Journal of Animal and Veterinary Advances 5 (3) : 184-187, 2006

The Effects of Dietary Bitter Kola (*Garcinia kola*) Inclusion on Body Weight, Heamatology and Survival Rate of Pullet Chicks

O.S. Adedeji, G.O. Farinu, S.A. Ameen and T.B. Olayeni
Department of Animal Production and Health,
P.M.B. 4000, Ladoke akintola University of Technology, Ogbomoso, Nigeria

Abstract: The effects of dietary dry seed powder of *G. kola* (Bitter cola) at inclusion levels of (O, 10, 20, 30 and 40g per kg of feed), on heamatological parameters body weights and survival rate of pullets chicks were investigated in a study that lasted eight weeks. 250- day old pullet chicks were randomly allocated to five treatment groups. A treatment contained two replicates of 25 birds each. Results showed that *G. Kola* (Bitter Cola) dry seed powder inclusion in the diet improved weight gain in groups B, C, D and E.This compared favourable with that of the control group A. Weight gain for group E fed 40 g kg^{-1} feed dry seed powder of bitter cola was lowest when compared to other groups. Highest weight gain was however recorded for the group D birds (30 g kg^{-1} feed) dry seed power of bitter cola. For the period the experiment lasted, results in this study showed that the higher the level of inclusion of dry powered seed of Bitter Kola in the diet the lower the mortality rate recorded. This supports the antimicrobial activity of Garcinia Kola, as already documented in literatures. Heamatological (parameters such as Pack Cell Volume (PCV), Heamoglobin concentration (Hb), Red Blood Cells (RBC), Mean Corpuscular Heamoglobin MCH, Mean Corpuscular Volume (MCV), for test groups B, C, D and E were not significantly different from that of the control group A. However there was a significant ($p<0.05$) proliferation of the White Blood Cells (WBC), specifically the lymphocytes in this study. This probably explains the antimicrobial effect of Garcinia cola seeds, in views of the major role that the lymphocytes assume in the immune defense mechanism of the body, in both man and animals.

Key words: *Garcinia kola,* body weight, heamatology, survival rate, pullet chicks

INTRODUCTION

The *G. Kola* plant is a medium-sized tree growing up to 12 metres tall and 1.5 metres wide and usually found in the rain forest of Nigeria. The tree produces a characteristic orange-like pod, with edible portion contained in the pod[1] the plant is found in must forest areas and also cultivated in homesteads. It is distributed throughout West and Central Africa. It has been located in Sierra Leone, Ghana, Nigiera, Cameroon and Congo.

Garcinia kola is used extensively in traditional medicine for the treatment of various diseases. The stem bark is used for the treatment of malignanttumors. The Latex (gum) is used internally to treat gonorrhea and is applied externally to fresh wounds[1]. The fresh seeds and the dry seed powder when chewed are used to prevent or to relieve colic pains, cure headache or chest colds and to relieve cough[1]. The seeds when chewed raw are also used in the treatment of bronchitis and throat infections[2].

Garcinia Kola and other members of the genus are known to elaborate a complex mixture of phenolic compounds including biflavanoids, xanthones and benzophenones[2-4]. The above phenolic compounds has been pharmacological proved to possess anti-inflammatory, antimicrobial, antidibetic and antiviral properties[1, 2]. The seed extract and dry powder seed of *G. Kola* plant have been formulated into various forms including tables, cream, cream, vials and tooth paste[5].

In spite of the numberous medicinal and socio-economic importance of *G. Kola*, the seed is not free of adverse effect on various body systems. Previous studies have shown that prolonged ingestion in the rat caused degenerative changes in the liver, kidney and intestinal mucosa[6]. However the effect of ingestion of *G. Kola* in whatever form has not been investigated in poultry.

Single-celled organisms that live in sea water have an external environment that provides all the needs of the organisms, such as food, disposal of excreted wastes and relatively constant condition for maintenance of life. As the complexity of organism increase, the problem of supplying each cell with a proper environment becomes more acute. In view of the above higher forms of animals have developed circulating blood and the fluid derived

Corresponding Author: O.S. Adedeji, Department of Animal Production and Health, P.M.B. 4000, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

Table 1: Mortality of birds per week

Week	Group A (control) (nil g G. Cola/kg feed)	Group B (10 g G. Cola/kg feed)	Group C (20 g G. Cola/kg feed)	Group D (30 g G. Cola/kg feed)	Group F (40g G. Cola/kg feed)
1	4	2	1	2	1
2	1	-	-	-	-
3	1	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	3	-	-	-
8	-	1	1	-	-
Total	6	6	2	0	0
% Mortality (10-8 weeks)	2.4	2.4	0.8	0.8	0.4

Table 2: Average body weight gain per week (g/bird)

Weeks	GRP.A	GRP.B	GRP.C	GRP.D	GRP.E	Total	Mean
1	0.01	0.07	0.06	0.06	0.07	0.33	0.07
2	0.10	0.10	0.09	0.20	0.20	0.49	0.10
3	0.24	0.25	0.20	0.35	0.32	1.16	0.23
4	0.40	0.40	0.30	0.50	0.30	1.80	0.36
5	0.52	0.46	0.46	0.62	0.45	2.41	0.48
6	0.60	0.50	0.60	0.70	0.60	2.80	0.56
7	0.71	0.70	0.71	0.82	0.80	3.64	0.73
8	0.90	0.80	0.80	1.50	0.50	4.20	0.84
Total	3.54	3.28	3.22	4.25	3.14	16.83	3.37
Mean	0.44	0.41^{b}	0.40^{b}	0.53^{a}	0.39^{b}	2.10	0.42

a, b: Mean in same row with different superscripts differ significantly ($p<0.05$)

form it as a means of maintaining relatively constant environment for all cells[7]. Therefore changes in normal values of blood cells and other blood constituents by whatever means could lead to serious physiological and or biochemical problems in the affected animal or individual. These may in turn result into improper maintenance of life[7].

This study was therefore carried out to evaluate the heamat ological response and antimicrobial activity of *G. Kola* seeds in poultry. The mortality records, lack of vaccination and medication of the various experimental groups with the exception of the control group were used to determine the possible antimicrobial activity of *G. Kola* seeds in the experimental birds.

MATERIALS AND METHODS

Preparation of materials: Seeds of *G. Kola* were purchased from the local market in Ogbomoso, Oyo State, Nigeria. The brownish dark covering of the seed were removed. The seed were slice and air dried. The dried seed were grounded into powdered form.

Experimental diets and animals: A total of 250 day old pullets of the Brown shavers strain were subjected to five dietary treatments for eight weeks of study. Fifty birds were in a treatment group containing two replicates, which were given 0g, 10g, 20g, 30g and 40g *G. Kola*/kg feed.Feed and water were supplied *Ad-libitum* to the birds. Body weights of chicks were recorded on 7, 14, 28, 35, 42, 49, 56 and 63 days of the trails (Table 1). Group A birds (control) were given routine poultry vaccinations and medications while groups B, C, D and E were not vaccinated nor was any medications given at all (Table 2). Records of mortality of disease outbreak in experimental birds were also noted to evaluate the effectiveness of *G. Kola* seeds as an antimicrobial agent in poultry. (Table 3)

Sample collection: Blood samples from each group were collected into EDTA-anticoagulant treated bottles. Packed Cell Volume (PCV), Red Blood Cells (RBC), White Blood Cells (WBC) and Heamoglobin (Hb) were determined using wintrobe's microheamatocrit, improved Neubuer heamocytometer and cyanomethaemoglobin, methods, respectively. Means Corpuscular Volume. (MCV), Mean Corpuscular Heamoglobin (MCH) and Mean Corpuscular Heamoglobin Concentration (MCHC) were computed according to Jain[8]. (Tables 4 and 5).

All data collected were subjected to one-way analysis of variance and Duncan's multiple range tests was applied for the separation of the means, where significant differences were noted among the means[9].

RESULTS AND DISCUSSION

Results obtained in this study were as shown in Tables 1, 2, 3 and 4. The result in Table 1 showed that weight gain was highest in group D birds with 30 g kg^{-1} feed *G. Kola* dry seed powder inclusion in the diet, when

Table 3:Heamatological parameters of control and birds with different inclusion levels of G. Cola dry seed powder in the diet

Parameters		Group A	Group B	Group C	Group D	Group E	
Level of *G. Kola* inclusion in diets	S.I. Unit	0 g *G. Kola* per kg feed	10 g *G. Kola* per kg feed	20 g *G. Kola* per kg feed	30 g *G. Kola* per kg feed	40 g *G. Kola* per kg feed	SEM
PCV	%	29.5	26	25	30	27	0.9
Heamoglobin	$X10\ g\ L^{-1}$	8.3	9.0	7.0	8.6	8.3	0.3
RBC	$X10^{12}\ L^{-1}$	4.1	4.5	3.5	4.3	4.0	0.2
WBC	$X10^{9}\ L^{-1}$	60.0^{a}	60.2^{a}	80.0^{b}	88.2^{b}	90.0^{b}	7.8

a, b, c = means with different superscripts on the same row which are significantly different ($p<0.05$)

Table 4:Differential WBC counts

		$X10^{9}/L$			
Groups	Level of *G. Kola* in g kg^{-1} feed	Polymorphs (neutrophils)	Monocytes	Eosinophils	Lymphocytes
A	0	39	2	6	53
B	10	34	2	7	57
C	20	36	2	8	70
D	30	40	2	5	73
E	40	30	3	6	80

compared to groups A, B, C and E with 0g, 10g, 20g and 40g per kg feed *G. Cola* dry seed power inclusion in the diet. Weights gains obtained for group B and C (10 g and 20 g kg^{-1} feed) inclusion of G. Cola dry powdered seed compares favourably with that of the control group A with nil dry powdered seed inclusion in the feed. Weight gain for group E birds with 40 g kg^{-1} feed dry powdered seed *G. Cola* inclusion in the diet was the lowest. This points to the fact that G. Cola dry powdered seed inclusion in the diet of the birds actually improves weight gain and this was highest at 30 g kg^{-1} feed inclusion level in the diet.

Table 2, shows records of mortality for each experimental group per week. O.4% mortality rate for the period the experiment lasted (0-8wks) was recorded for group E birds that have the highest level (40 g kg^{-1} feed) of dry powdered seed *G. Cola* inclusion in the diet. While 0.8% was recorded for those of groups C and D 2.4% mortality rate were recorded for Groups A and B birds. All the above points to the fact that the higher the level of *G. Cola* dry powdered seed inclusion in the diet the lower the mortality of birds recorded. This goes a long way to support the antimicrobial potency of *G. Kola* seeds as was already documented by many previous workers. [1, 2, 3, 4]pharmacologically confirmed the anti-inflammatory, antimicrobial antidiabetic and anti-viral activities of *G. Kola* dry powdered seed. This study therefore infers that *G. Cola* dry seed powder can be included in poultry feeds at levels of between 20– 40 g kg^{-1} feeds, especially in rural areas where vaccines are not available and where there is always lack of trained personnel to administer the vaccines or even where there is inadequacy of vaccine storage procedures. This would ensure and encourage rural dwellers to keep modern day poultry breeds and even encourage cross breeding of local fowls with exotic ones, in rural areas, once there is a simple or an easy way out to control some poultry diseases that does not allow improving on the local breeds a possibility.

Tables 3 and 4 showed the heamatological values of the control group and the groups fed dry seed powder of bitter cola. The heamatological values of the control (group A), pullet chicks and groups B, C, D and E pullet chicks fed dry powdered seed of *G. Kola* in this study were within the normal literature ranges for experimental birds[10]. This suggests that the dietary concentrations of dry powdered seed of *G. Kola* (10-40 g kg^{-1} feed) can be tolerated by the pullet chicks (0-8 weeks). However there was a proliferation of white blood cells, ($p<0.05$) specifically the lymphocytes, in group of birds fed 20, 30 and 40 g kg^{-1} feed *G. Kola* dry powdered seed (Groups C, D and E) Table 4. This we suggest was probably responsible for the antimicrobial (antiviral, antibacterial and antiprotozoan) activity of *G. Kola*[1] as the lymphocytes were scientifically known to play key role in the immune defence system of the body both in man and domestic animals. One of the major functions of lymphocytes is their response to antigens (foreign substances) by forming antibodies that circulate in the blood or in the development of cellular immunity[7].

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