



Disease Conditions and Different Abnormalities of Indian Peafowl and its Treatment in Captivity

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Abstract

The infectious diseases caused by bacteria, viruses, and parasites are common in Indian peafowl's. Peafowl infections are caused by a variety of factors. But, there is a dearth of published information regarding disease conditions, abnormalities, and treatment strategies for Indian peafowl. Our goal is to ascertain the various abnormalities and disease conditions, along with their treatment in captivity. The Bangladesh National Zoo (BNZ) hosted the research from April 2015 to December 2018 through direct observation, direct interaction, the use of a structured questionnaire, and data collection from a record book.

In the early stages, salmonellosis, colibacillosis, and peachicks were the main causes of death. From 2014 to 2018, only 8 disease-related deaths were reported in the early stages of the Indian peafowl population. The highest rate of recorded deaths, 62.5% (n = 5), was attributed to colibacillosis disease, while the rate of salmonellosis disease was 37.5% (n = 3). Conversely, in adult Indian peafowl, parasitic infestations and coccidiosis were the most common diseases found. Day-old peachicks were also found to have the disease omphalitis. Additionally, according to information from the record book and questionnaire survey, cases of Newcastle disease, chicken pox, avian cholera, rickets, and enteritis have been reported in the past. Over the last four years, curled toes, bumble feet, wing injuries, and lameness have been the most common abnormalities. Out of the 61 cases of common abnormalities that were recorded, curled toes accounted for the highest rate (54.1%; n = 33), while wing injuries accounted for the lowest percentage (n = 4). Conversely, bumble feet were noted (9.8%; n=6) and lameness was discovered (29.5%; n= 18). Furthermore, other anomalies were noted through the questionnaire answer sessions in addition to direct observation. These included weakness, gout in the hock joint, heat stress, cool stress, visitor stress, nervous disorder, and coprology. Male-to-male fighting was observed to occur frequently during the breeding season, and early-life cannibalism in Indian peafowl was observed in a small number of cases as a result of mineral deficiencies.

Antibiotics that are mostly used to treat infectious diseases; oxytetracycline and Gentamicin were the most widely used antibiotics. Without these anticoccidial medications in case of coccidiosis another common illness affecting Indian peafowl in BNZ was used. The most commonly used medications were found to be antibiotics, anti-coccidial, antihistaminic, anti-parasitic, anti-mycoplasmal, vitamin-mineral premix, vitamin B-complex, vitamin C, and saline solution. Without this, antiseptics, surgery, and additional supportive medications were used in the event of an injury. Starting at four months of age, the patient received medication to prevent parasitic infestation, and this was subsequently repeated every six months. A number of anomalies and illnesses are also regularly prevented by the regular use of certain vitamin, mineral, and nutrient substances. A physician's prescription was necessary to maintain the appropriate use of several disease-based medication types. In the BNZ, a veterinary hospital is licensed to treat and prevent various diseases and abnormalities.

Keywords: Indian peafowl, diseases, abnormalities, treatment, Bangladesh National Zoo

1. Introduction

Peafowl diseases caused by bacteria, viruses, nutritional deficiencies, and parasites are made possible by their captivity (Hollamby et al., 2003). Numerous bacterial, viral, and parasitic infectious diseases can affect both wild and domesticated peafowls (Hopkins, 1997). Peafowl infectious disease development is influenced by a number of risk factors (Perrins, 1990). The peafowl are regularly afflicted with about eighty infectious diseases. Among domestic poultry around the world, peafowl share many of the same diseases and health issues as turkeys (Schwartz, 1997). Since many of the diseases that can easily kill peachicks are found in the soil, many of these diseases suggest wire-bottom brooders. It should be remembered that caring for peachicks entails keeping them off of natural ground, keeping a close eye out for any symptoms of illness, and not using anything slick for bedding, such as metal, newspaper, or bare plastic. Sprangel-leg syndrome can result from poor footing as well as the brooder needs to be kept clean and draft-free (Kedreeva, 2015). The diseases found in peafowls were found to be nearly identical to those found in turkeys, their New World counterparts. Medication known to be beneficial for turkeys was administered to the peafowls. The spectrum of etiological or causative agents for infectious diseases in poultry includes viruses, bacteria that resemble viruses, fungi, protozoa, worms, and external parasites. Newcastle disease, fowl pox, hemorrhagic enteritis, and mycoplasmosis were listed as common viral diseases affecting peafowl.

Bacterial diseases included pullorum and fowl typhoid, paratyphoid, staphylococcus, fowl cholera, and avian tuberculosis. Protozoal diseases included coccidiosis, histomoniasis, trichomoniasis, and leucocytozoonosis. Ascaridia, cecal worms, gapeworms, capillaria worms, tapeworms, and external parasites like lice and mites were among the parasitic diseases that were observed. But rickets, curled toe paralysis, nutritional disorders, perosis, crazy chick disease, and gizzard myopathy were discovered to be nutritionally related diseases (Schwartz, 1997). A small number of peacocks had mixed infections, most commonly *Eimeria* spp. with *Ascaridia* spp. and *Eimeria* spp. with *Strongyles* spp. (Kathiravan1 et al., 2017). According to earlier research, birds are more likely to contract mixed parasite infections (Jaiswal et al., 2013). There is no set vaccination schedule for peafowl because they are not frequently kept as pets or farm animals, but avian pox, blackhead disease, and coccidiosis are always potential risks (Allie, 2017). Internal parasites are the primary cause of the most prevalent disease affecting peafowls. Outdoor-housed birds are inevitably susceptible to nematode infestations, specifically roundworm infections caused by *Ascaridia galli* and *Capillaria* sp. (Darrel, 1996). In addition to other helminthes, the previous study found that coccidial infections were highly prevalent in Indian peafowl (Kathiravan1 et al., 2017). In captivity, coccidiosis is known to result in significant mortality in galliform birds (Rommel, 2000). The three main endoparasites that infect peafowls are cestodes, gastrointestinal nematodes, and coccidia (Titilincu et al., 2009; Jaiswal et al., 2013).

Peafowl health deteriorates by disease like mycoplasmosis in breeding pens, wildlife parks and zoos (Nadeem *et al.*, 2014). Newcastle disease (ND) is a type of acute respiratory illness that spreads quickly, while fowl pox (FP) is a virus-induced true pox. Since there is no treatment that effectively combats viral diseases, vaccination combined with constant, high-quality husbandry is the only way to prevent or control them (Schwartz, 1997). Even in the absence of illness, peafowl experience a variety of abnormalities. The majority of anomalies, such as lameness and curled toes, were discovered to be caused by vitamin or mineral deficiencies (Schwartz, 1997). Furthermore, anomalies brought on by unintentional causes are extremely frequent (Hopkins, 1997).

Vaccines are sold commercially, although their effectiveness is quite low. Sulfa medications and antibiotics can be used to medicate flocks in order to contain outbreaks. Neomycin or nitrofurantoin, two medications that are included in chick starter feed, can help lower paratyphoid-related losses. Antibiotic therapy is effective in controlling outbreaks of staphylococcosis and can be given to individual birds or to the flock through feed or water. Staphylococcosis can be controlled with the help of improved flock management practices and improved housing environment sanitation. There is no known cure for tuberculosis. Better environmental sanitation and management practices will aid in halting the spread of the illness (Schwartz, 1997). Typically, a wide variety of anthelmintics have been used to combat helminths. For example, Hegngi *et al.* (1999) found that albendazole and fenbendazole were effective in treating and preventing histomoniasis in turkeys, and Ashraf *et al.* (2002) found that levamisole was effective against gastrointestinal nematodes in common peafowl across various climate zones. Antibiotics are commonly used in naturally infected birds to treat avian mycoplasmosis (Charleston *et al.*, 1998; Hannan, 2000). However, scientists have reported that resistance to different antibiotics has developed globally (Gautier-Bouchardon *et al.*, 2002;

Pakpinyo and Sasipreeyajan, 2007). Tripathy *et al.* (1972) used terramycin (0.5 ml) infused into the swelling after exudate was removed, along with vitamin A intramuscularly, to treat the infra-orbital swelling in peafowl.

Above mentioned information gave the data about diseases, abnormalities and the treatment of Indian peafowl, reared in captivity as well as wild ranged. But no data were found in Bangladesh context about diseases, abnormalities and treatment of Indian peafowl. Therefore, the present study was done with objective disease conditions and different abnormalities of Indian peafowl and its treatment.

2. Materials and Methods

2.1 Study site and period

The research work was conducted to determine the disease condition and abnormalities as well as its treatment system of Indian peafowl in Bangladesh National Zoo (BNZ). Between April 2015 and December 2018, BNZ, the capital city of Bangladesh, located in the country's middle region, was the site of the current study. Prior to commencing the research, the investigator conducted a staff training on data collection techniques for diseases and abnormalities, along with methods for preventing and controlling those conditions and diseases that cause suffering in Indian Peafowls. In order to provide information about disease conditions, various abnormalities, and management procedures related to Indian peafowl, the current study was conducted.

2.2 Diseases and abnormalities with prevention measures

Disease and abnormality data were collected by using questionnaire and direct observation.



Figure 2.1: Sowing curled toes and bumble foot in Indian Peafowl of BNZ

The diseases and abnormalities which were recording in current study time by own observation as well as informing from hospital authority; listed to my own record book data and then analyzed the results, prepared all the figures and tables. At first the zoo stuff who engaged with peafowl rearing generally knocked the veterinary doctor about the primary disease condition and abnormalities. Then the disease diagnosis mainly had done by the veterinary doctor of hospital in BNZ. Generally in live condition diseased were diagnosed by clinical sign and information history but in case of death peafowl diseases were diagnose mainly by postmortem analysis. In some confused cases, the dead sampled also sent to the central diseases diagnostic laboratory (CDIL) for specific diagnosis.

Later on, the preventive measure and treatment schedule were collected from registrar book of the veterinary hospital and direct observation as well as using questionnaire. The extra information related to disease conditions and abnormalities were collected by using questionnaire and by direct observation. A well formed questionnaire with disease condition, abnormalities, predators and its management procedure in BNZ were used for data collection properly. Without this, data for finding disease condition and abnormalities in 2014 were collected from the record book as well as direct questioning. After confirmation about disease, the veterinary doctor was given the proper prescription as well as management of that disease condition properly. The prescription generally done based on avilable important

medicine. But the vaccine schedule was made for the Indian peafowl based on important diseases. The administration of vaccine to peafowl was done as per rules of vaccine producing company.

In some cases small surjery was also done like the case of wing injury as well as some cases done dressing like bumble feet and others wounds. In these cases the peafowl were separated and keep in isolated houses up to recovery. The injectable form of antibiotics also administered for 4 to 5 days as well as extra care also taken in these cases. On the other hand most of medication done flock wise and medicine and vitamin-mineral were mixted with supplied water as per requirements. The scheduled medication was done based on well planned schedule information sheet. Without this some common medicine kept all time in the hospital for common diseases like parasitic infestation and coccidiosis. In some serious case also medical board was also arranged for taking decision. On the other hand some sudden cases in any time, veterinary doctor was taken decision based on problems.

2.3 Data collection and analysis

A period of fifteen days was dedicated to the gathering of data, oversight, and management observation in order to ensure a clear concept. However, one person was working at the national zoo in Bangladesh to continuously collect data. The experiment's data were entered into an Excel spreadsheet, arranged, and processed in preparation for additional analysis. Pie charts were used to present the results for the majority of

diseases and abnormalities, which were based on percentages. Conversely, management information data was provided in tabular form for ease of understanding. Microsoft Excel and STATA 13 were used to analyze the gathered data.

3. Results and Discussion

3.1 Diseases and abnormalities of Indian peafowl

The total calculated diseases case was recorded only 8 in early stage in Indian peafowl from 2014 to 2018 (Table 3.1). Only 5 cases of colobacillosis and 3 cases of salmonellosis was recorded from which the highest colibacillosis case 60% (n=3) was recorded in 2015 whereas no colibacillosis recorded from 2016 to 2018.

Table 3.1: Diseases of Indian peafowl in Bangladesh National Zoo in early stage

Year	Colibacillosis (%; 95%CI)	Salmonellosis (%; 95%CI)
2014	2(40; 5.27-85.34)	0(0; 0-70.76)
2015	3(60; 14.66-94.73)	2(66.67; 9.43-99.16)
2016	0(0; 0-52.18)	0(0; 0-70.76)
2017	0(0; 0-52.18)	0(0; 0-70.76)
2018	0(0; 0-52.18)	1(33.33; .84-90.57)
Total	5(100;47.82-100)	3(100;29.24-100)

Also the highest salmonellosis case 66.67% (n=2) was found in 2015 but no case of salmonellosis was found in years 2014, 2016 and 2017 (Table 3.1). Without this in 2014, 40% (n=2) of the

colobacillosis was occurred whereas in 2018, 33.33% (n=1) of the salmonellosis was occurred in peachicks.

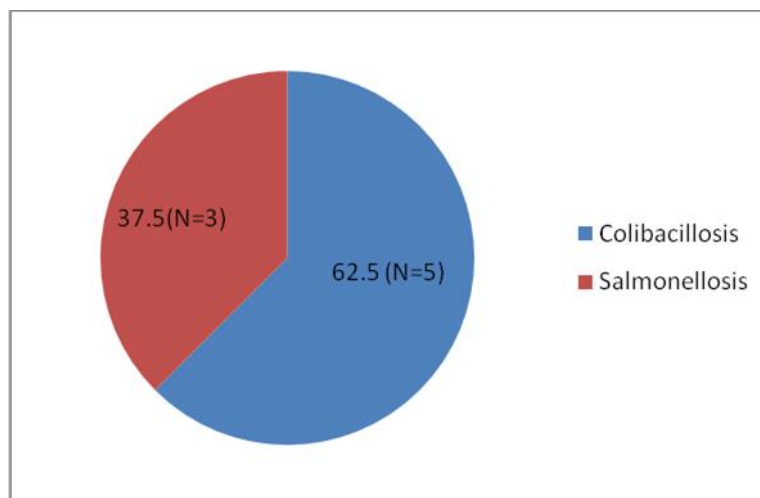


Figure 3.1: Diseases rate in early stage of Indian Peafowl in Bangladesh National Zoo

A total of 8 cases of common diseases in early stage of Indian peafowl were recorded in BNZ from 2014 to 2018, which were colibacillosis and salmonellosis. Out of the total recorded death case

of diseases, the highest rate 62.5% (n=5) was recorded colibacillosis and the salmonellosis rate was 37.5% in BNZ (Figure 3.1).

The disease omphalitis was also found in day old peachicks moreover ND, foowl fox, avian cholera, rickets, and enteritis reported in past time from record book and by questionnaire results. Mycoplasmosis is one of the most important diseases of Indian peafowl in BNZ. The common considerable disease, which was counted salmonellosis and colibesilosis in early stage of life of Inian peafowl. On the other hand, the inconsiderable but commonly found diseases were recorded in adult Indian peafowl was coccidiosis and parasitic infestation. The main causes of death were found in early stage of peachicks was found colibesilosis and salmonellosis. The others diseases did not causes more death in Indian peafowl of BNZ. One of the mature peacock dead

by heat stroke in 2016, in summer season and that was diagnosed by postmortem analysis of the dead bird. Another adult peacock died by combined effect of coli-enteritis and Ascaris parasitic infestation in 2017, which was also diagnosed by postmortem analysis of the dead bird.

The common abnormalities, which were counting in last four years, were curled toes; bumble feet wing injury and lameness (Table 3.2). The total cases counting in last four years was found 61 from where the highest was recorded curled toes (n=33), then lameness (n=18), then bumble feet (n=6) and the lowest was recorded (n=4) wing injury (Table 3.2).

Table 3.2: Year wise counting of abnormalities of Indian Peafowl in BNZ

Year	Curled toes (%; 95%CI)	Bumble feet (%; 95%CI)	Wing injury (%; 95%CI)	Lameness (%; 95%CI)
2015	9 (27.27; 13.29-45.52)	2 (33.33;4.33- 77.72)	2 (50; 6.76-93.24)	5 (27.78; 9.69-53.48)
2016	12 (36.36; 20.4054.88)	0 (0; 0-45.93)	0 (0; 0-60.24)	3 (16.67; 3.58-41.42)
2017	7 (21.21; 8.98- 38.91)	1 (16.67; .42-64.12)	1 (25; .63-80.59)	7 (38.89; 17.30-64.25)
2018	5 (15.15; 5.11- 31.90)	3 (50; 11.81-88.19)	1 (25; .63-80.59)	3 (16.67; 3.58-41.42)
Total	33 (100; 89.42-100)	6 (100; 54.07-100)	4 (100; 39.76-100)	18 (100; 81.47-100)

In 2016 the highest numbers of curled toes (36.36 %; n= 12) were recorded but the lowest number 15.15 % (n=5) was recorded in 2018. Bumble feet was recorded the highest number 50 % (n=3) in 2018 on the other hand no case was found in 2016. No wing injury was recorded in 2016 but recorded wing injury was the highest 50% (n=2) in 2015. Lameness was recorded the highest 38.89

% (n= 7) in 2017 but the lowest recoded 16.67% (n=3) in 2016 and 2018 (Table 3.2). Curled toes also recorded 27.27% (n=9) in 2015 and 21.21% (n=7) in 2017. Lameness was recorded 27.78% (n=5) and bumble feet was recorded 33.33% (n=2) in 2015. Wing injury reported 25% (n=1) in both year 2017 and 2018. But the bumble feet reported 16.67% (n=1) in year 2017.

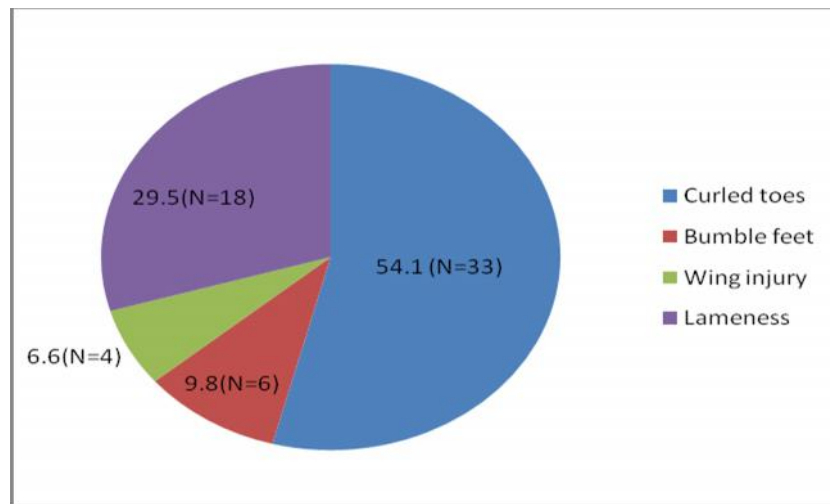


Figure 3.2: Rate of several abnormalities of Indian Peafowl in Bangladesh National Zoo

A total of 61 cases of common abnormalities were recorded in BNZ from 2015 to 2018, which were curled toes, lameness, bumble feet and wing injury. Out of the total recorded abnormalities, the highest rate 54.1% (n=33) was curled toes and the lowest recorded case rate was 6.6% (n=4) wing injury (Figure 3.2). On the other hand, the 2nd highest case rate was lameness (29.5%; n=18) and the 2nd lowest case rate was bumble feet (9.8%; n=6) in BNZ (Figure 3.2).

However, other abnormalities, which were listed, gout in hock joint, heat stress, cool stress, visitor stress, nervous disorder and coprophagy/autocoprophagy that were recorded from questionnaires answer and sometime from observation. Fighting was found common in breeding season by male to male and cannibalism found in rare case in early stage of life due to

mineral deficiency in India peafowl. The most of the abnormalities was mainly cause by vitamin-mineral deficiency and by environmental factors. Without this several type of stress like heat, cool and visitors were also observed in the present study of Indian peafowl. As we know peafowls are omnivores in nature due to these self-feces as well as self infested parasites were also intake by Indian peafowl.

3.3 Treatment for Disease conditions and different Abnormalities

Antibiotics used mainly for infectious diseases and the most common antibiotics were Oxy-tetracycline ad Gentamicine. Without this anticoccidial drugs used against coccidiosis which was also a common disease of Indian peafowl in BNZ (Table 3.3).

Table 3.3: Treatment of disease conditions and abnormalities of Indian Peafowl in BNZ

SL No.	Treatment
1	Antibiotics
2	Anticoccidial drugs
3	Antihistaminic
4	Antiparasitic drugs
5	Anti mycoplasmal drug
6	Sulfar drug
7	Vitamin-mineral
8	Vitamin B-complex
9	Vitamin-C
10	Saline solution
11	Antiseptic uses in injury
12	Surgery

Antibiotics, anti-coccidial drugs, antihistaminic, anti-parasitic drugs, anti-mycoplasmal drug, vitamin-mineral premix, vitamin B-complex, vitamin-C and saline solution were found mainly used drugs (Table 3.3). Without this in case of injury antiseptic as well as surgery was used and then other supportive drugs also used (Table 3.3).

Several types of medication based on diseases were maintained properly by Physician prescription. A veterinary hospital is sated in the BNZ for treating and preventing several types of abnormalities and diseases. The most common medication based on diseases was implemented is as follows: In case of omphalitis- oxytetracycline, 5-7 days; weakness – multivitamin and mineral solution, 5-7 days; parasitic infestation- piperazine citrate/ albendazole/ fenbedazole / single dose or some time double doses; coli-enteritis - doxycycline+colestin; salmonellosis- oxytetracycline, 5 days; mycoplasmosis/infectious bronchitis- tylosin/ doxycycline+colestin, about one week; coccidiosis-sulfa drug /sulphaclozine sodium monohydrate, 3-5 days; bumble feet - iodine swabbing and oxy tetracycline, 5 days and wound – iodine or potassium permanganate solution as antiseptic, up to required time. However, in case of surgery – inject 0.5 ml oxtetracycline for 4-5 days and dressing properly by antiseptic and supportive treatment by antihistaminic drugs. Without this for curled toes treatment was done only for few days by Vitamin B₁₂₆. On the other hand specific treatment and others supportive treatment with vitamin mineral and antihistaminic drugs were used for rapid recovery and proper cure of the diseases and abnormalities of Indian peafowl in BNZ.

The common diseases of Indian peafowl was found in past study enteritis, nephritis, haemorrhagic enteritis, coryza, liver intoxication, traumatic gizzard, hepatic discolouration, Newcastle, and putrefied (Tariq *et al.*, 2019). Without this in another past study the common diseases was found based on infectious agents were viral diseases of peafowl listed were Newcastle disease, fowl pox, hemorrhagic

enteritis and mycoplasmosis, but bacterial diseases were pullorum and fowl typhoid, paratyphoid, staphylococcus, fowl cholera (FC), avian tuberculosis, etc., and the protozoal disease were coccidiosis, histomoniasis, trichomoniasis, leucocytozoonosis. The parasitic disease was observed, internal parasitic - ascaridia, cecal worms, capeworms, capillaria worms, tapeworms and external parasitic lice, mites, etc. (Schwartz, 1997). Past studies described that the peafowls were found prone to many bacterial, viral and parasitic infectious diseases (Hopkins, 1997). On the other hand, the risk factors were recorded for developing infectious diseases in peafowl's including unnatural habitat, the human encroachment, and deforestation and fragmented forest lands (Perrins, 1990), availability of vectors and intermediate hosts and urbanization. There were approximately 80 infectious diseases that are encountering the peafowl regularly. The diseases and health of peafowl were reported very similar to turkeys and the domestic poultry (Schwartz, 1997).

One of the past study by (Khan *et al.*, 2009) who reported that peafowls raised in inadequate conditions, on poor quality feed and exposed to natural pathogens most frequently became victims of nutritional, viral, bacterial and parasitic diseases. Peafowl health deteriorates by disease like mycoplasmosis in breeding pens, wildlife parks and zoos (Nadeem *et al.*, 2014). Captive condition paves the ways for bacterial, viral, nutritional and parasitic diseases among peafowls (Hollamby *et al.*, 2003). The diseases of the first few weeks were found in peachicks like colibacillosis and salmonellosis were similar like the past study by (Frossido, 1986; Fattah *et al.*, 1999). In the present study, we also found same type of diseases in Indian peafowl but diseases number as well as variation was found few because of good management and proper care was taken by the BNZ authority to prevent and control diseases of Indian peafowl.

Parasitic infestation in birds is a common problem. The parasitic diseases in peacocks are less known, but it is an accepted fact that the most diseases resemble the ones that are encountered in turkeys Titilincu *et al.*, (2009). Birds are usually very hardy and the most common diseases that afflict them are caused by internal parasites. *Ascaridia* spp. are nematode parasites found throughout the globe, which possess a wide host range, infecting the small intestines of chickens, turkeys, geese, pigeons, partridges, guinea fowl, and a number of wild birds, including peafowl (Bean *et al.*, 2005; Camacho-Escobar *et al.*, 2008). Regrettably, like other captive birds, they are also suffering from potential stress and frequent cases of parasitic infections, which are among the most prevailing diseases that affect them (El-shahawy, 2010).

The most common disease was found in present study in Indian peafowl in whole time was parasitic infestation and coccidiosis, the past studies also supported that parasitic infestation was more common than coccidiosis compared to others disease. Basit *et al.* (2014) reported that the prevalence percentage of gastro-intestinal parasites was 56.32%. Coccidia, gastro-intestinal nematodes and cestodes are major endo-parasites infecting peafowls (Titilincu *et al.*, 2009; Jaiswal *et al.*, 2013). Among parasitic diseases caused by protozoa, coccidiosis, is common and causes the most rigorous health and economic problems throughout the world (El-Shahawy, 2010). One of the past study reported after examination, 8 of 12 samples (66.6%) presented single or mixed nematode infection and ascarid eggs were the most frequent finding on fecal examination in Indian peafowl. Adult peafowl did not present clinical signs even when positive after fecal exam (Teixeira *et al.*, 2012). Therefore, we found that the past studied result also agreed with the present study about parasitic infestation and coccidiosis. The several types parasitic infestation were found from the past findings but very common was ascarid infection which result also close agreement with current study finding in 2017 one of peacocks died from combined effect of

ascariasis and coli-enteritis. One of the common disease also reported in Indian peafowl of BNZ, mycoplasmosis that was also supported by past study by Nadeem *et al.*, 2014, the peafowl can be hampered by the disease mycoplasmosis in breeding pens, wildlife parks and zoos. One of the past study about the common organisms were found in peafowl in three zoos were *Bordetella avium*, *Mycoplasma synoviae* *Clostridium perfringens* and *Escherichia coli*. Some of those organisms was always found in the peafowl as commensalisms but some times they produced diseases when immune systems do not functioning well (Stewart *et al.*, 1996). The current study also reported the case of mycoplasmosis in Indian peafowl of BNZ which result also supported by the past studied results. Newcastle disease (ND) is a highly contagious and fatal disease affecting poultry and a wide range of wild birds worldwide (Miller *et al.*, 2010; Dimitrov *et al.*, 2016). The Newcastle disease and fowl pox (FP) disease were recorded in past time in BNZ when no ND vaccine was administered in peachicks and adult peafowl routinely. Now the Newcastle disease and FP not break down in the peafowl flock because of routine vaccination maintained properly. There was no break down of avian influenza (AI) in peafowl of BNZ though one case sent to CDIL to diagnosis for AI, but it was found negative result. Since the AI vaccine also administered routinely to Indian peafowl to prevent this disease. In adult peafowl most of the diseases were treated by proper medication and finally recovered from the diseases. However, in early stage before starting treatment some peachicks was found death because of immune system do not activated in peachicks. The parasitic infestation as well as coccidiosis case, the routine administration of drugs was found in BNZ and due to this that cases were recovered properly. One of the important diseases was found mycoplasmosis, peafowl was suffered by this disease for long time. This disease management and treatment is very tough for zoo people and in this case, they treated the peafowl with two combined antibiotics as well as supportive medicine for long time.

The nutrition related diseases were found as rickets, curled toe paralysis, nutritional roup, perosis, crazy chick disease and gizzard myopathy (white muscle disease). Other than the diseases, peafowls also suffer from several types of abnormalities like curled toes, lameness, wing injury etc. were found due to lack of vitamins or minerals (Schwartz, 1997). In addition, abnormalities occurred due to accidental causes are very common (Hopkins, 1997). There were not many chances for a peachick in a brooder to injure itself. More commonly you may see chicks bullying one another - picking head feathers, grabbing wings, pecking at exposed feet. Some of this is them exploring, sometimes it is something into which you need to intervene. If anyone draws blood, they should be separated. If you notice a chick is being kept away from food or water, it should be separated (Kedreeva, 2011). That result also supported by present study where we found cannibalism in peachicks due to mineral deficiency. Only few results of nutritional deficiency diseases and abnormalities were recorded in the past studies and most of which also supported by the present study. The current study also found same type of abnormalities in Indian peafowl but abnormalities number as well as variation was found more in present study. This is because of current study considered so many things as abnormalities though past study overlooked that science of these abnormalities recovered automatically or medicated with vitamin-mineral mix for few days. On the other hand, most of the abnormalities mainly caused from vitamin-mineral deficiency and environmental factors. Therefore, these were easily recovered from supply of specific vitamin-mineral and remove the environmental factors properly. As we know peafowl prefer to live in captivity and due to this suffer from low number of diseases. The diet is very important for suffering from several types of diseases, because from the past study by Norris, (1999) was found that the peafowl did not burn their excess protein and calcium by walking more and they will suffer from gout and kidney failure. In the present study we also found good number of gout cases, this is because in captivity not burning protein and calcium properly due to not walking more in captivity.

Generally the broad range of anthelmintics have been used against helminths such as albendazole and fenbendazole for their effectiveness in the treatment and prevention of histomoniasis (black head) in turkeys by Hegngi *et al.*, (1999), levamisole against gastrointestinal nematodes in common peafowl by Ashraf *et al.*, (2002) in different climatic areas. Coccidiosis is best controlled by preventative medication in the feed during the susceptible age of the birds. Coccidiostats (preventive drugs) are available commercially with Amprolium and Rofenaid being the most prominent two. If a coccidiostat cannot be obtained, any good sulfa drug can be substituted in the feed. When outbreaks occur, birds can be treated with sulfa drug in the drinking water. All drugs should be used in accordance with the label instructions (Schwartz, 1997). In case of injury peafowl was injected oxytetracycline, 0.50 ml/IM, finding of current study. If you must give an injection to one of your peafowl, unless specifically directed to be a veterinarian, do not inject into the breast muscles of your bird. If possible, subcutaneous injections should be given, and the best spot for this is between their wings along their back (Kedreeva, 2011). The ailing peafowl chicks were treated with Albendazole oral suspension @ 5mg/Kg body weight. No Ascaridia eggs could be detected on the examination of faecal samples of the treated peafowl chicks on 7th and 14th day post treatment and the birds recovered (Rao and Hafeez, 2006). Reece *et al.*, (1986b) reported that treatment with sulphonamide did not reduce the number of new cases within the flock, and so tylosin was recommended in infectious sinusitis associated with MG in peafowl, turkeys and other game birds. Reece *et al.*, (1986a) successfully treated mycoplasmosis in racing pigeons with tylosin followed by oxytetracycline or chlortetracycline at a dose rate of 0.2-0.5 g per litre of drinking water for five days. These above described treatment schedules helped to improve bird health gradually.

Most of the peacocks were found with good and large numbers of eye-spots which help to initiate more immunity in peachicks and suffers from low numbers of diseases in early stage. We also found that some time commensalism microorganism like *E. coli* also do diseases in peachicks because in early stage immune systems did not functioning well. From the above discussion, we can say that the Indian peafowl was suffered from the diseases like the diseases of chicken species as well as turkey bird species. Therefore, it is easy to diagnosis and treatment of peafowl diseases and abnormalities for management people. Without this available vaccine and medicine can be found easily from the market due to same type of disease like chicken and turkey species.. Therefore, diseases and abnormalities diagnosis as well as treatment procedure can be maintained easily. By this way management people of BNZ for Indian peafowl properly identified the diseases and abnormalities as well as can be taken the next steps of management perfectly.

Conclusion

When Indian peafowl reached adulthood, parasitic infestation and coccidiosis replaced the common diseases of early life, which were salmonellosis and colibacillosis in BNZ. However, lameness, bumble feet, curled toes, weakness, and wing injuries were the most frequently observed anomalies. Vaccination, management, and treatment were the general approaches for preventing and controlling the aforementioned item. Peachicks that are not properly brooded also contribute to the prevention of numerous diseases and exhibit good growth performance. Antibiotics that are primarily used to treat infectious diseases; gentamycin and oxytetracycline are the most widely used antibiotics. Additionally, anticoccidial medications were used to treat coccidiosis, another common illness among Indian peafowl in BNZ. A physician's prescription was necessary to maintain the appropriate use of several disease-based medication types.

The Bangladesh National Zoo has a veterinary hospital that is equipped to treat and prevent a variety of illnesses and abnormalities. Using the drugs that were readily available on the Bangladeshi market, BNZ implemented the most popular medication based on diseases. In the absence of these specialized treatments, Indian peafowl diseases and abnormalities were properly treated and quickly recovered from with the use of supportive treatments involving vitamin and mineral supplements and antihistaminic medications. The official veterinary physicians made accurate diagnoses of illnesses and abnormalities based on postmortem examination and clinical signs. The doctors' recommended course of treatment was then administered. Ultimately, we came to the conclusion that the official veterinary physicians correctly diagnosed diseases and abnormalities based on clinical signs and postmortem analysis, and that the doctors' recommended course of treatment came next. The current study's findings on abnormalities, disease conditions, and management techniques can be applied to these areas of future research. Many zoos, wildlife parks, and farms can use these significant findings on diseases and abnormalities in peafowl, as well as prevention and control measures, for their management needs.

References

- Allie, L. (2017). 5 Essential Tips for Keeping Peacocks as Pets. WOS, INC. <https://www.wideopenpets.com/5-essential-tips-for-keeping-peacocks-as-pets/>; Accessed on 09 April, 2019.
- Ashraf, M., Waraich, F. N., Ahmad, I. G., & Pervez, K. (2002). Chemotherapy of gastro-intestinal nematodes in common peafowl (*Pavo cristatus*). *Pakistan Veterinary Journal*, 22(2), 91-93.

- Basit, A., Ali, A. A., Malik, M. S., Malik, A. N., Iftikhar, M., Haq, H. M. A., & Nadeem, S. M. (2014). A study of gastrointestinal helminths in native peafowl and comparative efficacy of Albendazol and a Pyrantel pamoate against the helminth parasites. *Journal Infection and Molecular Biology*, 2(2), 22-25.
- Bean, D. L., Rojas-Flores, E., Foster, G. W., Kinsella, J. M., & Forrester, D. J. (2005). Parasitic helminths of Eurasian collared-doves (*Streptopelia decaocto*) from Florida. *Journal of Parasitology*, 91(1), 184-187.
- Camacho Escobar, M. A., Arroyo Ledezma, J., & Ramirez Cancino, L. (2008). Diseases of backyard turkeys in the Mexican tropics. *Annals of the New York Academy of Sciences*, 1149(1), 368-370.
- Charleston, B., Gate, J. J., Aitken, I. A., & Reeve Johnson, L. (1998). Assessment of the efficacy of tilmicosin as a treatment for *Mycoplasma gallisepticum* infections in chickens. *Avian pathology*, 27(2), 190-195.
- Darrel, K. S. (1996). Antimicrobials commonly used in avian medicine Part 4: Antifungals, anthelmintics, and antiprotozoals. Old World Aviaries Antimicrobial. Hill Country Aviaries, LLC, pp. 33-34.
- Dimitrov, K. M., Ramey, A. M., Qiu, X., Bahl, J., & Afonso, C. L. (2016). Temporal, geographic, and host distribution of avian paramyxovirus 1 (Newcastle disease virus). *Infection, genetics and evolution*, 39, 22-34.
- El-Shahawy, I. S. (2010). *Eimeria pavaegyptica* sp. nov. (Apicomplexa: Eimeriidae) in faeces of Indian peacocks (*Pavo cristatus*) Linnaeus, 1758 (Galliformes: Phasianidae) from Egypt. *Memórias do Instituto Oswaldo Cruz*, 105(8), 965-969.
- Fattah, K.A. (1999). The Danish human resource base in agricultural research for development. Poultry as a tool in poverty eradication and promotion of gender equality. Proceedings of a workshop. Held on March 22-26, pp. 21.
- Forssido, T. (1986). Studies on the meat production potential of some local strains of chickens in Ethiopia (Doctoral dissertation, University of Giessen).
- Gautier-Bouchardon, A. V., Reinhardt, A. K., Kobisch, M., & Kempf, I. (2002). In vitro development of resistance to enrofloxacin, erythromycin, tylosin, tiamulin and oxytetracycline in *Mycoplasma gallisepticum*, *Mycoplasma iowae* and *Mycoplasma synoviae*. *Veterinary microbiology*, 88(1), 47-58.
- Hannan, P. C. (2000). Guidelines and recommendations for antimicrobial minimum inhibitory concentration (MIC) testing against veterinary mycoplasma species. *Veterinary research*, 31(4), 373-395.
- Henggi, F. N., Doerr, J., Cummings, T. S., Schwartz, R. D., Saunders, G., Zajac, A. & Pierson, F. W. (1999). The effectiveness of benzimidazole derivatives for the treatment and prevention of histomonosis (blackhead) in turkeys. *Veterinary parasitology*, 81(1), 29-37.
- Hollamby, S., Sikarskie, J. G., & Stuht, J. (2003). Survey of peafowl (*Pavo cristatus*) for potential pathogens at three Michigan zoos. *Journal of Zoo and Wildlife Medicine*, 34(4), 375-379.
- Hopkins, C. (1997). Peafowl Husbandry. *Game Bird and Conservationists Gazette*, 6, 37-39.
- Hopkins, C. (1997). Peafowl Husbandry. *Game Bird and Conservationists Gazette*, 6, 37-39.
- Hopkins, C. (1997). Peafowl Husbandry. *Game Bird and Conservationists Gazette*, 6, 37-39.
- Jaiswal, A. K., Sudan, V., Shanker, D., & Kumar, P. (2013). Endoparasitic infections in Indian peacocks (*Pavo cristatus*) of Veterinary College Campus, Mathura. *Journal of parasitic diseases*, 37(1), 26-28.

- Kathiravan, R. S., Ramachandran, P., Shanmuganathan, S., Karthikeyan, A., Sathiyamoorthy, N., Gollapalli, S. K. & Madesh, E. (2017). Prevalence of Endoparasitic Infection in Free Ranging Peacocks of Southern Tamil Nadu, India. *Int. J. Curr. Microbiol. App. Sci*, 6(10), 366-371.
- Kedreeva, (2011). Peafowl 103: Illness, Injury, Medication and Care. <https://www.backyardchickens.com/thread/s/peafowl-103-illness-injury-medication-and-care-in-progress.542109/>; Accessed on 12 April, 2019.
- Kedreeva, (2015). Peafowl 101: Basic Care, Genetics, and Answers. Introduction to peafowl. The basics, caring for peafowl, genetics and more. <https://www.backyardchickens.com/articles/peafowl-101-basic-care-genetics-and-answers.67744/> Accessed on 12 April, 2019.
- Khan, A., Yousaf, A., Khan, M. Z., Siddique, M., Gul, S. T., & Mahmood, F. (2009). Cutaneous form of pox infection among captive peafowl (*Pavo cristatus*) chicks. *Avian pathology*, 38(1), 65-70.
- Miller, P. J., Decanini, E. L., & Afonso, C. L. (2010). Newcastle disease: evolution of genotypes and the related diagnostic challenges. *Infection, genetics and evolution*, 10(1), 26-35.
- Nadeem, M., Yousaf, A., Iqbal, Z., Awais, M. M., & Pervez, B. A. (2014). Prevalence, diagnosis and treatment of mycoplasmosis in game birds. *World's Poultry Science Journal*, 70(1), 69-80.
- Norris, T. 1999. Captive Bird Diets vs Wild Bird Diets. <http://www.peafowl.org/articles/captive-bird-diets-wild-bird-diets/>; Accessed on 12 April, 2019.
- Pakpinyo, S., & Sasipreeyajan, J. (2007). Molecular characterization and determination of antimicrobial resistance of *Mycoplasma gallisepticum* isolated from chickens. *Veterinary microbiology*, 125(1-2), 59-65.
- Perrins, C. M. (1990). Conseil international pour la protection des oiseaux. *The illustrated encyclopaedia of birds: the definitive guide to birds of the world*. Headline.
- Rao, T. B., & Hafeez, M. (2006). Ascariasis in Indian peafowl (*Pavo cristatus*) chicks. *Zoos PJ*, 21(8), 2377.
- Reece, R. L., Ireland, L., & Barr, D. A. (1986a). Infectious sinusitis associated with *Mycoplasma gallisepticum* in game birds. *Australian veterinary journal*, 63(5), 167-168.
- Reece, R. L., Ireland, L., Scott, P. C., Pang, V. F., Adams, J. H., Beasley, V. R., & Haschek, W. M. (1986b). Mycoplasmosis in racing pigeons. *Australian veterinary journal*, 63(5), 166-167.
- Rommel, M. (2000). Parasitosen des Nutzgeflügels (Huhn, Truthuhn, Gans, Ente, Taube). *Veterinärmedizinische Parasitologie*. Parey Buchverlag, Berlin, 673-774.
- Schwartz, D.L. (1997). Disease of Peafowl. Issue of The UPA Newsletter. © 1997 The United Peafowl Association. <https://unitedpeafowlassociation.org/page/1/?s=health/>; Accessed on 19 December, 2018.
- Stewart, I. R., Clark, F., & Petrie, M. (1996). Distribution of chewing lice upon the polygynous peacock (*Pavo cristatus*). *The Journal of parasitology*, 82(2), 370-372.
- Tariq, M., Butt, N. S., Mansha, M., & Bhinder, M. A. (2019). 34. Breeding performance and disease profile of six peafowl species in captivity at Jallo breeding center, Lahore. *Pure and Applied Biology (PAB)*, 8(1), 312-320.
- Teixeira, M., Monteiro, J. P., Catenacci, L. S., de Azevedo Rodrigues, M. D. L., & de Carvalho, M. (2012). Ascariasis in peafowl (*Pavo cristatus*, Phasianidae) due to *Ascaridia galli* Schrank, 1788. *Journal of Zoo and Wildlife Medicine*, 43(3), 585-587.

- Titilincu, A., Mircean, V., Bejan, A., Iovu, A., Ungureanu, R., & Cozma, V. (2009). Prevalence of endoparasites in peacocks (*Pavo cristatus*). *Revista Scientia Parasitologica*, 10(1/2), 101-105.
- Tripathy, S. B., Acharjyo, L. N., Singh, U., Ray, S. K., & Misra, S. K. (1972). Studies on an outbreak of *Mycoplasma gallisepticum* infection among peafowls (*Pavo cristatus*). *British Veterinary Journal*, 128(8), 428-431.

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