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Short Communication

A Comparative Study on Prevalence of Coccidian Parasites in Broiler Chicken (*Gallus gallus domesticus*), Japanese Quail (*Coturnix coturnix japonica*) and Wild Pigeon (*Columba livia*)

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ABSTRACT

Present study was conducted to detect the prevalence of coccidiosis in Broiler chicken (*Gallus gallus domesticus*), Japanese quail (*Coturnix coturnix japonica*)and wild pigeon (*Columba livia*). Three hundred fecal samples of each species were collected and examined from January 2010 to June 2010. Prevalence was detected by using three diagnostic techniques *i.e*., by direct smear method, sedimentation technique and floatation technique. The mean prevalence of coccidiosis detected during the study period was 17%, 21% and 23% in broiler chicken, Japanese quail and wild pigeon respectively. The prevalence of infection increased with the rise in temperature from January to June indicating a positive relationship, whereas, prevalence of coccidiosis in all three species of birds did not show any direct relationship with the relative humidity.

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Authors' Contributions
AAL and SF conceived the project and wrote the article, FM helped in statistical analysis, SA, IW and AA performed the experiments, AM helped in collecting samples.

Key words
Broiler chicken, Japanese quail, wild pigeon, coccidiosis..

Coccidiosis is a protozoan parasitic infection of mammals and birds which is caused by coccidial parasites divided in to two genera *Isopora* and *Eimeria*. It has been studied that some common species of *Eimeria* (*Eimeria tenella*, *Eimeria maxima*) and *Isospora* are responsible for the coccidiosis in quail, pigeons and chicken which are most common poultry birds (Boughton, 1937). *Eimeria* species are the most common species of coccidian parasites that plague the poultry industry. *Eimeria* infections results in the intestinal lesions, diarrhea, enteritis and even mortality of the infected bird. These coccidial organisms survive in the environment of the walls of oocysts. The infected birds excrete oocysts in their feces to provide a source of infection for other birds. The life cycle of *Eimeria* is completed within seven days and multiplication begins when active oocysts are picked up by the birds and swallowed. After being swallowed coccidia imbed in the intestinal lining and multiply several times and damage tissues. The incidence of coccidiosis in commercial poultry has increased due to higher stocking densities and intensive husbandry practices (Williams, 1999). It has been documented that it is the most consistently reported health problem in Poultry (Khan *et al*., 2006). Ten species of *Eimeria* were identified in domestic rabbits in Riyadh, Saudi Arabia (Azeem *et a.*, 2013) Annually, more than three billion dollars are spent worldwide for the prevention of coccidiosis in poultry (Williams, 1999).

About 25% of world's meat supply is derived from poultry *i.e.*, chicken, turkey, duck, geese, pigeon and quails etc. and the proportion is increasing steadily in South Asian countries such as Bangladesh, Pakistan, India and Sri-Lanka, that represent about 22% of world population (Prabakaran, 2003). Pakistan is deficient in the production of animal protein foods for its increasing human population, as demand of poultry products is so much higher as compared to their production (Abedullah *et al*., 2007). The hindrances to increased poultry products are parasitic diseases of birds. Helminths and protozoan infections can frequently be a major problem causing morbidity and even mortality in the birds. Keeping in view coccidiosis as major health problem in poultry and wild birds, present study was conducted to detect the prevalence of coccidiosis in wild pigeon, Japanese quail and broiler chicken by using different techniques and the detected prevalence was correlated with physical factors of the environment such as mean monthly temperature and mean monthly relative humidity to understand the role of these factors in disease transmission.

Materials and methods

Collection of fecal samples

The present study was conducted from January

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2010 to July 2010 on 300 Broiler chicken at 6-7 weeks of age, 300 mature Japanese quail at approximately 36 week of age and 300 wild pigeon. Fresh fecal samples for Japanese quails and broiler chickens were collected from different poultry farms of Lahore (31° 32° 59° North, 74° 20° 37° East) while samples for wild pigeon were collected from different areas of Lahore mainly from Lower Mall Road and Data Gunj Bukhsh Road. As feces get contaminated at the substrate, upper thin layer was removed and stored in 10% formalin.

Diagnostic techniques

Fecal samples of all birds were examined by the following three diagnostic techniques:

Direct smear examination: 0.5g of feces were mixed with 10-12 ml of normal saline solution. For the removal of debris and dust suspension was passed through a sieve and 2-3 drops of strained material were placed on clean glass slide and a thin layer of smear was made and covered with a cover slip. The slide was examined under low (40x) and high power (100x) of microscope for the detection of coccidian oocysts. At least three slides from different parts of the same fecal sample were examined. Samples negative with direct smear examination were subjected to Sedimentation and Flotation technique examination (Permine and Hansen, 1998).

Sedimentation technique: 1 g of feces along with 10-15ml of tap water was mixed in a bottle and shaked to mix it thoroughly. The suspension was passed through a sieve to remove the organic matter and dust. The strained fluid was poured in to a centrifuge tube and centrifuged for 2 min at 1500 rpm. The supernatant was discarded and a drop of sediment was placed on glass slide and examined under low and high power of microscope for the presence of coccidian oocysts (Anne and Gray, 2006).

Floatation technique: About 1 g of fecal sample was mixed with 15ml water and strained through a sieve to remove any organic matter. The mixture was allowed to sediment for 10-15 min on the bench or by light centrifugation for 2-3 min, until the supernatant was clear. The supernatant was discarded without disturbing the sediments. The sediment was then well mixed with saturated salt solution of NaCl in a centrifuge tube and centrifuged for 2 min at 1500 rpm. The oocysts floated to the top surface and got attached with cover slip. The cover slip was inverted on the glass slide and examined under low and high power of microscope for the presence of coccidian oocysts (Charles and Robinsons, 2006).

Meteorological data

The mean monthly temperature and mean monthly relative humidity data for the period of January 2010 to June 2010 was obtained from Pakistan Meteorological Department Weather information station, Lahore.

Statistical analysis

Data were entered and analyzed through SPSS, 13 Inc., Chicago. Qualitative data such as prevalence of coccidiosis was presented as percentages. Quantitative data such as relative humidity and temperature was presented as means. Data were presented in the form of tables and figures. Statistical analysis was done by using ANOVA taking p-value ≤ 0.05 as significant.

Results

Table I shows the mean percentage of infected birds among wild pigeon, Japanese quail and broiler chicken detected by three techniques. In broiler chicken, Japanese quails and wild pigeon the mean prevalence of coccidiosis in the six month study period was respectively 17%, 21% and 23% (Table I). The monthly prevalence of coccidiosis in birds was correlated with mean monthly temperature. Though no significant effect of mean relative humidity was observed on the prevalence of infection.

Discussion

Coccidiosis is of great economic and medical importance. Coccidial infections of birds have been observed in almost all over the world. It is assumed that most, if not all, domestic birds infected with coccidian during their lives (Taylor and Catchpole, 1994). The fecal examination for diagnosis of parasitic infections is probably the most common laboratory procedure in veterinary practice. Fecal examination can reveal the presence of parasites in several body systems.

The results revealed that the prevalence of coccidiosis infection was less in broiler chicken and Japanese quail as compared to wild pigeon. The main factor behind this less prevalence of infection is that the chicken and quail are bred in poultry farms under proper hygienic conditions and appropriate vaccination after stipulated intervals against various infections. All these conditions reduce the chance of various parasitic infections. In wild pigeons chance of parasitic infections are comparatively higher because they are inhabitant of open environment with microbial contamination which is manifested in the unhygienic feeding habits and because they are not subjected to vaccination. Wild birds are major source of infections in the poultry birds. These wild birds are reservoir of many parasitic diseases and play vibrant role in contaminating poultry products. When these wild birds feed in and around the poultry farms, they transfer the parasitic infections to the healthy birds through their plumage and fecal matter which are

Table I.- Month wise prevalence (%) of cocccidiosis among *G. gallus domesticus, C. livia* and *C. japonica*from January to June 2010.

Months of 2010	Prevalence of cocccidiosis in			Temperature (°C)	Relative humidity
	Gallus gallus domesticus (%)	*Coturnix coturnix japonica* (%)	*Columba livia* (%)		
January	6	6	8	12.5	80
February	10	12	14	17.3	61.5
March	14	14	16	25.0	54.5
April	18	22	24	30.1	32.5
May	24	34	36	33.3	31
June	30	38	40	33.6	38.5
Total	17	21	23		

serious hazards for healthy birds. These infections cause a number of health problems in poultry birds such as loss of weight, anemia and retard growth decreased body resistance against infectious diseases and even cause death. Ruff *et al*. (1998) observed coccidiosis in growing quail has wide spread physiological impact; it reduced weight gain and produced changes in plasma pigment. It also reduced egg production and fertility in Japanese quail and Bobwhite quail. Pakistan is deficient in the production of animal protein food, therefore, there was a need to asses prevalence of coccidian infection in poultry which is the major protein source here.

These finding of temperature and relative humidity with relation to prevalence (%) of infection are similar to the work of Adhikari *et al.* (2008). They reported that the disease incidence was positively influenced by the warm and humid weather, which characterized the rainy season period as favorable conditions for the growth and development of infective oocysts. The climatic conditions in Pakistan favor the parasitic infections like coccidiosis. The poor management of poultry animals can exacerbate the problem and result in great economic losses.

Conclusions

From the present study, it was concluded that coccidiosis is a serious disease not only in poultry birds but also in the wild birds. The observed prevalence (%) of infection in poultry birds was less compared to wild birds. The present study also revealed that the prevalence of coccidiosis, increased with the rise of temperature, though humidity did not show any direct relationship with the prevalence of coccidiosis.

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