

Incorporation of Tulsi (*Ocimum sanctum*) Leaf Powder in diet of broilers for quality meat production

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Abstract

An experiment was conducted to study the effect of dietary supplementation of tulsi (*Ocimum sanctum*) leaf powder on meat cholesterol and serum lipid profile of broiler from day old to 42nd day of age. One hundred fifty day old chicks were distributed into three experimental groups of 50 birds which were further divided into five replicates of 10 birds each. The control (T1) group was fed with standard broiler diet and T2 and T3 were fed standard broiler diet plus tulsi leaf powder at the rate of 0.5% and 1% respectively. All the birds were reared under standard managerial conditions. The observations were recorded for cholesterol content of meat and serum lipid profile of broilers. Supplementation of tulsi leaf powder at the rate of 1% for 42 days showed the significant decrease ($P<0.01$) in breast muscle and thigh muscle cholesterol. Group T2 showed the significant reduction in thigh muscle cholesterol but not in breast muscle cholesterol. The average serum total cholesterol was reduced significantly ($P<0.01$) in T3 group but not in T2. The average serum HDL cholesterol was increased significantly ($P<0.01$) in T2 and T3. The average serum triglycerides were significantly reduced in T2 and T3. But higher reduction obtained in birds fed with 1% tulsi leaf powder in diet. The average serum LDL cholesterol was significantly reduced ($P<0.01$) in T3 followed by T2 group. The study concluded that supplementation of tulsi leaf powder at the rate of 1% in broiler diet for 42 days reduced meat and blood cholesterol levels of broiler.

Key words: Broiler, Tulsi, Serum lipid profile, Meat cholesterol.

Introduction

Poultry egg and meat in recent years become important and popular food for the 68% of non-vegetarian population (Mohapatra, 2005). Consequently meat plays an important role in Indian meal not only as it due to its increasing capability in coping up with the ever increasing population but also as a fame of healthy, nutritious and protein rich food for the society and hence the quality of each food has to be tested as per as health point of view. Meat quality is assessed through physical (*viz.* PH, colour, tenderness, water holding capacity), chemical (*viz.* moisture, protein, ether extract, cholesterol, fatty acid, oxidative status, residuals etc.), organoleptic (*viz.* taste, flavor, juiciness etc.) and microbiological characteristics. (Thakur *et al.*, 2008). Hence many researchers started to improve the meat quality by altering the meat composition.

There is increasing incidences of coronary heart diseases (CHD) all over the world, the consumer

started thinking about the quality assurance in respect of cholesterol content of the meal he eats. The various Studies have shown that high levels of cholesterol are associated with CHD, even in the absence of other risk factors such as high blood pressure, cigarette smoking, obesity, and diabetes. Many different types of epidemiological studies have not only quantitatively defined the relationship between cholesterol levels and CHD risk but also suggests that the greater the reduction in cholesterol, the greater the reduction of CHD, whether this is achieved through diet or drug either in the context of primary or secondary prevention. Epidemiological studies, also suggested that each 1% reduction in blood cholesterol is associated with an approximate 2% reduction in CHD manifestations (Rifkind, 1986). As nutrition and feeding of birds has a marked influence on meat quality, consumer's health and nutritional status, thereby augmenting the nutritional profile of chicken meat through nutritional

manipulation is a fast emerging concept. Hence Present study is undertaken to improve the quality of the meat thought the reduction of cholesterol content in meat by the incorporation of Tulsi (*Ocimum sanctum*) leaf powder in broiler diet.

Materials and Methods

One hundred and fifty day old, vencobb broiler chicks were weighed individually and distributed into three equal groups viz. T1, T2 and T3 of fifty birds each with five replicates. All the chicks were reared on deep litter system from day old to 42 days of age. All the broiler chicks were immunized against as per vaccination schedule. The starter (0-3 weeks) and finisher (4-6weeks) diet fed *ad libitum* and clean drinking water provided. The chicks fed with the basal diet (Control group) T₁. The treatment group diet T₂ and T₃ supplemented with tulsi leaf powder @ 0.5% and 1% respectively.

Ten sample of each breast and leg muscle from each dietary treatment were randomly selected at the end of the experimental period for the estimation of total cholesterol content (Wybenga and Pileggi, 1970). Serum total cholesterol was estimated by the procedure of Libermann (1885). Serum HDL cholesterol was estimated by the procedure of Dernacker and Hifmans (1980). Serum triglycerides were estimated by the procedure of Stein and Mayer (1995). The LDL cholesterol was calculated by using Friedwald's formula (Friedwald's *et al.*, 1972).

Results and Discussion

The effect of dietary supplementation of tulsi (*O. sanctum*) on serum total cholesterol, HDL- cholesterol, LDL-cholesterol, serum triglycerides and on meat cholesterol is shown in table-1 .

It is revealed that there was a significant reduction in breast muscle cholesterol in group T3 (P<0.01) as compared to T1 and T2. The findings of present study are in accordance with results of Usha Rani (1997) who inferred decreased breast muscle cholesterol when tulsi and nicotinic acid were incorporated in the

broiler diets as compared to control. From Table, it is revealed that there was a significant reduction in thigh muscle cholesterol in group T3 and T2 (P<0.01) as compared to T1. Nagaraja Kumari *et al.* (2006) also found significant reduction in thigh muscle cholesterol by Amaranthus leaf meal (*A. tricolor*) in broiler.

The results revealed that the average serum total cholesterol was significantly reduced (P<0.01) in group T3 as compared to control T1 group. However there was no difference in the average serum total cholesterol when T1 and T2 were compared. It might be due to the reason that blood and tissue levels of cholesterol are determined by balance achieved between dietary inputs and body synthesis on one hand and excretion of neutral sterols and oxidation of bile acid on other hand. Hence any experimental change induced in blood cholesterol levels must be due to the changes in one or more of these input- output factors. In present study the hypocholesterolemic effect of tulsi (*O. sanctum*) might be probably through inhibition of hepatic cholesterol biosynthesis and increased faecal bile secretion and stimulation of receptor mediated catabolism of low density lipoprotein. The present finding is in agreement with Usha Rani (1997) who reported the decrease in the serum total cholesterol with the supplementation of tulsi and nicotinic acid in broilers and Deshpande (2006) who reported the significant reduction in serum total cholesterol in laying hens with the supplementation of tulsi leaf powder.

The average serum HDL cholesterol was significantly increased in group T2 and T3 as compared to control T1 group. Similar findings are also observed by Sarkar *et al.* (1994) in rabbits with supplementation of tulsi.

It is revealed that the average serum triglyceride value of group T2 and T3 was significantly reduced (P<0.01) than T1 but not in between T2 and T3. The present findings are in agreement with the Usha Rani (1997) who reported the decrease in the serum triglyceride with the supplementation of tulsi and nicotinic acid in broilers.

Table-1. Effect of supplementation of tulsi leaf powder on meat cholesterol and serum lipid profile in broilers.

Sr. no	Parameter	T1	T2	T3	Pooled S.E.
1.	Average breast muscle cholesterol (mg %) **	63.06 ^a	61.05 ^a	51.08 ^b	0.49
2.	Average thigh muscle cholesterol (mg %) **	97.76 ^a	96.05 ^b	90.60 ^c	0.19
3.	Average Serum total cholesterol (mg/dl) **	170.9 ^a	170.3 ^a	157 ^b	0.41
4.	Average HDL cholesterol (mg/dl) **	61.67 ^a	73.87 ^b	80.43 ^c	0.34
5.	Average Serum Triglycerides (mg/dl) **	96.523 ^a	90.18 ^b	86.83 ^b	0.29
6.	Average Serum LDL-Cholesterol (mg/dl) **	89.92 ^a	78.38 ^b	59.2 ^c	0.37

** - Significant at 1% level

abc - different superscript in a row differ significantly

It is revealed that the average serum triglyceride value of group T2 and T3 was significantly reduced ($P < 0.01$) than T1. The present findings are in agreement with Usha Rani (1997) who reported the decrease in the serum LDL-cholesterol with the supplementation of tulsi and nicotinic acid in broilers and Kavitha *et al.* (2007) who reported the significant decrease in serum LDL-cholesterol with the supplementation of dried tomato pomace in broiler.

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