

**Original Article****Occurrences of Newcastle Disease (ND) in Broiler Chicken at Bheramara Upazila, Kushtia District, Bangladesh**A. R. Nipa¹, M. H. Abid², M. M. Meher³, M. S. Islam^{3*}, M. A. Ullah^{1,4}¹Department of Microbiology and Veterinary Public Health, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh.²Veterinary Surgeon (leave/deputation /training/ reserve post), Department of Livestock Services, Dhaka, Bangladesh.³Department of Microbiology and Public Health, Faculty of Veterinary Medicine and Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh.⁴Livestock Extension Officer, Livestock & Dairy Development Project, Department of Livestock Services, Bangladesh.**ABSTRACT****Article History**

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sayedulmph@bsmrau.edu.bd**Keywords**Newcastle Disease, Broiler, Occurrences,
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findings.

Newcastle Disease is a viral disease that causes economic loss to farmers by reducing egg production and mortality both in backyard flocks and commercial farms. Therefore, this cross-sectional research was performed to estimate the occurrence, pathological conditions, and clinical features of ND in the small-scale commercial broiler farms in Bheramara Upazila of Kushtia District in Bangladesh during the period from 1st January 2019 to 30th April 2019. Sixty farms were selected randomly, among them 40 (66.67%) were found clinically suspected to ND. Age, vaccination, bio-security program, and provision of wild birds, native chickens, ducks, and crows in the farm premises exhibit a significant relation ($p < 0.05$) with the occurrence of ND in the susceptible flocks. The proportionate occurrences of ND were estimated as 81.25% in 20-35 days, 47.62% at 10-19 days, and 57.14% at 1-9 days. Moreover, the proportionate occurrences of ND were lower in vaccinated farms (53.48%), whereas all the non-vaccinated farms were infected, and the differences were statistically significant. Similarly, the occurrences were higher (97.44%) in the farms with the provision of wild birds and backyard poultry assessed to 9.52% occurrences in farms without wild birds and native chickens. In the present study, the occurrence of the disease was observed at 20% in moderate and 100% in poor bio-secured farms. Chandgram Union is identified as the most enzootic area. To sum up, vaccination, biosecurity program, and provision of wild birds, native chickens, ducks, and crow's adjunct to farm premises act as an exciting reason for the occurrence of ND in the study area.

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Introduction

The poultry sub-sector has emerged as an integral part of agribusiness in the farming community in Bangladesh. Poultry meat contributes approximately 37% of the total livestock-originated protein supply in the country (Rahman *et al.*, 1998). Among poultry, broiler rearing attributed its popularity to the farmers for its short life span and comparatively low capital investment (Begum *et al.*, 2012). Broiler farming has also played the important role in providing meat containing high-quality proteins and micronutrients, which has a tremendous impact on health and nutrition for poor people, especially in the village areas

(Belgrad *et al.*, 2018). Kushtia District in the west part of Bangladesh with different geo-climatic conditions from other parts. Several small-scale commercial broiler farms are available here. However, poultry diseases are major constraints for these farms, and Ranikhet disease is one of the common viral diseases of avian species specially poultry which has caused massive financial losses to farmers in the recent past. ND is caused by a paramyxovirus, the member of the family paramyxoviridae in the genus Avulavirus, and ND virus has been designated avian paramyxovirus-1 (APMV-1) (de Leeuw & Peeters, 1999). Newcastle disease viruses (NDV's) have three pathotypes: lentogenic,

mesogenic, and velogenic. Among them, the velogenic strains of NDV are frequently responsible for ND occurrences in poultry rather than mesogenic or lentogenic strains (Rahman and Samad, 2005). A series of approaches like contamination of feed, water, equipment, and clothing by the contact to fecal and other emissions from infected birds, selling or giving away sick birds, and entry of new birds in the farm is the way of transmission for NDV (Tu *et al.*, 1998). NDV is so virulent that many birds die without clinical signs (Rahman and Samad, 2005). Incidences of ND badly affect the economy and trade of poultry products (Biswas *et al.*, 2005). The occurrence of disease in a particular area depends on several features like geo-climatic-condition, management, biosecurity, husbandry, practices, immunization, social awareness, and so on (Sarkar *et al.*, 2020). So, to establish a commercial broiler farm, the occurrence of Ranikhet (ND) disease should be measured by the ND infection in the broiler. After consideration the criteria mentioned above, the current study was performed to determine the occurrence of ND in Bheramara Upazila under the Kushtia District of Bangladesh.

Materials and Methods

Study area and period

The cross-sectional research was performed in Bheramara Upazila, Kushtia District, from 1st February 2019 to 30th April 2019. There was 1 Pouroshova and 6 Union Parishad in Bheramara Upazila. The study region was divided into 7 clusters according to each union Parishad & Pouroshova area. The target population was all broiler farms present in one Pouroshova and six union parishads.

Data collection

Before taking of data regarding the infectious diseases, treatment for that disease, time of last vaccination, mortality the rate in the flock, educational qualifications of farmer, bio-security measures, hygienic management of farms, entry of wild birds and native poultry in the farmstead, feeding system and carcass disposal system, the hygienic status of vaccine gun and the man who administers vaccine to birds were taken by cross-questioning to the farm owners for the support of the diagnosis and the study. For anamnesis and data like age, vaccination, deworming, and biosecurity history were collected and recorded very carefully (Meher *et al.*, 2021).

Clinical diagnosis

The broiler exhibits the characteristics of marked dyspnea, gasping, coughing with sticky ocular and nasal discharge, violent diarrhea (yellowish-white or greenish white in color), and tremors, twisting of the head and neck, and sometimes paralysis was considered as the primary suspecting to Newcastle disease (ND). The ND cases were suspected considering the clinical signs according to the methods followed by (Hanif *et al.*, 2012).

Detection of infected poultry by postmortem lesions

The birds with the above-mentioned clinical signs and having the postmortem lesions of hemorrhage in the mucosal junction, caecal tonsils, gland of proventriculus, esophagus and air sac, necrotic foci lesion in the mucosa of the intestine and inflammation of the trachea were measured as clinically ND positive. The postmortem examination of the dead chicken was conducted aseptically according to the

postmortem examination methods followed by Hossain *et al.* (2017).

Statistical Analysis

All the data and test results were organized and analyzed by using Stata 13 MSI. The chi-square test was performed to determine the p-value. The statistically significant were considered when the p-values of less than 0.05.

Result

Figure 1 shows the gross changes of the internal organs of poultry, ascertained by postmortem examination. The extensive hemorrhage was observed in the different organs like the proventriculus, caecal tonsil, and the pinpoint hemorrhage was on the tip of the gland of the proventriculus. There was also a necrotic focus lesion in the mucous membrane of the intestine of the broiler. In the present study, 60 cases were recorded in the study. Among them, only 40 cases were clinically suspected. The ND occurrence was 66.67% (n=40). Table 1 shows the occurrence of ND according to different variables for example the age of the birds, vaccination, status of biosecurity, and provision of wild birds, native chickens, and ducks. ND occurrences with considering the different levels of all variables were statistically significant (p<0.05). Among the age category, the highest ND occurrences, 81.25% (n=26) was found in broiler of 20 to 35 days old.

Table 1. Occurrences of Newcastle disease associated with different factors.

Variable	Category	Number	Occurrences % (No of positive)	χ^2 -value	P-value
Age	0 – 9 Days	7	57.14%(4)	6.7768	0.034
	10 – 19 Days	21	47.62%(10)		
	20 – 35 Days	32	81.25%(26)		
Vaccination	Yes	43	53.48% (23)	11.8605	0.001
	No	17	100%(17)		
Provision of wild birds, native chickens and ducks in farms	Yes	39	97.44%(38)	47.4725	0.001
	No	21	9.52%(2)		
Status of bio-security	Poor	35	100%(35)	42.0000	0.001
	Moderate	25	20%(5)		
Total		60	40		

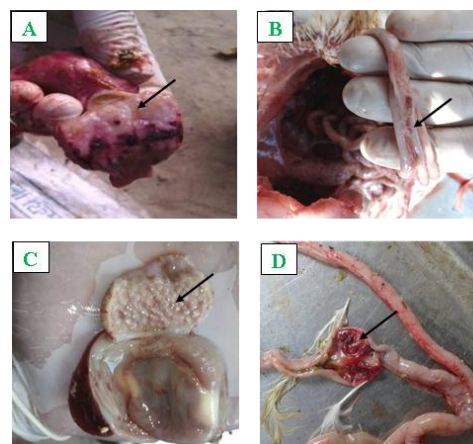


Figure 1. (A) Hemorrhage at proventriculus. (B) Hemorrhage at caecal tonsil. (C) Pinpoint hemorrhage in the tip of the gland of the proventriculus. (D) Necrotic focus lesion in the mucosa of the intestine.

However, the broiler of the unvaccinated farm showed about 100% (n=17) ND occurrence. The farms with the provision of wild birds, native chickens, and ducks revealed 97.44 % (n=38) Occurrences of ND. Most of the studied farms were under a satisfactory level of biosecurity practices. The poor biosecurity practiced farm showed the 100% (n=35) suspect to ND. The occurrences of ND according to union and pourashova were presented in figure 2. The highest ND suspected cases were ascertained Chandgram union of 88.88% (n=16) during the research period. The 2nd highest ND occurrences were suspected in Bhadurpur union, as 75.0% (n=9).

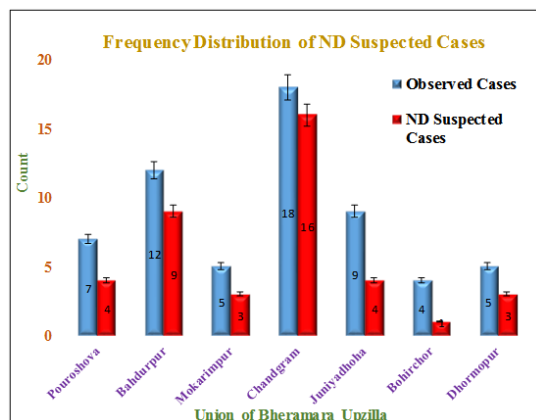


Figure 2. Frequency distribution of ND in Bheramara Upazilla.

Discussion

This study disclosed that the occurrence of ND is 66.67%. This finding is a little bit higher than the observation of Hasan *et al.* (2012) and Das *et al.* (2018), where they reported 14.89% and 8.9%, respectively. This might be caused by a smaller sample size and variation in a geographical area, seasonal variation, species variation, management error, and so on. The ND occurrences were suspected due to common clinical signs like sneezing, coughing, nasal discharge, labored breathing, and torticollis. These results are very near to the findings of Okoye *et al.* (2000).

Additionally, this study found greenish diarrhea in the broiler, which is also an important sign for ND (Alexander, 2000). The other signs like paralysis of legs, neck, and wing which is in line with the findings of Das *et al.* (2018). Through observing the gross changes in organs by postmortem examination were slight to severe hemorrhagic lesions in the caecal tonsils and proventriculus. These findings support the findings of Okoye *et al.* (2000), who reported that typical lesions are proventricular hemorrhage, most seen in the surface near the junction with the proventriculus. The findings in the caecal tonsils and intestines also support the finding of Okoye *et al.* (2000). The results of hemorrhagic lesions associated with necrosis are supported by Kumar *et al.* (2016).

The study showed that there are significant relationships within the ages of birds for the ND occurrences. Despite this, the percentage of ND outbreaks was highest in older birds. The longer life span of birds may enhance the incidence of occurrences in the broiler because the longer period of the same batch in a farm provides the chance for the birds, farm personnel, and equipment to contact the contaminated materials. Moreover, it provides a concept that ND may take place at any age considering the level of antibody produced

against the ND virus owing to various risk factors. However, our finding is very close to the results of Meher *et al.* (2020) who reported that the ND outbreak was highest in the age of 21 to 30 days old broiler. The vaccinated birds showed good protection against ND. The vaccination generates active immunity in the body to defend against specific diseases. Particularly, the efficacy of the ND vaccine may depend upon several factors, including diet supplementation like probiotics in poultry by Meher *et al.* (2021). Along with the vaccination, another important factor is biosecurity to control any viral diseases. This study showed the strict biosecurity practice is vital to protect the birds against ND. Biosecurity practice imposes a series of work that may diminish the chance of contamination to the birds. The case of entry of wild birds and native chickens and ducks showed higher ND occurrences. It notifies that the entry of wild birds and native chickens and ducks has a significant relationship with the occurrence of ND. These findings are in line with Meher *et al.* (2020), where the authors reported that 79.31% ND positive broiler farms had contact with the wild birds. Entry of wild birds and native chickens and ducks may facilitate the spread of ND from one farm to another. In considering the place, our study disclosed that the highest percentage of occurrences of ND was at Chandgram Union. This might be due to contaminated transport vehicles that get dirty egg-trays back to the farms frequently practiced in this area.

Limitations

Firstly, the ND was not identified by any molecular or serological test. Secondly, the study population was very short. Thirdly, four parameters were recorded and compared. Finally, any confirmatory diagnosis is essential to know the actual prevalence, but the disease in the study area only clinical detection was finished.

Conclusion

From the above findings, it may be decided that ND is a serious problem at the poultry farm at Chandgram union of Bheramara upzilla. Vaccination, biosecurity program, and provision of wild birds, native chickens, ducks, and crows in the farm premises act as an exciting factor in the occurrence of ND. It is possible to control ND under routine vaccination and preventive measure which is prime essential for substantial improvement in poultry production. For the understanding of ecology and epidemiology of ND in these areas, further improved data assortment and analysis can be performed.

Conflicts of Interest

The authors stated that they have no conflicts of interest.

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