PATHOLOGICAL CONDITIONS OF AVIAN COCCIDIOSIS IN THE SMALL SCALE COMMERCIAL BROILER FARMS IN DINAJPUR DISTRICT

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ABSTRACT

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The study was designed to investigate the pathological conditions of avian coccidiosis in the small scale commercial broiler farms at different region in Dinajpur district during July, 2012 to December, 2012. A thorough clinical and necropsy examination was done and the characteristics clinical signs and gross lesions were recorded. Different organs mainly caecum and other parts of intestine were collected, preserved and processed for histopathological examination. Intestinal content was also examined for detection of oocyst. Total 234 diseased and dead birds (from 50 farms) were examined out of which 20 (8.54%) birds were found to be positive for coccidiosis. The clinical signs of the affected birds were bloody diarrhea, anemia, reduction of feed and water intake, drooping wings. At necropsy, enlargement and discoloration of caecum with numerous hemorrhagic spots, blood mixed and reddish to brown intestinal contents in the intestinal lumen, hemorrhage on the intestinal wall and mucosa were found. Histopathological examination reveals distortion of normal architecture of intestine and desquamation of lining epithelia, formation of tissue debris on the intestinal mucosa and necrotic cells infiltration in the lamina propria and submucosa, degeneration of epithelial cells, glands and intestinal villi. So, outbreaks of coccidiosis in the commercial poultry flocks in Dinajpur district is lower due to farmers are intensely aware of coccidiosis now and they usually use coccidiostats routinely.

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INTRODUCTION

Bangladesh is one of the most densely populated countries in the world where 152.5 million people (P.D, 2011) and 31.5 percent people live under malnutrition (Brad, 2010). The average quantity of protein uptake by people is insufficient. Poultry production is an easy and efficient way of producing animal protein. More profit could be earned by producing poultry with less capital investment. The poultry population of Bangladesh has increased from around 71 million in 1986 to around 188 million in 2006, an increase of about 164 percent in 20 years (FAO, 2008). Increasing demand and economic aspect has created a lot of interest among the people to raise poultry either through backyard or intensive commercial farming system. But poultry farming in Bangladesh faces various kinds of hindrance among them coccidiosis is one of the most serious problems for poultry development. Although commercial poultry production has increased manifold during last decade but at the same time, coccidiosis which was primarily a sporadic disease in 1976 has become a diseases of high occurrence in 1986 (FAO/WHO/OIE, 1976, 1986). The coccidia of the genus Eimeria are an obligatory intracellular parasite which has a complex life cycle. Eimeria is distributed worldwide (Macpherson, 1978). Temperature and moisture are two important factors in the epizootic of coccidiosis and faulty waterers have been identified as one source of excess moisture (Davies and Joyner, 1955). The optimum temperature for rapid sporulation of oocyst of different species of Eimeria has been reported to be from 28 to 30°C (Edgar, 1955). The hot and humid environment of poultry houses in Bangladesh provides an ideal condition for the sporulation of the oocyst of coccidia. The practice of changing litter after each broiler crop apparently removes most of the oocysts, but is not effective in domination of the parasites (Long, 1978). Mondal (1978) made a preliminary report on the occurrence of Eimeria tenella, Eimeria necatrix and Eimeria maxima as by the fecal examination of chicks from Bangladesh Agricultural University Poultry Farm. Karim and Trees (1990) reported the occurrence of Eimeria acervulina and Eimeria brunetti in poultry in Bangladesh for the first time. But accurate figure of economic losses due to coccidiosis is not available in Bangladesh.

The parasite appears in the epithelial cells of digestive tract and its associated glands. Coccidiosis has also become a subject of growing interest because it causes significant economic loss in the poultry industry throughout the world. Considerable studies are being conducted to determine its economic importance and associated epizootiological factors and method of control of the disease. SenevIranta (1969) reported that 90 to 100 percent mortality in chicken to be associated with coccidiosis in India. The mortality in young birds is predominant features. In adult also poor growth rate or loss of egg production is observed (Lerine, 1961). The true picture as to the incidence and pathology of coccidiosis in chicken has not been worked out yet in the study region. Until some basic information regarding this disease occurrence and problem is available, therefore it is very difficult to encourage commercial farming in the country. Considering the fact in mind, the present study was undertaken to determine the prevalence of avian coccidiosis with their clinical and histopathological findings in Dinajpur district of Bangladesh.

MATERIALS AND METHODS

Experimental chickens

A total of 234 diseased and dead birds were examined from 50 farms in the small scale commercial broiler farms at different regions of Dinajpur district in Bangladesh. Among the examined birds, only 20 were found to be positive for coccidiosis. A detail flock history in relation to the incidence of diseases including housing, location of farms, source of birds, age, population of the birds per flock, rearing system, litter material, feeding and watering system, biosecurity, previous history on coccidia outbreaks, intervals between the batches, rearing of one more batches in the same farm at the same time etc., were also recorded. The birds affected with coccidiosis were submitted to the pathology laboratory for the diagnosis and treatment and other processing.

Clinical examination of affected birds

The general health condition and age of the chicken were recorded. The clinical signs were recorded during the physical visit of the affected flocks and the farmer’s complaints about the affected birds were also considered.
Necropsy findings of suspected birds

The necropsy was done on the suspected dead and diseased birds taken from different upazilla of Dinajpur district. At necropsy, gross morbid changes were observed and recorded carefully by systemic dissection. The collected samples were preserved at 10% formalin for the histopathological study. Gross morbid lesions of different organs were registered during the course of necropsy of the birds.

Histopathological examination

During necropsy, various organs having gross lesions were collected, preserved at 10% formalin, processed for the histopathological study. Formalin fixed samples of the small intestine, large intestine and caeca from the diseased and dead chicken were processed for paraffin embedding, sectioning and staining with haematoxylin and eosin according to standard method (Luna, 1968) for histopathological study.

Examination of faeces

Faecal samples were collected directly from the affected flocks. Interstinal content was collected during the postmortem examination of the birds. The slides were examined under microscope for detection oocysts in low and high magnification.

Photography

All images related to the present study were taken directly from microscope using different objectives manipulation of zooming system of a digital camera (Canon, 1XY, 16.1 Mega pixels, Japan). The images were provided following minute modification for the better illustration of the study.

RESULTS

Pathological investigation of avian coccidiosis encountered in small scale commercial broiler farms in Dinajpur district was studied and different clinical, parasitological, necropsy and microscopic conditions were recorded during the study period.

Clinical findings

The study was conducted in different small scale commercial Broiler farm in different upazilla in Dinajpur district. Total 50 farms were visited. Different species of Eimeria were found to be prevailed in those farms. Total 234 diseased and dead birds were examined out of which 20 birds were found to be positive for coccidiosis i.e. the incidence of coccidiosis was recorded as 8.54 % in relation to age and breed where highest proportion was recorded in birol upozila (13 %) and lowest proportion in phulbari, Kaharol and Birampur upozila (0.00 %). The age groups of 5-6 weeks were mostly affected (38.4 %) where 0-4 weeks age group less affected (12.8%).

Clinical signs were recorded as bloody diarrhea, considered to be a most important clinical sign in the examined chicken, followed by anaemic carcass (Figure 3), attachment of faeces around vent (Figure 1), blood mix with food (Figure 2). The prevalence of various coccidial disorders is shown in Table 1. Proportional mortality rate of coccidiosis in different age group was shown in Table 2.

Histopathological study

In the present study, distortion of normal architecture and desquamation of lining epithelia of intestine were found (Figure 4). Formation of tissue debris on the intestinal ucosa and necrotic cells infiltration in the lamina propria and submucosa (Figure 5) were markedly observed. Degeneration of epithelial cells, glands, intestinal villi and infiltration of inflammatory cell in the musculature (Figure 6) were also found. The villi of the mucosa were destroyed and disorganized and there was no continuation in the lining epithelial cells of villi (Figure 6).
Table 1. Prevalence of coccidiosis at different commercial broiler farms Dinajpur district is graphically shown

<table>
<thead>
<tr>
<th>Location of the firm (Upazilla)</th>
<th>No. of farm visited</th>
<th>No. of birds Necropsy done</th>
<th>No. of Affected farms</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sadar</td>
<td>14</td>
<td>56</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Birol</td>
<td>9</td>
<td>37</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Prabotipur</td>
<td>6</td>
<td>30</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Chairirbendor</td>
<td>5</td>
<td>32</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Kaharol</td>
<td>2</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Birgong</td>
<td>3</td>
<td>22</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Khansama</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Satabgong</td>
<td>5</td>
<td>19</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Phulbari</td>
<td>2</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Birampur</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>234</td>
<td>20</td>
<td>8.54</td>
</tr>
</tbody>
</table>

Table 2: Proportional mortality rate of coccidiosis in different age groups are graphically shown

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of farm affected</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 weeks</td>
<td>2</td>
<td>12.8</td>
</tr>
<tr>
<td>5-6 weeks</td>
<td>8</td>
<td>38.4</td>
</tr>
<tr>
<td>7-8 weeks</td>
<td>6</td>
<td>30.4</td>
</tr>
<tr>
<td>&gt; 8 week</td>
<td>4</td>
<td>18.4</td>
</tr>
</tbody>
</table>

Figure 1. Attachment of feces around vent (red arrow) of chicken;  
Figure 2. Feed mixed with blood (red arrow);
Figure 3. Anaemic carcass (blue arrow) of coccidia affected fowl; Figure 4. Distortion of normal architecture and desquamation of lining epithelia (green arrow) of intestine (cecum) (4 x); Figure 5. Formation of tissue debris on the intestinal (cecum) mucosa (red arrow) and necrotic cells infiltration in the lamina propria and submucosa (green arrow) (10x); Figure 6. Degeneration of epithelial cells and glands (green arrow) on intestinal villi (cecum) (10x)

DISCUSSION

The present study was conducted mainly to explore a pathological investigation of avian coccidiosis based on clinical, parasitological, gross and histopathological lesion.

Prevalence

Total 234 diseased and dead birds were examined out of which 20 birds were found to be positive for coccidiosis i.e. the prevalence of coccidiosis was recorded 8.54% in relation to age and breed. This observation is similar to those of reported in other authors where the prevalence of coccidiosis was recorded as 9.40% by Bhattachrjee et al., 1996. In West Bengal the cases of coccidiosis was recorded as 10.91% by Bhattacharya (1987).

In this study we found that the young birds are more susceptible to and more readily display signs of disease, whereas older chickens are relatively resistant as a result of prior infection. Typically, the disease is seen in birds of 3-6 weeks old, before they have acquired immunity. The proportional mortality rate of coccidiosis in different age group were 12.8%, 38.4%, 30.4% and 18.3% in 0-4 weeks, 5-6 weeks, 7-8 weeks and above 8 week respectively which is similar to the observation by Kamath, 1955; Rose, 1967; Humphrey, 1973 and Kogut et al., 1993.

Clinical examination

During this investigation the common clinical manifestations in the chicks suffering from coccidiosis were found as bloody diarrhea, anemic carcass, and attachment of faeces around vent, blood in faeces, depression and ruffled feather. These findings are also consistent with Reid and Pitoais, 1965 and Williams, 1996.
Weight loss, reduction in egg production, damp litter and death occurs mostly on 5th or 6th day after infection were also found in this observation. This report is agreeable with the findings of Tyzzer, 1929; Waxler, 1941; Ruff et al., 1976 and Levine, 1983.

Necropsy examination
Gross pathological changes of the various organs of the affected chicks were studied. At necropsy, the major pathological lesions were enlargement and discoloration of caecum with numerous hemorrhagic spots, blood mixed intestinal contents in the intestinal lumen which is vary from reddish to brown, pin point hemorrhage on the intestinal mucosa, profuse hemorrhage on intestinal wall and mucosa were recorded. These gross lesions are also reported by Bertke, 1955; Becker, 1959 and Reid, 1972. Thickening of intestinal wall than normal, hemorrhage and extravasations of blood within the intestinal lumen, profuse congestion, hemorrhagic enteritis, and blood-tinged exudates were also found. Our observation is same to those were reported by Poull, 1967; Jagadeesh et al., 1976; Arakawa et al., 1981 and Levine, 1983.

Histopathological study
The histopathological change founded in the present study were listed as severely distortion of normal architecture of intestine and desquamation of lining epithelia, formation of tissue debris on the intestinal mucosa, necrotic cells infiltration in the lamina propria and submucosa, degeneration of epithelial cells, glands, intestinal villi. The villi of the mucosa were destroyed and disorganized and there was no continuation in the lining epithelial cells of villi. This observation is similar to those reported by Noyilla et al., 1972 and Jagadeesh et al., 1976.

CONCLUSION
Prevalence of coccidiosis was recorded as 8.54 % in relation to age and breed. Highest mortality in 5-6 weeks (38.4%) and lowest in 0-4 weeks (12.8%) were recorded. Clinical signs including bloody diarrhea, anemia, depression, ruffled feather, reduction of feed and water intake, drooping of wings. At necropsy, enlargement and discoloration of caecum with numerous hemorrhage spots, blood mixed intestinal contents in the intestinal lumen vary from reddish to brown; pin point and profuse hemorrhage on intestinal mucosa were found. Histopathologically, distortion of normal architecture of intestine and desquamation of lining epithelia, formation of tissue debris on the intestinal mucosa and necrotic cells infiltration in the lamina propria and submucosa, degeneration of epithelial cells, glands, and intestinal villi were also present. From the above facts and findings, it could be concluded that outbreaks of coccidiosis in the commercial poultry flocks is lower due to farmers are intensely aware of coccidiosis now and they usually use coccidiostats routinely.

REFERENCES