Effect of dietary supplementation of Ajwain (*Trachyspermum Ammi)* seed powder on serum biochemical parameters of Pratapdhan chicken

ABSTRACT

Aim: The purpose of the present study was to evaluate the impact of Ajwain supplementation on the serum biochemical parameters of Pratapdhan chicken breed.

Study Design: Descriptive Study

Place and Duration of Study: Department of Livestock Production and Management, Sri Karan Narendra Agriculture University, Jobner, between 12 December 2016 to 5 February 2017.

Methodology: A totally randomized strategy was used to disperse 120 Pratapdhan chicks. The chicks were distributed into four treatment groups, each one contained 30 chicks. The treatment groups included the control (basal diet), T1 (basal diet + 0.1% Ajwain seed powder), T2 (basal diet + 0.2% Ajwain seed powder), and T3 (basal diet + 0.3% Ajwain seed powder). Daily records of the shed's temperature and humidity were used to calculate the Temperature Humidity Index (THI). During the experimental period, standard feeding practices and all other management techniques were used. One bird from each replicate was slaughtered on end day of the experiment period (2, 4, 6, and 8 week) to estimate serum biochemical parameters. The experiment lasted 8 weeks

Results: A significant difference ($P<0.05$) was observed in calcium, phosphorus, and magnesium values, among the biochemical indicators that varied between the treatment groups and the control group at whole tested period except the calcium concentration at 8 weeks of periods was not significantly ($P>0.05$) difference. Cholesterol value was observed ($P<0.05$) significantly decreasing with Ajwain supplementation groups when compared to control group.

Conclusion: Dietary inclusion of Ajwain seed powder had not negative effect on the serum bio-chemical parameters of Pratapdhan broiler breed and lowering cholesterol concentration, which directly affects humans who consume poultry meat.

Keywords: Pratapdhan, feed additive, Ajwain seed powder, bio-chemical parameter.

1. INTRODUCTION

Over the past few decades, the production of commercial poultry has seen an incredible increase in the broiler sector. Broiler meat is readily available, inexpensive, and a good source of animal origin protein, with no societal taboos [1]. In poultry rearing, feed comprises the majority of the overall costs, accounting for 80% of total expenditure [2]. Feed additives are a class of nutrient and non-nutrient-rich substances that aid in improving feed utilization and, as a result, lowering the high cost of feed [3]. The effectiveness of feed conversion and the benefit-to-cost ratio have been positively impacted by antimicrobial growth promoters in animal diets for a long time [4]. However, the use of such antibiotic growth promoter feed additives modify the normal gut

microbiota, generate residues in meat and eggs, and promote the growth of antibiotic resistant microorganisms, in addition to increasing production costs [5]. Therefore, natural growth promoters such as prebiotics, probiotics, symbiotic, enzymes, plant extracts, etc. can be used to replace them without negatively affecting the performance of the birds [6]. As a result, there has been a paradigm shift away from chemical growth boosters and towards phytogenic growth promoters, which employ herbal ingredients [7]. Scientists' interest in herbal feed additives as a resource for increasing production has grown during the past 10 years [8]. Herbs may be employed as feed additives due to their adaptability and preference, reduced toxicity risk, lack of meat residue, lower manufacturing cost, less health risks, and environmentally friendly nature [9]. Additionally, the phenols and other active components assist in lowering the parasite load, which has an impact on health and productive performance of broiler [10]. Ajwain (*Trachyspermum ammi L.*) is a fragrant, grassy, annual medicinal plant of the Apiaceae (Umbelliferae) family [11]. The major Ajwain growing states in India are Rajasthan, Gujarat, and Madhya Pradesh [12]. Ajwain is commonly considered a digestive aid as well as an antibacterial for gas, flatulent colic, atonic dyspepsia, and diarrhoea [13]. According to research [14], Ajwain has the ability to suppress platelet aggregation as well as have antifungal and blood pressure-lowering properties. Taking the foregoing facts into account, the present study was designed to investigate the effect of Ajwain supplementation in poultry diets on the serum biochemical measurements of the Pratapdhan chicken breed.

2. MATERIAL AND METHODS

The study was carried out at the poultry farm of the S.K.N. College of Agriculture at Jobner, Rajasthan (India). The 120-day-old Pratapdhan chicks were purchased from Maharana Pratap University of Agriculture and Technology, Udaipur, under the "Aangan me Murgi Palan" initiative supported by the Rashtriya Krishi Vikas Yojana. The chicks were distributed randomly into four treatment groups, containing 30 chicks each. Each treatment was reproduced three times with 10 birds per replicate using a completely random design (CRD). The good quality Ajwain seed was purchased from the local market in one slot. The seeds were ground into a fine powder and appropriately included in diet with different levels as specified for various treatments. The 1st group served as the control group and received the standard chick ration as per BIS (2007) specifications without any supplements (Table 1). The inclusion levels of Ajwain seed powder in diets T1, T2, and T3 were 0.1, 0.2, and 0.3 %, respectively. The experiment was prolonged until 8 weeks. During the experimental period, food and water were freely given to the broilers. The chicks were raised during the experimental period using standard management strategies, including feeding, watering, and disease prevention. All chicks were kept under the same environmental and hygienic conditions. The room temperature was adjusted at 33°C for the d 1 and then gradually reduced to 22°C±3°C, then maintained the temperature until the end of experiment period. The relative humidity was maintained between 60 and 65%, and the light exposure time was set between 20 and 22 hours.

Table 1: Specifications for Chick feed ration as per BIS Standards 2007

Nutrients	Units	Chicken feed ration
Moisture	Max %	11.00
Crude protein	Min%	20.00
Ether extract	Min%	2.00
Crude fibre	Max %	7.00
Ash	Max %	4.00
Salt as NaCl	Max %	0.50
Lysine	Min%	1.00
Methionine	Min%	0.45

Methionine + cystine	Min%	0.70
Metabolizable energy	Min% Kcal/kg	2800
Calcium	Max %	1.00
Phosphorous	Min %	0.70
Available P	Min %	0.45
Manganese	Min mg	60.00
Iodine	Min mg	1.00
Iron	Min mg	70.00
Copper	Min mg	12.00
Selenium	Min mg	0.15
Zinc	Min mg	60.00

2.1 Collection of Blood Sample: The blood was collected at 2, 4, 6, and 8 weeks of the experiment period. Blood samples were evaluated at the Disease Diagnostic Lab, Jaipur. For blood collection, birds were randomly selected from each replication of each treatment. The blood was taken from the wing veins using sterile, disposable syringes. The blood was immediately transferred into a series of sterile plastic tubes without an anticoagulant. For serum separation, the test tubes were kept in a slanting position. The serum was centrifuged at 5000 rpm for 30 min to eliminate any erythrocytes that were present. Then, the clear, non-haemolyzed sera was collected in clean, and dry vials with labels. Glucose, protein, total cholesterol, and other bio-chemical parameters were examined.

2.2 Blood sample analysis: Transasia Biomedical Limited kits were used with a fully automated Random Access Clinical Chemistry Analyzer (EM 200TM Erba Mannheim, Germany) to evaluate biochemical parameters.

2.3 Statically analysis: A statistical method using analysis of variance (ANOVA) was used for the analysis of data obtained from different experiments. The SPSS package (SPSS 16.0 for Windows, SPSS Inc., USA) was used to compare the results with Tukey at the P≤0.05 level of significance, following the procedure of Snedecor and Cochran [15]

3. RESULTS AND DISCUSSION

The results of various serum biochemical parameters of Pratapdhan chicken breed at 2 weeks of tested period performed by biochemistry auto analyzer are represented in Table 2. The mean values of serum glucose, total protein, calcium, phosphorus, and magnesium were showed significantly (P<0.05) results ranging from 210.10 (C) to 214.94 (T3) mg/dl; 2.81 (C) to 3.10 (T3) g/dl; 7.18 (C) to 7.64 (T3) mg/dl; 3.14 (C) to 3.31 (T3) mg/dl; and 2.79 (C) to 2.99 (T3) mg/dl, respectively. However, mean values of cholesterol were significantly (P<0.05) decreased with 0.2 and 0.3% Ajwain seed powder groups. Serum SGPT, SGOT, total bilirubin, urea, and creatinine levels were found to be non-significant.

Table 2 : Effect of Ajwain seed powder supplementation on serum biochemical parameters of Pratapdhan breed at 2 weeks of experimental period

Items	C	T1	T2	T3
SGPT (IU/L)	8.03±0.27	9.22±0.24	9.75±0.44	10.47±0.42
SGOT (IU/L)	250.83±0.64	251.32±0.83	252.81±0.75	252.82±0.78
Total bilirubin (mg/dl)	0.058±0.0016	0.051±0.005	0.0497±0.0005	0.0496±0.002
Urea (mg/dl)	2.46±0.025	2.42±0.027	2.40±0.026	2.31±0.063
Creatinine (mg/dl)	0.226±0.0007	0.224±0.0009	0.223±0.001	0.221±0.003
Glucose (mg/dl)	210.10±0.78^{b}	211.52±0.61^{ab}	212.49±0.71^{ab}	214.94±0.69^{a}

Total protein (g/dl)	2.81±0.05^{b}	2.88±0.048^{ab}	2.93±0.046^{ab}	3.10±0.08^{a}
Cholesterol (mg/dl)	113.36±0.85^{a}	111.61±0.61^{ab}	110.44±0.80^{bc}	108.94±0.88^{c}
Calcium (mg/dl)	7.18±0.051^{c}	7.27±0.037^{bc}	7.44±0.041^{b}	7.64±0.66^{a}
Phosphorus (mg/dl)	3.14±0.026^{c}	3.18±0.023^{bc}	3.23±0.018^{b}	3.31±0.067^{a}
Magnesium (mg/dl)	2.79±0.028^{c}	2.86±0.027^{bc}	2.92±0.026^{ab}	2.99±0.033^{a}

C: control diet group; T1: basal diet+0.1% Ajwain group; T2: basal diet +0.2% Ajwain group; T3: basal diet+ 0.30% Ajwain group

(n = 6) Means bearing different superscripts, differ significantly (P≤0.05) row wise.

The mean values of various serum biochemical parameters of Pratapdhan chicken at 4 weeks of experimental period are depicted in Table 3. Serum SGPT, SGOT, total bilirubin, urea, and creatinine had non-significant (P > 0.05) results however, serum glucose, total protein, cholesterol, calcium, phosphorus, and magnesium had significant (P < 0.05) results. The mean value of serum glucose, total protein, calcium, phosphorus, and magnesium ranged from 222.46 (C) to 225.50 (T3) mg/dl; 3.09 (C) to 3.29 (T3) g/dl; 8.17 (C) to 8.52 (T3) mg/dl; 3.81 (C) to 4.12 (T3) mg/dl, and 2.98 (C) to 3.12 (T3) mg/dl, respectively. However, mean values of cholesterol were significantly (P<0.05) decreased from 125.64 for C group to 122.31 for T3 tested group, respectively.

Table 3 : Effect of Ajwain seed powder supplementation on serum biochemical parameters of Pratapdhan breed at 4 weeks of experimental period

Items	C	T1	T2	T3
SGPT (IU/L)	11.31±0.18	11.83±0.37	12.54±0.30	12.88±0.22
SGOT (IU/L)	262.50±0.88	263.20±0.75	263.48±0.73	263.85±0.75
Total bilirubin (mg/dl)	0.066±0.008	0.0557±0.003	0.053±0.001	0.051±0.0027
Urea (mg/dl)	10.16±0.36	10.09±0.29	9.94±0.17	9.46±0.24
Creatinine (mg/dl)	0.224±0.0007	0.223±0.0009	0.217±0.004	0.216±0.003
Glucose (mg/dl)	222.46±0.61^{b}	223.10±0.60^{ab}	223.78±0.26^{ab}	225.50±0.59^{a}
Total protein (g/dl)	3.09±0.034^{b}	3.15±0.041^{ab}	3.24±0.053^{ab}	3.29±0.035^{a}
Cholesterol (mg/dl)	125.64±0.51^{a}	125.60±0.49^{ab}	123.81±0.57^{b}	122.31±0.45^{b}
Calcium (mg/dl)	8.17±0.033^{b}	8.24±0.031^{b}	8.40±0.052^{a}	8.52±0.035^{a}
Phosphorus (mg/dl)	3.81±0.036^{c}	3.87±0.025^{bc}	3.96±0.027^{b}	4.12±0.052^{a}
Magnesium (mg/dl)	2.98±0.049^{b}	3.03±0.020^{ab}	3.07±0.034^{ab}	3.12±0.023^{a}

C: control diet group; T1: basal diet+0.1% Ajwain group; T2: basal diet +0.2% Ajwain group; T3: basal diet+ 0.30% Ajwain group

(n = 6) Means bearing different superscripts, differ significantly (P≤0.05) row wise.

Table 4 is described the mean values of serum biochemical parameters of Pratapdhan breed at 6 weeks of experimental period. The significant results (P<0.05) were observed for serum urea, creatinine, cholesterol, calcium, phosphorus, and magnesium with tested poultry feedings groups. The mean value ranges from 20.47(T3) to 22.11(C)mg/dl for urea, 0.205 (T2) to 0.221(C) mg/dl for creatinine,127.99(T3) to 131.14(C)mg/dl for cholesterol,10.26 (C) to 10.65 (T3) mg/dl for calcium, 4.45 (C) to 4.75 (T3) mg/dl for phosphorus, and 3.12 (C) to 3.25 (T3) mg/dl for magnesium, respectively. Mean values of cholesterol significantly decreased with increased levels of Ajwain in chicken diets. The non-significant results (P > 0.05) were observed for serum SGPT, SGOT, and total bilirubin with different tested poultry feeding groups.

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Table 4 : Effect of Ajwain seed powder supplementation on serum biochemical parameters of Pratapdhan breed at 6 weeks of experimental period

Items	C	T1	T2	T3
SGPT (IU/L)	17.78±0.22	18.35±0.28	18.57±0.45	19.70±0.28
SGOT (IU/L)	291.96±0.78	292.41±0.58	293.01±0.41	293.72±0.81

Total bilirubin (mg/dl)	0.078±0.071	0.076±0.072	0.075±0.00	0.070±0.008
Urea (mg/dl)	22.11±0.48^{a}	21.44±0.40^{ab}	21.13±0.30^{ab}	20.47±0.38^{b}
Creatinine (mg/dl)	0.221±0.002^{a}	0.218±0.002^{ab}	0.205±0.002^{b}	0.213±0.004^{b}
Glucose (mg/dl)	227.62±1.69	229.69±1.27	229.89±1.06	230.85±1.24
Total protein (g/dl)	3.54±0.12	3.59±0.17	3.64±0.95	3.71±0.085
Cholesterol (mg/dl)	131.14±.14^{a}	129.81±0.54^{ab}	128.98±1.85^{ab}	127.99±0.77^{b}
Calcium (mg/dl)	10.26±0.062^{c}	10.34±0.037^{bc}	10.47±0.053^{ab}	10.65±0.059^{a}
Phosphorus (mg/dl)	4.45±0.40^{c}	4.53±0.036^{bc}	4.61±0.040^{ab}	4.75±0.048^{a}
Magnesium (mg/dl)	3.12±0.009^{b}	3.16±0.020^{b}	3.20±0.016^{ab}	3.25±0.028^{a}

C: control diet group; T1: basal diet+0.1% Ajwain group; T2: basal diet +0.2% Ajwain group; T3: basal diet+ 0.30% Ajwain group

(n = 6) Means bearing different superscripts, differ significantly (P≤0.05) row wise.

The results of the serum biochemical parameters of Pratapdhan breed at 8 weeks of experimental period are illustrated in Table 5. There was a significantly (P<0.05) difference in the total protein, cholesterol, phosphorus, and magnesium values among treatment groups, while the serum SGPT, SGOT, total bilirubin, urea, creatinine, glucose, and calcium showed not significantly (P>0.05) differences among the treatment groups. The mean value of serum total protein, cholesterol, phosphorus, and magnesium ranged from 3.76 (C) to 3.97 (T3) g/dl, 131.89 (T3) to 135.97(C) mg/dl, 4.79 (C) to 5.07 (T3) mg/dl, and 3.22 (C) to 3.47 (T3) mg/dl, respectively. Cholesterol values significantly (P<0.05) decreased with an increased supplemented level of Ajwain seed powder in the chicken diet.

Table 5 : Effect of Ajwain seed powder supplementation on serum biochemical parameters of Pratapdhan breed at 8weeks of experimental period

Items	C	T1	T2	T3
SGPT (IU/L)	20.71±0.48	20.67±0.22	20.67±0.28	21.12±0.29
SGOT (IU/L)	312.24±0.77	312.30±0.65	312.64±0.69	312.72±0.67
Total bilirubin (mg/dl)	0.121±0.005	0.120±0.006	0.110±0.007	0.107±0.004
Urea (mg/dl)	31.54±0.58	31.51±0.96	31.01±0.64	30.17±0.35
Creatinine (mg/dl)	0.215±0.002	0.209±0.003	0.204±0.001	0.203±0.002
Glucose (mg/dl)	236.07±071	236.92±0.82	237.77±0.59	237.89±0.78
Total protein (g/dl)	3.76±0.16^{b}	381±0.13^{ab}	3.89±0.080^{ab}	3.97±0.037^{a}
Cholesterol (mg/dl)	135.97±0.59^{a}	134.30±0.94^{a}	132.56±0.43^{b}	131.89±0.36^{c}
Calcium (mg/dl)	12.24±0.12	12.38±0.13	12.57±0.11	12.65±0.08
Phosphorus (mg/dl)	4.79±0.052^{c}	4.86±0.037^{bc}	4.98±0.040^{ab}	5.07±0.056^{a}
Magnesium (mg/dl)	3.22±0.036^{b}	3.26±0.06^{b}	3.34±0.034^{b}	3.47±0.046^{a}

C: control diet group; T1: basal diet+0.1% Ajwain group; T2: basal diet +0.2% Ajwain group; T3: basal diet+ 0.30% Ajwain group

(n = 6) Means bearing different superscripts, differ significantly (P≤0.05) row wise.

Dietary supplementation with natural herbal drugs showed no significant effect (P > 0.05) on broiler SGOT, SGPT, blood glucose, protein, or urea [16]. Moreover, no significant difference (P > 0.05) was observed in blood proteins, albumin, globulin, the A:G ratio, glucose, SGPT, and SGOT in the serum of broiler chicken supplemented with different levels of probiotics [17]. However, compared to the control groups, the probiotic-supplemented (Lacto-Sacc which contains Yea Sacc^{1026} 4.49×10^{9}, Lactobacillus acidophilus 10^{8} and Streptococcus faecium 10^{8} per gram) birds had a significantly (P<0.05) reduced serum cholesterol level. Furthermore, Ajwain supplementation signifacntly decreased blood cholesterol and improved HDL levels in Cobb 500 broiler chicks [18]. The methanolic and petroleum ether extracts of *Trachyspermum ammi* at 2 g/kg body weight were quite effective in treating albino rabbit hyperlipidemia similar to simvastatin drugs [19]. The possible mechanism of lipid alteration might be a cholestatic effect of

Trachyspermum ammi in the liver through enhanced removal or catabolism of lipoproteins or inhibition of HMG COA reductase and/or inhibition of lysosomal lipid hydrolytic enzymes secreted by the liver [19]. Thus, a decrease in LDL cholesterol level and an increase in HDL cholesterol can be associated with the therapeutic advantages of Ajwain [19]. Demir et al. [20] revealed that supplementation of thyme powder at 1 g/kg in the broilers' basal feed did not result in significant changes in plasma total protein, albumin, total cholesterol, triglyceride, AST, or ALT levels. The results of blood glucose, total serum protein, serum albumin, serum globulin, A:G ratio, AST, ALT, and ALP in the birds did not significantly differ ($P > 0.05$) between the control and enzyme-treated groups [21]. Additionally, supplementing broilers' diets with herbal ingredients significantly decreased their blood triglyceride and cholesterol levels and elevated their humoral response to the Newcastle disease vaccine [22]. Furthermore, the presence of compounds in Ajwain such as carvacrol and thymol is a major component responsible for lowering cholesterol levels in chicken blood [23]. Javed et al. [19] observed that a 20 ml/l water-based herbal infusion (Ajwain with other herbal plant) significantly improve various haematological parameters and immunity in broiler chicks. Tripathi et al. [24] reported that feeding of Ajwain, hot red pepper and black pepper significantly enhanced the performance of broilers, thereby improving the profitability of broiler sector. According to Samadian et al. [25], the utilization of Ajwain could impact feed intake and feed conversation ratio in broiler chicks. They demonstrated that Ajwain has a favourable effect on the digestive system and acts as an antiemetic in broiler chicks. They also showed that consuming Ajwain might reduce fat content in the muscular abdominal cavity and cholesterol level in meat of broilers.

4. CONCLUSION

The serum biochemical parameters indicates that Ajwain seed powder has the ability to significantly affect total protein, and serum minerals including calcium, phosphorus, and magnesium, which enhance immune system response of Pratapdhan broiler breed. Additionally, supplemented Ajwain seeds powder in poultry diets significantly decreased in their blood cholesterol concentration. As a result, Ajwain can be marketed as natural growth promoter in the broiler diets.

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COMPETING INTERESTS

The authors have declared no conflict of interests exist.

AUTHORS' CONTRIBUTIONS

The authors' contributions are as follows: Anurag Mahala: carried out the majority of the research work, Attar Uddin: responsible for the conception of the project, designed the study and planned the experiments, manuscript drafting. Sarita Kumari: carried out data interpretation and manuscript drafting

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