

## CLINICO-PATHOLOGICAL STUDIES ON NATURAL AND EXPERIMENTAL INFECTIOUS BURSAL DISEASE IN BROILER CHICKENS

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### ABSTRACT

The clinico-pathological studies on infectious bursal disease ( IBD ) were carried out in naturally occurred outbreaks of 19 to 22-day-old broilers ( population 1000 ) and experimentally produced infection in 40-day-old 23 broiler chickens during the period from November 2002 to January 2003. Each of the experimental birds received 100  $\mu$ l of 20% bursal homogenates intraocularly with a wild-type field strain ( BD-3 Wt ) of a Bangladeshi isolate of vvIBDV ( BD-3/99 ). The natural infection caused 29.2% mortality and experimental infection resulted in 26.8% mortality after an incubation period of 48 to 72 hrs. Clinical investigation showed almost similar clinical signs in both the natural and experimental cases. Dullness, depression, anorexia, whitish loose diarrhoea, bloody diarrhoea in some chickens, ruffled feathers and severe dehydration were the recorded clinical manifestations. Necropsy examination revealed no significant pathological differences between chickens died of natural and experimental IBDV infection. Oedematous swelling of the bursa with petechial haemorrhages and slimy to gelatinous materials on the inner surface, and petechial haemorrhages on the thigh muscles were the main gross pathological lesions in both cases. Haemorrhages at the junction between proventriculus and gizzard found in chickens of natural infection but not in chickens of experimental infection. The experimentally infected chickens that survived up to the last day of 10 days observation revealed atrophied bursa with creamy or yellowish discolouration at necropsy.

**Key words :** Infectious bursal disease, broiler chickens, clinical signs, pathology

### INTRODUCTION

The infectious bursal disease ( IBD ) is endemic in the environment of commercial poultry operations and is considered to be among the most economically important infectious diseases affecting the poultry industry ( Shane *et al.*, 1994 ). The IBD knocks out the antibody producing follicles of bursa at a very young age ( Hirai *et al.*, 1974 ), leaving the birds highly susceptible to other infectious diseases also. In the recent years, a very virulent ( vv ) pathotype of infectious bursal disease virus ( IBDV ) has emerged which alone can cause a very high mortality in chicks ( Chettle *et al.*, 1989; Van den Berg *et al.*, 1991 ). Although a large volume of literatures is available on outbreaks and the pathology of IBD, little is known about the pathological changes induced by the vvIBDV in experimental condition ( Nunoya *et al.*, 1992 ) and in natural condition. This paper describes the comparative clinical and pathological findings in broiler chickens following natural and experimental infections with a wild-type field strain of a Bangladeshi isolate of vvIBDV ( BD-3/99 ).

### MATERIALS AND METHODS

**Natural Infection :** Outbreak of acute IBD occurred in commercial broiler farm in the month of November 2002 in Sakhua union of Gauripur upazilla. Affected flock consisted of 1000 broiler chickens. The clinical findings, age of outbreak and mortality were recorded. The dead chickens with IBD were collected from the farm as soon as possible for necropsy. Swabs from heart and liver were collected for bacteriological examination. Cloacal swabs were examined under microscope for any coccidial infections.

**Experimental Infection :** A total number of 25 day-old broiler chickens ( Vencob strain ) were purchased from the Goalundo Hatcheries, Faridpur and were reared in the experimental poultry house of the Department of Medicine under strict hygienic management with fresh drinking water and commercial pelleted feed (Quality Feeds Ltd., Dhaka) *ad libitum*. The chickens were used for experimental infection at 40 days of age.

Of the 25 chickens, 23 were infected intraocularly with the virus suspension of a wild-type field strain ( BD-3 Wt ) of a Bangladeshi isolate of vvIBDV, BD-3/99 ( Islam *et al.*, 2001 ). For infection, BD-3 Wt was passaged in two chickens and bursa were collected to make 20% bursal homogenates diluting with phosphate buffered saline ( PBS ). Each of the chickens received 100  $\mu$ l of 20% bursal homogenates. The chickens were observed closely for the appearance of any clinical signs and mortality for 10 days. The dead birds that died during the course of the experiment were subjected to detailed necropsy. The survived birds killed on the last day of 10 days observation period were examined grossly also.

## RESULTS AND DISCUSSION

The mortality pattern of broiler chickens due to infectious bursal disease ( IBD ) during an outbreak in a farm and experimental infection are presented in Table 1. On investigation it was found that the broiler chickens of outbreak were not vaccinated against IBD.

Table 1. Mortality pattern due to infectious bursal disease in naturally and experimentally infected broiler chickens

S/N	Type of infection	Total number of birds	Age of birds at mortality / experimental infection ( days )	No. of birds died	Mortality ( % )
1.	Natural	1000	19 to 22	292	29.2
2.	Experimental	23	40	06*	26.8

\*Between 4 to 5 days of infection.

The mortality rate due to IBD in the naturally infected broiler chickens ( 29.2% ) was found higher in comparison to experimentally infected broiler chickens ( 26.8% ) ( Table 1 ). The mortality was recorded in naturally infected broiler chickens between the age of 19 to 22 days old whereas in experimentally infected broiler chickens it was between 4 to 5 days of infection after an incubation period of 48 to 72 hrs. These observations are in conformity with the earlier report of Muhammad *et al.* (1996) who reported IBD in broilers of 17 to 35 days old. It also supports the report of Sivaseelan and Balachandran (1999) who reported 21% mortality in naturally infected layer chickens. Hongjib *et al.* (1996) and Islam and Samad (2003) made similar observations, i.e., 27.3% and 29.2% mortality due to IBD in natural condition. Islam *et al.* (1997) recorded 100% mortality in 5-week-old layer chicks after experimental infection with a very virulent ( vv ) isolate ( BD-6 ) of infectious bursal disease virus ( IBDV ) which is contradictory with the present experimental finding ( 26.8% ) in broiler chickens. This finding suggests that broilers are less susceptible to IBDV than layers, as was observed previously by Van den Berg *et al.* (1991).

The natural infection of IBDV was characterized by dullness, depression, anorexia, whitish loose diarrhoea, bloody diarrhoea in some chickens, ruffled feathers, severe dehydration and prostration ( Fig. 1 ). These clinical observations are in agreement with the earlier reports of Chauhan *et al.* (1980), Saha and Majumdar (1997) and Islam and Samad (2003) who reported clinical signs of natural outbreak of IBD in chickens. The clinical signs showed by experimentally infected broiler chickens on day 3 and 4 post infection were almost similar to those of naturally infected chickens.

No significant pathological differences were seen between chickens inoculated experimentally with BD-3 Wt and chickens from the field outbreak. At necropsy, the bursa was swollen, oedematous and haemorrhagic ( Fig. 2 ). Streaks of petechial haemorrhages were also noticed on the inner surface of bursa ( Fig. 3 ). The cut surfaces of bursa Fabricius revealed slimy to gelatinous materials ( Fig. 4 ). The petechial haemorrhages on the thigh muscles were recorded in some birds ( Fig. 5 ). The spleen was haemorrhagic and swollen also ( Fig. 6 ). Haemorrhages at the junction between proventriculus and gizzard found in one broiler chicken of field outbreak which was not found in experimentally infected chickens. Similar observation was also made by Bygrove and Farghar (1970), Okoye and Uzuokuwu (1981) and Verma *et al.* (1990). Some changes like enlargement and changes in colour were also noticed on the liver, kidney and spleen.

The experimentally infected birds that survived up to the last day of 10 days observation revealed atrophied bursa with creamy or yellowish discolouration at necropsy. These post-mortem changes recorded in this study are in conformity with the earlier reports of Chauhan *et al.* (1980), Sami and Baruah (1998) and Sivaseelan and Balachandran (1999). Swelling of the bursa and their subsequent atrophy, as observed in the present study were also reported by Nunoya *et al.* (1992) with vvIBDV. Cosgrove (1962) reported that specific characteristic signs and lesions distinguished IBD as a specific entity. Calnek *et al.* (1997) also opined that the lesions produced by IBD virus are pathognomonic. No evidence of any bacteria and/or *Coccidia* of pathological significance were seen in bacteriological examination of swabs collected from heart and liver and direct microscopic examination of cloacal swabs respectively.

On the basis of the clinico-pathological observations of natural and experimental IBD in broiler chickens in the present study, it may be suggested that mortality pattern may vary and there might be no significant differences of clinico-pathological findings between chickens infected experimentally with a vvIBDV and chickens from the field outbreaks.



Fig. 1. A 20-day-old moribund broiler chicken naturally infected with infectious bursal disease showing prostration and blood mixed faeces.

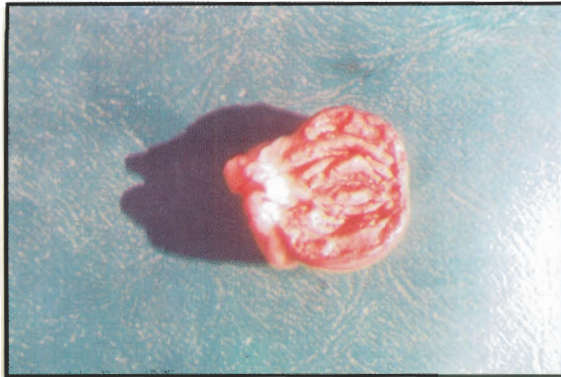


Fig. 2. A cut section of bursa of Fabricius of 44-day-old broiler chicken experimentally infected with infectious bursal disease showing oedematous swelling and haemorrhages.



Fig. 3. A cut section of bursa of Fabricius of 22-day-old broiler chicken infected naturally with IBD showing petechial haemorrhages (left) and oedematous swelling (right).



Fig. 4. The cut surfaces of bursa of Fabricius of 45-day-old broiler chicken infected experimentally with IBD showing slimy to gelatinous materials.

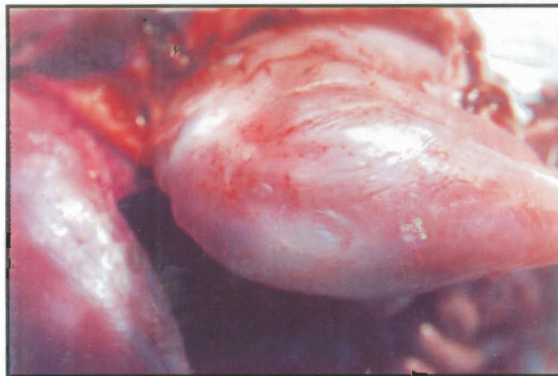


Fig. 5. Thigh muscle of 44-day-old broiler chicken infected experimentally with IBD showing haemorrhages.

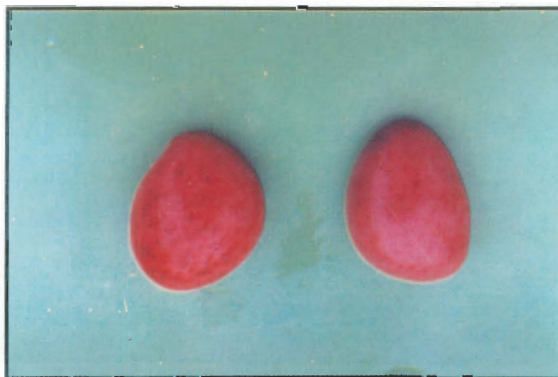


Fig. 6. Spleen of 21-day-old broiler chicken infected naturally with IBD showing haemorrhages and swelling.

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