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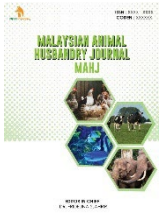

RESEARCH ARTICLE

WHITE BLOOD CELL POPULATION PROFILE OF A BROILER CHICKEN FEED WITH TAMARIND (*TAMARINDUS INDICA*) WATER FOR SIX WEEKS

Ibrahim, M. I[ab], Abubakar S[b], Aliyu-Paiko, M[a], Yahaya M. A[a], Esuwa E. A[a], and Kwatu, A.D[*a]

[a]Department of Biochemistry of Ibrahim Badamasi Babangida University, Lapai, Niger State.
[b]Biotechnology Advanced Research Centre, Sheda Science and Technology Complex, P.M.B. 186, Garki, Abuja, Nigeria.
**Correspondence Author Email: ibrahimyamagi@gmail.com/07039069211.*

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ABSTRACT

Broiler chicken is one of the major sources of protein in developing countries, as antibiotic is the major growth promoter. Studies have shown that antibiotics residues accumulate in the meat, which is dangerous to human health. It is also known that poultry birds have a very low immune response/strength. In this respect, phytobiotic (Tamarind) are used as alternative growth promoters and also to boost the immune system of the poultry birds. In this experiment, Chickens grouped into different treatments were offered water containing tamarind at particular time intervals for the period of Six weeks (Starter period). Blood samples were taken at the end of the sixth week and the White blood cell population and profile were evaluated compared with normal range of chicken hematological indices. The result indicated that WBC population and types in all the treatments are within the normal range WBC (2-4 X10%), Neutrophils (20-40%), Lymphocytes (30-40%), Monocytes (2-8%), Eosinophil's (1-5%) and Basophils (0.5-1.5%). Evaluation of other treatments was within the similar range with the control treatment except for Carrot treatment (those offered water containing tamarind for only the last two weeks) which was slightly higher than the control treatment. It may be concluded that offering water containing tamarind within 5th and 6th week starter period has more impact on the WBC population and profile.

KEYWORDS

Poultry, Population Profile, Tamarind, Water, White Blood Cells.

1. INTRODUCTION

All domestic bird species, including chicken, duck, turkey, guinea fowl, quail pigeon, geese, and similar species are called poultry (Paul, 2019). Farmers keep these birds for a variety of reasons. Poultry are raised mainly for meat and egg production. Other poultry products are feces such as manure, manure, feathers, etc. Poultry has been known to contribute about (10%) of the total national meat production. Experts have discovered that poultry production among other livestock is the fastest means of reducing protein deficiency in Nigeria.

Additionally, it gives the rural populace a flexible cash reserve. Effective management and nutrition are essential for the low-cost, efficient production of poultry goods like meat and eggs worldwide (Sorensen, 1999). Like the majority of agricultural animals, poultry production requires ongoing care seven days a week for them to thrive and fulfill their roles as a source of employment opportunities, financial income, and animal protein for human consumption (Ajani et al., 2016). Poultry production has been regarded as the traditional component of small farms and large farms that can contribute a large quarter to the developing world economy, in Africa it is estimated that (80%) of the poultry production is found in this production system that contributing up to (90%) of the chickens reared and they supply the bulk of the national requirements or eggs and meat for the urban populations (Ajani et al., 2016). In Nigeria, poultry contributes about 15 percent of the total annual protein intake with approximately 1.3kg of poultry products consumed per head per annum (Craig and Helfrich, 2009). Ajani et al., on the other hand, analyzed poultry as general terms for birds of several species such as chickens, fowls, turkeys, ducks, geese, guinea fowl, peafowl, pigeons, partridges, ostriches, and other domestic birds (Ajani et al., 2016). Accordingly, poultry production has Economic Importance that has ever been useful to people since time immemorial. Hence, they kept poultry of different sizes and had the contribution to men because eggs and meats are known to be the most balanced foods, providing people with the necessary vitamins and nutrients, poultry can be considered a food source for men. A large portion of eggs produced are used in the soap and bakery industries to make bread for human consumption, and a smaller portion is used in the pharmaceutical and vaccine industries. Similar to this, eggs can be used as a resource for poultry production and also provide meat that is accepted worldwide as food for human consumption and economic expansion (Ajani et al., 2016).

Tamarinds grow wild in backyards, along roadsides, and in wastelands throughout most of the tropics. The dry fruit known as the tamarind is well suited to arid and semi-arid regions. The fruit has a sausage-shaped pod and is pendulous (El-Siddig et al., 2006). Its brown, curly shell is brittle and easily breaks when pressed. The seeds are frequently arranged erratically within the shell. The seed cavities are surrounded by firm, soft pulp, which is thick and has a blackish color. The pulp's outer surface is covered in three tough, woody fibrous cords that branch from the base to the apex. One to ten seeds can be found in a pod (El-Siddig et al., 2006). The seeds have a reddish-brown color, are shiny, and are extremely hard. They can be used to make "jellose," or pectin, which is superior to other fruit pectin because it can form gels under neutral and basic PH conditions (Pino et al., 2004). Indian date, tamarind, and Madeira mahogany are some of the common English names. Other names are Tamiya (Hausa) in Nigerian languages. The evergreen tropical tree known as the tamarind (Tamarindus indica) is found growing wild primarily in semiarid regions

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of Africa. It is a member of the Caesalpinioidae subfamily within the Fabaceae family of plants. A study state that it is utilized for a variety of gastronomic, medicinal, and decorative purposes (Caluwé et al., 2009).

The study of blood's cellular components, including red blood cells (erythrocytes), white blood cells (leucocytes), and platelets (thrombocytes), as well as how these data are used to diagnose and track disease, is known as hematology (Dawood et al., 2017). Hematological studies help determine the extent of blood damage as well as diagnose a variety of illnesses (Dawood et al., 2017). To better understand how blood characteristics relate to the environment, hematological studies are of ecological and physiological interest (Da Paixão et al., 2017). As a result, they may be helpful in the selection of animals that are genetically resistant to particular diseases and environmental conditions. According to Dawood et al., hematological parameters are useful markers of an animal's physiological state (Dawood et al., 2017).

The parameters of blood and the organs that form blood are known as hematological parameters (Dawood et al., 2017). Also, blood serves as a pathological reflector of an animal's condition after exposure to toxins and other factors (Pereira et al., 2016). Animals with healthy blood composition are probably going to perform well (Pereira et al., 2016). Laboratory blood tests are essential instruments for identifying any deviation from the normal in the body of an animal or a human (Zhou et al., 2009). A vital role in an organism's nutrition, pathology, and physiological state is played by the analysis of blood, which provides the chance to look into the presence of various metabolites and other constituents in animal bodies (Barbieri et al., 2016). Blood composition analysis can yield valuable insights into the diagnosis and prognosis of animal diseases (Mohammed and Sambo, 2010). Blood components alter in response to the physiological state of health (Barbieri et al., 2016). These alterations are useful in determining how animals react to different physiological conditions (Adewumi et al., 2011). Researchers state that variations in hematological parameters are frequently utilized to assess the body's various conditions and identify stresses brought on by dietary, pathological, and/or environmental factors (Mohammed and Sambo, 2010). This research study aims to evaluate the growth response and hematological features of a water-fed chicken broiler containing tamarind.

2. Materials and Methods

2.1 Source of Tamarind and Day-Old Chicks

The Tamarind was found and packaged in sacks from Borgu local government area in Niger state and transported to the experimental location (Ibrahim Badamasi Babangida University lapai, Niger state.). Day old Ross 120 broiler chicks were purchased from CHI Farm Chicks' depot in UK Bello theatre, Minna, Niger state.

2.2 Experimental Location

The research was carried out at the Animal house of the department of Biochemistry, Ibrahim Badamasi Babangida University lapai, Niger state Nigeria. The structure has open sides that allow for cross ventilation in the animal house, where the average temperature was 36 degrees Celsius and the relative humidity was 65% respectively throughout the study's duration. Lapai is located between latitude 9o03N and 6o 34E of the equator and longitude 8o 49N and 6oc 41E of the Greenwich meridian. The region has a tropical climate with three distinct seasons: dry, hot, and humid. The seasons differ, with the rainy season lasting longer than the cool to hot season.

2.3 Housing

The poultry cage has dimension of 1500cm x 1500cm x 1000cm length x breadth x height. It was well thoroughly cleaned and sanitized prior to the experiment's start and arrival of the birds (chickens). Each of the cages was outfitted with a feeder and a drinker to permit unlimited intake of food and water by Ad-libitum. About twenty-four hours a day were spent with light coming from the sun during the day and artificial light added at night.

2.4 Feed Source

Chinkun Nigeria limited

2.5 Experimental Design

The chicks were distributed into five cages; each cage was further sub-divided into two (2) sides, making a total of 10 cages for the different treatment with ten (10) birds per cage. One week prior to the arrival of the birds (chicks), the cage were thoroughly cleaned and disinfected with disinfectant (70% ethanol). The cages were provided with rechargeable lamp each, to lighten the place so as to ensure continuous feed which indicates Ad-libitum in the night. The treatment was named as demonstrated in table 1 below.

Table 1: Weekly Administered of Tamarind with and without treatments

TREATMENT	1ST WEEK	2ND WEEK	3RD WEEK	4TH WEEK	5TH WEEK	6TH WEEK
ORANGE						
MANGO						
APPLE						
GRAPE						
CARROT						

WATER CONTAINING TAMARIND
WATER WITHOUT TAMARIND

ORANGE: This is the control (no tamarind was administered throughout)

MANGO: This is treatment A (Tamarind was administered throughout 6weeks)

APPLE: This is Treatment B (Tamarind was administered only in the first 2weeks)

GRAPE: This is Treatment C (Tamarind was administered only in the 2nd 2weeks)

CARROT: This is Treatment D (Tamarind was administered only in the 3rd 2weeks)

2.6 Data Collection

2.6.1 Weight Determination

The chicks were weighed individually at the start of the experiment to determine the initial weight, subsequently weekly for five (5) weeks; the average body weight was calculated. Feed and water were offered ad libitum daily to each experimental unit. Similarly, the residual feed and water in feeders and drinker respectively were weighed daily. At the end of each week, the average feed and water consumption were calculated.

2.6.2 White Blood Cells Counts and Population

Two chicks per treatment were randomly selected and 2ml of blood was obtained via the wing veins using sterile gauge 25 needles and syringes at the 6th weeks of the study after 12 hours of starvation. The blood was transferred into tubes containing EDTA (Ethylene diamine tetra-acetic acid). This involved thoroughly mixing a freshly collected blood sample and filled into two micro-capillary tubes approximately to two-thirds of their volume with the blood sample and sealed the empty ends with a Bunsen flame. The tubes were thereafter placed in a micro-haematocrit centrifuge in an opposite direction to be balanced, while the sealed end facing outwards. They were centrifuged for 3 minutes at 1500 revolution per minute (rpm). Packed cell volume (PCV) % was read from the micro-haematocrit centrifuge reader. Haemoglobin (g/100ml) is approximately 1/3 of the PCV value (Coles, 1986). White blood cell is 1/6 of the PCV value obtained. The concentration of mean corpuscular hemoglobin, or MCH, is hemoglobin in one red blood cell. It is the amount of haemoglobin expressed in relation to the volume of red blood cell, and also calculated using the formula by Tort et al. (1988). MCH= Hb x 100/PCV measured in g/dl.

3. Result

3.1 Blood Characteristics of Chicks in Response to drinking water containing Tamarind

3.1.1 White Blood cells

The WBC count showed that all the treatments, including the control is within the normal range of 2-4 X10%. And the Treatments A, B and C showed no significant difference ($p<0.05$), only Treatment D (Carrot) showed a significant difference as shown in figure 1 below.

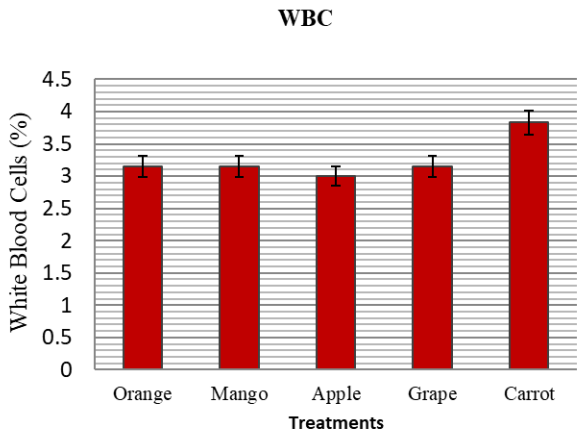

Figure 1: Showing the WBC count in each treatment after 6weeks

3.1.2 Neutrophils

The Neutrophils of all the treatments including the control is within the normal range of 30-40%. The Neutrophils of treatment B (Apple) is the lowest and showed the significant different ($p<0.05$) and the Neutrophils of treatment is higher than that of the control. This has been indicated in the figure 2 below.

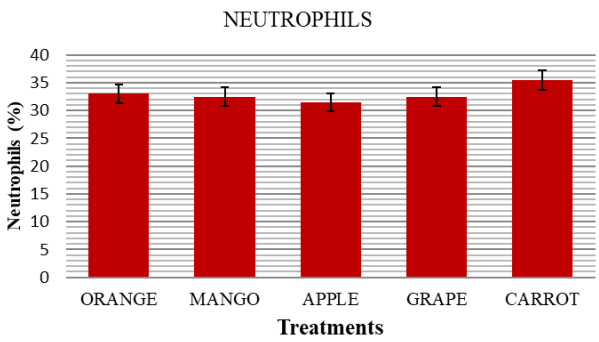

Figure 2: Chart showing the % of Neutrophils in each treatment after 6 weeks

3.1.3 Lymphocyte

Treatment B (Apple) has the least effect on the lymphocytes of the broiler chickens. All the treatments falls within the normal range (20-40) % of lymphocytes and treatment D (Carrot) showed higher value in comparation to the control ($p>0.05$). This has been indicated in the figure 3 below.

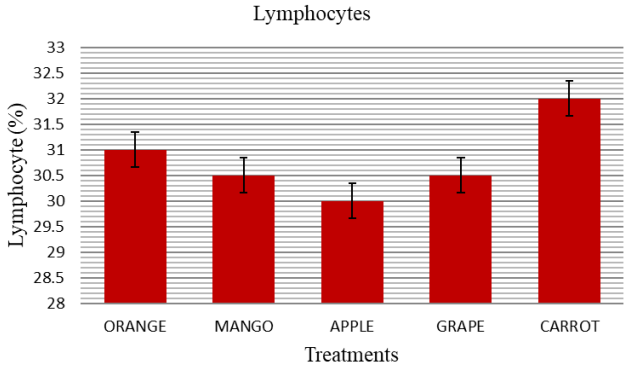

Figure 3: Chart showing the % of Lymphocytes in each treatment after 6weeks

3.1.4 Monocytes

All value of treatments were within acceptable range of (2-8) % and also all the treatment were similar, there was no significant difference. This has been indicated in table 2 below.

3.1.5 Eosinophils

All value of treatments were within acceptable range of (1-4%) and also all the treatment were similar, there was no significant difference. This has been indicated in table 2 below.

3.1.6 Basophils

There was trace of Basophils in all the treatments including the controls, the normal range is (0.5-1.5%) and the result showed Zero (0) see table 4 below.

Table 2: Effect of Water containing Tamarind on Some Blood Variables.

Parameters	Control (ORANGE)	Treatment A(MANGO)	Treatment B (APPLE)	Treatment C(GRAPE)	Treatment D(CARROT)	Normal Volume
White Blood Cell (×10%)	3.15±0.18	3.15±0.18	3±0.00	3.15±0.18	3.83±0.00	2-4
Neutrophils (%)	33±0.00	32.5±0.50	31.5±0.50	32.5±0.50	35.5±1.00	30-40
Lymphocytes (%)	31±0.00	30.5±0.50	30.0±0.00	30.5±0.50	32.0±0.00	20-40
Monocytes (%)	2±0.00	2±0.00	2±0.00	2±0.00	2±0.00	2-8
Eosinophils (%)	1±0.00	1±0.00	1±0.00	1±0.00	1±0.00	1-4
Basophilis (%)	0	0	0	0	0	0.5-1.5

Orange = control, Mango = Water containing tamarind throughout, Apple = Water containing tamarind for first two weeks, Grape = Water containing Tamarind for the Second weeks, Carrot = Water containing Tamarind for the third/last two weeks.

4. Discussion

4.1 White Blood Cells profile of chickens in response to addition of Tamarind to treatments

The White Blood Cells and Its types (Neutrophils, Lymphocytes, Monocytes, Eosinophil's and Basophils) obtained in this study though differed significantly among the group but were within normal range for WBC (2-4 X10%), Neutrophils (20-40%), Lymphocytes (30-40%), Monocytes (2-8%), Eosinophil's (1-5%) and Basophils (0.5-1.5%), in broilers (Fasuyi and Nonyerem, 2007). This observation implies that the birds' health was unaffected during the duration of the study; in fact the study was very excellent. The values obtained for all the treatment groups indicate tamarind is not dangerous to the health of the broiler chickens, since values did not deviate from the normal range and also in this experiment, Treatment D (Carrot) showed the highest value in all the parameters tested and it was still within the normal range. Studies have shown that the higher the WBC and its type (In a control range) the effective it (Smith, 1993). The Treatment with the lowest WBC values is treatment B (Apple) which indicates that feeding Broilers with water containing Tamarind for the first two weeks does not have impact on the White blood Population and profile rather it decreases it. Tamarind has been reported to have positive effect on blood parameters (Davidov-Pardo *et al.,* 2012).

5. Conclusion

The WBC counts showed that Tamarind has effect on the WBC population and profile depending on the time of administration and also Tamarind has no unfavorable effect on broiler Chickens since they were physically healthy and had progressive growth records.

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