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Prevalence of parasites of pigeons (*Columba livia domestica*) in the hilly region of Meghalaya

M. Das* • Rakesh Kumar • R. Laha • D. Bhattacharjee

Division of Animal and Fishery Sciences, ICAR Research Complex for NEH Region, Umiam, Meghalaya-793103

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ABSTRACT

The objective of this study was to determine the extent to which pigeons in the hilly regions of Meghalaya are infected with both internal and external parasites. A total of 195 numbers of faecal samples were examined for four months by using flotation and McMaster techniques. The overall prevalence of gastrointestinal parasitic infections in pigeons of Umiam, Meghalaya was 44.10%. Eggs of *Ascaridia columbae* (18.60%), *Paratanaisia bragai* (15.11%), *Capillaria obsignata* (9.30%), *Strongyloides avium* (12.79%), *Raillietina cesticillus* (6.97%), *Raillietina tetragona* (11.62%), *Eimeria* sp. (8.13%) and mixed infection (17.44%) were recorded. Examination of blood smear revealed presence of *Haemoproteus columbae* (6.63%). Necropsy of 6 numbers of pigeons revealed presence of *Raillietina tetragona* (33.33%), *Raillietina echinobothrida* (16.66%), *Cotugnia* sp. (16.66%), *Cysticercus* sp. (16.66%) and *Paratanaisia bragai* (16.66%). Two species of ectoparasites, *Menopon gallinae* (16.66%) and *Columbicola columbae* (33.33%) observed. The present findings have significance because these parasites have detrimental effect on the infected birds and also serve as a possible reservoir for zoonotic diseases.

1. Introduction

Pigeons, which are members of the order Columbiformes and can be found in almost every town and city on the planet, coexist with humans as a source of food, recreation, and for research purposes. Pigeons can be found in almost every town and city on the planet (Marques *et al.*, 2007; Sari *et al.*, 2008). Because of its contact with human beings as well as with other types of birds, both domestic and wild, it poses a risk of transmitting zoonotic diseases (Begum and Sehrin, 2012). Inhaling faecal dust from cages or locations polluted with dried faeces, urine, and other droppings can infect humans (Marques *et al.*, 2007), and zoonotic agents are sometimes transmitted as well (Karatepe *et al.*, 2011). Clinical and subclinical infections are caused primarily by gastrointestinal nematodes. Furthermore, they are seriously affected by ectoparasites, which are well-known to cause nuisance, anaemia, and general debility, and many of these parasites play an important role in the transmission of a wide range of infectious diseases. These factors caused slowed growth rate, wastefulness, a loss in productivity, costs related with treatment and prevention, susceptibility to other infectious illnesses, might eventually result in a greater death rate among the pigeons (Urquhart, 1996). Meanwhile, due to their ability to fly long distances pigeons carry many parasites, as a result, they are able to spread many different parasites and diseases to other poultry flocks, including coccidiosis, cryptococcosis, newcastle disease, and histoplasmosis, and thus pose a great threat to other poultry flocks (Opara *et al.*, 2012). The purpose of the current study was to determine whether ecto and endo parasites were common in the pigeons of the hilly regions of Meghalaya because there is currently no information available on their prevalence.

2. Materials and Methods

Pooled faecal samples (n=195) of pigeons were collected for four months (June-September, 2019) from the hilly regions of Umiam, Meghalaya. Qualitative tests were done by direct smear, flotation and sedimentation techniques (Hendrin and Robinson, 2006). The infection load was calculated using the modified McMaster technique and expressed as eggs per gram (EPG) of stool (Soulsby, 1982). Necropsy of pigeons (n=6) was done for identification of parasites in the gastrointestinal tract, kidney, lung and other organs. While cestodes and trematodes were stored in 10% formalin, nematodes were preserved in 70% ethanol, cleaned with

*Corresponding author: meenad3@gmail.com

lactophenol and identified (Vicente *et al.*, 1995). Birds were also examined for presence of any ectoparasites. Haemoprotozoan parasites in the heart blood smear are identified by Giemsa staining (MAFF, 1986).

3. Results and Discussion

It was found that 44.10 % of pigeons in Umiam (Meghalaya) were infected with parasitic gastrointestinal infections. Eggs of *Ascaridia columbae* (18.60%) was recorded highest followed by *Paratanaisia bragai* (15.11%), *Strongyloides avium* (12.79%), *Raillietina tetragona* (11.62%), *Capillaria obsignata* (9.30%), *Eimeria* sp. (8.13%) and *Raillietina cesticillus* (6.97%). 17.44% of birds had infections that were mixed infections involving more than two species. During the study, it was determined 17.44% of birds with mixed infections involving more than two species. Examination of blood smear revealed presence of *Haemoproteus columbae* (6.63%). Necropsy of 6 numbers of pigeons revealed presence of *Raillietina tetragona* (33.33%), *Raillietina echinobothrida* (16.66%) and *Cotugnia* sp. (16.66%) in small intestine; *Cysticercus* sp. (16.66%) in the mesentery of small intestine; *Paratanaisia bragai* (16.66%) in kidneys (Fig. 1). Only two species of ectoparasites, *Menopon gallinae* (16.66%) and *Columbicola columbae* (33.33%) were observed. In the present study, both ecto and endo parasites are found in the pigeons of Umiam, Meghalaya. Earlier, Ghosh *et al.* (2014) from Bangladesh reported 67% and 72% ecto and endo parasites in pigeons, respectively while Khan *et al.* (2018) from Pakistan, reported 86.66% and 66.66% ecto and endo parasites in pigeons, respectively. The current investigation identified many species of endoparasites, which was matching the results obtained by Mehmood *et al.* (2019), Mohammed *et al.* (2019) and Parsani *et al.* (2014), who conducted their research in Jammu, Nigeria, and Gujarat, respectively. Moreover, Tu *et al.* (2019) from China also detected *Capillaria obsignata*, *Heterakis* and coccidia in pigeons. This may be due consumption of beetles, snails, earthworms and ants along with grains, which are intermediate host of many parasites. In addition, the contaminated premises or soil serves as a significant reservoir as well as a transmission medium for helminths that are transferred via the soil (Islam *et al.*, 2009). The presence of helminths in the intestines of birds have been shown considerable impact on the immune system's ability to function, lead to immunodeficiency, and diminish the natural reaction of the diseased organism (Biswal *et al.*, 2016; Al Quraishy *et al.*, 2020). The highest prevalence of *Ascaridia columbae* was found in the current research, which agreed with the findings of Bogach *et al.* (2021) and Ghosh *et al.* (2014). This may be occurred due to consumption of feed, slugs, earthworms etc. that came from contaminated areas. In infected young pigeons, Bahrami *et al.* (2013) observed significantly ($p<0.05$) different values for white blood cells (WBC), packed cell volume (PCV), mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV), neutrophils and lymphocytes. It was also found that the tissue of the small and large intestine had some mild congestion, as well as histological and degenerative alterations in the epithelial tissues. The presence of cestodes in the small intestine improves nutrient absorption via the body's surface (Bogach *et al.*, 2021) and causes its blockage, resulting in high levels of depletion, weight loss, and even death of the bird (Radfar *et al.*, 2012). Cestode presence in the small intestine increases nutrient absorption via the body's surface (Bogach *et al.*, 2021) and causes its blockage, resulting in high levels of depletion, weight loss, and even the bird's death (Radfar *et al.*, 2012). In the present study, *Menopon gallinae* (16.66%) and *Columbicola columbae* (33.33%) were observed. Previous studies on prevalence rates of *Columbicola columbae* in pigeons have been recorded as high as 100% in Spain (Foronda *et al.,* 2004), 30% in Pakistan (Abdullah *et al.,* 2018), 94.11% in Uganda (Dranzoa *et al.*, 1999) and 12.03% in Assam (Saikia *et al.*, 2017). The prevalence of *Menopon gallinae* in pigeons was found to be 13% by Ghosh *et al.* (2014) and 100% by Ali *et al.* (2020). Possible explanations for the disparity in the percent prevalence of infections from the current study, which could be attributed to climate differences, geographical differences, or other factors. Due of their blood-sucking habit, lice can have a negative impact on the health of birds. This includes a loss of weight of around 711gms per bird and a fall in egg output of about 66 eggs per bird every year (Khan *et al.*, 2003). Infestation with ectoparasite causes distress, allergies, and transmit infectious diseases (Sivajothi and Reddy, 2016). *Haemoproteus columbae* (6.63%) was observed in the blood smear. Rosyadi *et al.* (2021) and Roy *et al.* (2011) also reported 62.5-100% and 60% prevalence of *Haemoproteus columbae* in pigeons, respectively. It causes macrocytic hypochromic anaemia, hypoproteinemia, and hyperfibrinogenemia in infected pigeons (Rosyadi *et al.*, 2021). In addition, Tayyub *et al.* (2021) stated that wild rock pigeons that are infected with many kinds of ectoparasites have the potential to be the cause of infestations in domesticated birds if those wild rock pigeons come into touch with the domesticated birds. The current research is significant because these parasites have a harmful or incapacitating effect on birds that have been infected with them. These effects include stunted growth, decreased productivity, and the prevention of healthy development. Additionally, adult birds that have been infected become more prone to secondary infections (Hembram *et al.*, 2015). Various researchers (El-Dakhly *et al.*, 2019; Vaz *et al.*, 2017) reported that many pigeons make their homes in places like parks, playgrounds, and marketplaces in cities and suburbs

and have the potential to act as a carrier of infections. In addition, because of their frequent contact with people as well as with other types of birds, both domestic and wild, they have the potential to serve as a reservoir for zoonotic parasites (Adang *et al.*, 2008; Karatepe *et al.*, 2011). One of them, *Raillietina* sp. in humans, has been recorded from a variety of locations throughout the world (Brenes *et al.*, 1983; Margono *et al.*, 1977; Haag Wackernagel, 2005; Haag-Wackernagel and Bircher, 2010). Therefore, the parasites must be constantly monitored since they interact with other poultry species and might spread disease. This study may be the first to show the presence of parasites in the pigeons of Meghalaya's hilly region.

4. Conclusions

Both ecto and endo parasites are widespread in the pigeons of mountainous region of Meghalaya and infections in pigeons should not be neglected because they may transmit the infections to other poultry birds and humans. Regular screening of fecal samples and deworming of birds are necessary to prevent spread of infections.

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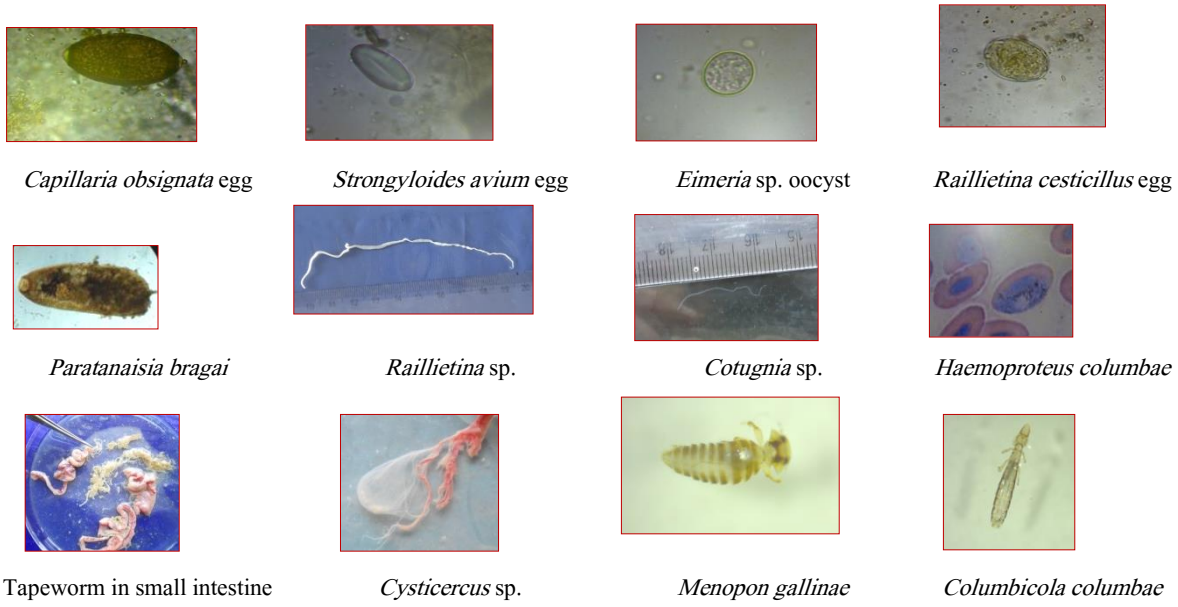

Figure 1. Parasites of pigeons in hilly region of Megahalaya

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