Effect Of Selenium Supplementation On Immune Response Post Vaccination Against Infectious Bursal Disease In Broiler Chicks

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ABSTRACT

Two hundred chicks were reared up to 43 days old under controlled experimental conditions. The chicks were randomly divided into four groups A, B, C and D , each containing 50 chicks, chickens of group A and B were not supplemented with selenium as a negative control. While chickens of group C and D were fed ration containing selenium @ 0,06 mg/Kg from day old to 43 days old. The chickens of groups B and D were vaccinated against infectious bursal disease (IBD) at 10 days old and boosted at 25 days old. The effect of selenium on humoral immune response was evaluated by recording weekly serum antibody titres against IBD through indirect haemagglutination (IHA) test. The cumulative mean titres (CMT) recorded in groups A, B, C and D were 15, 53, 16 and 61, respectively ($P<0.05$). These results indicated that selenium supplementation improve immune response of broiler chickens to IBD vaccines.

INTRODUCTION

Infectious bursal disease (IBD) is an acute and highly contagious viral disease of young chickens. It is of great economic importance because of the resulting morbidity and mortality as well as the immune suppression, which may occur if chickens are infected at an early age. The disease affects primarily bursa of Fabricious and other lymphoid organs to lesser degree *(1).*

Restoration of normal immune functions may increase resistance to infectious diseases and reduce the severity of disease. It can mainly be possible by immunostimulation, which is the enhancement of immune response by increasing the rate at which the response occurs, elevating its magnitude, thus prolonging the response or directing the response to a particular fact of the immune response. Substances capable of these actions may be specific or non-specific immuno-potentiators *(1).*

There are many immunostimulating substances that have been used in poultry with success. Some of these agents include levamisole, vitamin E and selenium *(2,3).* Selenium supplementation of animals in diets enhances the immune status and ability of the immune system to respond to disease challenges. The parental administration of selenium has been reported to enhance humoral immune response *(4).* The objective of the present study was to study the effect of selenium supplementation on humoral immune response against IBD in broiler chicks.

MATERIAL AND METHODS

Experimental design

A total of 200 day-old broiler chicks were divided into four groups A, B, C and D, each having 50 birds. Birds of groups A and B were not supplemented with selenium, while those of groups C and D were given selenium @ 0.06 mg/Kg of feed from day one to day 43. The birds of groups B and D were vaccinated against IBD on day 10 (intraocular) and day 25 (drinking water) using D 78 vaccine of IBD. All the groups were maintained under standard housing and management conditions.

Measurement of serum antibody titres

Blood samples were obtained from randomly selected 10 birds of each group at weekly intervals from day one to day 43 of age. The indirect haemagglutination (IHA) antibody titres against IBD were measured in serum samples *(5).* Geometric mean titres (GMT) of each group were calculated at each week and cumulative mean titres (CMT) of each group were measured for the whole period (7 weeks).

Statistical analysis

Data on IHA antibody titres against IBD were analyzed statistically through analysis of variance and cumulative mean titres were compared through Duncan's Multiple Range test (6).

RESULTS AND DISCUSSION

Vaccine failure and disease prevalence may be attributed to immunosuppression, which is a recurring economic problem in commercial poultry flocks. Factors such as poor biosecurity, imbalanced ventilation, extreme ambient temperature, stress, substandard vaccines and medicines, irrational use of antibiotics and poor quality feed cumulatively make the birds vulnerable to the attack of various infectious diseases. Nutrition plays a significant role in the development and function of the immune system *(7)*.

The geometric mean titres (GMT) against IBD measured through IHA in the present study are presented in Table 1. The highest cumulative mean titres (CMT) were recorded in group D (61), followed by groups B (53), C (16) and A (15). The statistical analysis of CMT indicated that the titres in the vaccinated groups B and D were significantly higher than those of non-vaccinated groups A and C ($P<0.05$). The titres of groups A and C were almost same, whereas the titres of group D were significantly higher than those of group B ($P<0.05$). These results indicate that selenium supplementation helps to increase post vaccination humoral immune response against IBD in broiler chicks.

The findings of the present study are supported by previous observations *(8,9)*, which showed that selenium supplementation enhanced the immune system and increased the natural resistant of animals by increasing response of the organism to antigenic stimuli. An increase in humoral antibody titres was recorded when selenium was supplemented in feed *(10)* .

Table 1. The indirect haemagglutination (IHA) titres against infections bursal disease (IBD) from day one to day 43 of age.

Geometric mean titres (GMT)	Groups			
	A	**B**	**C**	**D**
Day1	43	45	41	42
Day8	24	22	23	24
Day15	10	28	12	30
Day22	8	51	12	64
Day29	7	64	9	79
Day36	6	81	8	92
Day43	6	83	8	94
Mean cumulative titre (MCT)	15^{c}	53^{b}	16^{c}	61^{a}

CMT values with different superscripts differ significantly ($p<0.05$)

REFERENCES

*Steel R D G and Tome J H (1984):*Principles and Procedures of Statistics. Mc-Graw Hill Book Co. Inc. New York, USA.

Khan S A, Iqbal M and Ashraf S K (1993). Poultry industry in Pakistan. Agro. Vet. News, 5(6): 9.

Calnago G L, Jensen L S and Long P L, (1984): Effect of selenium and vitamin E on the development of immunity to coccidiosis in chickens. Poult. Sci., 63(6): 1136-1143.

Madron P and Vrzgulova N (1988): Vitamin E and selenium increase the natural

resistance of farm animals. Veterinarstvi, 38(8):369-371.

Schrauzer G N (2000): Selenomethionine: a review of its nutritional significance, metabolism and toxicity. J.Nutr.,130: 1653-1656.

Hyde R M and Patnode R A (1991): Immunology. 2nd Ed. Awiley Medical Publication, John Wiley and Sons, New York. USA.

Koller L (1982): Chemically induced immunomodulation. J. Amer. Vet. Med. Assoc., 181: 1102-1106.

Bashir F K (1994): Effect of vitamin E deficiency and excess on immune system of broiler chicken. M.V.SC Thesis, Deptt. Vet. Path., College of Vet. Sci., Lahore, Pakistan.

Droke E A and Loerch S C (1989): Effects on parenteral selenium and vitamin E on performance, health and humoral immune response of steers new to the feedlot environment. J. Anim. Sci., 67(6): 1350-1359.

Rahman S U, Ashfaque M and Saeed J (1994): Infectious bursal disease antibody titration using indirect haemagglutination test. Pakistan Vet. J., 14(2): 101-103.

الملخـــص العـــربي

تأثير استخدام السلينيوم على مستوى الأجسام المضادة بعد التحصين ضد مرض الجامبورو في بدارى التسمين

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أجريت هذه الدراسة على ٢٠٠ كتكوت تسمين عمر يوم واحد لمدة ٤٣يوم تم تقسيمها إلى أربع مجاميع أ ، ب ، جـ ، د ، كل مجموعة تحتوي على ٥٠ كتكوت المجموعتين جـ ، د تم اعطائها مادة السلينيوم بمعدل ٠,٠٦ ملليجرام/كيلوجرام عليقة من عمر يوم حتى ٤٣ يوم بينما المجموعتين أ ، ب تم إعطائها عليقة بدون سيلينوم.

طيور المجموعة ب ، د تم تحصينها ضد مرض الجامبورو (IBD) عند عمر ١٠ أيام ، عمر ٢٥يوم.

تم تقييم تأثير السلينيوم عل الاستجابة المناعية بحساب مستوى الأجسام المضادة ضد مرض IBD بواسطة اختبار Indirect haemagglutination (IHA). وكان متوسط مستوى الأجسام المضادة التراكمي (CMT) في المجاميع أ ، ب ، جـ ، د ١٥ ، ٥٣ ، ١٦ ، ٦١ على التوالي.

هذه النتائج تشير إلى أن إضافة السلينيوم يساعد على زيادة الاستجابة المناعية بعد التحصين ضد مرض الجامبورو (IBD) في دجاج التسمين و ذلك لتقليل خطورة المرض في تثبيط الأجسام المناعة في الأعمار الأولى..