

Article

Clinico-histopathological observations of pigeons (*Columba Livia*) suffering from Newcastle disease in northern Bangladesh

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Abstract: A survey was conducted to study clinical signs, gross and histopathological lesions in pigeons with naturally occurring Newcastle disease (ND). For this purpose, 45 pigeon farms of the Rajshahi, Natore and Pabna districts were conducted during from July 2015 to June 2016. Among these, 17(37.78%) farms showed clinical signs of Newcastle disease, including mainly greenish white mucoid diarrhoea and nervous signs with high morbidity and mortality. Morbidity was 90% and mortality was 100%. Diarrhoea, the most common clinical sign observed, was present in 48.28% of the affected pigeons, followed by nervous signs (27.59%), shivering (24.14%). Postmortem examination of affected birds showed lesions mainly in proventriculus, liver, lungs and kidneys. Histopathological changes were also observed in lungs, liver, and proventriculus. The results showed that the Newcastle disease virus was widespread in pigeons locally and caused high mortality rate. It is concluded that pigeon fanciers of northern Bangladesh do not maintain the regular preventive measures or vaccination against ND is being adopted to control the disease.

Keywords: pigeons; Newcastle disease; clinical signs; histopathology

1. Introduction

Pigeons are ubiquitous flying birds belonging to order columbiformes. The tradition of pigeon rearing in Indian subcontinent is traced back to Mughal era, when pigeons were primarily used as postal messengers. Now a days, domestic pigeons are commonly raised for racing, fighting and exhibition purposes in many cities of Bangladesh including Rajshahi. Moreover, the nutritional and therapeutic values of pigeon meat further enhance their utility. A variety of diseases affect pigeons but viral diseases predominate in terms of high morbidity and mortality. Newcastle disease (ND) is world wide in distribution and has a wide range of hosts like chickens, pigeons, turkeys, partridges, pheasants, doves, sparrows, gees, starlings and other free flying birds (Vindevogel *et al.*, 1972). It is caused by avian serotype-1 paramyxovirus in pigeons that is closely related to paramyxoviruses causing ND in poultry but not identical (Alexander *et al.*, 1985). The disease in pigeons is characterized mainly by sudden onset of listlessness, in-appetence, nervous manifestations and inability to fly. Morbidity and mortality averages 100 and 80%, respectively (Eisa and Omer, 1984). Several outbreaks have been reported in pigeon lofts throughout the world including Sudan (Eisa and Omer, 1984), Continental Europe and Great Britain (Alexander *et al.*, 1984), India (Mangat *et al.*, 1988; Singh *et al.*, 1989), Germany (Fischer, 1986), Pakistan(S. Shaheen *et al.*, 2005) Turkey (Coven *et al.*, 1999) and Japan (Maeda *et al.*, 1987). Statistically it was found that pigeon diseases in northern Bangladesh comprises bacterial disease (31.30%), viral disease (43.70%), parasitic diseases (9.43%) nutritional deficiency (0.51%) and miscellaneous causes (15.05%). Among the viral diseases

Newcastle, Pigeon Pox and Papillomatosis comprises 12.58%, 31.21% and 0.08%, respectively (Sarder *et al.*, 2017). During the course of disease, the virus causes sub mucosal to ecchymotic hemorrhages in proventriculus. The urban population associated with keeping and breeding of pigeons usually possesses insufficient knowledge concerning the pathological and therapeutic aspects. Accordingly the health and husbandry matters of pigeons require particular consideration. A scarce information on clinical signs, gross and histopathological lesions of pigeon Newcastle disease in Northern Bangladesh is available. This manuscript describes these aspects in pigeons.

2. Materials and Methods

During July 2015 to June 2016, a total of 45 pigeon farms were randomly selected and visited in the research area of Rajshahi, Natore and Pabna districts. Among these, 17 farms showed clinical signs of Newcastle disease. None of the farms was vaccinated against ND virus. During the survey, prevalence of Newcastle disease in pigeons was evaluated. Clinical signs, morbidity and mortality rates were also recorded throughout the examination. The data was documented using a specially designed proforma for recording the number of birds, general history, management, previous disease, vaccination and treatment etc. Recently dead birds or birds showing peculiar clinical signs of ND were subjected to postmortem examination in the Diagnostic Laboratory, Department of Veterinary and Animal Sciences, University of Rajshahi. Gross lesions were recorded. Morbid samples from proventriculus, liver and lungs were collected and fixed in 10% buffered formalin for histopathological examination. These tissues were embedded in paraffin, sectioned and stained with Haematoxylin & Eosin (Bancroft and Stevens, 1990).

3. Results

Forty five pigeon farms were visited, out of which 17(37.78%) showed clinical signs of Newcastle disease. Surveys indicated that the onset of ND in pigeons was sudden. Affected pigeons showed in-appetence, listlessness and greenish white diarrhoea. Morbidity was 90% and mortality was 100%. Diarrhoea, the most common clinical sign observed, was present in 48.28% of the affected pigeons, followed by nervous signs (27.59%), shivering (24.14%). Respiratory signs were not observed in any of the pigeon farms in the present study. Body condition of pigeons affected by ND was satisfactory in majority of the cases (71.43%), however, 28.57% of the affected pigeons were emaciated. Most of the clinical signs observed during the study included twisting of head and neck (tremors) (Figure 1), greenish white mucoid diarrhea (Figure 2) and shivering. These signs along with respective percentages have been illustrated in Table 2.

Postmortem examination of dead or clinically affected pigeons was conducted which showed gross lesions in various organs. Pale discoloration of liver in some pigeons. Kidneys in some pigeon were slightly enlarged. A few pinpoint haemorrhages were present in proventriculus of some pigeon (Figure 3). No gross lesions were detectable in other organs including trachea, esophagus, gizzard and intestines. Histopathologically, focal hepatitis, vacuolar degeneration was present in hepatocytes suggestive of mild degree of damage to liver tissue and congestion of the portal vein was present (Figure 8). Small to large multiple haemorrhages and congestion were seen in lungs (Figures 5 & 6). Mild degree of mononuclear cell infiltration was present (Figure 7). In the proventriculus, haemorrhage present at the tip of the gland (Figure 4).

Table 1. The prevalence of ND in the study area.

Location	No. of farms	Diseased farms	Prevalence (%)
Rajshahi	15	6	40 (%) ^b
Natore	15	9	60 (%) ^a
Pabna	15	2	13.33 (%) ^c

Table 2. Clinical sings observed in ND infected pigeons (n=29).

Clinical sings	No. of birds	Percentage (%)
Diarrhoea	14	48.28 (%) ^a
Nervous sings (Twisting of head & neck)	8	27.59 (%) ^b
Shivering	7	24.14 (%) ^b

Values with different superscripts differ significantly (P<0.01).

Table 3. Post-mortem lesions observed in ND affected pigeons (n=29).

Organs	No. of birds	Percentage (%)
Proventriculus	6	20.69 (%)
Liver	6	20.69 (%)
Lung	5	17.24 (%)
Kidney	4	13.79 (%)



Figure 1. Twisting of head and neck due to ND.



Figure 2. Diarrhoea and twisting of head symptom in case of ND.



Figure 3. Pin point haemorrhage in the proventriculus in case of ND.

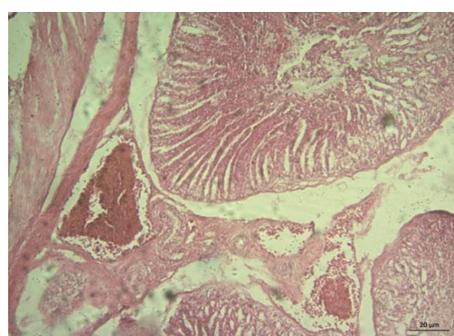


Figure 4. Hemorrhage present at the tip of the gland of proventriculus (arrow) (H&E x40).

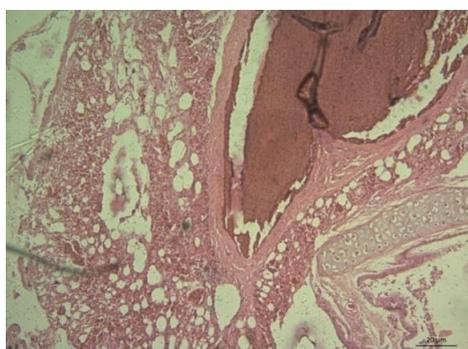


Figure 5. Congestion of the lungs (arrow) (H&E x40).

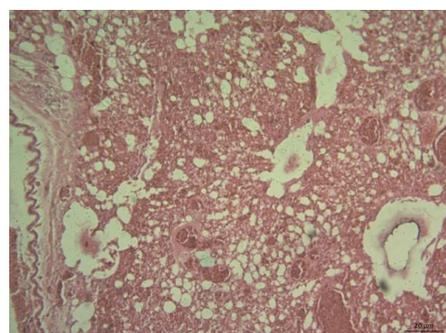


Figure 6. Hemorrhage and congestion of the lungs (arrow) (H&E x10).

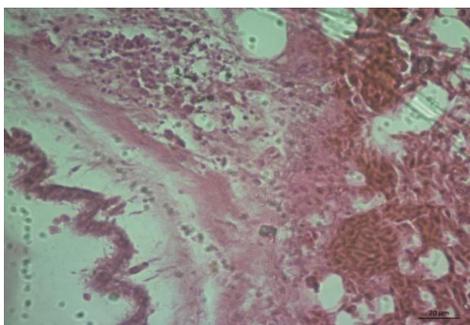


Figure 7. Infiltration of inflammatory cells (arrow) (H&E x40).

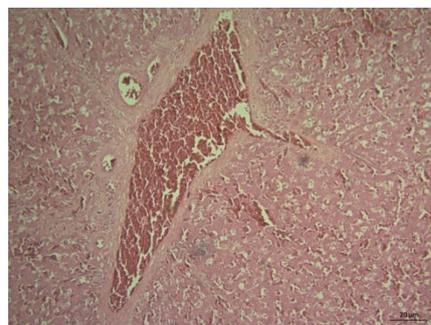


Figure 8. Focal hepatitis present, Congestion of portal vein (arrow) (H&E x10).

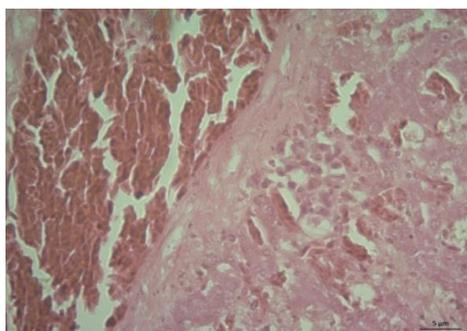


Figure 9. Infiltration of mononuclear cells (arrow) (H&E x40).

4. Discussion

Newcastle disease is a serious problem in pigeons. Fairly high morbidity (90%) and mortality (100%) rate due to paramyxovirus-1 (PMV-1) infection was observed in pigeons in the present study. Mangat *et al.* (1988) reported 50 to 70% morbidity in an outbreak of PMV-1 in racing pigeons in India. They further reported mortality around 60% in field outbreaks. During the study a survey of pigeon farms was conducted to determine the point prevalence of ND in pigeons in the research area. On the basis of green mucoid diarrhea and nervous signs it was considered that pigeons were suffering from ND. Using the mentioned clinical criteria, the point prevalence of ND in pigeons was observed to be 60%, 40% and 13.33% in Natore, Rajshahi and Pabna district respectively. Observations of our study are correlated with the findings of Shaheen *et al.* (2005).

In the present study, greenish white diarrhoea and nervous signs were more frequently observed. Barton *et al.* (1992) also observed diarrhoea and nervous signs associated with ND in racing pigeons. In the present study nervous signs in 27.59% cases, diarrhoea in 48.28% and shivering in 24.14% cases were observed but Fischer (1986) observed nervous signs in 86% cases, diarrhoea in 18% and paralysis of legs and wings in 9% of naturally affected pigeons. Many other workers have reported similar signs of ND in pigeons in experimental (El-Mubarak *et al.*, 1990; Mishra *et al.*, 2000) and field outbreaks (Eisa and Omer, 1984; Tangredi, 1985; Fischer, 1986; Mangat *et al.*, 1988). Khan (1968) reported paralysis of legs and wings in 80 and 60% experimentally infected pigeons, respectively. The occurrence of paralysis and nervous signs reported by Khan (1968) are fairly high than those observed in Pakistan. The occurrence of paralysis of legs and wings were not observed in the present study. No respiratory signs were also observed in the present study. Khan (1968) did not observe any respiratory signs in field outbreaks or experimentally inoculated pigeons but laboured breathing and respiratory distress was reported in pigeons kept in a cage adjoining experimentally infected pigeons. In the present study, 71.43% affected birds showed satisfactory body conditions, while 28.57% birds were emaciated. However, it appears that body condition relates to the duration of the disease. Alexander *et al.* (1984) reported that general loss of condition and anorexia occurred occasionally in ND infected pigeons. According to Herdt and Devriese (2000), general condition of the pigeons remains well in ND. Gross lesions were present only in few cases in the present study. In this study lesions were also recorded in lungs, liver and proventriculus. In most cases no gross lesions were recorded. Eisa and Omer (1984) and Maeda *et al.* (1987) reported no gross lesions in natural outbreaks of ND in pigeons, while El-Mubarak *et al.* (1990) reported congestion of viscera and catarrhal enteritis in experimentally infected pigeons with paramyxovirus-1. Mubarak (2000) observed gross lesions and congestion in visceral organs in experimentally infected pigeons with chicken origin ND virus.

Respiratory signs were not observed in present study which is in conformity to the findings observed by Herdt and Devriese (2000). They did not observe any respiratory signs in field outbreaks or experimentally inoculated pigeons. However, Fuller *et al.* (2010) reported the lack of gross lesions in natural ND outbreaks.

Histopathological changes were present in proventriculus, lungs and liver of the pigeons affected with ND in the present study. Mild degenerative changes were observed in liver in the present study. Fischer (1986) also observed mononuclear interstitial infiltration in liver in nearly all infected birds. However, Mangat *et al.* (1988) and ElMubrak *et al.* (1990) observed hepatitis. Although lungs appeared normal grossly, histological changes were detected including haemorrhages and mononuclear cell infiltration. Mubarak (2000) also observed haemorrhages and leucocytic infiltration in lungs but the type of leucocytes was not mentioned. Fischer (1986) did not observe haemorrhages but mononuclear interstitial infiltration was often seen in lungs of pigeons in natural outbreaks of paramyxovirus-1. No histological changes were detected in the trachea. It is concluded that the ND virus was wide spread in pigeons locally and no preventive measures or vaccination is being adopted by pigeon owners to control the disease.

5. Conclusions

From this study, it is concluded that due to high mortality rate Newcastle disease is an important harmful disease for pigeon rearing. Greenish white diarrhoea, head twisting and shivering are major clinical signs and grossly pin point haemorrhage in the proventriculus is the postmortem findings and microscopic study shows haemorrhage at the tip of the gland of proventriculus which is the key points for the diagnosis of ND. So, vaccination schedule should be applied regularly against ND for sustaining pigeon farm in Bangladesh.

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Conflict of interest

None to declare.

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