



A RETROSPECTIVE STUDY OF COMMON POULTRY DISEASES AT GAZIPUR DISTRICT OF BANGLADESH

MT Islam¹, MSJ Saurov¹, MA Rahman^{2*}, AK Talukder³, MA Islam⁴, MG Haider¹ and ANMA Rahman³

¹Department of Pathobiology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh

²Department of Surgery and Radiology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh

³Department of Gynecology, Obstetrics and Reproductive Health, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh

⁴Department of Medicine, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh

*Correspondence: Md. Ataur Rahman, Department of Surgery and Radiology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh, E-mail: ataursra@bsmrau.edu.bd

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ABSTRACT

This study was performed to investigate the prevalence of various diseases in poultry based on species, breed, sex and age in Gazipur district. The experimental data were recorded throughout the study period from January 2018 to March 2020. A total of 560 diseased and dead poultry (279 layer, 194 broilers, 77 sonali and 10 ducks) were considered in this study. The prevalence of diseases was investigated by the clinical signs, gross lesions in different organs and histopathological changes of different tissues. The prevalence of bacterial and viral diseases in different types of poultry was 38.2% and 27.1%, respectively. Among the different types of poultry, the highest prevalence of diseases (49.8%) was found in layer chicken. The prevalence of diseases in broiler, sonali chickens and ducks were 34.6%, 13.8% and 1.8%, respectively. In layer chickens, salmonellosis was found as most prevalent (21.5%) followed by colibacillosis (9.0%) and Newcastle disease (ND) (9.0%). In broiler and sonali chickens, salmonellosis (20.6% and 20.8%) was the most prevalent disease followed by infectious bursal disease (IBD) (17.0% and 10.4%) and colibacillosis (11.9% and 11.7%). However, duck plague (40%) was found as the most prevalent disease in ducks. Among the viral diseases, IBD was found as the most prevalent (11.3%). On the other hand, salmonellosis was the highest prevalent disease constituting 18.4% of all bacterial diseases.

Keywords: Retrospective study, prevalence, poultry diseases, Gazipur

Introduction

Bangladesh is one of the highly populated countries in the world, has a population of 160 million people within an area of 1,47,570 square-km (Islam 2014). The livestock sector provides approximately 2.95% of the country's gross domestic product (GDP) and 17.5% to the agricultural GDP. Among the livestock sector, the poultry industry has sufficient capability of increasing income, decreasing malnutrition, offering employment opportunities and alleviating poverty (Begum *et al.* 2010). However, poultry diseases are the major constraints for the development of the poultry industry in Bangladesh. The diseases of poultry can be classified according to causal agents such as viral diseases: Newcastle disease (ND), infectious bursal disease (IBD), Marek's disease, lymphoid leukosis, encephalomyelitis, pox disease, avian infectious bronchitis (IB), infectious laryngotracheitis (ILT), etc. Among bacterial diseases,

colisepticemia, colibacillosis, fowl cholera, fowl typhoid, salmonellosis, infectious coryza have been found. Some fungal diseases (aspergillosis, candidiasis, etc.) and parasitic diseases (nematodiasis, histomoniasis, etc.) also occur in poultry.

Gazipur district of Bangladesh has many Poultry industries. Owners of the poultry farms from different corners of Gazipur district regularly visit the Pathobiology department of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur with diseased and dead chickens to resolve the problems. Very few research papers have so far been published about the retrospective study of poultry diseases in different parts of Bangladesh (Talha *et al.* 2001, Saleque *et al.* 2003, Islam *et al.* 2003, Uddin *et al.* 2010). However, for the proper veterinary care and successful disease control program, it is required to perform the retrospective study of different poultry diseases on regular basis. Therefore, the objective

of this study was to investigate the prevalence of diseases in different poultry species in the Gazipur district.

Materials and Methods

Study area: This study was carried out at the Department of Pathobiology of BSMRAU, Gazipur 1706. Two years and three months (From January 2018 to March 2020) were considered as a study period for data collection in this experiment.

A total of 560 diseased and dead poultry (279 layer, 194 broilers, 77 sonali and 10 ducks) were considered in this study. Dead and diseased chickens from the adjacent areas of this university such as Gazipur Sadar, Sreepur, Kapasia, Kaliakair, Kaliganj (Figure 1) were brought to the laboratory of Pathobiology department of BSMRAU for necropsy and examination of gross lesions in different organs to diagnose the diseases and disorders.

Collection of samples: A systemic dissection was made at necropsy and gross changes in different tissues were recorded. Some representative organs (comb, wattle, trachea, lungs, liver, brain, spleen, heart, kidney, caecal tonsils, intestine, proventriculus, gizzard, bursa of Fabricius, shanks and egg follicle) were collected following necropsy of both dead and diseased birds (Chauhan and Roy 2008).

Histopathological examination: Euthanasia was performed for the live diseased birds by intravenous

injection of barbiturates. For histopathological studies, all the collected samples were cut into small pieces and fixed in the 10% neutral buffered formalin (Gridley 1960). Then the fixed small pieces were dehydrated in a series of ascending grades of alcohol, cleared in several changes of xylene and infiltrated with different grades of melted paraffin in the oven at 56°C. These tissues were embedded in paraffin and finally, the sections were cut at 6-µm thickness using a rotatory microtome. Finally, the sections were stained with Hematoxylin and Eosin staining method (H&E) (Luna 1968).

Methods of diagnosis: The presumptive diagnoses of different diseases were performed based on the history of the flock, age of affected birds, clinical signs, postmortem lesions and histopathology as previously described (Calnek *et al.* 1997).

Statistical analysis: The obtained data from this experiment were entered in a Microsoft Excel worksheet, organized and processed for further analysis and The results were expressed in percentages.

Results and Discussion

The prevalence of bacterial and viral diseases in different types of poultry was 38.2% and 27.1%, respectively (Table 1). Moreover, 10.5% of cases had mixed infection and 21.6% of cases had other types of infection such as

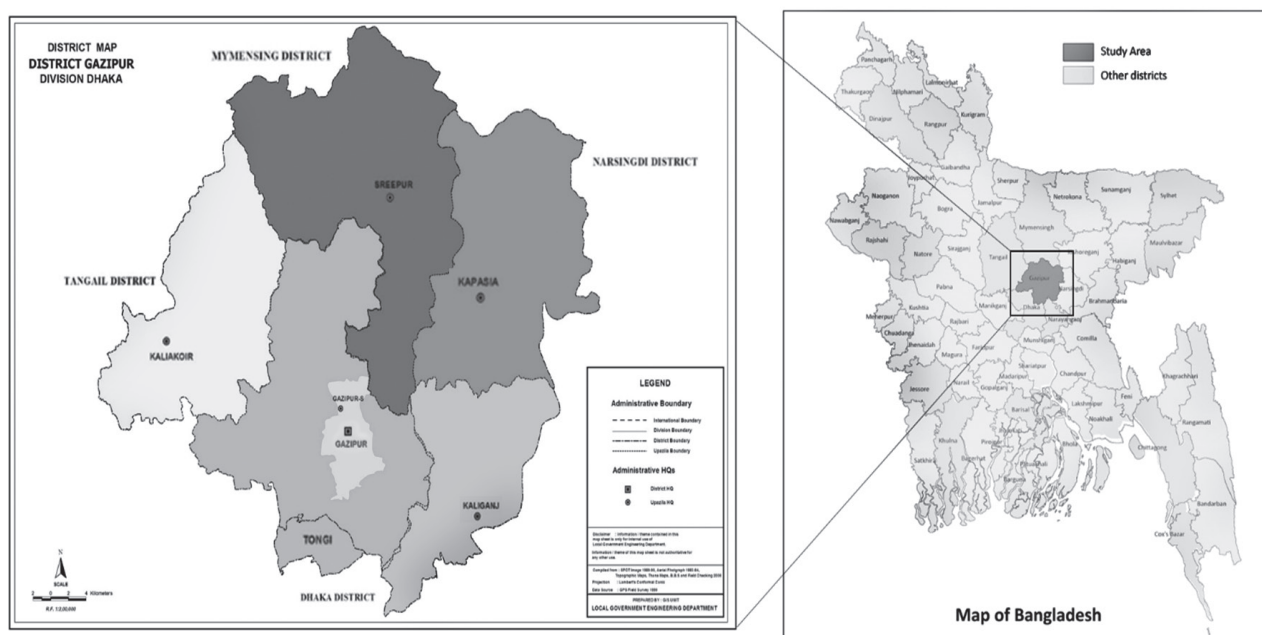


Figure 1. Study area map of Gazipur district of Bangladesh.

mycoplasmosis, aspergillosis, coccidiosis, deficiency disorder and internal parasitic problem (Table 1). Among different types of poultry, the highest prevalence of diseases (49.8%) was found in layer chicken (Table 2). The prevalence of diseases in broiler and sonali chicken were 34.6% and 13.8%, respectively (Table 2). Layer chickens are reared up to 85-90 weeks for egg production. Therefore, layer chickens have ample opportunities to be infected with many diseases. In Bangladesh, most of the sonali chickens are reared for meat purposes, not for egg production. They are reared for 60 to 75 days of age. They are well adapted to the country's environmental conditions. Broiler chickens also are reared for meat purposes for maximum 5- 6 weeks only.

In layer chicken, salmonellosis was found as most prevalent (21.5%) followed by colibacillosis (9.0%) and ND (9.0%) (Table 2). Also in broiler and sonali chicken, salmonellosis (20.6% and 20.8%) was the most prevalent disease followed by IBD (17.0% and 10.4%) and colibacillosis (11.9% and 11.7%) (Table 2). On the other hand, duck plague (40%) was found as the most prevalent

disease in duck (Table 2). However, 2.5% of cases were unidentified due to a lack of diagnostic facilities and autolysis of the chickens (Table 2).

Salmonellosis was the highest prevalent disease constituting 18.4% of all bacterial diseases (Table 1). The highest prevalence of salmonellosis was recorded in layer (21.5%) followed by sonali (20.8%) and broiler chicken (21.6%) (Table 2). These results correlate with the previous findings (Das *et al.* 2005, Saleque *et al.* 2003). The frequency of colibacillosis, fowl cholera and necrotic enteritis were 12.3%, 4.6% and 2.9%, respectively (Table 1 and 2). Prevalence of colibacillosis in different types of poultry was almost similar to the previous findings in Mymensingh (13.3% and 13.12%) (Das *et al.* 2005, Talha *et al.* 2001) and Gazipur (11.6%) (Saleque *et al.* 2003) region. However, these results are higher than that of the Sylhet region (5.17%) and the Narsingdi region (5.7%) (Islam *et al.* 2003; Uddin *et al.* 2010). In the previous reports, the prevalence of necrotic enteritis in chicken at Mymensingh, Sylhet and Narsingdi region was 0.45%, 0.44% and 0.4%, respectively (Das *et al.* 2005, Islam *et al.*

Table 1. Proportional prevalence of different poultry diseases in Gazipur district

Diseases	No. of cases	Percentage (%)	
Gumboro disease (IBD)	63	11.3	Viral diseases
Newcastle disease	40	7.1	
Pox	13	2.3	
Infectious bronchitis	18	3.2	
Infectious laryngotracheitis	14	2.5	
Duck plague	4	0.7	
Total	152	27.1	
Salmonellosis	116	20.7	Bacterial diseases
Colibacillosis	59	10.5	
Necrotic Enteritis	16	2.9	
Fowl Cholera	23	4.1	
Total	214	38.2	
IBD+Coccidiosis	10	1.8	Mixed infections
IBD+ND	17	3.0	
IBD+ND+Coccidiosis	04	0.7	
Salmonellosis+ Colibacillosis	28	5.0	
Total	59	10.5	
CRD/Mycoplasmosis	27	4.8	Miscellaneous infections
Coccidiosis	28	5.0	
Aspergillosis	24	4.3	
Deficiency disorder	30	5.4	
Internal parasitic problem	12	2.1	
Total	121	21.6	
Unidentified cases	14	2.5	

Table 2. Prevalence of diseases in different types of poultry in Gazipur district

Piseases	Layer chicken				Broiler	Sonali	Duck	Total
	Growers (0-8 Weeks)	Pullets (9-20 Weeks)	Layers (> 20 Weeks)	Total				
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
IBD	22 (23.2)	-	-	22 (7.9)	33 (17.0)	08 (10.4)	-	63 (11.3)
ND	04 (4.2)	07 (8.5)	14 (13.7)	25 (9.0)	12 (6.2)	03 (3.9)	-	40 (7.1)
IB	03 (3.2)	10 (12.2)	05 (4.9)	18 (6.5)	-	-	-	18 (3.2)
ILT	04 (4.2)	08 (9.8)	-	12 (4.3)	02 (1.0)	-	-	14 (2.5)
Pox	02 (2.1)	03 (3.7)	05 (4.9)	10 (3.6)	01 (0.5)	02 (2.6)	-	13 (2.3)
Duck plague	-	-	-	-	-	-	04 (40.0)	4 (0.7)
Salmonellosis	16 (16.8)	17 (20.7)	27 (26.5)	60 (21.5)	40 (20.6)	16 (20.8)	-	116 (20.7)
Colibacillosis	11 (11.6)	03 (3.7)	11 (10.8)	25 (9.0)	23 (11.9)	09 (11.7)	02 (20.0)	59 (10.5)
Fowl cholera	-	10 (12.2)	10 (9.8)	20 (7.2)	-	03 (3.9)	-	23 (4.1)
Necrotic Enteritis	-	02 (2.4)	08 (7.8)	10 (3.6)	04 (2.0)	02 (2.6)	-	16 (2.9)
Aspergillosis	04 (4.2)	-	-	04 (1.4)	14 (7.2)	06 (7.8)	-	24 (4.3)
CRD/Mycoplasmosis	06 (6.3)	03 (3.7)	03 (2.9)	12 (4.3)	10 (5.2)	03 (3.9)	02 (20.0)	27 (4.8)
Coccidiosis	06 (6.3)	04 (4.9)	-	10 (3.6)	12 (6.2)	06 (7.8)	-	28 (5.0)
IBD+Coccidiosis	02 (2.1)	-	-	02 (0.7)	06 (3.1)	02 (2.6)	-	10 (1.8)
IBD+ND	04 (4.2)	-	-	04 (1.4)	09 (4.6)	04 (5.2)	-	17 (3.0)
IBD+ND+Coccidiosis	-	-	-	00	03 (1.5)	01 (1.3)	-	4 (0.7)
Salmonellosis+ Colibacillosis	04 (4.2)	04 (4.9)	06 (5.9)	14 (5.0)	10 (5.2)	04 (5.2)	-	28 (5.0)
Deficiency disorder	03 (3.2)	05 (6.1)	04 (3.9)	12 (4.3)	11 (5.7)	06 (7.8)	01 (10.0)	30 (5.4)
Internal parasitic problem	-	05 (6.1)	07 (6.9)	12 (4.3)	-	-	-	12 (2.1)
Unidentified cases	04 (4.2)	01 (1.2)	02 (2.0)	07 (2.5)	04 (2.0)	02 (2.6)	01	14 (2.5)
Total	95 (34.1)	82 (29.4)	102 (36.6)	279 (49.8)	194 (34.6)	77 (13.8)	10(1.8)	560

2003, Uddin *et al.* 2010). The poor management system of the farm and weak biosecurity might contribute to the cause of the increase of bacterial diseases in this region.

Among the viral diseases, IBD was found as the most prevalent (11.3%) (Table 1). This result corresponded with the previously published report (Saleque *et al.* 2003). The frequency of ND, IB, ILT, pox and duck plague were 7.1%, 3.2%, 2.5%, 2.3% and 0.7%, respectively (Table 1 and 2). It has been reported that ND positive cases in chicken in the Mymensingh region were 6.73% and 10.24% (Islam *et al.* 2003, Talha *et al.* 2001). These results indicate that the high incidence of IBD and ND in commercial flocks is a severe problem for the rising poultry industry in Bangladesh despite the regular use of IBD and ND vaccines in commercial flocks. Further investigation is required to find out the cause of the

emergence of IBD and ND whether these diseases are occurred due to vaccination failure or any other factor.

The prevalence of mixed infections in different types of poultry were IBD+Coccidiosis (1.8%), IBD+ND (3.0%), IBD+ND+Coccidiosis (0.7%) and Salmonellosis+Colibacillosis (5.0%) (Table 1 and 2).

Along with bacterial and viral diseases, other diseases were observed in different types of poultry such as CRD/mycoplasmosis (4.8%), aspergillosis (4.3%), coccidiosis (5.0%), deficiency disorder (5.4%) and internal parasitic problem (2.1%) (Table 1 and 2). In the previous report, the prevalence of mycoplasmosis in chicken was 5.32% (Islam *et al.* 2003) which is similar to the present findings. However, these results are lower than the previously published report of the prevalence of mycoplasmosis in Gazipur (18.3%) (Saleque *et al.* 2003). In the present study,

4.3% of cases of aspergillosis in chickens were reported which is very close to the findings of previously published reports in chicken in the Gazipur and Mymensingh region (Saleque *et al.* 2003, Talha *et al.* 2001). In the present study, coccidiosis in different poultry constituted 5.0% of the total cases which corresponded with the previous results in chicken (Saleque *et al.* 2003, Talha *et al.* 2001).

Necropsy examination of dead chickens, caused by salmonellosis showed the enlarged and congested liver. In some cases, yellow or golden yellow color necrotic foci were present in the liver (Figure 2A). In some cases, fibrosis was observed in the lungs and catarrhal inflammation was found in the intestine. Unabsorbed yolk sacs were observed in some cases. Microscopically, the section of the liver showed severe congestion and focal necrosis with infiltration of mononuclear cells (Figure 2B). Congestion and hemorrhage were found within the lung tissue. Congestion, hemorrhages and infiltration of inflammatory cells were observed in the intestinal mucosa.

The chickens were weak, emaciated, lethargic, dehydrated and depressed with poor growth performance. Gross lesions included thickening of the air sacs with a cloudy appearance, congestion, fibrosis and caseous exudation on the respiratory surfaces. Catarrhal inflammation with sloughing off intestinal mucosa was observed in the intestine (Figure 2C). Microscopically, a section of the lungs showed infiltration of inflammatory cells, fibrinous exudation and pink colored fluid around the blood vessels. Congestion, hemorrhages and infiltration of inflammatory cells were observed in the intestinal mucosa (Figure 2D). In many instances sloughing of intestinal epithelia was found.

All the parameters used for diagnosis of salmonellosis and colibacillosis correlate with the findings of many authors (Pakpinyo *et al.* 2002, Haider *et al.* 2004).

Necropsy findings of dead chickens, caused by fowl cholera showed petechial hemorrhages on the base of the heart. Dark-colored liver and pinpoint white round numerous necrotic spots on the liver were observed. In some cases, enteritis was also found. These findings are similar to the previous reports (Calnek *et al.* 1997, Chauhan and Roy 2008).

Necropsy examination of dead chickens, caused by IBD showed bilateral hemorrhages on the thigh and pectoral muscles and severe mucus in the duodenum. Swollen and hemorrhagic bursa of Fabricius were observed (Figure 2E). Microscopically, severe hemorrhages were

observed on inter-muscular septa. Severe hemorrhages and moderate depletion of lymphoid follicular cells were found on the follicles of bursa (Figure 2F). The pathology observed in this study of IBD correlates with the previous reports (Calnek *et al.* 1997, Chauhan and Roy 2008, Talha *et al.* 2001, Rahman and Samad 2005).

Necropsy examination of a dead chicken, caused by ND showed dark red or purple-red color button like ulcer associated with necrosis in the intestinal wall. Hemorrhage under the cornified layer of gizzard (Figure 2G) and pinpoint hemorrhages on the tip of the glands of the proventriculus were observed. Severe inflammation of the trachea and air sacs were also noticed. The necropsy findings reported in this study of ND conform with the earlier reports in chicken (Talha *et al.* 2001, Rahman and Samad 2005). Microscopically, infiltration of mononuclear cells and hemorrhage in the gizzard were observed (Figure 2H). Congestion and huge infiltration of mononuclear cells were found in the proventriculus. These results are similar to the previous findings (Calnek *et al.* 1997, Chauhan and Roy 2008).

In case of ILT, necropsy findings of IB infected birds showed tracheitis, congested and fibrosed lungs, and nephritis. Egg production was dropped. Misshaped, deformed eggs and soft-shelled eggs were evident. Kidney lesions were characterized by swelling, enlarged and pale kidneys, frequently with urate deposits in the tubules. In some cases, the dilation of the oviduct was observed. Microscopically, hemorrhage and huge infiltration of inflammatory cells were found in the trachea and lungs. The main kidney lesions showed infiltration of a huge number of reactive cells, damage of tubular lining epithelium, distension of distal convoluted tubules and edema of Bowman's capsule. The gross and histopathological lesions observed in the lung, kidney and oviduct correlate with the previous findings (Chousalkar *et al.* 2007, Sun *et al.* 2011).

Necropsy examination of dead birds showed severe hemorrhage in the lungs and trachea with obstruction of the tracheal lumen by mucus, caseous exudates and blood. Congested and fibrosed lungs were observed. Microscopically, hemorrhage and huge infiltration of inflammatory cells were found in the trachea and lungs.

Necropsy examination of dead ducks, caused by duck plague showed petechial and ecchymotic hemorrhages on the heart, liver, proventriculus and other organs. Diphtheritic membranes were found in the oral cavity

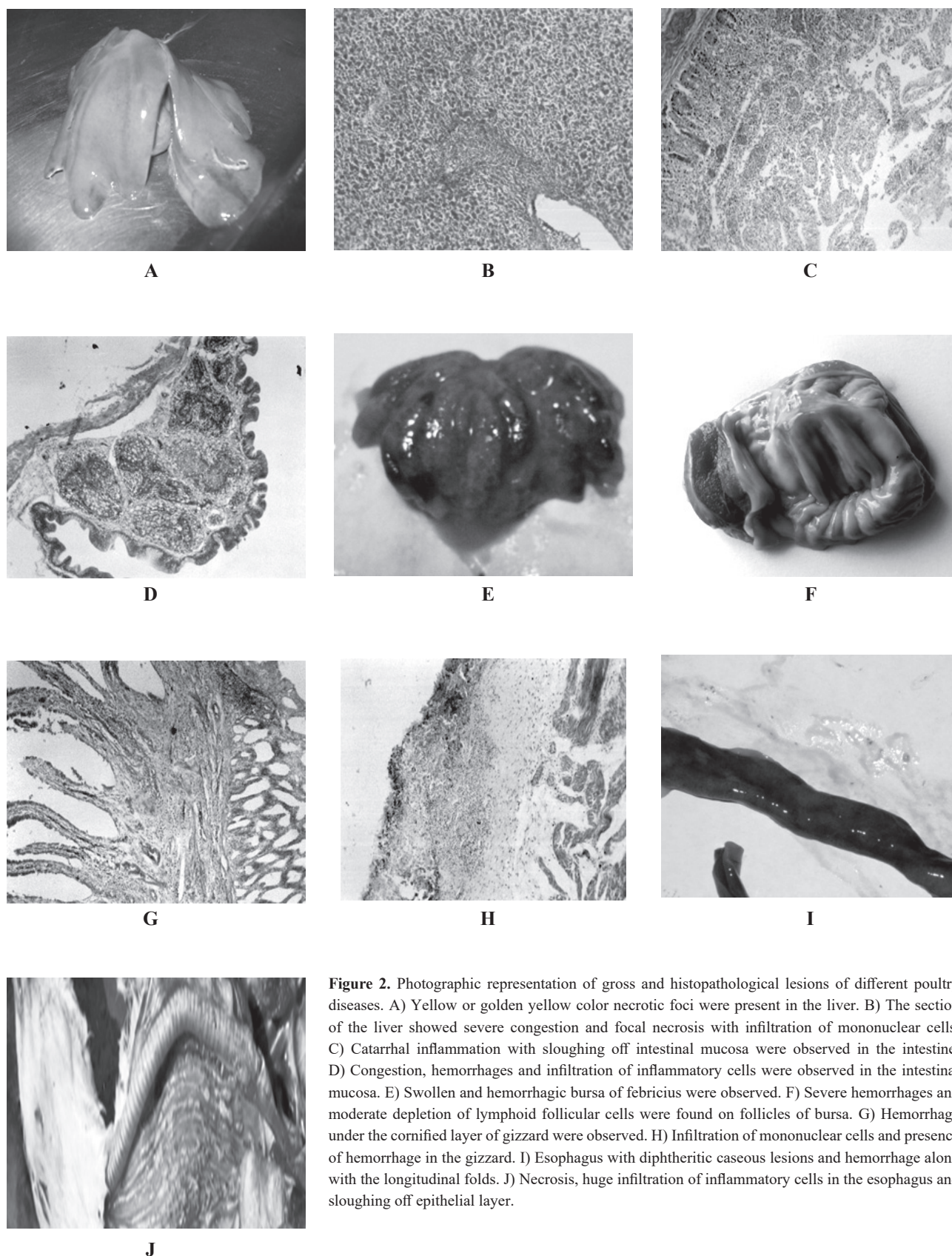


Figure 2. Photographic representation of gross and histopathological lesions of different poultry diseases. A) Yellow or golden yellow color necrotic foci were present in the liver. B) The section of the liver showed severe congestion and focal necrosis with infiltration of mononuclear cells. C) Catarrhal inflammation with sloughing off intestinal mucosa were observed in the intestine. D) Congestion, hemorrhages and infiltration of inflammatory cells were observed in the intestinal mucosa. E) Swollen and hemorrhagic bursa of febricitis were observed. F) Severe hemorrhages and moderate depletion of lymphoid follicular cells were found on follicles of bursa. G) Hemorrhage under the cornified layer of gizzard were observed. H) Infiltration of mononuclear cells and presence of hemorrhage in the gizzard. I) Esophagus with diphtheritic caseous lesions and hemorrhage along with the longitudinal folds. J) Necrosis, huge infiltration of inflammatory cells in the esophagus and sloughing off epithelial layer.

and esophagus (Figure 2I). The liver was enlarged and pale copper yellow in color. In some cases, hemorrhagic annular bands were observed in different portions of the intestines. Microscopically, eosinophilic intranuclear inclusions are observed in the bursa, spleen, esophagus and liver. Hemorrhage, necrosis and huge infiltration of inflammatory cells in the intestine were observed. Necrosis, huge infiltration of inflammatory cells in the esophagus and sloughing off epithelial layer were also found (Figure 2J).

Examination of diseased chicken caused by fowlpox showed typical skin lesions which included rough, gray or dark brown or necrotic nodular lesions on the lip, wattle, fingers and eyelid as previously reported (Calnek *et al.* 1997).

Grossly, the chickens and ducks were diagnosed with mycoplasmosis showed cloudy air sacs, fibrinous perihepatitis, fibrinous pericarditis and fibrinous pleuritis. Cheesy materials were observed in the air sacs. In some cases, tracheas were found congested. Microscopically, there were a fibrin layer and congestion in the liver. In some cases, fibrin layer, congestion, thickening of the pericardium and infiltration of the inflammatory cell were found in the heart. Congestion and accumulation of fibrin in lung parenchyma were observed. These necropsy findings and histopathological findings of mycoplasmosis corresponded with the previous reports (Calnek *et al.* 1997, Chauhan and Roy 2008).

In case of aspergillosis, white color nodules were observed in the lungs and air sacs. Clotted blood or cecal core was also found in the cecum in case of coccidiosis. The necropsy findings of aspergillosis and coccidiosis in chicken were very similar to the previous report (Calnek *et al.* 1997, Chauhan and Roy 2008).

Conclusion

Various diseases were recorded in different types of poultry farms (layer, broiler, sonali and duck) in Gazipur region of Bangladesh. All of the poultry were susceptible to bacterial, viral infection and parasitic infestation. Among them, salmonellosis, colibacillosis, IBD and ND were the most common diseases in the farm animals. The findings of this study may act as a foundation for the practitioners, veterinary doctors and researchers to

identify and diagnose diseases, and execute the best prevention and control program for these diseases.

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