Prevalence of Coccidiosis in Peacock at Lahore-Pakistan

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ABSTRACT

The aim of the study was to evaluate the prevalence of coccidiosis in peacocks (Pavo cristatus). Freshly egested fecal samples of adult peacocks (n=30) belonging to different locations in Lahore (Jallo park, Safari park, Bahria town park, Lahore Zoo, University of Veterinary and Animal Sciences, Lahore and Household peacocks) were collected from January to June 2012. The average prevalence of the disease was reported to be 22% from January to June and was found to be more prevalent during the month of June (30%). Male samples showed higher prevalence of coccidiosis (28.57%) than female samples (20%). The disease was found more prevalent (26%) in peacocks of University of Veterinary and Animal Sciences, Lahore and Household peacocks. The differences were attributed to the managerial and environmental conditions.

Key Words: Prevalence, Coccidiosis, Peacock, Pakistan.

INTRODUCTION

The peacock originated in India and was later introduced in Europe in VII-VIII century B.C, through Greece and Italy. It is also designated as a national bird of India and the provincial bird of Punjab. They are wild birds but are also raised as ornamental birds Titilincu et al., (2009). Only three species of peacocks are recognized namely, Pavo cristatus (Indian Peafowl); Pavo muticus (Green Peafowl) and Afropavo congensis (Congo Peafowl). The Congo peafowl is the only species that is distributed outside Asia Jackson, (2006). All peacocks have splendid plumage with attractive displays, small heads, long necked strong spurred legs (unusually, the females also have spurs). The most impressive characteristic of the blue and green peacock is their ability to raise their train feathers into a huge arc, 1.8-2.1 meters wide and walk around with this display, rattling and shimmering the feathers. It is an attractive display for human viewers, although the behavior of peahen is somewhat different. She behaves as if she has seen this display many times before. The peahen carefully selects the more splendid and mature male Jackson, (2006).

A peacock has weight of about 10 pounds. The male can be 6-8 feet long, including 4-6 feet of colorful feathers Berman, (1996). In south Asia, it is found mainly below an altitude of 1800m and in rare cases seen at about 2000m, Dodsworth, (1912). Peafowl prefers to live in hot places. However they can live in frosty cold weather too. Peafowl prefers to live in open areas like parks and

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grassy land with few trees and shrubs. Some even live in people’s backyards Berman, (1996). Peafowl are polygamous. A polygamous family of a peafowl is made up of one adult male and four to 6 peahens. In a family, the group of peahens is called a harem. The peafowl roost high in the trees Berman, (1996). The breeding season of the peafowl is spread out but it appears to be dependent upon the rains Petrie, (1999). In Southern India, the peak season of breeding is April to May, January to March in Sri Lanka and June in Northern India. The nest is made in the ground which is a shallow scarpe lined with leaves, sticks and debris Vyas, (1994). The clutch comprises of 4-8 fawn to buff white eggs which are incubated only by the female. The eggs hatch after about 28 days. The chicks after hatching follow the mother Whistler et al., (1949). An unusual instance of male incubating the eggs has been reported Ali et al., (1980); Shivrajkumar, (1957).

The blue or Indian peacock is recognized and accepted as the most glamorous bird around the world however it is much less known that green peacock is even more splendid. Its hardiness, beauty and adaptability has made it an inhabitant of our gardens and barnyards. It is a bird having distinctive characters. It is thought that peacock is a masculine bird, proud, showing off, flamboyant and aggressive Jackson, (2006). Peafowl are omnivorous and feed on insects, seeds, fruits, small mammals and reptiles. They feed on small snakes and stay away from the larger ones Johnsingh, (1976). In the Gir forest of Gujarat, the food of peafowl largely consists of fallen berries of Zizyphus Trivedi, (1995). Around cultivated areas, they also feed on wide range of crops tomato, groundnut, paddy, chilly and even bananas Johnsingh & Murali, (1978). Around human habitation, they feed upon different food scraps and even human excreta Ali et al., (1980).

In captivity, peafowl can live for about 23 years but it is estimated that they live only for about 15 years in the wild Flower, (1938). Adult peafowl usually escape ground predators by flying into the trees. In some regions such as Gir forest, peafowl are common prey for large predators like leopards, tigers and dholes Parasharya, (1999). The peafowl are provided with more safety when they forage in groups as there are more eyes to look for predators Yasmin et al., (2000). Sometimes large birds such as Crested Hawk-Eagle and Rock Eagle-owl also hunt them Dhanwatey et al., (1986); Tehsin et al., (1990). Chicks are more susceptible to predation than adult peafowl. The adults are sometimes hunted by the humans and domestic dogs in some human nearby areas. In some areas like Southern Tamil Nadu the “peacock oil” is used for folk remedies Johnsingh & Murali, (1978). In South Asia, particularly India has the highest diversity of Indian peacock species El-shahawy, (2010). Indian peacocks (Pavo cristatus), predominantly the males are distinctively large colorful birds. These are among the most marvelous birds of the entire poultry world El-shahawy, (2010). Domesticated peacocks and other fancy birds develop a variety of infections due to unnatural habitat and suboptimal management conditions Athar et al., (2001). 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 major stress factor that can lead to lowered performance and malnutrition is intestinal parasitism Badran & Lukesova, (2006). Parasitic infections are among the most common sanitary
problems affecting wild birds and become either a sub clinical condition or even a cause of death, they have attention only when they have threatened agriculture or human health. Among parasitic diseases caused by protozoa, coccidiosis, is common and causes the most rigorous health and economic problems throughout the world El-Shahawy, (2010). Coccidiosis is considered to be a commonest depreciator or even a potential cause of death of poultry Jadhav et al., (2012). It is a disease which develop within the intestine of most domesticated and wild animals and birds Badran & Lukesova, (2006). The coccidia comprise of a large variety of unicellular parasitic organisms in the subkingdom protozoa of the phylum Apicomplexa Conway & McKenzie, (2007). These parasites infect the intestinal tracts of animals and birds. These are obligatory parasites that are characterized by the presence of apical complex in the free stages of cycle (sporozoites and merozoites) which invade the epithelial cells. Eimeria have direct life cycle (only one host), they are very site specific with reference to the development (intestine) and to cell types (epithelial cells of the intestinal villi or cells of the crypts) Badran & Lukesova, (2006).

The life cycle of coccidia involves sexual and asexual phases. Once they have been ingested by suitable host, isosporan oocyst form haploid sporozoites that enter the epithelium of the intestine and undergo asexual reproduction through a variable number of cycles. This asexual phase is the damaging portion of the life cycle to the host as the sporozoites feed on host tissue to grow and divide. Eventually gametes are formed that fuse to form zygote in the intestine. Zygotes produce a tough outer coating to become oocysts that can then pass out of the parent host, survive extreme environmental conditions and then repeat the cycle if they are ingested by another suitable host Hill, (2002).

The symptoms of the disease include unthriftiness, loss of appetite, greenish or reddish diarrhea, huddling together, heads drawn in and ruffled feathers. In addition to weakness inability to stand and emaciation were also recorded at three out of twelve farms. The infected birds showed their comb and wattles pale and anaemic. Histological evidence revealed oedema, necrosis, leakage of blood, disruption and loss of villi. Severe unclotted blood may be observed in acute form Soomro et al., (2001). Coccidiosis is still the major disease problem of poultry in spite of advances that are made in control and prevention through chemotherapy, nutrition and management Gari et al., (2008).

Seven species of Eimeria (E. mayurai from P. cristatus, E. mayurai from P. muticus, E. pavonina from P. cristatus, E. pavonina from P. muticus, E. Pavonis from P. cristatus, E. pavonis from P. muticus, I. pellerdyi from P. muticus) are identified as infecting peacocks AlYousif & Al-shawa, (1999). E. arabica from Pavo cristatus, E. mandali from Pavo cristatus, E. patnaiki from Pavo cristatus, E. riyadhae from Pavo cristatus, E. kharjensis n.sp. from Pavo muticus, E. mutica n.sp. from Pavo muticus are also reported AlYousif, et al., (1998). Although this disease is known for many years, it is still considered as the most economically important parasitic condition affecting poultry production throughout the world. These infections result in diarrhea, poor growth and eventually high mortality particularly in young birds El-Shahawy, (2010).

The prevalence of infection with the parasite is as follows: (E. pavonina 48.3%); (E. pavonis 16.7%); (I. mayurai 3.3%) Titilincu et al., (2009). The economic losses due to the disease are estimated to about US$ 450 million and
due to medication are about US$100 million in the United States Allen and Fetterer, (2002); Lillehoj et al., (2001). The annual worldwide cost is anticipated to about $800 million and that for the American broiler industry about $450 million Badran & Lukesova, (2006). In countries like Pakistan where the farming is substandard, the disease becomes more serious and causes heavy economic losses; although the exact losses due to coccidiosis in Pakistan are not known due to the lack of statistical indices but these will be definitely in millions of rupees. Quantitative losses due to coccidiosis in Ethiopia are not well documented, but it has been reported that coccidiosis contributes to 8.4% loss in profit in large-scale farms and 11.86% loss in profit in small-scale farms Gari et al., (2008). The parasitic diseases in peacocks are less known in our country, but it is an accepted fact that the most diseases resemble the ones that are encountered in turkeys Titilincu et al., (2009).

*Eimeria* are very effective parasites. One of the main reasons coccidiosis is still a major problem, is the difficult diagnosis. The classical parasitological methods of diagnosis are labor intensive and therefore costly. Oocyst per gram (OPG) counts in feces or litter have a poor relation to the impact of the parasite on the performance of a flock. Identification of different species is based on morphology of oocysts. There are basically two means of prevention of coccidiosis: chemoprophylaxis and vaccination. Chemoprophylaxis using so-called anticoccidial products (ACP) or anticoccidials in the ration is by far the most popular: It is estimated that 95% broilers produced receive anticoccidials Chapman, (2005).

Generally two groups of anticoccidial drugs are used namely 'ionophores' (ionophorous) and 'chemicals' (synthetically produced drugs). In 1948, sulphaquinoxaline was the first drug administered in the feed Chapman, (2003), McDougald, (2003). Other chemicals followed in the years after, allowing the poultry industry to expand and upscale production McDougald et al., (1987); Peek & Landman, (2003); Naciri et al., (2004).

The objective of the study was to investigate the prevalence of coccidiosis in relation to sex, month and different locations. The relationship was also investigated with different environmental and managerial conditions to the prevalence of disease.

**MATERIALS AND METHODS**

Study area and duration

Three hundred freshly egested fecal samples of peacocks were collected from January to June 2012. The samples were taken from the ground of their cages at Jallo Park, Safari Park, Bahria Town Park, Lahore Zoo, University of Veterinary and Animal Sciences and household peacocks.

Sample collection

Three hundred freshly egested fecal samples of both sexes of adult *Pavo. cristatus* (Common Peafowl) were collected from the ground of their cages at the Lahore Zoo, Jallo Park, University of Veterinary and Animal Sciences, Lahore, and household peafowl in clean polyethylene bags to prevent loss of moisture. The appearance of fecal samples for diarrhea or constipation was
observed. The fecal samples were collected to prevent contamination by the feces of other animals, dust, stones and other material. The samples were preserved in cold icebox and stored at 4°C until the day of examination El-Shahawy, (2010). The samples collected were then taken to the coprological examination at University diagnostic laboratory, University of Veterinary and Animal Sciences, Lahore.

**Coprological examination**
The specimens were examined by both qualitative and quantitative fecal examination for the presence of oocysts of coccidia.

**Qualitative fecal examination**
Qualitative fecal examination was done by both macroscopic and microscopic examination.

**Macroscopic examination**
Macroscopic examination was done with naked eye. The fecal samples were observed for color, consistency, blood, mucous, odor and parasites Urquhart, (1996).

**Microscopic examination**
To identify the coccidial oocysts, direct smear method was used Urquhart, (1996).

**Direct Smear method**
A small amount of fresh fecal sample was placed on a clean microscopic glass slide and one or two drops of water were mixed with it thoroughly to form a homogenous mixture. The slide was tilted at an angle to allow the fluid to flow from the heavy debris. Placed a cover slip on the fluid making the smear and examined under low power of microscope. Fecal samples found negative for coccidia with direct smear method were examined either by direct floatation or centrifugal floatation method Soulsby, (1982).

**Concentration methods**
**Direct Floatation**
Two grams of fresh feces were mixed well with 20 ml of saturated NaCl solution. The homogenous suspension was strained with mesh and poured into the test tube up to the top. A cover glass was placed on the top of the test tube touching the meniscus of the mixture. It was allowed to stand for twenty minutes. The cover glass was then removed carefully from the test tube and placed on the glass slide and was examined under low power of microscope.

**Centrifugal floatation**
Two grams of feces were mixed with 30-50 ml of water. The solution was strained through a sieve (1mm mesh) to remove the coarse fecal material. The solution was sedimented for 10-15 minutes on the bench until the supernatant was clear. The sediment was then mixed with the saturated solution of sodium chloride in a centrifuge tube and centrifuged at 1500 revolutions per minute for
one or two minutes. The floating oocysts were removed by touching with cover glass and transferred to clean glass slide and then examined microscopically.

**Counting of oocysts**

The samples positive for coccidial infection were subjected to McMaster Counting Technique for counting oocysts/grams of feces Kelly, (1974).

**McMaster Technique**

Two grams of feces were weighed and placed in a 120 ml wide mouthed screw capped plastic bottle containing about four dozen small glass balls. 60 ml saturated sodium chloride solution was added in the bottle. After screwing the cap, the contents were shaken thoroughly for 2-3 minutes to break up the feces; the mixture was then sieved through a 100-mesh sieve into a small beaker and the debris discarded. The filtrate was agitated and with the help of Pasteur pipette a sufficient amount was withdrawn to fill one chamber of McMaster slide. The residues in the pipette were returned to the filtrate, re-agitated and again a sufficient amount of filtrate was withdrawn to fill the second chamber. After focusing a corner of the etched lines, the oocysts were counted by moving up and down the column of lines. The counting was revised for the second chamber. The total number of oocysts counted in two chambers was multiplied by 100 to get the number of oocysts per gram of feces (OPG):

\[
O.P.G = \frac{N \times 100}{100}
\]

Where \( N \) = No. of oocysts counted in two chambers.

**RESULTS AND DISCUSSION**

Freshly egested fecal samples (n=300) were collected from peacocks (*Pavo cristatus*) from January, 2012 to June, 2012, at Jallo Park, Safari park, Lahore Zoo, Bahria Town Park, University of Veterinary and Animal Sciences, Lahore and household peacocks. These fecal samples were examined concerning the presence of oocysts of *Eimeria*. Out of 300 fecal samples examined 66 were found positive for coccidia. The point prevalence of the disease can be found by the following formula:

\[
\text{Percent Prevalence} = \frac{\text{No. of existing cases during specified time period}}{\text{Population at risk during specified time period}} \times 100
\]

\[
\text{Percent Prevalence} = \frac{66}{300} \times 100 = 22\%
\]

Freshly egested fecal samples (n=300) were examined from January to June 2012. Out of which 66 samples were found positive for coccidiosis. The prevalence of the disease during this period was 22%. The average no. of oocysts in fecal samples is calculated to about 281.81/g.

**Month-wise prevalence of the Coccidiosis**

Freshly egested fecal samples of peacocks (n=300) were examined from January to June, 2012. During January 50 samples were collected, out of which
9 samples were found positive for coccidiosis. The percentage prevalence of coccidiosis during January was 18%. During February again 50 samples were examined, out of which 11 samples were found positive. The percentage prevalence of coccidiosis in February was 22%. Similarly in March again 50 samples were collected, out of which 10 were found positive. The percentage prevalence of disease during March was 20%. In April same no. of samples were examined, and out of which 13 were found positive. The percentage prevalence during April was 26%. In May again 50 samples were examined, out of which 8 were found positive for the presence of disease. The percentage prevalence in May was 16%. Similarly in June 50 samples were examined and 15 were found positive for coccidiosis. The percentage prevalence during June was 30% (Table 1).

**Table 1: Month-wise prevalence of the Coccidiosis**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Month</th>
<th>Total Samples Collected</th>
<th>Samples positive for coccidia</th>
<th>Percent Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January</td>
<td>50</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>February</td>
<td>50</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>3</td>
<td>March</td>
<td>50</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>April</td>
<td>50</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>5</td>
<td>May</td>
<td>50</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>6</td>
<td>June</td>
<td>50</td>
<td>15</td>
<td>30%</td>
</tr>
</tbody>
</table>

**Sex-wise prevalence of Coccidiosis**

Out of 300 samples examined from January to June, 2012, 70 samples were of male and 230 samples were of female. Out of 70 male samples, 20 were found positive. The percentage prevalence of disease in males was 28.57%. Out of 230 female samples, 46 were found positive and the percentage prevalence of disease in females was 20% (Table 2).

**Location-wise Prevalence of Coccidiosis**

Freshly egested fecal samples (n=300) were collected from 6 different locations i.e., Jallo Park, Safari Park, Bahria Town Park, Lahore Zoo, University of Veterinary and Animal Sciences and household peacock from January to June 2012. 50 samples were collected from each location. Out of 50 samples collected from Jallo park 12 were found positive for coccidiosis and the percentage
prevalence of the disease in Jallo park was found to be 24%. From Safari park 10 samples were found positive for disease and the percentage prevalence of the disease was observed about 20%. From Bahria Town park 8 samples were found positive for coccidiosis and the percentage prevalence of coccidiosis was calculated to about 16%. From Lahore Zoo 10 samples were found positive for disease and the percentage prevalence was about 20%. From University of Veterinary and Animal Sciences, Lahore 13 samples were found positive for coccidiosis and the percentage prevalence of the disease was about 26%. From household peacock 13 samples were found positive for coccidiosis and the percentage prevalence of the disease was about 26%. The highest prevalence was found in fecal samples of University of Veterinary and Animal Sciences, Lahore and household peacock. This highest prevalence may be due to difference in managerial conditions in both localities (Table 3).

Table 2: Sex-wise Prevalence of Coccidiosis

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Sex</th>
<th>Total samples</th>
<th>Positive samples</th>
<th>Percent Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>70</td>
<td>20</td>
<td>28.57%</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>230</td>
<td>46</td>
<td>20%</td>
</tr>
</tbody>
</table>

Table 3: Location-wise Prevalence of Coccidiosis

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Location</th>
<th>Total Samples</th>
<th>Positive Samples</th>
<th>Percent Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jallo Park</td>
<td>50</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>2</td>
<td>Safari Park</td>
<td>50</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>Bahria Town park</td>
<td>50</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>4</td>
<td>Lahore Zoo</td>
<td>50</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>5</td>
<td>University of Veterinary and Animal sciences, Lahore (UVAS)</td>
<td>50</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>6</td>
<td>Household Peacock</td>
<td>50</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>7</td>
<td>Jallo Park</td>
<td>50</td>
<td>12</td>
<td>24%</td>
</tr>
</tbody>
</table>

More than one coccidial parasite can cause simultaneous infection in birds Grulet *et al.*, (1982). As the oocysts of different species are produced at different times therefore such mixed infections may not be detected on examination of single fecal sample. The serious illness of chicken is eimerioses, running their courses painfully. The metabolism of proteins, lipids, and carbohydrates are being disturbed as well as the activities of the enzymes catalyzing these processes in the host tissue. The economic loss includes
mortality, the retardation of growth and development of the affected bird, the diminution of the body masses and rates of oviposition and deterioriation of the meat quality Musaev et al., (1991). Eimeria continues to circulate between the environment and the host; however their specific composition remains particularly constant for a relatively long time Musaev et al., (1991). In peacocks, 5 Eimeria and 11 Isospora species have been reported Pellerdy, (1974). It is well known that cryptosporidiosis in birds causes respiratory and digestive disorders mainly in immunocompromised birds and chicks Suteu et al., (2004). Clinical signs in peacocks were not noticed in our case, but the increase in prevalence was correlated with spring season when ambient temperature increases and also the number of chicks Titilincu et al., (2009). The information on eimerian parasite of the genus Pavo is limited to the reports of E. Arabica and E. riyadhae Amoudi, (1988); E. mandali, E. pavonina Banik & Ray, (1964); E. mayurai Bhatia & Pande, (1966); E. pathnika Ray, (1996) and E. pavonis showing heavy infection.

The size variation of the oocysts may be due to the geographic distribution and host differences Duszynski, (1971). The peacocks showing heavy infection revealed low growth rate, loss of feathers, weakness, signs of diarrhea and upon dissecting the small intestine, it was found to have many inflammatory lesions Al-Yousif & Al-shawa, (1999). Eimerian species are considered to be highly host specific not under natural conditions Hiepe & Jumgmann, (1983) but also in farmed birds Rommel, (2000). Therefore, host's geographic origin and systematic are commonly used criteria in their taxonomy El-Shahawy, (2010). The genus Eimeria represents the most specious genus within both protozoan and metazoan organisms. Up to present more than 1700 Eimeria species have been described based on both qualitative and quantitative traits of their sporulated oocyst and their host specificity Duszynski et al., (2001). Up to present, little data was available on eimeriid parasites of galliformes that infect game birds, such as peafowl, particularly regarding the biodiversity of Africa. The seasonality and biology of coccidian infection in galliform captive birds is almost not known. However it can cause severe disease and high mortality in galliform bird in captivity Rommel, (2000). The research on game bird population dynamics should not neglect protozoan infections, especially the ones caused by the coccidian parasites, which are of great importance for species conservation. Therefore more detailed parasitological studies are needed El-Shahawy, (2010).

During the current study it was noted that the prevalence of coccidiosis from January to June was 22%. The disease was found more prevalent during June. The possible reason might be the conditions prevailing during June that were favorable for the transmission of parasite. My study concludes that the disease was more prevalent in peacock of University of Veterinary and Animal Sciences, Lahore and household peacock. The possible reason might be environmental and managerial conditions. During the current study it was noted that the prevalence of coccidiosis in male peacock was 28.57% and in females 20%. The prevalence was higher in males than in females.
REFERENCES


