

Article

Clinicopathological status of duck plague at Dinajpur district of Bangladesh

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Abstract: Clinicopathological status of duck plague was investigated at different upazila of Dinajpur district during the period from October, 2017 to March, 2018. The clinical features emphasizing the mortality and prevalence, necropsy for gross morbid lesions, histopathological features were examined. The farm and flock history, managemental aspects, vaccination status, nutrition, etc. were recorded carefully. The data was collected and statistically analyzed. Farmer's complaints about their affected birds were also considered and emphasized. The average mortality rate was recorded as 14.42% and prevalence was 19.81%. The sick birds clinically showed moderate to severe depression, ocular and nasal discharges, ataxia, dyspsia. The affected organs were pathologically characterized as mild to moderate congestion and haemorrhages with misshapen, ruptured cystic ova and histopathologically characterized as mild to moderate architectural destruction, reactive cell infiltration.

Keywords: duck plague; mortality; prevalence; clinicopathology

1. Introduction

Household duck keeping has a significant contribution in the economy of rural Bangladesh. There are about 44.12 million ducks in Bangladesh of which 85% reared in rural households under semi-scavenging system (Ajnber and Mia, 2002). Duck farming in Bangladesh is an important option of livelihood (FRYP, 1998). Occurrences of diseases are the major hindrance for the development of duck farming in Bangladesh and thereby causing significant economic losses. The causes of mortality of ducks in Bangladesh were due to duck plague (Baki *et al.*, 1986, 1991; Das *et al.*, 1988, 2005).

In Bangladesh duck plague is first reported by Sarker (1980) followed by the isolation of this virus (Sarker, 1982 and Khan *et al.*, 1990) and characterized (Dev and sarker, 1982; Islam and Khan, 1995). The pathology of duck plague in Bangladesh was studied on natural infection (Das *et al.*, 1988 and Baki *et al.*, 1993) and experimental infection (Das *et al.*, 1990; Islam, 1992). Studies were also conducted in Bangladesh on the serological tests and cell mediated immunity in duck plague (Khan *et al.*, 1993; Hossain *et al.*, 2005; Islam *et al.*, 2005; Das, 2006 and Kayesh, 2007). Mortality in domestic duck range from 5 to 100% (Das *et al.*, 2005 and Saif *et al.*, 2008b). The morbidity and mortality in a flock depend on the virulence of the virus and the immunologic status of the birds (Campagnolo *et al.*, 2001).

Duck plague is a fatal infection prevalent in Bangladesh with varying degrees of severity in context to geographical locations. Therefore, the present study was carried out to investigate the duck plague with its clinicopathological status in some upazilas of Dinajpur district.

2. Materials and Methods

2.1. Study area and period

The study was conducted in the Department of Pathology and Parasitology under the Faculty of Veterinary and Animal Science (VAS) of Hajee Mohammad Danesh Science and Technology University (HSTU) during the period from October, 2017 to March, 2018. The area was investigated to find out sick and dead ducks. Representative samples (liver, trachea, lungs and heart) were collected from the sick and dead duck from the natural cases infection of domestic ducks from six different upazilas of Dinajpur District (Dinajpur sadar, Chirirbandar, Parbotipur, Fulbari, Birampur and Nawabgonj upazillas). The data were analysed by DMRT to find out the mortality and prevalence of duck plague in different upazilas.

2.2. Clinical Findings

The general health condition of the ducks was recorded. The clinical signs were observed and recorded during the physical visit of the farms and the farmer complaints in respect of the diseases were also emphasized.

2.3. Pathological Findings

The affected birds were brought to the laboratory immediately after clinical observation for necropsy examination. Postmortem examination was done as per standard procedure. The visible gross morbid lesions were recorded systematically. The gross samples were preserved in 10% formalin solution, processed, paraffinized, sectioned and stained using hematoxylin and eosin as per recommended procedure (Luna, 1968) for histopathological observation. The finally prepared slides were examined under microscope using various objectives and typical histopathological lesions were recorded.

2.4. Diagnosis of diseases

The disease was diagnosed on basis of owner's statement, clinical signs observed and laboratory diagnosis with gross tissue changes and characteristic microscopic features of diseases.

3. Results

3.1. Clinical findings

Table-1 showed, the study revealed the following status of mortality and prevalence of duck plague disease (DP) in native ducks. The overall prevalence at Dinajpur district is 19.81% and whereas 14.55%, 14.81%, 30.00%, 11.60%, 32.05% and 15.82% in Sadar, Chirirbandar, Parbotipur, Fulbari, Birampur, and Nawabgonj upazila respectively. The highest mortality was observed at Birampur upazila (25.64%) and lowest (8.21%) at Fulbari upazila with total mortality rate 14.42%.

Table- 2 shows the symbolic presentation of mortality and prevalence with higher and lower value. The coefficient of variation value indicates that they are more homogenous and significant.

The ducks were observed to detect clinical signs by visual examination. The characteristic clinical signs include inappetance, weakness, ataxia with ruffled feather and droopy wings, respiratory distress, watery nasal and ocular discharge and greenish watery diarrhoea (Figure 1).

3.2. Necropsy Findings

At necropsy prominent changes observed in ducks were multiple tiny haemorrhagic spots and fibrinous exudates with petechiation on internal surface of esophagus, the liver was pale copper colour with haemorrhagic spots and white foci, congestion in lungs, congestion and minute haemorrhagic spots on heart muscles, ruptured follicular contents in peritoneum, misshapen, cystic and ruptured yolk with stalk formation, anaemic oviduct, yellow mucosa of proventriculus, greenish colour of internal surface of gizzard and gizzard content, congestion and haemorrhages in vascular channels of mesentery, ballooned cloacae portion (Figure 2).

3.3. Histopathological Findings

After staining with H and E stain of the processed heart, there was destruction of muscle fibers, hyperacidophilic sarcoplasm with reactive cells infiltration. Thickened interalveolar spaces, alveoli filled with tissue debris and reactive cell infiltration also found in lungs. Breaking of hepatic cords, more acidophilic cytoplasm with less leukocytic infiltration was found in liver (Figure 3).

Table 1. Mortality and prevalence of duck plague at different upazilla of Dinajpur district.

Name of upazila	No. of total duck	No. of infected duck	No. of dead duck	Vaccination status	Percentage of Mortality	Percentage of Prevalence
Sadar	2,63,998	38,400	34,560	22,000	13.09	14.55
Chirirbandar	2,20,192	32,600	22,820	38,600	10.36	14.81
Parbatipur	2,55,490	76,647	38,323	56,900	14.99	30.00
Fulbari	1,24,100	14,400	10,080	35,200	8.21	11.60
Birampur	57,245	18,347	14,677	25,400	25.64	32.05
Nawabgonj	78,241	12,380	11,142	28,500	14.24	15.82

Table 2. Mortality and prevalence of different upazilas adjusted by DMRT.

Upazila	Mortality (%)	Prevalence (%)
Sadar	13.09 ^{bc}	14.55 ^{bc}
Chirirbandar	10.36 ^{cd}	14.81 ^{bc}
Parbotipur	14.99 ^b	30.00 ^a
Fulbari	8.210 ^d	11.60 ^c
Birampur	25.64 ^a	32.05 ^a
Nawabgonj	14.24 ^b	15.82 ^b
LSD	**	**
CV %	12.01	10.51
Mean ± SEM	14.42±2.47	19.81±3.6

**0.01% level of significance, LSD = Least Standard Deviation, CV = Co-variance, SEM = Standard Error Mean

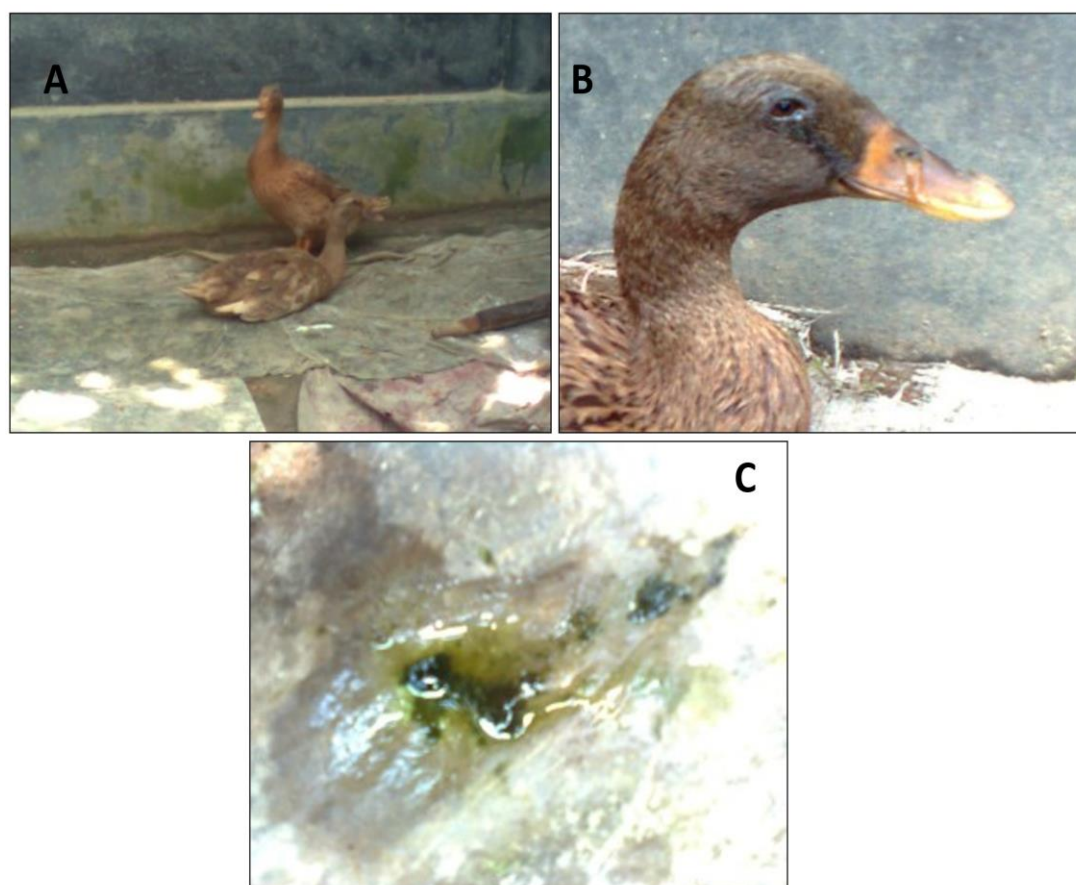


Figure 1. Clinical signs of Duck plague.
A. Ataxia with ruffled feather and droopy wings
B. Watery nasal and ocular discharge
C. Greenish watery diarrhoea

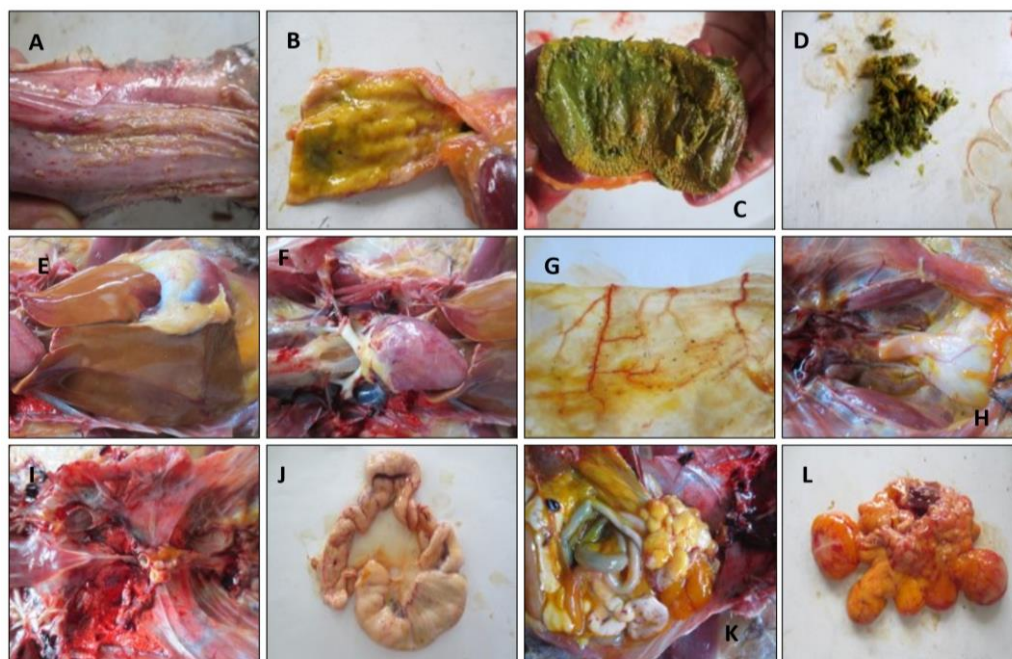


Figure 2. Gross pathological lesions: A. Fibrinous exudates with petechiation on internal surface of esophagus, B. Yellow mucosa of proventriculus, C. Greenish colour of internal surface of gizzard, D. Greenish gizzard contents, E. The liver surface was pale copper colour with haemorrhage with white foci, F. Congestion and minute haemorrhagic spots on heart muscles, G. Congestion and haemorrhages in vascular channels of mesentery, H. Balloned cloacal portion, I. Congested lungs, J. Anaemic oviduct, K. Ruptured follicular contents in peritoneum, L. Misshapen, cystic and ruptured yolk with stalk formation.

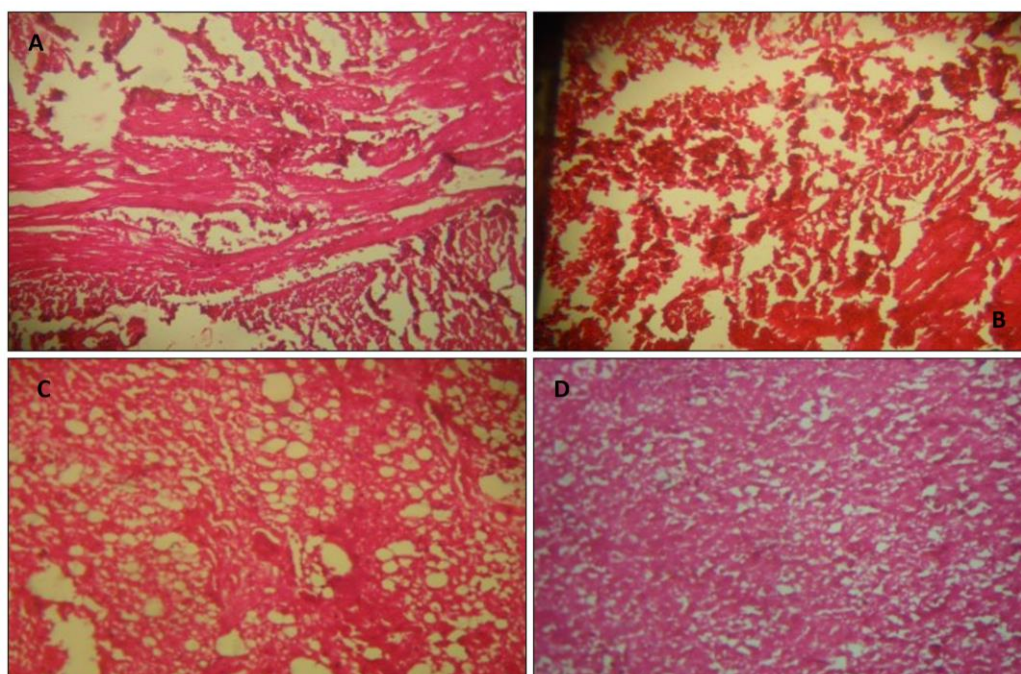


Figure 3. Histopathological lesions: A. Hyperacidophilic sarcoplasm with reactive cells infiltration in cardiac muscle, (Longitudinal section) B. Destruction of muscle fibers with reactive cells infiltration in cardiac muscle (Cross section), C. Thickened interalveolar spaces, alveoli filled with tissue debris and reactive cells infiltration in lung section, D. Breaking of hepatic cords, more acidophilic cytoplasm with fewer leukocytic infiltration in liver section.

4. Discussion

This study was undertaken with the objectives of clinicopathological observation of duck plague at different upazilas of Dinajpur district and resulted as the overall prevalence were 19.81% whereas 14.55%, 14.81%, 30.00%, 11.60%, 32.05% and 15.82% in Sadar, Chirirbandar, Parbotipur, Fulbari, Birampur, and Nawabgonj upazila respectively (Table 1). The highest mortality was observed at Birampur upazila (25.64%) and lowest (8.21%) at Fulbari upazila with total mortality rate 14.42%. These results vary with the reports of Das *et al.*, (2005); Saif *et al.* (2008). Khanum *et al.* (2005), where they showed different values of prevalence and mortality rate and highest prevalence was mentioned in Netrakona about 27.1%. These variations may be due to the geo-climatic condition, biological barriers, immunization status with social awareness and mostly on the health status of the ducks.

On the basis of visual examination, the characteristic clinical signs include inappetence, weakness, ataxia with ruffled feather and droopy wings, respiratory distress, watery nasal and ocular discharge and greenish watery diarrhoea which were similar with the findings of Brand and Docherty (1984); Wobeser (1997).

The observed gross pathological lesions were multiple tiny haemorrhagic spots and fibrinous exudates with petechiation on internal surface of esophagus, the liver was pale copper colour with haemorrhagic spots and white foci, congestion in lungs, congestion and minute haemorrhagic spots on heart surface, ruptured follicular contents in peritoneum with misshapen, cystic and ruptured yolk with stalk formation, yellow mucosa of proventriculus and greenish colour of internal surface of gizzard and gizzard content, congestion and haemorrhages in vascular channels of mesentery. These findings support the observations provided by Chennakesavalu *et al.*, (1987); Mahmud (2012); Brand and Docherty (1984).

Histopathological study revealed the finding as destruction of cardiac muscle fibers, hyperacidophilic sarcoplasm with reactive cells infiltration. In lung there was thickened interalveolar spaces, alveoli filled with tissue debris and reactive cell infiltration. Breaking of hepatic cords, more acidophilic cytoplasm with fewer leukocytic infiltrations also found in liver. These lesions were in agreement with those described by Das *et al.* (1988 and 1990); Davison *et al.* (1993) who reported that microscopically in heart there were degeneration and necrosis with reactive cell infiltration, in liver multi focal area of necrosis and degeneration of hepatocytes were found.

5. Conclusions

Duck rearing is a profitable agro sector in Bangladesh because of low cost feeding in free water bodies of the country. As these water sources supply natural aquatic feeds, duck rearing has become a means of reducing rural poverty in those areas especially. But the major constrains of duck rearing in Bangladesh are the outbreaks of various diseases and increase rate of mortality.

For the prevention and control of the diseases, a thorough knowledge about the occurrence of diseases, their epidemiology including morbidity and mortality pattern, pathogenesis and pathology of the diseases are essential. The present pathological investigation and prevalence study on to the disease of ducks in Dinajpur district of Bangladesh was conducted in the Department of Pathology and Parasitology, HSTU, Dinajpur, during the period from October, 2017 to March, 2018 and it was undertaken to uncover clues of duck mortality. The field investigation, history, clinical signs and postmortem findings were of the affected ducks of Dinajpur area recorded. From these findings, duck plague was suspected. Laboratory investigation was conducted by histopathological examination of duck plague. From all these findings it may be concluded that duck plague was an important cause of duck morbidity and mortality.

Conflict of interest

None to declare.

Authors' contribution

Md. Nazrul Islam designed and supervised the experiment. Shabnam Mostari carried out the experiment. Mahfuza Akther wrote the manuscript which was finely reviewed by S. M. Harun-Ur-Rashid and finalized in consultation with Md. Haydar Ali. All authors have read and approved the final manuscript.

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