

IMPORTANT VIRAL DISEASES ASSOCIATED WITH MORTALITY OF LAYER CHICKENS IN COMMERCIAL POULTRY FARMS IN BANGLADESH

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ABSTRACT

Disease profile investigation on 1751 dead chickens supplied from about 100 commercial large or small scale poultry farms of Gazipur district and surrounding area in Bangladesh during one year period from January to December 2002 at the BRAC Poultry Disease Diagnostic Centre, Nagapara, Gazipur showed that 22.73% (n = 398) cases with five different viral diseases, of which infectious bursal disease (IBD) (n = 196) and Newcastle disease (ND) (n = 181) showed significantly (p < 0.01) higher rate of occurrence than infectious bronchitis (IB) (n = 6), avian leukosis (AL) (n = 6) and fowl pox (FP) (n = 4). Age-wise occurrence of IBD showed highest infection rate in growing stage (82.65%) in comparison to brooding (3.06%), pullet (6.12%) and adult layer (8.16%) chickens. Although more or less all age groups of chickens were affected by ND (1.66% to 50.83%) but it was found significantly (p < 0.01) highest in adult (50.83%) chickens. Infectious bronchitis was recorded only in adult chickens. Avian leukosis was found higher in pullet (66.67%) than the adult (33.33%) layer birds. Fowl pox also recorded only in pullet stage of chickens. Seasonal influence showed significantly (p < 0.01) highest occurrence of IBD during summer (44.39%) in comparison to rainy (30.61%) and winter (25.00%) seasons. Similarly ND was recorded more or less uniformly in all the three seasons of the year with significantly (p < 0.01) higher rate during summer (41.99%) season. Infectious bronchitis was recorded significantly (p < 0.01) higher in summer (63.66%) season while avian leukosis was recorded in winter (66.67%). Fowl pox was found equally in winter and summer seasons (50%). Although IBD was found with other concurrent infection e.g., dual (23.98%) and triple (2.55%) types of infection but highest occurrence was recorded as a single type (73.47%) of infection. ND was found with dual (44.75%), triple (7.18%) and fourth (1.10%) types of infection but specially single infection (46.96%) were associated with high mortality. IB was recorded highest in single infection (54.55%) in comparison to dual (9.09%), triple (18.18%) and fourth types (18.18%) of infection. Avian leukosis was recorded higher as a single infection (83.33%) than dual (16.67%) type of infection. Fowl pox was recorded equally (50%) as single and triple types of infection. It may be concluded that both the single and concurrent infection of viral diseases, greatly influenced by season and age associated with high mortality, should be considered during vaccination programme, diagnosis, prevention and control.

Key words: Mortality, viral diseases, layer chickens

INTRODUCTION

Viral diseases have been reported to be the major problem in poultry industry world wide including Bangladesh (Calnek *et al.*, 1997; Samad, 2000). An overall single and concurrent diseases associated with mortality in commercial chickens in Bangladesh has already been reported (Rahman and Samad, 2003). Although some research works on ND and IBD have been done from Bangladesh but published reports on the viral diseases are limited. This paper describes an overall important viral disease profile with age and seasonal influences of the diseases.

MATERIALS AND METHODS

This study was conducted to determine the interactions of virus as etiological agents associated with mortality in 1751 commercial dead chickens which were submitted for diagnosis at the BRAC Poultry Disease Diagnostic Centre (PDDC), Nagapara, Gazipur during one year period from January to December 2002. This poultry disease diagnostic centre has been established with modern diagnostic facilities for commercial services on the diagnosis of poultry diseases. Diagnosis of each of the recorded disease in chickens was made on the clinical history and characteristic post mortem lesions described by Calnek *et al.* (1997). To assess the influence of age on the occurrence of diseases, birds were grouped into brooding (up to 2 weeks), grower (>2 to 8 weeks), pullets (>2 to 20 weeks) and adult layer (>20 weeks). The seasonal influence on the occurrence of diseases was assessed by dividing the year into three main seasons viz. summer (March to June), rainy (July to October) and winter (November to February). Results of single and concurrent diseases with age and seasons were analyzed by using the *Chi-square* test for significance (Gupta, 1982).

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RESULTS AND DISCUSSION

The 1751 dead cases examined, of which 398 (22.73%) cases diagnosed as viral diseases. Of the 398 cases, the IBD (n = 196), ND (n = 181), IB (n = 11), AL (n = 6) and fowl pox (n = 4) were diagnosed (Table 1). Thus, the occurrence of IBD and ND were found significantly ($p < 0.01$) higher in comparison to other viral diseases. Accordingly disease profile with age and seasonal influences of these most important viral diseases were studied. Age-wise analysis showed that significantly ($p < 0.01$) highest (45.98%) occurrence of viral diseases was recorded in grower (Table 2). Season-wise analysis revealed that significantly ($p < 0.01$) highest (43.47%) cases of viral diseases was in summer season (Table 3).

Table 1. Occurrence of single and concurrent viral diseases in commercial chickens

S/N	Diseases	Number of cases (%)				
		Single type	Two type	Three type	Four type	Total
1.	Infectious bursal disease	144 (73.47)	47 (23.98)	05 (2.55)	–	*196 (11.20)
2.	Newcastle disease	85 (46.96)	81 (44.75)	13 (7.18)	02 (1.10)	*181 (10.34)
3.	Infectious bronchitis	06 (54.55)	01 (9.09)	02 (18.18)	02 (18.18)	11 (0.63)
4.	Avian leukosis	05 (83.33)	01 (16.67)	–	–	06 (0.34)
5.	Fowl pox	02 (50.00)	–	02 (50.00)	–	04 (0.23)
Viral diseases (Total)		242 (60.80)	130 (32.66)	22 (5.53)	04 (1.00)	398 (22.73)

*Differed significantly ($p < 0.01$).

Table 2. Age-wise clinical occurrence of viral diseases in commercial chickens

S/N	Diseases	Number of cases (%)				
		Brooding Upto 2wks (n = 215)	Growing (>2-8 wks) (n = 241)	Pullet (>8-20 wks) (n = 318)	Layer (>20 wks) (n = 797)	Total (n = 1751)
1.	Infectious bursal disease	06 (3.06)	162 (82.65)*	12 (6.12)	16 (8.16)	196(11.20)
2.	Newcastle disease	03 (1.66)	21 (11.60)	65 (35.91)	92 (50.83)*	181(10.34)
3.	Infectious bronchitis	–	–	–	11 (100.00)	11 (0.63)
4.	Avian leukosis	–	–	04 (66.67)	02 (33.33)	06 (0.34)
5.	Fowl pox	–	–	04 (100.00)	–	04 (0.23)
Viral diseases (Total)		09 (2.26)	183 (45.98)*	85 (21.36)	121 (30.40)	398 (22.73)

*Differed significantly ($p < 0.01$).

INFECTIOUS BURSAL DISEASE (IBD)

IBD, called Gumboro disease, caused by IBDV is the most important viral disease of poultry causing heavy losses through mortality and reduced production (Rahman *et al.*, 1996). IBD was found in 196 (11.20%) chickens, of which highest cases noticed as single disease (73.47%) as compared to dual (23.98%) and triple (2.55%) occurrence of mixed infection (Table 1). This concurrent infection recorded in IBD supports the earlier reports of Rajeswar *et al.* (1995), Kim *et al.* (1996) and Reddy *et al.* (1998). Significantly ($p < 0.01$) highest infection rate was recorded in growing (82.65%) chickens in comparison to brooding (3.06%), pullets (6.12%) and layers (8.16%) chickens (Table 2). The 11.20% occurrence of IBD recorded in this study supports the earlier inland reports of Bhattacharjee *et al.* (1996a) who reported 10.99% of IBD in poultry in Bangladesh. However, Talha *et al.* (2001) reported 19.16%, Giasuddin *et al.* (2002) reported 12% and Islam and Samad (2003) reported 29.2-75% mortality of chickens due to IBD from Bangladesh. Significantly ($p < 0.01$) highest occurrence of IBD was recorded during summer (44.39%) in comparison

to rainy (30.61%) and winter (25.00%) seasons (Table 3). This observation contradicts the report of Farooq *et al.* (2000) who reported that season has no significant effect on the incidence of IBD in chickens.

Post mortem lesions of IBD affected dead birds showed haemorrhage in thigh and breast muscle and necrosis in bursa with caseous mass. The necropsy lesions observed in this study of IBD are in conformity with the earlier reports of Bhattacharjee *et al.* (1996a), Talha *et al.* (2001) and Islam and Samad (2003).

Table 3. Season-wise clinical occurrence of viral diseases in commercial chickens

S/N	Diseases	Number of cases (%)			
		Summer (March-June) (n = 748)	Rainy (July-October) (n = 491)	Winter (November-February) (n = 512)	Total (n = 1751)
1.	Infectious bursal disease	87 (44.39)*	60 (30.61)	49 (25.00)	196 (11.20)
2.	Newcastle disease	76 (41.99)*	59 (32.60)	46 (25.41)	181 (10.34)
3.	Infectious bronchitis	07 (63.66)*	–	04 (36.36)	11 (0.63)
4.	Avian leukosis	01 (16.67)	01 (16.67)	04 (66.67)	06 (0.34)
5.	Fowl pox	02 (50.00)	–	02 (50.00)	04 (0.23)
Viral diseases (Total)		173 (43.47)*	120 (30.15)	105 (26.38)	398 (22.73)

*Differed significantly ($p < 0.01$).

NEWCASTLE DISEASE (ND)

ND is an acute viral disease of poultry, a killer disease of chickens in Bangladesh, found all over the year causing serious damage to the farms due to high mortality. ND was recorded in 181 (10.34%) chickens of which 46.96% as single, 44.75% as dual, 7.18% as triple and 1.10% as four types of mixed infection (Table 1). The 10.34% occurrence of ND observed in this study supports the earlier reports of Talha *et al.* (2001) who reported 10.24% of ND in Bangladesh. Bhattacharjee *et al.* (1996a) reported 4.80% and Giasuddin *et al.* (2002) reported 8.0% incidence of ND in chickens. Although the ND was recorded in all the age groups of chickens but this study showed significantly ($p < 0.01$) highest infection rate in chickens of age >20 weeks (50.83%) (Table 2). This finding supports the report of Parimal and Balasubramaniam (1992) who reported highest incidence of ND in 2 to 6 months old chickens with highest mortality in 24 weeks of age. However, Pal *et al.* (1999) reported highest incidence of ND occur in >7 weeks of old chickens. ND was recorded in all the three seasons of the years with significantly ($p < 0.01$) higher during summer (41.99%) in comparison to rainy (32.60%) and winter (25.41%) seasons (Table 3).

Necropsy examination of chickens died of ND showed dark red or purple red button shaped haemorrhagic lesions associated with necrosis in the intestinal wall. Haemorrhages in the mucosal (glandular) surface of the proventriculus and sometimes in the gizzard were noticed. Severe inflammation of the trachea and air sacs were also observed. The necropsy lesions observed in this study of ND are in conformity with the earlier reports of Bhattacharjee *et al.* (1996a), and Talha *et al.* (2001).

INFECTIOUS BRONCHITIS (IB)

IB is an acute highly contagious viral disease of chickens. This study recorded 0.63% cases of IB in chickens, of which 54.55% recorded as single, 9.09% as dual, 18.18% both as triple and four types of mixed infection (Table 1). The occurrence of IB (0.63%) in chickens recorded in this study supports the report of Al-Sadi *et al.* (2000) who reported 0.48% incidence rate of IB. All the cases of IB were recorded in chickens of >20 weeks of age (Table 2) which is supported by Bhattacharjee *et al.* (1996b) who reported highest incidence of IB in >20 to 45 weeks age group. However, Christopher *et al.* (1996) reported highest incidence of IB in 25 to 45 weeks age group of chickens. The IB was recorded significantly ($p < 0.01$) highest in summer (63.66%) and lowest in winter (36.36%) seasons (Table 3).

Necropsy examination of dead chickens, caused by IB showed serous, catarrhal or caseous exudation in the trachea, nasal passage, sinus, cloudy and yellow caseous exudates in air sac and caseous plug in lower trachea. Pale and swollen kidneys in some cases and lesions on oviduct and laying hens. The necropsy lesions observed in this study of IB are in conformity with the earlier reports of Bhattacharjee *et al.* (1996b) and Talha *et al.* (2001).

AVIAN LEUKOSIS (AL)

The avian leukosis virus is an important retrovirus caused neoplastic disease of semimature and mature chickens. AL was recorded in only 6 (0.34%) chickens, of which 5 (83.33%) as single etiology and 01 (16.67%) as concurrent infections with ND (Table 1). The 6 cases of AL recorded in this study support the earlier inland reports of Mosleuddin *et al.* (1972) who reported 12 cases of AL in chickens. Kamal and Hossain (1992) reported 1.93%, Bhattacharjee *et al.* (1996a) reported 6.92% and Talha *et al.* (2001) reported 1.57% incidence of AL in chickens. Of the 6 cases, 4 (66.67%) cases recorded in pullet (> 8 to 20 weeks) and 2 (33.33%) cases in adult layer (>20 weeks old) chickens (Table 2). This study supports the earlier report of Talha *et al.* (2001) who reported 01 case in > 8 to 20 weeks and 5 cases in >20 weeks of old chickens. Highest occurrence was recorded during winter (66.67%) in comparison to summer (16.67%) and rainy (16.67%) seasons (Table 3).

Necropsy examination of dead chickens containing history of emaciation and age is ≥ 16 weeks old showed grossly visible, soft, smooth, and grayish to creamy white tumors on liver and spleen. The necropsy lesions observed in this study of AL are in conformity with the earlier reports of Bhattacharjee *et al.* (1996a) and Talha *et al.* (2001).

FOWL POX (FP)

Fowl pox is a slow spreading viral disease of chickens. This disease was recorded only in 4 (0.23%) pullet (>8 to 20 weeks) chickens (Table 2), of which 2 (50.00%) cases as a single etiology and remaining (50.00%) cases as three types of mixed infection (Table 1). Only 2 cases were recorded both in summer and winter seasons (Table 3). Although some works on fowl pox vaccine and vaccination aspects of the disease have been carried out from Bangladesh (Samad, 2000) but epidemiology and clinico-pathological aspects of the disease are lacking in inland literatures (Bhattacharjee *et al.*, 1996a; Kamal and Hossain 1992; Talha *et al.*, 2001). This indicates that fowl pox might be the main problem of scavenging chickens and occasionally in commercial poultry farms.

Necropsy examination of dead chickens caused by fowl pox showed typical skin lesions which included rough, gray or dark brown or necrotic nodular lesions on the comb, wattle and eyelid as reported by Calnek *et al.* (1997).

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