The Pharma Innovation Journal 2018; 7(4): 20-24

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(4): 20-24

www.thepharmajournal.com
Received: 08-02-2018
Accepted: 11-03-2018

Rajesh Dalal
Ph.D. Research Scholar, Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Parveen kumar Ahlawat
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Vinus
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Sonu
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

VS Panwar
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

BS Tewatia
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Nancy Sheoran
Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Correspondence
Sylvester O
Ph.D. Research Scholar, Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Effect of amla fruit powder on haemato-biochemical parameters of broiler poultry chicken

Rajesh Dalal, Parveen kumar Ahlawat, Vinus, Sonu, VS Panwar, BS Tewatia and Nancy Sheoran

Abstract
To study the effect of dietary supplementation of amla fruit powder on haemato-biochemical parameters of broiler chicken, 300 commercial broiler chicks were randomly distributed into six treatments having five replicates consisting of ten birds each. The chicks fed with standard basal diet in two different growth phases i.e. starter (0-28d) and finisher (29-42 d). The first group was kept as control (T_1) and given the basal diet without antibiotic, while second group (T_2) was given basal diet with antibiotic. In third (T_3), fourth (T_4), fifth (T_5) and sixth (T_6) groups, basal diet was supplemented with amla fruit powder @ 0.25%, 0.50%, 0.75% and 1%, respectively. The birds were weighed fortnightly to calculate performance parameters *viz.* feed intake, body weight change and FCR. At the end of the feeding trial (6^{th} week), blood samples were collected from one broiler per replicate, making five samples per treatment and thus a total of 30 samples were analyzed using automatic haemoanalyzer.% mean values for heterophil ranged from 23% (T_6) to 29% (T_1) and lowest heterophil count was found in T_6 group and this differ significantly from the control group. Mean values for lymphocytes ranged from 61.80% (T_1) to 68.40% (T_6) and differs significantly among amla supplemented and the control group. Mean values for this ratio ranges between 0.336 (T_5) to 0.473(T_1) and significantly lowest ratio was found in T_5 and T_6 group as compared to control group. Values of serum cholesterol content under different treatments were ranged between 135.79 mg/dl to 153.47 mg/dl and significantly lowest serum cholesterol value was reported in the 1% amla fruit powder (T_6) supplemented group. Supplementation of amla fruit powder results in decreased levels of total cholesterol and LDL, whereas HDL content of meat was increased as compared to control.

Keywords: Amla, cholesterol, Heterophil, HDL, LDL

Introduction
The practice of feeding livestock with sub therapeutic levels of antibiotics has been in use for over fifty years. Use of antibiotics has negative effects on animal health and its production such as residues in tissues, withdrawal period and development of resistance in microorganisms [1]. Recently, the emphasis is being directed towards the search of herbal formulations which could be effective for amelioration of stress and leads to increase in production of birds. Several Indian herbs are reported to possess adaptogenic, antistress and immunomodulator properties [2]. Herbs, spices and various plant extracts have received increased attention as possible antibiotic growth promoter replacements. In this view, the plants identified with properties of secondary metabolites became interesting due to their antimicrobial, antioxidant effects and their stimulating effects on animal performance and digestive enzymes. At present, there are large numbers of Natural Growth Promoters (NGPs) available in the market including herbs, probiotics, prebiotics and synbiotics etc. The use of naturally occurring compounds like herbs, herbal preparations and other botanicals are preferred over chemical compounds to satisfy consumer concerns over safety and toxicity [3]. Amla powder also possesses antistress, adaptogenic, immunogenic and other properties resulting in better performance of broilers [4, 2].

Materials and Methods
Ethical approval: The animal experiment was conducted in accordance with guidelines approved by the Institutional Animal Ethics Committee, 12/CPCSEA Dated 6.2.2017 in the Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar.

Experimental Design
Completely Randomized Design (CRD) was used as experimental design at uniform and standard management practices.

Birds and Management
A total of 300 commercial broiler chicks (Ven Cobb strain) were randomly distributed into six treatments having five replicates consisting of ten birds each. The chicks fed with standard basal diet in two different growth phase i.e. starter (0-28d) and finisher (29-42 d). The first group was kept as control (T_1) and given the basal diet without antibiotic, while in second group (T_2) basal diet was given with antibiotic. The diet in third (T_3), fourth (T_4), fifth (T_5) and sixth (T_6) groups were supplemented with amla fruit powder @ 0.25%, 0.50%, 0.75% and 1%, respectively. Birds were vaccinated against F1 strain of Ranikhet disease on 3rd day and IBD on 14th day. The birds were weighed fortnightly to calculate growth performance parameters *viz.* feed intake, body weight gain and FCR. At the end of the feeding trial (6th week), blood samples were collected from one broiler per replicate, making five samples per treatment and thus a total of 30 samples were analyzed. About 2 ml of blood was collected from each bird via brachial wing vein puncture using sterilized syringes and 5 ml scalp vein needle set into vacutainer containing ethylene diamine tetraacetic acid (EDTA) for haematology.

Figuring and composition of diets
Basal ration was formulated as per BIS (2007) [5] to fulfill the metabolizable energy (ME) and crude protein requirements of birds. Level of crude protein in starter (0-4weeks) and finisher (4-6weeks) ration was 22 percent and 20 percent, respectively. The respective ME content was 3000 and 3200 KCal/kg are presented in Table 1. All feed ingredients, additives and supplements used in the experiment were procured in one lot before the start of the experiment. The ingredients, additives and supplements used in the diet formulation were maize, soybean meal, vegetable oil, fish meal, mineral mixture, vitamins, coccidiostat, lysine, DL-methionine and amla fruit powder. The sources, composition and mixing rate of additives/supplements used in ration formulations are presented in Table 2. The experimental chicks were reared under deep litter system. The floor of the pens was thoroughly cleaned, disinfected before scattering of the bedding material. Well chopped dry wheat straw was used as bedding material to form the litter. The straw was evenly spread upto 5 cm thickness. The litter was regularly racked to avoid any lump formation. Wooden brooders fitted with bulb in the centre were used in each pen for brooding. The feeding programme consisted of a starter diet until 28 days and a finisher diet from 29 to 42 days of age. Weighed amount of feed was offered on paper sheets for first 3 days and thereafter, in the automatic feeders up to 28 days of age. Afterwards, the feed was offered through hanging feeders maintained at appropriate heights. The chicks were provided *ad libitum* clean drinking water through the plastic waterers during first two weeks of the experiment. Thereafter, bigger plastic waterers were used till the end of the experiment. Individual body weight of chicks was recorded at 0 day age and thereafter fortnightly. At the end of the experiment, one bird from each replicate was slaughtered ethically by mechanical stunning followed by exsanguinities.

Table 1: Chemical composition of feed ingredients used in ration formulation

Ingredient	CP (%)	CF (%)	EE (%)	TA (%)	Lysine* (%)	Methionine* (%)	ME* (kcal/kg)
Maize	9.11	2.44	3.44	2.25	0.18	0.15	3300
Soybean meal	45.15	3.93	3.16	8.47	2.57	0.76	2230
Fish meal	47.40	1.79	5.16	26.62	1.42	1.42	2210

*Calculated values (Singh and panda 1992) [6]

Table 2: Ingredient composition of experimental diets during different phases of growth

Ingredient (kg /100 kg of feed)	0-4wks	4-6 wks
Maize	58	60
Soybean meal	30	25
Fish meal	7	7
Vegetable oil	3	6
Mineral mixture	2	2
Feed addivites (g/100 kg feed)		
Spectromix	10	10
Spectromix BE	20	20
Veldot	50	50
Choline chloride	50	50
Lysine	50	50
DL-methionine	150	150

Composition, sources and rate of mixing of feed additives/supplements
1. Spectromix: Powder (Ranbaxy Animal Health, New Delhi). Each gm. contained VitaminA-82,500 IU, Vit D3-12000 IU, Vit B2-50 mg and Vit.K-10mg.Mixing rate: 10 g/100Kg of feed.
2. Spectromix BE: Powder (Ranbaxy Animal Health, New Delhi). Each gm. Contained Vit.B1- 8mg, Vit.B6- 16mg, Vit.B12- 80mg, niacin-120mg, calcium pentothenate-80mg, Vit. E-160 mg, Lysine hydrochloride-10 mg, DL-methionine-10 mg and calcium 260 mg. Mixing rate: 20g/100kg of feed.
3. Veldot: Venkeys- Dinitro-O-Toluamide (Coccidiostat). Mixing rate: 50g/100kg of feed.
4. Choline chloride: Contain 60 percent choline. Mixing rate: 50g/100kg of feed.
5. Lysine: Contained 98% lysine. Mixing rate: 50g/100kg of feed.
6. DL-methionine: Contained 98% methionine. Mixing rate: 150g/100kg of feed.

Serum Parameters
Blood samples were collected from the slaughtered birds in non-heparinised tubes and in EDTA tubes for haematology using auto analyser. The samples were centrifuged at 3000 rpm for 15 minutes and serum obtained was stored at -20^{0}C until analysis. Serum parameters were determined by auto analyzer using commercial kits. Serum samples were analysed for different serum variables like Total cholesterol, Triglyceride, HDL, LDL and VLDL.

Statistical Analysis
Data was analysed statistically as described by Snedecor and Cochran (1994). Analysis of variance was used to study the differences among treatment means and they were compared

by using Duncans Multiple Range Test (DMRT) as modified by Kramer (1956).

Results

Data pertaining to haematological parameters of the experimental birds under different dietary treatments are presented in Table 3. Mean values of Hb% ranged from 10.06% (T_3) to 12.78% (T_5) and significantly higher values for Hb% were obtained in T_5 group. RBC and WBC mean values not differ significantly among the supplemented and control group.% mean values for heterophil ranged from 23% (T_6) to 29% (T_1) and lowest heterophil count was found in T_6 group and this differ significantly from the control group. Mean values for lymphocytes ranged from 61.80% (T_1) to 68.40% (T_6) and differ significantly among amla supplemented and the control group. Mean values for this ratio ranges between 0.336 (T_5) to 0.473(T_1) and significantly lowest ratio was found in T_5 and T_6 group as compared to control group.

Table 3: Haematological parameter of bird's under different dietary treatments

Treatments	Hb%	RBC×10^6/µl	WBC×10^3/µl	Heterophil%	Lymphocyte%	H:L*
T_1	11.48^{ab}±.391	2.59^{ab}±.081	255.56^{ab}±2.32	29.20^{a}±.861	61.80^{c}±1.02	.473^{a}±.022
T_2	11.34^{ab}±.482	2.62^{ab}±.081	255.98^{ab}±2.54	26.20^{b}±1.11	64.60^{b}±1.16	.407^{b}±.024
T_3	10.06^{b}±.891	2.38^{b}±.232	240.32^{b}±13.3	26.80^{b}±.731	64.40^{b}±.871	.417^{b}±.017
T_4	11.52^{ab}±.414	2.95^{ab}±.331	264.48^{a}±7.19	26.20^{b}±.581	65.00^{b}±.442	.403^{b}±.011
T_5	12.78^{a}±1.04	3.08^{a}±.191	267.16^{a}±5.04	24.00^{c}±.311	67.60^{a}±.241	.355^{c}±.005
T_6	12.70^{a}±.801	2.86^{ab}±.211	256.22^{ab}±2.13	23.00^{c}±.312	68.40^{a}±.401	.336^{c}±.006

Means bearing different superscripts in a column differ significantly (P<0.05)
*****Heterophil: Lymphocyte *ratio*

Serum parameters

Serum cholesterol

Serum cholesterol content of different dietary treatments is shown in the Table 4. Values of serum cholesterol content under different treatments ranged between 135.79 mg/dl to 153.47 mg/dl and significantly lowest serum cholesterol value was reported in the 1% amla fruit powder supplemented group (T_6). Other dietary treatments viz. T_3, T_4 and T_5 also showed significantly lower serum cholesterol content than the control group.

Table 4: Serum cholesterol, triglycerides, HDL, LDL and VLDL under different dietary treatments

Treatments	Cholesterol (mg/dl)	Triglycerides (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
T_1	153.47^{a}±1.94	84.86±0.37	35.98^{c}±1.03	100.51^{a}±2.38	16.97±0.07
T_2	152.01^{a}±2.61	85.07±0.24	37.87^{bc}±1.16	97.12^{ab}±2.40	17.01±0.04
T_3	145.27^{b}±2.35	84.78±0.23	37.70^{bc}±1.29	90.61^{bc}±2.45	16.95±0.05
T_4	142.81^{bc}±1.75	84.81±0.16	39.47^{abc}±1.44	86.38^{c}±3.04	16.96±0.03
T_5	138.10^{cd}±1.46	84.74±0.19	42.19^{a}±0.68	78.95^{d}±1.89	16.94±0.04
T_6	135.79^{d}±1.56	84.59±0.22	40.93^{ab}±1.21	77.93^{d}±2.02	16.91±0.04

Means bearing different superscripts in a column differ significantly (P<0.05)

Serum triglycerides and VLDL

Value of serum triglycerides (mg/dl) under different dietary treatments ranged from 84.59 mg/dl (T_6) to 85.07 mg/dl (T_2). No significant difference was observed between amla supplemented and control group. Also no significant difference was observed in VLDL concentration among different supplemented group. Dietary supplementation of amla powder improved the HDL value significantly than the control group. Also significantly lower values for LDL concentration were obtained in 1% amla supplemented group. Supplementation of amla fruit powder results in decreased total cholesterol and LDL, whereas HDL content of meat was increased as compared to control.

Discussion

Mean values of Hb% ranged from 10.06% (T_3) to 12.78% (T_5) and significantly higher values of Hb% were obtained in T_5 group. RBC and WBC mean values also differ, but not significantly among the supplemented and control group.% mean values for heterophil ranged from 23% (T_6) to 29% (T_1) and significantly lowest heterophil count was found in T_6 group. Mean values for lymphocytes ranged from 61.80% (T_1) to 68.40% (T_6) and differs significantly among amla supplemented and the control group. Mean values for Heterophil: Lymphocyte (H: L) ratio ranges between 0.336 (T_5) to 0.473 (T_1) and significantly lowest ratio was found in T_5 and T_6 group as compared to control group. Our results are in agreement with the finding of [7] who reported that stress was indicated by increased percentage of heterophils and decreased percentage of lymphocytes and thus high H/L ratio (0.71). Supplementation of anti-stressor products vitamin C (0.39) and Ayucee liquid (0.69) significantly lowered the H/L ratio in broiler chicken. Vitamin C is reported to reduce plasma corticosterone, a stress hormone, and the heterophil: lymphocyte ratio. Similarly in present study numerical increase in values of Hb, TEC and TLC was found and results are in accordance with [8] who reported significant increase in the values of hemoglobin (Hb), packed cell volume (PCV) and total leukocyte count (TLC) in the treatment groups supplemented with phytogenic addivtives. [9] observed that 'Growell' herbal immunomodulator caused a significant increase in the haematological parameters in IBD vaccinated chicks. However, [10] found no significant effect with the addition of peppermint to the diet on blood traits, whereas the Heterophile/Lymphocyte ratio significantly increased in treatments as compared to control. Values of serum cholesterol content under different treatments ranged between 135.79 mg/dl to 153.47 mg/dl and significantly lowest serum cholesterol value was reported in the 1% amla fruit powder (T_6) supplemented group. Other dietary treatments viz. T_5, T_4 and T_3 also showed significantly lower serum cholesterol content than the control group. Value of serum triglycerides (mg/dl) under different dietary treatments ranged from 84.59 mg/dl (T_6) to 85.07 mg/dl (T_2). No significant difference was

observed between amla supplemented and control group. Also, no significant difference was observed in VLDL concentration among different supplemented and control group. Triglycerides are produced in the liver by hepatic lipogenesis and are secreted into the plasma [11, 12]. Dietary supplementation of amla powder improved the HDL value significantly than the control group. Also significantly lower values for LDL concentration were obtained in 1% amla supplemented group. Supplementation of amla fruit powder results in decreased levels of total cholesterol and LDL, whereas HDL content of meat was increased as compared to control. Similar results were obtained by [13] who reported that supplementation of broiler diet with amla has resulted in lower cholesterol, higher SAP, higher SGPT and normal SGOT in broilers. These results for lipid profile concentration agree with [14] and [15] who noted that *Curcuma longa* supplementation to the rabbit diets statistically decreased LDL and TG concentrations in plasma. Where, inclusion of *Curcuma longa* in the rabbit diets led to an increase in the 3-hydroxy-3-methylglutaryl coenzyme reductase inhibitor activity [15] thereby, the reduction of 3-hydroxy- 3-methylglutaryl coenzyme reductase resulted in a decrease in TC biosynthesis in rat cells [16]. Lowering TC effects may be mediated by the stimulation of hepatic cholestrol-7-hydroxylase activity as TG digestibility was not affected by curcumin addition [17]. Another finding from [18] supplemented commercial layer-ration with black cumin seeds and observed that serum triglycerides and total cholesterol contents were reduced, while serum high density lipoprotein (HDL) cholesterol level was increased. However, [19] observed that the abdominal fat percentage, breast and thigh muscle cholesterol in broilers showed no significant difference among treatment groups due to dietary inclusion of Aloe vera and *Curcuma longa* and their combination. On contrary, [20] reported significant increase in serum cholesterol level in male broilers fed diet with turmeric powder.

Conclusions

Based upon the above study, it can be concluded that amla fruit powder can be effectively supplemented as an alternative to antibiotic growth promoter in poultry ration regards with growth performance, anti-stress and biochemical parameters. Heterophils count was significantly reduced in amla supplemented group as compared to control group. An increased percentage of heterophils and decreased percentage of lymphocytes indicate stress. So this indicates anti-stress effect of amla by reducing plasma corticosterone, a stress hormone, and the heterophil: lymphocyte ratio. Dietary supplementation of amla powder improved the serum HDL level as compared to the control. Also, lower values of LDL concentration were obtained in 1% amla supplemented group which differ significantly from the control group. Lowest serum cholesterol value was reported in the 1% amla fruit powder (T_6) supplemented group which significantly differ from the control group which might be due to increase in the 3-hydroxy-3-methylglutaryl coenzyme reductase inhibitor activity thereby, the reduction of 3-hydroxy- 3-methylglutaryl coenzyme reductase resulted in a decrease in Total Cholesterol biosynthesis.

References

1. Botsoglou NA, Fletouris DJ. Drug residues in foods: pharmacology, food safety, and analisis. 2001.
2. Wadhwa D, Sood S, Meena K, Sharma VK, Chounan JS. Effect of supplementation of gooseberry (*Emblica officinalis*) powder supplementation on biological performance of commercial broilers. XXIV Annu. Conf. of IPSA and National Symposium 25-27 April 2007. Ludhiana: 2007, 95
3. Makkar HP, Francis G, Becker K. Bioactivity of phytochemicals in some lesser-known plants and their effects and potential applications in livestock and aquaculture production systems. Animal. 2007; 1(9):1371-91.
4. Sapcota D, Upadhyaya TN, Islam R, Choudhury KB Dev. Effect of dietary *Emblica officinalis* in ameliorating aflatoxicosis in broiler chicken: gross and histopathological studies. Indian Poultry Science Association, XXIII Annual Conference, 2005.
5. BIS. Nutrient Requirements of Poultry IS: 1374. Bureau of Indian Standards New Delhi, India, 2007.
6. Singh KS, Panda B. Feed additives. Poultry Nutrition, 1992, 134-143.
7. Kumar M, Kumar V, Roy D, Kushwaha R, Vaiswani S. Application of herbal feed additives in animal nutrition-a review. International Journal Livestock Research. 2014; 4:1-8.
8. Mushtaq M, Durrani FR, Imtiaz N, Sadique U, Hafeez A, Akhtar S *et al*. Effect of administration of Withania somnifera on some hematological and immunological profile of broiler chicks. Pakistan Veterinary Journal. 2012; 32:70-2.
9. Borkar BS, Harne SD, Kalorey DR, Godbole SM, Ingle VC, Kurkure NV. Effect of 'Growell'a herbal immunomodulator in infectious bursal disease vaccinated chicks. Journal of Immunology and Immunopathology. 2002; 4(1and2):79-83.
10. Al-Kassie GA. Influence of two plant extracts derived from thyme and cinnamon on broiler performance. Pakistan Veterinary Journal. 2009; 29(4):169-73.
11. Lanza-Jacoby S. Effect of continuous and discontinuous intravenous or intragastric total parenteral nutrition in rats on serum lipids, liver lipids and liver lipogenic rates. The Journal of nutrition. 1986; 116(5):733-41.
12. Herzberg GR, Rogerson M. Hepatic fatty acid synthesis and triglyceride secretion in rats fed fructose-or glucose-based diets containing corn oil, tallow or marine oil. The Journal of nutrition. 1988; 118(9):1061-7.
13. Vidyarthi VK, Nring K, Sharma VB. Effect of herbal growth promoters on the performance and economics of rearing broiler chicken. Indian Journal of Poultry Science. 2008; 43(3):297-300.
14. Quiles JL, Mesa MD, Ramírez-Tortosa CL, Aguilera CM, Battino M, Gil Á *et al*. Curcuma longa extract supplementation reduces oxidative stress and attenuates aortic fatty streak development in rabbits. Arteriosclerosis, Thrombosis, and Vascular Biology. 2002; 22(7):1225-31.
15. Wientarsih I, Chakeredza S, ter Meulen U. Influence of curcuma (Curcuma xanthorrhiza Roxb) on lipid metabolism in rabbits. Journal of the Science of Food and Agriculture. 2002; 82(15):1875-80.
16. Amin D, Gustafson S, Weinacht JM, Cornell SA, Neuenschwander K, Kosmider B *et al*. RG 12561 (Dalvastatin): A novel synthetic inhibitor of HMG-CoA reductase and cholesterol-lowering agent. Pharmacology. 1993; 46(1):13-22.
17. Asai A, Nakagawa K, Miyazawa T. Antioxidative effects

of turmeric, rosemary and capsicum extracts on membrane phospholipid peroxidation and liver lipid metabolism in mice. Bioscience, biotechnology, and biochemistry. 1999; 63(12):2118-22.
18. Akhtar MS, Nasir Z, Abid AR. Effect of feeding powdered Nigella sativa L. seeds on poultry egg production and their suitability for human consumption. Veterinarski arhiv. 2003; 73(3):181-90.
19. Mehala C, Moorthy M. Effect of Aloe vera and Curcuma longa (Turmeric) on carcass characteristics and biochemical parameters of broilers. International Journal of Poultry Science. 2008; 7(9):857-61.
20. Emadi M, Kermanshahi H. Effect of turmeric rhizome powder on performance and carcass characteristics of broiler chickens. International Journal of Poultry Science. 2006; 5(11):1069-72.