

INFLUENCE OF POLYHERBAL DIETARY SUPPLEMENTATION ON EGG YOLK CHOLESTEROL AND PERFORMANCE TRAITS IN LAYER BIRDS

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Abstract: Cardiovascular disease, currently the leading cause of death and illness in developed countries, will soon become the pre-eminent health problem worldwide. Several indigenous plants have been claimed to possess hypocholesteremic properties that may be beneficial to reduce the risk of cardiovascular diseases. Hypocholesteremic effect of the polyherbal preparation containing of tulsi (*Ocimum sanctum*), fruit of amla (*Emblica officinalis*), roots of ashwagandha (*Withania somnifera*), bark of mango (*Mangifera indica*) and stem of giloy (*Tinospora cordifolia*) in 3:2:2:2:1 ratio was observed on a total of 30 healthy Jabalpur colour birds of 38 week age old. Birds were divided into five groups containing six birds in each. Birds of group T₁ were kept as control while in experimental groups T₂, T₃, T₄ and T₅ diet was supplemented with polyherbal preparation @ 750, 1500, 3000 and 4500mg/kg of diet respectively. Six eggs were collected from each group of birds on days 0, 14, 28, 42 and 56 of the experiment. Yolk was collected from each egg for the extraction of lipids and cholesterol were estimated using standard diagnostic kits. It was concluded from the study that polyherbal preparation showed a significant hypocholesteremic effect (P<0.05). Production performance traits were also analysed to check the untoward effects if any but the supplementation was found to be safe.

Keywords: *Emblica officinalis*, *Ocimum sanctum*, and Hypocholesteremia, *Tinospora cordifolia*.

Introduction: Hypercholesterolemia is the aetiology behind most of the Cardiovascular diseases and Atherosclerosis is one among them. It is a progressive disease characterized by the accumulation of cholesterol, low density lipoprotein and fibrous elements in the large arteries, which constitutes the single most important contributor to the growing burden of cardiovascular diseases. These diseases are currently the leading cause of death and illness in developed countries, and will soon become the pre-eminent health problem worldwide. Cholesterol has always been a constituent of concern for the mankind.

Chicken eggs are rich sources of cholesterol and anxiety has often been created against their use in human diet, egg being one of the most nutritious and unadulterated natural food, is a rich source of all the essential amino acid, minerals and vitamins, however, in addition to these essential dietary components; egg contains about 200-250 mg of cholesterol. In an adult human, cholesterol levels greater than 250 mg/dl in blood may enhance the risk of cardiovascular diseases. The amounts of saturated and unsaturated fatty acids in egg yolk could be altered by dietary manipulation [1]. Therefore, it is considered relevant to explore ways for production of eggs low in cholesterol [2].

Several indigenous plants have been claimed to possess hypolipidemic, hypocholesteremic, and immune stimulating properties that may be beneficial to reduce the risk of cardiovascular diseases. Many workers have studied the hypocholesteremic effects of individual plants but only a few reports are available on the action of various combination of plants.

Alternatively eggs with low cholesterol content are required to be produced. Hence looking to this point in view, the following polyherbal preparation was tried. Production performance traits were also analysed to check the untoward effects if any.

Material And Methods:

Experimental birds and management: The study was conducted on a total of 30 healthy Jabalpur colour birds of 38 weeks age old. Birds were maintained at All India Coordinated Research Project on Poultry Breeding, Adhartal, Jabalpur. They were kept in individual cages under standard management conditions. All the experimental birds were kept under constant observations during the entire period of 56 days of study at College Poultry Farm, Adhartal, Jabalpur. Birds were divided into five groups containing six birds in each. The birds of different groups were kept separately in individual cages and maintained under similar hygienic conditions. Birds of group T₁ were kept as control which were fed with only basal diet without polyherbal supplements while the birds in experimental groups T₂, T₃, T₄ and T₅ were fed with basal diet supplemented with polyherbal preparations @ 750, 1500, 3000 and 4500mg/kg of diet respectively. The basal diet consisted of 2650 Kcal ME/kg and 18% protein.

Polyherbal preparation: Polyherbal preparation contained fruits of amla (*Emblica officinalis*), roots of ashwagandha (*Withania somnifera*), leaves of tulsi (*Ocimum sanctum*), bark of mango (*Mangifera indica*) and stem of giloy (*Tinospora cordifolia*) in 3:2:2:2:1 ratio. These all are dried and crushed to powder to use.

Extraction of lipids from egg yolk: Six eggs were

collected from each group of birds on days 0, 14, 28, 42 and 56 of the experiment. Total lipids were extracted from the egg yolk [3].and Cholesterol were estimated by using diagnostic kit (Aspen).

Body Weight: All the birds were weighed individually for observing change in body weights on days 0,14,28,42 and 56 of the experimental period with hanging double dial balance.

Egg production: Daily egg production of birds was recorded on individual hen basis.

Statistical Analysis: Data were analysed by factorial complete randomized design [4].

Results And Discussion:

Egg yolk cholesterol: The reduction in egg yolk cholesterol values observed on 14, 28 42 and 56 days for groups T₂, T₃, T₄ and T₅ in the birds fed with preparation were 0.62,2.13,4.33 and 8.42%, 1.94,6.06,6.59 and 14.89%, 3.25,6.62,13.25 and 20.38% and 4.83,13.23,17.62 and 24.60% respectively (Table.I.) Research found 5, 9, 14, 20 and 24% reduction in yolk

cholesterol of laying hens on supplementation of 2, 4, 6, 8 or 10% garlic paste in diet[5]. Similar results were observed on supplementation of 150mg/kg copper in the diet of laying hens. [6]. There was also report that 17.5% and 18.6% reduction in yolk cholesterol was noted on supplementation of amla alone and combination of arjuna, guggul, cinnamon and amla respectively[7].Similarly significant (P<0.05) reduction in yolk cholesterol on the supplementations of their diet with 750mg/kg of tulsi, ashwagandha, amla and giloy was found. [8].

Body weight and Egg Production: The percent increase in body weight in the birds fed with preparation on day 56 was 42.7% in group T₂ while it was 30.4%,32.3% and 25.3% in groups T₃,T₄ and T₅ respectively. The increase in the body weight in the birds fed with polyherbal preparation on day 56 was 34% in control group (Table.II.). With respect to Egg production it had shown increase in T₂ and T₄ by 6.62 and 5.38% respectively (Table.III).

Table.I.Mean +SE of Egg yolk cholesterol (mg/g) in Jabalpur colour birds under various treatments and duration

Treatments	Days				
	Day 0	Day 14	Day 28	Day 42	Day 56
T ₁	16.60+0.14	16.40+0.30	16.45+0.28	16.18+0.44	16.50+0.28
T ₂	15.90 ^b +0.23	15.80 ^b +0.23	15.56 ^b +0.21	15.21 ^{ab} +0.31	14.56 ^a +0.30
T ₃	16.98 ^b +0.68	16.65 ^b +0.66	15.95 ^b +0.53	15.86 ^b +0.47	14.45 ^a +0.14
T ₄	18.10 ^c +0.35	17.51 ^c +0.46	16.90 ^c +0.47	15.71 ^b +0.19	14.41 ^a +0.13
T ₅	18.21 ^c +0.33	17.33 ^c +0.10	15.80 ^b +0.21	15.00 ^b +0.20	13.73 ^a +0.18

Values in a row with different superscripts differ significantly (p<0.05).

Table.II.Mean + SE of Body Weight (g) in Jabalpur colour birds under various treatments and duration

Treatments	Days				
	Day 0	Day 14	Day 28	Day 42	Day 56
T ₁	1553.33 ^a +34.89	1863.33 ^b +33.23	2045.00 ^b +56.79	2046.66 ^b +56.01	2080.00 ^b +55.61
T ₂	1503.33 ^a +15.84	1930.00 ^b +70.66	1946.66 ^b +87.58	1945.00 ^b +88.08	1946.66 ^b +89.09
T ₃	1543.33 ^a +26.54	1946.66 ^b +62.22	1978.33 ^b +60.57	2011.66 ^b +76.61	2145.00 ^b +168.00
T ₄	1546.66 ^a +52.83	1881.66 ^b +82.76	1931.66 ^b +118.53	1966.66 ^b +103.81	2011.66 ^b +76.61
T ₅	1580.00 ^a +58.88	1915.00 ^b +34.71	2026.66 ^b +150.72	1978.33 ^b +110.07	2046.66 ^b +102.33

Values in a row with different superscripts differ significantly (p<0.05).

Table.III.Mean of Egg production + SE in Jabalpur colour birds under various treatments in 56 days

Treatments				
T ₁	T ₂	T ₃	T ₄	T ₅
40.33 ^a +1.54	43.00 ^a +2.39	40.00 ^a +2.74	42.50 ^b +1.31	40.33 ^a +0.91

Values in a row with different superscripts differ significantly (p<0.05).

There was a report that supplementation of 0.5 percent *Withania somnifera* to the diet of day-old broiler chicks for a period of 6 weeks, produced significant increase in feed consumption and gain in body weight[9].The addition of vitamins C and E (250mg/kg diet) in laying hens feed resulted in increased body weight [10].Similarly the

improvement in body weight in broiler chicks was seen when they have been fed *E.officinalis* fruit powder at the dose of 2.5 g/kg of diet[11]. Research showed that the effect of essential oil(EO) of thyme and cinnamon as a dietary supplementation to broilers in day-old broiler chicks for 42 days at 200 and 100 ppm individually resulting significantly

higher ($P < 0.05$) body weight gain [12].

Akhtar [13] observed significant increase in the egg production by the supplementation of *Nigella sativa* at the dose rate of 1.5% in layer ration. In the same manner improvement observed in egg production and egg weight on dietary supplementation of *W.somnifera* root powder at the dose of 5g/kg feed and 10g/kg feed for 10 weeks in 32 weeks old White

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