

# Comparative Study on Newcastle Disease and Infectious Bursal Disease in Chicken Submitted to Upazilla Veterinary Hospital, Bogra Sadar, Bangladesh

Arup Sen<sup>1\*</sup>, Abu Torab<sup>1</sup>, Abdus Salam SM<sup>2</sup>, Bhubon Halder<sup>2</sup> and Alauddin MD<sup>2</sup>

<sup>1</sup>Department of Microbiology and Veterinary Public Health, Chittagong Veterinary and Animal Sciences University, Chittagong, Khulshi, Bangladesh

<sup>2</sup>Faculty of Veterinary Medicine (FVM), Chittagong Veterinary and Animal Sciences University, Chittagong, Khulshi, Bangladesh

## Abstract

The study was conducted on 123 chickens submitted to Upazilla Veterinary Hospital, Bogra Sadar for the detection of Newcastle disease (ND) and Infectious Bursal disease (IBD) during the period of 9th February to 8th April 2017. On the basis of history and postmortem examination findings, the prevalence of ND and IBD was 8.13% and 23.58%, respectively. The morbidity was 6.19% and 3.69% in ND and IBD, respectively. The mortality of ND and IBD was 4.00% and 2.009%, respectively. The main pathological lesions observed in this study were pinpointed hemorrhage in the proventricular gland, thickness of proventriculus wall, hemorrhage in the duodenum in case of ND and hemorrhages on thigh and breast muscles; inflamed, edematous, hyperemic and hemorrhagic bursa of Fabricius in IBD. The study also showed that the chickens of more than 30 days old and chickens within 15-30 days old were highly susceptible to ND (27%) and IBD (44%), respectively.

**Keywords:** Chicken; Newcastle disease; Infectious bursal disease; Prevalence; Bogra Sadar

## Introduction

The economy of Bangladesh is agro based. About 21.77% of Gross Domestic products (GDP) come from agriculture sector of which livestock alone shares 7.23% [1]. Within the livestock sector poultry has the highest contribution to GDP. The poultry industry is an important part of agriculture in our country. Poultry farming is gradually taking the shape of a large industry, and it is now one of the intensive forms of agri-business in our country. In order to achieve the Millennium Development Goal (MDG), Bangladesh is committed to developing the poultry sector. The total poultry population, both backyard, and commercial accounts to approximately 246 million, providing 5400 million pieces of eggs annually and nearly 15% of total animal protein. This sector employs about 5 million people of the country and has experienced a long-term growth rate of about 4.5%, which is one of the highest in the economy and is believed to have accomplished a silent revolution in Bangladesh [2]. Some diseases create problems to run poultry farming profitably, such as Newcastle disease, Infectious bursal disease, Colibacillosis, Salmonellosis, Mycoplasmosis, Coccidiosis, Necrotic enteritis etc. Among these, Newcastle disease and Infectious Bursal disease are the threat for both commercial poultry and backyard poultry farming.

Newcastle disease (ND) is indicated as the most significant viral disease of poultry in the world together with developing countries [3]. In Africa and Asia ND is a major constraint to the development of both industrial and village poultry production. NDV infections of poultry range from latent to rapidly fatal depending upon the pathotype of virus involved [4]. Chicks from immunized parents possess a high level of maternally derived antibodies (MDA) which protect them against virulent and vaccine viruses [5,6]. The outbreak of diseases in Bangladesh causes about 30% mortality of chickens [7]. Among them, infectious bursal disease (IBD) is one of the major viral diseases which cause 80% mortality in field outbreak [8].

The etiological agent of IBD, infectious bursal disease virus (IBDV), is a non-enveloped virus, belonging to the family Birnaviridae, with a

bisegmented double-stranded RNA genome [9]. Since 1992, the poultry farms of Bangladesh have been experiencing the outbreaks of a disease resembling acute IBD. Swollen bursa and sometimes atrophied bursa, edematous and hyperemic bursa, gelatinous yellowish transudate covering the serosal surface and swollen kidney were observed in post-mortem examinations. Hemorrhage and areas of necrosis may be present in more severe cases of IBD. Hemorrhage may be seen in the thigh and pectoral muscles [10-14]. IBD causes significant mortality in chickens in Bangladesh. The disease is in both private and government farms in the country. IBD is frequently reported even from vaccinated flocks. Sometimes farmers are confused and cannot suspect clinically on their own the occurrences of ND and IBD and the prevalence estimates of these diseases at a particular upazilla level are not clearly known to them as well.

## Materials and Methods

The study was conducted at Upazilla Veterinary Hospital, Bogra (UVH, B) Sadar, Bogra district, Bangladesh. The duration of the study was the period of 8 weeks, starting from 9<sup>th</sup> February 2017 to 8<sup>th</sup> April 2017. A total of 123 birds were examined which were submitted to UVH, B from different commercial farms. Birds were examined postmortem at the UVH, B. ND and IBD on the reported farms were suspected based on the farmers' perceptions on clinical histories of diseases as received by taking direct interviews with them which were recorded on

**\*Corresponding author:** Dr. Arup Sen, DVM, MS, Department of Microbiology and Veterinary Public Health, Chittagong Veterinary and Animal Sciences University, Chittagong, Khulshi-4225, Bangladesh, Tel: +8801812716471; E-mail: arup09dvm@gmail.com

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questionnaires. Some epidemiological information, such as bio-security management of a farm, vaccination, mortality and feed/water source were also recorded on it.

### Case definition

Most of the time sick birds or dead birds brought to the Veterinary Hospital, examined first, history was taken from the farmers and finally postmortem examination was done. The bird which represent swollen or atrophied Bursa, hemorrhage /edematous fluid in bursa, hemorrhage on thigh muscles and breast muscles etc found on the postmortem examination were considered as case of IBD and ND is considered if pinpoint hemorrhage at the tip of the proventricular glands, hemorrhagic/diphtheric ulcers on the intestine and caecal tonsils were found on post-mortem. The clinical signs and post-mortem findings of other concomitant infections with ND and IBD were recorded. Post-mortems examinations were carried out and the different disease conditions of the birds were examined and tentative diagnoses were made as described by Calnek [15]. The clinical signs as seen or described by the owners and postmortem examination findings based on which ND and IBD and other diseases were diagnosed. The prevalence (%) of ND or IBD in the birds examined was calculated on the following formula:

$$\text{Prevalence} = \frac{\text{Total number of infected birds}}{\text{Total number of birds}} \times 100$$

### Data analysis

All data were entered into a spreadsheet program. Data management and analysis were performed using ANOVA Test: Single Factor using Microsoft Excel 2007. ANOVA Test: Single Factor done for the explanatory variables (Flock size, Age groups, Vaccination) and those having P-value ≤ 0.05 were considered significant.

### Results

In the UVH, B during study period 123 chicken was investigated of which 10 were found positive ND and 29 for IBD. The cardinal post mortem examination findings, especially lesions located into the proventriculus and Bursa of Fabricious based on which ND and IBD were diagnosed. The prevalence estimates of ND by type of birds, age groups, flock sizes and status of ND-vaccination are summarized in Table 1.

Of the total chickens investigated in the study, 8% were positive for ND. The prevalence (%) of ND in Sonali chickens was 14%, significantly higher in Sonali chickens compared to broiler ones (P<0.05). Compared with young ones the prevalence of ND was higher in chickens belonging to the age group >30 days (P<0.05). Surprisingly, ND was evenly distributed in ND-vaccinated and non-vaccinated chickens.

The prevalence estimates of IBD in chickens by type of birds, age, flock size and IBD-vaccination are presented in Table 2. The prevalence of IBD in chicks of 15-30 days' group was 44%, significantly higher than other age groups (p<0.05). Surprisingly, IBD was 29% in vaccinated chicks which are significantly higher than non-vaccinated ones (P<0.05). Table 3 is presented with the overall farm-based morbidity and mortality in chickens based on the available data. The overall farm-based mortality attributable to ND and IBD were 4% and 2%, respectively.

### Discussion

About 8% of the chickens investigated were diagnosed positive

with ND which was similar to the findings of Beach, Banerjee et al. and Alexander [16-18]. Most commonly observed postmortem lesions were pinpoint hemorrhages at the tip of proventricular glands, hemorrhagic ulcers in the intestinal wall and caecal tonsils, petechial hemorrhage in the colon, hemorrhagic lungs, tracheitis with congestion and catarrhal exudates. These findings corroborate with the findings of Kotani et al., Crespo et al., Talha et al. and Pazhanivel et al. [19-22]. The prevalence of ND observed in the study is, however, lower than the reports of Biswas et al. on chickens including Sonali reared under backyard system in Bangladesh [23,24]. A higher prevalence of ND in Sonali chickens, as observed in the study might be relating to weaker biosecurity for them compared to a better system of rearing for broiler chicks. The even distribution of ND in vaccinated and non-vaccinated birds should raise a question on the quality of vaccine used or its preservation and time of vaccination. This high prevalence of IBD found in this study is in accordance with the observation of Islam et al. who reported the proportion to be 24% in broiler chickens in Sylhet region [25]. However, there are reports in the other parts of the country which demonstrated the occurrence of this disease is lower than the present findings [21,26]. The highest prevalence (44%) of IBD was found in the group of 15-30 days birds and lowest (0%) in the group of 0-15 days birds. Lukert and Saif reported that clinically infectious bursal disease mostly occurs in the young chicken between 3-6 weeks of age, but the disease has also been reported to occur between 9 days to 20 weeks of age [27]. Rahman et al. found that the broilers of four weeks of age were highly susceptible to IBD (55%), whereas in third week 12.5% and in the fifth week 32.5% chicks were infected with IBDV and the broilers of two weeks of age were not affected with the virus [28]. Khan et al. reported that IBD affected birds were four weeks old conclusively [29]. Rajaonarison et al. showed that the birds of three to five weeks of old were most susceptible to IBD [30]. Wyeth et al. carried out studies IBDV in Great Britain and reported that IBDV can infect some chicks as young as fifteen days old [31]. No bird was found affected up to fifteen days. In this study, the outbreak of IBD in vaccinated flocks was significantly higher (P<0.05) which has also been described previously by Anku in Southern Ghana, Islam and Samad in Bangladesh and Jindal et al. in India [11,25,32]. They opined that factors like improper vaccination, poor biosecurity measures and the existence of very virulent strains of IBD virus contributed to the occurrence of IBD in the vaccinated flocks. The mortality rate of IBD (2%) in this study was similar to a previous report of Jindal et al. [32]. Age of the bird had a significant relationship on the prevalence and mortality of the disease. Mortality due to IBD in

Variable	N	Prevalence% (No. positive)	95% CI	P value
Type of bird	Sonali (63)	14% (9)	6-25	0.0258
	Broiler (60)	2% (1)	0.04-8	
Age	<15 days (35)	0% (0)	0-10	0.0008
	15-30 days (66)	6% (4)	32-57	
	>30 days (22)	27% (6)	0-15	
Flock size	<1000 birds (36)	0% (0)	0-9	0.0738
	1000-<2000 birds (45)	16% (7)	6-29	
	2000-<4000 birds (34)	6% (2)	0.72-19	
ND vaccinated	Yes (107)	8% (9)	3-15	0.8451
	No (16)	6% (1)	15-64	
Total	123	8.13%	3-14	

Table 1: Prevalence estimates of ND by type of birds, age, flock size and ND-vaccination in the investigated chickens.

Variable	N	Prevalence% (No. positive)	95% CI	P value
Type of bird	Sonali (63)	22% (14)	12-34	0.8805
	Broiler (60)	25% (15)	15-38	
Age	<15 days (35)	0% (0)	0-10	0.0001
	15-30 days (66)	44% (29)	32-57	
	> 30 days (22)	0% (0)	0-15	
Flock size	<1000 birds (36)	22% (8)	10-39	0.0655
	1000-<2000 birds (45)	13% (6)	5-27	
	2000-<4000 birds (34)	32% (11)	17-50	
	≥ 4000 birds (8)	50% (4)	15-84	
IBD vaccination	Yes (86)	29% (25)	20-40	0.0504
	No (37)	11% (4)	3-25	
<b>Total</b>	<b>123</b>	<b>23.58%</b>	<b>16-32</b>	

**Table 2:** Prevalence estimates of IBD in chickens by type of birds, age, flock size and IBD-vaccination in the investigated chickens.

Farm No.	Morbidity (%)		Mortality (%)	
	ND	IBD	ND	IBD
1		0.84		0.24
2		2		1
3		3.2		0.2
4		0.05		0.05
5		0.5		0
6	3.1		0.1	
7		1.55		0.67
8		3.18		2.92
9		1.37		1.25
10		6.4		0.4
11		4.16		1.67
12		0.72		0.73
13	17.5		16.66	
14		8		6
15		8		7.5
16		1.6		0.8
17		0.85		0.14
18	1.63		1.17	
19	17.14		14.28	
20	0.46		0.2	
21	1.1		0.5	
22	4		2.5	
23		6.25		3.13
24		7.5		2.5
25		1.2		0.8
26		5.9		4.09
27		1		0.6
28		15.22		10.87
29		1.37		0.13
30	10.27		1.18	
31	4		1	
32		4.09		1.82
33	2.72		2.27	
34		12		8
35		4.8		0.35
36		2.25		1.5
37		1.2		0.4
38		0.33		0.2
39		1.33		0.33
Average	6.19	3.69	4.00	2.00

**Table 3:** Comparison of morbidity and mortality in case of ND and IBD, on the basis of farms where the birds were from.

chicks was significantly higher in vaccinated chicks, an agreement with the findings of Shil et al. [33]. The prevalence, mortality, and morbidity of IBD were 7.75%, 6.38%, and 1.35%, respectively. Khan et al.; Sami and Baruah recorded 55 outbreaks of IBD in broiler flocks from 1993-95 with mortality ranging from 0.9-25.7% [30,34].

## Conclusion

The important postmortem findings in ND and IBD cases during postmortem examinations might be observed in the proventriculus and the Bursa of Fabricius, respectively. The prevalence of ND in the UVH, B might be 8%. The prevalence (%) of ND in Sonali chickens was 14%, which is significantly higher than broiler chicks. ND was also higher in chickens more than one month of age than younger birds. The distribution of ND was even in ND-vaccinated and non-vaccinated chickens. The prevalence of IBD in chicks of 15-30 days' group was much higher than the younger chicks. IBD was also much higher in vaccinated chicks. Farm-based mortality attributable to ND and IBD appears to be 4% and 2%, respectively.

## Conflicts of Interest

The authors declare no conflicts of interest.

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