Vol. 13(29), pp. 632-639, November, 2019
DOI: 10.5897/AJMR2019.9213
Article Number: 48DBA5C62220
ISSN: 1996-0808

http://www.academicjournals.org/AJMR

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African Journal of Microbiology Research

Full Length Research Paper

Passive surveillance of clinical poultry diseases in an Upazila Government Veterinary Hospital of Bangladesh

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Received 23 September, 2019; Accepted 15 October, 2019.

The present study is aimed at investigating clinical poultry diseases in an Upazila Government Veterinary Hospital of Bangladesh through passive surveillance and to know the frequency distribution of antimicrobial drugs prescription pattern. The study was conducted in Ramu Upazila Government Veterinary Hospital under Cox's Bazar district of Bangladesh from February to March, 2016. A total of 180 cases including 73 broiler, 84 layer, 18 duck and 5 pigeon were included in this study. Diseases were diagnosed based on clinical history, clinical signs, post mortem lesions and rapid kit test. The most prevalent diseases were Newcastle disease (ND) 17.8% (95% CI 12-24%), colibacillosis 11.5% (95% CI 6-17%), infectious bursal disease (IBD) 10.8% (95% CI 6-16%) and aspergillosis 9.6% (95% CI 5-14%) in broiler and layer chickens; duck plague 69.6% (95% CI 49-90%) in duck and pigeon pox 13% (95% CI 0.2-24%) in pigeon. Regarding production type, the prevalence of colibacillosis, IBD and aspergillosis was significantly higher in broiler chickens (17.8, 19.2 and 16.4%) when compared with layer chickens (6.0, 3.6 and 3.6%) ($p<0.05$). On the contrary, ND and avian influenza (AI) were significantly greater in layer (27.4 and 10.7%) than broiler chickens (6.8 and 1.4%). Within age group, aspergillosis and omphalitis were higher at 1 to 10 days age groups while IBD and ND were greater in older age groups. In layer chickens, the prevalence of ND, AI, salmonellosis and fowl cholera were recorded higher in number between the ages of 9 and 83 weeks. Among the antibiotic drugs, ciprofloxacin (46.7%), colistin (42.2%), trimethoprim and sulphur drug (37.8%) were mostly prescribed to treat the diseases. Poor biosecurity practices and lack of appropriate laboratory diagnostic facilities are associated with these disease distributions in the study area. Strict biosecurity and continuous surveillance program can minimize the disease prevalence.

Key words: Poultry diseases, veterinary hospital, antimicrobial drugs, Bangladesh, surveillance.

INTRODUCTION

Nowadays, poultry sub-sector is playing a significant role in the national economic growth and employment generation in Bangladesh (Hamid et al., 2017). According to United States Department of Agriculture (USDA), around one million entrepreneur and eight million people are directly or indirectly involved in this sector. In the last

few decades, the poultry industry has been the fastest fostering livestock sub-sector in Bangladesh with a 20% annual growth rate (Islam et al., 2014). Poultry rearing in Bangladesh started in the 80s with backyard poultry farming (Begum, 2005). However, progress mainly happened in the 90s when a lot of private farms invested in this industry and started producing day-old chicks (DLS, 2016). This sector plays a great role in the nutrition sector of Bangladesh and is reported to contribute 37% of the total meat supply and also meet 22 to 27% of total human protein demand (Hamid et al., 2017). In Bangladesh, there are 8 grandparent stock breeder farm, 82 parent stock breeder farm and hatchery, 53112 commercial broiler farm, 18222 commercial layer farm and 6554 commercial duck farm (DLS, 2013; Hamid et al., 2017). According to DLS (2018), in Bangladesh, out of 337.99 million poultry population, 282.21 million are chickens and 55.85 million are duck population.

Despite the rapid growth of the poultry industry in Bangladesh, several factors reduce the growth rate and cause mortality in chickens (Badruzzaman et al., 2015). Among such factors, poultry disease is one of the major constraints that hinder the productivity and decline the economic improvement of poultry farmer (Islam et al., 2016). It is noted that about 30% of total chickens in Bangladesh die due to several disease outbreak (Badruzzaman et al., 2015). Poultry diseases thrive due to several factors such as climate, geographical position, farm hygiene, biosecurity, immunity status, chick quality, hatcheries, and management practices (Abbas et al., 2015; Badruzzaman et al., 2015; Chakma, 2015; Hassan et al., 2016). Along with species of chickens, production type, age and sex play significant role in disease prevalence (Yunus et al., 2009; Rashid et al., 2013; Talukder et al., 2017; Rahman et al., 2019).

Diseases such as Newcastle disease (ND), infectious bursal disease (IBD), colibacillosis, aspergillosis, avian influenza (AI), coccidiosis, infectious bronchitis, fowl cholera, salmonellosis, mycoplasmosis, chronic respiratory diseases, necrotic enteritis in broiler and layer (Choudhary et al., 2012; Islam et al., 2014, 2016; Badruzzaman et al., 2015; Hassan et al., 2016; Matin et al., 2017; Rahman et al., 2017, 2019), duck viral hepatitis, duck plague in duck (Hossain et al., 2005; Hoque et al., 2006, 2010; Ahamed et al., 2015; Khan et al., 2018) and pigeon fox (Paul et al., 2015; Munmun et al., 2016; Elina et al., 2017) have been reported in Bangladesh. These poultry diseases have also been recorded in other countries like India, Nigeria, China and Pakistan (Balami et al., 2014; Abbas et al., 2015; Borah et al., 2017; Ghosh et al., 2017; Xi et al., 2017).

In Bangladesh, antibiotics in poultry farms are frequently prescribed for prophylactic and therapeutic purpose (Islam et al., 2014). Due to frequent uses, pathogens have become resistant to most antibiotics. These resistant bacteria can easily be transmitted to humans through food chain and pose a serious human health risk (Parvez et al., 2016; Islam et al., 2018). The present study aimed to investigate clinical poultry diseases through passive surveillance in an Upazila Government Veterinary Hospital of Bangladesh, and to know the frequency distribution of antimicrobial drugs prescription pattern.

MATERIALS AND METHODS

Study area

The study was carried out in Ramu Upzilla Government Veterinary Hospital (RUGVH), Cox's Bazar, Bangladesh from February to March 2016. This area is well known for the poultry sector and the numbers of broiler and layer poultry farms are quite high. Apart from that, people in this area also rear other poultry species such as pigeon, duck, myna and deshi chicken. So, farmers from different broiler and layer farms and also household's people around Ramu Upazila brought their dead or sick birds for the diagnosis and treatment in RUGVH. Ramu Upazila consists of 11 different union from where poultry cases are originated.

Sample size

A total of 180 poultry cases were reported in RUGVH, among which 73 were from broiler, 84 from layer, 18 from duck and 5 from the pigeon.

Examination procedure

In RUGVH, there was a designated area where clinical examination and postmortem of sick and dead birds were carried out. Postmortem examination was performed based on the standard procedure and protocol described in the Atlas of Avian Necropsy (Majó and Dolz, 2011). During postmortem, personal protection was ensured to prevent contamination. The birds were examined systematically and gross pathological lesions were observed and recorded carefully. As there was no laboratory support available, the final diagnosis of all bacterial, viral and fungal diseases was done based on clinical history, clinical signs, and postmortem lesions as mentioned in the Manual of Poultry Diseases (Brugere-Picoux et al., 2015). Rapid test was performed for the diagnosis of *Salmonella* (Serotext®SP, S & A Reagents Lab Ltd., Part Thailand) and Avian Influenza detection (AIV Ag Test Kit, BioNote Inc., Korea) as these two kits were available in hospital. Few samples were preserved and taken to the microbiology laboratory of Chattogram Veterinary and Animal Sciences University (CVASU) for isolation of pathogens and antibiotic sensitivity testing. After performing postmortem, the necropsied birds were thrown into the dumping pit immediately.

Data collection

During the study period, a structured questionnaire was developed

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Table 1. Frequency and distribution of different poultry diseases obtained from RUGVH.

Disease	Frequency	Percent	95% CI
Newcastle disease	28	17.8	12-24
Colibacillosis	18	11.5	6-17
Infectious bursal disease	17	10.8	6-16
Aspergillosis	15	9.6	5-14
Avian influenza	10	6.4	3-10
Salmonellosis	10	6.4	3-10
Coccidiosis	8	5.1	2-9
Mycoplasmosis	7	4.5	1-8
Chronic respiratory disease	7	4.5	2-9
Fowl cholera	6	3.8	1-7
Necrotic enteritis	5	3.2	0-5
Omphalitis	5	3.2	0-5
Infectious coryza	4	2.5	0-5
Fowl pox	3	1.9	0-4
Infectious bronchitis	2	1.3	0-3
Visceral gout	3	1.9	0-3
Ascites	2	1.3	0-3
Toxicity	2	1.3	0-3
Femoral head necrosis	2	1.3	0-3
Cannibalism	3	1.9	0-4
Other poultry disease (n=23)			
Duck Plague	16	69.6	49-90
Duck Viral Hepatitis	2	8.7	0.4-21
Pigeon Pox	3	13	0.2-24
Pigeon Newcastle disease	2	8.7	0.4-21

for the purpose of the study. Information collected include type of birds, number of birds, farm size, age, sex, history of vaccination, rearing system, clinical history, morbidity and mortality, postmortem lesions, a drug used previously, tentative diagnosis and drug prescribed. Before and during each postmortem, farmers were asked for the aforementioned questions and recorded carefully.

Statistical analysis

Data was incorporated into Microsoft excel 2010 (MS-10) and imported into Statistical Package for the Social Sciences (SPSS) software (IBM SPSS-25.0, USA) for further analysis. Descriptive analysis was carried out to calculate the prevalence according to different variable such as diseases, species, type, age and drug users. The results were presented as percentages with 95% confident interval. Pearson's Chi-square and Fisher's exact test were performed to evaluate the significant relationship between clinical poultry diseases with different variables. The probability (P) value of less than 0.05 was considered a significant relationship.

RESULTS

Overall prevalence of clinical poultry diseases

The overall prevalence of different poultry diseases are shown in Table 1. Among the diagnosed diseases in broiler and layer, Newcastle disease (ND) was higher (17.8%) followed by colibacillosis 11.5%, infectious bursal disease (IBD) 10.8%, aspergillosis 9.6%, avian influenza (AI) 6.4%, salmonellosis 6.4% and coccidiosis 5.15%, respectively. Other clinical diseases such as fowl cholera 3.8%, necrotic enteritis 3.2%, omphalitis 3.2%, infectious coryza (IC) 2.5%, fowl pox 1.9%, and infectious bronchitis (IB) 1.3% were found in small number of birds. Duck plague was more frequent in duck 69.6% than duck viral hepatitis 8.7%. Between two observed pigeon diseases, pigeon pox has a higher prevalent of 13% when compared with ND 8.7%.

Prevalence of clinical poultry diseases according to production type

The prevalence of colibacillosis, infectious bursal disease and aspergillosis were significantly ($p<0.05$) higher in broiler chickens (17.8, 19.2, and 16.4%) when compared with layer chickens (6.0, 3.6, and 3.6%) (Table 2). The prevalence of Newcastle disease and avian influenza in layer chickens was significantly ($p<0.05$) greater in

Table 2. Prevalence of clinical poultry disease based on production type.

Disease	Broiler (n=73)	Layer (n=84)	P value
Newcastle disease	5 (6.8)	23 (27.4)	0.001
Colibacillosis	13 (17.8)	5 (6.0)	0.020
Infectious bursal disease	14 (19.2)	3 (3.6)	0.002
Aspergillosis	12 (16.4)	3 (3.6)	0.006
Avian influenza	1 (1.4)	9 (10.7)	0.017
Salmonellosis	-	10 (11.9)	-
Coccidiosis	3 (4.1)	5 (6.0)	0.600
Mycoplasmosis	4 (5.5)	3 (3.6)	0.563
Chronic respiratory disease	7 (9.6)	1 (1.2)	0.017
Fowl cholera	-	6 (7.1)	-
Necrotic enteritis	1 (1.4)	4 (4.8)	0.227
Omphalitis	4 (5.5)	-	-
Infectious coryza	1 (1.4)	3 (3.6)	0.383
Fowl pox	-	3 (3.6)	-
Infectious bronchitis	-	2 (2.4)	-
Visceral gout	3 (4.1)	-	-
Ascites	2 (2.7)	-	-
Toxicity	1 (1.4)	1 (1.2)	0.920
Femoral head necrosis	2 (2.7)	-	-
Cannibalism	-	3 (3.6)	-

percentages (27.4 and 10.7%, respectively) than broiler chickens (6.8 and 1.4%, respectively). No significant difference ($p>0.05$) was observed for coccidiosis, mycoplasmosis, necrotic enteritis and infectious coryza in both broiler (4.1, 5.5, 1.4, and 1.4%) and layer chickens (6.0, 3.6, 4.8, and 3.6%). Omphalitis (5.5%), visceral gout (4.1%), ascites (2.7%), and femoral head necrosis (2.7%) were observed in broiler chickens. On the other hand, salmonellosis (11.9%), fowl cholera (7.1%), fowl pox (3.6%), infectious bronchitis (2.4%), and cannibalism (3.6%) were recorded in layer chickens.

Prevalence of clinical poultry diseases according to age groups

Among the observed diseases in the broiler, aspergillosis and omphalitis were higher at 1 to 10 days age groups (42.1 and 21.1%). Newcastle disease, infectious bursal disease, and chronic respiratory disease were higher between the ages of 11 and 20 days (8, 36, and 16%). Prevalence of colibacillosis and mycoplasmosis was greater at later age groups (20.7 and 10.3%) than earlier age (10.5 and 5.3%). Diseases such as avian influenza, necrotic enteritis, infectious coryza, visceral gout, ascites, and femoral head necrosis were prevalent between the ages of 2 and 35 days (Table 3).

In layer chickens, avian influenza, salmonellosis and fowl cholera varied significantly based on age groups and their prevalence was higher (20, 22.5, and 19.2%, respectively) between the ages of 9 and 83 weeks. Among the three age groups, ND was more prevalent between the ages of 20 and 83 weeks of age groups (32.5%) than the other two age groups (16.7 and 26.9%). Most of the diseases in layer chickens such as necrotic enteritis, infectious coryza, fowl pox, infectious bronchitis, toxicity, and cannibalism were recorded between the ages of 57 and 581 days, respectively (Table 4).

Frequency of antibiotic used in poultry diseases

Some of the antibiotics that were frequently prescribed in the treatment of the various poultry diseases are ciprofloxacin (46.7%), colistin (42.2%), trimethoprim and sulphur drug (37.8%), metronidazole (36.1%), erythromycin (28.9%), spiramycin (26.7%), enrofloxacin (25.6%), sulfadiazine (17.8%), linofloxacin (13.9%), tylosin tartrate (12.2%) and neomycin (11.1%), respectively (Table 5).

DISCUSSION

The current findings of poultry disease support previous studies conducted in Bangladesh (Uddin et al., 2010; Badruzzaman et al., 2015; Hassan et al., 2016; Rahman et al., 2017, 2019) and other countries like Nigeria and Pakistan (Balami et al., 2014; Abbas et al., 2015).

The prevalence of colibacillosis, IBD and aspergillosis

Table 3. Prevalence of clinical diseases in broiler based on age category.

Disease	1-10 (n=19)	11-20 (n=25)	21-35 (n=29)	P value
Newcastle disease	1 (5.3)	2 (8.0)	2 (6.9)	0.939
Colibacillosis	2 (10.5)	5 (20)	6 (20.7)	0.627
Infectious bursal disease	-	9 (36)	5 (17.2)	0.010
Aspergillosis	8 (42.1)	4 (16)	-	0.001
Avian influenza	-	-	1 (3.4)	-
Salmonellosis	-	-	-	-
Coccidiosis	-	1 (4)	2 (6.9)	0.500
Mycoplasmosis	1 (5.3)	-	3 (10.3)	0.250
Chronic respiratory disease	3 (15.8)	4 (16)	-	0.078
Fowl cholera	-	-	-	-
Necrotic enteritis	-	-	1 (3.4)	-
Omphalitis	4 (21.1)	-	-	-
Infectious coryza	-	-	1 (3.4)	-
Fowl pox	-	-	-	-
Infectious bronchitis	-	-	-	-
Visceral gout	-	-	3 (10.3)	-
Ascites	-	-	2 (6.9)	
Toxicity	-	-	1 (3.4)	-
Femoral head necrosis	-	-	2 (6.9)	-
Cannibalism	-	-	-	-

Table 4. Prevalence of clinical diseases in layer based on age category.

Disease	1-56 (n=18)	57-140 (n=26)	141-581 (n=40)	P value
Newcastle disease	3 (16.7)	7 (26.9)	13 (32.5)	0.456
Colibacillosis	2 (11.1)	2 (7.7)	1 (2.5)	0.397
Infectious bursal disease	3 (16.7)	-	-	-
Aspergillosis	3 (16.7)	-	-	-
Avian influenza	-	1 (3.8)	8 (20)	0.029
Salmonellosis	-	1 (3.8)	9 (22.5)	0.016
Coccidiosis	5 (27.8)	-	-	-
Mycoplasmosis	-	-	3 (7.5)	-
Chronic respiratory disease	1 (5.6)	-	-	-
Fowl cholera	1 (5.6)	5 (19.2)	-	0.012
Necrotic enteritis	-	3 (11.5)	1 (2.5)	0.136
Omphalitis	-	-	-	-
Infectious coryza	-	2 (7.7)	1 (2.5)	-
Fowl pox	-	1 (3.8)	2 (5.0)	0.636
Infectious bronchitis	-	2 (7.7)	-	-
Visceral gout	-	-	-	-
Ascites	-	-	-	-
Toxicity	-	1 (3.8)	-	0.323
Femoral head necrosis	-	-	-	-
Cannibalism	-	1 (3.8)	2 (5.0)	0.635

was found significantly higher in broiler chickens than the layer in the present study. Similar findings were observed in earlier studies such as Rahman et al. (2017) who observed increased prevalence of colibacillosis and IBD in the broiler (33.4 and 15.3%, respectively) than the layer chickens (15.9 and 8.4%, respectively) in Gazipur

Table 5. Frequency of antibiotic used in poultry cases.

Name of the antibiotic	Frequency	Percentage
Ciprofloxacin	84	46.7
Colistin	76	42.2
Trimethoprim and sulphur drug	68	37.8
Metronidazole	65	36.1
Erythromycin	52	28.9
Spiramycin	48	26.7
Enrofloxacin	46	25.6
Sulpudiazine	32	17.8
Linofloxacin	25	13.9
Tylosin tertrate	22	12.2
Neomycin	20	11.1
Doxycycline	17	9.4
Oxytetracyline	11	6.1
Streptomycin	8	4.4
Sulphequinoxaline	5	2.8
Chlortetracycline	3	1.7
Amoxicillin	2	1.1

district of Bangladesh. This finding is also in agreement with several other published studies conducted in Bangladesh and India (Uddin et al., 2010; Choudhary et al., 2012; Hassan et al., 2016; Borah et al., 2017). The difference in disease prevalence between broiler and layer may be due to poor biosecurity management, vaccination failure, improper use of the vaccine, low vaccination success rate, education level of farmers, subclinical disease prevalence and geographical location (Hamid et al., 2017; Rimi et al., 2017; Rahman et al., 2019).

In the present investigation, Newcastle disease was found in both broiler and layer chickens but the prevalence was significantly higher in layer chickens. The present findings correlate with several other previous findings (Geresu et al., 2016; Islam et al., 2016; Rahman et al., 2017; Das et al., 2018). There are several factors that may influence the greater prevalence of ND in layer chickens such as long term production period, types of breed and strain, failure to maintain bio-security for longer period of time, vaccine use, vaccine failure due to stressful condition and sometimes subclinical state of disease (Sarker et al., 2012; Munmun et al., 2016).

Colibacillosis was significantly higher in broiler chickens compared to layer chickens. This finding is in agreement with the previous study such as Rahman et al. (2017) who recorded 33.4% colibacillosis in broiler chickens than 15.9% in layer chickens of Gazipur district of Bangladesh. Colibacillosis was also recorded in different poultry farms in Bangladesh and other countries (Balami et al., 2014; Islam et al., 2014; Hassan et al., 2016; Matin et al., 2017). To improve the situation, biosecurity and hygiene measures should be followed strictly.

The prevalence of IBD was significantly higher in broiler chickens which agreed with several previous findings (Islam et al., 2016; Das et al., 2018). The prevalence was higher between the age of 11 and 35 days which is congruent with the earlier published research articles (Chakma, 2015; Islam et al., 2016; Hassan et al., 2016; Rahman et al., 2019). Initial 2 weeks of ages, chicks get maternally derived antibody from mother, after that proper vaccination should be ensured to protect from IBD (Rashid et al., 2013).

Aspergillosis was found mostly in the early stage of birdlife (1-10) days. Similar findings were also noted in other studies (Badruzzaman et al., 2015; Rahman et al., 2019). The prevalence of aspergillosis higher in earlier age may be due to inhalation of spore from litter, contaminated hatching incubator, higher moisture containing litter and sawdust litter (Sultana et al., 2015). Avian influenza is endemic in Bangladesh causes huge economic losses in the poultry sub-sector through reduced egg production and high mortality (Xia et al., 2017). The strain H5N1 causes high mortality in birds and poses a serious health risk to the human population (Sarker et al., 2016).

Salmonellosis, zoonotic disease, was frequently observed in layer chickens similar to several previous studies (Akter et al., 2007; Barua et al., 2012). Within different age groups, the prevalence of salmonellosis was higher in later age (above 21 weeks) which is comparable to other researches (Hossain et al., 2010; Sabuj et al., 2019). Both coccidiosis and necrotic enteritis are correlated with each other cause severe loss to poultry farm owners (Badruzzaman et al., 2015). Fowl cholera, fowl pox, infectious bronchitis, and cannibalism found

only in layer chickens and hand omphalitis, visceral gout, ascites, and femoral head necrosis in broiler chickens corresponding to the previous findings (Hassan et al., 2016; Rahman et al., 2017).

Duck plague considers an economic disease in Bangladesh causes higher mortality in the duck population (Hoque et al., 2010). Several studies have so far been conducted on duck plague elsewhere in Bangladesh (Hoque et al., 2011; Ahamed et al., 2015; Khan et al., 2018). The vaccine is available for duck plague but people did not use it regularly which leads to disease occurrence. Pox and ND were found as most of the pigeon which agree with other findings (Lawal et al., 2016; Elina et al., 2017; Rahman et al., 2019). Improved husbandry practices and regular vaccination can reduce the disease prevalence in the pigeon.

Various types of antibiotics were prescribed to treat healthy and sick birds in the study area. Antibiotics used in birds based on clinical signs and post mortem history and experience of the veterinary surgeon which may lead to antimicrobial resistance (Rahman et al., 2019). Combine drugs are mostly used to treat the clinical poultry disease as resistance had been developed to most of the antibiotic. Thus, with increased antibiotic resistance, resistant pathogens can transmit to humans through contact as well as food chain (Hasan et al., 2010; Khan et al., 2014; Rahman et al., 2019). The veterinarian should have to prescribe antibiotic drug careful and try to avoid it if not necessary. Through this study, poultry practitioners, veterinarian, researcher, and the government officials can get a real picture of the disease prevalence in this area which helps in future research and decision making. The shorter period of study, lower sample size and consider one veterinary hospital, these are the limitation in the present study.

Conclusion

Poultry diseases are more prevalent in the study area and antimicrobial drugs are used on an experience basis without testing sensitivity. For precise diagnosis of diseases, laboratory support must be ensured and a sensitivity test should be performed to detect the resistant pattern of an antibiotic.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to Dr. Rupen Chakma, Upazila Livestock Officer, Ramu Upazila Livestock Office, Ramu, Cox's Bazar, Bangladesh for his cordial support during the conduct of this research.

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