

PREVALENCE OF PARASITIC INFECTIONS OF GAME BIRDS IN DHAKA CITY CORPORATION, BANGLADESH

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ABSTRACT

Game birds are silent controller of maintaining ecological balance. To study the prevalence of intestinal parasites in game birds, a total of 60 birds (budgerigar, parrot, cockatoo, dove, turkey and teeter) were collected from several places of Dhaka Municipality area, during the period of June 2017 to November, 2017. Alongside the effects of age, sex, season and treatment on the prevalence of parasitic infection in game birds were studied. Coprologic analysis revealed that the overall prevalence of intestinal parasitic infection was 45%, of which 21.67% of *Ascaridia galli*, 10% for *Balantidium coli* and 13.33% for *Eimeria* spp. The prevalence of *Ascaridia galli* was 28.7%, 22.22% and 16.6% in teeter, budgerigar and parrot respectively. *Eimeria* spp. (16.67%) in budgerigar. The prevalence of *Ascaridia galli* was highest (25%) followed by *Eimeria* spp (16.67%) in parrot. The prevalence of *Ascaridia galli* in cockatoo was 16.67%. In dove prevalence of *Balantidium coli* (44.44%) was highest followed by *Ascaridia galli* (22.22%). The prevalence of *Eimeria* spp. and *Balantidium coli* were highest (25%) followed by *Ascaridia galli* (12.50%) in turkey. The prevalence of *Ascaridia galli* was highest (28.57%) followed by *Eimeria* spp (14.23%) in teeter. Age of this game birds had significant ($p > 0.05$) influence on the infections and odds ratio of Chick (<6 month) vs young (>6 month to 1 year), young vs adult (>1 year) and chick vs adult were 1.28, 1.08 and 1.4 respectively. The sex of the game birds had significant ($p > 0.05$) influence on the infections with intestinal parasites and odds ratio of male vs female was 0.81. Game birds had significant ($p > 0.05$) on the infection in the seasons of the year and odds ratio of summer vs winter was 2.12. Game birds had significant ($p > 0.05$) on the infection in the treatment given and the odds ratio of treated vs non-treated was 0.89. It may be concluded that game birds, irrespective of age, sex, season, treatment, intestinal parasites are the serious threat to game birds in Dhaka Municipality area, Bangladesh.

Keywords: Prevalence, parasitic infection, game birds, Dhaka

INTRODUCTION

Game birds are an integral part of every ecosystem that is commonly found in households, markets and zoos all over the world and it is reared mostly for recreational purposes. Game bird rearing is quite popular in Japan, Hong Kong, Korea, China, Singapore, India, Thailand, Malaysia, Indonesia, France, Italy, Germany, Britain and Russia. In Bangladesh, it has been popularized since 1990 (Atkinson, 1993). There are 27 natural Orders and 8600 Families representing 30,000 species of bird in the world. Out of which, in Bangladesh there are 20 orders and 75 families representing 1200 species of birds (Ali, 1996). In spite of providing all possible care and facilities, the birds kept in the market and households are under constant stress due to captivity and are prone to infections. Parasitic infections have caused considerable losses to wild life in the world (Patel, 2000). Cage birds are parasitized by a wide variety of intestinal parasites in which nematodes and protozoa are commonly found. Parasites are among the most common sanitary problems affecting captive birds especially in high density populations (Albers, 2014). Due to an increased risk of exposure parasites can lead to serious problems, kept for prolonged periods in confined housing and stressed by injuries, illness and adaptation to new environment. The concentration of parasite eggs in the birds has been attributed to limited housing and veterinary care services; the environment plays a major role in determining the severity of the infection. The birds pick up the parasite eggs

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directly by ingesting contaminated feed, water, litter and other insects which can carry the eggs of the parasites (Gary and Richard, 2012). As it is important to identify and control parasite species capable of producing diseases in captive birds, there is a clear need for parasitological species in avian species. However, severe parasitism still may be seen in pen reared birds like budgerigar (*Melopsittac usundulatus*), parrot (*Psittaci formes*), cockatoo (*Cacatuidae*), dove (*Streptopelia chinensis*), turkey (*Meleagridis gallopavo*) and teeter (*Franocdinus pondicerianus*). Parasites that commonly invade the gastrointestinal tract of the game birds include protozoa, nematodes, cestodes and trematodes (Soulsby, 1982). These parasites when found in the gastrointestinal tract could lead to loss of appetite, emaciation, diarrhea, anaemia, reduced egg production, retarded growth therefore reducing their economic value. A few ascarids may depress weight while large numbers may block the intestinal tract. Occurrence of parasites in birds confined in cage might vary according to type of husbandry practices, disease prophylaxis and treatment administered. Usually captive birds do not show alarming signs of parasitism if regular deworming practices were carried out (Parsani *et al.*, 2001). Despite the importance of game birds in meeting the demand for recreational purposes and maintaining ecological balance, effects of parasites on the game birds is poorly understood especially, in Bangladesh. This study explored the intestinal parasites of the game birds in Dhaka Municipality area. Considering the economical, ecological and recreational aspects of game birds in Bangladesh, the present study was undertaken with a view to determine the overall prevalence of parasitic infection in game birds in Dhaka Municipality area as well as to determine the factors (age, sex, season and treatment) associated with parasitism in the birds in the study area.

MATERIALS AND METHODS

Study area and period

To study the intestinal parasites of game birds the fecal samples of budgerigar, parrot, cockatoo, dove, turkey and teeter were collected from several places such as Kataban, Gulistan, Gulshan, Bashundhara in Dhaka Municipality areas. This study was carried out for a period of six months from June, 2017 to November 2017. Two seasons, summer (June to September) and winter (October to November) were examined in the current study.

Selection of birds

A total of 60 birds were selected randomly in which 18 were budgerigar, 12 parrot, 6 cockatoo, 9 spotted dove, 8 turkey and 7 teeter. The ages of game birds were determined according to Akinboye *et al.* (2017) based on the size of crown, length of the spur and flexibility of xiphoid cartilage together along with the information of owner. In young (<6 months) the crown size were smaller than those of adult (>6 months) the birds were classified as young and adult. The sex was determined in males and females according to combs and wattles, where larger one was found in males than in females and the head were more angular and masculine looking in males. The female were comparatively smaller than male and was more refined and famine looking.

Fecal sample collection and preservation

The fecal sample of game birds was collected from the top of freshly voided fecal mass. Before collection all possible hygienic measures including wearing apron, hand gloves were taken to avoid contamination. The bird's owner use metallic tray for each cage and wash tray every day. Thus it was possible to avoid soil and other contamination during sample collection. About 0.5-2 grams of feces from each bird was collected using separate plastic spoons and the fecal samples were kept in separate plastic vials to preserve the samples, few drops of 10% formalin were added to each sample. The vials were numbered properly and then transferred to laboratory as early as possible. During sample collection all relevant information such as age, sex, rearing system and feeding habit of birds are recorded carefully.

Examination of fecal samples and identification of egg of parasites

The fecal samples were examined by simple sedimentation technique for detection of eggs of intestinal helminths and cysts/ oocysts of the protozoa in the Laboratory of Parasitology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. The eggs of the helminth parasites and cysts/ oocysts of the protozoa were identified by their characteristic features.

Statistical analysis

Data were collected in spreadsheets (Excel 2007; Microsoft, Redmond, Washington) and analyzed using statistics software (STAT/IC-13.0), (Stata Corp, 4905, Lakeway Drive, College station, TX 77845, USA)

RESULTS

During this study, a total of 60 game birds such as budgerigar (n=18), parrot (n=12), cockatoo (n=6), dove (n=9), turkey (n=8) and teeter (n=7) were examined through fecal sample examination. Of which 27 (45%) were found infected with intestinal parasites. Three species of intestinal parasites (one nematode and two protozoa) were identified on the basis of characteristic morphological features namely, *Ascaridia galli*, *Balantidium coli* and *Eimeria* spp. The prevalence of *Ascaridia galli* was 22.2%, 25.0%, 16.7%, 22.2%, 12.5% and 28.6% in budgerigar, parrot, cockatoo, dove, turkey and teeter, respectively. Alongside, the prevalence of *Balantidium coli* was 44.4%, 25.0% in dove and turkey, respectively. Moreover, the prevalence of *Eimeria* spp. was 16.7%, 16.7%, 25.0%, 14.2% in budgerigar, parrot, turkey and teeter, respectively. However, the overall prevalence of *Ascaridia galli*, *Balantidium coli* and *Eimeria* spp. in game birds were 21.7%, 10.0% and 13.3%, respectively (Table 1). In this study, prevalence of intestinal parasites was highest in chick (50.0%) as compared to young (43.8%) and adult (41.7%). However, the difference was not statistically significant (p=0.86). Calculated odds ratio implied that, chicks were 1.28 and 1.4 times more susceptible to infection than young and adult, respectively. The young birds were 1.08 times more susceptible than adults (Table 2). The prevalence of intestinal parasites were relatively higher in female (50.0%) than in males (40.6%), although the difference was not statistically significant (p=0.60). The calculated odds ratio showed that the female birds were 0.81 times more susceptible than males (Table 2). In the present study the prevalence of intestinal parasites were higher in winter seasons (52.9%) than summer seasons (34.6%) and the difference was not significant (p=0.19). The calculated odds ratio showed that the game birds in winter seasons were 2.12 times more susceptible than summer (Table 2). The result showed that the prevalence of intestinal parasites were relatively higher in non-treated birds (45.7%) than treated (42.9%) one with no significant difference (p=0.89). The non-treated birds were 0.89 times more susceptible than treated birds (Table 2).

Table 1. Overall prevalence of intestinal parasites in game birds in Dhaka Municipality area

Types of birds	No. of sample examined	No. of positive sample				Prevalence (%)			
		<i>Ascaridia Galli</i>	<i>Balantidium coli</i>	<i>Eimeria</i> spp.	Total infected	<i>Ascaridia galli</i>	<i>Balantidium coli</i>	<i>Eimeria</i> spp.	Total
Budgerigar	18	4	–	3	7	22.2	–	16.7	38.9
Parrot	12	3	–	2	5	25.0	–	16.7	50.0
Cockatoo	6	1	–	–	1	16.7	–	–	16.7
Dove	9	2	4	–	6	22.2	44.4	–	66.7
Turkey	8	1	2	2	5	12.5	25.0	25.0	62.5
Teeter	7	2	–	1	3	28.6	-	14.2	42.8
Total	60	13	6	8	27	21.7	10.0	13.3	45.0

Table 2. Prevalence of intestinal parasites in birds in Dhaka Municipality area in relation to age, sex, season and treatment

Parameters	No. of sample examined	No. of positive cases	Prevalence (%)	P value (p>0.05)	Odds ratio (OR)
Age					
Chicks (<6 month)	20	10	50.0a	0.86	Chick vs young (1.28)
Young (>6 month to 1 year)	16	7	43.8a		Young vs adult (1.08)
Adult (>1 year)	24	10	41.7a		Chicks vs adult (1.4)
Sex					
Male	32	13	40.6	0.60	Male vs Female (0.81)
Female	28	14	50.6		
Season					
Winter	34	18	52.9	0.19	Winter vs summer (2.12)
Summer	26	9	34.6		
Treatment					
Treated	14	6	42.9	1.00	Treated vs Non treated (0.89)
Non-treated	46	21	45.7		

DISCUSSION

This research work indicates that, about 45% of game birds were found to be infected with *Ascaridia galli*, *Balantidium coli* and *Eimeria* spp. The finding in this study is similar to the findings of Fecchio *et al.* (2017) from Florida and Akinboye *et al.* (2017) from North America where game birds were infected with 40.6% and 38.0% of intestinal parasites respectively. On the other hand, present investigation was lower than the previous report of Albers, (2014) in Java, Indonesia (72%). Ferrell *et al.* (2006) recorded *Ascaridia galli* (16%), *Eimeria tenella* (18%), *Eimeria acervulina* (12%) and *Balantidium coli* (22%), from game birds. Fecchio *et al.*, (2017) reported three species of parasites namely *Ascaridia galli* (43%), *Balantidium coli* (28%), and *Eimeria* spp. (12%) in love birds in Florida. However, Borecka *et al.*, (2013) recorded *Ascaridia galli* (34%) and *Eimeria* spp. (23%) in Poland from game birds. Dubiec and Cichon (2001) found *Ascaridia galli* (42%), *Heterakis gallinae* (13%), *Lucida sphenoides* (20%) and *Echinostoma revolutum* (6%) in Saudi Arabia from love birds. Parsani *et al.* (2001) recorded *Ascaridia galli* (28%), *Eimeria* spp. (17%), *Balantidium coli* (11%) and *Heterakis gallinarum* (63%) from captive birds in Gujrat, India. The present results and earlier findings indicate that parasitic infection is widely distributed throughout the world in different game birds. This variation may be due to difference in the geographical location, climate conditions of the study area, age, sex, seasons, treatment of captive and exotic birds, method of study, sample size. From this study, prevalence of parasitic infection it was observed that the prevalence of parasitic infection was highest in chicks (50.0%) followed by young (43.8%) and adult (41.7%) which was higher than Imura *et al.* (2012) who recorded 46% of parrot (23.0%) of dove, 36.0% of cockatoo, 26.0% of teeter were in young birds than adult. According to Gaulty *et al.* (2005) the prevalence of parasitic infection was 50.0% at six months of age to 69.0% at one year of age and older which is almost similar to our study. Higher prevalence of parasites in chicks and young group of birds may be due to lack of immunity in this stage. In this research, the prevalence of parasitic infection was higher in females (50.0%) than males (40.6%) which coincided with the previous study of Petrak *et al.* (2015) who reported insignificant association between sex and prevalence of birds. Heyradin *et al.* (2012) found male birds generally exhibited resistance against parasites than female birds which was similar to this study. But there is a little information about the prevalence of intestinal parasitic infection between the sexes of birds. The exact cause of higher prevalence of parasitic infection in female cannot be explained but it can assume that it might be due their the voracious feeding of intermediate host and transport hosts including earthworm and much other infective stage of parasites to some extent help them to get infection. It was revealed that prevalence of intestinal parasites in game birds was significantly higher in winter (52.9%) season than summer (34.6%) which was almost consistent with Khalifa *et al.* (2007) where reported 40.3% parasitic infection was found in winter season.

Moller *et al.* (2003) also found highest rate of infection during winter season and the minimum during summer season, with the highest worm burden in pet birds occurring during autumn season. Again Dubiec and Cichon (2001) examined 48.9% and 23.7% parasitic infection in winter and summer. Higher prevalence of intestinal parasites in winter season might occur due to moist type environment. However, in summer season intermediate host and other organisms are dried by sunlight and unable to produce parasitic and other diseases. In this research, the prevalence was higher in non-treated game birds (45.7%) than treated (42.9%) one without significant difference. Gurler *et al.* (2010) found highest prevalence in non-treated birds (64.0%) than treated (53.0%) one. The prevalence of *Ascaridia galli* and *Eimeria* spp. were 64% and 53% respectively. Campbell *et al.* (2007) also found that the captive birds non treated with anthelmintics were affected by *Ascaridia galli* (67%) and *Eimeria* spp.(46%) but in case of treated birds the prevalence of *Ascaridia galli* and *Eimeria* spp. were 23% and 11% respectively. Meanwhile, due to anthelmintic treatment, treated bird showed low parasitic load than treated one. Non treated birds are always infected by intestinal parasites if their treatment is not continued.

CONCLUSION

Parasitism is one of the main problems affecting health and immune status of game birds. Age, sex, seasonal effect and treatment of birds had significant influence on the prevalence of intestinal parasitic infection. Further extensive studies should be carried out to determine the epidemiological determinants of parasitic infection and to assess the economic losses due to parasitic infection in game birds for outlining fruitful control measures against these parasitic diseases.

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