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A murine model study on the effect of Garcinia kola on body weight

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ABSTRACT

The effects of Garcinia kola seed on body weight was studied on adult male rabbits of comparable weight. They were divided into three experimental groups (X, Y, Z) and a control group (A), each consisting of six animals. For six weeks, group X, Y and Z received in addition to normal feed and water 1200mg/kg, 1500mg/kg and 1800mg/kg per body weight respectively of the reconstituted powdered Garcinia kola. Prior to the administration of Garcinia kola and at the end of each week, weights were measured and the mean recorded at the end of the experiment. Comparable weights were observed before and after acclimatization. However, at the end of the six weeks study, there was a dose dependent fall in body weight in the experimental groups and was statistically significant ($p<0.05$) for group Y (1.47±0.08 kg) and Z (1.48±0.06 kg) compared to the control (1.55±0.06 k g). The observed outcome of this study suggests Garcinia kola seed has potentials for weight management in overweight and thus anti-obesity.

Key words: Garcinia kola, herbs, Weight, obesity.

INTRODUCTION

Obesity is known to be a leading preventable cause of death worldwide with increasing prevalence in adults and children and increasingly negative impact on healthcare systems [1-4]. Although the increasing incidence is a recognized medical problem in developed countries [5], similar trend are now been observed in developing countries. Despite literatures attached decrease physical activities and increase energy intakes as the main factors causing the development of obesity [6-9], management still remains a problem as the world is faced with

overweight and obesity as a public health issue. According to Hermanussen et al [10], Obesity is not a separate problem of only the obese people but appears to be a characteristic feature of modern populations as a whole. To this regards, Akpamu et al [11], reported that what was once a plus for efficient energy storage has now become a funnel of health risks.

While the science of nutrition is considered as a significant part of preventive medicine and maintenance of health [11,12], herbs and spices have also been reported to be of utmost advantage for the management of obesity and overweight [11]. In addition, the use of natural herbal product has becomes a rapidly growing therapeutic area largely embraced by the general public. Of interest is *Garcinia-kola* (*G. Kola*), used as food in traditional hospitality, cultural and social ceremonies and in herbal medicine as remedy for several complications. Several scientific attestations have attached a number of health-related benefits to *G. kola* [13]. Specifically, *G. kola* has been extensively studied for its antiparasitic, antimicrobial, antiviral, anti-inflammatory, antidote, antidiabetic, hepatoprotective, antioxidant and scavenging properties [13-30]. It is therefore the aim of this study to determine the effect of *G. kola* on body weight of adult male rabbits. Male rabbits were used because of the assertion that *G. Kola* might be consumed more among male population reason due to its perceived aphrodisiac activity [31,32] and increased testosterone production [33,34] and as such referred to as “male kola”.

MATERIALS AND METHODS

The seeds of *G. kola* were obtained from a local market in Ireukpen, Ekpoma, Edo State, Nigeria. The coat of the seeds were removed and subsequently cut into pieces to increase its surface area for drying which was carried out under the hot sun. Grinding of the dried pieces into fine powder followed this procedure and finally the resultant *G. kola* powder was measured using Electric Balance (Denver Company USA -200398. 1REV.CXP-3000). The measurement was done separately, each weighed sample being packed in a drug envelope and stored in a dry glass bottle to keep it dry.

Twenty-four Male adult rabbits of comparable weight purchased from Aduwawa cattle market, Benin City, were used for the study. The rabbits were randomly divided into three experimental groups (X, Y, Z) and a control group (A). They were housed in separately labeled wooden cages and allowed acclimatization for a period of 10 days. During this period, they had *ad libitum* access to water and standard laboratory animal feed from Bendel Feed and Flour Mill, Ewu, Edo State, Nigeria. The cages were swept clean every morning and the animal’s feet and head examined regularly for evidences of infection, such as sore feet, sore mouth and discharges from their eyes and nose.

Treatment with plant material*:* The difference in feed composition between the control and test animals was that the later was supplemented with the test material (dried and milled seed of *Garcinia kola*). The weighted packed sample of *G.Kola* which was aliquots was reconstituted with distilled water to obtain suspensions of appropriate concentrations for oral administration. Animals in all groups, except the control which received normal saline, received by gavage graded concentrations of *G.kola* powder (suspended in distilled water) daily for Forty-two days. Three doses; 1200mg/kg B.W, 1500mg/kg B.W and 1800mg/kg, of the reconstituted powdered

G.kola were administered to the test groups X, Y and Z respectively. These values are chosen based on comparable information from previous work [35].

Weight measurement: At different stages, all rabbits were weight and the average weight recorded. These stages include; before and after acclimatization, prior to the experiment, at the end of every week before the commencement of the next feeding week they were also weight for weight changes. At the end of the experiment, the average weights of the test group were then compared with that of the control.

***Data Analysis*:** Data were analyzed using the SPSS version 17 soft ware package for ANOVA and $P < 0.05$ was considered as the level of significance.

RESULTS

Figure 1 and *Table* 1 show the weight changes of rabbits fed varies doses of *G. kola* at different stages of the experiment. Before acclimatization the weights in each experimental group were comparable to that of the control. After acclimatization, before the commencement of feeding with *G. kola*, there were increases in weights compared to the weight before acclimatization. These increases in weight were present in experimental and control groups and were not statistically different from the control or previous weight. At the end of the experiment, group X showed no weight difference from the weight prior to administration of *G. kola*. At the same time as group A (the control) presented with weight gain, weight loses were observed for group Y and group Z compared to corresponding weights prior to administration of *G. kola* (experiment).

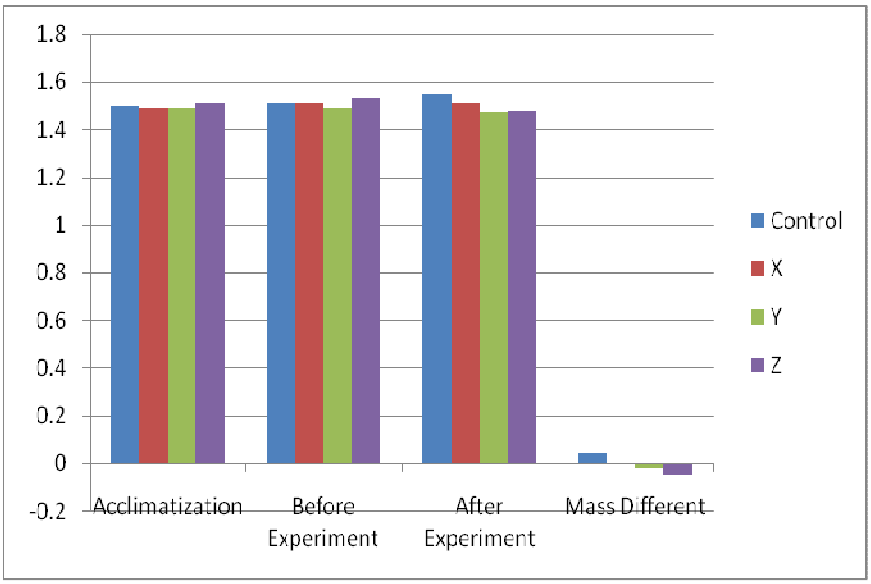

Figure 1: Bar chart on weight changes in Kg of rabbits fed varies doses of G. Kola

Key: *X= group X fed 1200mg/kg B.W of G. Kola, Y= group Y fed 1500mg/kg B.W G. Kola and Z= group Z fed 1800mg/kg B.W. G. Kola.*

The negative signs in weight differences between weights after the experiment (AE) and that prior to the administration of G. kola (AB) imply a fall in weight. As shown in *Figure* 1, these mean weight difference in group Y and Z appear on the negative side on the x- axis of the bar chart. The weight reduction in the experimental groups fed 1500mg/kg and 1800mg/kg of Garcinia kola were significant compared to control (1.55±0.06kg).

Table 1: weight changes in Kg of rabbits fed varies doses of G. Kola

Group	Acclimatization	Before experiment (AB)	After experiment (AE)	Weight different (AE – AB)
A (Control)	1.50±0.05[a]	1.51±0.06[a]	1.55±0.06[a]	+0.04
X (1200mg/kg G.k)	1.49±0.04[a]	1.51±0.03[a]	1.51±0.03[ab]	0.00
Y (1500mg/kg G.k)	1.49±0.08[a]	1.49±0.08[a]	1.47±0.08[b]	-0.02[*]
Z (1800mg/kg G.k)	1.51±0.05[a]	1.53±0.05[a]	1.48±0.06[b]	-0.05[*]

*Values are mean ±SD. G. kola = Garcinia kola; Values in each column having different super scripts are significantly different ($p < 0.05$). *= $p \leq 0.05$ compared to control.*

DISCUSSION

The results of this study suggests that oral ingestion of crude *G. kola* for a period of 6 weeks at doses of 1200, 1500 and 1800 mg/kg body weight, can induce weight loss as shown in *Table* 1 and *Figure* 1. The weight loss effect of *G. kola* observed in the present study illustrates a dose depended-fashion effect. This is justified by the statistical significant effects for group Y and Z which received higher doses than group X where no change in weight was subsisted. This is an indicative of the possible anti-obesity potential in *G. kola* and consequently, might be an agent of weight management. The finding of the present study agrees with a study which had earlier reported decrease in body mass in rats fed *G. kola* [32]. In the same study, a dose-related decrease in size of livers, lungs and hearts which was non-significantly influenced by the levels of *G. kola* extract was reported [32]. Similarly, it has been reported that *G. Kola* cause marked retardation of growth which did not affect organ weights [20]. Although weight gain was not deliberate studied in the study of Nottidge *et al*., he suggested that lesions found in the intestines could result in poor feed conversion and ultimately, a decrease in weight gain [36]. In addition, a significant reduction in weights of foetuses produced by pregnant rats which received *G. kola* seed extract has been documented [34].

On the other hand, enhanced growth performance in poultry [37], fishes [38] and rats [39] fed diets containing *G. kola* extracts have been reported. Specifically, the study of Dada and Ikuerowo [38], reported that the best growth performance in *C. gariepinus* broodstock was achieved at 1.0 g/Kg dietary level of ethanolic extracts of *G. kola.* However, weight reduction was observed at 2.0g/Kg dietary level in the same study [38]. Studies in which weight/mass loses of animals fed *G. kola* extract has been reported, the effects were tied to reduced feed consumption [32, 36] for the reason that earlier findings reported so [40,41]. It may be assumed that refusal of *G. kola* material by animals could be attached to the bitter taste. It is worthy to note that in the present study ingestion of G. Kola was by gavage. However, mass loss without

decreased feed intake has been documented [42]. Thus, the lost in body weight observed in this study appears dosage depended which might suggests that the potential for weight loss-effect of *G. Kola* seed is possibly due to its constituents.

G. Kola spp are known to be a complex mixture of phenotic compounds, bi-flavonoids, xanthones, benzophenones [17, 27] and potent antioxidants [39]. Literatures have it that obesity develops due to decreased physical activities and increased energy intakes [6-9]. Cloud it be that the constituents of G. kola are agents of energy metabolism? In line with this reasoning are the facts that *G. Kola* is widely consumed as a stimulant [43] and it's reported significant in carbohydrate metabolism [44]. Consequently, it becomes justifiable to conclude that the constituents of *G. kola* seed possess stimulatory effect on fat metabolism and thus anti- obesity. On the bases of the present findings coupled with other health-related benefits attached to *G. Kola*, management of over-weight and or excess body fat can thus be achieved by ingestion of G. Kola.

Conclusively, the fact that there were weight subsides in rabbits treated with *G. kola*, as compared to the control group, indicates that G. Kola seed may have possible anti-obesity effect. It is on the basis of this therefore, that we advocate a regulated consumption of G. kola for weight management in the obese and overweight.

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