



Research in

AGRICULTURE, LIVESTOCK and FISHERIES

ISSN : P-2409-0603, E-2409-9325

An Open Access Peer-Reviewed International Journal

Article Code: 0286/2020/RALF

Res. Agric. Livest. Fish.

Article Type: Research Article

Vol. 7, No. 2, August 2020 : 267-274.

CLINICO-PATHOLOGICAL INVESTIGATION OF CHICKEN COCCIDIOSIS AT DIFFERENT UPAZILA IN BOGURA DISTRICT

Md. Mofizul Islam, Md. Haydar Ali*, Md. Nazrul Islam, Mahfuza Akther and Md. Gausur Rahman

Department of Pathology and Parasitology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

*Corresponding author: Md. Haydar Ali; E-mail: haydar.dvm03@gmail.com

ARTICLE INFO

ABSTRACT

Received
05 July, 2020

Revised
18 August, 2020

Accepted
22 August, 2020

Online
31 August, 2020

Key words:
Chicken,
Coccidiosis,
Clinicopathology

The experiment was conducted with the interest to know the overall condition of coccidiosis in small scale commercial poultry farms at different upazilla in Bogura district and the investigation was done from July to December, 2018. A thorough clinical and necropsy examination was done for characterizing the clinical signs, recording of gross lesions and collection of different organs mainly the small intestine and the caecum for further histopathological examination. A total of 343 suspected and dead chickens were examined, among them 52 (15.38%) (20.6% in broiler, 10.47% in sonali, 10.25% in layer) chickens were found positive for chicken coccidiosis. The proportional mortality rates were 19.25%, 21.42%, 8.23% and 7.5% respectively in age group of 0-4 weeks, 5-6 weeks, 7-8 weeks and above 8 weeks and the highest value was found in age group of 5-6 weeks. Depression, ruffled feather, bloody diarrhoea, anaemia, drooping of wings and reduction of feed and water intake were commonly observed. Several gross changes were recorded including enlargement and discoloration of caecum, pinkish or blood mixed catarrhal contents in the intestinal lumen with numerous haemorrhagic lesions over intestinal mucosa. Histopathologically there was architectural destruction of caecum, destroyed and disorganized villi mucosa without any continuation of the lining epithelium. Some facts like farmers knowledge, the bio-safety measures and different protection programs with vaccination against the disease did not properly comply with the approved standards. Thus consideration of such points in management program of coccidiosis can improve the poultry farms of Bogura district.

To cite this article: Islam M.M., M. H. Ali, M. N. Islam, M. Akther and M. G. Rahman, 2020. Clinico-pathological investigation of chicken coccidiosis at different upazila in Bogura district. Res. Agric. Livest. Fish., 7 (2): 267-274.



Copy right © 2019. The Authors. Published by: AgroAid Foundation
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

In Bangladesh, Poultry industry plays an important role in the rural socio-economic system by contributing significantly on economic growth and simultaneously creating numerous employment opportunities. The contribution of livestock sub sector on GDP comes about 1.54 % (Bangladesh Economic Review, 2018). In the rural area of Bangladesh more than 65% family rears poultry and the poultry population in Bangladesh is only 215.00 million (BBS, 2017). A total of 5 million people are engaged in this sector (Saleque, 2007). At present chicken contributes 51% of total meat production in Bangladesh (Raha, 2007). Poultry industry is an emerging agribusiness in Bangladesh but there are several constraints for the establishment of this sector among them, various infectious and non-infectious diseases is one of major constrains for profitable poultry production. Outbreak of infectious disease causes economic loss and discouraging poultry rearing (Das *et al.*, 2005). On an average, 30 % poultry birds die annually in Bangladesh due to outbreak of several diseases (Ahmed and Hamid, 1992). However, several diseases cause much reduction in the growth rate of chicken. One of these diseases, chicken coccidiosis is responsible for immunosuppression in the host (Candra, 2013). The economic significance of coccidiosis is attributed to decrease production with higher feed conversion, growth depression and increased mortality and the cost involved in treatment and prevention, (Peek & Landman, 2011). Coccidial infection can brings a great loss to poultry industry.

Coccidiosis is a protozoal disease in poultry, caused by the- *Eimeria spp.* belonging to the phylum *Apicomplexa*. *Eimeria tenella* is the most important species, as it causes caecal coccidiosis in chickens (Shirley *et al.*, 1986). Intestinal coccidiosis caused by various species of *Eimeria*, is an economically important (estimated to be 2 billion dollars a year) disease of poultry (Zhang and Zeng, 2005). The mortality of young birds is predominant features. It is well known that poultry diseases are the major constraints for the developing the poultry industry (Karim, 2003). Poultry farmers face a wide range of diseases, which reduce the optimal productivity of poultry farms. Coccidiosis cannot even be controlled by vaccination due to mixed infestation of more than one species of *Eimeria*. Bogura is the northwest part of Bangladesh with different geo-climatic condition. Poultry diseases are the major constraints for developing the poultry industry in this region. Prevalence of coccidiosis may depend upon various factors such as geo-climatic condition, management system by farmers and vaccination etc. The actual picture of prevalence and pathology of chicken coccidiosis has not been worked out yet in this area and without the availability of some basic information regarding this disease problem, it is very difficult to encourage commercial farming in this region. Keeping these views in mind, the present work has been under taken with some objectives of determining the prevalence of chicken coccidiosis in relation to age group and variety of chicken with observation of clinical features and gross and histopathological changes of different organs developed due to chicken coccidiosis at different farm of Bogura district.

MATERIALS AND METHODS

Experimental area and period

The study was performed in several small scale commercial poultry farm of different upazila like Sadar, Gabtali, Sariakandi, Sherpur, Shajahanpur, Shibganj, Adamdigi, Dhunat, Sonatala and Dhupchachia at Bogura district of Bangladesh and the laboratory examinations were conducted at the Department of Pathology and Parasitology of Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur. The experimental duration was 6 months from July to December, 2018.

Experimental Chickens

A total of 95 farms were visited and the number of chickens in the farms was variable ranging from 250 to 1250 and they were reared on litter. A total of 343 diseased and dead chickens including broiler, layer and sonali were subjected to this examination and the suspected chickens were grouped into 4 age groups such as group of 0-4 weeks, 5-6 weeks, 7-8 weeks and above 8 weeks.

Data collection and processing

A detail farm history in relation to the prevalence of disease including housing system, location of poultry farms, sources of chickens, age and population of the chickens per flock, rearing system, litter material, feeding and watering system, biosecurity of the farms, previous history of outbreaks, batch intervals and rearing systems were recorded. All collected data were recorded and analyzed with Statistical Package for Social Science (SPSS) software (version-22.00).

Clinical Examination

The general health condition and age of the chicken were recorded. The clinical signs were recorded during the physical visit of the affected farms and the farmer's complaints about the affected chickens were also considered.

Fecal examination for oocysts determination

Faecal sample was collected either freshly fallen faeces from the affected flocks or during the postmortem examination of the chickens, directly from cloaca with spatula. Samples were kept in glass vial containing 10% formalin. In laboratory, faecal samples were examined using two methods, Direct Smear technique and Flootation technique with standard protocol (Fowler and Miller, 1999).

Necropsy examination

The necropsy of the suspected dead and diseased chickens taken from different areas was done with established method and the gross morbid changes were observed and recorded carefully by systemic dissection. Some important samples (small intestine, large intestine, caeca and liver) were collected and preserved at 10% formalin for further histopathological study.

Histopathological examination

Formalin fixed samples were processed for paraffin embedding, sectioning and staining with haematoxylin and eosin according to standard method (Luna, 1968) for histopathological study. 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).

RESULTS

Overall Prevalence of Coccidiosis

The study was conducted to outline the overall status of chicken coccidiosis in different small scale commercial farms of different upazila in Bogura district. Throughout the work, there were total 52 positive cases among 338 diseased and dead birds examination of different farms and the overall prevalence was 15.38%. Table 1 shows that there was no significant variation in the prevalence of chicken coccidiosis in different upazila and the prevalence rate were 13.33% in Sadar, 8.5% in Gabtali, 13.33% in Sariakandi, 14.63% in Sherpur, 20.00% in Shajahanpur, 16.67% in Shibganj, 20.00% in Adamdigi, 16.21% in Dhunat, 15.62% in Sonatala and 15.38% in Dhupchachia. Both Shajahanpur and Adamdigi upazilla show the highest prevalence rate (20.00%) whereas in Gabtali the rate was lowest (8.5%). The proportional mortality rates in different age groups were recorded as 19.25%, 21.42%, 8.23% and 7.5% in 0-4weeks, 5-6weeks, 7-8weeks and > 8week respectively which was significantly varied (Table 2). Five to six weeks of age group prevailed the highest value (21.42%). Table 3 shows that the variety of chicken had no significant influence on the prevalence of coccidiosis and higher prevalence of coccidiosis was recorded in broiler (20.6%) than sonali (10.47%) and layer (10.25%).

Clinical Findings

Bloody diarrhoea is considered to be the most important clinical signs found in the examined chickens which was indicated blood mix with feces (Figure 1. B) and attachment of bloody feces around vent. Some other clinical signs were recorded during clinical examinations like non bloody feces around the vent (Figure 1. A), depression, ruffled feather and overall anaemic carcass.

Table 1. Prevalence of coccidiosis at different commercial farms

Location of the farm (Upazila)	No. of sample	No. of positive sample	Percentage (%)
Sadar	45.00	6.00	13.33
Gabtali	35.00	3.00	8.5
Sariakandi	30.00	4.00	13.33
Sherpur	41.00	6.00	14.63
Shajahanpur	25.00	5.00	20.00
Shibganj	42.00	7.00	16.67
Adamdigi	30.00	6.00	20.00
Dhunat	37.00	6.00	16.21
Sonatala	32.00	5.00	15.62
Dhupchachia	26.00	4.00	15.38
P value	0.98 (NS)		

NS Means nonsignificant (P>0.05)

Table 2. Age related prevalence of coccidiosis in chicken

Age group	No. of sample	No. of positive sample	Percentage (%)
0-4 weeks	135	26	19.25
5-6 weeks	70	15	21.42
7-8 weeks	85	7	8.23
>8 weeks	53	4	7.5
P value	0.024*		

*Means significant at 5% level (P<0.05)

Table 3. Variety related prevalence of coccidiosis in chicken

Type	No. of sample	No. positive sample	Percentage (%)
Broiler	160	33	20.6
Sonali	105	11	10.47
Layer	78	8	10.25
P value	0.031*		

*Means significant at 5% level (P<0.05)



Fig. 1 A. Feces around vent



Fig. 1 B. Feces mixed with blood



Fig 2 A. Pinkish or blood tinged catarrhal exudates



Fig. 2 B. Deeper layers contained large areas of congestion

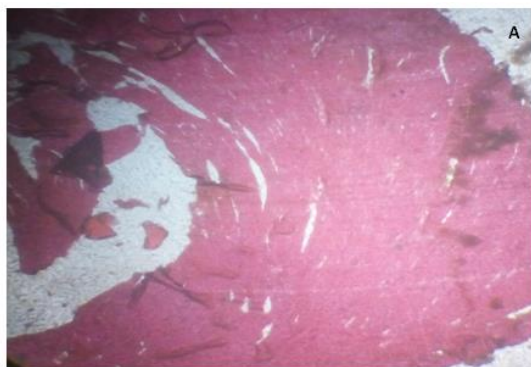


Fig. 3 A. Destruction of normal architecture of caecum

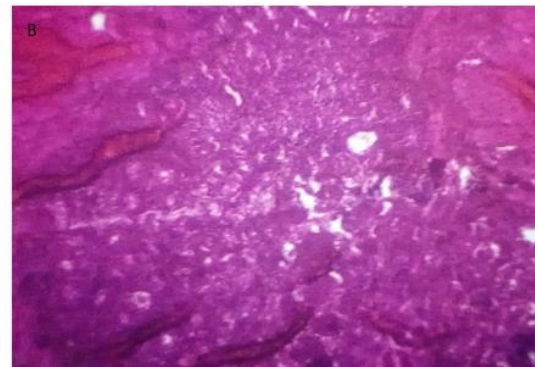


Fig. 3 B. Proliferation of fibrous connective tissue of liver

Necropsy Findings

Major changes were recorded from different intestinal regions of examined chickens and there were enlargement and discoloration of caecum with numerous haemorrhagic spots, thickening of intestinal wall than normal, blood mixed intestinal contents representing reddish to brownish color in the intestinal lumen (Figure 2. A), pin point to profuse haemorrhage was observed over the intestinal wall and mucosa (Figure 2. B).

Histopathological Findings

In histopathological section of caecum there was destruction of normal architecture of caecum, the mucosa of the villi were destroyed and disorganized and no continuation with lining epithelium of villi (Figure 3. A). In liver section, there was proliferation of fibrous connective tissue (Figure 3. B).

DISCUSSION

This total examination was undertaken to draw out the picture of prevalence of chicken coccidiosis at small scale commercial farm in different upazila of Bogura district with the observation of related pathological changes. Fifty two positive cases (15.38%) were found from 338 diseased and dead examined birds from several farms of Bagura district and there was a no significant relationship observed among the prevalence rate. The maximum prevalence was in shajahanpur and Adamdigi upazila on the other hand the minimum prevalence of coccidiosis was 8.5% which is founded in Gabtali upazilla. This observation is close to the data represented by other authors where they showed the incidence rate was 9.40% by Bhattachrjee *et al.*; 1996, 9.46% by Islam *et al.*; 2003. In West Bengal 85 (10.91%) cases of coccidian is recorded by Bhattacharya and Pramanik; 1987. These variations among the present and earlier studies might be due to several geographical, management practices and some examination protocol such as study period, differences in sample collection techniques and identification procedure.

Young chickens are more susceptible and more readily display signs of disease, whereas older chickens are relatively resistant as a result of prior infection. The mortality rates found in different age groups were 19.25%, 21.42%, 8.23% and 7.5% in 0-4weeks, 5-6weeks, 7-8weeks and above 8week respectively with highest value in 5-6 weeks of age group. This reesult is similar to the observation by Kamath; 1987, Rose; 1999, Humphrey; 1973 and Kogut *et al.*; 2005. Typically, the disease is seen in chickens of 3-6 weeks old before they have acquired immunity. The exact cause of higher prevalence of protozoa in young than adult chicken cannot be explained properly but it can be hypothesized that younger chickens have less developed immune system compared to adults.

The present result shows that variety of chicken had no significant influence on the prevalence of coccidiosis where broiler (20.6%) shows the highest prevalence rate than sonali and layer. The present findings contrast with the observation of Etuk *et al.*; 2004 who recorded a higher prevalence of coccidiosis in adult layer chicken in other age categories which is different from this study. The variation may be due to location, season, age difference, sex, breed and other managerial factors.

Clinical manifestation of chickens naturally infected with *Coccidia* was studied and the common findings were bloody diarrhoea, attachment of faeces around vent and blood mixed with feces. These findings are similar with the result of Reid and Pitoais; 1965 and Williams; 2006. 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 also agreed with the findings reported by Tyzzer; 1990, Waxier; 1998, Ruff *et al.*; 1976 and Levine; 1983.

Gross pathological changes of the various organs of the affected chickens were studied and the major pathological lesions were deeper layers contained large areas of congestion, pinkish or blood tinged catarrhal exudates, hemorrhage and extravasations of blood within the intestinal lumen and intestinal mucosa. These gross lesions are also reported by Bertke; 1989, Becker; 1959, Reid; 2002, Poul; 2009, Jagadeesh *et al.*; 1976, Arakawa *et al.*; 1981 and Levine; 1983.

The histopathological changes founded were destruction of normal architecture of caecum and the villi of the mucosa were destroyed and disorganized. Proliferation of fibrous connective tissue of liver. This observation is agreed with the report of Noyilla *et al.*; 2007 and Jagadeesh *et al.*; 1976.

CONCLUSION

The present work was conducted for the clinic-pathological investigation of chicken coccidiosis in different upazila in Bogura district based on clinical, parasitological, necropsy and histopathological feature. Total 95 farms were visited among which 343 diseased/dead chickens were examined out of which 52 chickens were found to be positive for coccidiosis. The proportion incidence of coccidiosis is lower because the farmers are intensively aware of coccidiosis and other parasitic disease now a day. They usually use coccidiostats routinely. The proportional mortality rates of coccidiosis in different age groups were significantly varied. The clinical signs of the affected birds were more or less similar to signs generally developed due to the infection with coccidiosis and clinically characterized as bloody diarrhea, anaemia, depression, ruffled feather, reduction of feed and water intake, drooping wings. At necropsy, deeper layers contained large areas of congestion, pinkish or blood tinged catarrhal exudates. Histopathologically destruction of normal architecture of caecum with destroyed and disorganized villi mucosa. On the basis of this examination, it is assumed that although coccidiosis is a serious problem for poultry production in Bangladesh but it possible to control under routine preventive and control measure which is prime essential for substantial improvement in poultry industry.

COMPETING INTEREST

The authors declare that they have no competing interests.

ACKNOWLEDGEMENT

The authors are grateful to the poultry farmers for agreeing to participate in this study. We also appreciate the animal health assistant of Bogura district for assisting us in identifying all poultry farms of the study area.

REFERENCES

1. Ahmed S and Hamid MA, 1992. Status of Poultry production and development strategy in Bangladesh. Proceeding of workshop on livestock development in Bangladesh. Bangladesh Livestock Research Institute, Savar, Dhaka, Bangladesh.
2. Arakawa A, Baba E and Fukata T, 1981. *Eimeria tenella* infection enhances *Salmonella typhimurium* infections in chickens. Poultry Science, 60: 2203-2209.
3. Becker RF, 1959. In Diseases of Poultry (Ed Biester N.E, IOWA State University Press, Ames, Iowa, USA, 4th Edition, 828-858.
4. Bertke EM, 1989. Pathological effect of coccidiosis caused by the *Eimeria tenella* in chicken (Unpublished Thesis). University of Wisconsin, USA. 67: 193-199.
5. Bhattacharjee PS, Kundu RL, Biswas RK, Hossain EE and Miah AH, 1996. Retrospective analysis of chicken diseases diagnosed at the CDIL, Dhaka. Bangladesh Veterinary Journal. 30: 105-113.
6. Bhattacharya HM and Framanik AK, 1987. Diseases of poultry in three districts of West Bengal affecting rural economy. Indian Veterinary Journal, 7(1): 63-65.
7. Candra AA and Putri DD, 2013. The efficacy of turmeric extract against experimentally induced *Eimeria Maxima* infection in broiler. Bangladesh Journal Veterinary Medicine, 11(2): 93-95.
8. Das PM, Rajib DMM, Noor M and Islam MR, 2005. Antibody response to Newcastle disease vaccines in commercial layer chickens. The Bangladesh Veterinarian, 23: 1-8.
9. Etuk EB, Okoli IC, Uko MU, 2004. Prevalence and management issues associated with poultry coccidiosis in Abak agricultural zone of Akwa Ibom State, Nigeria. International Journal of Poultry Science, 3: 135-139.
10. FAO, 2008. Bangladesh Bureau of Statistics (BBS), June 2006, pp. 172-198.

11. Humphrey CD, 1973. A comparison of uninfected and protozoan parasitized chick intestinal epithelium by light and electron microscopy. *Veterinary Bulletin*, 44(8): 37-98.
12. Islam MR, Das BC, Lucky NS and Mostafa MG, 2003. A study on the occurrence of poultry diseases in Sylhet region of Bangladesh. *International Journal of Poultry Science*, 2(5): 354-356.
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, 1987. Coccidiosis in chicken. *Indian Veterinary Journal*, 5(7): 19.
15. Karim M J, 2003. Current disease pattern in poultry with special emphasis on parasites and their method of control. Proceeding of the 3rd International poultry show and seminar of World Poultry Science Association, Bangladesh Branch, BFCC, Dhaka, Bangladesh. pp. 119-123.
16. Kogut MH and Powell KC, 2005. Preliminary findings of alterations in serum alkaline phosphatase activity in chickens during coccidial infection. *Journal of Comparative Pathology*, 108 (2): 113-119.
17. Levine DNP, 1983. *The Biology of Coccidia*. University Park Press, Baltimore, USA, pp. 28.
18. Noyilla MN and Medina CS, 2007. Pathology of experimental *Eimeria mivati* infection in young chicken. *Veterinary Bulletin*, 4(7): 31-57.
19. Peek HW and Landman WJM, 2011. Coccidiosis in poultry: Anticoccidial products, vaccines and other prevention strategies. *The Veterinary quarterly*, 31: 143-61.
20. Pout DD, 1967. Villous atrophy and coccidiosis. *Nature*, 213:306-307.
21. Raha SK, 2007. Broiler industry in Bangladesh: some issues. In: proceeding of 5th International Poultry Show and Seminar. The World Poultry Science Association, Bangladesh Branch, pp.1-9.
22. Reid WM and Pitosis M, 1965. The influence of coccidiosis on feed and water intake of chicken. *Avian diseases*, 9(3): 343-348.
23. Reid WM, 2002. *Diseases of poultry*. The Iowa State University Press. Ames, USA, pp.944-975.
24. Rose ME, 1999. The influence of age of host on infection with *Eimeria tenella*. *Journal of Parasitology*, 53: 924-929.
25. Ruff MD and Britton WM, 1976. Reduced yolk colour in layer with coccidiosis. *Poultry Science*, 55(5): 1712-1716.
26. Saleque MA, 2007. Poultry Industry in Bangladesh: Current Status and Its Challenges and Opportunity in the Emerging Market Environment. *Poultry Business Directory 2007*. Khamar Bichitra, Dhaka.
27. Shirley MW, 1993. Live vaccines for the control of coccidiosis. *Proceedings of the 5th International Coccidiosis Conference*. June 1993, pp. 61-72.
28. Shirley MW, Smith AL and Tomley FM, 2005. The biology of avian *Eimeria* with an emphasis on their control by vaccination. *Advanced Parasitology*, 60: 285-330.
29. Tyzzer EE, 1990. Coccidiosis in gallinaeeous birds. *Journal of Hygiene*, 10: 269-283.
30. Waxier SH, 1941. Changes occurring in the blood and tissue of chickens during coccidiosis and artificial haemorrhage. *American Journal of Physiology*, 134: 25-26.
31. Williams R, 2006. The ratio of the water and food consumption of chickens and its significance in the chemotherapy of coccidiosis. *Veterinary Research Communications*, 20(5): 437-447.
32. Zhang Z and Zeng M, 2005. Researches advance of drug resistance in chickens coccidian. *Chinese Journal of Veterinary Parasitology*, 13: 29-36.