

## Original Article

# A cross sectional study of Infectious Bursal Disease and Newcastle Disease in poultry in Narsingdi district of Bangladesh

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## ABSTRACT

**Objective:** A cross sectional study was conducted to estimate the prevalence of Infectious Bursal Disease (IBD) and Newcastle Disease (ND) in poultry of Narsingdi district, Bangladesh.

**Materials and methods:** Post mortem of a total of 208 dead birds were done for the diagnosis purpose. Different poultry species included in this study included broilers, layers, pigeon, duck etc.

**Results:** Among the examined birds, 38% were found to be affected with IBD, and 11% were affected with ND. Age of the birds for both IBD (19.95; 95%CI: 16-23) and ND (122.23; 95%CI: 98.62-145.83); and flock size only for IBD (1317; 95%CI: 1175-1460) was found significantly associated. The chicks aging between 16-23 days and flock size between 1175-1460 were found to be the most susceptible group to IBD, and adult poultry (98.62-145.83 days old) was mostly susceptible to ND.

**Conclusion:** IBD and ND are highly prevalent in the study area. Therefore, it is necessary to conduct effective control measures to reduce the prevalence of these diseases. This study can help in designing appropriate control measures considering risk factors of these diseases.

## KEYWORDS

IBD, ND, Post mortem, Prevalence

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## INTRODUCTION

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It has no reservation that poultry industry in Bangladesh has greatly expanded over the years holding the greatest promise in affordable animal protein supply, food security and alleviation of poverty in both villagers and urban populace. Poultry industry is the fastest budding livestock sub-sector which has the annual growth rate of around 20 per cent in Bangladesh ([Islam et al., 2014](#)). The industry plays a pivotal role in national economy by producing employment opportunities. Moreover, the sector is steadfast to alleviate the demand of good quality protein by means of meat and eggs in cheapest price ([Das et al., 2008](#)). Poultry rearing is an industry, superior to other sector in agriculture, has seen a tremendous development in the recent past and is an emerging agribusiness starting practically during eighties in Bangladesh. Previous studies indicated that poultry business is first on the list of currency of doublers among other financial transactions but poultry diseases are the major constraints for developing the poultry industry ([Karim, 2003](#)). Many studies reported constraints especially of disease and in particular viral disease have rendered this investment fearful and realistic to both organizations and individuals ([Sainsbury, 2000](#); [Islam and Samad, 2004](#); [Musa et al., 2010](#)).

Despite of the expansion and development of the poultry industry, mortality of chickens due to several infectious and non-infectious diseases is one of the major obstacles for development of profitable poultry production in Bangladesh. About 30% mortality of chickens in Bangladesh is due to various infectious diseases and outbreaks of concurrent diseases in broiler farms significantly affect the optimal production and health status of the chickens ([Chanie et al., 2009](#)). Most of the farms are small-scale commercial type where chickens are reared in semi-confined system with compromised biosecurity. Consequently, birds are more vulnerable to become infected with various infectious agents. Infectious diseases also cause economic losses in terms of morbidity and mortality. However, information on the occurrence of different poultry diseases is limited, if not absent. To establish commercial poultry farms, information on the occurrence of different poultry diseases in an area is necessary to control and prevent the various diseases.

Infectious bursal disease (IBD), popularly known as Gumboro disease, is a contagious disease of young chickens which cause damage to the lymphoid tissue with special predilection for the bursa of fabricius. The etiological agent of IBD is IBD virus (IBDV), is a non-enveloped virus, belonging to the family Birnaviridae,

with a bisegmented double stranded RNA genome ([Eterradossi and Saif, 2008](#)). Since 1992, the poultry farms of Bangladesh have been experiencing the out breaks of a disease resembling acute IBD. Now a days, IBDV has a worldwide distribution, occurring in all major poultry producing areas ([Singh et al., 2015](#)).

Newcastle Disease (ND) was known by such names as a "respiratory nervous disorder" and "avian pneumo-encephalitis" before recognized as ND until 1944 which attack chickens of all ages, from baby chicks to laying hens and others avian ([Miller et al., 2010](#)). Difficult breathing, twitching of head and neck; with marked weakness and depression are the most commonly presented symptoms of ND in chicks. In adult poultry, symptoms begins with respiratory distress followed by complete interruption in egg laying. In the floor, soft or rough-shelled egg may be found in the poultry house floor which usually persist for 4 to 8 weeks ([Miller et al., 2010](#)). IBD and ND are extremely contagious. In infected flocks, morbidity is high, with up to 100% serological conversion, after infection, whilst mortality is variable ([Miller et al., 2010](#)).

Gumboro and ND are causing highest mortality per year despite vaccination practiced in Bangladesh by the poultry farm owners. The prevalence of different diseases of poultry is well documented in different areas in both private and government sectors ([Saleque et al., 2003](#); [Uddin et al., 2010](#)). It is true that the farmers are not properly aware about the most important viral diseases of poultry like IBD and ND. So, a systemic work should be developed on the incidence and prevalence on IBD ([Rahman et al., 2010](#)) and ND. The present study was conducted to determine the prevalence of IBD and ND in poultry of Narsingdi district, Bangladesh and risk factors associated with IBD and ND infection in Narshingdi district.

## MATERIALS AND METHODS

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A cross-sectional study was performed during May-June, 2013 using the traditional paper-based case patient registration recording system in place at the Upazilla Veterinary Hospital (UVH), Narshingdi Sadar.

Dead birds with a diagnosis of IBD and ND, based on post-mortem clinical examination by registered veterinary surgeon (VS) of UVH, Narshingdi Sadar were defined as cases. These birds were submitted to the UVH hospital by their owner because of morbidity and mortality in their raised flock suspected under problems. A total of 208 birds were examined in the study periods. Different disease conditions of the birds were examined and

tentative diagnosis was made as per description of [Saif et al. \(2011\)](#). Information on date of admission to the hospital, farm address, type of bird, bird rearing system, breed, vaccination status, number of total birds in the farm, number of affected birds in the farm, number of dead birds in the farm, daily morbidity and mortality status, age and previous disease status along with post-mortem lesions were collected from each bird owner, using structured questionnaire. The ethics committee of the Chittagong Veterinary and Animal Sciences University has been approved the study protocol.

The obtained information was stored in spreadsheet (Excel 2012, Microsoft Corporation) and imported to the statistical software STATA version 14 (Stata Corp. College Station, Texas, USA) for descriptive and *t*-test statistical analysis. An association was regarded as significant when the *P* value was of the significance test <0.05.

## RESULTS AND DISCUSSION

Of 208 dead birds out of 468757 birds, 137 broiler (65.87%), 51 Layer (24.52%), 7 duck (3.37%), 6 pigeon (2.88%), 4 cock (1.92%) and 3 moyna (1.44%) were examined and diagnosed tentatively, using post-mortem examination (**Figure 1**).

Prevalence of poultry diseases and diseases of layers and broilers at Narsingdi district of Bangladesh are shown in **Figure 2**, the results of which disclosed the presence of sixteen different diseases in different species of poultry with IBD being the most prevalent, accounting for 38%, followed by Heat stress 13%, New Castle disease (ND) 11%, Coccidiosis 6% and Salmonellosis 6%. The other diseases included Colisepti-cemia, Ascariasis, Omphilitis, Chronic Respiratory Disease (CRD), Necrotic enteritis, Gout, ND & some mixed infections, Pediculosis, Duck plague and Brooder pneumonia.

### Infectious Bursal Disease

Infectious Bursal Disease (IBD) is a major poultry disease of Bangladesh which caused significant economic loss among poultry farm owners ([Rashid et al., 2013](#)). This study found 65.4% (n=123/188) IBD prevalence rate in commercial birds of Narsingdi district. Add this sentence here: Of 38% IBD prevalence, 83.75% (n=115) were in broiler and 16.25% in layer (**Figure 3**). The IBD prevalence found in this study was comparatively higher than the earlier studies of Dhaka (11.0%), Mymensingh (19.2%), Sylhet (24.3%) ([Talha et al., 2001](#); [Islam et al., 2003](#)), and in seventeen northern and north-central

districts of Bangladesh ([Biswas et al., 2005](#)). It was observed that in the IBD positive birds the minimum, maximum and median age was higher compared to the IBD negative birds. The minimum, maximum and median values of flock size was found lower in IBD positive group of birds related to IBD negative group. The above results indicated a potential effect of age and flock size on the occurrence of IBD in broilers in the study area. Further analysis (*t*-test) was performed to proof the relationship (**Table 1**).

**Age:** In our study, there was significant ( $P=0.007$ ) association between age (days) and getting infection by IBD virus in broilers (**Table 1**). The mean age of IBD positive birds was recorded 19.95 days which is higher than the negative group of birds (14.55 days). In different studies it was found that most of the birds get infection within 16-23 days (3<sup>rd</sup> weeks) of age. [Shekaro and Josiah \(2015\)](#) reported that the chickens of 3 to 6 weeks of age are most susceptible, because maximum development of bursa of fabricius take place at that time and the bursa follicles are filled up with immature lymphocytes. IBD virus replicate in and cytolitically affects the actively dividing B-lymphocytes in the bursa of fabricius. IBD have also been recorded at 14-20 weeks in Nigeria ([Abdu and Ibe, 2009](#)). [Rahman et al. \(2010\)](#) could not been find IBD infection in the chickens aging below 2 weeka of age but [Uddin et al. \(2010\)](#) has found this disease in broiler at 0-7 days of age in Narsingdi.

**Flock size:** In case of flock size, there was significant ( $P=0.0002$ ) association between flock size and susceptibility of getting infection by IBD virus (**Table 1**). In our study we found that the mean flock size in IBD positive broilers is 1317 (CI: 1175-1460) but a larger mean flock size 1724 (CI: 1565-1883) was recorded for IBD negative broilers. Higher susceptibility to IBD in broilers of small flock sized farms may be due to faulty management of the smaller farms who rears bird without thinking of commercial benefits. Moreover, these farms follow an irregular vaccination schedule and also bear negligence for vaccination.

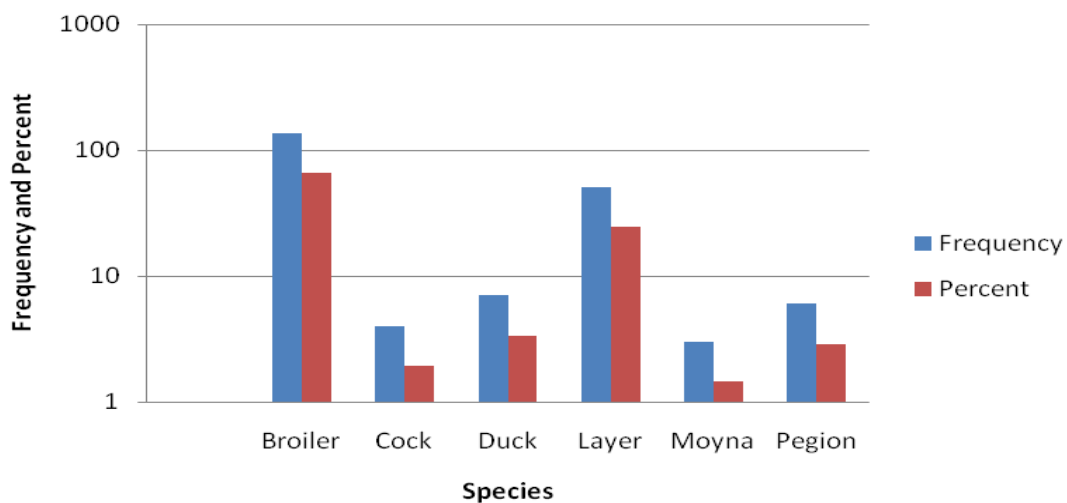
The present study revealed 38% prevalence of IBD in Narsingdi region that was higher than those of [Talha et al. \(2001\)](#) who reported 10.99, 16.0 and 19.16% cases of IBD in Dhaka and Mymensingh, respectively, but similar to Sylhet region, as reported by [Islam et al. \(2002\)](#); this variation might be due to variation in risk factors in different geographic region, management practice or flock sizes. Most of the birds diagnosed as IBD came from the flocks where vaccination was carried out against IBD. Findings of high percentage of IBD in birds suggest

**Table 1:** Association of mean age and flock size with occurrence of IBD in broilers tested with *t*-test.

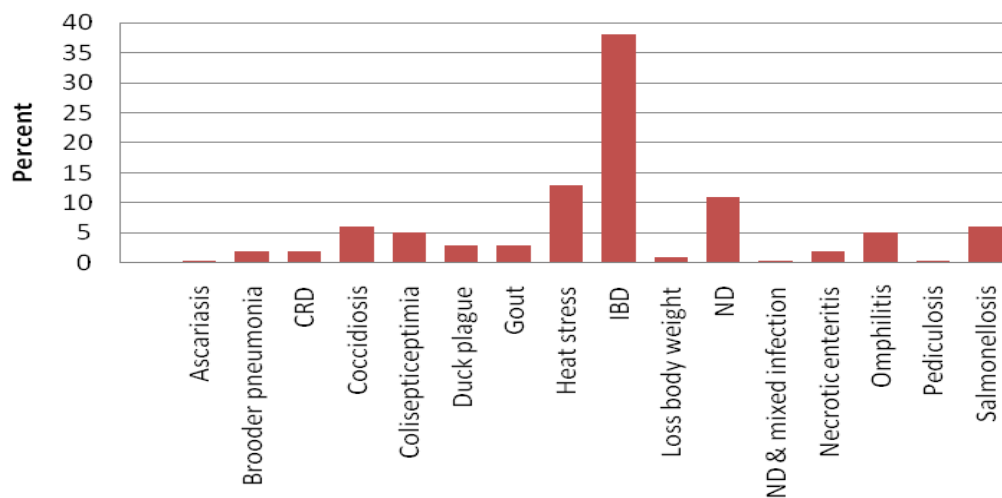
Variable	Diagnosis	Mean	95% CI	P-value
Age (days)	IBD positive	19.95	16-23	0.007
	IBD negative	14.55	12-16	
Flock size	IBD positive	1317	1175-1460	0.0002
	IBD negative	1724	1565-1883	

**Table 2:** Association of mean age and flock size with occurrence of ND in broilers tested with *t*-test.

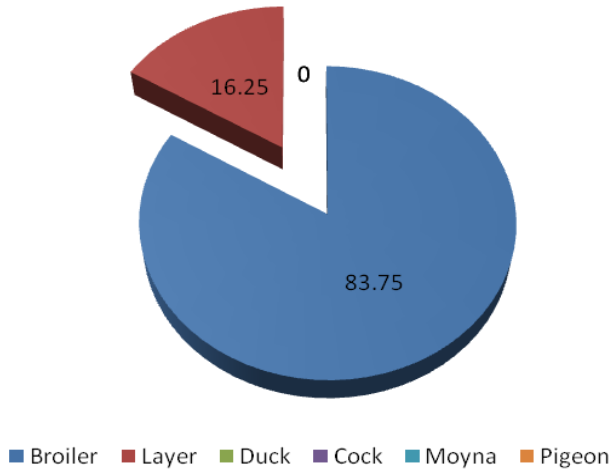
Variable	Diagnosis	Mean	95% CI	P-value
Age (days)	ND positive	122.23	98.62-145.83	0.0001
	ND negative	43.13	35.30-50.96	
Flock size	ND positive	2142.86	515.69-3770.04	0.8370
	ND negative	2266.74	1900.85-2632.63	



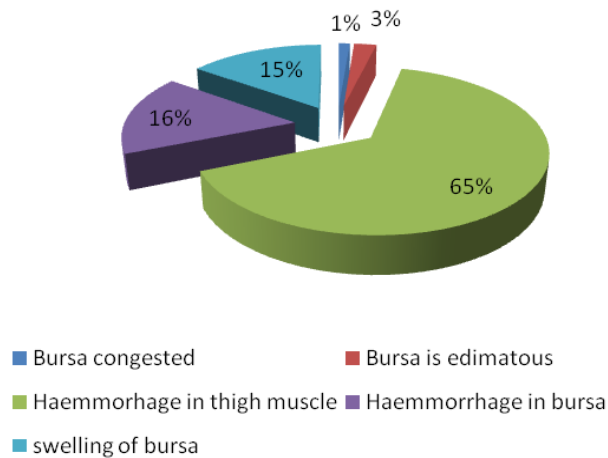
**Figure 1:** Frequency and percent of different poultry species attended during the study period.



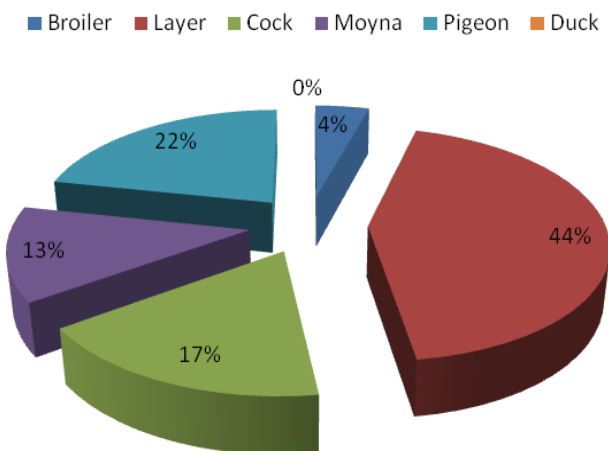
**Figure 2:** Percent of different poultry diseases observed during the study period in the study area.



**Figure 3:** Pie chart is showing the percentage of occurrence of IBD in different species of birds.



**Figure 4:** Pie chart is showing the percentage of different post mortem findings found in IBD affected broilers.



**Figure 5:** Pie chart is showing the percentage of occurrence of ND in different species of birds.

that vaccination could not protect the birds. IBD infection causes immunosuppression which results in vaccination failure with causing high mortality.

**Postmortem lesions in IBD:** IBD has some pathognomonic lesion through which we can diagnose this disease. The pathognomonic lesion of IBD is haemorrhage in thigh muscle, haemorrhage in bursa, swelling of bursa, edematous bursa and congestion in bursa. In our study in maximum (65%) case we found haemorrhage in thigh muscle where haemorrhage in bursa was observed in 16% cases, swelling of bursa in 15% case, edematous bursa in 3% case and congestion in bursa in 1% case (Figure 4). Khan et al. (2011) examined that at necropsy the gross pathological lesions were hemorrhages present on pectoral, leg and thigh muscles. The kidneys were swollen and a gelatinous film was present around the bursa.

### New castle Disease

In the present investigation, 11% of ND positive cases (Figure 2) were found in different species is match with Rahman and Samad (2003); who reported 10.34% in commercial chicken of Bangladesh. Another study conducted in Narshingdi has also reported nearly similar prevalence (8.92%) of ND During July 2002 to June 2003 (Uddin et al., 2010). Lower prevalence of ND is reported by Islam et al. (2003) 6.73% in Sylhet, 8.8% by Saleque et al. (2003) in Gazipur and 4.8% in Gaibandha district of Bangladesh (Islam et al., 2009; Khan et al., 2011). Higher prevalence of ND also documented like 14.89% in broiler and 30.68% in layer chicken by Hasan et al. (2012); in Bangladesh. The present findings would indicate that the reemergence of ND in commercial flocks is still a threat to the poultry industry in spite of available use of ND vaccines. It is important to investigate if the reemergence of ND is due to vaccination failure or any other factor.

Age of birds were found significantly associated with ND prevalence (Table 2). The adult (122.23, 95% CI: 98.62-145.83) poultry were found prevalent to ND. Saleque et al. (2003) reported highest prevalence of ND in adult poultry but some others reports have opponent findings that, young are more prevalent to ND (Uddin et al., 2010; Khan et al., 2011). The study was conducted during May to June months when the ambient temperature is higher than others season in Bangladesh. The ambient temperature and husbandry practice might attribute to the occurrence of disease in adult poultry Saleque et al., (2003).

In our study we found cases of ND in different species, maximum 44% case was found in layer, where 22% in



region, 18% in cock, 13% in moyna, 4% in broiler (Figure 5).

## CONCLUSION

The present study reflects different diseases of poultry in Narsingdi district, of Bangladesh. The IBD was found highly prevalent followed by ND, heat stress and salmonellosis. Chicks aged between 16-23 days and flock size between 1175-1460 are the most susceptible to various diseases, in particular, to IBD. All of the diseases recorded are economically important for broiler production and hence farmers can not earn their ultimate profit. It is important to assess the management system and husbandry practices of those farms that were affected by different diseases.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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## AUTHOR CONTRIBUTIONS

SI went to the field to collect the samples and carried out the research. SC supervised the overall research work. SI wrote the first draft before being revised and approved by all the authors.

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