



Incidence of parasites in house-hold pigeons (*Columba livia*) from Thanjavur region

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ABSTRACT

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The research focuses on the potential impact of the ecto and endo parasitic infections on the health of pigeons, as well as the associated risks to other domestic and wild avian species. In this study a total of 80 house-hold pigeons from four different locations of Thanjavur region were examined for the parasitic incidence. The incidence of ectoparasites such as *Pseudolynchia canariensis* (50%), *Columbicola columbae* (10%), *Menacanthus stramineus* (8.75%) and *Goniodes* sp., (3.75%) and endoparasites such as *Capillaria* sp., (10%) *Ascaridia columbae* (8.75%) and *Raillietina* sp., (5%) were reported. In addition, protozoan infections viz., *Haemoproteus columbae* (53.75%), *Trichomonas gallinae* (12.5%) and *Eimeria* sp., (5.6%) were identified. The findings underscore the intricate web of parasitic infections prevalent in domestic pigeons, emphasizing the importance of understanding and addressing these challenges for the sustainable coexistence of diverse bird species.

Keywords: Pigeons, Thanjavur, Ecto-parasites, Endo-parasites, *Haemoproteus* sp.

INTRODUCTION

A diverse species of birds particularly pigeons are the most widespread and frequently seen throughout the world in temperate, tropical and sub-tropical countries. Pigeons have adapted well to city life and can often be seen in urban areas. They are known for their beauty and are seen as symbols of peace (Dehlawi, 2006). Pigeon fanciers, who raise pigeons for entertainment and sports and are also associated with a historical background during ancient periods and are traditionally popular in Tamil Nadu. Additionally, pigeons are the most popular source of delicious bird meat that has emerged as a trend in the meat industry (Sari *et al.*, 2008).

Pigeons can act as reservoir for many parasitic diseases that affect poultry, and their close proximity to other household birds raises the risk of parasitic infections (Sari *et al.*, 2008). Despite the enormous potential for extra revenue, several diseases and high mortality rate keep hindering the development of pigeon farming. Pigeons can suffer from a wide range of health problems but both ecto- and endo-parasitic infections have been found to be the key contributors. Mixed parasitism often results in severe effects on the birds which includes stunted growth, low egg production and susceptibility to other diseases (Muthusamy *et al.*, 2020). Various metazoan and protozoan parasites affect pigeons, including *Haemoproteus columbae*, which is transmitted by *Pseudolynchia canariensis* fly which affects both domestic and wild pigeons (Mandal, 2002; Reddy *et al.*,

2022). Pigeon malaria, often known as pseudomalaria, is caused by *H. columbae* which is fatal to squabs and adult pigeons in severe cases (Soulsby, 1986). The parasites of domestic household pigeons are currently investigated in this study since the pigeons transmit the stages of parasites to other domestic birds in an integrated farming system and act as a source of infection in free-ranging wild birds.

MATERIALS AND METHODS

Study area

Thanjavur region is rich in fertile agricultural land with rice cultivation, animal husbandry, poultry farming and fish farming are the most significant occupations for the inhabitants. It is referred as the “Rice Bowl of Tamil Nadu.” The present study comprised domesticated pigeons raised by fanciers for sports and hobby in and around Thanjavur region of Tamil Nadu. Four pigeon holders from the places namely Kannanthangudi, Soorakottai, Kumbakonam, Thiruvudaimaruthur having 30-40 pigeons, in which 20 birds were randomly selected for collection of samples with a total 80 pigeons involved in the study.

Collection of samples

On observation, the pigeons were apparently healthy. There was no history of regular deworming in the birds as reported by the owners. The ectoparasites were collected in 70% alcohol from the randomly selected pigeons for further morphological identification. The freshly voided faecal samples also collected without soil contamination in a container with 70% alcohol. Blood

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samples were also collected from wing vein of pigeons in a vial containing heparin as anticoagulant. Oropharyngeal swab was taken from each pigeon for screening of protozoa.

Processing of samples

The collected ectoparasites were processed with 10% sodium hydroxide followed by clearing in Xylene and mounted in DPX for morphological identification (Soulsby, 1982). Faecal samples were processed by concentration method for screening parasitic ova and oocysts. The blood smears were stained with Giemsa's stain for 40 minutes and examined using light microscope for blood parasites. Oropharyngeal swab was examined by both direct smear and Giemsa's stain method (Coles, 1980).

RESULTS AND DISCUSSION

Ectoparasites

The study represents the incidence of external parasites that live on the skin and feathers of birds. Among the pigeons physically examined, the lice species identified



Fig. 1: House-hold pigeons

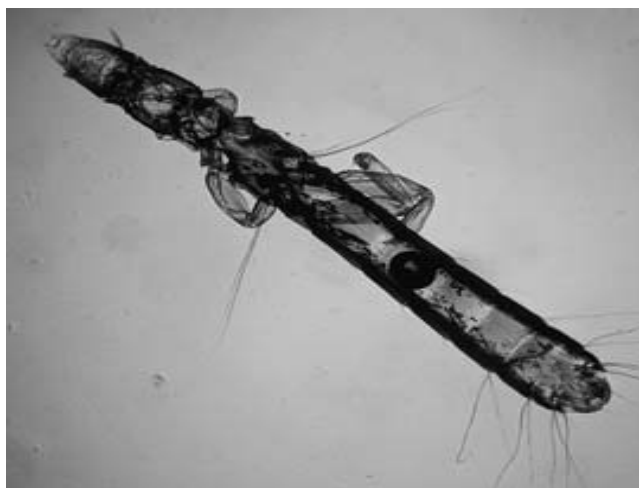


Fig. 2: *Columbicola columbae* (×40)



Fig. 3: *Menacanthus stramineus* (×40)

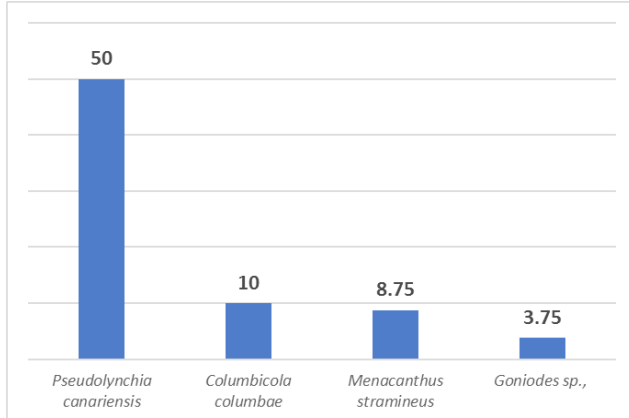


Fig. 4: *Goniodes* sp., (×40)



Fig. 5: *Pseudolynchia canariensis*

were *Columbicola columbae* (10%), *Menacanthus stramineus* (8.75%) and *Goniodes* sp., (3.75%) (Figs. 2, 3 and 4) from this study (Graph1) similarly, Pérez-García *et al.* (2015) documented the prevalence of *C. columbae* as 64%, *P. canariensis* as 52% and 24% prevalence of *M. gallinae* in pigeons of Colombia. The incidence of *C. columbae* infestation in this study was in agreement with the findings of Harlin (1994) and Dranzoa *et al.* (1999) who strongly emphasize that *C. columbae* was the predominant mallophagian parasite among pigeons.



Graph 1: Incidence of Ectoparasites



Fig. 6: Egg of *Capillaria* sp., (×400)



Fig. 7: Egg of *Ascaridia columbae* (×400)

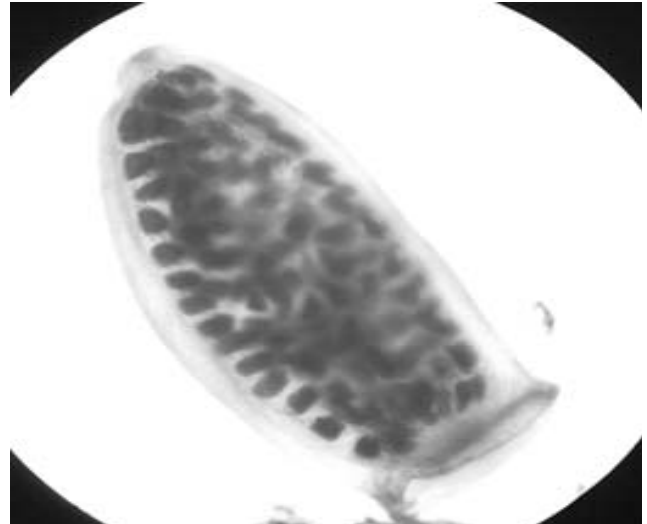


Fig. 8: Gravid segment of *Raillietina* sp., (×100)

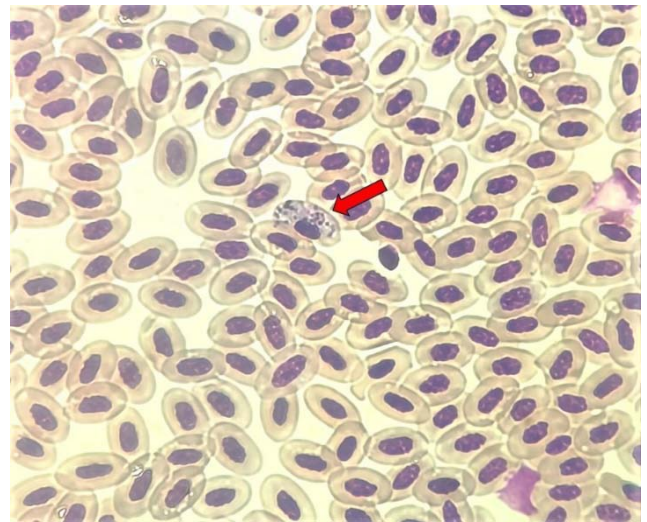


Fig.9: Intra-erythrocytic gamonts of *Haemoproteus columbae* (×1000)



Fig. 10: Sporulated oocyst of *Eimeria* sp., (×400)

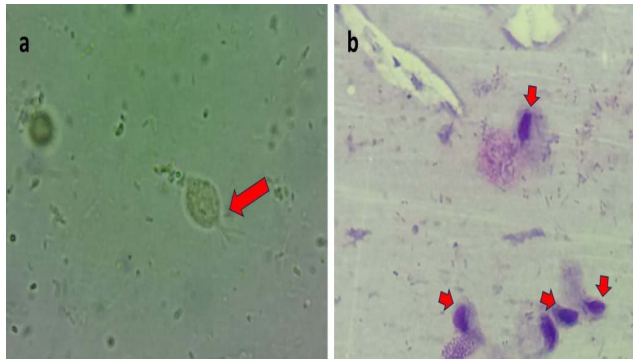
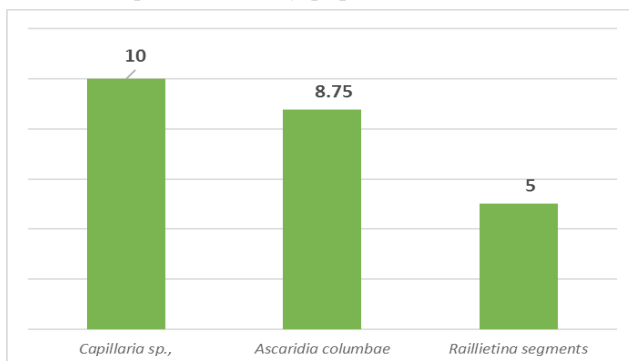


Fig. 11: *Trichomonas gallinae* in wet-film (a) and Giemsa's stained (b) (x400)

Hippoboscids 'pigeon louse fly' *Pseudolynchia canariensis* (Fig. 5) accounts for high incidence of 40% in our study which was agreed with Mushi *et al.* (2000) who identified two ectoparasite species, *Pseudolynchia canariensis* (50%) and *Columbicola columbae* (30%) in pigeons of Botswana. *P. canariensis* feeds on blood and contributes in spreading the obligate blood protozoan parasite *Haemoproteus columbae* (Soulsby, 1982) and their identification in the present study highlights the mode of transmission of the haemoproteoal infection. Among the ectoparasites, *P. canariensis* exhibits the highest incidence followed by *Columbicola columbae*, *Menacanthus stramineus* and the lowest incidence of *Goniodes* sp., in the study population.



Graph 2: Incidence of Endoparasites

Endoparasites

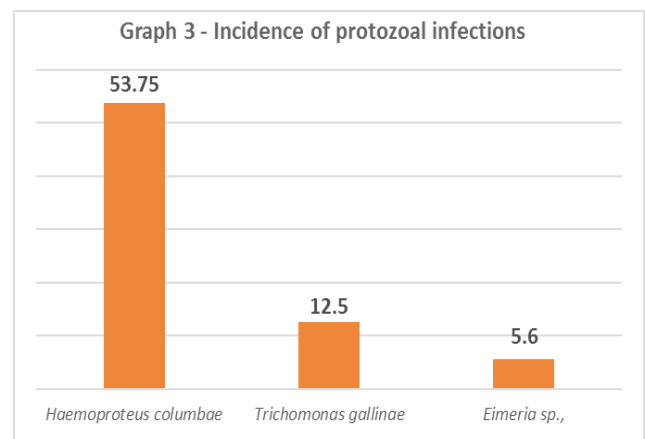
The study of endoparasites which is specific to gastro-intestinal tract in the pigeon population has provided significant additional evidence on the incidence and potential consequences of internal parasites. The endoparasitic infection identified in our study were *Capillaria* sp., *Ascaridia columbae* and *Raillietina* sp., (Figs. 6,7 and 8) accounts for 10, 8.75 and 5%, respectively (Graph 2). According to investigations undertaken in different parts of the world, the tape worms of the genus *Raillietina* sp., are the most prevalent internal parasites of the pigeons (Dehlawi, 2006). Alkharigy *et al.* (2018) recorded the 22% prevalence of *Ascaridia columbae* and 4% prevalence of *Capillaria* sp., from pigeons of Turkey. In the context of capillarias is

pertaining to our study, Mohammed *et al.* (2017) reported a 6.63% incidence of *Capillaria* sp., in the intestinal contents of 144 pigeons. Sivajothi and Reddy (2015) reported that 72.7% of domestic pigeons carries internal parasites including *Ascaridia columbae* (33.3%), *Eimeria* sp., (31.0%), *Capillaria columbae* (17.4%) and *Raillietina* sp., (9.0%).

Protozoal Infections

The present investigation extensively examined the incidence and possible ramifications of protozoal infections in the pigeon population. Intra-erythrocytic blood protozoan *Haemoproteus columbae* (Fig. 9) was found to be 53.75%, which was transmitted by *Pseudolynchia canariensis* (Soulsby, 1982). Gastro-intestinal flagellar protozoan *Trichomonas gallinae* (Fig. 11) was found with the incidence of 12.5% among these pigeon population. 5.6% of pigeon population was found to be carrying coccidian oocysts *Eimeria* sp., (Fig. 10) in their faecal samples (Graph 3). Gicik and Arslan (2001) reported 57% of *H. columbae* in wild pigeons of Ankara, Turkey and Shinde *et al.* (2008) observed comparable findings of *Haemoproteus columbae* (58.33%) from pigeons of urban areas in Mumbai, India which were in accordance with our study. Borkataki *et al.* (2015) observed 61.33% prevalence of *H. columbae* in pigeons from Jammu, India. The presence of this infection may be non-pathogenic and normally found in apparently healthy pigeons which aggravates during stress conditions (Preena *et al.*, 2020). This parasite develops sexually in the vector louse fly, *Pseudolynchia canariensis* and asexually in the blood of birds (Adriano and Cordeiro, 2001) which strongly accentuate the vector potential of *P. canariensis* in transmitting the blood protozoans from infected to healthy pigeons.

In this study, *Trichomonas gallinae* was 12.5% which was in accordance with the findings of Saikia *et al.*, (2020) who reported 26.85% prevalence of *T. gallinae* in pigeons. Begum *et al.* (2008) observed the higher incidence of *T. gallinae* in winter and rainy seasons



Graph 3: Incidence of protozoal infections

than the summer months in Mymensingh district of Bangladesh. The flagellated protozoa *Trichomonas gallinae* infects upper digestive tracts of pigeons and causes canker, a condition characterised by the development of granulomatous lesions in the affected birds crop, buccal cavity, gizzard and liver. These flagellated protozoa get transmitted to the squabs through feeding of crop milk by the infected parents (Soulsby, 1982).

This study reports 5.6% of coccidian oocysts in the sampled pigeon faecal samples. Marques *et al.* (2007) reported a prevalence of 86.05% of *Eimeria* sp., in free living urban pigeons in Brazil. In India, higher prevalence rate was reported by Kommu *et al.* (2016) in Hyderabad with 32.7% whereas Mohammed *et al.* (2017) investigated the prevalence of coccidiosis in 144 intestinal contents of pigeons and recorded an overall prevalence of 19.44%. Clinical manifestations of coccidiosis caused by *Eimeria* sp. are usually unclear in pigeons. The disease is acute in young pigeons, resulting in weight loss, the excretion of blood-stained faeces, and death rate of 5% to 30% (Aleksandra and Pilarczyk, 2014).

CONCLUSION

This comprehensive study sheds light on the intricate web of parasitic infections prevalent in domestic pigeons from Thanjavur region of Tamil Nadu and in addition these findings reveal a nuanced panorama of ecto- and endo-parasitic infections acquired by these adaptable birds, influencing not only their health but also posing potential risks to other domestic and wild avian species. By understanding and addressing the parasitic challenges faced by domestic pigeons, we can contribute to the sustainable coexistence of diverse bird species, ensuring the beauty associated with pigeons while promoting a harmonious balance in avian ecosystems.

CONFLICT OF INTEREST

The authors do not have any conflict of interest for this article.

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