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Review

Effect of *C. metuliferus* on some Metabolic Parameters in wistar strain albino rats

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The effects of the fruit extract of *C. metuliferus* on the Water and food intake, feacal and urine output were monitored daily for a period of four weeks in albino rats. The weight of the animals were also taken daily during the entire study period. The result showed that there were dose dependent changes in body weight of the experimental rats, which were not statistically significant (P>0.05). 500 mg/kg of the extract produced an increased in food intake of the experimental rats while 1000 mg/kg produced decreased in food consumption of the rats, however, these changes were not statistically significant (P>0.05). On the other hand, increased in water intake showed significant difference compared to the control (P<0.05). There was no significant difference (P>0.05) in the faecal output of rats in the treated groups. The decrease in urine output in the animals administered 500 mg/kg was statistically significant (P<0.05); so also the increased in urine output in rats treated with 1000 mg/kg. There was an insignificant increased (P>0.05) in electrolyte concentration (Na^+ and K^+) in the 500 mg/kg treated group compared to that of control. On the contrary, 1000 mg/kg showed significant (P<0.05) decreased in electrolyte concentrations.

Keywords: *C. metuliferus*, metabolic parameter, albino rats, non-bitter species, annual herbs.

INTRODUCTION

The plant, *Cucumis metuliferus* also referred to as kiwano, African cucumber, melano, Horned melon and jelly melon in English; metualon in French; and burar za'aki or kanda garki in Hausa; is a monocious, climbing, annual herb that can also be grown practically anywhere, provided the season is warm (Benzioni *et al*., 1993). It flowers from July to September and the fruit ripened from October to December (Bates *et al*., 1990; Mabberlay, 1997). The fruits are ovoid, about 8-10cm long and 4-5cm in diameter, reddish-orange or yellow at maturity with strong spiny thorns; and the seeds are embedded in the mesocarp which is emerald green containing juice which is bland-tasting (Benzioni *et al*., 1993; Morton, 1987).

Two species of *C. metuliferus* have been identified, the non-bitter species that is widely used and the bitter species that have limited use. The bitter form has been reported by Teuscher and Lindequist (1994) to contain Cucurbitacins which is highly toxic to man and animals. The non-bitter forms are non-toxic and are widely cultivated (Enslin *et al*., 1954; Andeweg and Debruyn, 1959).

C. metuliferus has been used by traditional healers for the management of various ailments including Diabetes mellitus, hypertension, peptic ulcer, HIV/AIDS (Jimam, 2008). Jimam (2008) further reported that some poultry farmers have also used both dried and fresh fruits of the plant in water for their birds and claimed to protect the birds against viral diseases such as new castle disease and avian influenza disease. The seed has been reported to expel gastro intestinal worms when grounded into powder and made into emulsion with water and taken orally (Cheij, 1984.). The leaves are used as a source of vegetable with high nutritional values (Faciola, 1990; Bruecher and Keith, 1977).

From available literature, not much scientific work has been reported on this plant species. The extensive consumption and the claimed therapeutic potentials of the fruit of the plant was the motivating factor to

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Table 1: Changes in weekly body weight of Albino Rats Administered *C. metuliferus* daily for four weeks

	Body weight (g)			
Dose (mg/kg)	**Week 1**	**Week 2**	**Week 3**	**Week 4**
Distilled Water	198.39±5.08	194.57±3.40	182.36±10.45	214.00±1.52
500	194.89±4.54	187.64±3.20	193.07±1.02	203.93±2.44
1000	177.46±4.12	176.07±3.14	179.50±3.11	197.21±2.46

n=5

Table 2: Effect of *C. metuliferus* Fruit Extract on Food and Water intakes in Albino rats

Dose (mg/kg)	Food intake (g)	Food intake (ml)
Distilled Water	28.00±2.72	26.66±0.94
500	33.00±2.88	36.33±1.09*
1000	26.33±3.84	38.00±1.91*

n=5, *P<0.05

Table 3: Changes in Faecal and Urine output of Albino Rats Administered *C. metuliferus* Fruit Extract for four weeks

Dose (mg/kg)	Faecal output (g)	urine output (ml)
Distilled Water	23.33±2.35	3.53±0.17
500	22.00±2.64	2.00±0.25*
1000	21.67±2.71	5.60±0.51*

n=5, *P<0.05

investigate its effect (if any) on some Metabolic Parameters in albino rats with the aim of providing some scientific basis for the local use of the plant, in addition to contributing to scientific data on the usefulness of this plant as a source of future orthodox drugs.

METHODS

Fifteen male albino rats (wistar strain) weighing between 150 and 260 g were randomly allocated into three groups of five animals each. Animals in group 1 (control group) were given equi-volume of distilled water daily for four weeks. Those in group 2 and 3 were administered 500 and 1000 mg/kg body weight daily of the powder dissolved in distilled water respectively using an orogastric tube.

The rats were placed in fifteen separate metabolic cages with each cage hosting one animal. These animals were fed with food and water which were measured. Water and food intake, feacal and urine output for these animals were monitored daily for a period of four weeks. The weight of the animals were taken daily during the entire study period.

Measurements of the urine output and water intake were done directly using recalibrated urine tubes and water bottles respectively. The measurements of food and feaces were done on weighing balance.

Urine samples collected on the 21st, 24th and 28th days of the study were analyzed for electrolytes (sodium and potassium ions).

RESULT

Table 1 showed that there were dose dependent changes in body weight of the experimental rats, which were not statistically significant P>0.05).

Table 2 showed that 500 mg/kg of the extract produced an increased in food intake of the experimental rats while 1000 mg/kg produced decreased in food consumption of the rats, however, these changes were not statistically significant (P>0.05). On the other hand, increased in water intake showed significant difference compared to the control (P<0.05).

There was no significant difference (P>0.05) in the faecal output of rats in the treated groups (Table 3). The decrease in urine output on the animals administered 500 mg/kg was statistically significant (P<0.05); so also the increased in urine output in rats treated with 1000 mg/kg (table 3). The increased in electrolyte concentration in the 500 mg/kg treated group compared to that of control showed no significant difference (P>0.05). On the contrary, increasing the dose to 1000 mg/kg (table 4), there was significant (P<0.05) decreased in electrolyte concentrations.

DISCUSSION

Table 1 showed dose-dependent variations in body weight of the rats during the four weeks daily administration of the fruit extract. There was statistically insignificant reduction in the mean total body weight in the treated groups compare to the control group. The statistical insignificant (P>0.05) decrease in body weight at week one and two, was followed by a gradual increase in body weight at week three and four as shown in Table 1. The observed variations in body weight of animals treated with this extract were not significant, and might be due to experimental errors or changes in the laboratory conditions. The increased in body weight of animals

Table 4: Effect of *C. metuliferus* Fruit Extract on Electrolyte Excretion in Albino Rats

Dose (mg/kg)	Na^+ (mmol/L)	K^+ (mmol/L)
Distilled Water	2994.29±244.42	10371.43±1596.63
500	3430.00±509.31	10416.67±1748.19
1000	1796.67±17.30*	5566.67±30.45*

n = 5, **P*<0.05
Na^+ = sodium ions,
K^+ = potassium ions

treated with the extract at week three and four correspond with its stimulant effect on food consumption (Table 2), and the statistically insignificant decrease in body weight in those treated with 1000 mg/kg was also a reflection of the decrease in the quantity of food intake (Table 2). The changes in food intake also affected the feacal output (Table 3). The significant increase in urine outputs by the animals given 1000 mg/kg explained the corresponding increase in water intake observed in the rats, and hence the diuretic activity of the plant exhibited by the groups that received the 1000 mg/kg dosage. It has been documented that metabolic behaviours that regulate water and food intake are controlled by neural and physiological mechanisms (Potter and Bruno, 1989). The significant increase in the water intake in the treated groups suggests that the plant may have some effects on the neural and physiological mechanisms; though it is known that water intake and urine outputs are biologically dependent on many factors (Barney and West, 1990). The decreased urine output due to the effect of 1000 mg/kg dose (Table 3) was accompanied by a decreased in sodium and potassium excretion (Table 4), suggesting that the diuretic activity might be through a different mechanism (Tanira *et al*., 1996). Similarly, insignificant increase (*P*>0.05) in sodium and potassium excretion due to dose of 500 mg/kg may be associated with an impairement of water excretion as a result of kidney abnormally or the inappropriate secretion of antidiuretic hormone (Wynne and Edwards, 2003).

CONCLUSION

There was dose dependent increase in water intake by the rats; 500 mg/kg also produced an increase in food intake of the rats. 500 mg/kg produced increased in electrolyte excretion, while 1000 mg/kg dose point showed the opposite.

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