

Preventive Measures and Management Systems against Diseases and Abnormalities of Indian Peafowl in Bangladesh National Zoo

Abstract

The wild and domesticated peafowls are prone to many bacterial, viral and parasitic infectious diseases. Various factors are contributing to infections in peafowls. However, there is very little published data on preventive measures and management systems against disease conditions and abnormalities of Indian peafowl. Therefore, we aim to identify the disease conditions and different abnormalities as well as its management in captivity. The research was done from April 2015 to December 2018 in Bangladesh National Zoo (BNZ) by direct interacting, observing, using structured questionnaire and taking data from record book. Vaccine against ND, fowl pox and avian influenza were used for Indian peafowl in BNZ for combating against those diseases. Without this medication against parasitic infestation was started from 4 month of age and later continued regularly six months' interval. Some vitamin mineral and nutrients substances also used regularly for preventing several abnormalities and diseases. Routine checkup was also found to prevent diseases, abnormalities. A well management system has developed in relation with feeds, feeding system, and habitats for making protection against abnormalities, diseases and predators of Indian peafowl. The house was made with good protection system for entering predators and also the visitors which help to protect predation and disturbing of visitors. Without this cleaning regularly, proper drainage system, controlling for entering predators and enough spaces in houses also help in protection against abnormalities, diseases and predators. Feeds and feeding system was also found very good like regular fresh feed supply, balanced feed supply and nutrias feed supply all the year round to their peafowl's. Without this properly brooding of peachicks also, help to prevent many diseases as well as express good growth performance. A veterinary hospital in the BNZ premises provides regular monitoring of their health status and suggests good quality management practices for all animals including Indian peafowl.

Keywords: Indian peafowls, diseases, abnormalities, preventive measures, management system, Bangladesh National Zoo

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Introduction

Restricting the free movement of visitors in wildlife parks as well as zoos and adopting the proper bio-security measures is vital to minimize the risk of infectious diseases in Galliformes.¹⁷ Most of the commonly occurring infections caused by *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) in captive peafowl and pheasants are associated with respiratory diseases and are characterized by foamy eyes, swollen infra-orbital sinuses, respiratory distress and death, but in peafowl its mechanism of transmission is unknown. Transmission may be associated with infected hosts at shared feed stations or shelter areas in the winter season.⁸ Other avian species, including turkeys, chickens and bantams, may be the cause of transmission of MG in peafowl maintained in cages, and further transmission of the disease may occur by farm-to-farm movement of workers, visitors and other personnel on farm.^{13,5} reported that MG remained alive in human hair for up to three days and MS up to eight hours, and on the nose and clothes MG and MS survived 12-24 hours and two to four days, respectively. Avian mycoplasmosis may be transmitted vertically through the eggs, or horizontally by direct contact between sick or unaffected carriers and susceptible animals. Indirect transmission via people, wild birds, drinking water, litter or breeding material may play a major role in the initiation of MS outbreaks because of the possible persistence of *Mycoplasma* spp. in the environment.¹¹ MG and MS infections were frequently found in game birds where multiple housing of different avian species was practiced.^{8,16}

⁴reported that addition of new birds within the flocks, without serological screening, could be a possible cause of infection in pheasants and peafowl. The best control is prevention of the introduction of *Pasteurella* into the flock from new birds, sick birds, or contaminated materials and equipment. Vaccines are commercially available but are only marginally successful. Outbreaks can be brought under control by flock medication with sulfa drugs and antibiotics. Premises will remain infected following a FC outbreak unless a thorough decontamination program is conducted. In case of typhoid the birds should be eradicated from flocks. Outbreaks of Staphylococcosis do respond to antibiotic therapy that can be administered to birds individually or to the flock in the feed or water. Improved sanitation of the housing environment and better flock management will help control Staphylococcosis. There is no treatment against TB. Improved management, better sanitation of the environment will help to prevent the introduction of the disease.²⁰

Control of lice is established by initiation treatment for all birds in the flock on a periodic basis with an approved safe pesticide. Treatment is not recommended unless lice are present on the birds. The life cycle of mite is 7 to 14 days so control requires treatment at 10 day intervals for 3 to 4 treatments and monthly thereafter of all birds in the flock with an approved safe pesticide.²⁰ Modern anthelmintics generally have a wide range of safety, considerable activity against immature larval and mature stages of helminths, and a broad spectrum of activity. The ideal anthelmintic should have a broad spectrum of activity against mature and immature parasites, be easy to administer, have a wide

margin of safety and be compatible with other compounds and be cost effective. 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,⁷ levamisole against gastrointestinal nematodes in common peafowl by,¹ in different climatic areas.

Infectious diseases of peafowl cross the whole spectrum of etiological or causative agents including virus, virus-like bacteria, fungi, protozoan, worms, and external parasites. Similarly, all systems of the bird are affected by these infections. The approaches to study diseases are to consider specific infections, regardless of causative agent by systems such as the respiratory, digestive, immune, reproductive, circulatory, renal, and nervous systems. The more common approach is to study the disease agent by its manifestations, clinical signs, systems affected and control. In case of dead peafowl, it should be done postmortem for diagnosis diseases, but in some case for confirm diagnosis needs laboratory diagnosis also. All bird fanciers are encouraged to familiarize themselves with necropsy (post-mortem) procedures and should routinely necropsy freshly dead or sick birds at the onset of a disease outbreak. Even if you contact your veterinarian or birds are submitted to a diagnostic laboratory, you need to be in position to describe the lesions you found in the birds. Important points to observe are the attitude of the bird, feathering, fleshing, colour of flesh, scaly legs, crusts on beak or eyelids, internal lesions by organ, i.e. heart liver, lungs, spleen, intestine, gonads, and kidney.²⁰

In summary, the diseases and health of peafowl are about the same as those in domestic poultry, especially turkeys. The experienced peafowl and poultry breeder become familiar with diseases endemic on their farm, locality or state. Since many of the avian diseases do cross species line, the mingling of peafowl with other menagerie birds or domestic poultry will increase the chance of becoming infected with diseases that are endemic. There was no study about Indian peafowl preventive measures and management system of diseases and abnormalities earlier in Bangladesh context. Therefore, the present study was done with objective preventive measures and management system of diseases and abnormalities of Indian peafowl in Bangladesh National Zoo.

Material and methods

Study site and period

The research work was conducted to determine the preventive measures and management system of disease condition and abnormalities of Indian peafowl in BNZ. The current study was done in BNZ, which is located in capital of Bangladesh and situated middle part of Bangladesh during April 2015 and December 2018. Before starting the experiments, the researcher took a training class of the staffs about experiment for taking data properly on disease condition and abnormalities as well as prevention and control methods of that diseases and abnormalities which, cause suffering of Indian Peafowl. Therefore, the current study was done to inform about disease conditions and different abnormalities of Indian peafowl and its management procedure.

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 staff who engaged with peafowl rearing generally knocked the veterinarian about the primary disease condition and abnormalities. Then the disease diagnosis mainly had done by the Veterinary 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 available 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 surgery 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 5days 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 mixed with supplied water as per requirements. The schedule 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. Finally, most of management data were taken from direct observation and by using questionnaires.

Data collection and analysis

A 15days' interval was done for data collection, supervision and observation of management for clear conception. On the other hand, one person was engaged in BNZ to collect data continuously. The data generated from this experiment were entered in Microsoft Excel worksheet, organized and processed for further analysis. The management information data were presented in tabular form for informing easily.

Results and discussion

Preventive measures against disease conditions and abnormalities

Vaccine against Newcastle disease (ND), Fowl pox (FP) and Avian influenza (AI) were used for Indian peafowl in BNZ to protect those diseases. The vaccines were administered based on the vaccine production company direction (Table 1). Vaccine against ND was given usually at 5days and 21stdays, 2months, 4month then regular yearly, but vaccine against avian influenza H5N1 strain @ 0.5ml in the adult peafowl yearly and then vaccine against fowl pox was supplied at the age of 30 to 31days, single dose. Table 1

Without this medication against parasitic infestation was started from 4 month of age and later continued regularly six months' interval. Some vitamin mineral and nutrients substances also used regularly for

preventing several abnormalities and diseases. Amino acid solution supplied at the time of growing stage as well as train feathers initiation stage. To prevent of heat stress in summer electrolyte and vitamin C supply in the water and in case cool stress in winter supply multivitamin and mineral in the water routinely. In early stage glucose water as well as some time antibiotic water supply for more energy and to prevent omphalitis of peachicks (Table 1). In the breeding season extra supply of vitamin AD₃E, calcium, vitamin E and selenium, multivitamin and mineral and Vitamin AD syrup which help to maintain proper breeding stage for male displaying and sperm production and female good ova formation and egg laying (Table 3.4). Routine checkup was also found to prevent diseases, abnormalities. Without this dust bathing space and quarantine shed as well as veterinary support was found available in BNZ for Indian peafowl (Table 1).

Table 1 The most important preventive measures against disease conditions and abnormalities of Indian peafowl in BNZ

SL No.	Preventive measures
1	Vaccination against ND
2	Vaccination against fowl pox
3	Vaccination against avian influenza
4	Anti-parasitic drugs start from 4 month of age
5	Routine anti-parasitic medicine supply
6	Glucose water supply in early stage
7	Antibiotic water supply in early stage for preventing omphalitis
8	Routine check-up
9	Routine multivitamin and mineral supply in winter season
10	Routine electrolyte solution and vitamin C supply in summer season
11	Vitamin-mineral supply also in other time when need
12	Amino-acid solution supply at the growing stage and molting stage
13	Calcium supply in breeding season
14	Vitamin E and Selenium supply in breeding season
15	Routine multivitamin and mineral supply in breeding season
16	Vitamin AD ₃ E supply in breeding season
17	Vitamin AD syrup supply in production season
18	Quarantine shed for diseased or newly arrived Indian peafowl
19	Properly maintain hygiene of Indian peafowl enclosure
20	Available space for dust bathing
21	Maintain a veterinary hospital

The Newcastle disease vaccine is very effective on peafowls. Poultry feed, vitamin and minerals supplements are enough for peafowl's, continued health and productivity.⁹ In case of birds, most of time used only Newcastle disease vaccine. Previously, only killed virus vaccines were recommended, but recent studies have shown that some modified live vaccines are safe for use in selected species. The decision to vaccinate zoo animals for less common diseases for which a vaccine is available should be made on an individual basis.¹⁵ When it comes to vaccinations in birds, it is usually the whole flock or none of the flock.¹⁰ Present study also supported the previous findings, where properly maintain Newcastle disease vaccine and maintain some other vaccine. Without this we found that the dust-bathing of Indian peafowl is one of the most common behaviors which prevent bacteria and other external parasites infestation. That result supported by the past finding as Ramesh and McGowan,¹⁸ point out, 'dust-bathing' is important to get rid of the feather-degrading bacteria and other external parasites another past finding was found by also similar result.¹⁹

Most of the past study about prevention of diseases and abnormalities gave emphasis on control parasitic infestation, which make hazard in whole life of Indian peafowl. The parasites adversely affect the health of birds during the time of heavy infestation with loss in body weight, lowering the host resistance against other infections, retarded growth, unthriftiness, damage to the gut epithelium, reduced

egg production, emaciation and death especially in younger birds.¹⁴ A broad range of anthelmintics such as Hegngi,⁷ has used albendazole and fenbendazole for their effectiveness in the treatment and prevention of histomoniasis (black head) in turkeys.¹ used Levamisole against gastrointestinal nematodes for common peafowl in different climatic areas. The twice a year worming is preventative and "house cleaning" in nature, not a restriction. If worming only twice a year, most people will do this at the start of the breeding season (spring) and at the end of the breeding season late summer/ fall.¹⁰ Current study findings also supported by this pas study results where we found antiparasitic drugs used twice yearly and using pattern was found very tricky. Combined used of safe drugs also used in present study for killing worm properly which is also supported by past study findings. Components of the preventive program include quarantine of new arrivals, periodic fecal examinations and treatments for parasites, booster vaccinations, and health screening procedures, nutrition evaluation, necropsy examination of deceased specimens, and a comprehensive pest control program.³ That past findings also supported by the current study where quarantine shed maintain properly. Routine checkup is one of the most important things for preventing diseases properly which is also supported by past findings of.¹⁰ Quarantine facilities should follow the "all-in/all-out" principle, i.e., if additional animals are added to an ongoing quarantine, the quarantine period should be restarted.¹² There for screening of bird health before entering new shed should be done. That was done in quarantine shed and kept the peafowl minimum 30days before releasing in new shed. Therefore, these findings also supported by the present study result.

It can be concluding that vaccination and antiparasitic drugs were commonly used by most of the peafowl caretaker from earlier study as well as present study findings from above discussion. Routine checkup helps to know about diseases and abnormalities about early stage which help to take preventive measures rapidly that protected from big loss. Without these measures, a well sated veterinary hospital for taking all measures to prevent diseases and abnormalities of Indian peafowl in BNZ.

Management against diseases and abnormalities of Indian peafowl

There was a big management system developed relation with feeds, feeding system and habitats for making protection against abnormalities, diseases and predators of Indian peafowl in BNZ (Table 2).

The house was made with good protection system for entering predators and also the visitors which help to protect predation and disturbing of visitors. Without this cleaning regularly, proper drainage system, controlling for entering predators and enough spaces in houses also help in protection against abnormalities, diseases and predators of Indian Peafowl in BNZ (Table 2). Feeds and feeding system was also found very good like regular fresh feed supply, balanced feed supply and nutrias feed supply all the year round to their peafowl's in BNZ. Without this properly brooding of peachicks also, help to prevent many diseases as well as express good growth performance (Table 2).

A 500 square feet room with a height of 10 feet is adequate room for a pair of birds. Poultry feed and vegetables are enough for their continued health and productivity.⁹ That also supported by present study result housing and feeding of peafowl properly. Management of animals in captivity poses serious challenges that range from animal welfare considerations, space requirements, human skills, veterinary care and visitor satisfaction to financial requirement.² One of the

past study result reported restricting the free movement of visitors in wildlife parks as well as zoos and adopting the proper biosecurity measures is vital to minimize the risk of infectious diseases in Galliformes.¹⁷ Dehydrated birds may appear lethargic, wobbly, or be cold to the touch. When you receive new birds through hatching or shipping or pick up, ensure that they are drinking before leaving them alone, even if it means sitting by the brooder for a while or “pecking” at the water with your fingers to help them. You can also provide electrolyte water to new. Their food should be kept dry and clean, including the feeder.⁹

Table 2 Most important management systems against disease conditions and abnormalities of Indian peafowl in BNZ

Serial no.	Management systems
1	Predator control
2	Control of external feed supply
3	Control to enter outer person in the houses
4	Fresh water supply
5	Spinach supply
6	Fruit supply
7	Peanuts supply
8	Balanced feed supply
9	Ad libitum fresh water for all time
10	Supply the fresh feeds
11	Feed supply regularly
12	Cleaning regularly
13	Sanitation Properly
14	Take initiative quickly in any case
15	Wire netting properly into the houses
16	Brooding properly
17	Give enough space in houses
18	Clean feeder regularly
19	Clean waterer regularly
20	Proper management of litter in brooding house
21	Hardwire netting in drainage opening

The management of the most common found infectious disease mycoplasmas was done properly by drinking water and litter management. Which was also supported by past study result, most of the commonly occurring infections caused by MG and MS in captive peafowl and pheasants are associated with respiratory diseases and are characterized by foamy eyes, swollen infraorbital sinuses, respiratory distress and death, but in peafowl its mechanism of transmission is unknown^{6,8} Without this transferring from brooding sheds to growing sheds the peachicks kept in quarantine shed for adapting properly and by this way diseases transmission can be prevented. External supply of feeds by visitor sometime cause food poisoning as well as choking which is very dangerous situation for peafowl therefore, the zoo authority tried their best to prevent supply of any feeds by visitors. Without this several types of feeds supply based of important nutrients compositions which help to maintain proper health of peafowl. Litter management in brooding house also very important, because of more wetted and dried litter caused several diseases to peachicks. Entering visitors as well as predators both causes the chances of zoonotic diseases breakdown as well as predation peafowls by predators. After hatched out of birds at zoo should be examined to check their health, to give those vitamins, their first vaccinations and some kind of individual identification. In case of peachicks of BNZ the authority supplied albidum amount of feed and clean water so that they can intake as their requirement. Above findings most of the past results as well as management systems were similar to current study results.

The summarized management systems involved in Indian peafowl rearing in BNZ were found all time supplied of fresh and required amount feeds routinely which saved peafowls from several diseases

and nutrient deficiency. Albidum water for peafowl was supplied which was liked by peafowl and those maintained physiological activities properly. The enclosure design also has done which minimize the risk of injury and ensured animal could get away from each other, as well as mixed species could not injure each other. Providing correct diet and suitable hygienic environment by BNZ authority prevented and controlled diseases.

Conclusion

The general prevention and control methods of above-mentioned thing were vaccination, management and treatment. The prevention and control methods were found very high quality for diseases, abnormalities and predators in BNZ for Indian peafowl. Vaccine against Newcastle disease, fowl pox and avian influenza were used to combat those diseases. Moreover, medication against parasitic infestation was started from four month of age and later continued regularly in six months interval. Some vitamins, minerals and nutrients were used regularly for preventing several abnormalities and diseases. There was a big management system developed relation with feeds, feeding system and habitats for making protection against abnormalities, diseases and predators of Indian peafowl. The house was made with good protection system for entering predators and also the visitors which help to protect predation and disturbing of visitors. Without this cleaning regularly, proper drainage system, controlling for entering predators and enough spaces in houses also help in protection against abnormalities, diseases and predators of Indian peafowl in BNZ. Feeds and feeding system was also found very good like regular fresh feed supply, balanced feed supply and nutrias feed supply all the year round to their peafowl's in BNZ. Without this properly brooding of peachicks also, help to prevent many diseases as well as express good growth performance.

Finally, we concluded that welfare of Indian peafowl in BNZ, which was maintained properly by providing curative and preventive medicine for the treatment of diseased peafowl's. Without this important finding on diseases and abnormalities of peafowl and its prevention and control measures can be used by several zoos, wildlife parks and farms for their management purposes.

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Conflicts of interest

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