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Short Communication

EFFICACY OF ASHWAGANDHA (*Withania somnifera*) SUPPLEMENTATION ON HAEMATOLOGICAL AND IMMUNOLOGICAL PARAMETERS OF JAPANESE QUAILS

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ABSTRACT
An experiment was conducted to assess the effect of feed supplementation of *Withania somnifera* root powder on performance of haematobiochemical-immune response of Japanese quails. One hundred chicks of day-old stage were randomly distributed into four treatments comprising twenty five chicks in each group. The average body weights of all the groups were similar. The dietary treatments contained *Withania somnifera* at the rate of 0.0%, 0.5%, 1.0% and 1.5%, respectively. The body weight gain, feed consumption and feed conversion efficiency revealed significant ($P<0.05$) variations among the groups. Haematological studies revealed significant ($P<0.05$) increase in packed cell volume (PCV) and hemoglobin per cent in Ashwagandha treated groups over untreated group. Immunological study indicated significantly ($P<0.05$) higher immunonoglobulins and skin thickness in group fed on 1.0 per cent Ashwagandha where as significantly ($P<0.05$) higher skin diameter was recorded in group fed on 1.5 per cent Ashwagandha. It was concluded that supplementation of 1 per cent Ashwagandha (*Withania somnifera*) root powder significantly improved body weights, feed efficiency and the immune status of birds.

KEY WORDS: *Withania somnifera*, Quail, Body weight, Haematological parameters, Immunological Parameters

INTRODUCTION

Ashwagandha (*Withania somnifera*) is one of the well known medicinal plants. Number of active principles (Withanolides) have so far been isolated from *Withania somnifera* and have been reported to possess immunomodulatory effects as well as Ashwagandha (*Withania somnifera*) is reported to be general tonic, anti-stress, hepato-protective, haematinic, growth promoter, anti-oxidant in human practice (Bhattacharya, S.K. and Ghosal, S. 1994). The use of herbal medicines or medicinal plants as feed additives can avoid widespread abuse of many diseases and disturbed occurrence of hormones, antibiotics etc. in humans and livestock.

An ideal growth promoter should be readily biodegradable, free from environmental hazards, non-toxic, involved with transferable drug resistance, and improve performance effectively and economically. (Akotkar *et al.,* 2007) revealed ($P<0.05$) significant effect on body weight gain, feed consumption and feed conversion efficiency in different dietary treatments of Ashwagandha at six weeks of age in broilers. (Khobragade, R.S. 2003) reported significant rise in body weight, body weight gain and haematobiochemical parameters viz: Hb, TSP, albumin, globulin and lipids on supplementation of medicinal plants *Tinospora cordifolia* and *Leptadenia reticulate* in broilers**.** (Wheeler, G.E. 1993) reported blood biochemical profile on supplementation of Satavari (*Asparagus racemosus)* root powder on the performance of broilers and found that the blood biochemical profile revealed significant ($P<0.01$) rise in hemoglobin, total serum protein and serum total globulin levels in broilers and they observed that the values of TSP, albumin, globulin, total lipids and Calcium (Ca) were better, and concluded better general health status of birds fed with Satavari. Therefore, an effort has been made to study the effect of Ashwagandha supplementation on performance and haematological parameters of Japanese quails.

MATERIALS AND METHODS

One hundred Japanese quail chicks of day old stage were distributed randomly into four treatments comprising twenty five chicks in each group and reared on standard managemental conditions on deep litter. All the ingredients were analyzed and a basal ration having CP 22% and ME 2900 kcal/kg of feed containing maize (55%), deoiled soybean cake (31%), rice bran (3%), fish meal (8%) and mineral mixture (3%) was fed to the chicks. The dietary treatments T_2, T_3 and T_4 were added with Ashwagandha (*Withania somnifera)* root powder at the rate of 0.5%, 1.0% and 1.5%, respectively, while diet T_1 was without any Ashwagandha supplementation. These diets were offered *ad libitum* to the various experimental groups up to six weeks of age. The weekly body weight, feed consumption and feed efficiency were recorded for each group. The blood samples were collected at the end of study to estimate haemoglobin by Sahli's haemoglobinometer, packed cell volume (PCV) by micro haematocrit method; however, total leukocytic

count (TLC) and differential leukocytic count (DLC) were estimated as per standard procedure (Natt and Herrick 1954). The cell mediated immune response was estimated by skin hypersensitivity test using 1 per cent 2, 4-dinitrochlorobenzene reagent in acetone (DNFB) (Chatur *et al.,* 1994.). The data collected during the experiment were analyzed statistically as per standard procedure (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The chemical composition of Ashwagandha root powder on dry matter basis was found to be as given below in table no 1.

TABLE 1. Chemical composition of Ashwagandha root powder on dry matter basis

Chemical composition	Dry matter basis (%)
Organic matter	97.15
Crude protein	14.15
Ether extract	1.90
Crude fiber	11.05
Ash	2.85
Nitrogen free extract	70.06
Metabolizable energy (Kcal/kg)	3915

The total body weight gain revealed significant ($P<0.05$) variations and the observations are consistent with (Singh et al., 2003). (Bhardwaj et al., 2009) reported that Japanese Quails Fed with *Asparagus Racemosus Root* Powder improved the appetite and led to increased body weight of the quail birds.

TABLE 2. Effect on growth performance of Japanese quails on inclusion of *Withania Somnifera* root extracts in feed. Mean ± SE.

Growth Performance	Dietary treatments (%)			
	T_1	T_2	T_3	T_4
Initial body weight (g)	7.41±0.051	7.54±0.052	7.57±0.149	7.45±0.050
Final body weight (g)	194.10^{d}±1.35	224.65^{c}±2.28	235.62^{b}±6.60	242.15^{a}±13.80
Total weight gain (g)	186.69^{d} ±2.88	217.11^{c}±3.46	227.65 ±4.04	234.80^{a}±2.59
Total feed consumption (g)	472.56^{a} ±1.63	465.18^{b} ±1.22	460.40 ±0.82	463.50^{d} ±0.60
Feed efficiency	2.53^{c} ±0.023	2.14^{b} ±0.024	1.95^{a} ±0.040	1.97^{a} ±0.021

The values having at least one common superscript do not differ significantly ($P<0.05$) in a row.

The total feed consumption (Table 2) was significantly higher ($P<0.05$) between the treatments. The poorest feed efficiency was seen in control T_1 (2.53±0.023) which improved upon supplementing Ashwagandha. Better feed efficiency was observed in T_3 and T_4 (1.95 ±0.040) and (1.97 ±0.021) as compared to T_2 (2.14±0.024). The results indicated improved feed efficiency in present findings and are in accordance with earlier reports (Bhardwaj and Gangwar, 2011), (Khobragade, 2003),(Daisy, 2006 and Desai, 1975), exploited the usefulness of *Withania somnifera* as growth promoter and appetizer and observed improved feed conversion ratio and increased average body weight with better FCR due to the supplementation of Ashwagandha which may be due to its health restorative activity and general tonic property as described by (Bhattacharya, S.K. and Ghosal, S 1994), and adaptogenic, anti-stress activity of withanolides present in roots of *Withania somnifera*.

TABLE 3. Effect on hematological parameters of Japanese quails on inclusion of *Withania Somnifera* root extracts in feed. Mean ± SE.

Hematological Parameters	Dietary treatments (%)			
	T_1	T_2	T_3	T_4
Hb (g/dl)	11.53^{a} ±0.06	13.05^{b} ±0.07	14.26^{c} ±0.09	14.48^{d} ±0.38
PCV (%)	37.45^{a} ±0.24	39.36^{b}±0.26	39.90^{c} ±0.04	40.06^{d} ±0.07
TEC $\times 10^6$/cmm	2.82^{a} ±0.05	2.97^{b} ±0.01	3.05^{b} ±0.01	3.58^{b} ±0.21
TLC $\times 10^3$/cmm	29.26^{a} ±0.02	30.70^{b} ±0.15	31.80^{d} ±0.99	32.07^{c} ±0.64
Heterophils %	31.33±0.09	31.70±0.30	32.36±0.23	33.33±0.03
Lymphocyte %	50.16^{a} ±0.44	52.32^{ab} ±1.16	53.44^{b} ±0.45	53.59^{b} ±0.70
Monocyte %	2.03±0.13	2.33±0.79	2.83±0.22	3.08±0.17
Eosinophils %	2.20^{d} ±0.03	2.38^{c} ±0.09	2.47^{b} ±0.19	3.70^{a} ±0.10
Basophils %	2.01^{a} ±0.30	1.33^{b} ±0.17	1.00^{b} ±0.00	1.00^{b} ±0.26

The values having at least one common superscript do not differ significantly ($P<0.05$) in a row.

The hematological parameters (Table 3) revealed significant (P<0.05) increase in the haemoglobin concentration, total erythocytic count and total lymphocytic count for Ashwagandha-treated groups. Present observations are in agreement with (Seshadri and Sudershan 1986), (Daisy, 2006) and (Deshmukh, V.D. 1998) who found beneficial effects of Ashwagandha as haematinic.

TABLE 4. Effect on immunological parameters of Japanese quails on inclusion of *Withania Somnifera* root extracts in feed. Mean ± SE.

Immunological Parameters	Dietary treatments (%)			
	T_1	T_2	T_3	T_4
Immunoglobulin (mg/dl)	2.64 [a] ±0.07	2.66 [a] ±0.08	2.70 [a] ±0.05	2.81 [b] ±0.06
Skin thickness (cm)	0.18 [a] ±0.020	0.23 [a] ±0.012	0.26 [a] ±0.062	0.25 [a] ±0.065
Skin diameter (cm)	1.50 [a] ±0.018	2.02 [b] ±0.016	2.17 [bc] ±0.024	2.24 [d] ±0.065

The values having at least one common superscript do not differ significantly (P<0.05) in a row.

The immunoglobulins (Table 4) were significantly more (P<0.05) in 1.5% Ashwagandha group than other treatments including control group. Higher immunoglobulins indicated the improvement of immune response in the treated group, which is in accordance with (Bhattacharya and Ghosal 1994). Increased immunoglobulins in the Ashwagandha-treated groups may also be due to anti-stress activity of *Withania somnifera* as stress factor shows depressed activity resulting in immunosuppression (Chatterjee, S. 1994). The skin thickness as well as the diameter of the reactive skin lesion evaluated for cell mediated immune response was significantly (P<0.05) higher in treated groups over the control. These findings are in accordance with earlier reports (Rekhate *et al.,* 2004.) demonstrating that components of immune system potentiate both cellular and humoral immunity. The immunomodulatory activity of *Withania somnifera* may be due to the presence of glycowithanolides (Tizzard, I.R. 1992) and since there is an evidence that certain adaptogens, particularly medicinal plants, increase the resistance against effect of a number of extraneous factors from physical, chemical and biological origin.

CONCLUSIONS

It was concluded that supplementation of Ashwagandha (*Withania somnifera*) root powder at inclusion rate of 1 per cent was found optimum and had significant effect on body weight, feed conversion efficiency (FCE), haematological parameters and also improves the general health status of birds, which ultimately yields more economic profits for the poultry farmers.

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