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COMPARATIVE SEROLOGICAL RESPONSES AND PROTECTION CONFERRED BY VACCINATION WITH V_4HR AND BCRDV IN CHICKENS

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ABSTRACT

The serological responses and protection of Sonali breed chickens with Australian Newcastle disease V_4 heat resistant (NDV_4HR) live freeze-dried vaccine (Australian Webster Pvt. Ltd., Sydney) was compared with that of locally produced conventional Lentogenic F-strain Baby Chick Ranikhet Disease vaccine (BCRDV, DLS, Dhaka) of Bangladesh. Thirty day-old chicks were purchased from Mirpur Govt. Poultry Farm, Dhaka and maintained hygienically with commercial feed and water supply *ad libitum* during the experimental period from November 2002 to January 2003. These birds were divided into three groups (A, B and C), each consisting of 10 birds. Each birds of group A was vaccinated with NDV_4HR and group B with BCRDV intraocularly, primary vaccination at 7 days and booster vaccination at 28 days of age, whereas the birds of group C kept as control. Sera samples of each of the bird of all the three groups were collected at 14 days of post-vaccination following each of the primary and booster vaccination at 23 and 44 days of age of birds. Each of the serum sample of all the three groups of birds was titrated by using haemagglutination inhibition (HI) test and results recorded that both the NDV_4HR (32.49 ± 23.94) and BCRDV (28.28 ± 10.54) produced more or less similar serological response at two weeks after booster vaccination. The results of challenged experiment showed that the NDV_4HR vaccine (80%) apparently conferred higher protection to birds than the BCRDV vaccine (70%). Therefore both the vaccines may be recommended to control ND in commercial chickens but NDV_4HR vaccine could provide a practical method of control ND in rural scavenging chickens.

Key words: Serological responses, F-strain (BCRDV), NDV_4HR vaccine, HI antibody titre, protection, chickens

INTRODUCTION

Newcastle disease (ND) is endemic in Bangladesh and causes high rate of morbidity and mortality in chickens. Vaccination as a mean of protecting chickens against ND is routinely practised in the endemic country like Bangladesh which are reviewed by Samad (2000). The lentogenic strain F is widely used as Baby Chick Ranikhet Disease Vaccine (BCRDV) as intraocular inoculation within 7 days of age, and repeated dose with F strain to growing chickens followed by mesogenic vaccine (RDV) are used to boost up the immunity produced by Mukteswar strain. The reports on preparation, application and evaluation of different vaccines including conventional vaccines (BCRDV & RDV) against ND have been made locally (Chowdhury *et al.*, 1981; Sarker *et al.*, 1981; Saifuddin *et al.*, 1986, 1990, Amin *et al.*, 1987ab; Hossain *et al.*, 1989; Saha *et al.*, 1998). Maintaining a cold-chain, catching and handling each individual bird, skilled vaccinators and repeated doses of vaccine are required for immunization of birds with conventional vaccines. Recently ND vaccine with heat resistant V_4 strain of ND virus (NDV_4HR) has been developed in Australia (Ibrahim *et al.*, 1981) and Malaysia (Aini *et al.*, 1987) showed several advantages over conventional vaccines like easy to transport without a cold-chain, easy to administer, suitable for delivery by any route and any age of chickens and without need of subsequent vaccination (Bell *et al.*, 1995; Biswas *et al.*, 1996a; Rehmani, 1996). The comparative serological response and protection between locally produced conventional vaccines and Australian heat resistant V_4 strain of NDV vaccine have been evaluated in indigenous scavenging chickens in Bangladesh (Biswas *et al.*, 1996ab). This paper further describes the comparative serological responses and protection between the locally produced conventional F strain (BCRDV) vaccine and Australian heat resistance V_4 strain of ND virus (NDV_4HR) vaccine in Sonali breed commercial chickens.

MATERIALS AND METHODS

Thirty day-old-chicks of Sonali breed with the history of vaccination of parent stock against Newcastle disease (ND) were purchased from Mirpur Govt. Poultry Farm, Dhaka and reared at the experimental house of the Department of Microbiology and Hygiene, BAU, Mymensingh, during the period from November 2002 to January 2003.

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These birds were divided into three groups (A, B & C), each consisting of 10 birds. Birds were provided with commercial feed and tube-well drinking fresh water *ad libitum* throughout the experiment. The Australian heat resistant V_4 strain of ND virus (NDV_4HR) vaccine (obtained from Dr. Jonathan Bell, Senior Advisor, SLDP-2 project) and F strain (Baby Chick Ranikhet Disease Vaccine, BCRDV) vaccine locally produced by the Director of Livestock Services (DLS) were used for this comparative trial experiment. Each bird of group A were inoculated with NDV_4HR and each bird of group B was inoculated with BCRDV intraocularly @ 2 drops / bird two times at the age of 7 and 28 days, whereas the birds of group C kept as unvaccinated control. Blood samples were collected from the wing vein of each of the thirty birds of all the three groups at the age of 6 days, i..e., one day before of primary vaccination and at the age of 23 days, i.e., two weeks after the primary vaccination and 44 days, i.e., two weeks after booster vaccination. Sera were separated and stored at -20^0 C until tested. Each of the collected serum sample was titrated for NDV antibody using the Haemagglutination Inhibition (HI) test by using reference Newcastle disease HA antigen (Nisseiken Co. Ltd., Japan) as per method of Allan and Gough (1974). Each of 20 vaccinated birds of group A and B, and of 10 unvaccinated control birds was challenged IM at the age of 45 days, i.e., 16 days of post-booster vaccination @ 0.25 ml of 10^3 EID50 NDV obtained from Department of Microbiology and Hygiene, BAU, Mymensingh. Challenged birds were observed for two weeks twice daily. Any bird showing the symptoms of ND was recorded, and necropsy examination was conducted in all the dead birds. Results were analyzed statistically by using computerized statistical program (SPSS, Version-7.5).

RESULTS AND DISCUSSION

The mean HI antibody titer of birds in group A (5.74 ± 2.10) which were vaccinated with NDV_4HR and group B (6.60 ± 2.58) which were vaccinated with BCRDV did not differ significantly ($p > 0.05$) in comparison to unvaccinated control group C (6.60 ± 6.25) at the age of 23 days, i. e., two weeks of post-primary vaccination (Table 1).

Table 1. Antibody response and protection to Newcastle disease virus challenge of vaccinated and non-vaccinated chickens

S/N	Vaccinated with	No. of birds	Pre - vaccination HI titer	Vaccinated age (days)		Post-vaccination HI titer		Challenge (protection)	
				Primary	Booster	23 days of age[1]	44 days of age[2]	No.	% protected
1.	NDV_4HR	10	05-20 13.50±2.58	7	28	05-10 5.74±2.10	20-80 **32.49±23.94	10	8 (80)
2.	BCRDV	10	05-20 12.75±3.85	7	28	05-10 6.60±2.58	20-80 **28.28±10.54	10	7 (70)
3.	Control	10	05-20 13.50±2.58	-	-	05-10 6.60±6.25	05-10 05.74±02.10	10	0 (00)

**Indicates significant ($P < 0.01$), NDV_4HR = Newcastle disease V_4 heat resistant live freeze-dried vaccine, BCRDV = Baby Chick Ranikhet Disease Vaccine, [1]Two weeks of post primary vaccination, [2]Two weeks of post booster vaccination.

The mean HI antibody titer at 44 days of age, i.e., two weeks after booster vaccination were significantly ($p < 0.01$) higher in both the group A (32.49 ± 23.94) and group B (28.28 ± 10.54) vaccinated with NDV_4HR and BCRDV respectively in comparison to their respective values of 23 days of age and controls (Table 1). The mean HI antibody titer in birds of group A (32.49 ± 23.94) vaccinated with NDV_4HR was found insignificantly ($p > 0.05$) higher in comparison to group B (28.28 ± 10.54) vaccinated with conventional BCRDV. This observation did not confirm the earlier report of Biswas *et al.* (1996b) who reported higher HI titer in the birds vaccinated with conventional vaccine (BCRDV & RDV) than in the NDV_4HR vaccinated birds. However, the birds of control group C showed a similar level of HI antibody titer like primary vaccinated birds at 23 days of age but it did not protect the birds during the challenge experiment. The presence of HI antibody in control birds before challenge might be due to very mild exposure to NDV possibly transmitted by feeds and attendants. The challenged test revealed that the conventional BCRDV and NDV_4HR vaccines protected 70 to 80% of the chickens (Table 1). NDV_4HR vaccine apparently produced higher protection in birds (80%) than the BCRDV vaccine which produced 70% protection (Table 1). All birds of control group developed clinical signs of ND, after exposure to virulent NDV and died. The results of

the present study indicate that both the locally produced conventional BCRDV and Australian NDV_4HR vaccines stimulated similar and satisfactory humoral responses that are subjected to protect a virulent challenge. Therefore both vaccines could be recommended for field use but vaccination with NDV_4HR vaccine could be an easy and effective method to immunize chickens.

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