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

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ABSTRACT

The clino-pathological studies on infectious bursal disease (IBD) were carried out in naturally occurring outbreaks of 19 (9.22 day-old broilers, population 1000) and experimentally produced infections in 40-day-old 25 broiler chickens during the period from November 2002 to January 2003. Each of the experimental birds received 100 µl of 20% bursal homogenate intramuscularly with a wild-type field strain (IBD-3 86) of a Bangladesh isolate of vEBDV (BD-3 99). The natural infection caused 28.7% mortality and experimental infection resulted in 26.8% mortality after an incubation period of 48-72 h. Clinical investigation showed severe clinical signs in both the natural and experimental cases. Diarrhoea, depression, anaemia, which lead diarrrhoea, bloody diarrhoea in some chickens, ruffled feathers and severe depilation were the recorded clinical manifestations. Necropsy examination revealed no significant pathological differences between chickens died of natural and experimental IBDV infection. Occasionally swelling of the gums with potential hoodnoms and derry to gelatinous material in the inner ear and pericellular haemorrhages on the third retina were the main gross pathological lesions in both cases. Haemorrhages at the junction between the pre ovarian and glandular bind in chickens of natural infection but in chickens of experimental infection. The experimentally infected chickens that survived up to the last day of 10-day observation revealed accepted brood with emaciation with yellowish discoloration of necropsy.

KEYWORDS: 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 the bursa at a very young age (Hirn 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 (Chetue et al., 1989; Van den Berg et al., 1990). Although a large volume of literature is available on outbreaks and the pathology of IBD, little is known about the pathological changes induced by the vv-IBDV in experimental conditions (Namoya et al., 1992) and in natural conditions. 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 Bangladesh isolate of vv-IBDV (BD-3 99).

MATERIALS AND METHODS

Natural Infection: Outbreak of acute IBD occurred in commercial broiler farm in the month of November 2002 in Sylhet union of Gaibandha district. Affected flock consists 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. Coccidial swabs were examined under microscope for any coccidial infections.

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

Of the 25 chickens, 21 were infected intradermally with the virus suspension of a wild-type field strain (BD-3 86) of a Bangladesh isolate of vv-IBDV, BD-3 99 (Ismail et al., 2001). For infection, BD-3 86 was passaged in two chickens and stocks were collected to make 20% bursal homogenates diluting with phosphate buffer saline (PBS) by the Department of Medicine under strict hygienic management with fresh drinking water and commercial pellet feed (Quality Feeds Ltd., Dhaka) ad libitum. The chickens were used for experimental infection at 40 days of age. Of the 25 chickens, 21 were infected intradermally with the virus suspension of a wild-type field strain (BD-3 86) of a Bangladesh isolate of vv-IBDV, BD-3 99 (Ismail et al., 2001). For infection, BD-3 86 was passaged in two chickens and stocks were collected to make 20% bursal homogenates diluting with phosphate buffer saline (PBS). Each of the chickens received 100 µl 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 necropsy. The surviving birds killed on the last day of 10 days observation period were examined grossly also.

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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

<table>
<thead>
<tr>
<th>S/N</th>
<th>Type of infection</th>
<th>Total number of birds</th>
<th>Age of birds at mortality (days)</th>
<th>Experimental infection</th>
<th>No. of birds died</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Natural</td>
<td>1000</td>
<td>9 to 22</td>
<td></td>
<td>292</td>
<td>29.2</td>
</tr>
<tr>
<td>2</td>
<td>Experimental</td>
<td>23</td>
<td>40</td>
<td>92</td>
<td>06*</td>
<td>26.8</td>
</tr>
</tbody>
</table>

*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 9 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 Muharram et al. (1996) who reported IBD in broilers of 13 to 35 days old. It also supports the report of Sivaselvan and Balachandran (1999) who reported 21% mortality in naturally infected layer chickens. Hongsil et al. (1996) and Islam and Samad (2003) made similar observations, i.e., 27.3% and 29.4% mortality due to IBD in natural conditions. Islam et al. (1997) recorded 100% mortality in 5-week-old layer chicks after experimental infection with a very virulent (vv) isolate (IBD-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 prevously by Van den Berg et al. (1991).

The natural infection of IBDV was characterized by dullness, depression, retraction, whitish bone hypertrophy, 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 (2000) who reported clinical signs of natural outbreak of IBD in chickens. The clinical signs showed by experimentally infected broiler chickens on day 5 and 4 post infection were almost similar to those of naturally infected birds. No significant pathological differences were seen between chicken inoculated experimentally with B1-3 Vt and chickens from the field outbreak. At necropsy, the bursa was swollen, redness and haemorrhagic (Fig. 2). Streaks of petechial hemorrhages were also noticed on the inner surface of bursa (Fig. 3). The cut surfaces of bursal Fabricius revealed slumpy to gelatinous materials (Fig. 4). The petechial hemorrhages in the thigh muscles were recorded in some birds (Fig. 5). The spleen was hemorrhagic 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 Bygrave and Farquhar (1970), Okyere and Uzodike (1981) and Verma et al. (1990). Supercell 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 discoloration at necropsy. These post-mortem changes recorded in this study are in conformity with the earlier reports of Chauhan et al. (1980), Saha and Barua (1998) and Sivaselvan and Balachandran (1999). Swelling of the bursa and their subsequent atrophy, as observed in the present study were also reported by Nuttall et al. (1992) with vIBDV. Congrove (1992) reported that specific characteristic signs and lesions distinguished IBD as a specific entity. Catzek et al. (1997) also opined that the lesions produced by IBD virus are pathognomonic. No evidence of any bacteria and Tor Coccidia of pathological significance were seen in bacteriological examination of swabs collected from heart and liver and direct microscopic examination of chalcid swabs respectively.

On the basis of the clinico-pathological observations of natural and experimental IBD in broiler chickens from 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 vIBDV and chickens from the field outbreaks.

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Fig. 1. A 26-day-old moribund broiler chicken naturally infected with infectious bursal disease showing prostration and blood matted feathers.

Fig. 2. A cut section of bursa of Fabricius of 44-day-old broiler chicken experimentally infected with infectious bursal disease showing oedema, 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 edematous swelling (right).

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

Fig. 5. Thigh-muscle of 46-day-old broiler chicken infected experimentally with IBD. Showing haemorrhages.

Fig. 6. Spleen of 34-day-old broiler chicken selected naturally with IBD showing haemorrhages and swelling.
REFERENCES