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Local Field Isolates of Infectious Bursal Disease Virus (IBDV) in Bangladesh can Induce Higher Immune Response in Chickens than that of the Commercially Available IBDV Vaccines

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Abstract: The aim of the study is to detect the causes of vaccination failure in chickens against IBD in Bangladesh. One selected local field IBDV isolate, one commercially available live attenuated IBDV vaccine Bur-706 (RP) and one killed IBDV vaccine Gumboriffa (RP) were used in this study. A total of 100 chicks (Star brow) of 0,7,14,21 and 28 days age group (taking 20 in each group) were used for study the serologic response with a selected local field IBDV isolate. Similarly two other vaccines were vaccinated in each 100 chicks of similar age groups. After collection of sera weekly for upto six weeks from all groups of birds they were subjected to SNT, PHA test and AGPT against a specific IBDV antigen. Through this investigation it is found that the local field IBDV isolate demonstrate higher serologic response than that of commercially available live or killed IBDV vaccines. So, it may be concluded that the commercially available imported vaccines can not induce sufficient immune response to protect the chickens in Bangladesh. It may be due to degradation of the vaccine quality during transportation or in a new environmental condition or due to antigenic dissimilarities among the local field virus and the imported vaccines.

Key words: Field, isolates, infectious, bursal disease, IBDV, immune,vaccines

Introduction

Infectious bursal disease (IBD) commonly known as Gumboro disease in chickens appears as an emerging and fatal disease in Bangladesh. IBD is an acute highly contagious viral disease of chickens. The young chickens either broiler or layer pullet between 3 to 6 weeks of age are mostly susceptible to infection to this disease. Important signs include vent picking, soiled vent feathers, whitish or watery diarrhea, anorexia, depression, ruffled feathers, trembling, severe prostration and finally death. The economic importance of IBD is manifested in two ways. The first is due to clinical disease and 30-60% mortality in chickens of 3 weeks of age and older. The second and more important manifestation is severe prolonged immunosuppression of chickens infected at an early age due to lymphoid depletion. Sequalae of the immunosuppression include gangrenous dermatitis, inclusion body hepatitis, anemia syndrome, E.coli Infection, coccidiosis and vaccination failure (Calnek *et al.* 1997) IBD is caused by a double stranded naked RNA virus, Belongs to the genus Birna virus under the family Birna viridae. Like other viral diseases IBD is being controlled world wide following strict hygienic and sanitary measures along with proper vaccination (either live attenuated or killed). In Bangladesh the causal agent of this ailment was first isolated and identified by Rahman *et al.* (1986), Later on Choudhury *et al.* (1996). conducted the pathological observation and. IBDV islolation. Unfortunately IBDV vaccine from local field isolate is not still available in Bangladesh. These IBDV vaccines are regularly imported from abroad to control IBDV in chickens. Interesting observation through the poultry raisers in Bangladesh is that their farms are being destroyed due to IBD even after proper IBDV vaccination. Therefore, in order to solve these problems a thorough investigation regarding the vaccine quality and the antigenic relationships among the local field IBDV isolates and the imported IBDV vaccines is a national need.

Materials and Methods

IBDV Field Isolates: Naturally occurring IBDV isolates were isolated from the IBDV suspected sick and dead birds collected from some selected poultry farms in Mymensingh and Dhaka region of Bangladesh. As a source of virus the bursa and spleen were collected. The isolates were identified as IBDV after cultivation in embryonated chicken eggs (ECE) and in chickens. Later the isolates were confirmed through serum neutralization test (SNT) with the specific antisera raised in chickens.

Selection of a Local Field IBDV Isolate: A total of 6 field isolates were subjects to chicken embryo mortality test. The death pattern were recorded and the isolate showing lowest embryo mortality was selected and used in this study.

IBDV Vaccines: Commercially available live IBDV vaccine BUR-706 of Rhone-Poulenc and a killed IBDV vaccine Gumboiffa of the same pharmaceutical company were collected from the local market and were used in this study.

Specific IBDV Antigen: Specific IBDV antigen was collected from the Dept. of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Experimental Procedure: The selected local field IBDV isolate was inoculated intraocularly into the chicks of 0,7,14,21 and 28 days age group of birds at the dose rate of $100EID_{50}$ ml. In each group 16 chicks were inoculated and 4 were kept as control. Live IBDV vaccine BUR-706(RP) was vaccinated following the same procedure and schedule described in inoculation of selected local IBDV isolate. Killed IBDV vaccine Gumboriffa (RP) was vaccinated subcutaneously at the dose rate 0.5 ml per chick following the schedule described in inoculation of selected local IBDV isolate. Sera from all group of birds were collected weekly for up to 6 weeks of inoculation and stored at −20°C. The collected sera were subjected to the serum Neutralization Test (SNT) described by Skeeles *et al.* (1979), Passive Hemagglutination (PHA) Test described by Aliev *et al.* 1989 and Agar Gel Precipitation Test (AGPT) described by Cullen *et al.* (1975) for detection of the antibody titre against a standared IBDV antigen.

Results and Discussion

Serologic response in chickens either inoculated with selected local IBDV isolate or vaccinated with live or killed IBDV vaccine was determined in terms of antibody titre through SNT, PHA test and AGPT. The results of SNT, PHA test and AGPT is presented in Table 1, 2 and 3 respectively.

Table 1: Neutralizing antibody titre in the sera of chickns either inoculated with selected local field IBDV isolate or vaccinated with live or killed IBDV vaccines

Weeks of serum collection	Selected local IBDV Isolate					Live IBDV vaccine (BUR-706)					Killed IBDV vaccine (Gumboriffa)				
	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days
First	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Second	-	32	64	64	64	-	16	32	64	64	-	-	08	16	16
Third	-	64	128	256	256	-	32	64	128	128	-	08	16	32	16
Fourth	08	64	256	512	512	08	32	64	256	256	08	08	32	64	32
Fifth	16	128	512	1024	1024	16	64	128	512	512	08	16	64	128	128
Sixth	32	256	512	1024	512	32	128	256	512	256	16	32	128	256	256

= Negative

Table 2: Passive hemagglutination titre in the sera of chickens either inoculated with selected local IBDV isolate or vaccinated with live or killed IBDV vaccines

Weeks of serum collection	Selected local IBDV Isolate					Live IBDV vaccine (BUR-706)					Killed IBDV vaccine (Gumboriffa)				
	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days
First	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Second	-	08	8	16	16	-	08	16	16	16	-	08	08	08	08
Third	08	16	16	64	32	08	08	32	32	32	-	08	08	16	16
Fourth	16	32	32	256	128	08	16	64	128	64	08	16	16	32	32
Fifth	32	64	128	512	512	16	32	128	256	256	16	16	32	64	64
Sixth	64	128	256	512	256	32	64	128	256	128	16	32	64	128	128

=Negative

Table 3: Precipitating antibodies in the sera of chickens either inoculated with selected local IBDV isolate or vaccinated with live or killed IBDV vaccines

Weeks of serum collection	Selected local IBDV Isolate					Live IBDV vaccine (BUR-706)					Killed IBDV vaccine (Gumboriffa)				
	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days	0 day	7 days	14 days	21 days	28 days
First	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Second	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-
Third	-	-	+	+	+	-	-	-	+	+	-	-	-	-	-
Fourth	-	+	+	+	+	-	-	+	+	+	-	-	-	+	+
Fifth	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
Sixth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

- = Negative
+ =Positive

Table 1 indicates that the highest neutralizing antibody titre is 1024, detected in 21 and 28 days age group of chickens which are inoculated with selected local field IBDV isolate. Incase of live IBDV vaccine the highest antibody titre is 512 which detected in 21 and 28 days age group of chickens. The chickens which are vaccinated with killed IBDV vaccine shows highest anibody titre 256 which detected at 21 days age groups.

Table 2 indicates that the highest passive hemagglutination (PHA) titre is 512, detected in 21 and 28 days age group of chickens which are inoculated with selected local field IBDV isolate. Incase of live IBDV vaccine the highest PHA titre is 256 which detected in 21 and 28 days age group of chickens. The chickens which are vaccinated with killed IBDV vaccine shows highest PHA titre 128 which detected at 21 and 28 days age groups.

Table 3 indicates that the precipitating antibody is first detected at in 21 and 28 days age group of chickens at second week of inoculation which were inoculated with selected local field IBDV isolate. Incase of live IBDV vaccine the precipitation antibody was first detected at 21 and 28 days age group of chickens at third week of vaccination. The chickens which are vaccinated with killed IBDV vaccine shows precipitating antibody in 21 and 28 days age group at fourth week of vaccination.

In each serological test the selected local field IBDV isolate shows higher serologic response than that of the imported live or killed IBDV vaccine. The results of serologic response in chickens against the selected local IBDV isolate or live or killed IBDV vaccines revealed that the 21 and 28 days age group of chickens showed higher immune response than that of the lower age group. In each group control chicks showed no serologic response (not shown in tables). Through this investigation it may be concluded that the commercially available imported vaccines can not induce sufficient immune response to protect the chickens in Bangladesh. It may be due to degradation of the vaccine quality during transportation or in a new environmental condition or due to antigenic dissimilarities among the local field virus and the imported vaccines. Further study should be needed to detect the protective level of immunity against IBD, to justify the quality of imported vaccines, to specify the local field IBDV strains and to prepare a suitable vaccine from the local field isolate which can protect the chickens from IBD in Bangladesh.

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