EPIDEMIOLOGICAL INVESTIGATION OF *PASTEURELLA MULTOCIDA* INFECTION IN POULTRY IN GAZIPUR DISTRICT OF BANGLADESH

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ABSTRACT

The present study was undertaken to determine the present status of fowl cholera (FC) infection of poultry in Gazipur district during September 2016 to February 2017. A total of 282 either dead or sick birds (Layer and Sonali) were taken as sample in which the sick birds were subjected to record clinical data and consequently the dead birds were for post mortem examination. Hence, overall 12.41% prevalence was found for FC and about 87.59% was for mixed other diseases. All the birds were grouped into six named as A1, A2 and up to A6 accordingly their age. The highest incidence (29.79 %) was found in A1 (8-20weeks) group and the lowest was 4.26% in A5 (51-60 weeks) group. Furthermore, six FC infected farms were categorized to treat with six specific antibiotics individually. Thereafter, the highest recovery rate (89.6% and 87.5%) was recorded in two farms using Enrofloxacin and Gentamicin particularly. The lowest recovery rate (60%) was in Erythromycin treatment group. However, the layer birds of six farms lost their body weight almost 11.84%, specifically the highest percentages (16.49%) was in treated with Ampicillin and lowest percentages (5.79%) found in a farm treated with Gentamicin. In brief, FC commonly appears just near to laying age and therapeutic management trivially decreases the body weight that ultimately shoots up the production cost.

Keywords: Epidemiology, *Pasteurella multocida,* poultry, Gazipur

INTRODUCTION

Fowl cholera (FC) is considered to be one of the most contagious and economically important bacterial diseases of poultry particularly chicken, turkeys, ducks and geese caused by *Pasteurella multocida* and remains an important havoc for the poultry production in Bangladesh (Rimler and Glisson, 1997; Singh *et al.*, 2014). It occurs all over the Bangladesh mostly in fall winter and late summer with 25% to 35% mortality in chickens and ducks (Ievy *et al.*, 2013). The laying flocks are mostly affected as compared to younger chickens (Choudhury *et al.*, 1985).

Pasteurella multocida is one of the members of Pasteurellaceae family which is coccobacillary in shape having capsule (Akhtar, 2013; Ievy *et al.*, 2013). In addition, its capsule carries different types of polysaccharides for which it is grouped into A, B, D, E and F. Afterwards, it is further classified into 16 serotypes (1 to 16) primarily based on lipopolysaccharide antigens among them only two or three are present in Bangladesh (Choudhury *et al.* 1985; Kwaga *et al.*2013). However, *Pasteurella multocida* inhabits as commensal of the respiratory tract of many avian species and produces disease when the birds are under stress (Harper *et al.*, 2006). Subsequently it is extensively involved in respiratory syndrome of commercial layers all over the world particularly in countries having hot humid environment. Fowl cholera is characterized by nasal discharge, facial edema, blackening of comb and wattles, ataxia, back ward retraction of head, rise in temperature, off feed and water, dull, depressed with high morbidity (up to 50%) (Shah *et al*., 2008). This study was performed to determine the prevalence of FC in layer and Sonali in certain Gazipur district with the effect of antibiotics therapy.

MATERIALS AND METHODS

This study was conducted at Gazipur district to determine the FC infection during the period from September 2016 to February 2017. A total of 282 either dead or sick birds were subjected as sample which was from various poultry farms in different area of Gazipur district. The FC was diagnosed according to the history of the flock, age of affected birds, clinical signs and lastly post mortem lesions. All the bird's samples were grouped into 6 according to age which are named as A1 (8-20weeks), A2 (21-30

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weeks), A3 (31-40 weeks), A4 (41-50 weeks), A5 (51-60 weeks), A6 (≥61weeks). Besides this, a total of 9350 birds of six layer farms were under close observation and the farms were named as F1, F2, F3, F4, F5 and F6. All the instruments were sterilized before postmortem examination. Separate set of instruments were used for each case. Normal saline solution (0.9% NaCl) was used for cleaning tissues/organs. 10% neutral buffered formalin (4% formaldehyde) and 70% alcohol were used for wetting and disinfecting the feathers and skin.

The birds were observed to detect clinical signs by usual inspection. All of the sick birds were examined closely by using different methods such as palpation, auscultation, percussion, needle puncture and locomotion of the birds to observe the signs. The weight of each experimental bird was measured regularly. Besides this, body temperature, pulse and respiratory rate of sick birds were also recorded. The clinical data was collected on a preformed questionnaire by close method from the farmers and person who are exclusively related with the affected flock. Each owner was asked about previous vaccination history of his/her birds suffering from FC.

The postmortem examination was performed as early as possible and not exceed to 12 hours after death Samad (2000). Most of the postmortem examinations were performed at morning hours, so there was little chance to exceed the time limit that is 12 hours. Gross pathological changes were recorded carefully with a specific consideration to define cases.

Descriptive analysis was done to express the results in percentage. Data were structured in the Microsoft® Excel spreadsheet and the percentages of disease conditions prevalent in different groups and seasons were intended.

RESULTS AND DISCUSSION

In this study, a total of 282 birds were examined among which 35 birds (Table 1) were detected as FC infection. The common clinical signs were nasal and ocular discharge, darkened head and combs, greenish watery diarrhoea, ruffled feathers, increased respiratory rate, swollen wattles, high temperatures and lameness which agreed with the findings of Khan *et al.* (1997) and Rahman *et al.* (2004).

Table 1. Prevalence of Fowl cholera in different birds at Upazilla Veterinary Hospital, Gazipur Sadar, Gazipur

Bird Type	Total Birds	Diseased Bird No.	Other diseases
Layer	202	26 (12.87%)	176 (87.13%)
Sonali	80	9 (11.25%)	67 (89.34%)
Total	282	35 (12.41%)	247 (87.59%)

In this study, the prevalence was a little bit different from the value reported in the earlier studies. The overall prevalence of Fowl cholera was 12.41% in Gazipur Sadar. Though disease prevalence of Sonali were found 11.25% and more was (12.87%) in layer, Belal (2013); Hasan *et al.* (2010) and Hossain *et al.* (2013) reported that the overall prevalence of FC was 11.42% in Gazipur and Sirajgonj districts. Besides, Hasan *et al.* (2010) found 12.05% prevalence in layer and 4.25% in broiler chicken in Mymensingh and Gazipur districts which were very much close to our study, whereas Hossain *et al.* (2013) found 13.04% prevalence in in Mymensingh district in chicken and Belal (2013) found 59.72% in backyard poultry in Sirajgonj district. In our study area, about 87.59% was mixed with other diseases which were mainly coli-enteritis, Newcastle disease, infectious coryza, coccidiosis and egg displacement etc.

Table 2. Incidence of fowl cholera in different aged bird groups at Gazipur sadar

Age Group	Suspected Birds	Diseased Birds	Percentages Affected
A1	47	14	29.79
A2	47	8	17.03
A3	47	5	10.64
A4	47	3	6.38
A5	47	2	4.26
A6	47	3	6.38
Total	282	35	12.41

This study indicated that A1 age group was the highest (29.79 %) and A5 was the lowest susceptible (4.26%) age group (Table 2) whereas A2 was recorded as the 2nd highest susceptible (17.03%) age group. Mbuthia *et al.* (2008) stated that 12-week-old family chickens were more susceptible. Moreover, Rimler and Glisson (1997) and Christiansen *et al.* **(**1992) reported that the infected birds remain carriers up to 9 weeks after infection which can affect birds of any age rarely less than 8 weeks of age. The prevalence of FC infection is due to improper vaccination and through interaction with those domestic birds not vaccinated for this disease.

The postmortem findings were found as cloudy air sacs, petechial hemorrhages on serosal membranes, focal necrosis on liver (Figure 1) with viscous fluid in proventriculus and intestine. There was fragile liver (Figure 2), enlarged spleen (Figure 3), congested lungs (Figure 5) and often yolk peritonitis (Figure 4.) also found. All the postmortem findings were similar to Mehmood *et al.* (2016) and Shivachandra *et al.* (2004).

Table 3. Effective antibiotics against fowl cholera

Antibiotics	Farm	Population size	Duration of treatment	Affected birds	Recovered birds	Average recovery day
Erythromycin	F1	1000	5 days	50	30(60%)	5-7
Gentamicin	F2	1200	5 days	80	70(87.5%)	5-7
Oxytetracycline	F3	1500	5 days	40	32(80%)	5-7
Doxycycline	F4	2000	5 days	75	50((71%)	5-7
Enrofloxacin	F5	1450	5 days	48	43(89.6%)	5-7
Ampicillin	F6	2200	5 days	80	50(62%)	5-7

After postmortem examination and clinical inspection, it was detected that a total of 373 birds were suffering from Fowl Cholera infection in the respective farm (Table 3). The farms were categorized into six and in which six specific antibiotics were used separately. Thereafter, the findings revealed that F5 and F2 groups had highest recovery rate (89.6% and 87.5%) which was treated with Enrofloxacin and Gentamycin respectively. These findings are closely associated with the report of Shivachandra *et al.* (2004) found 71.54% sensitivity to enrofloxacin and Hassan *et al.* (2017) found 100% sensitivity to Enrofloxacin and Gentamicin in water fowl. However, the lowest recovery rate was 60% in F1 group which was treated with Erythromycin.

Table 4. Application of antibiotics and body weight (BW) gain

Antibiotics	Farm	No. of Birds	Age (Weeks)	Average BW prior to infection(gm)	Average BW after treatment(gm)	Average BW loss (gm)	BW loss (%)
Erythromycin	F1	1000	22	1824	1620	204	11.18
Gentamicin	F2	1200	25	1727	1627	100	5.79
Oxytetracycline	F3	1500	30	1834	1595	239	13.03
Doxycycline	F4	2000	35	1789	1553	236	13.19
Enrofloxacin	F5	1450	30	1786	1590	196	10.97
Ampicillin	F6	2200	37	1843	1539	304	16.49
	Total			10803	9524	1279	11.84

Table 4 showed that the layer birds of six farms lost their body weight almost 11.84% due to Fowl cholera. The highest percentages (16.49%) of body weight loss were found in F6 farm which was treated with Ampicillin and the lowest percentages (5.79%) of body weight loss occurred in F2 which was treated with Gentamicin. Choudhury *et al.* (1985) reported that about 10-30% production reduced with losses of body weight of Layer birds associated with FC which is compatible with the present study.

Fowl cholera is also a threat for poultry industry especially small scale farming in Bangladesh. It commonly appears just near to laying age and ultimately declines the body weight. However, this study will help to make a conception about the prevalence and effective treatment with specific antibiotics against FC. It's true that this is very preliminary work and in future this would require the isolation and molecular characterization with antibiogram study of avian type *Pasteurella multocida* with large sample size.

Figure 1. Necrotic foci on liver

Figure 2. Fragile liver

Figure 3. Enlargement of spleen
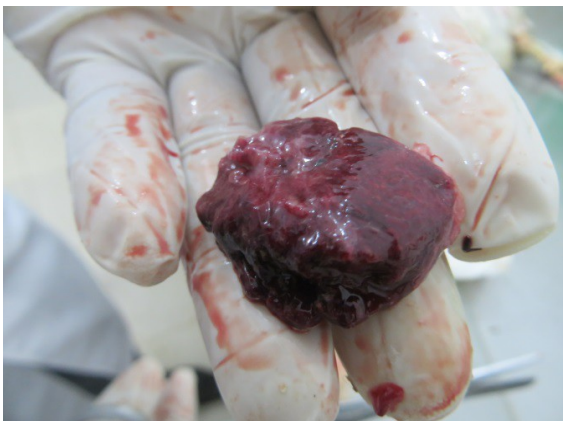

Figure 4. Unabsorbed yolk sac

Figure 5. Congested lung

Figure 6. Greenish color feces

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