



Giloy Stem Powder on Performance of Japanese Quails

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Dietary Inclusion of *Tinospora Cordifolia* (Giloy) Stem Powder on Performance, Serum Parameters and Carcass Traits of Japanese Quails

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ABSTRACT

This study was conducted to evaluate the effect of Giloy stem powder (*Tinospora cordifolia*) on the performance of Japanese quails. For this, 480-day old Japanese quail chicks randomly distributed into six dietary treatments with four replicates per treatment (80 birds per treatment) and each replicate had twenty birds. The first group was kept as a control (T1) and given the control diet (CD) without antibiotic while second group (T2) was fed CD with antibiotic, third (T3), fourth (T4), fifth (T5) and sixth (T6) groups were fed CD supplemented with Giloy stem powder @ 0.25, 0.50, 0.75 and 1% respectively. The results indicated that supplementation of giloy stem powder @ 0.50% (T4) recorded significantly ($P < 0.05$) higher body weight gain, feed intake and better feed conversion compared to control, antibiotic and other treatment groups. Among all the treatments, significantly highest dressing weight percentage, breast weight percentage, thigh weight percentage, lymphoid organ weight percentage recorded with giloy @ 0.50%. Significantly lower serum total cholesterol level ($P < 0.05$) was observed in giloy @ 0.50%. However, there was no significant ($P > 0.05$) difference was observed on the total protein concentration different dietary groups. Finally, it can be concluded that supplementation of 0.50% giloy stem powder can effectively be used as an alternative to antibiotic growth promoter in Japanese quails.

KEY WORDS: Body weight, FCR, Japanese quail, *Tinospora cordifolia*, Total cholesterol.

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INTRODUCTION

In the poultry feed industry, antibiotics as antimicrobial growth promoters are frequently employed. Long-term usage of antibiotics has disadvantages, including tissue residue, a prolonged withdrawal time and the emergence of bacterial resistance. By modifying the immune system, the use of various herbs as dietary supplements may have a positive effect on poultry health and productivity. These natural feed additives boost immunity, live weight gain and feed conversion ratio while exhibiting no adverse effects on the health of the birds (Samarth et al., 2002). The plant named *Tinospora cordifolia*, also called “Guduchi” or “Giloy,” Since ancient times, the entire plant has been utilized as a traditional medicine to treat a variety of human maladies due to its wide range of health advantages (Bhattacharyya and Bhattacharyya, 2013). Jain (2020) reported that supplementation of

Tinospora cordifolia increased the performance of broilers and Japanese quails (Poonia et al. 2022). Effect of *Tinospora cordifolia* as feed additives on production performance in poultry was reported by Devegowda (1996), Kulkarni et al. (2011) and Gupta et al. (2018). However, regarding utilization of Giloy (*Tinospora cordifolia*) in the ration of poultry and Japanese quails very meager information is available. Therefore, the present research work was planned to study the effect of feeding *Tinospora cordifolia* stem extracts on performance of Japanese quails.

MATERIALS AND METHODS

To conduct the proposed study, four hundred and eighty (480) day-old Japanese quail chicks were weighed individually and wing banded. The birds were later randomly distributed into six dietary treatment groups with four replicates in each treatment group and twenty birds in each replicate.

T1 consist of a control diet (CD), T2: CD with antibiotic (BMD 500gm/ton in feed),T3: CD with 0.25 % *Tinospora cordifolia* powder in feed,T4: CD with 0.50 % *Tinospora cordifolia* power in feed, T5: CD with 0.75 % *Tinospora cordifolia* powder in feed and T6: CD with 1.0 % *Tinospora cordifolia* powder in feed. *Tinospora cordifolia* stems were purchased from the local market and were dried, ground separately to a fine powder. The chicks were reared under deep litter system with optimum brooding conditions from day-old to five weeks of age.

Weekly body weight, Feed intake and feed conversion ratios were calculated as feed intake per unit bodyweight gain at weekly intervals. The mortality rate was recorded throughout the experiment. On the day of mortality, the leftover feed was weighed for the sake of accuracy in data collection in feed consumption. At the end of the trial period (5th week), four birds per replicate and thus a total of sixteen birds per treatment were randomly selected, weighed and slaughtered. Individual dressing percentage, breast and thigh yield percentage, giblet weight percentage and lymphoid organ weight percentage was recorded. Mortality among the birds during the entire experimental study was recorded and the causes were ascertained by detailed autopsy.

Blood samples were collected from four birds per replicate at the end of the experiment into anticoagulant free vials and allowed to clot so that the serum got separated. The separated serum was then made clear by centrifugation at 3000 rpm for 10 minutes and stored in a refrigerator for estimation of serum parameters. Total protein and cholesterol was estimated in serum by using Erba Mannheim kit protocol (Transania bio-medicals limited, India).

The data obtained were subjected to one-way ANOVA using general linear model process of the statistical package for social sciences (SPSS) 20th version. Duncan's multiple range test (Duncan, 1955) was used to assess differences between treatment means, with significance set at $P < 0.05$.

Table1. Ingredient composition of control diet (%) fed to the Japanese quails

Ingredient	Percentage
Maize	54.0
Vegetable oil	1.0
Soyabean meal	41.5
Stone grit	1.10
DCP	1.00
Salt	0.30
DL-Methionine	0.38
L-Lysine HCl+	0.15
Trace Mineral Mixture***	0.12
Vitamin AB2D3K*	0.01
Vitamin B-Complex**	0.03
Choline chloride 60%	0.10
Toxin binder	0.10
Total	100
Nutrient composition (calculated values)	
ME (kcal/kg)	2850
Crude protein (%)	24
Lysine (%)	1.3
Methionine (%)	0.6
Calcium (%)	0.9
Available phosphorous (%)	0.4

*AB2D3K provided per kg diet: Vitamin A 20000 IU, Vitamin B2 25 mg, Vitamin D3 3000IU, Vitamin K 2mg.

** Vitamin B-Complex provided per kg diet: Riboflavin 25mg, Vitamin B1 1mg, Vitamin B6 2mg, Vitamin B12 40mg, and Niacin 15mg.

***Trace mineral provided per kg diet: Manganese 120mg, Zinc 80mg, Iron 25mg, Copper 10mg, Iodine 1mg.

RESULTS AND DISCUSSION

Body weight gain

Supplementation of Giloy @ 0.50% (T4) had significantly ($P < 0.05$) improved body weight gain compared to control and other treatment groups at 5 weeks of age (Table 2). The lowest body weight gain was recorded in control (T1) group. However, the body weight in T5 and T6 was intermediate and higher than the control and antibiotic groups. The findings depicted that the body weight gain of the Giloy supplemented groups are significantly higher than the control group. In agreement with findings of the present study Joshi et al. (2015) reported that the higher weekly body weight gains were observed in *Tinospora cordifolia* supplemented groups compared to the control in the positive effect on growth performance of broilers may be attributed to active principles of *Tinospora cordifolia* (tinosporine) which limits the metabolic signs of stress

and alleviate the physiological consequences of stress. Similar findings were reported by Singh et al. (2014) and Gupta et al. (2018) reported that body weight increased when birds were supplemented with Giloy. The improved body weight gain in giloy supplemented groups might be due to improved appetite, digestion, absorption and anabolic effect of herbal supplementation. The improvement in body weight gain in Japanese quails in the current study could be attributed to improved metabolic efficiency as a result of Giloy's hepatoprotective activity (Singh et al., 2018).

Feed intake

The overall feed intake during the experimental period (0-5 weeks) birds supplemented with 0.5% Giloy (T4) was significantly ($P < 0.05$) higher compared to the control (T1) and other treatment groups (Table 2). However, birds receiving Giloy @ 0.25%, 0.5%, 0.75% and 1% consumed more feed compared to other groups. Similarly, Sarag et al. (2001) recorded significantly higher feed intake in *Tinospora cordifolia* (0.5%) compared to control. Singh et al. (2014) revealed significant ($P < 0.05$) effect of giloy alone (G₁) and mixture of bael and giloy (B₁G₁) on average feed intake. Similarly, the positive effect of giloy supplementation on feed intake was also reported by Joshi et al. (2015) and Jain (2020). However, decreased feed intake was observed in higher dose of giloy (T5 and T6), it might be due to deleterious effects of high level of inclusion of giloy in diet on the palatability of the feed.

Feed conversion ratio (FCR)

Among all the treatment groups, significantly better FCR was recorded in giloy 0.5% followed by giloy 0.75% and giloy 1.0% compared to other treatment groups (Table 2). The results of the present study are in agreement with findings of Poonia et al. (2022) observed that supplementation of Giloy herb and ascorbic acid increased the FCR of Japanese quails. Similarly, Singh et al. (2018) reported the supplementation giloy 0.5% level improved the FCR of broilers. Consistent with results of present study Singh et al. (2014) conducted an experiment in which Giloy supplementation @ 0.5% (G1) shows better

FCR as compared to control. Similar results are obtained from the study of Sarag et al. (2001) as they recorded improvement of feed efficacy in broilers with supplementation of *Tinospora cordifolia* (0.50%) and *Leptadenia reticulata* (0.50%). On contrary, Kulkarni et al. (2011) did not find any significant effect of giloy supplementation on FCR of broilers.

Livability

The birds were observed regularly for any abnormal behavior and mortality if any, during the experimental period. All through the experimental period, 32 quails died from all the treatment groups. Highest livability was recorded in the giloy supplemented groups.

Carcass characteristics

The results indicated that supplementation of giloy stem powder in the diet of the Japanese quails had significant ($P < 0.05$) effect on dressing weight percentage, breast weight percentage, thigh weight percentage, lymphoid organ weight percentage and it was significantly ($P < 0.05$) highest in treatment T4 supplemented with giloy @ 0.50% as compared to other treatment groups (Table 3). In agreement with findings of the present study Bharambe et al. (2020) reported that significant improvement in dressed weight, breast, drumstick thigh weight and giblet weight in broiler fed with 0.2 per cent fenugreek seed and giloy stem powder during winter season than rest of the treatments and seasons. In contrast to the present results Singh et al. (2018) stated that the addition of giloy to the broiler diet had no significant effect on dressing percentage when compared to the control group.

Lymphoid organ weights

The lymphoid weight percentage was significantly higher ($P < 0.05$) in birds receiving dietary treatment T4, T5 and T6 as compared to T1 and the control T2 group (Table 3). The results of present study are in agreement with findings of Stoev et al. (2021) studied the protective effect of two herbs, *Glycyrrhiza glabra* and *Tinospora cordifolia*, given as feed additives and higher relative

weight of lymphoid organs of the chicks supplemented with both herbs revealed their beneficial effects on the immune system when compared with control group. Similarly, Singh et al. (2018) recorded increased immune organ weights with giloy supplementation in broilers.

Serum biochemical parameters

The cholesterol level of T4 (159.65) was significantly lower ($P < 0.05$) as compared to the treatment group T1 (168.92) and T2 (169.93). Therefore, as the level of inclusion of giloy in diet was increased, the total cholesterol level decreased

in a dose dependent manner as compared to the control group (Table 4). Similarly, reduced serum cholesterol level with giloy supplementation was noticed in Sahiwal heifers (Vaswani et al., 2022) and rats (Stanley et al. 2000). There is no significant difference in the serum total protein concentration of quails between the control group and the Giloy supplemented groups. Similar results were reported Jain (2020). On contrary, Singh et al. (2018) reported that the serum total protein concentration of birds receiving diet containing Giloy @1% was significantly higher as compared to the control group.

Table 2. Effect Giloy stem powder on body weight gain, feed intake and FCR in Japanese quails.

Treatment	Groups	Total BWG (g)	Total feed intake(g)	FCR	Mortality (%)
T1	Control	188.3±1.90 ^d	632.4±3.35 ^c	3.36±0.02 ^a	7.5
T2	Antibiotic	196.0±1.93 ^{bc}	646.5±3.92 ^b	3.30±0.03 ^{ab}	5.0
T3	Giloy (0.25%)	191.0±2.27 ^{cd}	639.7±4.72 ^{bc}	3.35±0.02 ^a	5.0
T4	Giloy (0.50%)	206.9±1.81 ^a	663.7±3.16 ^a	3.21±0.04 ^c	4.0
T5	Giloy (0.75%)	200.9±2.29 ^{ab}	651.7±5.83 ^{ab}	3.24±0.01 ^{bc}	4.0
T6	Giloy (1.0%)	198.8±2.00 ^b	648.9±3.39 ^b	3.26±0.02 ^{bc}	4.0
SEM		16.694	85.01	0.001	-
N		4	4	4	-
P Value		0.001	0.002	0.001	-

Values bearing different superscripts with in a column differ significantly ($P < 0.05$).

Table 3. Effect of Giloy stem powder on carcass characteristics (%) of Japanese quails

Treatment	Dressing wt (%)	Breast wt (%)	Thigh wt (%)	Giblet wt (%)	Lymphoid organ wt (%)
T1	67.7±0.26 ^d	18.4±0.25 ^c	13.0±0.03 ^d	6.37±0.03	0.10±0.004 ^c
T2	70.3±0.61 ^{bc}	19.3±0.25 ^b	13.3±0.04 ^{ab}	6.47±0.06	0.10±0.005 ^c
T3	69.1±0.52 ^c	18.9±0.12 ^{bc}	13.2±0.06 ^c	6.54±0.02	0.11±0.002 ^b
T4	73.4±0.39 ^a	20.0±0.36 ^a	13.4±0.04 ^a	6.57±0.05	0.13±0.001 ^a
T5	70.8±0.41 ^b	19.0±0.16 ^{bc}	13.2±0.02 ^{bc}	6.46±0.05	0.12±0.001 ^{ab}
T6	70.4±0.28 ^b	18.9±0.17 ^{bc}	13.1±0.05 ^c	6.44±0.04	0.12±0.001 ^{ab}
SEM	0.74	0.21	0.007	0.008	0.001
N	16	16	16	16	16
P Value	0.001	0.003	0.001	0.06	0.001

Values bearing different superscripts with in a column differ significantly ($P < 0.05$).

Table 4. Effect of Giloy stem powder on serum parameters in Japanese quails

Trt	Groups	Serum total protein (g/dL)	Serum total cholesterol(mg/dL)
T1	Control	3.78±0.05	168±2.12a
T2	Antibiotic	3.90±0.04	169±0.65a
T3	Giloy (0.25%)	3.79±0.06	164±0.99b
T4	Giloy (0.50%)	3.88±0.08	159±1.10c
T5	Giloy (0.75%)	3.95±0.03	161±0.89bc
T6	Giloy (1.0%)	3.86±0.04	163±1.27b
SEM		0.01	6.34
N		16	16
P Value		0.297	0.001

Values bearing different superscripts with in a column differ significantly (P<0.05).

CONCLUSION

It can be concluded that supplementation of Giloy stem powder at dietary level of 0.50% can effectively be used as an alternative to antibiotic growth promoter in Japanese quails.

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