

Prevalence of gastrointestinal parasitic diseases and associated risk factors in domestic pigeons (*Columba livia*) in Rajshahi division of Bangladesh

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Abstract

Context: Pigeons probably originally the rock dove in Europe, have been partially domesticated and carried to all parts of the world. The gastro-intestinal tracts of pigeons harbor a wide variety of helminthes, of which nematodes are the most deleterious parasites and are responsible for clinical and sub-clinical parasitism.

Objective: The present studies was under taken for calculation of prevalence of parasitic diseases in pigeon in relation to breed, age, farm type and region and determine the rate of infection with the different species of parasites.

The present research was undertaken for the prevalence of gastrointestinal nematodes in Pigeons from January 2015 to December 2015. Total 3 different species of parasites were recorded in this study. Those were *Ascaridia columbae*, *Capillaria obsignata*, *Raillietina tetragona*. During this study, prevalence of parasitic infections according to age, breed, farming system and regions were recorded.

Results: Out of 263 fecal samples positive case was 114 and all were endoparasites. The rate of infection was Ascariasis 22.81%, Capillariasis 8.63% and Raillietinosis 1.90%. The helminthes were significantly more prevalent in adults (50%) than in young (22.22%). Indigenous breeds are more prevalent in parasitic infection (63.47%) than exotic breeds (36%). In traditional farming system the rate of infection is more (71.16%) than commercial farming system (31.14%). Among three districts Rajshahi, Natore, Pabna the rate of infection is high in Pabna (68.32%) than Natore (57.84%) and then Rajshahi (33.33%). All the differences were statistically significant ($p < 0.05$).

Conclusion: Adult pigeons (50%), Indigenous breeds (63.47%), traditional farming system (71.16%) and Pabna (68.32%) were more susceptible to parasites infection in the study area. At the same time the efficacy rate of anthelmintics at 21th day in young and adult are 86.36% and 65.51%, respectively.

Key words: Prevalence, Gastrointestinal Parasitic, risk factors and domestic pigeons.

Introduction

The pigeon is considered as a symbol of peace. The ancient Greeks and Romans also were fully recognized of its superior, food value (Levi, 1955). There are many people who are yet to be acquainted with the fine flavor and nourishing qualities of squab meat. For this reasons it is envisaged that the future of commercial pigeon farm in this country is most promising. The geo-ecological condition of this country is suitable for rearing of pigeon (Rahman, 1999). Pigeon rearing is popular in rural areas in this country. There are about twenty varieties of domestic pigeon are Bangladesh e.g. Gola pigeon, White king, Tumbler, Rolling pigeon, Fantail, Lahores. Jacobin, Lakkha, Pouter, etc. (Rahman, 1999). A lot of professional pigeon farms have been established in different areas of Bangladesh viz. Dhaka, Chittagong, Rajshahi, Natore, Pabna, Dinajpur, Khulna, Rangpur, Kustia, Norshindi etc. Moreover, about 1000 pigeon small and large sizes farms at Pabna district. They created association named "Pabna Payra PalakSomity" (Sarder, 2014). Pigeon serves as the host of large number of endoparasites such as cestodes, nematodes and unicellular protozoa (Senlik *et al.*, 2005). They also revealed that pigeons mostly suffered from *Capillaria spp.* and *Ascaridia columbae*. Parsani *et al.* (2014) was conducted to assess the prevalence of helminthes

parasites of domestic wild and zoo pigeons in Gujarat, India by fecal sampling and postmortem examination.

Therefore, the present study was carried out the following objectives:

1. To evaluate the prevalence of parasitic diseases of pigeon in relation to breed, age, farm type and region.
2. To determine the rate of infection with the different species of parasites.

Materials and methods

The present study was conducted the pigeon farm both the traditional and commercial which are located at different districts of Rajshahi division of to evaluate the prevalence of gastrointestinal parasite of pigeon. The area and the farm were selected purposefully and randomly from January 2015 to December 2015. Keeping in view the objectives of the study, the farm was also chosen on information that owner of this farm had been rearing pigeons of different varieties since long time. Three districts of Rajshahi division namely, Rajshahi, Natore and Pabna, were included the present research. A total 263 samples were collected from 45 farms each district from 15 pigeon farms which have at least >10 pairs of pigeon. Houses for pigeons are generally called lofts. There are no real constraints on the design of housing for pigeons. There are different types of housing system of pigeon. The data were collected directly from the pigeon owners using questionnaires, and diagnosis of gastrointestinal parasitic diseases was made

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on the basis of the history, clinical signs, clinical examination, gross lesions and response to treatment. The important information was collected by using questionnaire and the obtained prevalence was compared to breed, age, farming system and region.

Fecal sample examination for identification of parasite egg Direct smear method

A drop of water is placed on the center of a clean glass slide. A small amount of feces is detached from the given sample with the help of tooth peck and spread out to form a thin smear. This can be done gently drawing the coarse particles towards a side on the glass slide. A suitable cover slip may preferably be put over the smear and the slide is then placed under the low power objective of a microscope for examination.

Post-mortem operation techniques for identification of adult parasite

The postmortem carcass observed live parasite in the small intestine.

Routine examinations: This was made of the entire alimentary tract, respiratory system, liver, heart, kidney and reproductive tract as follows. The nematodes and cestodes removed and washed by water and a number of nematodes were cleared in lacto phenol for identification and the rest of them stored in 70% alcohol containing 5% glycerin for parasitological examination.

Statistical Analysis

The raw data was sorted, computed and statistically analyzed to calculate the prevalence of gastrointestinal parasite of pigeon in relation to different factor and the efficacy of anthelmintics were calculated in percentage (%). Statistical analysis was done by DMRT and student t-test.

Results and Discussions

Investigation on 263 fecal samples of pigeon from different areas of Rajshahi division, revealed the presence of 3 different species of parasites. Among 3 different species of parasites 2 species belonged to the class Nematoda under the phylum Nematelminthes and one to the class cestoda, of the phylum plathyelminthes. The overall prevalence of gastrointestinal parasites in pigeon was 43.34%, from where 22.81%, 18.63% and 1.90% were in Ascariasis, Capillariasis and Raillietina parasite, respectively (Table 1). These findings are supported by Buriro (1982) who reported the presence of *Ascaridia galli* in pigeon. The author Enz (1983) observed the presence of Ascarid in pigeon and overall prevalence of GIT parasites was reported to be 26.3%. Begum and Shaikh (1987) reported the prevalence of GIT parasite 86% with two species of nematodes i.e. *Ascaridia columbae* and *Capillaria obsignata* which is in agreement with the findings of present study. According to Radfar *et al.* (2011), the prevalence of helminth *Ascaridia colombae*, *Cotugnia digonopora*, *R. magninumida* and *R. achinobothrida* were 16.66%, 13.79%, and 18.62%, 32.35%, respectively. Natala *et al.* (2009) also reported that *Raillietina tetragona* (4.9%), *R. cesticillus* (3.0%), *R. echinobothrida* (7.6%), *Ascaridia columbae* (1.2%), *A. galli* (1.2%) and *Cappillaria anatis* (0.8%). The other researchers also cited that the values found in the helminth infestation were significantly higher than those of helminth infestation of pigeon observed by Radfar *et al.* (2011) and Natala *et al.* (2009). So far, information on the helminth parasites of *Columba livia* is scanty in

Bangladesh, except that of Begum *et al.* (2008) who observed epidemiology and pathology of protozoan parasites in *Trichomonas gallinae* in the common pigeon (*Columba livia*).

Table 1. The overall prevalence of gastrointestinal parasites in pigeon

Name of Parasites	No. of Fecal Sample	Positive case	% of infection
Ascariasis	263	60	22.81% ^a
Capillariasis		49	18.63% ^a
Raillietina		5	1.90% ^b
Grand total		114	43.34%

Values are percentage (%), values ab with superscript level in column differ significantly (P<0.05) with each other.

Age wise prevalence of parasites in pigeon is observed in table 2. Adult pigeons were more susceptible to parasites than young and the rate of infection is 50% and 22.22%, respectively. In young squab Ascariasis, Capillariasis and Raillietina infection were in 9.52%, 12.69% & nil, but in adult Ascariasis, Capillariasis and Raillietina infection were 27%, 20.5% and 2.5%, respectively. The authors Adang *et al.* (2008) disagreed with the study and they observed the young birds (squabs), causing retarding growth, interfering with healthy development, and making older birds prone to secondary infections.

Table 2. Age wise prevalence of parasites in pigeon

Age	No. of sample	Name of parasites	Number of positive cases	% of infection
Young	63	Ascariasis	10	9.52%
		Capillariasis	12	12.69%
		Raillietina	0	0%
		Total	22	22.22% ^b
Adult	200	Ascariasis	50	27%
		Capillariasis	37	20.5%
		Raillietina	5	2.5%
		Total	92	50% ^a

Values are percentages (%),^{ab} superscript significant effect (P<0.05) between this column.

Breed wise prevalence of parasites in pigeon is observed in table 3. Indigenous breeds are more prevalent in parasitic infection than exotic breeds and the rate of infection is 63.47% and 31.74%, respectively. In indigenous & exotic pigeon the rate of infection about Ascariasis, Capillariasis and Raillietina 31.74% & 20%; 30.15% & 2% and 1.58% & 2%, respectively.

Table 3. Effect of breed on gastrointestinal parasites in pigeon

Breed	No. of sample	Name of parasites	Number of positive	% of infection
Exotic	200	Ascariasis	40	20%
		Capillariasis	28	14%
		Raillietina	4	2%
		Total	72	36% ^b
Indigenous	63	Ascariasis	20	31.74%
		Capillariasis	19	30.15%
		Raillietina	1	1.58%
		Total	40	63.47% ^a

Values are percentages (%),^{ab} superscript significant effect (P<0.05) between this column

Effect of farming system on prevalence of gastrointestinal parasites in pigeon is observed in table 4. In traditional farming system the rate of infection is more than commercial farming system. The rate of infection in traditional farming system is

71.16% and in commercial farming is 31.14%. In commercial pigeon farms Ascariasis, Capillariasis and Raillietina infection were in 16.39%, 13.11% & 1.63%, whereas in traditional farms got Ascariasis, Capillariasis and Raillietina infection were 37.41%, 31.25% and 2.5%, respectively. The authors (Radfar *et al.*, 2012) disagreed with this experiment and they stated that the current study indicates that domestic pigeons could be less susceptible to mixed infections in comparison with free-range backyard chickens. Free-range backyard chickens and domestic pigeons are considered as potential reservoirs for parasite infections and this poses a risk of contamination for modern chicken farms. These differences in the prevalence rate of cestodes could be related to the differences in the prevailing environmental conditions at the sampling time (Eshetu *et al.* 2001).

Table 4. Effect of farming system on prevalence of gastrointestinal parasites in pigeon

Farm types	No. of fecal sample	Name of parasites	Number of positive	% of infection
Commercial	183	Ascariasis	30	16.39%
		Capillariasis	24	13.11%
		Raillietina	3	1.63%
		Total	57	31.14% ^b
Traditional	80	Ascariasis	30	37.41%
		Capillariasis	25	31.25%
		Raillietina	2	2.5%
		Total	57	71.16% ^a

Values are percentages (%), ^{ab} superscript significant effect. (P<0.05) between this column

Effect of regions on prevalence of gastrointestinal parasites in pigeon is observed in table 5. Among three districts Rajshahi, Natore, Pabna the rate of infection is high in Pabna (68.32%) then Natore (57.84%) then Rajshahi (33.33) %. The efficacy of anthelmintics in young at 7th day is 77.27% and 21th day is 86.36% and in case of adult the rate of infection is 44.82% in 7th day and 65.51% at 21th day. The rate of infection in Rajshahi, Pabna & Natore region were 18.18%, 33.33% & 26.31%; 14.54%, 33.33% & 23.38% and 0.606%, 1.66% & 7.89% in Ascariasis, Capillariasis and Raillietina, respectively. These differences in the prevalence rate of cestodes could be related to the differences in the prevailing environmental conditions at the sampling time (Eshetu *et al.* 2001).

Table 5. Effect of regions on prevalence of gastrointestinal parasites in pigeon

Area	No. of sample	Name of parasites	Number of positive	% of infection
Rajshahi	165	Ascariasis	30	18.18%
		Capillariasis	24	14.54%
		Raillietina	1	0.606%
		Total	55	33.33% ^c
Pabna	60	Ascariasis	20	33.33%
		Capillariasis	20	33.33%
		Raillietina	1	1.66%
		Total	41	68.32% ^a
Natore	38	Ascariasis	10	26.31%
		Capillariasis	9	23.38%
		Raillietina	3	7.89%
		Total	22	57.84% ^b

Values are percentages (%), ^{abc} superscript significant effect (P<0.05) between this column.

Conclusions

The present study showed that, helminthes were significantly more prevalent in adults than in young. Indigenous breeds are more susceptible in parasitic infection than exotic breeds. In traditional farming system the rate of infection is more than commercial farming system. The trend of infection higher to lower was in Pabna, Natore than Rajshahi, respectively among three districts. From the present study it may be concluded that nematodes like *Ascaridia columbae*, *Capillaria obsignata* and *Ascaridia galli* are common nematodes in wild and domestic pigeon.

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