Prevalence of Coccidiosis and its Association with Risk Factors in Poultry of Quetta, Pakistan

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ABSTRACT--- ***The present study was undertaken to evaluate the incidence of coccidiosis and its association with various risk factors in chickens in Quetta city. A total of 353 specimens comprising of 250 gut samples and 103 faecal droppings were collected from chickens of different poultry shops and poultry farms. The microscopic examination of gut samples revealed 18.40% (n= 46/250) overall incidence of coccidiosis and only 6.79% (n=7/103) faecal droppings were found positive for coccidial oocysts. Higher prevalence rates of gut samples were recorded in broilers (20.86%), young chickens aged 2-6 weeks (22.69%) and during the month of August (52.94%) followed by September (45.45%) . Difference in the prevalence of disease in age groups and months was statistically significant (P<0.05). However, no significant difference (P> 0.05) was observed between broilers and layer.***

Keywords- Coccidiosis, Prevalence, Chickens, Quetta

1. INTRODUCTION

Coccidiosis is an infectious disease of the digestive tract of poultry caused by a microscopic protozoan parasites (sporozoa) of the genus *Eimeria*, phylum Apicomplexa [1] which are commonly known as coccidia. It adversely affects the poultry industry throughout the world and results in a remarkable economic loss[2]. The parasite damages the intestinal mucosa of the bird (or other animal hosts), being highly host-specific and causing illness and sometimes death [3]. Nearly 1800 species of *Eimeria* are known to infect the intestinal lining of birds and several other animals [4]. Most of the coccidia infecting chickens and other poultry belong to the genus *Eimeria*, but very few species of *Cryptosporidium, Isospora and Sarcosporidia* have been documented [5]. In many countries, nine species of *Eimeria* have been reported in chickens in surveys of commercial poultry farms [6]. Seven species are regarded as valid: *E. acervulina, E. maxima, E. praecox, E. mitis, E. necatrix, E. tenella and E. brunetti.* These *Eimeria* species are distinguished by: (a)The morphology of oocysts (b) their localization in the digestive tract and (c) their degree of pathogenecity [7]. The different *Eimeria* species differ in their localization in the intestine and in their ability to cause morbidity and mortality [8].

On the basis of location in the gut, coccidiosis has been categorized into caecal coccidiosis characterized by diarrhea, caecal haemorrhages and anemia caused by *Eimeria tenella* [9] and intestinal coccidiosis caused by a number of parasites such as *E.necatrix*, *E.acervulina*, *E.maxima*, *E.brunetti*, *E.mitis*, *E.mivati*, *E.praecox* and *E.hagani*. [10]. *E.tenella, E.maxima, E.brunetti, E. necatrix* are regarded as highly pathogenic while *E. acervulina, E. mivati and E. mitis* are less pathogenic, and *E. praecox* and *E. hagani* are least pathogenic [11,12].

Clinical signs of the infection in chickens can range from none to bloody droppings, watery diarrhea, dehydration, lowered feed intake, weight loss, paleness, huddling, ruffled feathers, and depression. All ages of chickens are susceptible to infection, but the disease is more prevalent in 6-8 weeks of age [13,14]. Several factors influence the prevalence of the disease such as high air temperature high animal density, high humidity, feed change, different age categories of birds at same place and health status of the birds [15].

Susceptible chickens acquire the infection by ingesting infective (sporulated) oocysts in litter, soil, contaminated water and feed. The infected birds excrete oocysts into the faeces and are major source of infection for other birds [16]. The infection can be transmitted by direct as well as indirect contact [17]. The infective oocysts can also be mechanically spread by dust, equipment, insects, rodents, wild birds and as well as humans [18]. The disease adversely affects the growth of the infected birds and causes high morbidity and mortality [19].The infection can be controlled by good management including dry and clean litter and good ventilation, [20]. Since 1950s, the control of coccidiosis has been achieved through anticoccidial compounds administered in the feed, which reduce infections to a sub-clinical level [21].

With the increasing interest in the poultry production evidenced by the proliferation of poultry farms, it is pertinent to continually evaluate the prevalence of poultry disease such as coccidiosis in Quetta city. The present study

aimed at assessing the incidence of poultry coccidiosis in chickens in various poultry farms and poultry shops in Quetta city, Balochistan.

2. MATERIALS AND METHODS

2.1. Sample Collection

A total of 353 specimens of chickens (broilers and layers) comprising of 250 gut samples and 103 faecal droppings were randomly collected from different poultry shops and farms located at various regions of Quetta city. All the samples were brought to the Laboratory of Zoology Department, Sardar Bahadur Khan Women's University, Balochistan, for processing and microscopic examination.

2.2. Data Collection

During sampling different parameters were also recorded such as breed, age groups, month, external lesions and area.

2.3. Parasitological Examination

2.3.1. Microscopic Examination of Gut Samples

At first, all the intestines and caeca were examined carefully for the presence of external lesions. The intestines were cut opened and the gut contents were microscopically examined by direct wet mount smear method for the presence of *Eimeria* oocysts [22]. The results for the presence or absence of *Eimeria* oocysts were recorded. If no oocysts were found on the three slides of the sample, it was recorded as negative sample. The positive samples were also kept in a 2.5% aqueous solution of potassium dichromate ($K_2Cr_2O_7$) for sporulation [23].

2.3.2. Microscopic Examination of Faecal Samples

The faecal samples were soaked overnight at 37°C in 2.5% (w/v) aqueous solution of potassium dichromate. The samples were shaken vigorously to break up the feces. The suspension was filtered through a cheese cloth into a beaker. The filtrate obtained was centrifuged at 2000 rpm for 5 minutes to settle down the oocysts. The supernatant fluid was discarded and the *Eimeria* oocysts present in the sediment were separated using floatation technique and then examined carefully through microscope using oil emersion lens for the presence of the *Eimeria* oocysts [24]. Photographs of the positive slides were taken.

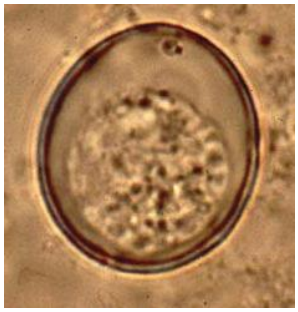

Figure 1: Unsporulated oocyst of *Eimeria* form chicken in Quetta city, Pakistan.

2.4 Statistical Analysis

Using SPSS version 16, the data were analyzed using chi-square with a significance level of $P < 0.05$ to find out the association between coccidiosis and the various risk factors.

3. RESULTS AND DISCUSSION

The study was undertaken to investigate the prevalence of chicken coccidiosis in district Quetta, Balochistan, Pakistan. Out of 353 specimens collected, that is 250 chicken guts and 103 faecal droppings, 46 (18.40%) gut samples were infected with *Eimeria* oocysts and only 7(6.79%) faecal droppings were positive

The overall incidence of coccidiosis of guts was 18.40% which was partially in line with the finding reported by Diriba *et al.* [25] who reported a prevalence of 20.57% in western Ethiopia. However, the prevalence of coccidiosis recorded in Quetta city is lower than other surveys conducted in Pakistan. Awais *et al.* [26] and Khan *et al.* [27] reported 43.89% prevalence of coccidiosis in Faisalabad, Pakistan and 71.86% in Rawalpindi/Islamabad area, respectively. The comparatively low prevalence of coccidiosis in Quetta may be due to its dry and cold climatic conditions. The study of gut samples revealed the infection rate of 20.86% and 11.11% in broiler and layers, respectively. However, statistically significant difference (*P> 0.05*) in the prevalence of coccidiosis between broilers and layers was not observed (Table 1). This result disagrees with the finding of Etuk

Table 1: Prevalence of Chicken Coccidiosis in Respect to Different Risk Factors (Gut Samples)

Risk factors	Categories	No. examined	No. infected	Prevalence (%)	Chi-square	*P value*
Breed	Broiler	187	39	20.86	2.98	0.084
	Layer	63	7	11.11		
Age Group	*Young	163	37	22.69	5.767	0.016
	*Adult	87	9	10.34		
Month	June	10	3	30.00	43.64	0.005
	July	20	4	20.00		
	August	17	9	52.94		
	September	22	10	45.45		
	October	28	6	21.43		
	November	28	8	28.57		
	December	42	2	4.76		
	January	18	0	0.00		
	February	18	0	0.00		
	March	47	4	8.51		

*Young (2-6 weeks) and adult (greater than 6 weeks)

et al. [28] who reported significantly higher infection rate in layers (22.29%) than broilers (3.51%) and Yunus *et al.* [29] also found coccidial infection to occur more in layers (27%) than broilers (19.6%).

The result of the current research indicated that the rate of the disease is significantly higher ($P<0.05$) in younger chickens (22.69%) as compared to adults (10.34%) (Table 1). The result obtained supports the findings of Kaschula (1961) and Khan *et al.* [27] that younger birds had greater infection ratio than older birds and Etuk *et al.* [28] also found that coccidial infection was more prevalent (18.75%) in young chickens aged 1-5 weeks in Nigeria. This also agreed with the finding of Bachaya *et al.* [31] who reported that predominance of infection was 60.16% among younger chickens and 37% among older ones.

The disease was significantly prevalent during the hot and humid months of the year because such climatic condition favor the transmission and development of the oocysts [32]. In the present study, higher coccidial infection was observed during the months of August and September (52.94% and 45.45%, respectively) followed by June (30%), November (28.57%), October (21.43%), July (20%), March (8.51%), December (4.76%) while no infection was recorded during the months of January and February. The difference in the prevalence rate was also statistically significant ($P<0.05$) among different months (Table 1) Amin *et al.* [33] studied the seasonal prevalence of Eimeriosis in broiler chickens in Abbottabad, Pakistan and reported the highest percentage of infection proportion during the months of August and September. Bachaya *et al.* [31] in Pakistan also observed the highest predominance of coccidiosis in the month of September (73.33%) and Hirani *et al.* [34] also indicated highest incidence during monsoon season in India, indicating seasonal influence on the prevalence of the disease.

Table 2: Prevalence of Chicken Coccidiosis in Respect to Different Risk Factors (Faecal Droppings)

Risk factors	Categories	No. examined	No. infected	Prevalence (%)	Chi-square	*P value*
Breed	Broiler	38	4	10.52	1.323	0.250
	Layer	65	3	4.61		
Age Group	*Young	24	5	20.83	9.734	0.002
	*Adult	79	2	2.53		
Month	August	10	1	10.00	11.859	0.065
	September	20	1	5.00		
	October	5	2	40.00		
	November	13	1	7.69		
	December	25	0	0.00		
	March	20	2	10.00		
	April	10	0	0.00		

* Young (2-6 weeks) and adult (greater than 6 weeks

The findings of the microscopic examination of the faecal droppings are represented in Table 2. Between the breeds, broilers recorded higher prevalence rate (10.52%) than layers (4.16%), but this difference was not statistically significant ($P> 0.05$). Monthwise prevalence of faecal droppings showed higher infection (40%) in October, followed by August (10%) while no occurrence was recorded during the months of December and April. Age incidence of infection showed that chickens aged 2-6 weeks (young) were more affected than the ones aged 6 weeks and above (adult). As the age of the birds increases, they develop immunity against the disease . This may be the reason why the disease rate decreases with increasing age of birds (Chapman, 1997;Uza *et al.*, 2001).

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