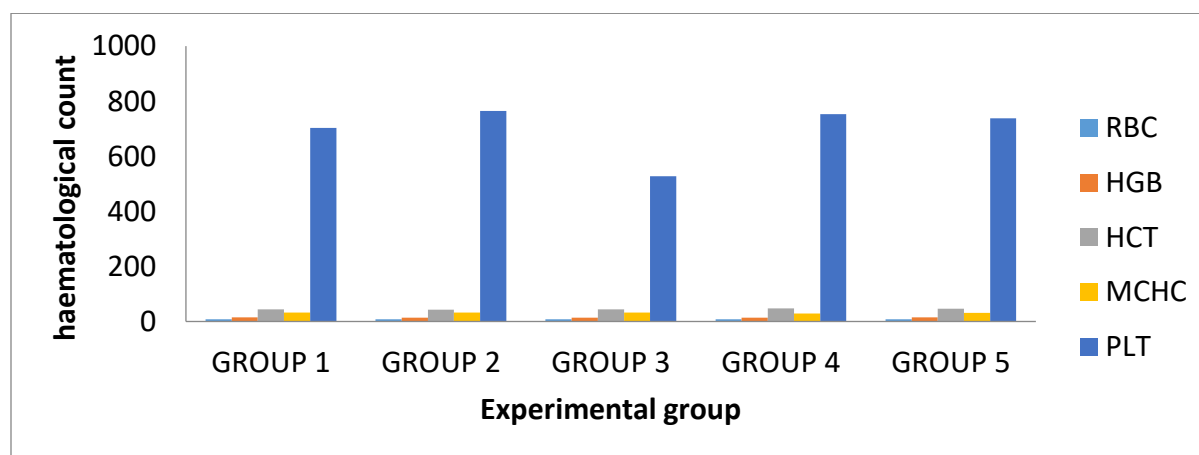
MCHC levels. There was a significant decrease in PLT for the test animal in group III, which was treated with the extract compared with other groups. Therefore the extract suppress the toxic impact of the cadmium salts.

The purpose of determining the haematological indices is to corroborate and correlate the fundamental results obtained in the routine complete blood count (Bryet *al.*, 2001). The evaluated haematological parameters (RBC, HGB, PCV, MCHC and PLT) showed that the levels of RBC, PCV in groups treated with the extract slightly increased compared with those in the normal and negative control groups.

**Table 1: Result of the effect of ethanolic extract of *Bryophyllumpinnatum* leaves on haematological parameters (RBC, PLT, HB, PCV, and MCHC) of male albino Wistar rats exposed to cadmium chloride.**

GROUPS	RBC ( $10^6/\mu\text{L}$ )	HGB (g/DL)	PCV (fL)	MCHC (g/dL)	PLT ( $10^3/\mu\text{L}$ )
GROUP 1	7.91±0.16	14.52±0.13	44.6±0.75	32.6±0.48	702.7±84.3
GROUP 2	7.69±0.20	13.80±0.95	42.7±0.95	32.1±1.37	764.7±64.26
GROUP 3	7.70±0.18	14.07±0.17	43.6±0.61	32.3±0.70	528.0±93.01
GROUP 4	8.54±0.24	13.90±0.96	47.8±0.96	29.2±2.36	753.2±26.88
GROUP 5	8.26±0.12	14.72±0.09	46.7±0.70	31.7±0.46	737.7±62.0

Results expressed as Mean ± Standard Deviation of data obtained, the difference were said to be significant at  $P<0.05$ .



**Fig. I: Effect of the treatment of cadmium-contaminated male albino Wistar rats with ethanol extract on some haematological parameters (RBC, HGB, PCV, MCHC and PLT)**

There was a slight negative effect of the extract on MCHC parameter compared with the records from for the experimental animals in the normal and negative control groups. Prolonged use of the extract may lead to microcytosis and macrocytic anaemia when there is a decrease in MCHC.

#### 4.0 Conclusion

The haematological parameters evaluated showed non-significant differences when compared with the negative and normal control groups. Elevated platelet levels indicate that *Bryophyllum pinnatum* extract has blood clotting factors.

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