



**THE EFFECT OF *Colocynthis citrullus* (CUCURBITACEAE) SEEDS ON BODY WEIGHT AND HAEMATOLOGICAL PARAMETERS IN ALBINO RATS**

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**Abstract**

This work was designed to evaluate the effects of dried powdered seeds of *Colocynthis citrullus* (Cucurbitaceae) fed to albino rats on haematological parameters (PCV, Hb, RBC, WBC and Differentials) and weight changes using 12 rats. The rats were separated into 4 groups of 3 rats per group. Animals in group A were fed with the amended diet containing 25%(w/w) *Colocynthis citrullus* seed powder, group B 50%(w/w) and group C 75%(w/w) for a total of 13 weeks. Group D served as control and fed with standard diets (Feed Master Grower Mash) alone. Blood samples of the animals were collected, from which red blood cell count and white blood cell/differential counts were carried out. At the end of the experiment, it was observed that the faeces of rats fed with 75% formulated diets were loose and the animals showed weight decreases compared with those fed with standard diet. Statistical analysis using analysis of variance (ANOVA) single factor and Dunnett's multiple comparison tests on the haematological data obtained in rats fed with different concentrations of amended diets that contained *Colocynthis citrullus* powdered seeds showed that there was no significant difference ( $P < 0.05$ ) in packed cell volume (PCV), haemoglobin, red blood cell (RBC) and in differential leucocyte counts when compared with the control. It is suggested that chronic consumption of *Colocynthis citrullus* dried powdered seeds at 75% (w/w) could affect growth.

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**Keywords:** *Colocynthis citrullus*; seeds; albino rats; haematological parameters; body weight

**INTRODUCTION**

*Colocynthis citrullus* (Cucurbitaceae), locally known as "agushi", is native plant of Asia and Africa. It is abundantly found in Syria and Egypt. In Nigeria, it is mostly cultivated in the middle belt areas like, Niger, Kafanchan, Zaria etc. *Colocynthis citrullus* is a slender hairy monoecious annuals, often sprawling over the ground. The root system is very extensive and superficial. The stem is thin, angular, grooved, 1.5-5 m long, with long white hairs. Leaves, 5-20

by 2-12 cm, 3-4 pairs pinnate lobes, lobes again divided and footed with broad spines. The flowers are unisexual, solitary, axillary and usually more male flowers than female. Fruit globose or oblong, varying greatly in size up to 60 cm or more long, rind mostly glabrous; green or cream, striped or mottled green, hard but durable. The flesh is reddish green, yellow or whitish, usually sweet and many seeded. The seeds are white, black, reddish, yellow, flat, smooth, 0.6-1.5 by 0.5-0.7 cm; containing not

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more than 2% of epicarp and 5% of seeds (Dalziel, 1963). It is marketed either as broken pieces, which are light and spongy, or in the form of flakey powder; which is yellowish orange or yellowish green in colour. The plant is used in folk medicine by people in the rural areas as a purgative, antihelmentic, antirheumatic, and as a remedy for skin infection (Coe and Anderson, 1996). Phytochemical analysis of the seeds of the plant demonstrated the presence of 21% semi drying fixed oil, the constituents of which are given as, phytosterol, phytosteroline and alpha spinasterole. The fruit pulp was found to contain a very small amount of volatile oil; citrullol which is a phytosterol glucoside a new crystalline dihydric alcohol, alpha elaterin and hentriacontan. The fruit juice is reported to contain citrullin, citruluen and citrullinic acid in addition to alpha elaterin (Watt and Breyer-Brandwijk, 1962). In spite of efforts made in many countries to encourage the production, collection, and manufacture of medicinal plants, casualties have over the years been observed among villagers and animals as a result of indiscriminate consumption, over dosage or use of remedies consisting of herbs or mixtures of herbs against problems of different body systems. In a related study, whole curry leaf (*Murraya Koenigii*) and mustard (*Brassica juncea*) fed to rats at doses equal to normal human intake did not cause any adverse effect on food efficiency ratio, haematological parameters, liver and renal function tests, fibrin level and glycosylated haemoglobin. No histopathological changes were observed in the liver (Khan *et al.*, 1995a). Both, plants showed significant hypoglycemic action in rats. There was an increase in the concentration of hepatic glycogen and glycogenesis and a decrease in glycogenolysis and gluconeogenesis (Khan *et al.*, 1995b).

The present investigation was conducted to determine the effect of graded quantities of the powdered seeds of the plant on haematological parameters and body weight changes on albino rats

## MATERIALS AND METHODS

### *Plant material*

Fresh seeds of *Colocynthis citrullus* were collected during rainy season (May-October) in Zaria, Kaduna State, Nigeria. It was identified by a botanist, at the herbarium of the Department of Biological Sciences, Ahmadu Bello University, Zaria, where a voucher specimen (No.1266) was deposited. The seeds were air-dried and powdered; the powder was stored at room temperature in an airtight container prior to use.

### *Experimental animals*

Albino rats of both sexes were used. The animals were housed in a clean environment, kept in separate cages and provided with food and water *ad-libitum*. Prior to the commencement of the experiment the animals were allowed two weeks familiarization with cage environment. The animal care and handling was conducted in compliance with the National Regulations for Animal Research. University Ethical Committee reviewed the protocols, which were consistent with International Animal Welfare Guidelines.

### *Animal treatment*

Twelve albino rats of both sexes weighing between 110 and 140 g were randomly allocated into four groups of three animals each. The animals were allowed free access to water and food pellets. The rats were kept at room temperature in 12 hr-12 hr light and dark cycles. Animals in groups A, B and C were fed with feed containing 25%, 50% and 75% (w/w) *Colocynthis citrullus* seed powder for thirteen weeks. The control (group D) animals were fed with the standard diet only, for the same period of time.

### *Preparation of animal diet*

Three different concentrations of the diet were prepared using Feed Master Grower Mash livestock feed. This was carried out by

mixing 25%(w/w), 50%(w/w) and 75%(w/w) powdered plant material with the standard diet.

#### Weight determination

The animals were weighed daily using Mettler P1200 weighing scale. At the end of the experiment, pre and post treatment body weight of the animals were compared and statistically analyzed.

#### Evaluation of haematological parameters

The blood samples were obtained by nipping the tip of the tail and then squeezed to collect about 2-3 drops of the blood from each animal. The tail was first disinfected with 75% methanol and the tip cut with a sterilized sharp scissors. Packed Cell Volume was estimated

following collection of blood into heparinised capillary tube. Haemoglobin was determined after diluting blood with Drabskin fluid leading to the conversion of Haemoglobin to cyanomethaemoglobin (Coles, 1974). Total protein was estimated by the Biuret method (Kaplan *et al.*, 1988). Red blood cell count, white blood cell count, neutrophils and lymphocyte count was carried out as outlined by Barbara and Brown (1980).

#### Statistical analysis

Tests of significant differences between the means were carried out using analysis of variance (ANOVA) single factor and Dunnett's multiple comparison tests (Mead and Curnow, 1983).

## RESULTS

**Table 1:** Haematological parameters (mean SEM) of rats fed with formulated diet containing *Colocynthis citrullus*

Rats Group	PCV %	Hb g/100ml	RBC 10 <sup>12</sup> /L	Tp mg/100ml	WBC X10 <sup>9</sup> /L	Neut. (%)	Lym. (%)
A	41.0 1.00	13.6±0.35	6.8 0.22	6.8 0.29	15.1 3.27	17.3 1.53	81.7 3.22
B	41.3 2.89	13.7 0.98	6.8 0.46	6.7 0.52	15.8 2.77	18.3 1.53	79.7 2.52
C	39.7 2.52	13.2 0.85	6.6 0.45	6.7 0.29	12.13 2.85	17.3 1.53	80.7 1.53
D	38.7 2.52	12.9 0.81	6.4 0.40	7.1 0.60	15.57 5.76	21.7 4.93	78.0 5.20

PCV= Packed Cell Volume; Hb= Haemoglobin; Tp= Total Protein; RBC= Red Blood Cell  
 WBC= White Blood Cell; Neut.= Neutrophils; Lym.= Lymphocytes

**Table 2:** Mean ( SEM) weight of rats fed with formulated diets of *Colocynthis citrullus* powdered seeds before and at the end of the experiment

GROUP	Weight (g)							
	A		B		C		D	
Initial	128.5	35.59	131.0	28.95	135.7	19.95	113.3	31.02
Final	171.5	47.70	143.5	22.92	129.3	21.33	156.4	37.80

## DISCUSSION

From the study, a significant ( $P<0.05$ ) growth increase was observed in animals fed with 25% (w/w) amended diet that contained powdered seeds of *C. citrullus*. Stunted growth was seen in animals fed with 50% (w/w) of the formulated diet while a significant retarded growth was observed in animals fed with 75% amended diet containing powdered seeds of *C. citrullus* compared with the control. This might be due to malabsorption of nutrients along the gastrointestinal tract of the animals fed with

formulated diet containing 75% (w/w). This was noticed from the 6<sup>th</sup> week of the experiment in the stool of the animals fed with 75% (w/w) formulated diet which was loose.

The result of the haematological parameters of rats fed with the amended diet containing *C. citrullus* powdered seeds (A, B, C) was not significantly ( $P<0.05$ ) different when compared with the control group D. There was a slight increase in the counts of packed cell volume, haemoglobin and red blood cells. A high level of haemoglobin,

packed cell volume and red blood cells is an indication that the rats were not anaemic while a lower level is a sign of anaemia. The packed cell volume measures the ratio of the volume of whole blood in a sample of capillary or venous blood (Dalziel, 1963). It is a convenient and rapid measure of the degree of anaemia and from a nutritional standpoint, provides information comparable to haemoglobin concentration, which this work showed to be normal. The white blood cell is important in defending the body against infections (Schalm *et al.*, 1975). The leucocytes (WBC) counts however, cannot give specific information and this necessitated differential leucocytes counts. In differential leucocytes counts, the neutrophil was higher in the control group (D) when compared with the treated groups (A, B, C). Neutrophil is responsible for phagocytosis of pathogenic microorganisms during the first few hours after their entry into the tissue. The basophil and monocyte counts were however, negligible in all the groups hence not even indicated on the table but their haematological importance cannot be over emphasized, hence, they have to be mentioned as well. Basophil counts increases upon sensitization to antigen while monocyte is responsible for defense of tissue against microbial agents. The lymphocyte counts of rats fed with the amended diet containing *C. citrullus*

powdered seeds in the treated groups A, B and C was slightly higher when compared with that of the control group (D). The primary role of lymphocyte is in humoral antibody formation and cellular immunity (Baker and Silver, 1985). In essence, the slight increase in lymphocyte counts observed for the rats in the treated groups showed a sign of immunostimulatory effect (Aattouri *et al.*, 2001).

The data gathered from this work shows that consumption of large quantities of *C. citrullus* powdered seeds at a higher concentration (75% w/w) for a long period of time is not recommended. However, smaller concentration (25%w/w) could be tolerated. Overview of the haematological parameters shows that packed cell volume, haemoglobin and red blood cells are higher in group B. Total protein and lymphocyte counts were higher in group A.

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