

Prevalence of Coccidiosis in Commercial Broiler Chicken in District Abbottabad Khyberpakhtunkhwa, Pakistan

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Abstract

A cross sectional study was conducted from February 2018 to July 2018 to determine the age wise and month wise prevalence of poultry coccidiosis in District Abbottabad. Droppings (n = 294) of broiler chickens of age 5 - 42 days were examined for prevalence of coccidiosis and identification of *Eimeria* species. Out of which 29 samples were found positive. The disease mostly affects the older birds. Whole intestinal tract of each bird was examined for gross pathological changes. The prevalence was higher in the birds of age 29 - 35 days (34.48%). The prevalence of coccidiosis was higher in the month of March (33%), while lowest during February (2%). Four species of *Eimeria* were identified *E. acervulina* (27.5%), *E. maxima* (20.6%), *E. mitis* (13.7%), *E. tenella* (37.93%).

Keywords: *Eimeria*; Age; Broiler; GI Tract; Prevalence

Introduction

Poultry sector is an important source of animal protein (egg and meat). This organized sector is adversely affected by the protozoan parasites of the genus *Eimeria*, which multiplies in intestinal mucosa causing coccidiosis [1]. Coccidiosis is one of the most important common illnesses in the poultry, which is responsible for major financial losses worldwide. Great economic losses have been attributed to the intestinal parasites because they produce lesions ranging from dilation of the intestine and nodule formation to severe enteritis, thus impairing the absorbing power of intestine. In addition, nutrients and vitamins are absorbed by the parasites from the host thus causing the loss of weight, bloody feces, ruffled feathers, retarded growth, reduced egg production, weakened body resistance and even death [2].

Broiler chicken (*Gallus Gallus domesticus*) is a gallinaceous domesticated fowl, bred and raised definitely for meat production [3]. There are more chickens in the world than any other species of bird [4].

One of the major problems faced by public in Pakistan is an acute shortage of animal's protein in common and poultry products in particular. Efforts have been made by the Government and private sector to improve the poultry farms by reorganizing and proper planning on modern scientific methods [5].

Coccidiosis still remains one of the major disease problems especially for poultry producers. The acute infection of young chickens often results in mortality rates sometime approaching 100%. The chronic infection in older birds may not always be fatal but results in reduced weight gain. In young birds recovery may occur but growth is retarded and maturity is delayed which further adds in cost of production [6].

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The specie of coccidian in the chicken belongs to family *Eimeriidae* of the genus *Eimeria*. All attack the lining of the intestine or caeca. Several species of *Eimeria* which includes *E. tenella*, *E. necatrix*, *E. maxima*, *E. acervulina*, *E. mitis* and *E. mivati* they are pathogenic. Symptoms include dysentery, enteritis, emaciation, drooping wings, poor growth, low production with high rate of mortality and morbidity [2].

Their oocyst distributed by clothes, shoes, dust and other. *Eimeria spp* can survive in infected birds and environment for long times. It causes high mortality in young chicks because most of the *Eimeria spp* affects birds between the age of 3 and 18 weeks [7].

Identification of each species is dependent upon the zone of intestine parasitized, gross appearance of the lesion, oocyst morphology and location of parasite in the host intestinal epithelium.

Parasitic growth in the host cells involves both sexual and asexual phases of multiplication. The specific objectives of the study were to determine the *Eimeria spp.* prevalent in broiler population of District Abbottabad during different climatic conditions and effect of age on occurrence of coccidiosis in broiler birds.

Materials and Methods

Study area

The study was carried out from February 2018 to July, 2018 in district Abbottabad, in the Khyber Pakhtunkhwa province of Pakistan. Abbottabad is a district of Pakistan. The district covers an area of 1,969km² with the city of Abbottabad being the capital. The broiler chickens are mostly reared in open sided houses in this area. About 2.5 million broilers is being annually reared in this region, in addition to 04 million broilers breeder stock, 0.5 million commercial layers and 3.00 million rural poultry. However, the area is still deficient in supporting local meat market and sometime broiler chickens are brought from other cities to meat market [8].

Sampling area

The study was conducted in the healthy broiler flock reared in the surroundings of district Abbottabad. About 30 apparently healthy broiler chicken flocks were visited and birds were randomly collected for postmortem and further sample analyses. Also, fecal samples (n = 144) were collected around the drinkers and feeders of the same flock.

The chicks and the fecal samples were then brought to the post-mortem section of the Veterinary Research and Disease Investigation Center, Abbottabad for clinical diagnosis in Parasitology lab.

Sample collection and analyses

Postmortem of the chickens was performed and gross lesions were noted. Faecal samples were collected from the intestines of broiler chickens in a petridish [9]. About 5 birds from each flock were obtained for analyses. Likewise, 5 droppings from 26 flocks and 7 droppings from two flocks were also obtained. Different grades of alcohol are used for gradual dehydration of material. Dehydration results into the shrinkage of materials. Staining leads to the absorption and reactions of the dyes with the cell contents, giving it a particular color. Different stains are used to differentiate various parts [10].

Procedure

Following is the procedure for whole mount stain.

Staining

1. Take a clean watch glass.
2. Take the fresh material in water in a watch glass.
3. Transfer the material with camel hair brush to second watch glass and wash the material 3-4 times to remove the fixative.

4. Transfer the material to 30% alcohol; cover the watch glass with petridish. Leave the material in it for 5 - 10 minutes depending upon the thickness of material.
 - a. Transfer the material in the following chemicals one after the other. Transfer it to 50% alcohol for 5 - 10 minutes.
 - b. Borax Carmine for 10 - 20 minutes.
 - c. 70% alcohol for 10 minutes.

Check the material under the microscope. It should be properly stained i.e. color should be dark pink. If it is under stained transfer back to Borax Carmine and if over stained place it in 70% acid alcohol for 5 - 15 seconds. It removes the extra stain and gives shines to the material [11].

5. Transfer the material to 90% alcohol for 10 to 15 minutes. Take absolute alcohol in watch glass; now shift the material to it. Keep it here for 10 - 15 minutes.
6. Take xylol (also called xylene) and transfer the material to it. This is a check test. If dehydration is not complete a milky layer around the specimen will be formed and if dehydration is complete, no milky layer will be formed.

Just after checking transfer it to clove oil or cedar wood oil for 3-5 minutes

Mounting

Take a neat and clean slide; place 1 - 2 drops of Canada blossom on it. No air bubbles should be present in it.

1. Now change the clove oil once again with xylene.
2. After 2 - 3 minutes transfer the material with the help of brush to the Canada blossom.
3. Place the cover slide on the specimen [12].
4. Observe the results.

Results and Discussion

Total 294 samples were taken in which 29 samples from 13 flocks were positive. In February total number of sample examined were 56 in which 01 case was positive and showed the 1.78% prevalence. While in March 33.33%, April 2.85%, May 12.5%, June 16.66% and July 4.8%. Among all of the months the total prevalence was recorded is 10%. Age wise prevalence recorded in different age groups. About 1 - 7 days of broiler showed the 3.44%, 8 - 14 days showed 10.34%, 15 - 21 days of broiler showed 17.24%, 22 - 28 days of broiler showed 31.03%, 29 - 35 days of broiler showed 34.48%. 36 - 42 days of broiler showed the 3.44%.

Highest prevalence rate of *E. tenella* (37.93%), followed by *E. acervulina* (27.5%), *E. maxima* (20.6%), *E. mitis* (13.7%) was recorded. The disease mostly affects older birds as compared to younger one. So, disease was more common in birds of 29 - 35 days of age (34.48%). Coccidiosis less affect the younger birds of age 1 - 14 days (3.44%).

Months	No. examined	No./(%) of positive
February	56	1 (1.78 %)
March	30	10 (33.33%)
April	35	1 (2.85%)
May	48	6 (12.5%)
June	42	7 (16.66%)
July	83	4 (4.8%)
Total	294	29 (9.86%)

Table 1: Month wise prevalence of coccidiosis in broilers.

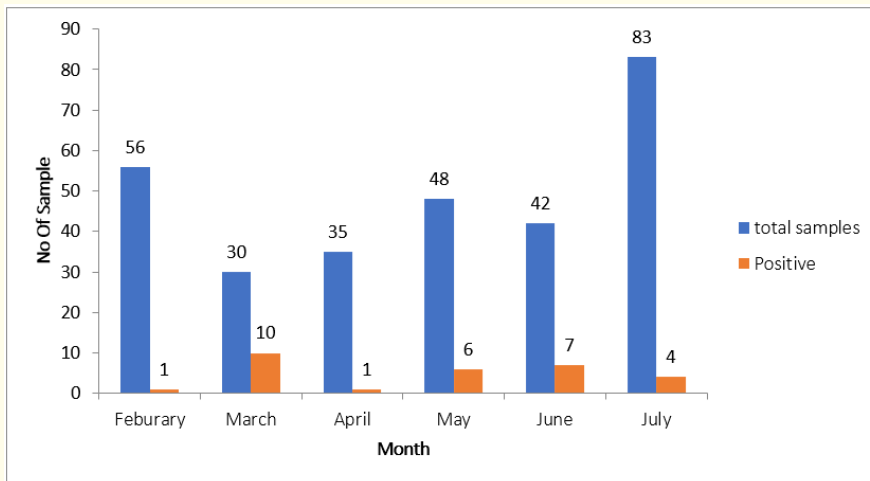


Figure 1: Graphical presentation of prevalence of coccidiosis in broilers.

In the present study, data showed that Eimerial infection was more prevalent in March (33%) followed by June (17%) and this prevalence pattern of disease correlated with [13].

During the month of March prevalence recorded was 33.33%. This disease was more prevalent in month of March. Highest prevalence (73.33%) was observed which support the results of this study and this might be due to high level of humidity combine with temperature [7].

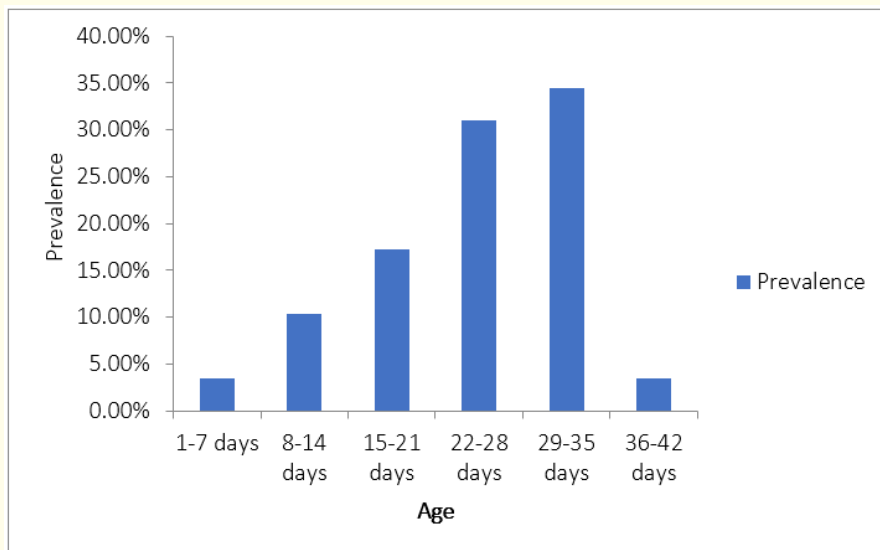


Figure 2: Effect of Age on occurrence of coccidiosis in broilers.

Age (Days)	Prevalence (%)	No. of Flocks
1 - 7	3.44%	01
8 - 14	10.34%	01
15 - 21	17.24%	02
22 - 28	31.03%	04
29 - 35	34.48%	04
36 - 42	3.44%	01

Table 2: Effect of Age on prevalence of coccidiosis in broilers.

In this study highest prevalence rate was recorded in broiler chicken grouped under 29 - 35 days. This disease is more common in the adult birds than the younger ones but a highest prevalence has also been recorded in previous studies in chicken under grouped 2 - 8 weeks (young) as compared to adult chickens [2].

<i>Eimeria</i> Species	Part of intestine affected	% appearance
<i>E. acervulina</i>	Duodenum and/or jejunum	27.5%
<i>E. maxima</i>	Middle part of small intestine	20.6%
<i>E. mitis</i>	Duodenum	13.7%
<i>E. tenella</i>	Caecum	37.93%

Table 3: Prevalence of various *Eimeria* Spp. in different parts of intestines.

The results obtained in the present study related to the 4 species of *Eimeria*. Present study reveals that *E. tenella* showed highest prevalence (37.93%) however, the prevalence of this species recorded in previous studies was (40.9%) [14].

The overall prevalence of coccidiosis is (10%) during the examined months where as in past a higher prevalence of coccidia infection (33.3%) in the sampled chickens was observed [15]. This relatively highly prevalence of the infection is due to the rainy season of study period. In Abbottabad, the lower prevalence rate of coccidiosis may be due to the cold and dry climatic conditions.

Conclusion

It was concluded that the four species of *Eimeria* are prevalent in broilers flocks of district Abbottabad. A higher prevalence of coccidiosis recorded during the month of March might be due to increased rains and development of wet conditions in poultry houses.

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