



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

Md. Manik Hossain¹, Md. Shahadat Hossain^{1*}, Md. Tareq Mussa², SM Harunur Rashid³ and Md. Nazrul Islam¹

¹Department of Pathology and Parasitology and ²Department of Anatomy and Histology, Faculty of Veterinary and Animal Science, Jhenidah Government Veterinary College, Jhenidah, Bangladesh; ³Department of Pathology and Parasitology, Faculty of Veterinary and Animal Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

*Corresponding author: Md. Shahadat Hossain; E- mail: shahadatvet@gmail.com

ARTICLE INFO

ABSTRACT

Received
30.11.2016

Accepted
14.12.2016

Online
18 December 2016

Key words
Avian coccidiosis,
Commercial broiler
farms,
Coccidiostats,
Dinajpur district

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.

To cite this article: Hossain MM, MS Hossain, MT Mussa, SMH Rashid and Md. Nazrul Islam, 2016. Pathological conditions of avian coccidiosis in the small scale commercial broiler farms in Dinajpur district. Res. Agric. Livest., Fish., 3 (3): 425-431.



This is an open access article licensed under the terms of the Creative Commons Attribution 4.0 International License

www.agroaid-bd.org/ralf, E-mail: editor.ralf@gmail.com

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° (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. Senevtranta (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. Interstitial 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

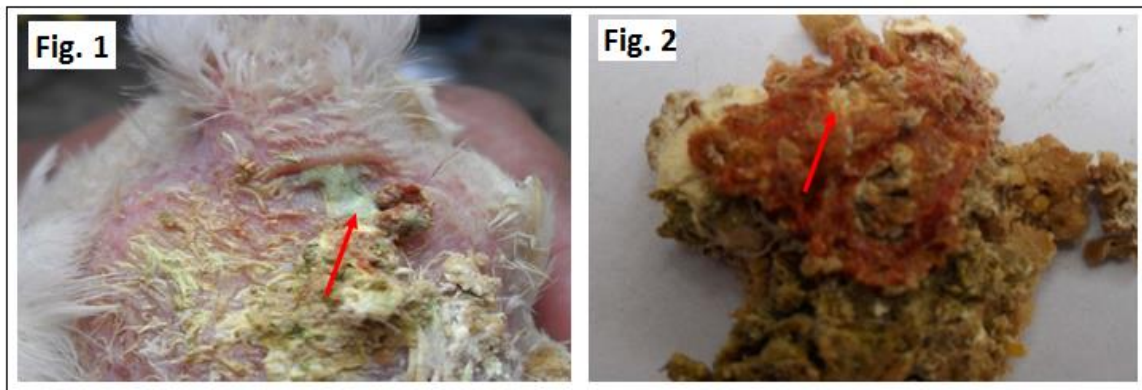
In the present study, distortion of normal architecture and desquamation of lining epithelia of intestine were found (Figure 4). Formation of tissue debris on the intestinal ucosa and necrotic cells infiltration in the lamina propria and submucosa (Figure 5) were markedly observed. Degeneration of epithelial 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

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

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

Age group	No. of farm affected	Percentage (%)
0-4 weeks	2	12.8
5-6 weeks	8	38.4
7-8 weeks	6	30.4
> 8 week	4	18.4

**Figure 1.** Attachment of feces around vent (red arrow) of chicken;**Figure 2.** Feed mixed with blood (red arrow);

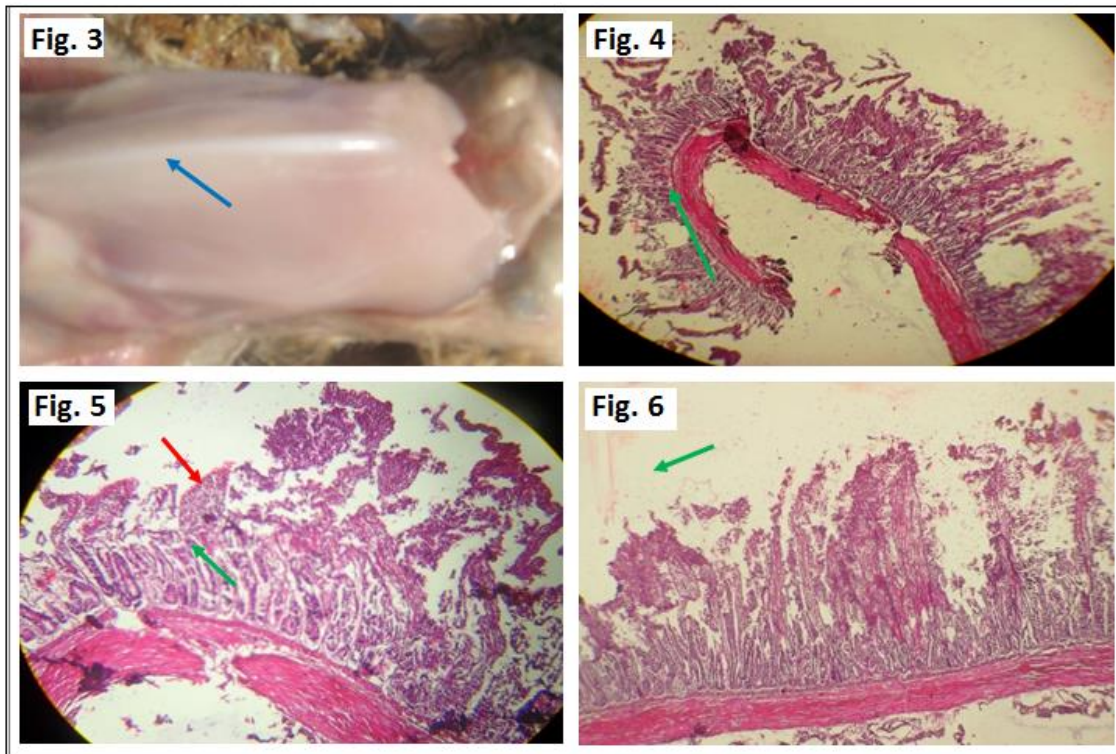


Figure 3. Anaemic carcass (blue arrow) of coccidia affected fowl; **Figure 4.** Distortion of normal architecture and desquamation of lining epithelia (green arrow) of intestine (cecum) (4 x); **Figure 5.** Formation of tissue debris on the intestinal (cecum) mucosa (red arrow) and necrotic cells infiltration 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 Bhattacharjee *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 chickens 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 Poul, 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

1. Arakawa A, Baba E and Fukata T, 1981. *Eimeria tenella* infection enhances *Salmonella typhimurium* infections in chickens. Poultry Science, 60: 2203-2209.
2. Becker RF, 1959. In Diseases of Poultry. IOWA State University Press, Ames, Iowa, USA, p. 828-858.
3. Bertke EM, 1955. Pathological effect of coccidiosis caused by the *Eimeria tenella* in chicken (Unpublished Thesis). University of Wisconsin, USA. 67: 193-199
4. Bhattacharjee D, Pan A, Dhara S, Kumar and Das SK, 1996. Evaluation of Economic Losses due to Coccidiosis in Poultry Industry in India. Agricultural Economics Research Review, 23: 91-96.
5. Bhattacharya HM and Framanik AK, 1987. Diseases of poultry in three districts of West Bengal affecting rural economy. Indian Veterinary Journal, 7: 63-65.
6. Bradfield R, 2010. Increasing and diversifying food production in Bangladesh" cited by Ahmed, U.K. (1998) Gardiner's book of production and nutrition vol.1.
7. Davies SFM and Joyner LP, 1955. Observation on the parasitology of deep litter of poultry houses. Veterinary Research, 67: 193-199.
8. Edgar SA, 1955. Sporulation of oocysts at specific temperature and notes on the prepatent period of several species of avian coccidia. Journal of Parasitology, 41: 214-216.

9. FAO, 2008. Bangladesh Bureau of Statistics (BBS), June 2006, 172-198.
10. FAO, WHO and IOE, 1976. Animal Health Year Book. Animal Health Services, Animal Health and Production Division. Food and Agricultural Organization of the United Nations (FAO), World Health Organization (WHO), International Office of Epizooties (OTE), 108-148.
11. FAO, WHO and IOE 1986. Animal Health Year Book, Animal Health Services, Animal Health and Production Division. Food and Agricultural Organization of the United Nations (FAO), World Health Organization (WHO), International Office of Epizooties (OIE), 79-144.
12. Humphrey CD, 1973. A comparison of uninfected and protozoan parasitized chick intestinal epithelium by light and electron microscopy. *Veterinary Bulletin*, 44: 37-98.
13. Jagadeesh KS, Seshardi SJ and Mohiuddin S, 1976. Studies on pathology of field cases of coccidiosis in poultry. *Indian Veterinary Journal*, 53: 47-54.
14. Kamath MG, 1955. Coccidiosis in chicken. *Indian Veterinary Journal*, 5: 19.
15. Karim MJ and Trees AJ, 1990. Isolation of five species of *Eimeria* from chicken in Bangladesh. *Tropical Animal and Production*, 22: 153-159
16. Kogut MH and Powell KC, 1993. Preliminary findings of alterations in serum alkaline phosphatase activity in chickens during coccidial infection. *Journal of Comparative Pathology*, 108: 113-119.
17. Lerine DN, 1961. Protozoan Parasites of domestic animals and man. Burgess Publishing Company, 15: 775-780
18. Levine, D.N. P. 1983. The Biology of Coccidia. University Park Press, Baltimore, USA, 28.
19. Long PL, Boorman KN and Freeman BM, 1978. Avian Coccidiosis. Proceedings of the 13th Poultry Science Symposium, 14-16th September, 1977. British Poultry Science Limited.
20. Luna LG, 1968. Manual of Histologic staining methods of the Armed Forces Institute of Pathology (3rd edition). Mc Graw Hill Book Co. New York.
21. Macpherson, I. 1978. Avian Coccidiosis. British Poultry Science Ltd. Edinburgh, 465-494.
22. Mondal AN and Ahmed, 1978. Coccidiosis; Laboratory confirmation of clinical disease. *Experimental Parasitology*, 28: 137-146
23. Noyilla MN and Medin CS, 1972. Pathology of experimental *Eimeria mivati* infection in young chicken. *Veterinary Bulletin*, 4: 3157.
24. PDEU, 2011. Population development and evaluation unit, Bangladesh population data sheet, planning c6ommission People's Republic of Bangladesh
25. Poul DD, 1967. Villous atrophy and coccidiosis. *Nature*, London, 213: 306-307.
26. Reid WM, 1972. Diseases of poultry. The Iowa State University Press. Ames, USA, 944-975.
27. Reid WM and Pitosis M, 1965. The influence of coccidiosis on feed and water intake of chicken. *Avian diseases*, 9: 343-348.
28. Rose ME, 1967. The influence of age of host on infection with *Eimeria tenella*. *Journal of Parasitology*, 53: 924-929.
29. Senevtranta P, 1969. Diseases of poultry (2nd Edn). John Wright and Sons Ltd Bristol.
30. Tyzzer EE, 1929. Coccidiosis in gallinaeeous birds. *American Journal of Hygiene*, 10: 269-283.
31. Waxler SH, 1941. Changes occurring in the blood and tissue of chickens during coccidiosis and artificial haemorrhage. *American Journal of Physiology*, 134: 25-26.
32. Williams RB, 1996. The ratio of the water and food consumption of chickens and its significance in the chemotherapy of coccidiosis. *Veterinary Research communications*, 20: 437-447.