Bangl. J. Vet. Med. (2004). 2 (1) : 37–38

COMPARATIVE EFFICACY AND HUMORAL RESPONSES OF AN INACTIVATED INFECTIOUS BURSAL DISEASE VIRUS VACCINE PREPARED FROM A LOCAL ISOLATE WITH THAT OF A COMMERCIAL LIVE VACCINE IN LAYER BIRDS

M. I. A. Begum, M. A. Islam, A. T. M. Mahbub-E-Elahi, M. Rahman and M. E. R. Bhuiyan[1]

Department of Microbiology and Hygiene, Department of Physiology[1], Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh, Bangladesh

ABSTRACT

The humoral immune response and efficacy of an inactivated adjuvanted infectious bursal disease virus (IBDV) vaccine prepared with a virulent local isolate was compared with a live commercial IBDV vaccine (Nobilis D78®, Intervet) in 20 layer birds during the period from October to November 2002. These day-old experimental birds were divided into four groups, A, B, C and D, each consisting of 5 birds. Each bird of groups A, B and C was immunized with live IBDV vaccine (Nobilis D78®, Intervet), live + inactivated vaccine, and inactivated IBDV vaccine, respectively at day 7, day 21 and day 28, whereas birds of group D served as unvaccinated controls. The sera of chickens vaccinated with either combined (live + inactivated) or only inactivated IBDV vaccine showed clear band of precipitation with agar gel immunodiffusion test (AGIDT) and higher antibody titre with ELISA. The protection test revealed that the experimentally prepared inactivated IBDV vaccine gave 100% protection against 80% protection in layer birds immunized with live commercial vaccine.

Key words : Efficacy, humoral immune response, IBD, inactivated vaccine, live vaccine, layer birds

INTRODUCTION

The infectious bursal disease (IBD) is an emerging viral disease in all of the major poultry producing countries of the world including Bangladesh (Calnek *et al.*, 1997; Samad, 2000). Poultry raisers of many countries including Bangladesh are still under threat despite of following regular vaccination schedule to their chickens using imported conventional IBD virus vaccines available in Bangladesh. No commercial vaccine against IBD has yet been developed or manufactured in Bangladesh using the prevailing local isolates of IBD virus. A local isolate of IBD virus M6 strain was isolated and characterized in Bangladesh (Begum *et al.*, 2004) which are still being evaluated for their usefulness as vaccine virus. This paper describes the comparative efficacy and humoral immune responses of an inactivated IBD virus vaccine prepared from local isolate (M6) with that of a commercial live vaccine in layer birds.

MATERIALS AND METHODS

Chicken embryo fibroblast (CEF) cell culture propagated infectious bursal disease virus (IBDV) M6 strain was purified and concentrated @ 1 mg / ml in PBS and 2.5 μl of commercial formaldehyde (37%) was added with 250 μg of purified concentrated virus present in 250 μl of PBS (v/v) and kept at room temperature for about 72 hours to inactivate the virus properly. Then 2.5% alum was added in the inactivated virus which is used as an adjuvant and this inactivated adjuvanted IBDV vaccine was used for experimental immunization of chickens.

The immunization trial experiment was conducted with the locally prepared IBDV vaccine, in layer chickens during the period from October to November 2002. Day-old 20 layer chicks were purchased from the local hatchery (Begum Rokeya Poultry Farm, Mymensingh) on the month of October 2002. These layer chicks were divided into four groups (A, B, C & D), each consisting of five birds. Each bird of group A was vaccinated with live IBDV vaccine (Nobilis D78®, Intervet), birds of group B were vaccinated with the combination of live (Nobilis D78®, Intervet) plus locally prepared inactivated adjuvanted (BAU-IBDV) vaccines, birds of group C were vaccinated with only the experimentally prepared inactivated adjuvanted (BAU-IBDV) vaccine at day 7, day 21 and day 28 of age respectively. Birds of group D served as unvaccinated controls. The dose rate of the inactivated adjuvanted vaccine was 0.5 ml (10^4CID_{50}) / bird through IM route where one drop of live vaccine (Nobilis D78®, Intervet) was inoculated in each eye of chicks as per manufacturer instruction. Birds of group D which served as unvaccinated controls and group C vaccinated with only the inactivated vaccine were kept in separate cages in separate room.

At 35 days of post-immunization, each bird of all the four groups A to D was challenged orally with 0.5 ml of homologous virulent IBDV M6 virus suspension diluted in PBS contained 10^4CID_{50}/ dose. Each of the challenged bird was closely observed to record the development any clinical signs or mortality. Serum was collected from all the birds of each group at 7 days interval of post-immunization, and at 14 days of post-challenge. Each of the collected sera was tested with agar gel immunodiffusion test as described by Asai and Lyisan (1991) and a commercial IBD ELISA test kit (IDEXX Lab., USA) to detect the humoral immune responses in layer chickens.

RESULTS AND DISCUSSION

The results of humoral immune responses and efficacy of live and inactivated vaccines against IBD in layer birds are presented in Table 1. The antibody ELISA titre of sera of chickens immunized with live Nobilis D78® commercial IBD vaccine was found remain unchanged during the post-immunization period, whereas 10 fold increased antibody titre was recorded with inactivated vaccine (Table 1). These observations support the earlier reports of Kwang *et al.* (1987), Martin *et al.* (1992) and Cadman *et al.* (1994) who reported higher level of antibodies at 21 and 28 days of post-immunization by ELISA.

Table 1. Humoral responses and efficacy of vaccines against infectious bursal disease in layer birds

Groups	No. of birds	Immunized with	Post-immunization (days)						Post-challenged*				
			21		28		35		Ab response		Efficacy results (%)		
			AGIDT	ELISA	AGIDT	ELISA	AGIDT	ELISA	AGIDT	ELISA	Sick	Died	Protected
A	5	Nobilis D78®	No band	10	No band	10	Faint band	100	Faint band	100	20	20	80
B	5	Nobilis D78® + BAU-IBDV	No band	100	Faint band	100	Clear band	1000	Clear band	1000	00	00	100
C	5	BAU-IBDV	No band	100	Clear band	100	Clear band	1000	Clear band	1000	00	00	100
D	5	Control	No band	< 10	No band	< 10	No band	< 10	No band	< 10	100	40	60

*Challenged after 35 days of post-immunization.

However, they also recorded poor humoral responses either with live or killed IBDV vaccine in chickens having regardless higher or lower maternal derived antibodies in their blood during the time of immunization. The results of agar gel immunodiffusion test revealed that birds vaccinated with only the live IBDV vaccine failed to show any band of precipitation on the agar gel, whereas the sera of chickens vaccinated with either combined (live + inactivated) or only inactivated IBDV vaccine showed clear band of precipitation on the agar gel within 3 to 4 days of incubation at 4^0C. The result of AGIDT of the sera of vaccinated groups of chicken strongly supports the findings of Elmubarak and Abuelgasim (1990), and Zorman *et al.* (1991) who detected the precipitating antibody in the sera of pullets of day 24 of post-vaccination with killed IBDV vaccine.

REFERENCES

1. Asai Y and Lyisan AS (1991). Comparison of the enzyme linked immunosorbent assay (ELISA) with the quantitative agar gel precipitation (QAGP) test for detecting antibodies to infectious bursal disease vaccine virus in broilers. *Pendik Hayvan Hastaliklari Merkez Arastirma Enstitusu Dergisi* 22 : 107–121.
2. Begum MIA, Islam MA, Bhuiyan MER, Akter S and Rahman M (2004). Isolation and characterization of virulent strain of infectious bursal disease virus from broiler birds in Bangladesh. *Bangladesh Journal of Veterinary Medicine* 2 : 00–00
3. Cadman HF, Kelly PJ, Zhou R, Davelar F and Mason PR (1994). A serosurvey using enzyme linked immunosorbent assay for antibodies against poultry pathogens in ostriches (*Struthio camelus*) from Zimbabwe. *Avian Diseases* 38 : 621–625.
4. Calnek BW, Barnes HJ, Beard CW, McDougald LR and Saif YM (1997). *Diseases of Poultry.* 10th edn., Iowa State University Press, USA.
5. Elmubarak AK and Abuelgasim AI (1990). The occurrence of infectious bursal disease in the major poultry producing area in Sudan. *Bulletin of Animal Health and Production in Africa* 38 : 293–296.
6. Kwang MJ, Lu YS, Lee LH, Lin DF, Liao YK, Lee C and Lee YL (1987). Detection of IBD viral antigen prepared from the cloacal bursa by the ELISA. *Journal of the Chinese Society of Veterinary Science* 13 : 265–269.
7. Martin NR, Silva D, Mockett APA and Cook JKA (1992). The immunoglobulin response in chicken serum to IBDV. *Avian Pathology* 21 : 517–521.
8. Samad MA (2000). An overview of livestock research reports published during the twentieth century in Bangladesh. *Bangladesh Veterinary Journal* 34 : 53–149.
9. Zorman O, Cajavec S and Josipovic D (1991). Evaluation of the inactivated infectious bursal disease vaccine (Gumpeskal, Pliva) in laboratory and field conditions. *Praxis Veterinaria Zagreb* 39 : 85–94.