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Effect of Oral Levamisole Hydrochloride on Humoral Immune Response and Serum Proteins of Broilers

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Abstract: Levamisole hydrochloride was orally administered at 3.75, 7.5, 15 and 30 mg kg^{-1} b.w. doses to different groups of broiler chicks on Day 7,8,9,28,29 and 30 along with the primary and booster inoculations of Ranikhet-La Sota and Sheep Red Blood Cells (SRBC) on Day 7 and 28. The Humoral immune response and serum proteins were observed. Levamisole hydrochloride in all dose levels tested showed elevated antibody titres against La Sota and SRBC and elevated total serum proteins and serum globulins.

Key words: Levamisole, humoral antibody response, la sota, SRBC, serum proteins

INTRODUCTION

The use of Immunomodulators in poultry production shows an increasing trend in the last few years .Since the present day poultry is subjected to variety of stress-associated immunosuppression, the use of immunomodulators would be one of the important practices in poultry industry. In this study numerous compounds such as VitaminE, Selenium, Levamisole, etc. are frequently used as immunomodulators. Levamisole hydrochloride, an imidazothiazole group, was reported to possess immunomodulatory properties in stressed birds[1]. The present study was taken up with the objective of assessing the immunomodulatory properties in healthy broilers against two different antigens viz..Ranikhet-La Sota and Sheep Red Blood Cells and the influence on serum proteins.

MATERIALS AND METHODS

Day old sexed male broiler chicks of 'cobb' strain were randomly divided into groups of six chicks each. The chicks were leg banded and reared in three-tier individual cages (12x12x18) and reared for 8 weeks. Feed and water were provided individually ad libitum under standard managemental conditions. The broilers were fed with standard broiler starter mash and finisher mash from 0-4 weeks and 5-8 weeks, respectively.

Levamisole hydrochloride was orally administered at 3.75, 7.5, 15 and 30 mg kg^{-1} body weight doses to different groups of broiler chicks on day 7,8,9, 28, 29 and 30 along with the priming and booster inoculation with Ranikhet-La Sota and SRBC on day 7 and day 28 (Table 1).+

Blood parameters such as total serum protein, serum albumin and serum globulin and immunological parameters such as Haemagglutination antibody titre against La Sota and SRBC were observed (Table 2).

For estimation of Haemagglutination inhibition titre against Ranikhet La Sota antigen, microdilution technique, as described by Giamborne[1] using V bottom microplates was followed. For estimation of Haemagglutination antibody titre against Sheep Red Blood Cells, the method described by Van Der Zipp[2] was followed. For estimation of total serum protein, serum albumin and serum globulin, modified Biuret and Dumas method[3] using SPAN KIT (code 25931) was followed.

Antigens used: La Sota: Ranikhet Disease virus-La Sola Strain was used to produce antibodies against Ranikhet disease virus.

Sheep red blood cells: The Sheep Red Blood Cells (SRBC) were obtained from six Mecheri sheep and washed three times in physiological saline solution and then packed. The 0.25 mL of packed SRBC mixed with 0.75 mL of physiological saline served as antigen. This antigen was injected intramuscularly 0.5 mL each in both the thighs of the bird.

RESULTS AND DISCUSSION

Levamisole hydrochloride has been reported to increase humoral antibody response against La Sota

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Table 1: Effect of levamisole hydrochloride(oral administration) on HI titre (log_2) against La Sota antigen in broilers

Dose of Levamisole (mg kg^{-1} bw)	HI titre							
	Day7	Day 14	Day 21	Day 28	Day 35	Day 42	Day 49	Day 56
Control	2.09±0.01	2.41±0.05	2.65±0.05	2.87±0.04	2.80±0.05	2.69±0.05	2.62±0.04	2.41±0.05
3.75	2.04±0.01	2.40±0.09	2.62±0.04	2.90±0.04	2.90±0.04	2.69±0.05	2.62±0.04	2.41±0.05
7.50	2.09±0.12	2.40±0.09	2.72±0.01	2.90±0.04	2.80±0.04	2.69±0.05	2.61±0.07	2.49±0.05
15.00	1.91±0.12	2.31±0.08	2.65±0.05	2.87±0.04	2.73±0.00	2.53±0.07	2.41±0.05	2.27±0.05
30.00	2.16±0.07	2.49±0.05	2.73±0.05	2.90±0.05	2.90±0.04	2.73±0.05	2.57±0.06	2.45±0.06

Table 2: Effect of levamisole hydrochloride (oral administration) on Haemagglutinin antibody titre (log_2)against SRBC in broilers

Dose of Levamisole (mg Kg^{-1} bw)	Haemagglutinin antibody titre							
	Day 7	Day 14	Day 21	Day 28	Day 35	Day 42	Day 49	Day 56
Control	0.00±0.00	1.86±0.09	1.55±0.05	0.86±0.29	2.04±0.15	1.79±0.09	0.86±0.29	0.00±0.00
3.75	0.00±0.00	1.86±0.09	1.46±0.16	0.86±0.29	2.05±0.05	1.79±0.09	1.03±0.24	0.00±0.00
7.50	0.00±0.00	1.86±0.09	1.55±0.05	1.03±0.12	2.11±0.07	1.86±0.09	1.19±0.12	0.33±0.21
15.00	0.00±0.00	2.09±0.12	1.72±0.09	1.39±0.12	2.49±0.05	2.05±0.05	1.46±0.16	0.86±0.29
30.00	0.00±0.00	2.11±0.07	1.79±0.09	1.46±0.16	2.49±0.05	2.14±0.12	1.79±0.09	0.86±0.29

Table 3: Effect of levamisole hydrochloride (oral administration) on serum proteins (g%)

Groups	Total serum proteins	Albumin	Globulin
Control	3.02±0.02^{a}	1.01±0.00^{a}	2.00±0.02^{a}
Levamisole 3.75 mg kg^{-1} bw	3.19±0.02^{b**}	1.01±0.01$^{a ns}$	2.18±0.01^{b**}
Levamisole 7.50 mg kg^{-1} bw	3.21±0.01^{b**}	1.01±0.01$^{a ns}$	2.20±0.02^{bc**}
Levamisole 15.00 mg kg^{-1} bw	3.30±0.02^{c**}	1.01±0.00$^{a ns}$	2.29±0.02^{c**}
Levamisole 30.00 mg kg^{-1} bw	3.29±0.05^{c**}	1.00±0.01$^{a ns}$	2.28±0.06^{c**}

Mean values within each column bearing atleast one common superscript do not differ significantly, *p<0.05, **p<0.01 as compared to the control

antigen in chicken[4,5]. In the present study, Levamisole hydrochloride in all the doses given, produced elevated antibody titres against La Sota antigen; but produced significant rise in antibody titres only against SRBC. Levamisole hydrochloride produced a significant ($p<0.01$) increase in total serum proteins and globulin levels in all the doses tested: But did not produce any change in serum albumin Table 3. These results are in agreement with that of Karnatak[6]. Levamisole hydrochloride apparently helped the antigens with reference to antigenic presentation and effective participation in the immunological cascade of events resulting in substantial humoral antibody response[7]. Of the two antigens tested, the humoral antibody response was better with respect to SRBC than with La Sota. The SRBC is relatively an unnatural antigen and this could be the reason for Levamisole hydrochloride's greater influence in producing humoral antibodies.

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