

HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF FINISHER BROILER BIRDS ADMINISTERED AQUEOUS EXTRACTS OF *GARCINIA KOLA* SEEDS

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Abstract

The haematological and serum biochemical parameters of 135 finisher broiler birds were determined, following the administration of aqueous extracts of *Garcinia kola* seeds. The experiment was carried out in a Completely Randomized Design (CRD), made up of 3 treatments; T_1 , T_2 and T_3 , containing 0.00, 15.00 and 30.00 mg of *Garcinia kola* seed extracts per litre. The experiment was replicated thrice. Haemoglobin concentration (Hb), mean corpuscular haemoglobin concentration (MCHC), white blood cell (WBC) and lymphocyte counts were significantly ($P < 0.05$) higher in the treated birds, while heterophil counts were significantly ($P < 0.05$) lower in the treated birds. Total protein (TP), globulin, uric acid, alanine transaminase (ALT) and alkaline phosphatase (ALP) increased in birds on T_3 , while albumin, glucose, cholesterol and aspartate transaminase (AST) decreased in them. This study demonstrates that aqueous extracts of *Garcinia kola* seeds do not have untoward effects on the haematological and serum biochemical parameters of finisher broiler birds; and achieved best results at 30 mg/L administration.

Key words: Haematological, biochemical, *Garcinia kola* seed extracts, finisher broiler.

Introduction

Unconventional and non synthetic materials are being employed in different ways in livestock production in recent times. This is sequel to the advocacy for organic farming, increasing cost of conventional feed materials and the untoward effect of synthetic antibacterial drugs used in livestock production (Iwuji and Herbert, 2012). Many of these unconventional and non synthetic materials are usually used in livestock production as feedstuffs to replace/substitute conventional but more expensive ones, as feed additives to promote growth or as natural antibiotics (Ertas *et al.*, 2005). Although these materials may have recorded positive results in their replacement/substituting and feed additive roles, their effects on the blood of the animals receiving them need to be evaluated to fully ascertain their beneficial effects in these animals. Sequel to the study on the evaluation of growth performance, carcass and organ weights of broiler finisher birds administered aqueous extracts of *Garcinia kola* seeds (Iwuji *et al.*, 2016), it became imperative to evaluate the haematological and serum biochemical parameters of finisher broiler birds administered aqueous extracts of *Garcinia kola* seeds.

Materials and Methods

The experiment was carried out at the Poultry Unit of the Teaching and Research Farm, Department of Animal Science and Technology, Federal University of Technology Owerri, Imo State.

Garcinia kola seeds were purchased at 'Afor Enyigugu' market in Mbaise, Imo State. The seeds were prepared and ground as described by (Uko *et al.*, 2001). The dried ground *Garcinia kola* seeds were then stored in a clean dry plastic container with cover, to be used when needed. Aqueous extracts of *Garcinia kola* seeds were prepared daily using boiled clean water, by dissolving ground *Garcinia kola* seeds at the rate of 15.0 g/L and 30.0 g/L in the boiled clean water for treatment two and three, respectively. The solutions were then filtered after 24 hours with a clean silk cloth, immediately after shaking. Treatment one (T_1) was the control and contained 0.0 g/L of ground *Garcinia kola* seeds.

One hundred and thirty five 4 weeks old Marshall Broiler birds were used for the experiment. The birds were purchased at day old from a reputable farm in Owerri, Imo State and reared for four weeks, after which they were divided into three groups and assigned to the three treatments in a Completely Randomized Design (CRD). Each treatment contained 45 birds, replicated thrice of 15 birds each. The birds were raised in deep litter system with each replicate housed in a 2 m x 3 m pen. Standard management procedures were observed, while feed and water were offered *ad libitum*. Each replicate in the experimental groups received two litres of treatment every morning, for 28 days, after which normal clean water were offered for the rest of the day. At the end of the experiment, the birds were starved feed overnight

and fifteen birds per treatment (five per replicate) were randomly selected for blood collection through the jugular vein for haematological and serum biochemical analyses as described by Alikwe *et al.*, 2010.

All data collected were subjected to one way analysis of variance (ANOVA) according to Steel and Torie (1980). Significantly ($P < 0.05$) different means were separated using Duncan's New Multiple Range Test (DNMRT) as outlined by (Obi, 1990).

Results and Discussion

Haematological analysis of the experimental birds recorded significantly ($P < 0.05$) higher haemoglobin concentration (Hb) in birds on T_2 (9.25 g/dl) and T_3 (9.60 g/dl) than in birds on T_1 (8.70 g/dl). Since the red blood cells (RBC) were similar ($P > 0.05$) among the experimental birds, it means that aqueous extracts of *Garcinia kola* seeds only affected the RBCs by increasing their oxygen carrying capacity through increased Hb (Frandsen *et al.*, 2009). This assertion is further corroborated by the significantly ($P < 0.05$) higher values obtained for mean corpuscular haemoglobin concentration (MCHC) of the treated birds in T_2 (28.65 g/dl) and T_3 (28.30 g/dl) than in T_1 (27.35 g/dl). Total white blood cell (WBC) counts of birds on T_1 ($80.35 \times 10^3/\mu\text{l}$) was significantly ($P < 0.05$) higher than that of birds on T_2 ($75.50 \times 10^3/\mu\text{l}$), but significantly ($P < 0.05$) lower than WBC counts of birds on T_3 ($84.50 \times 10^3/\mu\text{l}$). However, the percent lymphocyte counts were significantly ($P < 0.05$) higher in the treated birds ($T_1 = 75.00\%$; $T_2 = 79.00\%$; $T_3 = 81.00\%$), while the percent heterophil counts were significantly ($P < 0.05$) lower in the treated birds ($T_1 = 25.00\%$; $T_2 = 21.00\%$; $T_3 = 19.00\%$). Despite significantly ($P < 0.05$) lower WBC count recorded in T_2 , the cellular immunity was not compromised since the value was within documented normal range (Mitruka and Rawnsley, 1977); and the ability of *Garcinia kola* to enhance cellular immunity through increased percent lymphocyte count, even in non pathogenic conditions was still demonstrated (Iwuji, 2010). The significantly ($P < 0.05$) lower percent heterophil counts in the treated birds may be due to the antioxidant activity of *Garcinia kola* (Iwuji, 2010) in the absence of an inflammatory condition (Brooks *et al.*, 1996).

Similar ($P > 0.05$) total protein (TP) values were recorded between T_1 (3.25 g/dl) and T_2 (2.80 g/dl); T_1 and T_3 (3.70 g/dl), but T_3 was significantly ($P < 0.05$) higher than T_2 . Albumin and globulin components of the TP in T_1 (1.65 and 1.60 g/dl for albumin and globulin, respectively) and T_3 (1.65 and 2.05 g/dl for albumin and globulin, respectively) were similar ($P > 0.05$), but significantly ($P < 0.05$) lower than the albumin of the birds on T_2 (2.40 g/dl) and significantly ($P < 0.05$) higher than the globulin of the birds on T_2 (0.40 g/dl). This may be an indication that the administration of aqueous extracts of *Garcinia kola* seeds at 15 g/L was responded to as an under dose by the birds in TP and its components; which led to a withdrawal syndrome (Crump *et al.*, 1976). Serum glucose values of the experimental birds were 138.45, 153.00 and 86.35 mg/dl, for T_1 , T_2 and T_3 , respectively; and serum cholesterol values were 142.45, 111.80 and 116.50 mg/dl, for T_1 , T_2 and T_3 , respectively. Unequivocally, the anti diabetic and anti cholesterolemic properties of *Garcinia kola* seeds (Iwuji, 2010) were demonstrated in these results. Serum uric acid values of the experimental birds were 8.75, 7.70 and 12.05 mg/dl, for T_1 , T_2 and T_3 , respectively; which was significantly ($P < 0.05$) higher in T_3 , probably due to higher serum protein content of the birds. Aspartate transaminase (AST) was similar ($P > 0.05$) in T_1 (11.00 IU/L) and T_2 (12.00 IU/L) which were significantly ($P < 0.05$) higher than AST of birds on T_3 (9.50 IU/L). Alanine transaminase (ALT) of the birds on T_1 (3.50 IU/L) and T_2 (4.50 IU/L) was similar ($P > 0.05$), but was significantly ($P < 0.05$) lower than ALT of birds on T_3 (6.00 IU/L). Alkaline phosphatase (ALP) was similar ($P > 0.05$) in T_2 (183.65 IU/L) and T_3 (186.30 IU/L), but was significantly ($P < 0.05$) higher than ALP of birds on T_1 (116.95 IU/L). These results of the liver enzymes evaluated were within the range of documented normal values (Mitruka and Rawnsley, 1977) and do not indicate hepatic damage or toxicity as a result of the administration of aqueous extracts of *Garcinia kola* seeds. The significant ($P < 0.05$) differences in their values among the experimental birds may be due to altered metabolic activities in other organs or tissues where they are also produced (Dial, 1995; Iwuji, 2010).

Table 1: Haematological parameters of broiler birds administered aqueous extracts of *Garcinia kola* seeds.

Parameters	T ₁	T ₂	T ₃	SEM
Hb (g/dl)	8.70 ^b	9.25 ^a	9.60 ^a	0.16
RBC (x 10 ⁶ /μl)	2.23	2.28	2.41	0.24
PCV (%)	29.00	30.25	30.67	0.59
MCV (fl)	143.00	141.80	140.35	1.97
MCH (pg)	39.10	40.60	39.80	0.92
MCHC (g/dl)	27.35 ^b	28.65 ^a	28.30 ^a	0.29
WBC (x 10 ³ /μl)	80.35 ^b	75.50 ^c	84.50 ^a	1.28
Lymphocytes (%)	75.00 ^b	79.00 ^a	81.00 ^a	1.26
Heterophils (%)	25.00 ^a	21.00 ^b	19.00 ^b	1.24
Monocytes (%)	-	-	-	-
Basophils (%)	-	-	-	-
Eosinophils (%)	-	-	-	-

abc: Means within a row with different superscripts are significantly (P<0.05) different.

Table 2: Serum biochemical parameters of broiler birds administered aqueous extracts of *Garcinia kola* seeds.

Parameters	T ₁	T ₂	T ₃	SEM
Total protein (g/dl)	3.25 ^{ab}	2.80 ^b	3.70 ^a	0.28
Albumin (g/dl)	1.65 ^b	2.40 ^a	1.65 ^b	0.20
Globulin (g/dl)	1.60 ^a	0.40 ^b	2.05 ^a	0.30
Glucose (mg/dl)	138.45 ^a	153.00 ^a	86.35 ^b	12.49
Cholesterol (mg/dl)	142.45 ^a	111.80 ^b	116.50 ^b	6.65
Uric acid (mg/dl)	8.75 ^b	7.70 ^b	12.05 ^a	0.97
Creatinine (mg/dl)	0.14	0.12	0.28	0.06
AST (IU/L)	11.00 ^a	12.00 ^a	9.50 ^b	0.48
ALT (IU/L)	3.50 ^b	4.50 ^b	6.00 ^a	0.45
ALP (IU/L)	116.95 ^b	183.65 ^a	186.30 ^a	21.90

ab: Means within a row with different superscripts are significantly (P<0.05) different. AST = Aspartate transaminase; ALT = Alanine transaminase; ALP = Alkaline phosphatase.

Conclusion

The results of the haematological and serum biochemical parameters of finisher broiler birds administered aqueous extracts of *Garcinia kola* seeds showed no adverse effect, thereby supporting its earlier use to enhance growth in broiler birds (Iwuji *et al.*, 2016).

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