

Short Communication

Prevalence and pathology of Newcastle disease in broiler at Bochaganj Upazila of Dinajpur, Bangladesh

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Abstract: The study was schemed to investigate the prevalence, pathological conditions, mortality and clinical features of Newcastle disease in the small scale commercial broiler farms at Bochaganj upazila of Dinajpur district during January to June, 2014. A total 1950 birds (from 5 farms), among which 160 diseased and dead birds were selected out of which 99 (5.35%) birds were found to be positive for Newcastle disease. The clinical signs of the affected birds were sneezing, coughing, nasal discharge, laboured breathing, and torticollis. Broiler were inactive, weak and rough in appearance, greenish watery diarrhoea occur severely. Nervous sign include clonic, spasm and paralysis of the legs and wings. In this observation, the gross pathological lesions were slight to severe haemorrhages in caecal tonsils, typical lesions were proventricular haemorrhage, most commonly seen in the surface near the junction with the proventriculus. The prevalence of Newcastle disease in Bochaganj upazila was 5.35%. Mortality of Newcastle disease in non-vaccinated and vaccinated broiler flock was 20.76% and 4.6%, respectively.

Keywords: prevalence; mortality; Newcastle disease; broiler; clinical signs

1. Introduction

In the recent years poultry rearing has become a growing and prospective industry in Bangladesh. Poultry rearing can play a vital role in the country like Bangladesh where most of the people are landless, disadvantaged and devoid of formal education or skill to participate in income generating activities. The vast majority of the world's hungry people live in developing countries, where 13.5% of the population is undernourished (WFP, 2015). The average quantity of protein uptake by people is insufficient per head per day where as desirable requirement is decreasing daily per head day by day. The country has a population of 16 million people who need a daily protein requirement of 70 to 100 grams a day. Currently, the average poultry meat consumption is just one kilogram a person a year, while just 28 eggs per person are eaten each year, (Peter, 2014). Despite the

special emphasis of the state on this sector, the development of poultry industry is seriously threatened by the outbreaks of acute contagious and fatal diseases. Among them Newcastle disease (ND), also known as Ranikhet disease, is one of the major problems in the development of poultry industry in Bangladesh.

Newcastle disease is a deadly viral disease of poultry due to its high and rapid spreading nature among poultry and other domestic and semi domestic species of birds. It is caused by *Avulavirus*, a newly formed genus under *Paramyxoviridae* (Chang *et al.*, 2001; Mayo, 2002). The virus mainly infects birds through their respiratory and gastrointestinal tract (Alexander, 1988). Depending on the strains of virus and how it reacts it causes huge economic losses to the poultry industry due to its high mortality rate in acute cases. The owner of the small scale farm faces many problems and loses their birds due to Newcastle disease infection that cause major economic loss. In the present study, gross and histopathological lesions produced by Newcastle disease virus (NDV) in various organs of diseased and dead birds were observed with their prevalence in broiler in Dinajpur district, Bangladesh.

2. Materials and Methods

2.1. Research area

Samples were collected from the small scale commercial broiler farms at Bochaganj upazila of Dinajpur district and research was conducted in the laboratory of Department of Pathology and Parasitology, Hajee Mohammad Danesh Science & Technology University, Dinajpur during January to June, 2014.

2.2. Experimental chickens

A total of 1950 birds of five farms were observed and 160 diseased and dead birds were examined for ND.

2.3. Clinical study

The general health condition and age of the chicken were recorded. The chickens were observed to detect clinical signs by usual inspection. The clinical signs were recorded during the physical visit of the affected flocks and the farmer's complaints about the affected birds were also considered.

2.4. Gross lesion

Gross morbid lesions of different organs were observed after necropsy examination of the birds.

2.5. Histopathological examination

During necropsy, various organs having gross lesions were collected, preserved and trimmed at 10% formalin. Formalin-fixed samples of the caecal tonsil, proventriculus and intestine from the diseased and dead chicken were processed for paraffin embedding, sectioned and stained with haematoxylin and eosin according to standard method (Luna, 1968) for histopathological study.

3. Results

Pathological investigation of Newcastle disease encountered in small scale commercial broiler farms at Bochaganj upazila in Dinajpur district was studied and different clinical, necropsy and microscopic conditions were recorded during the study period.

3.1. Clinical examination

The clinical signs of the birds affected with NDV varied from farm to farm. The signs were sneezing, coughing, and torticollis of the neck and shaking of the head. Chicken showed marked depression, inactive and weak. Sometime complete inability to make sound. Greenish watery diarrhoea occurred. Nervous sign include paralysis of the neck and legs.

3.2. Status of prevalence and mortality of the disease

The study revealed the following status of mortality and prevalence of Newcastle diseases virus (NDV) in broiler. Table 1 showed the prevalence of ND at different region of Bochaganj upazila of Dinajpur district. A total of 1950, among which 160 birds were selected during the study period from which 99 birds were found infected with ND. The prevalence of ND was 5.35%. Mortality rate of vaccinated broiler was 4.65% and in non-vaccinated broiler was 20.76% showed (Table 2). The total mortality rate was 4.5 times higher in non-vaccinated than in vaccinated birds. The percentages variation of most common gross lesions that were found in different organs during postmortem examination are presented in Table 3.

Table 1. Prevalence of ND at different commercial broiler farms at Bochaganj Upazila.

Farms	No. of birds	No. of infected birds	ND encountered	Prevalence of ND (%)	Level of significance
F-1	250	27	12	4.80	-
F-2	500	38	22	4.40	-
F-3	450	30	24	5.33	-
F-4	200	20	15	7.50	*
F-5	550	45	26	4.73	-
Mean±SEM				5.35±0.56	

* = Significant at 5% level of significance

SEM=Standard Error of Mean

Table 2. Mortality rate in nonvaccinated and vaccinated flock.

Vaccination status	Total birds	Death due to ND	Mortality rate of ND (%)
nonvaccinated	130	27	20.76%
vaccinated	130	6	4.6%
Relative risk			4.5

Table 3. Common gross lesions observed in the Newcastle Diseases affected broiler during necropsy.

SL. No.	Gross Lesions	No. of birds exhibit the lesions out of 25 birds	Percentages (%)
1	Enlarged haemorrhagic or congested caecal tonsils	21	84
2	Haemorrhage in the mucosa of proventriculus	14	56
3	Haemorrhages, congestion and edema in the lungs	19	76
4	Haemorrhages, congestion in tracheal mucosa	7	28
5	Hepatic necrosis and haemorrhage	18	72
6	Haemorrhages in the intestinal mucosa	12	48

3.3. Necropsy examination

Gross pathological changes in different samples were nearly similar but varied in severity. These included slight to severe haemorrhages in the proventriculus (Figure 1), haemorrhage in the internal wall of intestine and haemorrhage in caecal tonsils.

3.4. Histopathological study

Histopathological changes in proventriculus are distortion of normal architecture of tissue. Necrosis and haemorrhages around the gland, globular destruction of the proventriculus (Figure 2). Severe epithelial layer destruction in the proventriculus (Figure 3). Haemorrhage in the proventricular section.



Figure 1. Haemorrhages in the proventriculus.

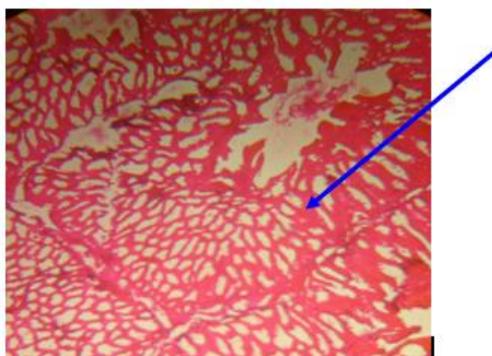


Figure 2. Globular destruction in the proventriculus section (40X, H& E).



Figure 3. Epithelial layer destruction in the proventriculus section (40X, H& E).

4. Discussion

A total 1950 birds, among which number of infected birds was 160, out of which 99 affected broiler chickens were examined as NDV and observed clinical signs were sneezing, coughing, nasal discharge, laboured breathing, and torticollis which correspond with the findings of Okoye *et al.* (2000). Greenish diarrhoea which was also similar with the findings of Alexander (1993). Nervous system was marked by paralysis of legs, neck and wing which correspond with the findings of Ressang *et al.* (1961).

Prevalence of NDV at different small scale commercial broiler farms in Bochaganj upazila are showing in Table 1 where total 5 farms visited in this upazila. Total 160 diseased and dead birds were examined out of which 99 birds were found to be positive for NDV. The prevalence of ND at Bochaganj was 5.35% which were dissimilar with the findings of Yuguda *et al.* (2007) who stated 46% prevalence in Borno state of Nigeria. Salihu *et al.* (2012) stated 54.67% prevalence. Njagi *et al.* (2010) stated 17.8% prevalence in hot dry zone and 9.9% in cool wet zone. The variation of prevalence may be due to variation in geographical location, seasonal variation, species variation, managemental error and so on.

Out of 130 non-vaccinated birds, 27 died due to ND and mortality rate was (20.76%), whereas out of 130 vaccinated birds, 6 died of ND and 4.6% mortality rate showed in Table 2. The relative risk of NDV was 4.5 times higher in nonvaccinated birds than vaccinated one. In vaccinated flock death from ND might be due to vaccination failure (wrong time vaccination, wrong route, use of denaturated vaccine etc.), improper management. The mortality was 4.5 times higher in nonvaccinated birds than in vaccinated birds. Result was not agreed with Barman *et al.* (2010) who stated that the risk was 1.5 time higher in nonvaccinated birds.

Percentages variation of most common gross lesions that were found in different organs during postmortem examination showed in Table 3. In this observation, the gross pathological lesions were slight to severe haemorrhages in the proventriculus, haemorrhage in caecal tonsils. These findings support with the observation of Mishra *et al.* (2000) and Okoye *et al.* (2000) who reported that typical lesions are proventricular haemorrhage, most commonly seen in the surface near the junction with the ventriculus and in the caecal tonsils and haemorrhages in the intestine, which supports with the finding of others (Jungherr and Hanson, 2004). Kianizadeh *et al.* (2002) who reported that haemorrhagic lesions associated with necrosis are found in the intestinal wall.

Histopathological lesions in the proventriculus were distortion of normal architecture of tissue, globular destruction, sever epithelial layer destruction, haemorrhages and congestion in the mucosa of proventriculus.

5. Conclusions

On the basis of this study, it is assumed that ND is a serious problem at poultry industry at Bochaganj. It is possible to control ND under routine vaccination and preventive measure which is prime essential for substantial improvement in poultry production.

Conflict of Interest

None to declare.

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