

PREVALENCE OF *CAPILLARIA* NEMATODES OF PIGEONS (*COLUMBA LIVIA DOMESTICA*) IN DISTRICT NAROWAL, PUNJAB, PAKISTAN

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ABSTRACT: Pigeons are omnipresent birds which belong to the order, *Columbiformes* and cover a large part of every town and city, worldwide. Among the parasites of pigeons, *Capillaria* is found to be more prevalent in them after *Eimeria*. These worms penetrate deeply in the intestinal mucosa leading to haemorrhages and epithelial necrosis thereby presenting clinical disease and death occurs if left untreated. The major purpose of this study was to determine the burden of *Capillaria* spp. in domestic pigeons (*Columba livia domestica*) of district Narowal. Total 210 fecal samples from pigeon flocks were processed qualitatively through direct microscopy and floatation method while quantitatively through McMaster technique. The parasitic eggs were diagnosed using standard keys. In this study, 154 (73.33%) out of the 210 samples were found infected with *Capillaria* spp. The quantitative examination presented the lowest eggs per gram (EPG) of 300 in the Narowal tehsil and highest EPG of 800 in Shakargarh tehsil among the study areas. This study will be helpful in raising awareness to pigeon owners to improve pigeons health status through better control of capillariasis.

Keywords: Domestic Pigeons, *Capillaria* spp., Prevalence, Floatation method, EPG.

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INTRODUCTION

Domestic pigeons (*Columba livia domestica*) belong to pigeon subspecies called rock dove (Blechman, 2007). In rural areas, they are a symbol of tradition and culture. There are three categories of pigeons: poultry pigeons, carrier pigeons and feral and fancy pigeons (Tanveer *et al.*, 2011). Many pigeon breeds have been developed which have importance for human beings. These pigeon breeds are useful for meat production e.g. `King pigeon` for commercial meat production. Domestic pigeons are also being used for research purposes like in lab experiments, biomedicine and cognitive science. Research on pigeons is extensive, enclose and category based (Levi, 1977). These pigeons are being raised for meat purpose, as a source of income and entertainment and religious purposes (Adang *et al.*, 2008, 2010, 2012; Alam *et al.*, 2014). The pigeons are raised in semi-intensive environment or kept in free range giving them opportunity to scavenge and forage on ants, earthworms, termites and other invertebrates prevailing around homesteads. Therefore, these pigeons are predisposed to infective stages of variety of parasites and intrinsic zoonoses (Karatpe *et al.*, 2011, Bahrami *et al.*, 2012). The most dominant factor for reduced productivity and overall health of the pigeons is the pathological lesions caused due to helminthic parasites (Dranzoa *et al.*, 1999).

Despite ectoparasitic infestations, endoparasites also infect domestic pigeons (Sivajothi and Reddy, 2015).

These endoparasites infect the intestine of their hosts reducing the intestinal capacity for absorption of nutrients and vitamins resulting in a condition called endoparasitism thereby reducing the growth and productivity of these pigeons (Duneau and Ebert, 2012). Many GI and hematazoan infections are as a source of disease transmission to humans and other birds. The dust particles present on feces in cage contaminated by dropping can contribute to disease spread (Marques *et al.*, 2007a). Nematodes present in pigeons are *Ascaridia columbae*, *Dispharynx* spp. and *Capillaria* spp. (Dovc *et al.*, 2004; Ejere *et al.*, 2014; Alkharigiy *et al.*, 2018). The *Capillaria* spp. dominate in pigeons causing chronic gastro-enteritis and anorexia which lead to severe emaciation and mortality (El-Dakhly *et al.*, 2016). Three species of *Capillaria* including *columbae*, *obsignata* and *longicollis* affect pigeons. These *Capillaria* spp. are fine hair like worms present in the digestive tract of pigeons and give rise to lemon like ova having thicker brownish egg shell and bipolar plugs (Rabiu *et al.*, 2017).

Many people domesticate pigeons in district Narowal. A good knowledge about the parasitic diseases of the pigeons may help in uplifting of their survival. Only one study about the capillariasis was reported in the Lahore region of Pakistan (Qamar *et al.*, 2017). Therefore, there was need of study on prevalence of capillariasis in district Narowal. The main objective of this study was to investigate the presence of *Capillaria* spp. in domestic pigeons of district Narowal.

MATERIALS AND METHODS

In this study, total 210 fresh droppings of domestic pigeons from three tehsils of district Narowal including Narowal, Zafarwal and Shakargarh (n=70 from each tehsil) were collected in sterile plastic containers (Figure 1). The sampling was done from May to September, 2018. The samples were processed qualitatively through direct microscopy and floatation method while quantitatively through McMaster technique to assess EPG at the Parasitology Lab, University of Veterinary and Animals Sciences Lahore sub campus Narowal. The parasitic eggs were diagnosed using standard keys developed by Soulsby (1982). The direct microscopy was performed by placing a drop of distilled water on a glass slide and mixed with a small amount of dropping. Then a cover slip was placed on the glass slide and examined on a microscope at 10X and 40X objective lens (Gupta and Singla, 2012).

For floatation method, about 2 grams of feces were mixed with 15 mL of water and the mixture was strained. This filtered solution was poured into a 15 mL plastic centrifuge tube within ½ inches from the top and centrifuged for 5 minutes at 1800 rpm. After centrifugation, the supernatant was discarded without disturbing the pellet and small amount of sugar solution was added to the tube and mixed properly with pellet. After that tube was filled with sugar solution and centrifuged for 10 minutes at 800 rpm. After the centrifugation has been completed, extra sugar solution was added to create the reverse meniscus and cover slip was placed over it. After 15 minutes, coverslip was removed and placed on microscope glass slide for examination at 10X and 40X objective lenses (Paul *et al.*, 2015).

McMaster egg counting technique was used for the purpose of estimating the number of eggs of parasites present in the droppings. For this technique, 2g of droppings were mixed in 60 ml of saturated salt solution and was strained through strainer. Solution was continuously stirred in the beaker to resuspend and immediately pipetted up the solution and filled in one chamber of 3-chambered McMaster egg counting slide. After at least 5 minutes, chamber was observed under 10X lens for EPG of helminth eggs (Paul *et al.*, 2015).

Statistical Analysis: The prevalence of *Capillaria* spp. was statistically analyzed using t- test in the three study regions by SAS software package (Schork and Remington 2010). Variables were considered statistically significant at $P < 0.05$.

RESULTS AND DISCUSSION

The *Capillaria* spp. was identified in the fecal samples with lemon like bipolar eggs having thicker shell

and 50µm x 26µm size. In this study, 154 (73.33%) out of the 210 fecal samples from domestic pigeon flocks were found infected with *Capillaria* spp. The prevalence of the parasite in the pigeon population of the selected localities of each study region is given in the Table 1. The overall prevalence of *Capillaria* spp. is found to be 73.33% with highest prevalence in the Shakargarh tehsil (26.19%) and lowest (22.38%) in the Narowal tehsil.

The quantitative examination depicted that lowest EPG of 300 was found in the Narowal region while highest EPG of 800 was found to be in Shakargarh region indicating the more parasitic load in the pigeon population (Table 1).

There was insignificant ($P > 0.05$) difference between prevalence of the *Capillaria* spp. among the pigeon population of the three study regions and overall prevalence was not statistically associated ($P > 0.05$).

The current research introduces first time the study of intestinal parasites infecting domestic pigeons in district Narowal, Punjab, Pakistan. This research work identified the presence of *Capillaria* spp. in the study regions and the same parasitic species were observed from pigeons and poultry throughout the world (Mushi *et al.*, 2000; Marques *et al.*, 2007; Adang *et al.*, 2008; Borji *et al.*, 2012; Eljadar *et al.*, 2012 and Hussein *et al.*, 2014; Sood *et al.*, 2018).

The current study dealt with the presence of *Capillaria* spp. in domestic pigeons which are intestinal worms. These parasites are thread worms and give rise to lemon shaped bipolar eggs. Our results are in agreement with other previously related studies (Fowler, 1996; Muhairwa *et al.*, 2007; Muthusami *et al.*, 2017; Qamar *et al.*, 2017). These gastrointestinal parasites were also detected in domestic chickens.

The similar *Capillaria* spp. infection has been reported in the pigeons in another study where overall prevalence rate was 57% with 60% in wild pigeons and 55% prevalence in the domestic pigeons (Basit *et al.*, 2006). About 10.1% *Capillaria* spp. in the domestic pigeons was reported by Khezerpour and Naem (2013) while Patel (2000) reported 53.57% prevalence of *Capillaria* spp. and Borghare *et al.* (2009) documented about 56.66% prevalence of *Capillaria* spp. in pigeons. In a study conducted in Egypt, *Capillaria* spp. prevalence was reported about 6% (Bahrami *et al.*, 2011). However, one study presented 67.2 % prevalence of *Capillaria* spp. (Tanveer *et al.*, 2011) and in another study, it was found about 32.56% *Capillaria* spp. (Marques *et al.*, 2007b). In a study conducted in 2007, of total 103 pigeons of 32 different breeds, *Capillaria* spp. was found in 36.4% of fancy pigeons and only 3.6% in the carrier breeds (Dehlwi, 2007). In Libia, 4% prevalence of *Capillaria* spp. in the domestic pigeons was reported (Alkharigy *et al.*, 2018) while 19.9% prevalence was reported in domestic pigeons in Turkey (Sari *et al.*, 2008). The *Capillaria* spp. among the endoparasites were also

observed in pigeons during race season (Zigo *et al.*, 2019).

The variation in the prevalence observed might be due to differences in the health status of birds studied, climatic and geological conditions in the study areas. These variations reveal that the endoparasitic burden of

Capillaria spp. in the study regions is higher and should not be ignored. The reason for higher prevalence might be due to the presence of high level of humidity and moderate temperature in the study regions as these are the major factors for the survivability of the parasites.

Table 1: Location wise prevalence and EPG of *Capillaria* spp. in domestic pigeons.

Study Regions	Localities	No. of samples	Sample positive for <i>Capillaria</i> spp.	Prevalence (%)	EPG
Narowal	Siddique Pura	14	7	10	300
	Chandowal	14	10	14.28	400
	Kashmiri Mohalla	14	10	14.28	400
	Abbas Nagar	14	8	11.42	400
	Gung Hussainabad	14	12	17.14	300
	Total	70	47	67.14	---
Zafarwal	Hussain Town	14	9	12.85	500
	Jammu gate	14	10	14.28	400
	Mohalla Bagechi	14	10	14.28	600
	Doban Pura	14	11	15.71	500
	Ahmed Colony	14	12	17.14	400
	Total	70	52	74.28	---
Shakargarh	Gamtala Chowk	14	9	12.85	600
	Chamal	14	11	15.71	700
	Darman	14	12	17.14	500
	Sargala Colony	14	11	15.71	800
	Kot Nainan	14	12	17.14	600
	Total	70	55	78.57	---

Conclusion: It is concluded that present study provides the data of capillariasis in district Narowal which will be helpful in raising awareness to pigeon owners for better control and treatment strategies of capillariasis.

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