Effect of Force 6® Poultry (Curcumin) on Lipid profile in Broiler chicken in presence of IBD vaccine

Amjed H. Ulaiwi[1], Shony M. Odishio[2] and Salah M. Hassan[3]
[1]Department of Pathology, [2]Department of Microbiology, College of Veterinary Medicine, Baghdad University, [3]Mosul University, Iraq.
E-mail: amjed_alseidy@yahoo.com
Accepted: 12/01/2015

Summary

The aim of this study was to investigate effect of Force 6® Poultry on lipid profile in broiler chicken in presence of IBD vaccine. Two hundred chicks at one day old were divided into four equal groups as: Group 1; 50 day old unvaccinated chicks were given (50 gm/ton) of Force 6® Poultry (curcumin) along the experimental period (35 days), chicks in group 2; were given IBD vaccine in (15-day old) (BURSINE-2), chicks in group 3 were vaccinated with IBD at (15-day old) and given Force 6® Poultry along time of experimental (with 50 gm/ton). Group 4, 50 chicks were saved as negative control. Blood samples were collected from heart for lipid profile detection and included (cholesterol, triglyceride, high-density lipoprotein HDL, very low density lipoprotein VLDL, low-density lipoprotein LDL). The result of lipid profile showed significant ($P<0.05$) differences with higher value between groups which were (G2, G4) which did not receive force 6 poultry than group (G1, G3) which received force 6 poultry for (cholesterol, triglyceride, HDL, LDL,VLDL). In conclusion, the Force 6® Poultry had main effect to improve lipid profile of treated groups than these groups untreated.

Keywords: Force 6® Poultry, lipid profile, broiler chicken, IBD vaccine.

Introduction

Force 6® Poultry (curcumin) is an innovative and patented premixture of feed additives ensuring the controlled release of active component curcumin in a bio-available form. Force 6 Poultry is a performance booster designed for high productive animals. The expected effects are an improvement of immunity and a limitation of anti-inflammatory process and oxidative stress which orient metabolism into a protection of organism instead of growth and feed efficiency (1). The Curcumin (*Curcuma longa*) plant, a perennial herb belonging to the ginger family, is cultivated extensively in south and southeast tropical Asia (1). The rhizome of this plant is also referred to as the "root" and is the most useful part of the plant for culinary and medicinal purposes. The most active component of turmeric is curcumin, which makes up 2 to 5% of the spice (2). Numerous studies suggest that curcumin lowers serum cholesterol levels (3). Soudamini et al. (4) investigated the effect of oral administration of curcumin on serum cholesterol levels and on lipid peroxidation in the liver, lung, kidney, and brain of mice treated with carbon tetrachloride and cyclophosphamide. Oral administration of curcumin significantly lowered the increased peroxidation of lipids in these tissues, produced by these chemicals. Administration of curcumin also significantly lowered the serum and tissue cholesterol levels in these animals, indicating that the use of curcumin helps in conditions associated with peroxide-induced injury, such as liver damage and arterial diseases. Soni and Kuttan (5) examined the effect of curcumin administration in reducing the serum levels of cholesterol and lipid peroxides in ten healthy human volunteers receiving 500 mg of curcumin per day for 7 days significant decrease in the level of serum lipid peroxides, an increase in high density lipoproteins (HDL)-cholesterol, and a decrease in total serum cholesterol were noted. Because curcumin reduced serum lipid peroxides and serum cholesterol, the study of curcumin as a chemopreventive substance against arterial diseases was suggested. Yasni et al. (6) investigated the effects of *Curcuma xanthorrhiza* on serum and liver lipids, serum HDL cholesterol, apolipoprotein, and liver lipogenic enzymes. In rats given a cholesterol-free diet, *Curcuma xanthorrhiza* decreased the concentrations of serum triglycerides,

phospholipids, and liver cholesterol and increased the concentrations of serum HDL-cholesterol and apolipoproteins. Also the oxidation of low-density lipoproteins (LDL) plays an important role in the development of atherosclerosis. Atherosclerosis is characterized by oxidative damage, which affects lipoproteins, the walls of blood vessels, and subcellular membranes. Several studies suggest that curcumin inhibits oxidation of LDL (7). Dietary curcuminoids have lipid-lowering potency in high fat diet, probably due to alterations in fatty acid metabolism (8). The aim of this study was to investigate effect of Force 6® Poultry on lipid profile in broiler chicken in presence of IBD vaccine.

Materials and Methods

Experimental Designs: The experiment was carried out in the experimental unite of poultry diseases, department of pathology. College of Veterinary Medicine, Baghdad University. Two hundred and twenty, one day old broilers chickens Rose 308 breed were used to carry out this experiment from 1 day to 35 days. At day one, twenty chicks were chosen randomly for blood samples collection. The blood samples were collected for estimation the lipid profile concentrations. The rest two hundred chicks were divided into four equal groups, including three treated groups and one control group, chicks for each group were reared in sterile separated pens under good hygienic condition the control group was reared in separated room. The experimental groups and their treatment were explained as below.

Experimental Groups: Group 1: 50 chicks were give immune modulator from 1-at the end of experiment.(with 50gm/ton). Group 2: 50 chicks were give IBD vaccine in (15-day old) (BURSINE-2). Group 3: 50 chicks were give immune modulator all time of experiment and IBD vaccine at (15-day old). Group 4: 50 chicks as negative control.

Note: challenge test for all groups was done in 28 day old by IBDV in dose ($10^{4.4}$/ TCID50).

Lipid profile: Serum Triglycerides, cholesterol, HDL-C cholesterol and LDL-C cholesterol concentrations were measured enzymatically using (Automatic Biochemical Analyzer system-KENZA 240TX). The test was carried out according to the manufacturer's assay protocol, the results appear regarding to BioLabo company program. While VLDL cholesterol was calculated according to Fred ward formula: (Triglycerides / 5 = VLDL) (9).

The Statistical Analysis System-SAS (2010) was used to affect of different previous factors on (cholesterol, Tri.G, HDL, VLDL, LDL) study parameters. Chi-square test was used to significant compare between percentage and least significant difference-LSD multiple range tests was used to compare between means in this study (10).

Results and Discussion

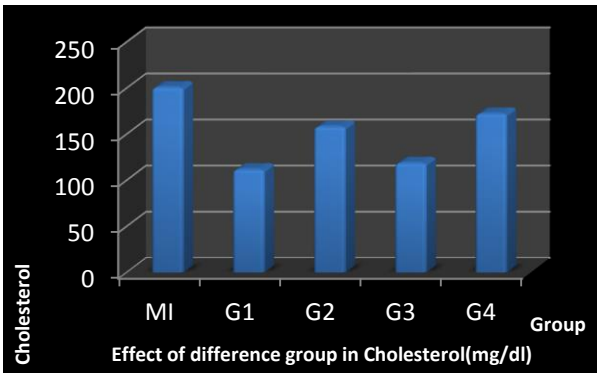
The results of lipid profile were explained in chicken after 28day of force 6® Poultry feed and vaccinated with IBD vaccine (Bursine-2) as in (Table, 1). A: Cholesterol: The results showed significant ($P<0.05$) increase by maternally cholesterol concentration (MI) with higher value at (200.80 ± 19.42) than other groups, so significant ($P<0.05$) difference in (G2-G4) at (158.10 ± 3.95 /172.20 ± 13.73) respectively than (G1-G3) at (111.60 ± 10.94 /118.60 ± 6.60) respectively. B: Triglyceride (Tri. G): The results of (Tri. G) revealed significant ($P<0.05$) increase in maternally with higher value at (285.40 ± 45.23) than other groups, also significant ($P<0.05$) difference in (G2-G4) at (171.50 ± 13.96 / 157.00 ± 12.30) respectively than (G1-G3) at (126.20 ± 11.77 /102.50 ± 13.43) respectively. As well as significant ($P<0.05$) difference in (G1) at (126.20 ± 11.77) than (G3). C: High-Density Lipoprotein (HDL): The results of (HDL) appeared significant ($P<0.05$) increase in maternally (MI) with higher value at (104.67 ± 3.77) than other groups, so significant ($P<0.05$) difference in (G1-G3) at (82.51 ± 10.29 / 88.54± 6.56), respectively than (G2-G4) at (60.13 ± 17.75 /61.40 ± 3.54), respectively. D: Very Low-Density Lipoprotein (VLDL): The results of (VLDL) demonstrated significant ($P<0.05$) increase in maternally with higher value at (57.08 ± 2.86) than other groups, as well significant ($P<0.05$) difference in (G2-G4) at (34.30 ± 2.79 /31.40 ± 2.46) respectively than (G1-G3) at (25.24 ± 2.35 /20.50 ± 2.68) respectively. E: Low-

Density Lipoprotein (LDL): The results of (LDL) explaned significant (P<0.05) increase in maternally and (G2-G4) with higher value at (38.03 ± 10.42 / 38.90 ± 7.58 /37.48 ± 3.97) respectively than (G1-G3) at (24.20 ± 3.63 / 24.72 ± 6.05), respectively.

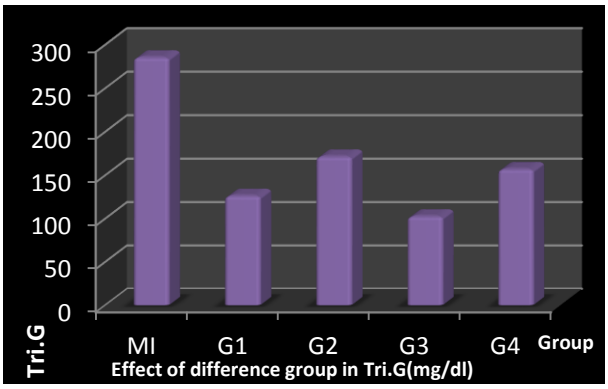
Table, 1: Effect of difference group in lipid profile (mean ± SD)

Group	Mean ± SD				
	Cholesterol	Tri.G	HDL	VLDL	LDL
MI	200.80 ± 19.42 a	285.40 ± 45.23 a	104.67 ± 3.77 a	57.08 ± 2.86 a	38.03 ± 10.42 a
G1	111.60 ± 10.94 c	126.20 ± 11.77 c	82.51 ± 10.29 b	25.24 ± 2.35 c	24.20 ± 3.63 b
G2	158.10 ± 3.95 b	171.50 ± 13.96 b	60.13 ± 17.75 c	34.30 ± 2.79 b	38.90 ± 7.58 a
G3	118.60 ± 6.60 c	102.50 ± 13.43 d	88.54± 6.56 b	20.50 ± 2.68 d	24 .72 ± 6.05 b
G4	172.20 ± 13.73 b	157.00 ± 12.30 b	61.40 ± 3.54 c	31.40 ± 2.46 b	37.48 ± 3.97 a
LSD Value	16.853 *	20.977 *	10.025 *	4.195 *	6.134 *

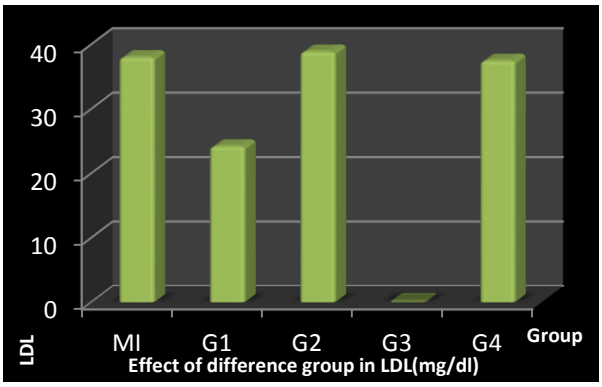
Different letters appear: Significant differences among means in column.



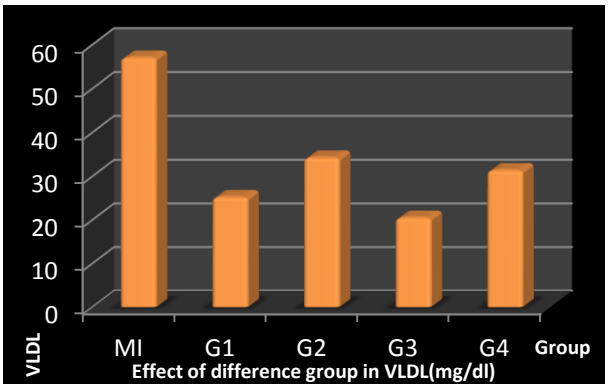
Figure, 1: Effect of difference group on serum Cholesterol concentration (mg/dl).



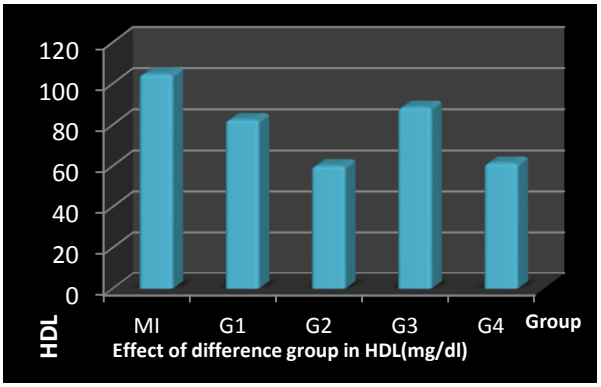
Figure, 2: Effect of difference group on serum Tri.G concentration (mg/dl).



Figure, 3: Effect of difference group on serum LDL concentration (mg/dl)



Figure, 4: Effect of difference group on serum VLDL concentration (mg/dl).



Figure, 5: Effect of difference group on serum HDL concentration (mg/dl).

The present study revealed that curcumin possesses hypolipidemia effect manifested by significantly decrease of lipid serum cholesterol (Fig. 1), Tri.G (Fig. 2), LDL (Fig. 3), and VLDL (Fig. 4), as compared with control. As well as curcumin had elevated effect on HDL-C (Fig. 5), when compared with curcumin free groups, (11) demonstrated the normal value of Serum lipids (triglyceride, cholesterol, HDL-C cholesterol, LDL-C cholesterol, and VLDL) in clinically healthy broilers ostriches. The results were as follows:

the mean±SD of triglyceride, cholesterol, HDL-C, LDL-C, and VLDL in broiler serum was (190 ± 82, 183 ± 46, 118 ± 24, 24 ± 8, and 38 ± 16 mg/dl), respectively. The serum lipid values showed highly significant difference between broilers and ostriches, this result matched other results like (12). Who explained that Curcumin significantly ($p<0.05$) reduced triglycerides at 1.5% and 2.5% and cholesterol and LDL at 2.5%. Similarly, the graded curcumin powder (0.05 to 0.20%) significantly decreased serum triglyceride, total cholesterol, and LDL but increased HDL in laying hens at 104 weeks of age (13). Moreover, it has been reported that hens (28 wk) fed curcumin at 1.0% significantly decreased yolk total lipid by 13.95% (14). However, recent study showed a significant reduction of triglycerides with no effects on other lipid parameters in subjects treated with curcuminoids (1 g/day) (15). As well, (16) demonstrated that increase in serum concentration of total cholesterol was not modified by exogenous antioxidants, increased level of high-density lipoprotein cholesterol (HDL-C) in serum of hypothyroid rats was further enhanced by vitamin E and curcumin. Moreover, a significant elevation in mitochondrial lipid peroxidation and protein carbonylation was noticed in hypothyroid groups treated with vitamin E and curcumin. Moreover (17) explained that the bile duct epithelial fold length was significantly increased ($P<0.01$) in broiler chickens fed curcumin. Curcumin has been known to produce hyperplasia of bile duct muscles and increase bile flow output. But some studies have watched the contrary results (18) showed the curcumin concentration was greater after capsule than powder administration. Consumption of either dose of curcumin did not significantly affect triglycerols, or total, LDL, and HDL cholesterol over 1 month or 6 months. However, the concentrations of plasma curcumin and serum cholesterol were positively and significantly correlated.

Curcumin consumption does not appear to have a significant effect on the serum lipid profile, unless the absorbed concentration of curcumin is considered, in which case curcumin may modestly increase cholesterol.

In general this discrepancy with our study and others may explain the variation among the experimental units or the source of curcumin. The significant reduction of serum lipids clearly indicated the hypolipidemic affects of curcumin which was dose-dependent due to the production of hyperplasia of bile duct muscles and the increase of bile flow output also alterations in fatty acid metabolism.

References

1. Aggarwal, B.; Indra, D.; Bhatt, B.; Ichikawa, H.; Ahn, K. S.; Sethi, G.; Santosh, K.; Sundaram, S. C.; Seeram, N. and Shishodia, S. (2006). Curcumin - Biological and Medicinal Properties. Pp: 297-368.
2. Aggarwal, B. B.; Kumar, A. and Bharti, A. C. (2003). Anticancer potential of curcumin: preclinical and clinical studies. Anticancer Res., 23(1): 363-398.
3. Rao, D. S.; Sekhara, N. C.; Satyanarayana, M. N. and Srinivasan, M. (1970). Effect of curcumin on serum and liver cholesterol levels in the rat. J. Nutr., 11: 1307-1315.
4. Soudamini, K. K.; Unnikrishnan, M. C.; Soni, K. B. and Kuttan, R. (1992). Inhibition of lipid peroxidation and cholesterol levels in mice by curcumin. Indian J. Physiol. Pharmacol., 36(4): 239-243.
5. Soni, K. B. and Kuttan, R. (1992). Effect of oral curcumin administration on serum peroxides and cholesterol levels in human volunteers. Indian J. Physiol. Pharmacol., 36(4): 273-275.
6. Yasni, S.; Imaizumi, K.; Nakamura, M.; Aimoto, J. and Sugano, M. (1993) Effects of Curcuma xanthorrhiza Roxb. and curcuminoids on the level of serum and liver lipids, serum apolipoprotein A-I and lipogenic enzymes in rats. Food Chem. Toxicol., 31(3): 213-218.
7. Naidu, K. A. and Thippeswamy, N. B. (2002) Inhibition of human low density lipoprotein oxidation by active principles from spices. Mol. Cell Biochem., 229(1-2):19-23.
8. Asai, A. and Miyazawa, T. (2001). Dietary curcuminoids prevent high-fat diet-induced lipid accumulation in rat liver and epididymal adipose tissue. J. Nutr., 131(11): 2932-2935.
9. Fred, H. M. and Grundy, M. S. (1972). Comparison of effects of dietary saturated, monounsaturated, and polyunsaturated fatty acids on plasma lipids and lipoproteins in man. Journal of Lipid Research. 26: 194-202.

10. SAS. (2010). Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.
11. Khaki, Z.; Khazraiinia, P.; Chegini, S. and Nia, S. K. (2010). Comparative study of serum lipid profile in chicken, ostrich, cattle, and sheep. Comparative Clin. Path., 21(3): 259-263.
12. Arshami, J.; Pilevar, M.; Azghadi, M. A. and Raji, A. R. (2013). Hypolipidemic and antioxidative effects of curcumin on blood parameters, humoral immunity, and jejunum histology in Hy-line hens. Avicenna J. Phytomed., 3(2): 178–185.
13. Kermanshahi, H and Riasi, A. (2006). Effect of turmeric rhizome powder (Curcuma longa) and soluble NSP degrading enzyme on some blood parameters of laying hens. Int. J. Poult. Sci., 5:494–498.
14. Radwan, N. L.; Hassan, R. A.; Qota, E. M. and Fayek, H. M. (2008). Effect of natural antioxidant on oxidative stability of eggs and productive and reproductive performance of laying hens. Int. J. Poult. Sci., 7: 134–150.
15. Mohammadi, A.; Sahebkar, A.; Iranshahi, M.; Amini, M.; Khojasteh, R.; Mobarhan, M. G. and Ferns, G. A. (2012) Effects of supplementation with curcuminoids on dyslipidemia in obese patients: A randomized crossover trial. Phytother Res., 26(11) ISSN 0951-418.
16. Subudhi, U.; Das, K.; Paital, B.; Bhanja, S. and Chainy, B. N. (2009). Supplementation of curcumin and vitamin E enhances oxidative stress, but restores hepatic histoarchitecture in hypothyroid rats. Life Sci., 84: 372–379.
17. Namagirilakshmi, S.; selvaraj, P.; Nanjappan, k.; Jayachandran, S. and Visha, P. (2010). Turmeric *(CurCuma longa)* as an alternative to in-feed antibiotic on The gut health of broiler chickens. Tamilnadu J. Vet. Anim. Sci., 6(3): 148-150.
18. Baum, L.; Cheung, K. K.; Mok, C. T.; Lam, C. W.; Leung, P. Y.; Hui, E.; Ng, C. Y.; Chow, M.; Ho, P. C.; Woo, S. J.; Chiu, F. K.; Goggins, W.; Zee, B.; Wong, A.; Mok, H.; Cheng, K. F.; Fong, C.; Lee, S. W.; Chan, M. H.; Szeto, S. L.; Lui, W. C.; Tsoh, J.; Kwok, C. Y.; Chan, H. S. and Lam, W. K. (2007). Curcumin effects on blood lipid profile in a 6-month human study. Pharma. Res., 56: 509–514.

تأثير القوة 6® للدواجن على ملف الدهون في دجاج اللحم بوجود لقاح التهاب الجراب المعدي

امجد حسين عليوي[1] و شوني ميخائيل اوديشو[2] و صلاح مهدي حسن[3]

[1]فرع الامراض، [2]فرع الأحياء المجهرية، كلية الطب البيطري، جامعة بغداد، [3]جامعة الموصل، العراق.

E-mail: amjed_alseidy@yahoo.com

الخلاصة

استعمل في التجربة 200 فرخة بعمر يوم واحد قسمت الى اربع مجاميع متساوية بواقع خمسين فرخة على النحو التالي (المجموعة الاولى): 50 فرخة اعطيت القوة 6 للدواجن بجرعة (50غم- للطن) من عمر يوم الى نهاية التجربة (35 يوم). (المجموعة الثانية): 50 فرخة اعطيت لقاح الكمبورو (بورسين-2) بعمر 14 يوم. (المجموعة الثالثة): 50 فرخة اعطيت القوة 6 للدواجن بجرعة (50غم- للطن) من عمر يوم الى نهاية التجربة بالإضافة الى لقاح الكمبورو (بورسين-2) بعمر 14 يوم. (المجموعة الرابعة): 50 فرخة كمجموعة سيطرة. ملف الدهون تشمل (الكولسترول، الدهون الثلاثية، البروتين الدهني عالي الكثافة HDL، البروتين الدهني منخفضة الكثافة جدا VLDL، البروتين الدهني منخفض الكثافة LDL). نتيجة الدهون الجانبي إظهار اختلافات معنوية مع قيمة أعلى بين المجموعات التي كانت للمجاميع 2 و 4 التي لا تلقى القوة 6 الدواجن من المجاميع 1و3 التي تلقت القوة 6 الدواجن لكل من (الكولسترول، الدهون الثلاثية، البروتين الدهني عالي الكثافة، البروتين الدهني منخفضة الكثافة جدا، البروتين الدهني منخفض الكثافة). تستنتج الدراسة: كان لمنتج القوة 6® للدواجن التأثير الرئيسي لتحسين مستوى الدهون في الدم لمجموعة الافراخ التي عولجت بالقوة 6® للدواجن بالمقارنة مع المجموعات التي لم يتم علاجها.

الكلمات المفتاحية: القوة 6® للدواجن، ملف الدهون، دجاج اللحم، لقاح التهاب الجراب المعدي.