

Pathological investigation of infectious bursal disease (IBD) in Sonali chicken at Gaibandha district of Bangladesh

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ABSTRACT

The study was designed to investigate prevalence and pathology of Infectious Bursal Disease (IBD) of Sonali chicken at different upazila in Gaibandha District of Bangladesh in a short six month duration starting from January to June 2014. Eight sonali chicken farms with sum of 3230 birds of various age groups from four different upazila like Sadar, Palashbari, Suddulapur and Gobindogonj were suspected for Infectious Bursal Disease (IBD). On the basis of detail about farm history, clinical signs and postmortem investigation of infected chicks, the prevalence of IBD was 10%, 10.95%, 7.89% and 12% in Sadar, Palashbari, Suddulapur and Gobindogonj upazila respectively with an overall prevalence 10.21% at Gaibandha district. The prevalence of IBD in sonali chickens was the highest (11.98%) at 4th week of age and the lowest (7.88%) at 6th week of age. No sonali chick was identified as positive for IBD in their first two weeks of age. The highest mortality was observed at Gobindogonj upazila (5%) and the lowest (3.80%) at Palashbari upazila with total mortality rate 4.19%. The necropsy findings of infected chicks revealed haemorrhages on thigh and breast muscles; enlarged, edematous, hyperemic and haemorrhagic Bursa of Fabricius followed by atrophy. In some cases kidneys were found swollen. Severe lymphoid depletion and reactive cells infiltration in the interfollicular space were found in histopathological studies by using H & E stain. Therefore, it was concluded that susceptibility of chicks to IBD is influenced by its age. Ruffled feather, depression, whitish diarrhoea with haemorrhagic muscles and inflamed, edematous, hyperemic Bursa of Fabricius is attributable to Infectious Bursal Disease (IBD).

Introduction

Poultry plays an important economic role for 73% of rural people who lives in rural areas of Bangladesh (Reneta, 2005). The poultry industry gained more than 200 percent growth in the last 5 years with a number of identified problems (Shamsuddoha and Sohel, 2004). Bangladesh Poultry is dominated by backyard local chickens (Desi or local) in scavenger system (Nielsen, 2007) followed by commercial farming. Poultry helps the livelihood of many and contribute towards improving the family diet with eggs and meat (Das et al., 2008) and is a cheap source of animal protein in terms of meat and eggs (Shamsuddoha, 2010a). Poultry meat alone contributes 37% of the total meat production in the country and 22 to 27% of total animal protein (Ahmed, 1988 and Haque, 1992) producing 11500 metric tonnes of chicken meat (FAO, 2003). Availability of poultry meat in Bangladesh is only 16.5 gram/day (Amin, 2005), whereas world per capita consumption is 30.14 gram/day and 95.89 gram/day for USA (Farrell, 2003). Poultry meat and eggs provide approximately 38% total animal protein in the country (FAO, 1999). It is estimated that the share of poultry in the animal protein of human diet increased from 14% in 1977 to 23% in 1987 and in further estimated to 30% in 1995 (Alam, 1997) and the local chicken supply approximately 71% of the total meat (Paul et al., 2004).

Sonali breed is a F1 cross breed which had been produced from the cross of Road Island Red (RIR♂) cocks and Fayoumi hens♀. It has specially been advocated in terms of their higher production rate and better adaptability in rural situation (Ahmed, 1997). Pure line of RIR cocks and Fayoumi hens has been used for the production of hatchable eggs to be used by broody hens. Body plumage is yellowish red (locally called Sonali, hence the name of the breed). Legs and ear-combs are yellowish. Sonali females produce about 180 eggs per year (Ali, 1981 and Hasan et al., 2017). Sonali chicken is important part of poultry production in Bangladesh.

The major constraints in poultry farming are the outbreak of several devastating diseases causing economic loss and discouraging poultry rearing (Das et al., 2005). The common diseases are found to be Salmonellosis, Mycoplasmosis, Newcastle disease, Gumboro, Coccidiosis, Colibacillosis, Gangrenous dermatitis, Ascitis and Omphalitis at the time of chicks rearing period (Saleque, 2003). Among the various diseases, Infectious Bursal Disease (IBD) popularly known as Gumboro disease is the number one killer disease of chickens. It is a major poultry pathogen in the poultry industry (Hein et al., 2002). The name "Gumboro" disease was initially given to the condition because it was first recognize on the farm in the Gumboro district of Delaware, USA in 1962. Initially the IBD was confused with a variant form of

infectious bronchitis virus (IBV) accompanied by nephrosis (Winter and Hitchner, 1962; Cosgrove, 1962). Gumboro is the highly infectious disease of poultry (Hasan et al., 2017). In Bangladesh the first outbreak of IBD occurred at the end of 1992 (Islam et al., 1994; Chowdhury et al., 1996; Rahman et al., 1996).

Infectious Bursal Disease (IBD) or Gumboro disease is an acute, highly contagious viral disease of growing chickens specially chickens of 3-6 wks of age. It is caused by a double stranded, bi segmented RNA virus belonging to the genus Birnavirus, sub-genus Avibirnavirus (Pringle, 1998), family Birnaviridae (Dobos et al., 1979; Brown, 1986). There are two distinct serotypes of IBDV: serotype 1 and serotype 2. Serotype 1 is pathogenic to chicks and classified as classical, variant and very virulent (vv) IBDV while serotype 2 is not pathogenic to chicks.

The disease is characterized mainly by severe damage of the Bursa of Fabricius (BF) followed by immunosuppression (Cheville, 1967; Fadley et al., 1976; Rosenberger and Gelb, 1978; Saif, 1994; Lukert and Saif, 1997). There are frequent occurrences of this disease, reported by the farm-owners, even when the flocks have been vaccinated against the disease (Bentue, 2004). IBD is economically important for the poultry industry in function of the immune depression that it causes (Moraes et al., 2004). The primary target organ for IBDV is the Bursa of Fabricius (Lukert and Saif, 1997). IBDV affects the actively dividing B-lymphocytes bearing cell surface IgM (Hirai and Calnek, 1979; Miiller, 1986), developing the severe morphological alteration of Bursa of Fabricius (Lukert and Saif, 1997) and producing a profound immunosuppression (Ivan et al., 2001).

The immunosuppression prevents the birds from optimally responding to vaccine (Sharma et al., 1984) and ultimately leads to increase the incidence of numerous concurrent infections including Marek's disease (Sharma, 1984), Newcastle disease (Faragher et al., 1972), coccidiosis (Anderson et al., 1977), infectious bronchitis (Pejkovski et al., 1979), hemorrhagic-aplastic anemia and gangrenous dermatitis (Rosenberger et al., 1975), infectious laryngotracheitis (Rosenberger and Gelb, 1978), inclusion body hepatitis (Bacon et al., 1986), reovirus (Montgomery and Maslin, 1991), chicken anemia agent, salmonellosis, colibacillosis *Mycoplasma synoviae* (Giambone et al., 1977) and *Eimeria tenella* (Anderson et al., 1977). One of the significant components of the control of the disease is its vaccination which if improved may help in lowering the incidence of the disease in poultry (Zaheer et al., 2003). Many researchers reported the prevalence and incidence of Infectious Bursal Disease in different regions of Bangladesh. In greater Mymensingh district the incidence was 21.1% (Das et al., 2005) whereas the prevalence of IBD in Joypurhat was found 25.51% (Hasan et al., 2017).

Considering the above facts the present study was undertaken to investigate the prevalence and mortality rate of diseases especially Infectious Bursal Disease (IBD) in sonali chicken encountered at Gaibandha district of Bangladesh.

Materials and methods

Experimental birds

In this study, a total of 3230 birds of various age groups from four different upazila (Sadar, Palashbari, Saddullapur and Gobindogonj) were suspected for the disease and considered as experimental birds. From these farms all dead as well as live sick chickens were collected with detailed particular of the outbreaks of IBD including farm location, history, age, breed, total number of birds and affected birds in farm, intervals between the batches, vaccine schedule, daily mortality and total mortality and clinical signs of affected birds were also recorded. In each case sampling was done following standard sampling methods and send to the laboratory. Different organ like liver, Bursa of Fabricius, breast and thigh muscle, kidney were collected during necropsy for further study. All the diagnostic works were carried under the Laboratory of Department of Pathology & Parasitology, Hajee Mohammad Danesh Science and Technology University (HSTU). Clinical diagnosis and in some cases necropsy examinations were completed at the place of sampling and histopathology of all samples were done in the laboratory.

Diagnosis of diseases

The diagnosis of the disease was based on history, clinical signs and gross lesions as well as histopathological alterations.

Clinical examination of affected birds

The general health status and age of the chickens were recorded. The chickens were observed for detection of clinical signs. The clinical signs were observed by visual examination. The clinical signs were recorded during the visit of the infected flocks and the farmer's complaints about the affected birds were also considered.

Necropsy findings of suspected birds

The postmortem changes of all the cases were performed immediately after collection of the dead birds. At necropsy, gross changes were observed and recorded very carefully. The representative tissue samples containing lesions were fixed in 10% buffered neutral formalin.

During necropsy, different organs having gross lesions were collected, preserved at 10% buffered neutral formalin, processed, sectioned and stained for histopathological examination following a standard procedure (Luna, 1968).

Results and discussion

Clinical findings of affected birds

The clinical signs of the birds affected with IBD varied from farm to farm and age to age. The signs were clinically characterized as marked depression (Figure 1A), anorexia, ruffled feathers, whitish or watery diarrhea (Figure 1B), vent picking, reluctant to move, huddling together and severe prostration and sudden death which were similar to those described by (Islam et al., 2014 and Hasan et al., 2017).

The study revealed the following actual status of mortality and prevalence of infectious Bursal disease (IBD) in sonali chicken Table 1 showed the mortality and prevalence of IBD at different region of Gaibandha district where as Table 2 showed the prevalence of IBD at different age group. The present study showed the prevalence of infectious Bursal disease (IBD) in sonali chicken is 10.21%. This finding was corresponded with (Islam et al., 2006; Hasan et al., 2017) who recorded IBD 24.26% and 25.51% respectively. The mortality rate is 4.19% No case was found in first two weeks of age.

Prevalence and mortality of the disease

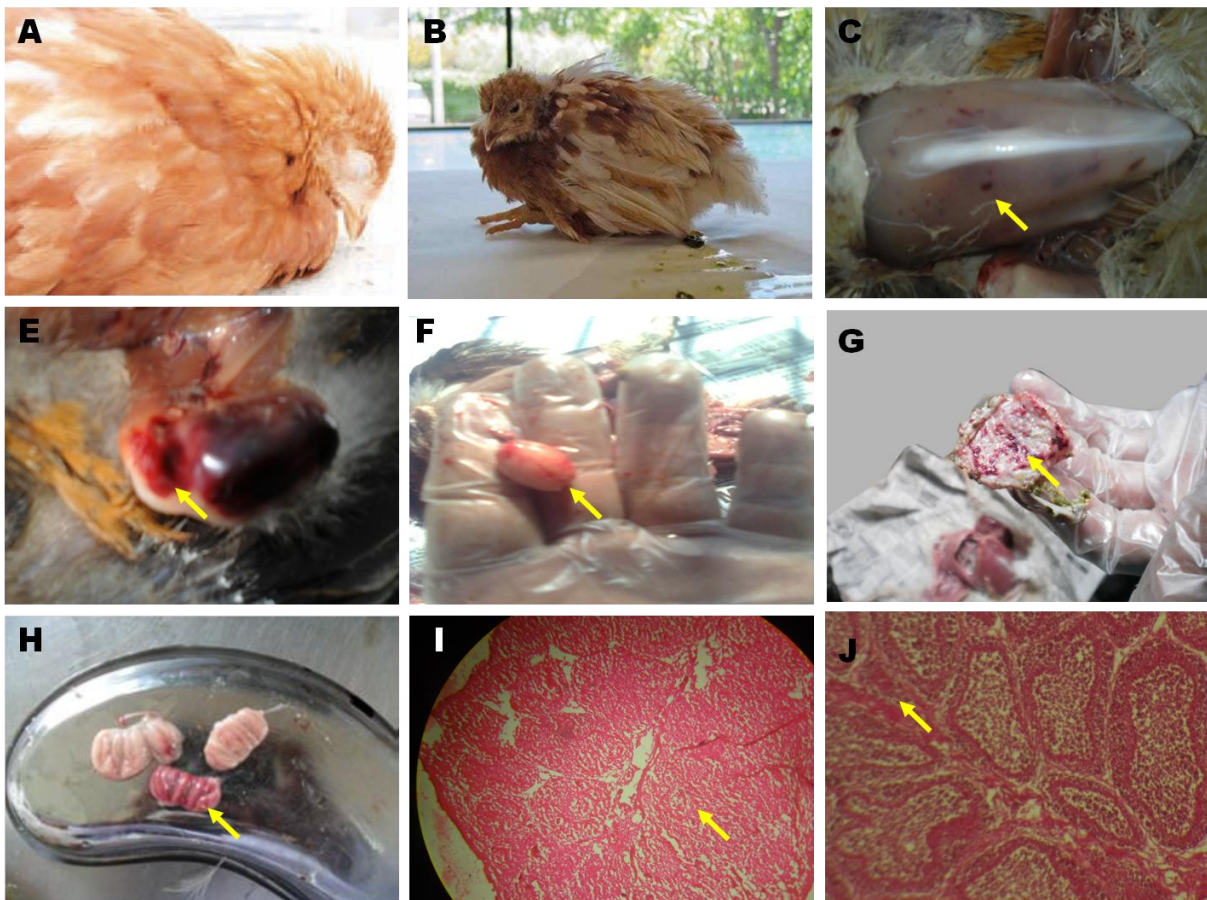


Figure 1. Birds affecting IBD showed clinical and pathological signs and lesion

Table 1. Prevalence and mortality rate of IBD in Sonali chicken at different Upazila of Gaibandha

Name of Upazila	No. of Farm Visited	No. of Birds observed	No. of infected birds	No. of Dead Birds	Mortality (%)	Prevalence (%)
Sadar Upazila	3	1250	125	50	4	10
Palashbari	1	420	46	16	3.80	10.95
Suddulapur	2	760	60	30	3.94	7.89
Gobindogonj	2	800	96	40	5	12
Mean ± SEM					4.19±0.27	10.21±0.87

*SEM: Standard Error Mean

Table 2. Prevalence of IBD in Sonali chicken at different age group

Age of Birds(Weeks)	No. of Birds observed	No. of infected birds	Prevalence (%)
3 rd	850	76	8.94
4 th	1160	139	11.98
5 th	700	70	10
6 th	520	41	7.88
Mean ± SEM			9.70±0.87

*SEM: Standard Error Mean

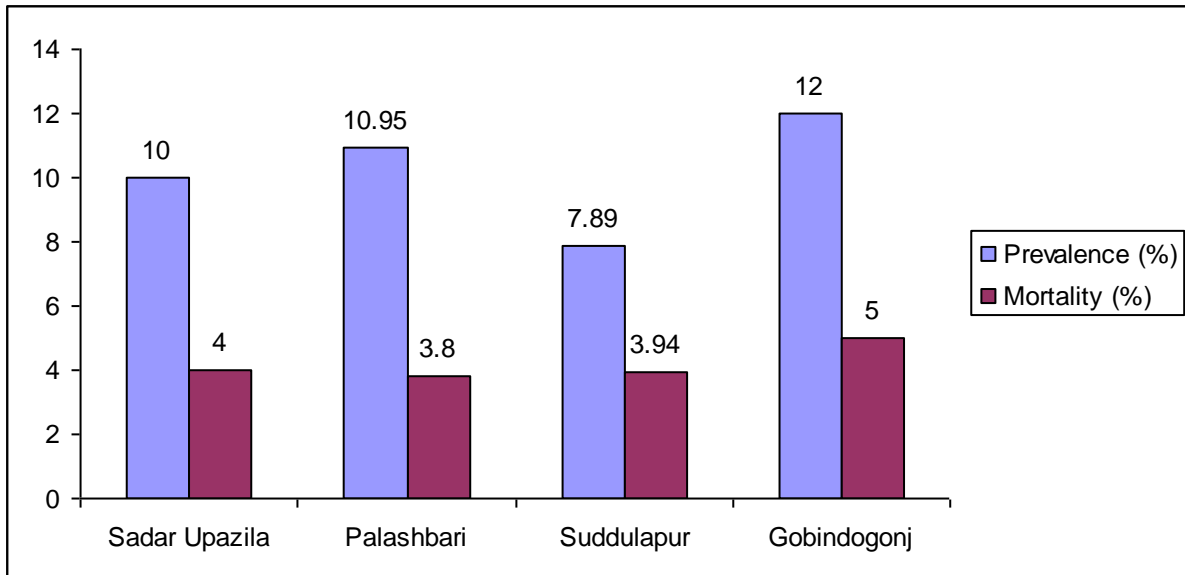


Figure 2. Prevalence and mortality of IBD in Sonali chicken at different Upazilla in Gaibandha

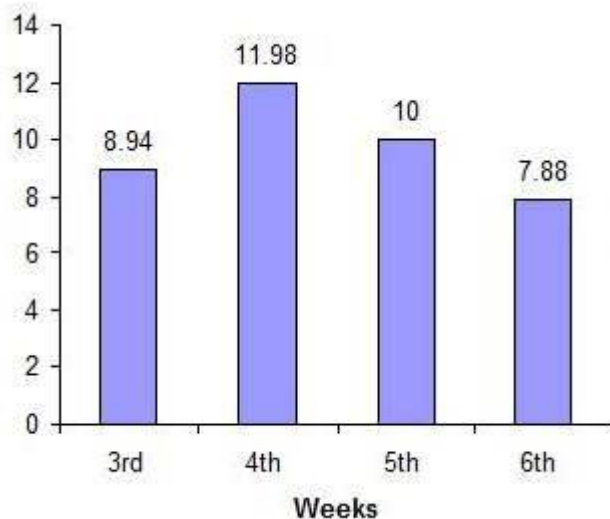


Figure 3. Prevalence (%) of IBD in sonali chicken at different age group at different Upazilla in Gaibandha

Necropsy findings of suspected birds

For the conformation of Infectious Bursal disease the pathological lesions of different parts of the body were examined mainly on Bursa of Fabricius and thigh muscle. During necropsy examination the most frequent gross lesions of IBD were

haemorrhages in the breast muscle and thigh muscles (Figure 1C, 1E). The main changes are swollen and haemorrhagic Bursa of Fabricius (Figure 1F) was found in primary stage. A cut surface of Bursa of Fabricius showing haemorrhage (Figure 1H). Haemorrhage in the internal wall of Bursa (Figure 1G). In some cases kidneys were swollen. These gross lesions were supported by different investigators (Khan et al., 2006; Khan et al., 1998; Islam et al., 2014; Hasan et al., 2017).

Histopathological study

In the present study, few lymphoid depletion in Foilicles of the Bursa of Fabricius (Figure 1H) and in most follicles severe lymphoid depletion were observed (Figure 1I). Reactive cells infiltration by heterophils and macrophages in the interfollicular space (Figure 1). These lesions were similar with (Ismail et al., 1987; Nakamura et al., 1992; Haque et al., 1999; Hasan et al., 2017).

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