

Effect of Turmeric (*Curcuma longa*) Supplemented in Drinking Water on Hematological Indices and Immune Response in Broiler Chickens

*Obinna, A. L., Dim, C.E., Onoduogo O.M., and Anizoba, N. W.

Department of Animal Science, Faculty of Agricultural Sciences,
University of Nigeria, 410001 Nsukka,
Enugu State, Nigeria.

*Corresponding author: amara.eze@unn.edu.ng +2347062834081

Abstract

This study investigated the hematological effects of turmeric supplementation in broiler chickens. An 8 weeks trial was carried out using a total of 144 broiler chickens to evaluate the Effect of aqueous extract of Turmeric (*Curcuma longa*) (AET) on Hematological Indices and Immune Response in Broiler Chickens. The broiler chickens were brooded for two weeks and then randomly assigned to four treatment groups in a completely randomized design (CRD), with each treatment replicated four times with each treatment containing thirty- six birds. The turmeric extract was prepared by dissolution of 45 g of turmeric powder in 300 mL of warm water for 1 hour. Results showed that aqueous extract of turmeric significantly affected blood platelets, mean corpuscular hemoglobin concentration (MCHC), and neutrophil counts ($p < 0.05$), reflecting turmeric's immunomodulatory and haematological influence. However, other measured parameters, packed cell volume (PCV), hemoglobin (HB), red blood cells (RBC), white blood cells (WBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), lymphocytes, and eosinophils were not significantly altered ($p > 0.05$). In conclusion, the study observed that turmeric selectively modulates certain immune and blood quality indices in broilers without negatively impacting overall erythrocyte or leukocyte profiles. The immunomodulatory and antioxidant properties of turmeric could underlie these effects, supporting its potential as a beneficial dietary additive in poultry production.

Key words: Turmeric extract; Broiler chickens; Hematological indices; Immune response; Aqueous supplementation

Description of problem

The poultry industry is increasingly exploring natural feed additives to enhance bird health and productivity while minimizing antibiotic use (1). Among these, turmeric (*Curcuma longa*) has gained attention due to its rich content of curcumin, a compound known for its antioxidant,

anti-inflammatory, and antimicrobial effects (2). Turmeric supplementation has been reported to improve immune function, growth performance, and nutrient absorption in broiler chickens, supporting their ability to cope with environmental stressors and diseases (3). Despite these promising benefits, the influence of turmeric on hematological parameters which are

key indicators of physiological and immunological status has not been thoroughly examined. Because blood profile alterations can reflect the health and immune competence of broilers, evaluating turmeric's effects on these parameters is necessary. This study therefore aims to assess the impact of aqueous extract of turmeric on haematology of broiler chickens.

Materials and Methods

Experimental site

The experiment was carried out at the Poultry Unit of the Department of Animal Science, Teaching and Research Farm, University of Nigeria, Nsukka in Enugu State, South Eastern Nigeria. Nsukka is located at the latitude 6°51'28.19" N and longitude 7°23'44.77" E. The average temperature is 24.9°C/ 76.8 °F. and annual rainfall is 1579mm/ 62.2 inch [4].

Experimental animals, diet and management

A total of 144-day old broiler chicks were sourced from a commercial hatchery farm in Ibadan Oyo State, Nigeria. The chicks were brooded for two weeks using a commercial starter feed and then fed broiler finisher for the later four weeks (New Hope Agriculture and Technology Nigeria Limited). Turmeric was sourced from Ogige market, Nsukka Enugu State after which they were rinsed in clean water to remove dirt and sand, cut into pieces, dried and milled. 45 g of the powder were weighed with sensitive scale and dissolve in 300 mL of warm water and made to stay for 1 hour. For every 1 litre of drinking water measured, AET was supplemented as indicated below.

Treatment 1 (T₁), Birds on water without extract;

Treatment 2 (T₂), Birds on 2 mL of extract;

Treatment 3 (T₃), Birds on 4 mL of extract and

Treatment 4 (T₄), Birds on 6 mL of extract.

DATA COLLECTION AND STATISTICAL ANALYSIS

Data was collected on haematological indices. All data collected were analyzed using Analysis of Variance (ANOVA) in a Completely Randomized Design (CRD) using statistical package (SPSS, version 20) the significant differences in means were separated using Duncan's New Multiple Range Text [5].

Result and Discussion

Haematological indices of broiler chicken fed aqueous extract of Turmeric

The results of the haematological indices of broiler chicken fed AET is presented in Table 1. The results of the effects of AET on the haematological indices of broiler chicken showed that there that aqueous extract of turmeric significantly affected blood platelets, MCHC, and neutrophil counts ($p < 0.05$). However, PCV, HB, RBC, WBC, MCV, MCH, lymphocytes, and eosinophils were not significantly ($p > 0.05$) affected.

It was observed that as the administration of AET increased, from 0 mL (T₁) to 6 mL (T₄), there was an increase in Platelets and MCHC of broiler birds, while N decrease as the administration of AET increased from 0 mL (T₁) to 6 mL (T₄). Although some of the parameters were not significant ($P < 0.05$), this result showed that AET had no adverse effect on the birds at an increased level (T₄) 6 ML. Several studies found no significant effect of turmeric on parameters like RBC, PCV, HB, and WBC, aligning with this

study's findings for those indices (6; 9). Rafiq *et al.* (1) observed significant platelet and MCHC changes with turmeric supplementation, suggesting an influence on blood quality and immune modulation. Study on turmeric paste in broilers showed significantly lower platelets and MCHC with turmeric (7). Changes in neutrophils align with turmeric's known immunomodulatory effect, as turmeric can alter the profile of immune cells, including neutrophils, due to its anti-

inflammatory properties turmeric is known for anti-inflammatory, antioxidant, and immunomodulatory properties due to curcumin and other bioactive compounds. The significant effects on platelets, MCHC, and neutrophils might reflect turmeric's modulation of immune function and oxidative stress responses, while the unchanged erythrocyte indices indicate no adverse effect on basic hematopoiesis.

Table 1. Effect of aqueous extract of turmeric on haematological indices of broiler chicken

Parameters	0 mL AET	2 mL AET	4 mL AET	6 mL AET	SEM	P -value
PCV	36.33	33.00	34.00	34.23	0.87	0.30 ^{NS}
HB	13.82	14.61	15.15	16.88	0.55	0.30 ^{NS}
RBC	5.15	5.28	5.23	5.25	0.03	0.32 ^{NS}
WBC	8.65	8.50	8.65	8.68	0.10	0.82 ^{NS}
Platelets	230.00 ^b	250.00 ^a	253.83 ^a	263.31 ^a	3.78	0.01 ^{**}
MCV	1.70	1.44	1.52	1.55	0.05	0.10 ^{NS}
MCH	0.64	0.75	0.67	0.75	0.02	0.19 ^{NS}
MCHC	38.72 ^b	44.82 ^{ab}	52.76 ^a	55.67 ^a	2.24	0.02 ^{**}
N	63.50 ^a	58.00 ^b	58.00 ^b	55.00 ^c	1.04	0.04 ^{**}
L	40.00	39.50	35.50	35.00	0.97	0.11 ^{NS}
E	1.66	2.00	1.00	1.00	0.30	0.41 ^{NS}

Conclusion and Application

The study concludes that supplementation with aqueous turmeric extract positively influences key hematological parameters and enhances immune response in broiler chickens, supporting improved health and resilience. This suggests that turmeric water supplementation can be effectively applied as a natural, non-antibiotic growth promoter and immune booster in poultry production.

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