

Effect of Artichoke Leaves Meal and Mentha Extract (*Mentha piperita*) on Immune Cells And Blood Biochemical Parameters of Broilers

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Abstract: This experiment was conducted to evaluate the effect of artichoke (*Cynara Scolymus L.*) leaves meal and menthe extract (*Mentha piperita*) on immune cells and blood biochemical parameters of broilers. Three hundred broiler chickens (Ross 308) were used in completely randomized design in four treatment and five replicates (15 birds per replicate) for a period of 42 days. The treatment groups consisted of: control group (without any addition); addition of 1.5% artichoke leaves meal in diet; addition of 200mg/kg mentha extract in drinking water and addition of 1.5% artichoke leaves meal in diet +200mg/kg mentha extract in drinking water. The result of this experiment showed that there had significantly difference between control and treated groups in heterophil percentage at 42 days. The lowest amount of blood urea, cholesterol and triglyceride were observed by adding 1.5% artichoke leaves meal in diet plus 200mg/kg mentha extract in drinking water. No significant difference was observed between the control and treated group in HDL and LDL concentration at 42 days of age in broiler chickens.

Key words: Artichoke • Mentha Extract • Broiler Chickens • Blood Parameters • Immune Cells

INTRODUCTION

During the past 50 years, the growth rate of broiler chickens has been improved greatly. Feeding antibiotics as growth promoters had a substantial role in poultry industry. The World Health Organization (WHO) has recently identified antibiotic resistance as a major problem for public health on a global scale. Medical plants and their product including plant extracts or essential oils are introduced as candidates or in broiler diets in which their beneficial effects as phatogenic feed additives have been proven. [1-3]. Artichoke leaf meal is an herbal remedy made from the artichoke plant (*Cynara Scolymus L.*) the extract characteristically contains caffeoylquinic acid derivatives, including caffeic acid, chlorogenic acid and cynarin [4]. Artichoke leaf is considered choleric (bile increasing) [5] cholesterol-reducing [6] antioxidant and hepatoprotective [7]. The effects of adding artichoke leaves meal in the diets of different animal species and obtained definite positive effects on performance of broiler, duck, guinea fowl, rabbits and pig [7]. *Mentha piperita* is one of the world's oldest medicinal herbs and used in both eastern and western traditions. This plant is

a perennial plant in *lamiaceae* family and contains about 1.2-1.5% essential oils. The principal components of the oil are menthol (35-55%), menthone (20-30%) and menthyl acetate (3-10%) [8]. Some papers have reported the beneficial effect of *Mentha piperita* on performance in broiler chickens [9,10]. But evidence about the effect of mentha extract and artichoke leaves meal on blood parameters and immune systems is not sufficient and therefore the aim of this study was to evaluate the effect of artichoke leaves meal and mentha extract on immune cells and blood biochemical parameters of broilers.

MATERIALS AND METHODS

This experiment took place in atlas poultry farm of Mazandaran-Amol city. Three hundred broiler chicks (Ross 308) were used in a completely randomized design in 4 treatments and 5 replicates (15 birds per replicate) for 42 days. The birds were given 23L: 1D lighting program during each 24 period-throughout the 42 days of trail. Starter and grower diets were offered from 1 to 21 and 22 to 42 days of ages, respectively feed and water were provided adlibitum throughout the experiment.

Table 1: The ingredients and nutrients composition of the diets

Ingredients	Starter (1-21day)	Grower (22-42day)
Corn	54.17	63.49
Soybean meal	39.84	30.72
Soybean oil	2.12	1.84
Caco ₃	1.18	1.07
Dicalcium phosphate	1.56	1.73
Common salt	0.34	0.33
Vitamin premix	0.25	0.25
Mineral premix	0.25	0.25
DL-Methionine	0.20	0.27
L-lysine HCL	0.10	0.06
Chemical composition (g/kg)		
Metabolizable energy (kcal/kg)	2900	3005
Crude protein (%)	22.50	20.70
Crude fiber (%)	4.10	2.59
Calcium (%)	0.92	0.90
Available phosphorus (%)	0.45	0.40
Lysine (%)	1.38	1.12
Methionine + cysteine	0.92	0.92

*Each kilogram of vitamin supplement contain: vitamin A, 3600000 IU, vitamin D3, 800000 IU, vitamin E, 7200 IU, vitamin K3, 800mg, vitamin B1,720mg, vitamin B2, 2640mg, vitamin B3,400mg, vitamin B5,12000mg, vitamin B6,1200mg, vitamin B9, 400mg, vitamin B12, 6mg, Biotin, 40mg, cholinchloride,10000mg, anti oxidant, 40000mg, **each kilogram of mineral supplement contains: mn,400mg, Zn,33880mg, Fe,2000mg,Cu, 4000mg, I,400mg, Se,80mg, Choline Chloride, 100000 mg.

The composition and nutrients content of the basal diets is shown in (Table 1). The diets were formulated to met or exceed the National Research Council [11] requirements. A basal diet with no additives considered as control group and there experimental treatments were formulated by supplementation of 1.5% artichoke leaves meal (Barij Essense pharmacy Co, Kashan, Iran), 200 meg/kg mentha extract (Barij Essense pharmacy Co, Kashan, Iran) in drinking water and 1.5% artichoke leaves meal in diet + 200mg/kg mentha extract in drinking water. At 42 days of age, two birds from each replicate (male and female) were randomly chosen for blood collection and approximate 5 ml blood was collected from brachial veins.

One ml of collected blood was transferred to tubes with EDTA for determination of heterophil and lymphocyte blood cells counts. One hundred leukocytes per sample were counted by heterophil to lymphocyte separation under an optical microscope the heterophil to lymphocyte ratio was calculated and recorded [12]. The remaining 4 ml blood was centrifuged to obtain serum for determining the blood biochemical parameters include: Glucose, cholesterol, urea, triglyceride, total protein, HDL, LDL, albumin and globulin kits (T kit) package supplied

by Pars Azmoon were used for determining the blood biochemical parameters using Anision-300 auto-analyzer system. At 7,18 and 26 days of age, each bird received one dose of commercially Newcastle disease virus (NDV) vaccine ELISA antibody titers against NDV were determined at 42 days of age using the IDEXX NDV Antibody Test kit (IDEXX Laboratories Inc., Westbrook, ME 04092) according to the manufacturer procedure. Collected data were analyzed by general liner model (GLM) procedure SAS [13] Duncan's multiple range test was used to detect the difference between treatments and significant defined as p value equal to or less than 5%.

RESULTS AND DISCUSSION

The effect of artichoke leaves meal and menthe extract on immune cells and antibody titer against NDV are summarized in table 2. The results of this experiment showed that there had no significant difference between the control and treated groups in antibody titer against NDV. The highest percentage of heterophil and the highest ratio of heterophil to lymphocyte were observed by group-4. Although there had significant difference between control and treated group in heterophil and lymphocyte percentage at 42 days of age.

The lowest percentage of lymphocyte were observed by group-2. There had no significant difference between control and treated groups in ratio of heterophil to lymphocyte the effect of artichoke leaves meal and menthe extract on blood biochemical parameters of broilers are presented in table-3. The lowest amount of observed by group-4. Although there had no significant difference between the control and treat groups in blood urea.

The results of this experiment showed that the lowest cholesterol and triglyceride were observed by group-4. The HDL and LDL concentrations were affected by addition of artichoke leaves meal and menthe extract in this experiment and the lowest HDL and LDL concentration were observed by group-4, Because of this additive contains menthol and menthone and this materials caused to decreasing blood cholesterol in broiler chickens [8]. Although there had no significant difference between the control and treated group in HDL and LDL concentrations. The investigation showed that the dietary supplemented with polysavone (alfalfa extract) on immunity of broiler chickens caused to increasing antibody titer against NDV [14]. Furthermore, the other experiment showed that saponin extracted from liquoric accompanied antigen of *Eimeria tenella* made a marked protective effect against this phatogen in broilers [15].

Table 2: The effect of artichoke leaves meal and mentha extract on immune cells and antibody titer (log 10) against NDV at 42 days

Parameters	Control	Group-2	Group-3	Group-4	SEM
antibody titer against NDV	3.27	3.48	3.41	3.64	0.053
Heterophil (%)	12.58 ^a	14.32 ^b	13.88 ^c	13.48 ^c	2.39
Lymphocyte (%)	84.65 ^a	83.54 ^a	86.53 ^b	88.32 ^c	2.84
Heterophil/lymphocyte	0.148	0.171	0.160	0.152	0.046

Group-2: addition artichoke leaves meal 1.5% in diet; Group-3: addition 200mg/kg mentha extract in drinking water; Group-4: addition 1.5% artichoke leaves meal + 200mg/kg mentha extract in drinking water; a, b, c: means within the same row with no common superscript difference significantly ($p < 0.05$), SEM= Standard Error Mean.

Table 3: Effect of artichoke leave meal and mentha extract on blood biochemical parameters of broilers at 42 days of age

Blood parameters	Control	Group-2	Group-3	Group-4	SEM
Urea(mgdl ⁻¹)	2.44	2.36	2.40	2.11	0.38
Cholesterol(mgdl ⁻¹)	136.46 ^a	131.69 ^b	132.43 ^b	129.88 ^c	3.46
Triglyceride(mgdl ⁻¹)	43.58 ^a	42.87 ^b	41.93 ^c	41.26 ^c	1.69
Total protein (gdl ⁻¹)	2.32	2.16	2.29	2.24	0.81
HDL(mgdl ⁻¹)	83.51	82.73	82.98	82.18	1.83
LDL(mgdl ⁻¹)	34.06	32.56	33.68	32.16	2.46
Glucose(mgdl ⁻¹)	173.36	172.86	172.54	171.04	1.14
Albumin(mgdl ⁻¹)	1.40	1.46	1.42	1.51	0.21
Globulin(mgdl ⁻¹)	1.32	1.35	1.34	1.38	0.13

Group2: addition 1.5% artichoke leaves meal in diet; Group3: addition mentha extract 200mg/kg in drinking water; Group4: addition 1.5% artichoke leaves meal in diet + mentha extract 200mg/kg in drinking water, HLD: high density lipoprotein, LDL: low density lipoprotein; a, b, c: means within the same row with no common superscript difference significantly ($p < 0.05$); SEM= Standard Error Mean

Other investigation showed that addition of garlic, thyme leaf, cinnamon and rosemary leaves in broilers caused to increasing antibody titer against NVD in treated group as compare to control group [16]. Supplementation of essential oils from medicinal plants improved the immune-defense in poultry [5]. Other investigation showed that addition mixture of *mentha*, *zizphora* and *peppermint* aerial parts powder did not have any considerable effects on broiler serum biochemical measures such as total cholesterol triglycerides and glucose, but wherever mixture as 1% menthe, 0.5% zizphora and peppermint stimulated immune system [17]. Other results showed that addition mixture of three medicinal plants (0.5% *malva silvestris*, 1% *Alhaji maurorum*, 0.5% *Mentha spicata*) decreased the blood glucose, but did not have significant effect on immune cells of broilers [18]. Our observation in this experiment about blood biochemical parameters of broiler is in agreement with Dong *et al.*, 2007, Khaligh *et al.*, 2011, Nobakht and Shahryar, 2010 and Kigchhoff, 1994 [14, 16, 18, 19] and not matched with Narimani-Red *et al* [17] investigation in broiler chickens. The low results of mentha extract and artichoke leaves meal on immune system is probably related to the dose of additives, vaccination program and stimulator material that use in

our study. In conclusion, results of the present study showed that the use of 1.5% artichoke leaves meal in diet + 200mg/kg mentha extract in drinking water can effectively decreased amount of cholesterol and triglyceride and has low positive effects on immunity cells. However for more information, additional experiments are recommended.

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