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Effect of Dietary Supplementation of Tulsi (*Ocimum sanctum)* Leaf Powder on Oxidative Stress Marker in Broilers

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ABSTRACT

The study was conducted on 72 - day old straight run commercial broiler chicks (DOC) till 6 weeks of age to investigate the effect of Tulsi (*Ocimum sanctum*) leaf powder (TLP) on the hematological parameters of broilers. Chicks were randomly divided into four groups of 18 chicks each. Control group received standard broilers diet. Chicks in second, third and fourth group received standard broilers diet supplemented with Tulsi leaf powder (TLP) @ 0.25, 0.50 and 1 percent. Blood samples were collected at the end of 6th week from the wing vein in sterile heparinized tubes. Plasma was separated by centrifugation for determination of oxidative stress marker in broilers. Results revealed a significant effect of TLP in feeds as alkaline phosphatase level was significantly ($P<0.05$) lower in diets supplemented with 0.5 % and 1.0% TLP.

Keywords: Broiler, Tulsi, Oxidative stress.

Oxidative stress is the major cause of reduction in growth rate in broilers and increase in incidence of infectious and metabolic diseases in poultry, which can be minimized by the use of anti-stress compounds. The anti-stress compounds should not only ameliorate stress but also should be safe and economical. Antioxidants are substances present in lower concentrations and significantly delay or prevent oxidation of substrates such as protein, lipids, carbohydrates and DNA (Sen, 1995). Of the several plants which are found to possess antioxidant properties, the ubiquitous herb, Tulsi (*Ocimum sanctum*) is a fairly economic therapeutic agent for several pathological conditions**.** Further, it is an anti- stress (Bhargava and Singh, 1981) and antioxidant agent Gupta *et al*. (2006). External sources of antioxidant nutrients essential for antioxidant protection include antioxidant vitamins E and C and the mineral selenium. Organic selenium is a natural seleno-aminoacid (selenomethionine) which possesses antioxidant properties and improves resistance against oxidative stress (Mahmoud

and Edens, 2003). The present study was conducted to assess the effect of various levels of *Ocimum sanctum* leaf powder on alkaline phosphatase, SGOT, SGPT, Superoxide dismutase (SOD) and Glutathione peroxidase (GSH-Px) in broilers.

MATERIALS AND METHODS

A total of 72 straight run DOC were randomly distributed into four groups i.e. T_1 (Control), treatment T_2, T_3 and T_4 with six sub groups comprising of three birds in each. Broilers in T_1 were fed diet as per NRC standard (CP 22%and ME 2900 kcal/ kg) but broilers in T_2, T_3 and T_4 were fed standard ration supplemented with 0.25, 0.5 and 1 percent TLP respectively. All broilers were offered feed and plenty of water all time. Birds were provided 0.8 square feet each floor space in battery cages of small animal laboratory in S.S. of animal science, SHIATS Allahabad. A bulb of 15 watt was provided in each cage. Initial weight of each chick was noted on arrival weekly body weight and feed consumption was recorded. Green Tulsi leaves were sun dried for three days initially and then at 60ºC in oven till moisture content level were below 10%. Then the leaves were crushed manually to make it fine. It was passed through fine wire mesh sieve to obtain uniform powder. It was mixed with standard feed according to the ratio mentioned. Cages, feeders, waterers**,** and other equipments were properly cleaned, disinfected and sterilized before use. The waterers were disinfected with 0.02%KMnO4 solution every day. Blood samples were collected at the end of 6th week from the wing vein in sterile heparinized tubes. Plasma was separated by centrifugation. The levels of superoxide dismutase in plasma was measured by the method of Marklund and Marklund (1974), glutathione peroxidase activity was assessed as per the method of Rotruk *et al*. (1973). Alkaline Phosphatase, Serum glutamate oxaloacetate transaminases and Serum glutamate pyruvate transaminases was Analysed by ready kit. Data were statistically analyzed using analysis of variance as per Snedecar and Cocharan (1994).

RESULTS AND DISCUSSION

Mean blood alkaline phosphatase of broilers in irrespective of treatment range from 1.62±0.04 to 1.65±0.03 Ka unit, The lowest value of alkaline phosphatase was recorded in T_4 (1.62±0.02 Ka unit) followed by T_3 (1.63±0.02 Ka unit) T_2 (1.62±0.04 Ka unit) and T_1 (1.65±0.03 Ka unit) but differences between there were found significant ($P<0.05$). This revealed that alkaline phosphatase was significantly influenced by the dietary supplementation of TLP. T_4 and T_3 registered significantly lower alkaline phosphatase than control (T_1). However, T_2 was not significantly different from control and also T_3 and T_4. Dismutation of superoxide ion to hydrogen peroxide by SOD is often called as the primary defense. SOD, is widely distributed in oxygen metabolizing cells and protect aerobic cells against deleterious actions of supero xide radicals and other reactive oxygen species (ROS) (Yamaguchy, 1991). The super oxide dismutase (SOD), SGOT AND SGPT attributes in broilers fed TLP has been presented in Table 1.

Table 1: Effect of Dietary supplementation of Tulsi (O*cimum sanctum)* leaf powder on Oxidative stress marker in broilers.

Parameter	Treatment				
	T_1	T_2	T_3	T_4	
Alkaline phosphatase {Kaunit}	1.65±0.03[a]	1.63±0.02[ab]	1.62±0.04[b]	1.62±0.02[b]	S
S.O.D (U/mgHb)	3.44±0.01	3.36±0.04	3.25±0.03	3.21±0.04	NS
S.G.O.T (Unit/ml)	110.14±0.03	110.33±0.01	111.13±0.05	111.86±0.02	NS
S.G.P.T. (Unit/ml)	30.52±0.03	31.04±0.02	31.43±0.02	31.92±0.03	NS
GSh-Px (mM GSh utilized / min / mg)	2.73±0.04	2.84±0.02	2.98±0.03	3.18±0.01	NS

Means bearing same superscripts in a row do not differ significantly (P<0.05)

It was noted that the lowest super oxide dismutase was recorded in T_4 (3.21±0.04U/mg Hb) followed by T_3 (3.25±0.03U/mg Hb) T_2 (3.36±0.04U/mg Hb) and T_1 (3.44±0.01 U/mg Hb) but differences between super oxide dismutase of broilers among the treatments were found non-significant. Regardless of treatments, the mean SGOT of broilers ranged from 110.14±0.03-111.86±0.02 and the mean highest SGOT was recorded in T_4 (111.86 unit/ml). However, the differences in these values of SGOT did not show any significant effect on SGOT of broilers compared to the control.. Highest mean SGPT (Unit/ml) of broilers was recorded in T_4 (31.92±0.03) followed by T_3 (31.43±0.02), T_2 (31.04±0.02) and T_1 (30.52±0.03). it was observed that regardless of treatment the mean SGPT of broilers ranged from 30.52±0.03 to 31.92±0.03.The differences in SGPT among treatment groups were found non-significant as compared to control group, The SGPT increased non-significantly in T_4 (31.92±0.03) compared to the rest of the groups. The glutathione peroxidase, present in the cytosol and mitochondrial matrix, catalyses the degradation of various peroxides by oxidizing glutathione. Selenium is an essential component of selenium-dependent glutathione peroxidase enzyme, which reduces peroxides and protects cells against the damaging effects of oxidation. The mean GSh-Px of broilers in viz T_1, T_2, T_3 and T_4 was 2.73±0.04, 2.84±0.02, 2.98±0.03 and 3.18±0.01 (mM GSh utilized / min / mg) respectively.The differences in SOD, SGOT, SGPT, and GSh-Px, among treatment groups were found non-significant compared to control group. Increased non-significantly in T_4 all these parameters except GSh-Px compared to control (T_1) in T_2, T_3 and T_4 but not significant. The trend GSh-Px was different which decreased treatment of diet of TLP supplementation.

It was concluded that there was a significant effect of supplementation of TLP @ 0.5 and 1% in feed on alkaline phosphatase (P<0.05). Other parameters such as superoxide dismutase, Serum glutamate oxaloacetate transaminase, Serum glutamate pyruvate transaminases, glutathione peroxidase, were not influenced by TLP supplementation.

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