Epidemiological Assessment of Poultry Diseases (Newcastle Disease in particular) and Pattern of Antibiotics Prescribed at the Selective Veterinary Hospitals in Bangladesh

Abstract

Poultry sector is one of the growing and promising enterprises in Bangladesh. However, infectious disease is one of many challenges in this sector. Therefore, assessing different hospital-based clinical cases of poultry is much helpful to know disease status and their diversities. A descriptive clinico-epidemiological study was therefore conducted on different clinical cases of poultry with the special focus on Newcastle disease (ND) registered in Teaching Veterinary Hospital (TVH) of Chittagong Veterinary and Animal Sciences University, Bangladesh during 17 November 17 to 11 January 2018 and in Upazilla Veterinary Hospital (UVH) of Upazilla Livestock Office, Lohagara, Chittagong, Bangladesh during 3 February to 29 March, 2018. A total of 89 cases were considered for the study (UVH, N=59, n=41chickens, n=13 pigeons, n=4 ducks and n=1 Parrot) and TVH, N=30, n=13 chickens, n=12 pigeons, n=2 love birds and n=3 turkeys) using a newly developed case record keeping sheet. Individual bird level data along with clinical history, clinical signs, postmortem (PM) lesions, diagnosis and treatment and preventive data were recorded. Cases were diagnosed according to clinical history, observable clinical signs and or gross PM lesions. The overall proportionate prevalence (PP) of ND cases was 46.7% (n=14) in TVH of which Chicken contributed 53.9%and others poultry 41.2%, whereas the overall PP of ND cases was 13.6% (n=8) in UVH of which chicken accounted for 20.6% and others poultry 5.9%. Birds, irrespective of species, immunized with ND vaccine had lower PP than non-immunized birds (9.1% vs. 16.2% in UVH; 0% vs. 51.9% in TVH). Frequency of observable clinical signs of ND cases was recorded as torticollis (50% only in pigeon), whitish diarrhea (59.1%, all species combined), gasping and coughing (4.54% all species combined). The PP prevalence of other cases was as

follows: 20% pigeon pox in pigeon and 6.7% Ca deficiency in chicken in TVH and 15.2% pigeon pox in pigeon and 10.1% parasitic infestation in chicken in UVH. To prevent secondary bacterial infection 45.5% ND cases were treated with ciprofloxacin (Ciproflox®), 9.1% with Pefloxacin (Pexacin®), 9.1% cases with doxycycline (Doxivet),9.1% cases with sulphamethoxazole (Cotrim vet®) and 9.1% cases without any antibiotic treatment. In conclusion, ND followed by pigeon pox was common cases in this study and there is likely chance to develop antimicrobial resistance as antibiotics were used against ND, a viral poultry disease.

Keywords: *Poultry, ND, Antibiotics pattern*

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Abbreviation	Elaboration
UVH	: Upazilla Veterinary Hospital
TVH	: Teaching Veterinary Hospital
SAQTVH	: SA Kaderi Teaching Veterinary Hospital
ND	: Newcastle Disease

Chapter I: Introduction

Poultry sector is one of the rapidly growing sectors in Bangladesh. There are 304.2-million poultry in Bangladesh (Hamid et al., 2017). Number of commercial broiler, layer and breeder farms is reported to be 53112, 18222 and 90, respectively in this country (Hamid et al., 2017). This sector provides easy, less costly and important source of animal protein to people in this country and contributes 2.5% to the Gross Domestic Product (Hamid et al., 2017).

Although poultry is utmost profitable sector in Bangladesh, there are many limiting factors in poultry rearing of which disease is one of the top factors. Important poultry diseases were –Newcastle disease, Duck cholera, Coccidiosis etc. (Alam et al., 2014) and each of these causes mortality and economic losses at variable level. Highly pathogenic avian influenza in poultry is the disease of zoonotic important which causes huge mortality in poultry (Alexis et al., 2017).

Newcastle Disease (ND), caused by Newcastle diseases virus belonging to the family of Paramxoviridae, is considered an endemic poultry disease occurred in a wide range of bird species in Bangladesh and beyond(Barman et al., 2002). There are three different types of NDVs such as mesogenic, lentogenic and velogenic which cause variable mortality in poultry (25-100%) (Joseph et al., 2014). Transmission ND is occurred through aerosol, nasal secretion, feces (Mai et al., 2004). The reported sero prevalence of ND is 14-22% in poultry (Kouakou et al., 2015). Newcastle disease is commonly occurred in dry season (45.7%) than in rainy season (32.8%) (Hassan et al., 2016) and non-vaccinated birds (6%) (Arup et al., 2017). Diagnosis of ND was based on clinical signs, gross post-mortem lesions and different laboratory tests such as hemagglutination inhibition (HI) with polyclonal NDV specific area, ELISA and molecular testing (Seal et al., 2000).

Both live and killed ND vaccines are regularly used to prevent the occurrence of endemic poultry diseases in this country. However, vaccine coverage in rural poultry is very poor or totally absent. Farm hygiene and bio-security is also very crucial to prevent and control poultry diseases. However, in general farm hygiene and bio-security status still remains below standard.

Symptomatic and antibiotic treatment of poultry diseases is quite common and therefore there is highly likely to develop antimicrobial resistance (Nhung et al., 2017) which is an important public health issues (Ferri et al., 2017).

Considering the above background, a study was conducted on clinical poultry cases during my internship rotation at two selected veterinary hospitals in Bangladesh with the aim of following objectives:

1. To estimate proportionate prevalence of clinical poultry cases in the selected veterinary hospitals
2. To know potential factors associated with the occurrence of clinical Newcastle Disease in poultry
3. To describe observable clinical signs of Newcastle Disease and antibiotics prescribed for this disease in poultry

Chapter II: Materials and Methods

2.1 Veterinary Hospitals (Internship Placements)

Teaching Veterinary Hospital (TVH), Chittagong Veterinary and Animal Sciences University, and Upazilla Veterinary Hospital (UVH) Lohagara, Chittagong were considered for conducting the study to produce my clinical scientific report. Both hospitals efficiently provide services to livestock farmers. TVH is used for teaching and learning purposes of veterinary students as well as offering public services around its catchment areas.

2.2 Cases

Average 20 various clinical cases in different livestock per day were presented to each placement for the purposes of treatment and preventive. The clinical rotation was 113 days (1 February to 30 March at UVH in 2018 and 17 November2017 to 11 January2018at TVH). Although a wide range of clinical cases were handled during the rotation. This study included 89 clinical poultry cases.

2.3 Case assessment

Cases were mainly evaluated by looking at clinical history, clinical signs, close physical inspection and observation, and gross post-mortem lesions in some cases.

2.4 Data collection

Data were recorded using a record keeping sheet developed by CVASU Epidemiology Group through face-to-face interview or clinical inspection and observation. Date of registration, duration of illness, case diagnosis data along with clinical signs, bird level data (species, sex, age vaccination and rearing system and drug data (name and kind, dose and duration) were registered.

2.5 Data entry and analysis

Data collected were entered into Microsoft Excel-2010 and checked the data consistency and integrity before exporting to statistical software STATA-13 (STATA Corporation, 4905, Lakeway River, College station, Texas 77845, USA) for statistical analysis. Descriptive analysis was performed on the data obtained. Fisher's exact test was applied to assess the difference of proportion of ND cases between categories of individual factor studied. The results were presented as frequency numbers and percentage. The p value of 0.05 was set as significant.

Chapter III: Results

3.1. Distribution of Clinical Cases in Poultry at the Veterinary Hospitals

Different clinical poultry cases were recorded at the veterinary hospitals during the rotation. Among all cases (N=89) ND ranked the highest, ranging 13.6-46.7% followed by pigeon pox (15.2-20.0%) and calcium deficiency (7.0%) and others (Table 1).

Table 1: Frequency distribution of clinical cases in poultry by placement type

Types of cases	TVH		UVH	
	N	%	N	%
Newcastle Disease	14	46.7	8	13.6
Pigeon pox	6	20	9	15.2
Infectious Bursal Disease	0	0	3	5.8
Duck cholera	0	0	4	6.8
Fowl cholera	0	0	4	6.8
Bacterial infection	0	0	3	5
Pullorum disease	0	0	2	3.4
Salmonellosis	1	3.3	1	1.7
Infectious coryza	0	0	1	1.7
Parasitic infection	0	0	6	10.1
Coccidiosis	1	3.3	4	6.8
Parasitic infestation	2	6.7	0	0
Mycoplasmosis	1	3.3	1	1.7
Endo parasitic infection	1	3.3	1	1.7
Malnutrition	0	0	2	3.4
Calcium deficiency	2	6.7	4	6.8
Feather abnormalities	1	3.3	0	0
Mineral deficiency	0	0	1	1.7

Egg bound syndrome	0	0	1	1.7
Respiratory problem	0	0	2	3.4
Anthelmintic poisoning	1	3.3	0	0
Eye infection	0	0	1	1.7
Fowl pneumonia	0	0	1	1.7
Total	**30**		**59**	

3.2. Association between the Proportion of Newcastle Disease and Factors

None of the factors was significantly associated with the occurrence of ND in poultry. However, chicken, female, non-vaccination and semi-intensive rearing had apparently higher proportion of ND in this study (Table 2).

Table 2: Association between the proportion of Newcastle Disease and factors

Factors	**Categories**	**UVH**			**SAQTVH**		
		ND			**ND**		
		+ (%)	**-**	**P**	**+ (%)**	**-**	**P**
Species	Chicken	7 (20.6%)	34	0.234	7 (53.9%)	6	0.491
	Others	1 (5.9%)	17		7 (41.2%)	10	
Sex	Male	1 (7.7%)	12	0.59	4 (40%)	6	0.605
	Female	5 (13.2%)	33		10 (50%)	10	
Vaccination	Yes	2 (9.1%)	20	0.439	0 (0)	3	0.088
	No	6 (16.2%)	31		14 (51.9%)	13	
Rearing	Intensive	3	20	0.926	8	14	0.061

system		(13.0%)			(36.4%)		
	Semi intensive	5 (13.9%)	31		6 (75.0%)	2	

3.3. Description of Clinical signs of Newcastle Disease

Observable clinical signs of ND were torticollis, whitish droppings, gasping and coughing (Table 3).

Table 3: Frequency distribution of clinical signs of Newcastle Disease (N=22)

Signs	**N**	**%**
Torticollis	11	50%
Whitish droppings	13	59.1%
Gasping	1	4.5%
Coughing	1	4.5%

3.4 Discretion of Antibiotics used in Newcastle Disease (N=22 ND cases)

Multiple antibiotics were prescribed of which ciprofloxacin was more common (Table 4).

Table 4: Frequency distribution of antibiotic uses for Newcastle Disease cases

Antibiotics	**N**	**%**
Amoxicillin	1	4.5%
Ciprofloxacin	10	45.5%
Doxycycline	2	9.1%
Doxycycline and oxytetracycline	1	4.5%

Oxytetracycline HCL, Neomycin sulfhate and Excipicent	1	4.5%
Pefloxacin	2	9.1%
Salphamethoxale	2	9.1%
Trimethoprim Sulphadiazine	1	4.5%
No antibiotic	2	9.1%

Chapter IV: Discussion

A wide range of poultry diseases or conditions recorded in this study clearly indicate disease is an important constrain in poultry rearing in the study areas. Occurrence of multiple poultry diseases in this investigation is agreed with many previous studies in Bangladesh (Islam et al., 1998; Talha et al., 2001; Giasuddin et al.,2009, Rahman et al., 2016, Sen et al., 2017)

The reasonably high level of proportionate prevalence of ND, Pigeon pox and Ca deficiency in this study are in close agreement with many earlier studies (Awan et al., 1994; Qian et al., 1997; Medina et al., 2004; Walter et al., 2005; Driver et al., 2006; Snoeck et al., 2009; Otim et al., 2017). These results are very likely as ND is considered as endemic disease and seasonally epidemic in poultry (Asadullah et al., 1992; Awan et al., 1994; Otim et al., 2017); pigeon pox is frequently occurred poultry disease as reported by poultry practitioners in this country; nutritional deficiency like Ca can easily occur if balanced poultry feed formulation is not followed, calcium phosphorus ratio, metabolic disorder and stress (Whitehead et al., 2007)

None of the factors studied was determined as significant factor associated with ND in this study. However, number of factors was previously reported as potential risk factors for ND in Poultry in Bangladesh and elsewhere in the world (Asadullah et al., 1992; Islam et al., 2003; Arup et al.,2017; Otim et al., 2017). Those were seasons, migratory birds, stocking source of birds, Therefore, along with ND vaccination modification of risk factors are utmost crucial in preventing ND occurrence.

Clinical signs (torticollis, whitish dropping etc.) of ND observed in this study correspond to the findings reported by an earlier study (Walter et al., 2005). Diagnosis of poultry diseases based on clinical signs and post-mortem lesions is not as sensitive as specific

laboratory test. So, ND can be misdiagnosed with other poultry diseases like avian influenza (Capua et al., 2009).

Use of antibiotics in poultry viral diseases is common in Bangladesh. A wide range of antibiotics was prescribed for ND cases in this study which suggest indiscriminate use of antibiotics and this kind of drug use will definitely lead to develop antimicrobial resistance and thus pose public health risk (Kumarasamy et al., 2010; Nhung et al., 2017)

Limitations

The limitations of the study were short study period, small sample size and non-laboratory based disease diagnosis. Information bias might have occurred though care was taken in recording information through face-to-face farmers' interview.

Conclusion

In conclusion, there were poultry disease diversity in this study along with more frequent diseases of ND, pigeon pox and Ca deficiency. Multiple antibiotics were prescribed for ND in this study

Recommendations

A comprehensive future risk factor study for ND and other common diseases is required to prevent the occurrence of poultry diseases. Awareness of judicious use of antibiotics should be built up among farmers and veterinarians to save antibiotic sensitivity.

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Biography

I am Sydus Shalekin Shakil, I completed my Secondary School Certificate (SSC) examination in 2009 with GPA-5 from Hazi Mohammad Mohsin Govt High School, Chittagong and Higher Secondary Certificate (HSC) examination in 2011 with GPA-5 from Chittagong Cantonment Public College, Chittagong. Currently, I have been doing my internship programme which is the compulsory of DVM programme under the Faculty of Veterinary and Animal Sciences University. My favorite hobby is reading books. I feel much interested in exploring new techniques for contributing in development of veterinary field in Bangladesh and beyond.