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EFFECTS OF DIETARY VITAMIN C SUPPLEMENTATION ON SERUM BIOCHEMICAL PARAMETERS OF BROILERS

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ABSTRACT

The research study was undertaken to investigate the effect of different schedules of administration of Vitamin C serum biochemistry of broilers chicks. A total of 45 (Arbor-Acres) day old chicks were used in this study. Five levels of Vitamin C at the rate of supplemented with 30mg/kg, 60mg/kg, 90mg/kg and 120mg/kg feed of vitamin C was incorporated into the basal diet for six weeks. Feeding period for all groups was lasted for 42 days. Relevant data was recorded throughout the experiment till the termination of experiment. Significant decreased total cholesterol and VLDL was observed in Treatment T_4. It is concluded that schedule on the basis receiving infusion three days in a week is more potent than other schedule of research study.

KEYWORDS: Broiler, Vitamin C, VLDL, lipoprotein, cholesterol.

INTRODUCTION

An important economic goal of the poultry industry is to increase the productivity. However, the productivity of this industry is threatened by climatic, physical and social stressors Dreiling *et.al*.1997. High temperature in poultry-house reduces feed intake, body weight gain and feed efficiency. Furthermore, high ambient temperature causes the release of corticosterone and catecholemines. Corticoids depress immune system function, reduce serum protein concentrations and increase blood glucose concentrations which have damaging effect on poultry performances by decreasing body weight gain and egg production. Therefore, maximum production requires the elimination of the deleterious impacts of environmental stressors Bollengier *et. al*. 1998, Dreiling *et.al*.1997.

Several methods are available to reduce the adverse effects of high ambient temperature on performance of poultry. Since cooling of animal buildings is expensive, alternative methods are preferred to reduce the negative effects of environmental stressors. By decreasing synthesis and secretion of corticosteroids, dietary vitamin C has been reported to have beneficial effects on poultry housing under heat stress Anderson et. al. 1996, Mcdowell *et. al*.1989, Mowat *et.al*. 1994, Sahin *et. al*. 2001. Vitamin C, also referred to as ascorbic acid or ascorbate, participates in numerous biochemical reactions. Although poultry can synthesise vitamin C, dietary supplementation with vitamin C is thought to be beneficial when metabolic demand likely exceeds endogenous supply Jones *et al*.1996, Pardue *et. al*.1986. Plasma ascorbic acid concentrations were reduced in animals stressed by environmental temperature Mcdowell *et. al*.1989. Moreover, ambient temperature impairs absorption of vitamin C and increases the dietary requirement of this vitamin Klasing *et. al*.1998, Freeman *et. al* 1967. Therefore, we intended to study the effects of vitamin C on some biochemical parameters in serums of broilers exposed to heat stress. Furthermore, we also aimed to compare the effects of different dietary doses of Vitamin C on biochemical markers.

MATERIAL AND METHOD

A total of 45 DOC of same hatch were procured and randomly distributed into five groups i.e. T_0 (Control), treatments T_1, T_2, T_3 and T_4 with three sub groups comprising of three birds in each to serve as replicates.

Table 1 Ingredient and nutrient composition of experimental diet (%DM).

Ingredients (%)	**Broiler starter (0 – 21 days)**	**Broiler finisher (22 –42 days)**
Maize	60.00	63.00
Ground nut cake	23.11	18.00
Fish meal	13.00	15.00
Mineral mixture	3.00	3.00
Common salt	0.22	0.33
Vitamin premix (vit. A,B_2,D_3)	0.02	0.02
TM – 100	0.10	0.05
Amprosol	0.05	0.05
Nuvimin	0.05	0.55
Nutrient composition		
Moisture (%)	6.29	6.22

Crude Protein (%)	23.29	21.28
Total Ash (%)	8.02	9.34
CP	22.00	19.00
ME (Kcal/Kg)	2900	3000

Broilers in treatment T_0 were fed diet as per NRC standard CP 22 and ME 2900 and broilers in T_1, T_2, T_3 and T_4 were fed standard ration T_0 supplemented with 30mg/kg, 60 mg/kg, 90mg/kg and 120mg/kg feed of vitamin C. All broilers were offered feed and water adlib all time. They were housed in metal type battery cages in small animal laboratory of S.S. and AH Dairying, SHIATS Allahabad. A bulb of 15 watt was left on in each cage. Initial weight of each chick was recorded on arrival and then weekly. Then vitamin C was mixed with standard feed mixture according to the ratio mentioned. Chicks were provided 0.8 sq.ft/bird space. Cages, feeders, waterers and other equipments were properly cleaned disinfected and sterilized before use. The waterers were disinfected with 0.02% KMnO4 solution every day. At the end of the experimental period, 20 birds per group were randomly selected animals were killed by decapitation and blood samples were collected in tubes. Serum was separated by centrifugation at 1700 g, at room temperature, for 10 minutes. The analyses of serum were carried out according to the manufacturer's instructions. Lipid profile including total cholesterol, Triglyceride, HDL, LDL and VLDL were determination using Elitech Kit technique as described by Werner et al. (1981). Data obtained on various parameters were tabulated and statistically analyzed using analysis of variance (ANOVA) technique as per Snedecar & Cocharan (1994) in RBD.

RESULT AND DISCUSSION

The research study was conducted to investigate the effect of Vitamin C on biochemical of broiler chicks. Significant ($P<0.05$) differences in the mean serum total cholesterol and very low density lipoprotein (VLDL) values were recorded among the treatments presented in Table 2. Means Total cholesterol level is presented in table 2. Treatment T_4 receiving 120 mg/kg feed of vitamin C at the rate was incorporated into the basal diet for six weeks showed lower total cholesterol (235.30mg/dl) level but significant in between treatment. Means Triglyceride level is presented in table 2.

Table 2: Mean±SE Total cholesterol, Triglycerides, High-density lipoprotein, Low-density lipoprotein and Very low-density lipoprotein in broiler chicks with supplementation of Vitamin C.

Treatment	Total cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
Control(T_0)	249.20±3.9[a]	253.66±3.4	120.53±3.3	31.21±1.8	91.65±1.3[a]
30mg(T_1)	248.20±2.2	249.44±2.4	121.40±4.1	32.21±0.6	91.41±2.9
60mg(T_2)	245.00±3.8	248.33±3.3	121.17±4.8	31.21±4.6	85.91±3.4
90mg(T_3)	239.60±2.1	247.55±4.8	123.59±2.8	30.61±0.8	84.51±3.2
120mg(T_4)	235.30±5.1[b]	246.55±5.4	124.24±3.2	29.74±0.3	81.31±1.8[b]

ab means in the same column with no common superscript differ significantly (P≤0.05).

Treatment T_4 receiving 120mg/kg feed of vitamin C at the rate was incorporated into the basal diet for six weeks showed lower triglyceride (246.55mg/dl) level but non significant in between treatment. Our findings are supported the observation of and Jayant and Dhuley (1997), who reported that ashwagandha (*Withania somnifera*) prevented the rise in LPO in rabbit and mice and Babu et al. (1997), who fed herbal plant to diabetic rats and found low value of serum cholesterol and serum triglyceride. Result of our findings are comparable with the findings of Nishant et al. (2006), who reported that Withania somnifera significantly (P<0.05) lowered the cholesterol in hypercholesteremic male albino rats. Result of our findings are relevant to the result of Andallu and Radhika (2000), who reported significant decrease in cholesterol and triglycerides in hyperlipidemic rats, while feeding *Withania somnifera* extract to the mice. Means High density lipoprotein (HDL) level is presented in table 3.Treatment T_4 receiving 120 mg/kg feed of vitamin C at the rate was incorporated into the basal diet for six weeks showed higher HDL (124.24mg/dl) level but non significant in between treatment. Result of our findings are opposed by the findings of Nishant et al. (2006), who reported that Withania somnifera significantly (P<0.05) increased the HDL in hypercholesteremic male albino rats. Mean serum low-density lipoprotein (LDL) values were found *non* significant among the treatments presented in Table 2. The lower serum low density lipoprotein value was recorded in treatment T_4 than control. The results of present study are in agreement with result of Babu et al. (1997), who fed herbal plant, cur cumin to diabetic rats and found low values of serum LDL. Mean serum very low density lipoproteins (VLDL) values were observed lower in Treatment T_4 than control group Table 2. The results

of present study are in agreement with result of Babu et al. (1997), who fed herbal plant, cur cumin to diabetic rats and found low values of serum VLDL. It was concluded that there was a significant effect of different treatments of Vitamin C supplementation in feed on significant decreased total cholesterol and VLDL was observed in Treatment T_4 in broilers was observed in ration supplemented with 120mg/kg feed of vitamin C. From economic point of view feed containing 120mg/kg feed of vitamin C was better due to significantly lowest feed consumption and improved feed conversion ratio.

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