GSAR Journal of Agriculture and Veterinary Sciences
ISSN: 3048-9075 (Online)
Abbreviated key title: Glob.J. Agri.Vet.Sci.
Frequency: Monthly
Published By GSAR Publishers
Journal Homepage Link- https://gsarpublishers.com/journal-gjavs-home/

HAEMATOLOGICAL AND SERUM BIOCHEMISTRY OF BROILER FED WITH GRADED LEVELS OF *Justicia Carnea*

By

Urom, S.M.O.C[1]., Onunkwo, D. N[2]., Onwukwe, S.C[3]., Okocha, N. L[4] and Odukwe, C. N[5]

[1,2,3,4,5]College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, Abia State.

Received: 01/05/2025	*Accepted: 04/05/2025*	*Published: 06/05/2025*	*PP: 49-52*

INTRODUCTON

Poultry production is a vital sector of the agricultural industry, contributing significantly to the global food supply.It plays a crucial role in Nigeria's food security and economic development, providing a vital source of protein for the population and generating income for rural communities (Babatunde *et al*., 2009). They are a nutritional powerhouse, packed with essential nutrients crucial for human health and development (Havenstein *et al*., 2003). Broiler meat (chicken) is an excellent source of choline, essential for brain health and development, along with vitamins A, D, E, B12, riboflavin, and folate (USDA, 2023). But poultry industry is faced with major challenge hinged on high cost of feed and feed scarcity.This has resulted to researchers searching for alternative feed source that are readily available and cheap.These include Cassava leave and Justicial Carnea. Justicial Carnrnea is a Medicinal plant which is becoming more popular in healthcare program due to their locality, accessibility and cheap cost. The therapeutic importance of these medicinal plants notwithstanding, some toxic substances have shown to be present in large numbers. Consumption of medicinal plants without examining their efficacy and safety can result in unexpected toxic effects, especially on organs in the body such as the liver and kidney.

Justicial Carnea, known as “Hospital too Far, Ewe ajeri in Yoruba, and Ogwu-Obara in Igbo” is a flowering plant used in traditional African medicine to treat anemia, inflammation, fever, diarrhea, liver diseases, arthritis, respiratory, and gastrointestinal disorders. *Justicia carnea* also commonly known as the Brazilian plume flower is also popular for its potential health benefits in various animal species. It is believed to enhance growth performance and improve certain physiological parameters. However, limited research has been conducted to investigate its effect on the hematological and serum biochemistry of broilers.

Although J. carnea leaf meal is safe and may increase red blood cell, hemoglobin, packed cell volume, and platelet count. At larger doses it causes evidence of liver and kidney harm (Ukpabi-Ugo *et al*, 2017). Justicia carnea, a potential feed ingredient, has gained attention for its purported benefits. It has been reported that J. carnea is rich in macronutrients and trace elements such as iron and calcium (Rasheed *et el*, 2013). This study investigated the impact of graded levels of *Justicia carnea* on the hematological and serum biochemal parameters of broilers.

MATERIALS AND METHOD

The research was conducted at the poultry unit of the teaching and research farm of Michael Okpara University of Agriculture, Umudike, Abia State. The university is located at latitude 05’27’ North and longitude 07’32’ East. The university area lies at an altitude of 122m above sea level. Umudike has ambient temperature of 22’c-37’c with annual rainfall of 2177 mm and relative humidity of above 50-70% (NRCRI, 2022).

EXPERIMENT ANIMALS AND MANGEMENT

One hundred and forty four (144)day old chicks were purchased from a reliable source from Ibadan. The birds were brooded for 2 weeks before allocating them into their various treatment groups of 36 birds per group which were further divided into 3 replicate of 12 birds per replicate in a completely randomized design.

EXPERIMENT DIET/ FEED FORMULATION

Justicia Carnea used for this research was gotten from MOUAU farms and Environment. The leaves were plucked on daily bases, thoroughly washed and dried in room temperature.

DATA COLLECTION AND ANALYSIS

Data were collected on the following parameters: Pack cell volume (PVC), Haemoglobin, Red blood cell (RBC), White blood cell (WBC), Platelet mean volume (MCV), Mean cell haemoglobin (MCH) and mean Mean cell Haemoglobin concentrate (MCHC).

Serum biochemistry parameters include; Glucose, Total Protein, Calcium, Albumin, Globulin, Phosphorus and Urea.

EXPERIMENTAL DESIGN

*Corresponding Author: **Urom, S.M.O.C.**

A completely randomized design (CRD) was used to carry out the experiment for all the treatments. The appropriate statistical method is as follows; $Y_{ij}= \mu + D_i+e_{ij}$

Where;
Y_{ij}= Single observation
μ= Overall mean,
D_i= Effect of diet,
e_{ij}= Random error which is independently, normally distributed with zero mean and constant variance (e_{ij}= iind (0, γ^2)

3.9 STATISTICAL ANALYSIS

Data collected/obtained was subjected to analysis of variance (ANOVA) as stated by Steel and Torrie (1980). Significant difference between treatment/formulation means was separated by using Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Table 1 Heamatological parameters of broilers fed graded graded levels of *Justicia carnea*

Parameter/Treatment	T_1	T_2	T_3	T4	SEM
PVC (%)	28.12^a	26.11^c	27.11^b	27.10^b	0.21
Hb (g/dl)	8.07^a	7.57^b	6.60^c	6.53^c	0.19
RBC (X10)	3.21^a	3.12^b	3.08^b	2.96^c	0.03
WBC	18.67^a	16.05^b	15.02^c	14.53^d	0.48
MCV	87.23^b	83.25^c	87.78^b	90.64^a	0.85
MCH (pg)	25.13^a	24.55^a	22.43^b	21.93^b	0.48
MCHC (%)	28.81^a	29.10^a	24.44^b	24.19^b	0.70

$^{abcd:}$ Means on the same row with different superscript differ ($p<0.05$) significantly
SEM = standard error of mean.

The heamatological parameters of broilers treated with *Justicia carnea* across four different treatments showed significant ($p<0.05$) differences in all the parameters recorded.Treatment1 T_1 had the highest value of PCV (28.12%), which wasw significantly higher than the other treatments, Followed by T3 and T4 with 27.11 and 27.10 respectively, with T_2 (26.11%) being the lowest. This indicates better oxygen-carrying capacity in T1, T3 and T4 as observed in related studies (Awodi et al., 2005). Heamoglobin levels followed a similar pattern, with T1 having the highest value (8.07 g/dl), which reflects the better health status of broilers treated with lower concentrations of *Justicia carnea* (Akinmoladun, 2016).

For RBC, T_1 also recorded the highest value (3.21 x10), while T_4 (2.96 x10) was the lowest. The higher RBC count in T_1 suggests enhanced erythropoiesis compared to treatments with higher concentrations of *Justicia carnea* (Chineke et al., 2006). The White Blood Cell count, an indicator of immune function, was significantly higher in T_1 (18.67) compared to T_4 (14.53). This aligns with findings by Muhammad and Muneer (2021) that suggest lower WBC levels,at increased levels of J.Carnea which indicate positive influence on the birds.

Regarding MCV, T_4 had the highest value (90.64), indicating larger red blood cells compared to T_2, which recorded the lowest (83.25). These differences could be linked to the varying inclusion levels of *Justicia carnea* affecting erythrocyte size (Demoranville and Best, 2013). Mean Corpuschular Heamoglobin levels were highest in T_1 (25.13 pg) and lowest in T_4 (21.93 pg), which suggests that higher concentrations of *Justicia carnea* might reduce the haemoglobin content per red cell (Gernsten, 2009). Finally, MCHC was higher in T_1 and T_2 (28.81% and 29.10%, respectively) compared to T3 and T4, implying that lower *Justicia carnea* inclusion results in better haemoglobin saturation in red cells (Obioha, 1992).

Table 2 Serum Biochemical parameters of broilers fed graded levels *Justicia carnea*

Parameter/Treatment	T_1	T_2	T_3	T4	SEM
Total protein (g/dl)	3.86^a	3.59^b	3.39^c	3.04^d	0.92
Albumin (g/dl)	1.81^a	1.74^a	1.69^a	1.49^b	0.04
Globulin (g/dl)	2.05^a	1.85^b	1.70^c	1.54^d	0.06
Glucose (mg/dl)	175.33^c	197.33^b	207.33^{ab}	218.00^a	5.17
Cholesterol (mg/dl)	105.54^a	101.99^b	100.75^b	99.77^b	0.72
Creatin (mg/dl)	0.89^a	0.87^b	0.86^c	0.85^c	0.01

*Corresponding Author: **Urom, S.M.O.C.**

Urea (mg/dl)	10.15[a]	9.94[b]	8.94[c]	8.67[d]	0.17

[abcd]: Means on the same row with different superscript differ ($p<0.05$) significantly
SEM = standard error of mean.

The serum biochemical parameters of broilers treated with *Justicia carnea* show significant differences across all parameters measured. The total protein levels ranged from 3.86 g/dl in T_1 to 3.04 g/dl in T_4, with a significant reduction observed as the concentration of *Justicia carnea* increased (Akinmoladun & Owojuyigbe, 2020). This suggests that higher concentrations of the plant extract might impair protein synthesis or absorption, as reported by Effert and Kaina (2011).

Albumin levels, while not significantly different between T_1, T_2, and T_3, were significantly lower in T_4 (1.49 g/dl), indicating that high concentrations of *Justicia carnea* may negatively affect liver function or albumin production (Chimaroke, 2017). Similarly, globulin levels followed a descending pattern, with T_1 recording the highest value (2.05 g/dl) and T_4 the lowest (1.54 g/dl). These results suggest a possible immunosuppressive effect at higher concentrations, as globulin is a key component of immune function (Muhammad & Muneer, 2021).

Glucose levels increased progressively with higher concentrations of *Justicia carnea*, with T_4 recording the highest value (218 mg/dl) and T_1 the lowest (175.33 mg/dl). This indicates that higher doses of the extract might induce hyperglycemia, a finding supported by earlier studies on medicinal plant toxicity (Akinmoladun, 2016). Cholesterol levels showed a slight, but significant decrease across treatments, with T_1 recording the highest value (105.54 mg/dl) and T_4 the lowest (99.77 mg/dl). This could imply a cholesterol-lowering effect of *Justicia carnea*, especially at higher concentrations, consistent with its use in traditional medicine to manage lipid profiles (Effert & Kaina, 2011).

Creatinine levels were highest in T_1 (0.89 mg/dl) and lowest in T_4 (0.85 mg/dl), though the differences were slight. The slight decrease in creatinine across treatments may suggest a protective effect of *Justicia carnea* on renal function at lower concentrations (Gernsten, 2009). Urea levels also showed a significant decrease, with T_1 recording 10.15 mg/dl and T_4 recording 8.67 mg/dl. The lower urea levels in T4 may indicate a reduction in protein catabolism or improved nitrogen retention, as observed in studies related to the dietary use of medicinal plants (Obioha, 1992).

CONCLUSION

Broilers treated with *Justicia carnea* exhibited significant differences in hematological and serum biochemical parameters across four treatments. Treatment 1 (T_1) consistently showed the best results, with the highest packed cell volume (PCV), hemoglobin (Hb), red blood cell (RBC) count, and white blood cell (WBC) count, suggesting enhanced oxygen-carrying capacity, erythropoiesis, and immune function. Treatment 4 (T_4), which had the highest concentrations of *Justicia carnea*, recorded the lowest values in most hematological parameters, indicating potential negative effects at higher doses. Serum biochemical parameters revealed that lower inclusion rates had higher total protein, albumin, and globulin levels, while T_4 had lower values. Conversely, glucose levels increased with higher *Justicia carnea* concentrations, implying possible hyperglycemic effects. These results suggest that lower concentrations of *Justicia carnea* positively affect blood and serum parameters, whereas higher concentrations could lead to compromised immune and metabolic functions.

5.2 RECOMMENDATION

- Adopt moderate doses of *Justicia carnea* (T_2-T_3): The lower concentration in T_2-T_3 showed the best overall hematological and biochemical profiles, ensuring better erythropoiesis, immune response, and metabolic stability.
- Avoid high concentrations: Treatments with higher doses, especially T4, led to reduced RBC count, lower hemoglobin content, and compromised immune function, which could negatively impact broiler health.
- Monitor glucose and protein levels: While *Justicia carnea* can have some benefits, higher doses may lead to hyperglycemia and impaired protein synthesis, suggesting that serum biochemical parameters should be regularly monitored.
- Consider dose adjustments based on health objectives: Adjusting *Justicia carnea* supplementation depending on specific health or performance goals, such as immunity boosting or enhanced oxygen transport, can provide more targeted benefits.

REFERENCES

1. Akinmoladun, E.F. 2016. Growth and hematological responses of broiler chickens fed diet supplemented with Justicia carnea leaf extract. Journal of Agricultural Science, 8(9), 167-174
2. Akinmoladun, E.F., &Owojuyigbe, O.S. 2020. Effects of Justicia carnea on the health status and blood profile of animals: A review. African Journal of Biomedical Research, 23(1), 75-81.
3. Awodi, S., Ayo, J. O., Atodo, A. D., Dzende, T. (2005). Some haematological parameter and the erythrocyte osmotic fragility in the laughing dove (streptopellasensgalensis) and the village weaner bird (*ploceuscucullatus*). Proc. Of the 10th Annual Science Assoc. of Nigeria, 384-387.
4. Chineke, C., Ologun, A., Ikeobi, C. (2006). Haematological parameters in rabbit breeds and crosses in humid tropics. Pakistan Journal of Biological Sciences, 9: 2102-2106.
5. Chimaroke Onyeabo.2017- Hematological and biochemical studies on justiciacarnea leave extract

*Corresponding Author: **Urom, S.M.O.C.**

in PHEYNLHYDRAZUNE INDUCED-ANEMIA IN ALBINO RATS.

6. Demoranville, V. E., Best, M. A. (2013). Haematocrit. Encyclopedia of Surgery: A guide for patients and care giver. Available at: enwikipedia.org/wiki/haematology.
7. Duncan, D.B (1995) Multiple Range and Multiple F. Test. Biometrics 11, 1-42. http://dx.doi.org/10.2307/500147
8. Effert , T., & Kaina, B. 2011. Toxicity of medicinal plants. Molecular Aspects of Medicine, 32(2), 89-106.
9. Gernsten, T. (2009). Medline plus Medical Encyclopedia: RBC Indices. Available at: en.wikipedia.org/wiki/red-blood-cell-indices.
10. G.B Havenstein, P.R Ferket, M A Qureshi (2003). Growth, Livability, and feed conversion of 1957 versus 2001 broilers when fed representative 1957 and 2001 broiler diet. Department of poultry Science, North Carolina state university, Raleigh, North Carolina 27695, USA. PMID : 14601725 DOI: 10.1093/ps/82.10.1500
11. Muhammad, Bilal., M. Muneer (2021). A comparative study of some haematological parameter of broiler and indigenous breeds of poultry. International Journal of Agricultural Sciences, 3(4): 189-199.
12. National Root Crop Research Institute, (2022).
13. Obioha, F. C. (1992). A Guide to poultry production in the tropics; Enugu. Acena publisher.
14. Rasheed, H., Mahgoub, D., Hegazy, R., et al. (2013). Evaluation of Urinary Hepcidin as a marker for the early Diagnosis of Iron Deficiency Anemia in Children.
15. Ukpabi-Ugo, J.C, Uho, E.N, LEABO P.O &Ekwere, A.E (2017). Effects of methanol leaves and lipid profile in Alloxin-Induced Diabetic Albino rats.

*Corresponding Author: **Urom, S.M.O.C.**