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Effects of Aqueous Stem Bark Extract of *Momordica balsamina* Linn on Serum Electrolytes and Some Haematological Parameters in Normal and Alcohol Fed Rats

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Abstract: In the present study aqueous stem bark extract of *Momordica balsamina* was administered intragastrically to normal and alcohol fed rats to determine the effects of the extract on serum electrolytes and some haematological parameters. The stem bark extract was administered for two weeks at a dose of 0.56 mg/100 g body weight. The parameters studied were the major electrolytes (Na^+ , K^+ , Cl^- and HCO_3^-), glucose, albumen, total protein and some haematological parameters (RBC and WBC counts, PCV and haemoglobin). The results obtained showed that serum electrolytes levels were not significantly affected and there are no significant effects on haematological parameters (RBC counts, PCV and haemoglobin) except WBC counts. The stem bark extract produced significant ($p < 0.05$) increases in WBC count values. This elevation of the white blood cells count following the administration of the extract may be an indication of a possible immune response of treated rats but the implication of this finding on WBC count remains to be explained.

Key words: *M. balsamina* Linn, Na^+ , K^+ , Cl^- , HCO_3^- , PCV, RBC, WBC

INTRODUCTION

The quest of man to find peace in what surrounded him has provoked the need for vast studies, exploring the inherent benefits from them. However the fear of illness and death has resulted in the discovery of medicinal values of plants for treatment of psychological disorders and preservation of health.

The use of plants by native and herbalists (*keskakerima* in Kanuri of Nigeria) has prompted interest in researchers in tapping valuable potentials endowed in plants by nature. Yet, only very few of these plants (herbs) used, have been properly identified and documented^[1]. Until these plants are subjected to scientific analysis, their efficacies are questionable.

Momordica balsamina Linn, which belongs to the family cucurbitaceae, is a climber that grows over native huts. It is annual to perennial herb found wild throughout Borno and Yobe States of Nigeria^[2]. Different parts of the plant have been used for different medicinal purposes. The Wollofs in Senegal and Gambia have used the fruits as purgative agents^[3]. The whole plant is used as sponge in treating skin disease; elsewhere it is also used as tranquilliser in the treatment of mental illness^[3,4]. Tender shoots are usually consumed with okra soap by the Kanuris of Borno and Yobe States (Nigeria) where the plant is locally known as dagdawu. Phytochemical

screening of *M. Balsamina* Linn has revealed the presence of tannins, saponins and lectins^[4]. The seed of *M. balsamina* is known to contain glycosides, saponins and steroids. The leaves and fruits were observed to have hypoglycaemic effects in rats^[5,6]. Further more, the fruits were observed to be toxic to various organs and tissues of rats in very high dose^[7]. In view of the fact that the plant is used by the traditional healers to alleviate pain among the natives, the present study therefore aimed to examine the effects of aqueous stem bark extract of the plant on the serum electrolyte levels and haematological parameters in normal and alcohol fed rats.

MATERIALS AND METHODS

Preparation of plant extract: The stem barks of *Momordica balsamina* L. were collected from Bolori-Layout Maiduguri, Borno State of Nigeria. Dr.S.S. Sanusi of the Botany Unit in the Department of Biological Sciences, University of Maiduguri, Nigeria, authenticated the specimen of the plant. The stem barks were room dried and ground into powder and the powdered stem bark were subjected to aqueous extraction. This was done by dissolving 8.5 g of the powder in 500 mL of distilled water and allowed to stand overnight. The supernatant was carefully filtered and was used for treatment.

Experimental protocol: Twenty male wistar strain albino rats weighing 100-220 g, obtained from the animal house unit of the Department of Biochemistry, University of Maiduguri, Nigeria, were acclimatized and divided into four groups of 5 rats each in standard rat cages according to the schedule below:

- Group A: The animals in this group were fed with normal standard diet for 2 weeks.
- Group B: The animals in this group were administered 1 mL/100 g body weight of 30% ethanol for two weeks.
- Group C: The animals in this group were fed 0.56 mg/mL/100 g body weights of 30% ethanol and the plant extract for two weeks.
- Group D: The animals in this group were fed with 0.56 mg/mL/100 g body weights of rat plant extract only, for 2 weeks.

All four groups had free access to normal standard diet and water throughout the experiment. On the last day of the experiment, the rats were fasted for 24 h before their blood samples were taken for analysis, after sacrifice by cervical dislocation.

The serums obtained by ultra centrifugation were used to carry out the analysis on glucose, using enzymatic method as described by Trinder^[8]. Protein, using Biuret method and albumin using BCG colorimetric method were determined according to the methods as described by Silverman *et al.*^[9]. Flame photometric method was used for sodium and potassium ion analysis^[10]. The analysis of the other two electric (Cl^- and HCO_3^-) were also done by the methods as described by Tietz *et al.*^[10].

Haematology parameters were analysed from the blood samples collected from the tail of each rat just after the fasting day. These parameters included WBC counts using haemocytometer and RBC counts by methods described by Schalm *et al.*^[11] and Coles^[12] Haemoglobin estimation was done by the method described by Van Assendelft^[13] and PCV was done by using micro-haematocrit method described by Coles^[12].

RESULTS AND DISCUSSION

The experiment was performed in an attempt to assess a possible effect of the aqueous stem bark extract of the plant on electrolyte levels and some haematological parameters in normal and ethanol fed rats.

The mean body weight changes of the animals (Table 1) for the control and treatment groups indicates that the differences were not statistically significant in the treatment groups when compared to normal control, as well as within treatment groups.

A decrease was observed in the levels of blood glucose and total protein in the treatment groups. The difference was statistically significant ($P < 0.05$) when compared to normal control (Table 2). This is consistent with earlier reports where the plant was reported to have hypoglycaemic properties^[6]. The decrease in total protein might be due to the protein sparing action in gluconeogenesis.

Table 1: Effect of extract on body weight (g)

Week	Group A	Group B	Group C	Group D
Initial	190.63±2.00	150.88±4.30	164.18±6.00	200.22±8.20
Final	203.92±6.80	166.21±9.30	176.12±9.40	210.5±10.50

Values are means ± standard deviation

Table 2: Effect of two weeks oral administration of aqueous stem bark extract of *M. balsamina* on serum electrolytes in normal and alcohol fed rats

Parameters	Group A	Group B	Group C	Group D
Glucose (mmol L ⁻¹)	3.9±0.53a	2.9±0.73b	2.8±0.71b	2.5±0.71b
Total Protein (g L ⁻¹)	64.3±4.16a	56.5±4.50b	54.0±4.50b	56.8±4.60b
Albumin (g L ⁻¹)	28.7±2.52	30.8±4.44	30.1±6.68	31.0±3.46
Sodium (mmol L ⁻¹)	130.3±0.58	130.5±2.12	134.3±1.15	129.3±1.57
K (mmol L ⁻¹)	5.6±0.31	6.2±0.1	6.7±0.66	7.0±0.73
HCO ₃ (mmol L ⁻¹)	15.7±1.16	12.5±0.71	13.7±4.73	140.0±1.73
Chloride (mmol L ⁻¹)	101.3±1.16	101.0±1.41	104.0±0.00	98.7±2.31

Table 3: Effect of two weeks administration of aqueous stem bark extract of *M. balsamina* on some Haematological parameters in normal and alcohol fed rats

Parameters	Group A	Group B	Group C	Group D
Glucose (mmol L ⁻¹)	3.90±0.53a	2.90±0.73b	2.80±0.71b	2.50±0.71b
Total protein (g L ⁻¹)	64.30±4.16a	56.50±4.50b	54.00±4.50b	56.80±4.60b
Albumin (g L ⁻¹)	28.70±2.52	30.80±4.44	30.10±6.68	31.00±3.46
RBC (x10 ⁹ /mm ³)	7.62±0.36	6.16±0.30	6.87±1.35	6.45±0.19
WBC (x10 ³ /mm ³)	4.73±0.76a	7.80±1.64b	6.88±1.10b	6.45±1.56b
PCV (%)	48.60±1.40	44.00±2.00	44.40±1.34	45.00±3.16
Haemoglobin (g dL ⁻¹)	8.13±1.00	8.13±1.00	8.78±0.90	9.25±0.91

Values are means ± standard deviation. Comparison was done between the groups and values with different superscript on the same vertical column are significantly different ($P < 0.05$)

Administration of the various concentrations of the plant extract did not affect the levels of the serum electrolytes significantly (Table 2). The slight increase shown might be as a result of exogenous uptake of the minerals from the plant extract and water. There is no significant effect on haematological parameters (Table 3), except WBC counts. The mean WBC counts showed an increase for all treated groups compared to a control group and that increase was statistically significant.

This elevation of WBC counts might be a possible immune response following the administration of ethanol and extract to the rats. However the implication of this finding on WBC and the mechanism of action remain to be explained.

In conclusion, the study obtained that intragastric administration of *M. balsamina* has no significant effect on serum electrolytes and by extension the kidneys and other organs, in both alcohol fed and normal rats.

But the effect of this extract is seen in increasing WBC counts, which might be a possible immune response. However the implication remains to be explained.

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