**Original Research Article**

**Epidemiological Investigation of poultry diseases and prescribed antimicrobials in Kishoreganj based on hospital data**

**ABSTRACT**

An epidemiological study was conducted in District Veterinary Hospital, Kishoreganj, from June 2019 to October 2019 to explore the distribution of different diseases/conditions in chickens (broiler, layer, sonali) and duck, as well as to know the prescribed antimicrobial patterns at the study area. A total of 805 poultry information of either infected or dead birds were collected and examined to diagnose the diseases based on history, clinical signs, and postmortem findings. The prevalence of Newcastle disease was the highest (16.61%; 95% CI: 13.79-19.75) in chickens among the overall chicken diseases and Duck plague (55.49%) over other duck diseases. IBD percentage (31.78%) was higher followed by visceral gout (16.82%), mycoplasmosis and omphalities in broiler. In layer, distribution of ND (23.81%) was significantly higher among all diseases during the study period, accompanied by IBD, CRD, Avian tuberculosis, Avian Influenza and heatstress etc. Coccidiosis was counted as most frequent disease in sonali and prevalence was 32.69% while, IBD, ND, AI and concurrent infections of Coccidiosis with ND and IBD were dominant. Present study observed lots of co-infections in poultry and wide ranges unnecessary antimicrobials were prescribed for treating the diseased birds. Among them, a combination of Erythromycin, Sulphadiazine and Trimethoprim (20.08%) was the most commonly used antibiotic followed by Tiamulin hydrigen fumerate (13.58%). This study depicts the clinical poultry diseases/conditions burden which will be helpful for the authority to prioritize the disease and take preventive or control measures, and findings will act as a baseline information for future research in the study area.

*Keywords: Epidemiological, antimicrobials, Newcastle disease, Duck plague, baseline*

1. **INTRODUCTION**

In Bangladesh from the beginning of 21st century, poultry industry has become unprecedented for quick profit, the generation of local employment, and the production of cheaper animal proteins than any other sector (1). There is a long historical record of poultry rearing under traditional backyard farming in Bangladesh. In the beginning, commercial poultry farming, started on small scales, and poor rural women, unemployed youth involved and thus become employed. It also involved some semi-urban and urban poultry raisers which helped to meet the growing demand for eggs and meat. In the last two decades, many poultry farms have been established in Bangladesh (2). Government efforts, involvement of some NGOs and entrepreneurs, changes in the socioeconomic status of the country recently has favored this greater shift in the Bangladeshi poultry sector (3). In Bangladesh, poultry meat contributes to the total meat products is 35.25% and egg production is 63.65% of the national demand in Bangladesh (4); although meat consumption according to per capita poultry is much lower (1.9 kg) compare to other Asian countries (4). In 2018, the percentage is estimated, around 150,000 poultry farmers in Bangladesh, producing around 570 million tons of meat and 7.34 billion eggs (5). Government of the People’s Republic of Bangladesh has recently given priority in potential poultry sector. Poultry population in Bangladesh is estimated about 347.735 million where chicken population is about 289.283 million and duck population is about 57.752 million(6). United States Department of Agriculture (USDA) estimates that one million entrepreneurs and eight million people involved in Bangladesh’s poultry sector commercially produce 10.22 billion eggs and 1.46 million tons of poultry meat annually (7).

In Bangladesh, though poultry farming is a potential field but the farmers have to face different challenges to rear them which hinder the growth and influences bird mortality (8,9) Every year, different poultry diseases or conditions were reported and subsequently poultry farmers had to face economic loss due to reduce the optimal production of the flock (10–12). The occurrences and distribution of poultry diseases depends on various factors like geo-climatic condition of the area, season, management practices, immune status of the bird, vaccination failure, farm biosecurity, species, production type, breed and age of the bird etc.(10,13,14).

Previous studies suggest that Infectious Bursal Disease (IBD), Chronic Respiratory Disease (CRD), Newcastle Disease (ND), Aspergillosis, Salmonellosis, Coccidiosis, Colibacillosis, Ascites, Omphalitis, Necrotic Enteritis, Infectious Coryza, Infectious Bronchitis, DP, DC, etc. are most prevailing poultry diseases in our country (14,15,16). Moreover, several reports from BD showed that avian influenza virus was also encountered among the poultry species in their study (10,17).

The poultry farmers choose different kinds of antibiotics to prevent and sometimes to control these diseases and conditions irrespective of prescription from registered veterinarian (18). Most of the time the non-therapeutic use of antimicrobials and not maintaining proper withdrawal period leads to antimicrobial resistance (19) which impose a major food safety and public health issues (20,21).

Kishoreganj is district of Bangladesh with unique geo-climatic condition and well known for different poultry rearing. Previous studies reported that different poultry diseases were prevail here (10,14,22,23) which is very shocking and alarming for poultry farmers. Though previous studies observed poultry diseases but time period was very limited (10) and did not encountered for different age groups of chickens and duck (14). So, the aim of the current study was to estimate the clinical prevalence of different diseases of chickens and duck to understand the disease burden that came at District Veterinary Hospital, Kishoreganj, Bangladesh and also to explore the distribution of prescribed antimicrobials.

1. **MATERIAL AND METHODS**

**2.1 Study area**

The study was conducted at District Veterinary Hospital of Kishoreganj which is under the Dhaka division of Bangladesh. (Fig. 1)

|  |
| --- |
| **Fig. 1: Study area (District Veterinary hospital, Kishoreganj, Bangladesh)** |

**2.2 Study Population and unit**

The population for the study were selected both dead or live chickens (Broiler, Layer and Sonali) and duck from different poultry farms of different upazillas of Kishoreganj came to examine at District Veterinary hospital of Kishoreganj during the study period. Here, individual bird represents the study unit.

**2.3 Study design and period**

A cross-sectional study was conducted from June 2019 to October 2019 over a period of five (5) months to determine the clinical prevalence of poultry visited the hospital.

**2.4 Diagnosis of diseases/conditions**

Diseased birds (lived and dead) were received at hospital and the tentative diagnosis of chicken (broiler, layer and sonali) and duck disease was made based on the history of the flock, age of affected birds, clinical signs and symptoms, postmortem findings for the respective disease etc.

1. **Disease History:** History of diseases was collected by asking question to the farmers came to the hospital with live or dead chicken and duck.
2. **Clinical signs:** To determine the specific disease clinical signs were observed in each affected bird and the signs of diseases and conditions told by the farmer and the farms conditions information were also collected from the farmers.
3. **Postmortem Examinations:** Postmortem examination was carried out by the veterinary doctor of the hospital and the identification of diseases done by the veterinary doctor of District Veterinary Hospital, Kishoreganj. Specific lesions in various organs determine the specific disease. Various internal organs such as liver, lung, kidney, spleen, heart, intestine, trachea, bone, muscle, etc. were examined properly for the diagnosis and conformation of disease.

**2.5 Data collection and management**

A total 805 chickens and duck information were collected for this study. A structured record keeping sheet was developed for this study and used with the permission of the veterinary doctor. The information was collected from the hospital regarding some important parameters like species and age of bird, total number of birds reared in a farm, disease history, clinical sign, postmortem findings, total number of dead birds in the farm and respective treatment prescribed for the disease etc. After initial descriptive analysis age of the birds was categorized due to their skewed distribution. Broiler, layer, sonali age were categorized in three categories and duck was four categories based on the prior information found in available literature (10).

**2.6 Statistical analysis**

Clinical prevalence was calculated as the proportion of a particular disease/condition (n) among the total number of diseases/conditions (N) in specific bird encountered in the study period. Prevalence were presented as percentage and the precision of these estimates was ensured by calculating 95% confidence interval. Statistical Analysis System (SAS) version 9.4 was used to perform all statistical analysis. Differences in prevalence between poultry traits were compared using Fisher exact test.

1. **RESULTS**

A total of 805 cases were studied from District Veterinary Hospital, Kishoreganj during study period. Among them 632 cases were chicken (broiler 107 cases, layer 349 cases, sonali 176 cases) and 173 cases were duck.

**3.1 Prevalence of overall poultry diseases/conditions**

According to the Table 1 and Fig 2, the prevalence of Newcastle disease was the highest (16.61%; 95% CI: 13.79-19.75) in chickens among the overall chicken diseases followed by Infectious bursal disease (14.40%), coccidiosis (8.39%), mycoplasmosis (4.59%). Among the mixed infections (Fig 2), IBD and Coccidiosis (2.69%) was found the most dominating chicken disease followed by ND and Colibacillosis.

**Table 1: Frequency distribution of chicken diseases and conditions in Kishoreganj from June, 2019 upto October, 2019.**

| Disease name | Prevalence (%) | Confidence Interval (95%) | P-value |
| --- | --- | --- | --- |
| Avian Influenza (AI) | 3.16 | 1.94-4.84 | <.0001 |
| Ascities | 0.79 | 0.26-1.84 |
| Fowl Cholera (FC) | 1.58 | 0.76-2.89 |
| Avian Leukosis | 0.32 | 0.04-1.14 |
| Infectious Bursal Disease (IBD) | 14.4 | 11.75-17.38 |
| Infectious Bronchitis (IB) | 1.58 | 0.76-2.89 |
| Infectious Coryza (IC) | 0.95 | 0.35-2.05 |
| Newcastle Disease (ND) | 16.61 | 13.79-19.75 |
| Coli enteritis | 1.42 | 0.65-2.69 |
| Egg Peritonitis | 1.42 | 0.65-2.69 |
| Avian tuberculosis | 0.32 | 0.04-1.14 |
| Fowl Pox | 0.16 | 00-0.88 |
| Visceral gout | 3.16 | 1.94-4.84 |
| Necrotic Enteritis | 0.95 | 0.35-2.05 |  |
| Omphalitis | 3.01 | 1.82-4.66 |
| Oophoritis | 0.32 | 0.04-1.14 |
| Salmonellosis | 2.22 | 1.22-3.69 |
| Colibacillosis | 3.48 | 2.19-5.22 |
| Aphlatoxicosis | 0.32 | 0.04-1.14 |
| Tape worm | 0.32 | 0.04-1.14 |
| Aspergillosis | 0.16 | 00-0.88 |
| Complicated Chronic Respiratory Disease (CCRD) | 2.53 | 1.45-4.08 |
| Coccidiosis | 8.39 | 6.34-10.83 |
| CRD/mycoplasmosis | 4.59 | 3.09-6.52 |
| Heat stress | 6.33 | 4.56-8.52 |
| Less intake of feed | 0.16 | 00-0.88 |
| Liver cirrhosis | 1.11 | 0.45-2.27 |
| Malnutrition | 0.47 | 0.10-1.38 |
| Beak infection | 0.16 | 00-0.88 |
| Calcium deficiency | 0.32 | 0.04-1.14 |
| Mixed Infections |  |  |

**Fig. 2: Frequency distribution of chicken diseases and conditions (Mixed infection) in Kishoreganj from June, 2019 upto October, 2019**

In case of Duck, Duck plague (55.49%) and CCRD (14.45%) were found the most common disease over other duck diseases. Beside above mentioned infectious diseases, Duck Cholera (1.73%), Colibacillosis (1.73%), CRD (4.05%), Duck viral hepatitis (0.58%) etc. were also observed in study period. Some metabolic disease along with infectious disease such as malnutrition (4.05%), Indigestion (1.16%) and Vit E deficiency (0.58%) etc. were also observed during study (Table 2).

**Table 2: Frequency distribution of duck diseases and conditions in Kishoreganj from June, 2019 upto October, 2019.**

|  |  |  |  |
| --- | --- | --- | --- |
| Disease name | Prevalence (%) |  Confidence Interval (95%) | P-value |
| Duck Plague (DP) | 55.49 | 47.76-63.03 | 0.0003 |
| Duck Viral Hepatitis (DVH) | 0.58 | 0.01-3.18 |  |
| Avain tuberculosis | 0.58 | 0.01-3.18 |  |
| CRD/mycoplasmosis | 4.05 | 1.64-8.16 |  |
| ND | 0.58 | 0.01-3.18 |  |
| Oophoritis | 0.58 | 0.01-3.18 |  |
| Aphlatoxicosis | 0.58 | 0.01-3.18 |  |
| Anaemia | 1.16 | 0.14-4.11 |  |
| CCRD | 14.45 | 9.58-20.59 |  |
| Colibacillosis | 1.73 | 0.36-4.98 |  |
| Coccidiosis | 0.58 | 0.01-3.18 |  |
| Vit E deficiency | 0.58 | 0.01-3.18 |  |
| Indigestion | 1.16 | 0.14-4.11 |  |
| Malnutrition | 4.05 | 1.64-8.16 |  |
| Heat stress | 1.73 | 0.36-4.98 |  |
| Duck Cholera (DC) | 0.58 | 0.01-3.18 |  |
| DC+DP | 0.58 | 0.01-3.18 |  |
| CCRD+ E. coli | 0.58 | 0.01-3.18 |  |
| DP + Heatstress | 1.73 | 0.36-4.98 |  |
| DP+CCRD | 0.58 | 0.01-3.18 |  |
| DP+ *E.coli* | 1.16 | 0.14-4.11 |  |
| DP+FC+CRD | 1.16 | 0.14-4.11 |  |
| DP+Malnutrition | 0.58 | 0.01-3.18 |  |
| DP+Tape Worm | 1.16 | 0.14-4.11 |  |
| Colibacillosis+Egg Peritonitis | 0.58 | 0.01-3.18 |  |
| Malnutrition+CCRD | 1.73 | 0.36-4.98 |  |
| Heat stress+Perihepatitis | 0.58 | 0.01-3.18 |  |

**3.2 Prevalence of chicken diseases and conditions by production type and age**

The broiler chickens were divided into three groups according to ages likely group A (1-10 days), group B (12-20 days) and group C (1-32 days). Prevalence of IBD (31.78%) was calculated significantly higher among all diseases and followed by visceral gout (16.82%), Mycoplasmosis and Omphalitis (10.28%) in broiler bird. Prevalence for Omphalitis (58.82%) was estimated as higher among all diseases found in group A within study period while, Visceral gout (25.00%) was the most dominant in Group B, followed by IBD (21.15%). In broiler group C, occurrence of mycoplasmosis (10.53%) was counted highest among the prevail diseases and all three age groups are susceptible to this infection. One important observation is that 12 to 20 days birds are more prone to different diseases and conditions than chick and mature birds. Some co-infections also recorded where IBD combined with Coccidiosis, *E. coli*, and CCRD and prevalence was 2.80% for each (Table 3).

**Table 3: Distribution of diseases and conditions (N = 107) in broiler in Kishoreganj from June, 2019 upto October, 2019.**

| Disease name | Prevalence (%) | CI (95%) | P-value | 1-10 days | 11-21 days | 22-40 days |
| --- | --- | --- | --- | --- | --- | --- |
| IBD | 31.78 | 23.11-41.48 | <0.001 |   | 21.15 |   |
| Ascities | 1.87 | 0.23-6.59 |  |   | 1.92 | 2.63 |
| Aspergillosis | 0.93 | 0.02-5.10 |  |   | 1.92 |   |
| Coccidiosis | 1.87 | 0.23-6.59 |  |   | 3.85 |   |
| Coli enteritis | 1.87 | 0.23-6.59 |  |   | 3.85 |   |
| CCRD | 3.74 | 1.03-9.30 |  |   | 1.92 |   |
| ND | 3.74 | 1.03-9.30 |  |   | 7.7 | 2.63 |
| Necrotic Enteritis | 1.87 | 0.23-6.59 |  |   | 3.85 |   |
| Colibacillosis | 2.8 | 0.58-7.98 |  |   | 3.85 | 2.63 |
| Omphalitis | 10.28 | 5.24-17.65 |  | 58.82 | 1.92 |   |
| Mycoplasmosis/CRD | 10.28 | 5.24-17.65 |  | 5.88 | 11.54 | 10.53 |
| Less intake of feed | 0.93 | 1.64-8.16 |  |   | 1.92 |   |
| IBD+CCRD | 2.8 | 0.58-7.98 |  |   | 5.77 |   |
| IBD+Coccidiosis | 2.8 | 0.58-7.98 |  |   | 5.77 |   |
| IBD+ *E. coli* | 2.8 | 0.58-7.98 |  |   | 3.85 | 2.63 |
| Visceral gout | 16.82 | 10.29-25.28 |  | 29.41 | 25 |   |
| Visceral gout+CCRD | 0.93 | 1.64-8.16 |  |   | 1.92 |   |
| Visceral gout+IBD | 0.93 | 1.64-8.16 |   | 1.92 |   |  |
| CRD+salmonellosis | 0.93 | 1.64-8.16 | 5.88 |   |   |  |

Layer birds were divided into three groups according to ages such as group A (1-56 days), group B (57-140 days) and group C (141-665 days) (Fig. 3). Prevalence of ND (23.21%, 95% CI: 18.88-28.00) was counted as significantly higher among all diseases occurred in layer during study period. Beside ND, prevalence of IBD (5.75%) and CRD (4.30%) were the dominating diseases in layer. Along with infectious disease, Heatstress also observed in layer and the proportion was 11.17%. In Group A, prevalence of IBD (29.03%) was calculated higher followed by ND (12.90%) and coccidiosis (12.90%) prevalence. While in Group B and Group C, highest prevalence was calculated for ND and the value were 39.06% and 21.52% respectively (Table 4).

**Table 4: Distribution of diseases and conditions (N =349) in layer in Kishoreganj from June, 2019 upto October, 2019.**

| Disease Name | Prevalance (%) | CI (95%) | P-value | 1-56 days | 57- 140 days | 141- 665 days |
| --- | --- | --- | --- | --- | --- | --- |
| Avian Influenza (AI) | 2.58 | 1.19-4.84 | <.0001 | 4.84 |   | 2.69 |
| IBD | 5.75 | 3.54-8.71 |  | 29.03 | 3.13 |   |
| FC | 2.58 | 1.19-4.84 |  |   |   | 4.04 |
| IB | 2.87 | 1.38-5.21 |  | 4.84 | 1.56 | 2.69 |
| IC | 1.15 | 0.31-2.91 |  |   | 3.13 | 0.9 |
| Fowl Pox | 0.29 | 0.01-1.59 |  |   | 1.56 |   |
| Ascities | 0.86 | 0.18-2.49 |  |   | 1.56 | 0.9 |
| Avian tuberculosis | 0.57 | 0.07-2.05 |  |   |   | 0.9 |
| Avian Leukosis | 0.57 | 0.07-2.05 |  |   |   | 0.9 |
| Coccidiosis | 2.29 | 0.99-4.47 |  | 12.9 |   |   |
| Coli enteritis | 2.01 | 0.81-4.09 |  | 1.69 | 3.13 | 1.79 |
| Colibacillosis | 3.72 | 2.00-6.29 |  | 3.23 |   | 4.93 |
| ND | 23.21 | 18.88-28.00 |  | 12.9 | 39.06 | 21.52 |
| CRD/mycoplasmosis | 4.3 | 2.43-6.99 |  |   | 1.56 | 6.28 |
| Salmonellosis | 3.72 | 2.00-6.29 |  | 1.61 | 3.13 | 4.48 |
| Aphlatoxicosis | 0.57 | 0.07-2.05 |  |   |   | 0.9 |
| Necrotic Enteritis(NE) | 0.57 | 0.07-2.05 |  | 1.61 |   | 0.45 |
| Omphalitis | 1.43 | 0.47-3.31 |  | 8.06 |   |   |
| Oophoritis | 0.29 | 0.01-1.59 |  |   |   | 0.45 |
| Tape worm | 0.57 | 0.07-2.05 |  |   | 3.13 |   |
| Beak infection | 0.29 | 0.01-1.59 |  |   | 1.56 |   |
| Calcium deficiency | 0.57 | 0.07-2.05 |  |   |   | 0.9 |
| CCRD | 2.29 | 0.99-4.47 |  |   | 4.69 | 2.24 |
| Liver cirrhosis | 2.01 | 0.81-4.09 |  |   |   | 3.14 |
| Visceral gout | 0.57 | 0.07-2.05 |  | 1.61 |   | 0.45 |
| Heat stress | 11.17 | 8.07-14.96 |  | 3.23 | 4.69 | 15.25 |
| Malnutrition | 0.86 | 0.18-2.49 |  |   | 3.13 | 0.45 |
| Mixed Infections |  |  |  |  |  |  |

**Fig. 3: Frequency distribution of layer diseases and conditions (Mixed infection) in Kishoreganj from June, 2019 upto October, 2019.**

In case of Sonali chicken, they were categorized into three groups according to their ages likely group A (1-42 days), group B (43-140) and group C (141-180days). Coccidiosis (24.43%) was counted as most frequent disease in sonali during study period and prevalence was 24.43%. IBD also observed and prevalence was 21.02%. Like layer, ND prevalence was also comparatively higher than other diseases and the value was 11.36%. Like other type chicken, mixed infection also observed in this chicken and IBD and Coccidiosis was counted more frequent than others (6.82%). In case Group A, Prevalence of IBD (32.69%) was higher followed by coccidiosis (29.81%). For Sonali Group B, ND (20.90%) were the most dominant disease (Table 5).

**Table 5: Distribution of diseases and conditions (N =176) in sonali in Kishoreganj from June, 2019 upto October, 2019.**

| Disease Name | Prevalance (%) | CI (95%) | P-value | 1-42 days | 43-140 days | 141 - 180 days |
| --- | --- | --- | --- | --- | --- | --- |
| Avian Influenza (AI) | 6.25 | 3.16-10.91 | <.0001 |   | 14.93 | 20 |
| FC | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| Colibacillosis | 3.41 | 1.26-7.27 |  | 4.81 | 1.49 |   |
| IBD | 21.02 | 15.25-27.79 |  | 32.69 | 4.48 |   |
| IC | 1.14 | 0.14-4.04 |  |   | 2.99 |   |
| CRD/mycoplasmosis | 1.7 | 0.35-4.90 |  |   | 4.48 |   |
| ND | 11.36 | 7.08-17.00 |  | 4.81 | 20.9 | 20 |
| NE | 1.14 | 0.14-4.04 |  | 0.96 | 1.49 |   |
| Omphalitis | 1.7 | 0.35-4.90 |  | 2.88 |   |   |
| Oophoritis | 0.57 | 0.01-3.13 |  |   |   | 20 |
| salmonellosis | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| Coccidiosis | 24.43 | 18.28-31.47 |  | 29.81 | 17.91 |   |
| CCRD | 2.27 | 0.62-5.72 |  |   | 5.97 |   |
| AI+ coccidiosis | 1.14 | 0.14-4.04 |  |   | 2.29 |   |
| Coccidiosis+CCRD | 1.14 | 0.14-4.04 |  | 1.92 |   |   |
| CRD+salmonellosis | 0.57 | 0.01-3.13 |  |   |   | 20 |
| *E. coli* +IBD | 1.14 | 0.14-4.04 |  | 1.92 |   |   |
| *E. coli* +ND | 1.14 | 0.14-4.04 |  |   | 2.99 |   |
| *E. coli* +Tapeworm | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| IBD+Coccidiosis | 6.82 | 3.57-11.61 |  | 11.54 |   |   |
| ND+NE | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| IC +ND | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| Salmonellosis+ Coccidiosis | 0.57 | 0.01-3.13 |  | 0.96 |   |   |
| CRD+ Coccidiosis | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| ND+AI | 1.14 | 0.14-4.04 |  | 0.96 | 1.49 |   |
| ND+Coccidiosis | 3.98 | 1.61-8.02 |  | 2.88 | 5.97 |   |
| *E. coli* +ND+CRD | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| Visceral gout + Coccidiosis | 1.14 | 0.14-4.04 |  | 1.92 |   |   |
| Heat stress | 0.57 | 0.01-3.13 |  |   |   | 20 |
| Heat stress+ *E. coli* | 0.57 | 0.01-3.13 |  |   | 1.49 |   |
| Heat stress+NE | 0.57 | 0.01-3.13 |  | 0.96 |   |   |

**3.3 Prevalence of duck diseases and disease conditions by age**

Duck were divided into four groups on accordance of their age and they were group A (4-79 days), group B (90-179 days), group C (180-269 days) and group D (270-730 days). The prevalence’s of DP in all ages of duck (A=30.26%, B=75.68%, C=82.00% and D=68.57%) were relatively high among all diseases in case of duck. (table 6).

**Table 6:**  **Distribution of Duck diseases and conditions by production type (N =173) in Kishoreganj from June, 2019 upto October, 2019.**

| Disease Name | 4-89 days | 90-179 days | 180-265days | 266-880 days |
| --- | --- | --- | --- | --- |
| DP | 30.26 | 82 | 75.68 | 68.57 |
| DVH | 1.32 |  |  |  |
| Avian tuberculosis | 1.32 |  |  |  |
| CRD | 6.58 |  |  | 5.71 |
| ND | 1.32 |  |  |  |
| Oophoritis |  |  | 2.7 |  |
| Aphlatoxicosis |  | 4 |  |  |
| Anaemia | 2.63 |  |  |  |
| CCRD | 31.58 |  |  | 2.86 |
| Colibacillosis | 1.32 |  |  | 5.71 |
| Coccidiosis | 1.32 |  |  |  |
| Vit E defficiency | 1.32 |  |  |  |
| Indigestion | 2.63 |  |  |  |
| Malnutrition | 6.58 | 4 | 2.7 |  |
| Heat stress | 3.95 |  |  |  |
| Duck Cholera | 1.32 |  | 2.7 | 2.86 |
| DC+DP |  |  | 2.7 |  |
| CCRD+ *E. coli* | 1.32 |  |  |  |
| DP + Heatstress |  |  | 2.7 | 5.71 |
| DP+CCRD | 1.32 |  |  |  |
| DP+ *E. coli* |  |  | 2.7 | 2.86 |
| DP+FC+CRD |  |  |  | 5.71 |
| DP+Malnutrition | 1.32 |  |  |  |
| DP+Tape Worm |  | 4 | 2.7 |  |
| *E. coli* +Egg Peritonitis |  |  | 2.7 |  |
| Malnutrition+CCRD | 3.95 |  |  |  |
| Heat stress+Perihepatitis |  |  | 2.7 |  |

**3.4 Prescribed antimicrobial drug frequency**

From the Fig-4 we can see that, there were lots of antimicrobial drugs were prescribed for the different diseases of chicken and duck during the study period (Drug code in Appendix). Among them a mixer of Erythromycin, Sulphadiazine and Trimethoprim (20.08%) were most commonly used drug for treating the illness of birds. Second most common drug used for treating was Tiamulin hydrigen fumerate (13.58%) accompanied by Ciprofloxacin (9.96%), Neomycine sulphate (9.21%), Doxycycline (4.75), Sulphaclozine (4%), levofloxacin (3,89%) etc.

**Fig. 4: Antimicrobial Drug used frequency in Kishoreganj from June, 2019 upto October, 2019.**

To treat the chickens, a combination of Erythromycin, Sulphadiazine and Trimethoprim was frequently (23%) prescribed antibiotic during study period. Beside this, Ciprofloxacin (12%) and Neomycin sulphate (11%) also used to cure the sick chickens (Fig. 5, Graph 1).

On the other hand, Tiamulin hydrogen fumerate preparation (63%) was most commonly used antimicrobial for treating sick duck. Another commonly used drug was combination of Doxycycline and Trimethoprim (12%) for curing the bird (Fig-5, Graph 2).

**Fig. 5: Drug usage frequency in chicken (Graph 1) and duck (Graph 2) in Kishoreganj from June, 2019 upto October, 2019.**

1. **DISCUSSION**

In present study total of 805 cases were studied from District Veterinary Hospital, Kishoreganj during study period and identified 40 different diseases or conditions among which 6 were specific to duck and rest of them were found both in chicken and duck. In case of chicken, surprisingly most of the diseases occurred in combined form and near about 18 combinations were noticed in this study (Fig 2). The most dominant diseases in chicken were Newcastle disease (16.61%), Infectious bursal disease (14.40%), Coccidiosis (8.39%), CRD (4.59%), Colibacillosis (3.48%), Visceral gout (3.16%), AI (3.16%), Omphalitis (3.01%), Salmonellosis (2.22%) etc. Among the infection, IBD & Coccidiosis (2.69%), ND & *E. coli* (1.90%), ND & Coccidiosis (1.42%) were found the most common cases for chicken. Besides the infectious diseases, effect of heat stress also noticed in the chicken population in the study areas and the proportion was 6.33%. These findings represent the poultry (chicken) diseases of Bangladesh and are supported by the previous studies (24–28). Prevalence for mixed infection of IBD and Coccidiosis was similar to the findings of Uddin et al. (13) who reported 2.32% but higher from the Badruzzaman et al.(8) who documented 0.71% from Narsingdi and Sylhet, respectively. In Duck, DP (55.49%) and CCRD (14.45%) prevalence were found comparatively higher than CRD (4.05%), DC (1.73%), Colibacillosis (1.73%), DVH (0.58%) etc. in study area. Some metabolic disease also noticed in duck like malnutrition (4.05%), Indigestion (1.16%) and Vit E deficiency (0.58%) etc. (Table 2). These findings portray the common duck diseases throughout the whole Bangladesh and congruent with the findings of the previous studies (10,29–32). Mostly occurred DP prevalence of current study was inclined with the findings of Islam et al. (33) who recorded 56.7% prevalence in Gaibandha. However, it was lower from the report of Rahman et al. (10) and Sabuj et al. (34) who documented 76.2% and 69.6% in kishoreganj and ramu, respectively. This discrepancy might be due to sample size of the duck population. Rahman et al. (10) used to very small size sample (21 ducks) for the study which leads very high prevalence. Current finding inclined with the previous report statement on endemic nature of DP in Bangladesh (35). Though vaccine are available, but unawareness of farmer with poor veterinay services and vaccine maintenance might be the reason of high DP prevalence in study area.

This study showed that prevalence of IBD (31.78%), visceral gout (16.82%), mycoplasmosis (10.28%) and Omphalitis (10.28%) were relatively higher in broiler than layer and sonali. These findings were agreed with the findings of Mamun et al. (14), Hassan et al. (16). But disagreed with the findings of Islam et al. (36), who documentd higher prevalence of IBD in sonali (37.5%) than broiler and layer. On the other hand, in layer, prevalence of ND (23.21%) and Colibacillosis (3.72%) were comparatively higher than both broiler and sonali chicken. Prevalence of Salmonellosis (3.72%) and Fowl cholera (2.58%) were higher in layer bird in compared to sonali bird. On the other hand, prevalence of Coli enteritis (2.01%) was higher in layer than broiler chicken. These findings were consistence with the findings of Mamun et al. (14), Rahman et al.(10) ; Hassan et al. (16), Islam et al. (36) from different parts of Bangladesh and from pakistan Abbas et al. (37). In case of Sonali, prevalence of Coccidiosis (24.43 %) estimated as highest among all three types chicken, followed by IBD and Coccidiosis mixed infection (6.82%). This variation might be due to use of anticoccidial drug in feed of case broiler and layer. Zoonotic AI prevalence was 6.25% in sonali and it was higher than layer (2.58%) (Table 4 and 5). These findings were consistence with the findings of previous studies ((14,16). The variation of different disease prevalence among chicken types in the study area might be due to improper vaccine usage, lower vaccination rate, vaccination failure, poor hygienic management, poor bio-security maintenance in the farm, chicken types itself, farmer unawareness about diseases etc.

Prevalence of IBD (31.78%) was estimated significantly highest among all diseases observed in broiler in the study area. These finding were congruent with the findings of previous studies from Bangladesh (10,14,22) and from India (38). Prevalence for Omphalitis (58.82%) and Visceral gout (25.00%) followed by IBD (21.15%) and CRD (10.53%) were estimated as higher among all diseases found in broiler of 1-10 days, 11-20 days and 21-40 days ages, respectively (Table 3). Higher Omphalitis prevalence in chicks was supported by previous studies (8,13,34,39) and might be occur due to yolk sac infections rai et al. (34) and/or poor management of chicks Hussain et al. (39). Panigrahi et al. (41) reported occurrence of visceral gout in 1~10 days chicks were more common and it reduces with the advancement of age which support our findings. In current study, higher IBD prevalence was observed in 11-20 days age group broiler which correlates with the results of Sabuj et al. (34) and Rahman et al. (10) and might be due to lack of maternal antibody against virus, improper vaccination and incomplete bursal development (22). All ages broiler was susceptible to CRD and matches with the previous study findings (16,34) while disagree with Rahman et al. (10) who recorded no prevalence for 11-20 days birds.

ND was most prevailing and estimated 23.21% in layer which agreed with the findings of Rahman et al. (10), Das et al. (22) and Abbas et al. (37) but did not match with Hassan et al. (16) who found the highest prevalence for the salmonellosis (38.56%) in layer. Heatstress condition was observed in all ages layer and the proportion was 11.17% which was supported by the findings of Rahman et al. (10) who recorded 4.7% from the same area which indicates the improper ventilation of poultry shed and management system of farms. In 1-56 days age group, prevalence of IBD (29.03%) was higher followed by ND (12.90%) and coccidiosis (12.90%) prevalence. Higher IBD was observed might be due to lack of vaccination or vaccination failure because after first 2 weeks, maternal derived antibodies deployed and unable to protect chicks from IBD (42). ND prevalence were calculated highest for the rest two groups and the value were 39.06% and 21.52%, respectively (Table 4). Though generally commercial layer farmer vaccinated birds against ND but current findings might be due to vaccine failure because of expired /improper storage vaccine usage, stress condition of birds during vaccination, different strain etc. (32,43).

Most important findings in layer was Avain tuberculosis and prevalence was 0.57% which was relatively unique findings of the study area and supported by the findings of Rahman et al. (10), and Reza et al. (44). Presence of zoonotic tuberculosis in layer might be due to inadequate hygienic and biosecurity measurement in the farm. Tuberculosis was observed in older (above 20 weeks) birds which was consistence with the report of previous research (10,23,45). Another striking observation was 2.58% prevalence of Avain Influenza in layer which was supported by the findings of Rahman et al. (46) and Nooruzzaman et al.(47) and near the record (1.98%) of Islam et al. (23)but lower from the prevalence (10.7%) of Sabuj et al. (34). This discrepancy might be due to the sample size variation, farm biosecurity practice etc. in the study area.

Coccidiosis, IBD, ND, zoonotic AI and concurrent infections of IBD & Coccidiosis, ND & Coccidiosis were more frequently occurred disease in sonali during the study period. These results supported by the previous research findings (14,16,23,48). In current study, Coccidiosis prevalence was significantly higher (24.43%) followed by IBD (21.02%) which differs from the findings of Talukdar et al. (2017) who documented highest prevalence for IBD (14.72%) followed by coccidiosis (13.95%) in Bogra. Current Observed higher coccidiosis frequency was agreed with the documentation of Belal (49) and indicative to poor hygienic managements of farms. IBD (32.69%) and coccidiosis (29.81%) counted most frequent for the age group 1-42 days and ND (20.90%) for age group 43-143 days (Table 5). Similarly, Sharma et al. (50) reported higher prevalence of coccidiosis in the age group of 31-45 days. Higher IBD and ND might be due to lack of maternal antibody, inappropriate vaccination, farmer unawareness, faulty storage and administration of vaccine etc.

The prevalence of DP was relatively high irrespective of ages among all diseases observed in this study and 90~179 days ages had higher frequency. These findings were consistence with the findings of Noor et al. (31) and Rahman et al. (10) from Sylhet and Kishoreganj. CCRD was prominent in young birds while Avain tuberculosis, DVH and co-infection of malnutrition & CCRD only observed in this group. Duck cholera was observed relatively higher in mature duck (2.86%), similar to previous Bangladesh study where recorded 1.48% (31). This study findings were in conformity with the earlier reports of Rahman et al. (10) and Noor et al. (31) who recorded Heat stress and nutritional deficiency, respectively in different aged duck.

The present study encountered lots of co-infections both in chickens and duck which is relatively rare documentation; supported by previous research on poultry (8,10,13,30,48). Further study is suggested on laboratory diagnosis for confirmation of prevailed combined infections. The variation in the different diseases prevalence in this study might be due to different factors, such as sampling periods, sample size, study design, geo- climatic conditions of the area, density of the bird population in the flock, available veterinary facilities, farm management, farmer awareness etc.

Current study observed a lots of wide ranges antimicrobials (mostly antibiotics) were prescribed for treating the diseased birds of different flocks at the study area. Using frequency and usage indicates that prescription of antimicrobials basically antibiotics were experienced based instead of standard poultry diseases treatment protocol. Combined and unnecessary antimicrobial also used for curing sick bird, which is totally prohibited. Because it will lead to develop resistant strain of bacteria in poultry, ultimately in environment and human, which is alarming and threatening to public health (10,19–21). Erythromycin, Sulphadiazine and Trimethoprim combination (20.08%) were estimated higher prescribed frequency for treating the sick chickens whereas, second most common drug was Tiamulin hydrigen fumerate which was mainly used to cure duck. Moreover, Ciprofloxacin, Neomycine sulphate, Doxycycline, Sulphaclozine, levofloxacin etc. also prescribed for treatment purpose which supported by previous studies Rahman et al. (10) and Sabuj et al. (34) who also recorded Ciprofloxacin, Neomycine, levofloxacin etc. usage in sick poultry.

1. **CONCLUSION**

The findings presented in this study represents the current relative disease prevalence in the study area for chicken and duck. The prevalence of Newcastle disease (ND) and Duck plague was counted as the highest among all documented diseases in chickens and duck, respectively in study period. Prevalence of IBD (31.78%), ND (23.81%) and Coccidiosis (32.69%) were observed higher among prevail diseases in broiler, layer and sonali, respectively. Mixed infection of different diseases were more frequent which was current study unique findings. Though this study based on hospital data and it is difficult to have true picture, but we can assume present disease burden in poultry sectors. Using this information, respective authority can take necessary actions to mitigate the challenges in poultry sectors from diseases in the study area. These findings may assist researchers to further research or poultry consultants to make a strategy for the control or eradication of specific poultry diseases in Kishoreganj as well as in Bangladesh.

**ETHICAL APPROVAL**

As this study dealt with poultry, there was no existence of animal ethical issue.

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**APPENDIX**

**Table A1:**  **Code for Prescribed drug for poultry in Kishoreganj from June, 2019 upto October, 2019.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Generic name of used Antimicrobes** | Erythromycin+Sulphadiazine+Trimethoprim | Doxycycline | Sulphaclozine | Doxycycline+Neomycine sulphate | Sulphadiazine+Trimethoprim | Tiamulin hydrigen fumerate | Oxytetracycline | Ciprofloxacin | Metronidazole | Sulphachloropyridazine+Trimethoprim | Doxycycline+Trimethoprim | Doxycycline+Tylosin | Pefloxacin | levofloxacin | Neomycine sulphate | Colistin sulphate+Gentamycin | Gentamycin | Amoxacillin | Colistin sulphate+ Trimethoprim | Tylosin | Enrofloxacin | Colistin sulphate | Flumequine | colistin sulphate+ Doxycycline | Amoxicillin trihydrate+ colistin sulphate |
| **Code for****Drug** | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y |