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RESEARCH ARTICLE
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Effect of shatavari and vitamin E on hemato-biochemical profile of broilers during the winter season

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Abstract

Aim: The study was carried out to investigate the effect of shatavari and vitamin E on hemato-biochemical profile of broilers during the winter season.

Materials and Methods: For this 120 day old chicks, randomly distributed into six groups were reared up to 6 weeks on standard managemental conditions. The powder of shatavari and vitamin E was added to the basal diet@ 0% and 0 mg/kg feed, 1% and 0 mg/kg feed, 1.5% and 0 mg/kg feed, 0% and 200 mg/kg feed, 1% and 200 mg/kg feed, 1.5% and 200 mg/kg feed in T_1 to T_6 respectively.

Results: The significant ($p<0.05$) increase in hematological parameters like total erythrocyte counts, hemoglobin, packed cell volume, mean corpuscular volume, mean corpuscular Hb and mean corpuscular Hb concentration in shatavari and vitamin E treated groups than control group. Whereas biochemical parameters like total serum protein, albumin, globin were significantly ($p<0.05$) higher and cholesterol, alanine aminotransferase and aspartate aminotransferase were significantly ($p<0.05$) lower in shatavari and vitamin E treated groups than control group.

Conclusions: Supplementation of shatavari and vitamin E supplementation removes cold stress and improves immuno status of broilers.

Keywords: broilers, shatavari, vitamin E.

Introduction

The poultry is one of the important components of farmer's economy. It provides additional income and job opportunities to a large number of rural populations in the shortest possible time. Poultry farming has assumed much importance due to the growing demand of poultry products especially in urban areas because of their high food value. "Shatavari" is an herbal plant known as the "queen of herbs" in ayurveda having properties like nutritive tonic, ant stress [1]. The root powder of *Asparagus racemosus* (AR) is used as an herbal feed additive which augments the appetite and stimulates the liver function. The tuberous roots of shatavari are well known for its galactogogue and anabolic activity [2,3] and it appears in many ayurvedic preparations as growth promoters and immuno-stimulant. Hemoglobin (Hb) and packed cell volume (PCV) concentration increased in the treatment group supplemented with 1% shatavari root powder as compared to control the group of broiler chicken [4,5]. Bhardwaj *et al.* [6] reported that the supplementation of shatavari root powder in broiler birds improved the protein level in the blood. Serum cholesterol level observed lower in shatavari treated group of rats Bhosale *et al.* [7]. Vitamin E is a primary biological antioxidant preferentially retained in cellular membrane and provides the first line of defence against oxidative damage. Vitamin E has been an excellent biological function as a natural antioxidant prevents the oxidation of unsaturated lipid materials within cells, thus protecting the cell membrane oxidative damage [8]. A combination of selenium and vitamin E has been shown to play a major role in the development and maintenance of defence systems [9]. Dietary inclusion of vitamin E increased the PCV, Hb and total leukocyte count levels in the blood as compared to control the group of broiler chicken [10].

Therefore the present study was planned to explore the effect of shatavari and vitamin E on hemato-biochemical profile of broilers during the winter season.

Materials and Methods

Ethical approval

The project proposal of the Ph.D. research programme to conduct this study was duly approved by Institutional Animal Ethics Committee of Veterinary and Animal Sciences College, Meerut.

Experiment design and feeding

The experiment was conducted while winter season on 120 day old broiler chicks maintained at experimental poultry farm, SVBPUAT, Modipuram, Meerut - 250 110, Uttar Pradesh, India. 120 day old broiler chicks randomly divided into six groups of 20 (n=20) in each. Group 1 (T_1) supplemented commercial ration only served as control. Group II (T_2) supplemented commercial starter ration +1% shatavari root powder. Group III (T_3) supplemented commercial starter ration +1.5% shatavari root powder. Group IV (T_4) supplemented commercial starter ration + vitamin E 200 mg/kg feed. Group V (T_5) supplemented commercial starter ration +1% shatavari root powder + vitamin E 200 mg/kg feed. Group VI (T_6) supplemented commercial starter ration +1.5% shatavari root powder + vitamin E 200 mg/kg feed. Shatavari (AR) root purchased from the farmer and vitamin E capsules (Evion® 400, Merck Ltd.) were provided through thoroughly mixed with broiler starter feed. Broilers starter feed purchased from the local market at Meerut of which chemical composition given in Table-1. Each group was reared on deep litter up to 6 weeks on standard management conditions.

Sampling and analysis

The hematological parameters were studied at the end of 6th week reported for hemoglobin, determined by acid heatin methods using Sahli's hemometer, PCV by micro hematocrit methods, total erythrocyte count (TEC) as per Natt and Herrick [11]. Mean corpuscular volume (MCV), mean corpuscular Hb (MCH), and mean corpuscular Hb concentration (MCHC) was calculated by PCV, Hb, and TEC. The biochemical parameters such as total serum protein, albumin, globulin (by subtraction), alanine aminotransferase (ALT), aspartate aminotransferase (AST) and cholesterol were also performed at 6th week of age by kits supplied Span Diagnostics Ltd. Surat, Gujarat (India).

Statistical analysis

Data were analyzed by the generalized linear model procedure of statistical software package SPSS version 19 (SPSS for Windows, V19.0; SPSS, Chicago, IL, USA). The model was used to estimate the treatment (shatavari and vitamin E supplementation) effect on hematological and biochemical parameters:

$$Yij=\mu+Ti+eij$$

Where Yij=Dependent variable; μ=Overall mean of the population; Ti=Mean effect of shatavari and vitamin E treatment (i=1… 6); and eij=Unexplained residual element assumed to be independent and normally distributed.

The pair-wise comparison of means was carried out using "Tukey's multiple range test."

Table-1: Chemical composition of broiler starter feed.

Chemical constituents	Starter feed (%)
Moisture	9.89
Dry matter	90.10
Ash	8.5
Organic matter	91.5
Crude protein	25
Ether extract	5

Results and Discussion

The results of the study showed a significant ($p<0.05$) difference in TEC between treatment groups and control (Table-2). Feeding of shatavari (alone) and its combination with vitamin E significantly ($p<0.05$) increased TEC as compared to control. Similarly, it was reported that a significant ($p<0.05$) increase in erythrocytes and leukocytes count in broilers supplemented with aromatic herbal extract [12].

Hb level is observed significantly higher in T6 group in comparison to other groups and the lowest level of Hb observed in control (Table-2). Rekhate *et al.* [4] reported that significant ($p<0.01$) rise in Hb due to the inclusion of 1% shatavari root powder in treatment groups of broilers. Pal *et al.* [13] reported that Hb levels increase in herbal tonic (superlive, AV/SSL/12, liver tonic brand A and liver tonic brad B) treated groups. Galib *et al.* [14] reported that the Hb levels higher in treatments compared with the control group.

PCV level was observed higher in treatment groups in comparison to control group (Table-2). Similar results also reported by Thatte and Dhanukar [15] with different level of shatavari supplementation in broiler. Rekhate *et al*. [5] also reported that shatavari supplementation increase the PCV level in the blood. Present study showed that T6 has the highest level of PCV in comparison to other groups. It may be due to supplementation of shatavari and vitamin E. Similar results have been reported by Gowda *et al.* [16] who observed a significant increase in PCV values at 10% inclusion levels of shatavari.

In the present study, MCV was found significantly lower in treatment groups in comparison to control. Similar trends were also observed in levels of MCH and MCHC (Table-2). The observed values of MCV, MCH and MCHC, were in the normal range as reported by Onu [17] and Zomrawi *et al.* [18,19].

Treatments groups have significantly ($p<0.05$) higher total serum protein level than the control as shown as in present results (Table-3). Similar finding also reported by Rekhate *et al.* [4] who observed that significant ($p<0.01$) rise in serum total protein due to enclosion of 1% shatavari root powder in treatment groups. Bhardwaj *et al.* [6] reported that the effect of shatavari (AR) root powder was added over the basal ration at 0.0%, 0.5%, 1% and 1.5%, which showed a significant ($p<0.05$) increase in the serum total protein levels.

Treatment groups have significantly ($p<0.05$) higher albumin level in comparison to the control group (Table-3). Kumari *et al.* [20] reported that serum albumin was significantly ($p<0.05$) higher in herbal

(1% methiorep) treated group as compared to control the group as observed in our results. Rekhate *et al.* [5] reported that the albumin was higher in shatavari supplementation groups in comparison to non-supplemented group. Present findings revealed that feeding of shatavari and vitamin E alone or in combination increase the blood albumin level in broiler birds.

The results revealed higher level of plasma globulin in the treatment groups than that of the control group (Table-3). The entire group did not show a significant difference among themselves. Increase in the plasma globulin in the treatment groups may be due to feeding of root of shatavari and vitamin E. Similar findings had been reported by earlier investigators [5,20].

Treatment groups have lower AST level in comparison to control group (Table-3). These finding are in close agreement with that of Pal *et al.* [13] who reported that low AST level in herbal tonic (superlive, AV/SSL/12, liver tonic brand A and liver tonic brad B) treated group as compared to control, indicating normalization of liver functions in herbal liver tonic supplemented groups in broiler. Bulbul *et al.* [21] also reported that AST level decreased in AR supplemented groups compared to non-supplemented groups. Present findings revealed that feeding of shatavari and vitamin E alone or in combination decrease the blood AST level in broiler birds.

The result indicates significantly ($p<0.05$) lower blood ALT level in treatment groups as compared to the control group (Table-3). Similar findings had been also reported by Sharma *et al.* [22] who found that the significant ($p<0.001$) declined level of *ALT* in Swiss albino mice, due to supplementation of aqueous root extract of AR @ 50 mg and 150 mg/kg body weight/day freshly dissolved in distilled water. Rehman *et al.* [23] also reported that AR supplanted group has lower blood ALT level as compared to non-supplemented group.

Present experiment showed that total cholesterol levels were lower in treatment groups than the control group and difference among the treatment groups were significant ($p<0.05$) (Table-3). Similar findings also reported by Bhosale *et al.* [7] reported that AR root powder as 5 g% feed supplementation to hyperlipidemic rats resulted in a decrease of total serum cholesterol. Rekhate *et al.* [5] reported that total lipid level decreased in shatavari supplemented group compared to non-supplemented broiler. The observed values of cholesterol level in the normal range reported by Rekhate *et al.* [5] and Gupta *et al.* [24].

Conclusions

RBC, Hb, PCV, MCV, MCH, MCHC, total serum protein, albumin and globin level was increased in shatavari and vitamin E supplemented groups whereas ALT, AST and cholesterol level was decreased in shatavari and vitamin E supplemented group in comparison to control group. Which indicates that shatavari and

Table-2: Effect of shatavari and vitamin E on hematological parameters in different groups during winter season.

Item	Group						SEM	p value
	T1	T2	T3	T4	T5	T6		
TEC (10^6 cell/mm^3)	2.37^a	2.53^b	2.55^c	2.53^b	2.56^d	2.74^e	0.01	<0.001
Hb (g/dl)	12.28^a	12.44^b	12.52^c	12.34^a	12.62^d	12.80^e	0.04	<0.001
PCV%	27.73^a	29.63^c	29.81^d	29.56^b	29.88^e	30.75^f	0.02	<0.001
MCV (fL)	117.13^{cd}	117.20^d	117.12^{cd}	116.78^{bc}	116.65^b	112.24^a	0.28	<0.001
MCH (pg)	51.89^d	49.20^c	49.20^c	48.76^b	49.27^c	46.73^a	0.20	<0.001
MCHC (g/dl)	44.29^d	41.98^{bc}	42.01^{bc}	41.75^{ab}	42.24^c	41.63^a	0.14	<0.001

T_1=Control, T_2=1% shatavari supplemented group, T3=1.5% shatavari supplemented group, T4=200 mg/kg feed vitamin E supplemented group, T5=1% shatavari root powder+200 mg/kg feed vitamin E supplemented group, T6=1.5% shatavari root powder+200 mg/kg feed vitamin E supplemented group, Means with different superscripts in small letters in a row differ significantly ($p<0.05$). SEM=Standard error of the mean, TEC=Total erythrocyte count, Hb=Hemoglobin, PCV=Packed cell volume, MCV=Mean corpuscular volume, MCH=Mean corpuscular hemoglobin, MCHC=Mean corpuscular hemoglobin concentration

Table-3: Effect of shatavari and vitamin E on biochemical parameters in different groups during winter season.

Item	Group						SEM	p value
	T1	T2	T3	T4	T5	T6		
Total serum protein (mg/dl)	5.40^a	5.71^c	6.04^d	5.63^b	6.35^e	6.71^f	0.07	<0.001
Albumin (mg/dl)	3.06^a	3.40^c	3.75^d	3.34^b	4.10^e	4.51^f	0.04	<0.001
Globulin (mg/dl)	2.33^c	2.31^c	2.28^{bc}	2.30^{bc}	2.25^{ab}	2.20^a	0.04	0.043
ALT (U/L)	11.50^d	11.40^d	11.22^c	11.13^c	10.89^b	10.52^a	0.12	<0.001
AST (U/L)	158.03^f	146.25^b	150.64^e	148.09^d	147.19^c	142.55^a	0.74	<0.001
Cholesterol (mg/dl)	185.67^f	162.37^e	149.92^c	155.16^d	147.19^b	142.75^a	0.78	<0.001

T_1=Control, T_2=1% Shatavari supplemented group, T3=1.5% Shatavari supplemented group, T4=200 mg/kg feed vitamin E supplemented group, T5=1% Shatavari root powder+200 mg/kg feed vitamin E supplemented group, T6=1.5% Shatavari root powder+200 mg/kg feed vitamin E supplemented group. Means with different superscripts in small letters in a row differ significantly ($p<0.05$). SEM=Standard error of the mean, ALT=Alanine aminotransferase, AST=Aspartate aminotransferase

vitamin E supplementation removes the cold stress, normalized the function of the liver, and improved the immunity status of broiler chicks.

Authors' Contributions

SK and NA designed the experiment, GC and RAS helped in biochemical and hematological analysis of blood in Veterinary Physiology Laboratory. All authors reviewed and edited the work, read and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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