PHYSIOLOGICAL RESPONSES OF BROILER CHICKENS OFFERED OLIVE LEAF EXTRACT UNDER HOT HUMID TROPICAL CLIMATE

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Abstract
This study was designed to determine the effects olive leaf extract (OLE) supplementation in the drinking water of broiler chickens under hot-humid tropical climate. Two hundred and forty Arbor acre broiler chickens were used for this experiment and were allotted to four treatment comprising of four replicates of 15 birds each. The birds were offered either 0, 5, 10 or 15ml OL per litre of water in a Completely Randomized Design (CRD). Rectal temperature (RT), haematological indices, serum chemistry and plasma malondialdehyde (MDA) were measured. The data obtained was subjected to analysis of variance (ANOVA). The result obtained showed that OLE improved ($P<0.05$) the average rectal temperature, plasma MDA, blood glucose, globulin. It was concluded that inclusion of 15ml OLE in the drinking water enhanced the physiological response of broiler chickens during hot dry season.

Key words: Physiology, olive leaf extract, broiler, MDA

Introduction

In the last few years, there has been an increasing interest in researches for production of biologically active compounds from natural sources particularly the pursuit in the use of plant products on livestock in order to improve performance, control diseases and the yield (Shafey *et al.* 2013). Medicinal plants, which refer to the whole plant, leaves, flowers and plant extracts can enhance animal performance (Abdel-Wareth et al., 2014). In the search for natural antioxidant additives, much attention has been directed to several herbal preparation used in the diets of broiler chickens including Aloe species, Chinese medicinal herbs, cinnamon, *Acacia nilotica* , neem, garlic, ginger, tulsi and turmeric (Al-Kassie *et al.* 2011) to enhance the performance and also ameliorate the effect of stress on the animals.

Olive trees are rich in phenolic substances having significant biological properties, the most important of which is oleuropein. The leaf extract contains Oleuropein, ligostroside, dimethyl oleuropein, flavonoids including apigenin, kaempferol and luteolin, as well as phenolic compounds such as caffeic acid, tyrosol, and hydroxytyrosol (Chiou *et al*, 2007). A complex phenolic compound, known as oleuropein present in olive leaf has been reported to have many beneficial and health-promoting effects which is associated to its antioxidant property (El-damrawy ,2011). Thus, this study was designed to investigate the effects of olive leaf extract on the physiological response of broiler chicken under hot dry season.

Materials And Methods

Experimental Location and Meteorological Observations

The research was carried out at the Poultry Unit of the Research Farm of the Federal University of Agriculture, Abeokuta, Ogun State, Nigeria (latitude 7° 13′N; longitude 3° 26′E and altitude 76 metre above sea level).

Experimental Birds, Materials and Management

Two hundred and forty day-old-chicks broilers were purchased from a reputable hatchery in Nigeria and were randomly allotted to four treatment groups of four replicates having fifteen birds each. The 4 treatment groups were daily supplied drinking water without OLE (0), with 5, 10 and 15mL of OLE per litre of water. The birds were reared on a deep-litter floor in an open-sided poultry house. The birds were floor-brooded for three weeks on wood-shavings. The chicks were fed *ad libitum* with standard starter mash and thereafter with finisher mash. Water at ambient temperature was supplied *ad libitum* throughout the period of the experiment.

Data collection

Collection of blood samples

4ml blood samples were collected from 2 chickens per replicate each via brachial veins over a period of 30 sec to 1 min using hypodermic syringes. Blood collection was done at the 4th and 8th week of the experiment. The blood was drawn into a heparinized tubes to prevent coagulation Blood samples were then analysed for packed cell volume (PCV), Hb, white blood cells (WBC), red blood cells (RBC), serum protein, serum glucose, serum albumin and globulin, serum creatinine, serum urea, mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin

concentration (MCHC), serum creatine kinase, Aspartate Transaminoferase (AST), Alanine Transaminoferase (ALT).

Plasma malondialdehyde

Plasma was obtained by centrifugation the heparinized blood for 15 min (3500 rpm), and then stored at -20 °C for later analysis. Malondialdehyde concentrations were measured by using the method of Tappel and Zalkin (1959)

Data Analysis

The data collected were subjected to analysis of variance using SAS (2008) statistical package while significant means were compared using Duncan's Multiple Range Test.

Results and Discussion

Table 2 shows the effect of different levels of olive leaf extract on rectal temperature of broiler chicken at different weeks. At the 5th and 8th week there was no significant difference in the rectal temperature of the birds in across the treatment groups but at the sixth week, the rectal temperature of the birds offered 10ml OLE was significantly higher ($P<0.05$) than that of 15ml but similar to those of control and 5ml. Also at the 7th week, the rectal temperature of the birds in control, 5ml and 10ml was similar but significantly higher than that of 15ml.

Table 3 shows the effect of different levels of Olive leaf extract on haematological parameters of broiler chickens at starter phase during hot-dry season. The trend observed in the haematology of the bird's shows that there was no significant effects of different levels of Olive leaf extract on all parameters monitored.

Table 4 shows the effect of different levels of olive leaf extract on the MDA of broiler chickens at finisher phase during hot-dry season. At the starter phase, the serum MDA level observed in the birds in 10ml was significantly ($p<0.05$) than those of the birds in all other treatment groups. Also the birds in 5ml was significantly higher ($p<0.05$) in their serum MDA level than to the birds in 15ml and control. Also was the birds in 15ml was significantly higher ($p<0.05$) in their serum MDA levels than those of the control. At the finisher phase, the serum MDA level observed in the birds in 5ml was significantly higher ($p<0.05$) than those of the birds in all other treatment groups. Also birds in control was significantly higher ($p<0.05$) in the serum MDA levels than those of the birds in 10ml and 15ml. however the birds in 10ml and 15ml was similar in their serum MDA level.

Table 5 shows the effect of different levels of Olive Leaf Extract on serum parameters of broiler chickens at starter phase during hot-dry season.

The birds in all the treatment groups had similar on Total protein, Albumin, Triglyceride, AST and ALT values. However, it was observed globulin level in the birds in 10ml was similar to that of 15ml but significantly ($p<0.05$) than those of the birds in all other treatment groups. Also it was observed that the birds in 5ml was similar in globulin level to that of the control. The blood glucose level decreased progressively with the inclusion of on OLE. The birds in the control and those offered 5ml had a similar level but that of the control was however higher than those of 10 and 15ml.

Discussion

Haematological characteristics of livestock suggest their physiological disposition to the plane of nutrition (Madubuike and Ekenyem, 2006). The haematolgical parameters obtained in this study across the treatment groups were within the normal range values reported by Ogbe et al. (2010). This observation suggests that the addition of OLE was not deleterious to the health of the birds used in this study.

Malondialdehyde level endogenously reflects lipid peroxidation, which is the sequela of diminished anti-oxidant protection as ROS levels increase (Vossen et al., 2011). Antioxidant effects of OLE has been reported (Lee and Lee, 2010). The improved MDA observed in the present study are in agreement with the observation of El-damrawy (2011) who indicated that olive leaves extract significantly increased plasma decreased TBARS. Globulin concentration is direct indicate the humoral immune competence (Swechha *et al.* 2014). In the present study, the higher levels of globulin observed in the birds offered 10 and 15ml suggests a higher immune competence. This observation corresponds to the lower levels of blood glucose and MDA in the birds offered OLE. These improved indices can therefore be attributed to the antioxidant activities of some components of *OLE* (Lee and Lee, 2010).

Conclusion

This study has shown that inclusion of olive leaf extract to the drinking water offered to broiler chickens was significant in the blood parameters among all the treatment group, but had no significant in the haematological parameter.

References

Swechha, A., Arun P., Subha, G. 2014. Overall effect of supplementation of *M. Oleifera* leaf extract on Hematological Parameters of Broiler Chicks. International Journal of Pharmacy and Natural Medicines, 2: *102-*

106.

Madubuike, F.N. and B.U. Ekenyem, 2006. Haematology and Serum Biochemistry characteristics of broiler chicks fed varying levels of Ipomoea asarifolia Leaf Meal. *Int. J. Poult. Sci.*, 5: 09-12.

Ogbe A.O., Atawodi S.E., Abdu P.A., Oguntayo B.O. and Noel D., 2010. Oral treatment of *Eimeria tenella*-infected broilers using aqueous extract of wild mushroom (*Ganoderma* sp): Effect on haematological parameters and histopathology lesions, *Afr. J. Biotec.*, 9(52), 8923-8927.

El-damrawy, S.Z. 2011. Alleviate the oxidative stress in aged rabbit bucks by using olive leave extract. Egypt. Poult. Sci., 31, 4: 737-744.

Lee, O.H.; and Lee, B.Y. 2010. Antioxidant and antimicrobial activities of combined phenolics in olea europaea leaf extract. *Bioresour. Technol.* 101: 3751-3754.

Vossen, E. Ntawubizi, M., Raes, K. Smet, K. Huyghebaert G., Arnouts, S and De Smet, S.2011. Effect of dietary antioxidant supplementation on the oxidative status of plasma in broilers. *J. Anim. Physiol. Anim. Nutr.* 95: 198–205.

SAS. 2008. User's Guide. Ver. 9.2., SAS Institute Inc., Cary, NC., USA.

Tappel, A.L.; and Zalkin, H. (1959). Inhibition of lipid peroxidation in mitochondria by vitamin E. *Arch. Biochem. Biophys.*, 80: 333-336.

Abdel-Wareth, A.A.A., Seddik, H., Hassan, A. 2014. Effects of khaya senegalensis leaves on performance, carcass traits, haematological and biochemical parameters in rabbits. *EXCLI Journal 2014;13:502-512*

Shafey, T. M., Al-Ruqaei, I. M., and Saud, I. A. 2013. Effect of feeding Olive leaves extract (Oleuropein) on performance, nutrient utilization, small intestine and carcass characteristics of broiler chickens. *J. Anim. Vet. Adv.*, 12: 740-746.

Al-Kassie, G.A.M., A.M. Mohseen and R.A. Abd-Al-Jaleel, 2011. Modification of productive performance and physiological aspects of broilers on the addition of a mixture of cumin and turmeric to the diet. *Res. Opin. Anim. Vet. Sci.*, 1: 31-34.

Chiou A, Salta FN, Kalogeropoulos N, Mylona A, Ntalla I, Andrikopoulos NK (2007). Retention and distribution of polyphenols after pan-frying of French fries in oils enriched with olive leaf

Table 2: Effect of different levels of olive leaf extract on the rectal temperature of broiler chickens

	OLE Level					
Week	Control	5ml	10ml	15ml	S.E.M	P-Value
5	40.83	40.45	40.9	40.70	0.15	0.7796
6	40.78^{ab}	40.2^{ab}	41.28^{a}	39.88^{b}	0.21	0.0687
7	40.55^{a}	40.63^{a}	40.5^{a}	39.48^{b}	0.19	0.0926
8	40.25	40.70	40.60	40.00	0.17	0.4816
Average	40.6^{ab}	40.49^{ab}	40.82^{a}	40.01^{b}	0.12	0.0803

[a,b.] Means within a row with different superscripts differ significantly (P< 0.05).

Table 3: Effect of different levels of Olive leaf extract on haematological parameters of broiler chickens at starter phase during hot-dry season

	OLE					
Parameters	Control	5ml	10ml	15ml	S.E.M	P-Value
PCV(%)	32	32.5	27.5	29	0.920	0.1269
HB (g/dl)	9.4	9.05	8.5	7.85	0.289	0.3538
RBC ($x10^{12}$/L)	2.65	2.9	2.15	2.2	0.139	0.1352
WBC($x10^{9}$/L)	12.2	12.7	10.75	12.2	0.447	0.5481
HET (%)	29.5	26.5	31.5	26	1.179	0.3570
LYM (%)	70	72	68.5	73	1.273	0.7086
EOS (%)	0	0.5	0	0.5	0.164	0.6151
BAS (%)	0	1	0	0	0.25	0.4789
MONO(%)	0.5	0	0	0.5	0.163	0.6151

PCV – Packed Cell Volume, HB – Haemoglobin, WBC - White blood cell, HET – Heterophil, LYM – Lymphocyte, EOS – Eosinophil, BAS – Basophil

Table 4: Effect of different levels of olive leaf extract on the MDA of broiler chickens at finisher phase during hot-dry season

	OLE Levels					
Phase of Growth	Control	5ml	10ml	15ml	SEM	P Value
Starter phase (µmol/mL)	3.21^{a}	2.56^{b}	3.04^{d}	1.92^{c}	0.64	0.0001
Finisher phase (µmol/mL)	8.04^{a}	6.73^{b}	2.48^{c}	2.44^{c}	0.65	0.0001

[a,b.c:] Means within a row with different superscripts differ significantly (P< 0.05).

Table 5: Effect of different levels of Olive Leaf Extract on serum parameters of broiler chickens at starter phase during hot-dry season

	OLE Levels					
Parameters	Control	5ml	10ml	15ml	S.E.M	P-value
Total protein (g/l)	4.1	4.85	4.65	4.55	0.16	0.4915
Albumin (g/l)	2.5	3.15	2..4	2.6	0.16	0.4497
Globulin (g/l)	1.6^{c}	1.7^{bc}	2.25^{a}	1.95^{ab}	0.09	0.0148
Glucose (mg/dl)	139^{a}	138^{ab}	130^{bc}	125^{c}	2.32	0.0252
Triglyceride (mg/dl)	84	80	86	87	4.08	0.9632
Aspartate amino-transferase (Iu/l)	59	67	76.5	62.5	3.47	0.3681
Alanine amino-transferase (Iu/l)	23	22	22.5	20.5	1.13	0.9286

[a,b,c,] Means within a row with different superscripts differ significantly (P< 0.05).