

EFFECT OF INGESTION OF ETHANOL EXTRACT OF GARCINIA KOLA SEED ON ERYTHROCYTES IN WISTAR RATS

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Summary The objective of this study is to investigate the effect of ingestion of crude ethanol extract of Garcinia Kola seed on erythrocytes. Fifty male Wistar rats with average weight of 200g were divided into 5 treatment groups of 10 rats per group. Group A, served as the control and was fed with standard animal feed only while groups B, C, D and E which were the treatment groups, in addition were force-fed 2g/kg/rat/day of the Ethanol extract of Garcinia Kola seed for 1,2,3 and 4 weeks respectively by means of an endogastric tube and syringe. At the end of the experimental period for each group the animals were sacrificed and the erythrocyte number, pack cell volume (PCV), and haemoglobin concentration values were determined. The result on analysis showed that erythrocyte-count, PCV and haemoglobin concentration values showed significantly decreased values ($p < 0.05$) between group B (week 1) and Group A, but groups C, D and E values showed a steady rise which were not significant ($P > 0.05$) when compared with Group A. None of the values fell below the normal physiological range of the experimental animals. This shows that Garcinia Kola seed which has flavonoids as its active constituent has no long term significant toxicological implication with respect to the concentration given on the erythrocytes of mammals.

Key Words: *Garcinia Kola, Erythrocytes, Wistar rats, Flavonoid.*

Introduction:

Garcinia Kola seed, generally known as Bitter Kola in Nigeria belongs to a family of tropical plants known as Guttifera (Plowden, 1972). It is commonly called "Namiji goro" in Hausa and "Agbilu" in Igbo. *Garcinia Kola* seed is used in traditional medicine for various therapeutic purposes based on pharmacological effects of the active components (Flavonoid) in the seed and other parts of the plants (Braide and Vitrotio, 1989). Despite the fact that physiological studies are still lacking to validate the therapeutic ability of *Garcinia Kola* (Orie and Ekon, 1993), its use in African traditional medicine cannot be over emphasized. Holmes (1960) reports that *Garcinia Kola* Seeds are used as an antidote to the effects of *Strophantus gratus*. It also serves as a guinea-worm remedy (Lewis *et al*, 1977), and employed in the treatment of Diabetes (Tita *et al*, 2001). The sap from *Garcinia Kola* is used for parasitic skin disease while the latex is used internally for gonorrhoea.

The seeds are rich in flavonoids, which have been shown to have antibiotic property (Hong-xi and Song, 2001) anti-inflammatory property (Braide, 1990), and antimicrobial activity (Madubunyi, 1995). Despite its extensive use as herbal medicine, much work has not been done to study some of the toxicological implications on other related systems. Motivated by this, we considered it necessary to study what effect(s) the ethanol extract of *Garcinia Kola* seed

would have on erythrocytes of the Wistar rats.

Materials and Method

Experimental Procedure

Fifty male Wistar rats of average weight of 200g were randomly divided into five groups of ten rats each. Group A, served as the control. They were fed with the standard

animal feed and water only while Group B, C, D, and E were force-fed with Ethanol extract of *Garcinia Kola* seed for 1,2,3, and 4

weeks respectively. Each rat received 2g/kg rat body weight of the extract dissolved in 2ml of distilled water and force-feeding was carried out using 2ml syringe and endogastric tube.

Blood Sample Collection and Analysis

At the end of each consecutive week of force-feeding, the animals in the corresponding group were sacrificed and the blood samples were collected by nipping the tail of each animal in Group A, at the onset of the study so as to determine the pretreatment status for the group. The average values of each index served as the set point or control value for the treatment groups. During the experimental period which lasted for four weeks, blood samples were collected by same method from Groups B,C,D and E at the end of the first, second, third and fourth week respectively. On analysis, Red blood cell (RBC) count, Pack cell volume (PCV), and Hemoglobin (Hb) concentration values were determined based on the method described by Schalm et al, (1975).

Statistical Analysis

The mean values of the indices were determined and the standard errors of mean

were calculated. Values obtained were compared with that of the control values and the student- t test was used to compute the level of significance at $p < 0.05$.

Result

The result of the hematological analysis for Groups B, C, D, and E were obtained at an interval of 1,2,3, and 4 weeks respectively, while that of Group A was collected at the onset of study. The mean values of the RBC – count, PCV and Hemoglobin concentration values at the beginning and at the end of the first, second, third and fourth week for Groups A, B, C, D and E respectively are shown in table 1. There was a significant decrease ($p < 0.05$) in the mean values of the RBC-count, PCV and haemoglobin concentration of Group B when compared with that of the control group A (Table 1). Groups C, D and E showed a non significant increase in the mean values of RBC-count, PCV and haemoglobin concentration when compared with that of group A (Table 1).

Table I: Mean values of RBC-count, PCV, and HB-Conc. For the control Group A and the Treatment Groups B, C, D & E.

Groups	A	B	C	D	E
Weeks	0	1	2	3	4
RBC-Count (10^{12})	8.31 ^a ± 0.2	6.9 ^b ± 0.3	7.0 ^a ± 0.02	8.13 ^a ± 0.09	8.43 ^a ± 0.4
PCV-Value (%)	44.5 ^c ± 0.6	40.5 ^d ± 0.3	44.0 ^c ± 1.6	46.0 ^c ± 0.12	47.5 ^c ± 3.1
HB-Conc (g.dl)	14.35 ^e ± 0.4	13.45 ^e ± 0.1	14.65 ^e ± 1.1	15.3 ^e ± 0.2	15.8 ^e ± 0.2

Values along the variable columns with similar superscript are not significant at $P < 0.05$ based on the student t-test.

Discussion

The observations on the RBC count, pack cell volume and hemoglobin concentration values, following the ingestion of Ethanol extract of Garcinia Kola seed revealed variations in the values obtained at the end of the first, second, third and fourth week. The steady rise in the value of the erythrocytes observed as the week progressed in Groups C, D & E might be attributed to the normal physiological variation of this parameter (Conley, 1975) since the values obtained for each group when compared with the control group A, was not significant ($P > 0.05$). In Group E the comparatively high value observed might be due to the antioxidant activity of flavonoid (Bravo, 1998) which are present in the blood as a result of Garcinia kola seed intake thereby elevating the total

antioxidant capacity of the blood. Studies, have shown that polyphenols particularly flavonoid supplements are likely to be beneficial for long term health since they act as potent antioxidants (Bravo, 1998, Wang, *et al*, 2000).

The increase in the erythrocyte level might have alternately led to the increase in the Pack cell volume and hemoglobin concentration value since there is direct relationship between erythrocytes, PCV, and hemoglobin concentration (Shalm *et al*, 1975). The result of the RBC-count, PCV and Hemoglobin concentration values for the first week showed reduced values. This could be due to complexes which flavonoid forms with reactive metals such as iron, zinc and copper thereby reducing their nutrient absorption (Siegenberg, 1991). The formation of these

complexes might have affected hemoglobin synthesis and erythropoiesis since iron deficiency is characterized by deficient hemoglobin synthesis with red cell containing less than the usual concentration of hemoglobin (Fairbanks, *et al* 1971). Though this is compensated as ageing erythrocytes are destroyed the iron was salvaged, transported to the erythroid cells of the marrow by transferring, and reutilized for new hemoglobin synthesis (Conley, 1974). This was seen in the subsequent weeks as the values increased significantly.

Though there were variations in the values none of these values fell below the normal physiological range of the experimental animals. This agrees with the work of Kou, (1997) who found no significant side effects evident from regular consumption of polyphenol or flavonoids containing dietary supplements. In conclusion, the constituent of the ethanol extract of *Garcinia kola* seed has been shown to exert no long term significant toxicological implication to erythrocytes, rather it showed the tendency of increasing the erythrocyte number.

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