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Effect of *Heracleum persicum* extract on performance and some haematological parameters in broiler chicks

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Abstract

The aim of this study was to evaluate the effect of *Heracleum persicum* extract on performance, blood cholesterol and immune response in broiler chicks. A total 320 one day broiler chicks with an average weight of 41±50 g were randomly divided into four treatments. Each treatment was further divided into four replicates. Chicks were fed a basal diet either as control diet or 100, 150 and 200 mg/l of *H. persicum* extract in other treatments (T1, T2 and T3). At the end of trial (42 days), 2 birds form each treatment were weighed and slaughtered. Data showed that feed intake (FI) increased significantly in treated groups in comparison to control ($P<0.05$). Body weight gain (BWG) and total body weight (TBW) were also significantly higher in treated groups. Cholesterol, triglyceride, LDL level decreased significantly in treated groups while HDL level increased in all treated groups. Antibody titre against Newcastle disease virus increased significantly in treated diet compared to the control. We concluded that *H. persicum* extract at the present levels can enhance body performance, blood cholesterol and ND titre in broiler chicks.

Keywords: *Heracleum persicum* extract; performance; broiler chicks

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Introduction

The genus Heracleum with more than 120 species in the world is one of the largest genera of the Umbelliferae (Apiaceae) family. *Heracleum persicum* is a perennial flowering plant native to Iran. It is used as a flavouring agent for making pickles. The fruits and leaves of this genus are also used as antiseptic, carminative, digestive and analgesic in the Iranian folk medicine (Zargari, 1998; Asgarpanah et al., 2012). Some reports indicate the presence of six furanocoumarins and flavonoids in the fruits of *H. Persicum* (Merijanian et al., 1980; Brunton et al., 2006).

The commonly known photochemical compounds from *H. persicum* are volatile substances, terpenoids, triterpenes, furanocoumarins, flavonoids and alkaloids. Hexyls butyrate (56.5%), octyl acetate (16.5%), hexyl-2-methylbutanoate (5.2%) and hexylisobutyrate (3.4%) were identified as the major constituents of the *H. persicum* fruit essential oil. The oil contained about 95% of aliphatic esters, 4% of aliphatic alcohols and 1% mono terpenes, 37 esters and 17 mono terpenes (Scheffer et al., 1998; Hemati et al., 2010). It also exhibits a variety of biological activities including antioxidant activity, antimicrobial activity and Anti-diabetic activities (Jayaprakasha et al., 2006). Antioxidant activity of some furanocoumarins isolated from *H. persicum* has been reported (Souri et al., 2004). Moreover, it has been shown that furanocoumarins have protective effect against lipid per oxidation (Vimal and Devaki, 2004).

This study was carried out to find the effect of *Heracleum persicum* extract on broiler performance and some haematological parameters.

Materials and Methods

This experiment was carried out at the Poultry Farm of Veterinary College, Islamic Azad University, Shahrekord branch, Iran. A total of 320, one days old

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broiler chicks with an average weight of 41±50 g were divided into 4 treatment groups and were further subdivided into 4 replicates. The *H. persicum* was purchased from local market in Tehran. For preparation of hydro alcoholic extract, air-dried and powdered fruits of the plant were macerated with ethyl alcohol for 48 h. The extract was then shacked, filtered and evaporated in a rotating evaporator under reduced pressure until dryness (Sajjadi et al., 1998). Evaporation and solvent removal of hydroalcoholic extract gave semi-solid masses. The treatments were divided as basal diet with no herbal extract kept as control, and for others 100 mg/l (T1), 150 mg/l (T2) and 200 mg/l (T3) of *H. persicum* extract were used in their drinking water respectively. The chemical composition of the experimental basal diets is shown in Table 1. Diets and fresh water were provided *ad libitum* during this experiment. Chicks were vaccinated against Newcastle disease. The live body weight gains and feed consumption of birds were measured individually feed conversion efficiency were calculated weekly. At the end of experimental period, 2 birds form each replicates (totally 32 birds) were slaughtered by cervical dislocation method for determination of other parameters.

Evaluation of blood parameters

Blood samples were taken from the brachial vein from two birds per replicate and stored at refrigerator at 4°C. Serum samples were isolated by centrifugation at 2000 g for 10 min. Individual serum samples were analyzed for total cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL) cholesterol and triglyceride, by an automatic biochemical analyzer following the instructions of the corresponding reagent kit (Pars Azmoon Co., Teheran, Iran).

In addition, blood samples were collected from brachial vein of vaccinated (2 birds per replicate) birds on d 42 of the experiment for the systemic antibody response to Newcastle virus. Blood samples were centrifuged at 2000 g for 10 min to obtain serum. Serum was isolated and stored at -80°C. Antibody titre against Newcastle was measured using Haemagglutination inhibition test.

Data analysis

Data were collected and analyzed using the General linear model procedure of SAS (2001). Differences between means were analyzed by Duncan's multiple ranges test and P value less than 0.05 was considered as significant.

Results

According to Table 2 significant decrease in FI was observed in T3 while BW and TBW increased significantly in T3. FCR decreased significantly in T2 and T3. TBW decreased significantly in T1 and T2.

The data of haematological is shown in Table 3. Data from this study showed that triglyceride, cholesterol and LDL level decreased significantly ($P<0.05$) in the treated groups, while HDL level increased significantly in T3 group compared to control.

Data from this study showed that *H. persicum* reduced mortality and increased dressing percentage significantly ($P<0.05$). Liver percentage and gizzard weight percentage increased by *H. persicum* significantly ($P<0.05$). The lowest mortality was observed in T2. Percentage of dressing, liver and gizzard increased significantly in T2 (Table 4).

Table 1: Composition of the experimental diets for broiler chicks

Ingredients %	0-21 (days old)	21-42 (days old)
Corn grain	53.65	62.88
Soybean meal	40.7	32.8
Vegetable oil	21.7	12.6
Dicalcium phosphate	14.4	10.7
Calcium carbonate	12.1	12.8
DL Methionine	1.3	0.2
Nacl	2.5	2.5
Vitamin premix*	2.5	2.5
Mineral premix**	2.5	2.5
Calculated nutrient content		
ME (Kcal/kg)	2900	2950
CP (g/kg)	208.4	189.9
Ca (g/kg)	9	8.28
Available phosphorus (g/kg)	4.05	3.22
Lysine (g/kg)	9.2	9.2
Methionine+Cystine (%)	8.1	6.6

*Vitamin premix per kg of diet: Vit. A, 2.7 mg; vit. D3 0.05 mg; vit. E, 18 mg; vit. K3 2 mg; thiamine 1.8 mg; ribofavin 6.6 mg; panthothenic acid 10 mg; pyridoxine 3 mg; cyanocobalamin 0.015 mg; niacin 30 mg; biotin 0.1 mg; folic acid 1 mg; choline chloride 250 mg; **Mineral premix per kg of diet: Fe 50 mg; Mn 100 mg; Zn 100 mg; Cu 10 mg; I, 1 mg; Se 0.2 mg

Table 2: The effect of added experimental diets on broilers performance

Treatments	FI (g/d)	BWG (g/d)	FCR	FI (kg)	FBW (g)
Control	80.11^{c}	40.15^{d}	2.00^{a}	3364^{c}	1686^{d}
T1	81.22^{c}	41.56^{c}	1.96^{b}	3416^{b}	1742^{b}
T2	83.54^{a}	43.34^{a}	1.92^{c}	3509^{a}	1820^{a}
T3	81.84^{b}	42.47^{b}	1.95^{b}	3433^{b}	1770^{c}
MSE	0.165	0.278	0.101	0.347	0.674

Means within a column with no common letter are significantly different ($P<0.05$). Control: Basal diet; T1: basal diet with 100 mg *H. persicum*, T2: basal diet with 150 mg *H. persicum*, T3: basal diet with 250 mg *H. persicum*. FI: feed intake, BWG: body weight gain; FCR: Feed conversion ratio, TFI: total feed intake; FBW: final body weight

Table 3: The effect of added experimental diets on some haematological parameters

Treatments	Triglyceride (mg/dl)	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
Control	74.32[a]	137.24[a]	58.71[d]	74.71[a]
T1	72.52[b]	134.36[b]	60.41[c]	72.40[b]
T2	69.11[c]	131.74[c]	62.25[b]	69.81[c]
T3	67.17[d]	129.45[d]	63.42[a]	67.74[d]
MSE	0.178	0.197	0.541	0.511

Means within a column with no common letter are significantly different (P<0.05). Control: Basal diet; T1: basal diet with 100 mg *H. persicum*, T2: basal diet with 150 mg *H. persicum*, T3: basal diet with 250 mg *H. persicum*

Table 4: The effect of added experimental diets on mortality, dressing percentage, liver and gizzard percentage

Treatments	Mortality percentage	Dressing percentage	Liver percentage	Gizzard percentage
Control	7.1[a]	69.65[d]	3.10[c]	2.4[c]
T1	6.2[b]	71.66[b]	3.26[b]	2.7[b]
T2	5.1[d]	73.54[a]	3.52[a]	2.8[a]
T3	5.8[c]	70.47[c]	3.22[b]	2.7[b]
MSE	0.087	0.687	0.101	0.261

Means within a column with no common letter are significantly different (P<0.05). Control: Basal diet; T1: basal diet with 100 mg *H. persicum*, T2: basal diet with 150 mg *H. persicum*, T3: basal diet with 250 mg *H. persicum*

Table 5: The effect of experimental diets on antibody titres against Newcastle vaccine

Treatments	$HI_{(35\ days)}$ ($\log_2$)	$HI_{(42\ days)}$ ($\log_2$)
Control	3.41[c]	4.17[d]
T1	3.88[b]	4.38[c]
T2	3.91[ab]	4.71[b]
T3	4.10[a]	5.21[a]
MSE	0.287	0.114

Means within row with no common on letter are significantly different (P<0.05). Control: Basal diet; T1: basal diet with 100 mg *H. persicum*, T2: basal diet with 150 mg *H. persicum*, T3: basal diet with 250 mg *H. persicum*

The antibody titre against ND in control and treated groups is given in Table 5. Significantly high antibody titre was recorded in T 3 at 35 and 42 d of treatment in group T3.

Discussion

In the present study, the performance traits in broilers improved in response to different levels of *H. persicum* treatment. In literature, the effect of this plant on the feed intake, weight gain and feed efficiency in broiler are not available. We may hypothesize that the improved performance of broiler may be due to presence of pharmacological agents of the plants which might have digestive effects.

We found that *H. persicum* extract in broiler chicks had some beneficial effect. Medicinal plants are rich source in substances which enhance have beneficial effects (Weiner, 1994; Great head, 2003). The plant showed an increased response with all the tested doses, but this increase was only significant with highest does of the plant. This activity could be due to the presence of flavonoids or furanocoumarins which can augment the humeral response by stimulating the macrophages and beta-lymphocytes involved in antibody synthesis (Sharififar et al., 2009). *H. persicum* extract may also have a stimulatory effect on lymphocytes and the accessory cell types (Vimal and Devaki, 2004).

Some of the reports showed that hydro alcoholic extract essential oil significantly reduced serum concentration of total cholesterol and LDL cholesterol (Vimal and Devaki, 2004; Hajhashemi et al., 2014).

The mechanism of hypolipidemic activity of *H. Persicum* essential oil and hydroalcoholic extract in reducing LDL is not clear. They may reduce LDL by inhibiting intestinal absorption of cholesterol with a mechanism similar to ezetimibe (Scheffer et al., 1984; Souri et al., 2004).

Conclusion

We concluded that *H. persicum* extract could be effectively used in improving performance, blood cholesterol and antibody titre against Newcastle disease virus.

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