

Prevalence of coccidiosis in different broiler poultry farms in Potohar region (district Rawalpindi) of Punjab-Pakistan

Abstract

A cross sectional study was conducted from July 2017 to October 2017 in potohar region (District Rawalpindi) Punjab-Pakistan with the objectives to determine the prevalence of poultry coccidiosis. A total of n=420 faecal samples were examined using flotation technique to detect coccidian oocysts. The study revealed 23.80% were positive for coccidian oocysts. The prevalence of coccidiosis was accounted 16.27%, 22.22%, 23.61%, 25.71%, and 32.83% in Chakri, Dandi, Dahari, Rawat and Nela Dolha respectively. Significantly ($P < 0.05$) highest prevalence of coccidiosis was recorded in Ross-308 (24.61%), Cobb-500 (24.37%) and lowest in Hubbard Classic (22.30%). Among age group higher prevalence rates (31.67%) was observed in young (<4 weeks) than adult chicken. Young chicken had ($P > 0.05$) higher risk of acquiring coccidiosis than adult. Higher prevalence of 28.57% was recorded in intensive poultry birds as compared to chicken kept under extensive management system (21.42%). Even though relatively higher prevalence of coccidiosis was recorded in male (28.49%) than female chicken (20.79%). In conclusion, the present study showed that coccidiosis is an important disease of poultry and this warrants appropriate control strategies need to be designed in order to reduce the impact of poultry coccidiosis in the study area.

Keywords: coccidiosis, prevalence, broiler poultry, potohar region, rawalpindi

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Introduction

Poultry industry is a flourishing domain of livestock which contributes 2% in national GDP of Pakistan.¹ It is playing main role in the stability of mutton and beef prices. Commercial poultry in Pakistan was started in 1963.² Commercial poultry farming is one of the most flourishing industries in the world and it provides the cheapest source of animal proteins to human beings.³ However, it has been prone to threats including viral, bacterial and parasitic diseases involving GIT system of the birds.⁴ Enteric diseases are an important concern to the poultry industry because of production losses, increased mortality and reduced welfare of birds and increased risk of contamination of poultry products for human consumption.⁴ Coccidiosis is a common protozoan disease in domestic birds and other fowl,⁵ characterized by enteritis and bloody diarrhea,⁶ which is caused by multiple species of the protozoan parasite of the genus *Eimeria*.⁷ The intestinal tract is affected, with the exception of the renal coccidiosis in geese.⁸ The infection is realized by a fecal-oral route.⁹ The disease occurs only after ingestion of sporulated oocysts in susceptible hosts and is characterized by diarrhea, enteritis, emaciation, drooping wings, poor growth, and increased morbidity and mortality.⁹ Poor management practices, such as wet litter and high stocking density, can exacerbate the clinical signs.¹⁰ For chemoprophylaxis of coccidiosis, anticoccidial drugs have been used as feed additives to overcome the disease, but complications have been started by emerging drug resistance and hazardous effects of such drugs on bird's health.¹¹ If the chickens are exposed to the natural effect of a moderate number of oocysts in their environment,¹² they develop immunity to the respective parasitic species.¹³ Different *Eimeria* species causing avian coccidiosis include *E. mitis*, *E. brunette*, *E. tenella*, *E. acervulina*, *E. maxima* and *E. necatrix*.^{14,15} In Pakistan even though poultry coccidiosis have been

studied by several researchers in different areas of the country, the disease is still continued being a major constraint in poultry production which needs more research and further investigations. There is little information regarding the prevalence of coccidiosis and their impact on poultry production in and around potohar region of Rawalpindi. Therefore the present study was done with the objectives to determine the prevalence of poultry coccidiosis disease in poultry kept under different production in the study area.

Material and methods

Study area description

The study populations were all apparently healthy chickens in potohar region of Punjab (District Rawalpindi) and kept under different management system mainly intensive. The study birds were grouped into sex (male and female), breeds (Ross-308, Cobb-500 and Hubbard Classic) and the age as young (<4 weeks) and adult (above 5 weeks of age).

Study design and sampling method

Cross-sectional study was conducted to determine the prevalence of coccidiosis in chicken in potohar region of Punjab (District Rawalpindi) in July 2017 to October 2017. A total of n=420 fecal samples were collected from broiler flocks farms. The fecal sample were collected from the upper surface of the litter immediately after dropping of feces with spatula then each fecal sample was placed in a pre-labeled universal bottle from each chicken. Fecal samples were brought to the laboratory for parasitological examination. Information regarding the age, history of diarrhea, and type of chicken and other general information about farms and flocks were taken from farmers (Table 1).

Table 1 Composition of farm

Farm Location	Farm no	Flock Size	Age of flock	Breed
Chakri	1	10000	3 weeks	Ross-308
	2	10000	5 weeks	Cobb-500
	3	10000	5 weeks	Hubbard Classic
Dandi	1	10000	4 weeks	Ross-308
	2	10000	5 weeks	Cobb-500
	3	10000	2 weeks	Hubbard Classic
Dahri	1	12000	3 weeks	Cobb-500
	2	10000	5 weeks	Ross-308
	3	10000	4 weeks	Hubbard Classic
Rawat	1	15000	2 weeks	Cobb-500
	2	15000	5 weeks	Ross-308
	3	15000	4 weeks	Hubbard Classic
Nela Dolha	1	10000	3 weeks	Hubbard Classic
	2	10000	6 weeks	Cobb-500
	3	10000	6 weeks	Ross-308

Laboratory investigations

Freshly deposited fecal sample were collected from the upper surface of the litter immediately after dropping and examined thoroughly. The sample was collected with a spatula, which was washed and cleaned after each collection in order to avoid contamination. Each fecal sample was placed in a pre-labeled universal bottle indicating the age, breed and sex of the chicken. Oocysts in each fecal sample of chicken were detected by using floatation technique using saturated sodium chloride solution.¹⁶ One gram of fecal sample was weighed using a top loader balance put into a beaker and mixed with saturated salt solution. It was thoroughly mixed and strained using 90 mesh sieves into another beaker. The filtrate was poured into test tube of respective fecal sample number and these were placed in test-tube stands. Each test tube then filled to the brim with salt solution of sodium chloride. Cover-slip was placed on test tube surface and left to stand for 15 minutes after which they were gently lifted off without brushing against the tubes. This was then placed on microscopic slides sideways in one quick movement to avoid air bubbles on the glass-slide and viewed under the microscope. Examinations of the slides were carried out using 40X objective lens.

Statistical analysis

Statistical analysis was performed by using the software package SPSS version 16.0 for Windows. The differences among variables were evaluated by chi-square test. A *P* value <0.05 was considered statistically significant.

Results

A total n= 420 chicken samples were examined, Overall 100 (23.8%) of the fecal samples were reported positive for coccidian oocysts. Among study areas the highest prevalence parentage at 22

(32.83%) was observed in Nela Dolha followed by 25.71%, 23.61%, 22.22% and 16.27% prevalence obtained in Rawat, Dahari, Dandi and Chakri respectively (Table 2). In this study Higher prevalence rate was recorded in chicken grouped under <4 weeks (young) (31.67%) compared to chicken with >4 weeks (adult) age categories with significant difference (*P*<0.05). Young chickens had higher risk of being infected by coccidiosis as compared to adult chickens. Higher prevalence of 28.57% was observed in poultry kept under intensive farms as compared poultry under extensive management (21.42%). Even though relatively higher prevalence was obtained in male (28.49%) than female chicken (20.79%), statistically significant (*P*>0.05) difference in the prevalence of coccidiosis was low observed breed wise. Hubbard classic show low percentage of infection as compare to Ross-308 and Cobb-500 (Table 3).

Table 2 The prevalence of poultry coccidiosis in the study area

Farm location	Number of sample	Number of negative sample	Number of positive sample	Prevalence %
Chakri	86	72	14	16.27
Dandi	90	70	20	22.22
Dahari	72	56	17	23.61
Rawat	105	78	27	25.71
Nela Dolha	67	45	22	32.83
Total	420	320	100	23.8

Table 3 Prevalence of coccidiosis in different sex, breed, age, and management of broiler

Variable	Category	Sample examined	No. positive (%)	P value
Sex	Male	165	47 (28.49)	0.001
	Females	255	53 (20.79)	0.001
Age	Young (<4 week)	180	57 (31.67)	0.001
	Adult (>4 week)	240	43 (17.97)	0.001
Breed	Ross-308	130	32 (24.61)	0.001
	Cobb-500	160	39 (24.37)	0.001
	Hubbard Classic	130	29 (22.30)	0.001
Management	Extensive	280	60 (21.42)	0.001
	Intensive	140	40 (28.57)	0.001

Discussion

Results obtained in this study revealed that coccidiosis was wide spread in the study area. In the present study an overall prevalence of chicken coccidiosis was found to be 23.80% (100/420). The variation in prevalence of the disease may be due to the difference in the climatic conditions, agro-ecological set-up and lack of adequate information on the disease.^{17,18} And difference in management systems of the farms. The prevalence rate of the disease was significantly ($P < 0.05$) higher in Ross-308 breed (24.61%) than Cobb-500 (24.37%) and Hubbard Classic (22.30%). This result in agreement with the most previous research work done in different parts of the world, who reported higher prevalence of coccidiosis in exotic breed than local chickens.¹⁹ In contrary to this finding study conducted in Dera Ismail Khan⁴ and Rawalpindi²⁰ indicated no association between coccidiosis occurrence and breed of chicken. The result of the current study was in concordance with the reports of Kaboudi et al.²¹ In contrary to this finding several other researchers reported higher prevalence of poultry coccidiosis in female as compared to male chickens.¹⁴ Absence of statistically significant difference between female and male might be due the equal chance of exposure for the coccidiosis infection. This result disagree with the report made by Oljira et al.²² who recorded similar prevalence of coccidiosis among age groups 31.67% in young (4 weeks) and 17.97% in adult (>4 weeks) chicken. In this study, it found that there was statistically significant difference with the occurrence of poultry coccidiosis between different management system (intensive and extensive) ($P < 0.001$). Chickens that kept under intensive management system were found to be more likely to be infected than chickens kept under extensive management system. However, the current result was disagreement with the previous report by¹⁵ who recorded higher prevalence in chickens which are managed in backyard production system (45.7%) than floor (49.1%) and cage (25.6%) production systems. The observed higher prevalence of coccidiosis in intensive management system might be explained in terms of the rearing systems where all of the poultry farms included in the study practiced deep litter rearing system. Deep litter poultry houses further exacerbate the risk of coccidial infection as it provides optimal condition of temperature and humidity for oocyst sporulation.^{4,14} On other hand poor poultry management where there is overcrowding, leaking water troughs and accumulation of feces are factors that contributed to the high prevalence rate.

Conclusion

In conclusion, the result of this study indicated that poultry coccidiosis is major threat to poultry producers in the study areas which warrants appropriate intervention. Age, breed and management systems were among risk factors that were associated with chicken coccidiosis in the study areas. Strategic prophylaxes and treatment against *Eimeria* should be developed and implemented in order to reduce the economic losses due to the disease in area. Furthermore, efforts needed to be done to develop economical and sustainable prevention and control strategies as coccidiosis remains a major challenge to poultry producers in country wide.

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Conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Author's contributions

All author carry equally contribution in whole study.

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