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Ecto- and Endoparasites of Domesticated Pigeons (*Columba livia*) in Port Harcourt, Nigeria

Laku CB, Ugbomeh AP and Amuzie CC*

Department of Animal and Environmental Biology, Rivers State University, Port Harcourt, Nigeria

Abstract

Domesticated pigeons (*Columba livia*) are commonly infected with ecto- and endo- parasites. Fifty adult specimens of the species weighing 215±11g were purchased from Mile III market, Diobu, Port Harcourt, Nigeria, between January and March, 2018, for the purpose of investigating their ecto and endo parasites. The sample was composed of twenty-three males and twenty-seven females. Three ecto-parasites (*Pseudolynchia canariensis, Columbicola columbae, and Chelopistes meleagridis*) were recovered from the specimens. One nematode (*Ascaridia columbae*) and two cestodes (*Raillietina echinobothrida* and *R. tetragona*) were the endo-parasites found. An overall prevalence of 28%, 4%, and 24%, was computed for cestode, nematode and lice infections, respectively. Single infection with cestodes was more prevalent (26%), than either co-infection of cestode and nematodes (2%) or that of cestodes and lice (8%). There was no significant difference between mean weight of infected and non-infected pigeons. Prevalence rates did not vary significantly between sexes ($\chi^2_{0.05,7}$= 15.01, P=0.036). However, to prevent higher infestation rates and economic loss, both traders and breeders should maintain proper hygienic practices.

Keywords: Lice; nematodes; cestodes; gastrointestinal parasites; pigeon; Port Harcourt; Nigeria.

Introduction

The use of pigeons as sources of income and animal protein has been reported to be on the increase in Nigeria [1-3]. Due to their cosmopolitan nature, similar reports are also documented elsewhere in the world [4-6]. Some researchers [7-9] have reported that survival of pigeon populations is threatened by parasites which cause decline in yield and in economic benefits.

Documented evidence shows that certain parasite species are prevalent in the birds irrespective of their geographical position. For instance, reports from Nigeria [1-2], Uganda [10], Northern Greece [11], Libya [12], Iran [13], and Brazil [5] mention same cestodes (eg., *Raillietina* spp.), nematodes (such as *Ascaridia columbae*, *A. galli* and *Capillaria* sp.), and ectoparasites (namely Pseudolynchia canariensis and Columbicola columbae) as prevalent.

According to Adang *et al.*, [1] there is a paucity of information on the parasites infecting domesticated pigeons from the southern part of Nigeria. This study was therefore, conducted to provide information on the prevalence of ecto and endo-parasites of domesticated pigeons in a city in southern Nigeria.

Materials and methods

Fifty adult domestic pigeons, comprised of twenty-three males and twenty-seven females, were purchased between January and March, 2018, from traders in Mile III market in the Diobu area of Port Harcourt, Rivers State, Nigeria. The pigeons were bred extensively in Kano, a city in the northern part of the country, from where they were transported to the large market in the southern part for sale.

Samples were anaesthetized in Chloroform vapor and weighed using an electronic weighing balance (Denver Instrument, Model TP-512A). Their wings were spread out and both sides brushed out in order to let out the external parasites when present. The parasites were fixed in 70% alcohol for subsequent identification.

Additionally, removal of the feathers on their ventral side was done so they could be dissected in order to expose their internal organs. The gastrointestinal tract as well as the gizzard were severed and examined for parasites. Both organs were cut open in separate Petri dishes filled with 0.72% normal saline. Stool samples were removed by gently squeezing the anal orifice onto a microscope slide; a drop of 0.72% normal saline was added to moisten it according to Fleck and Moody [14] after which they were examined under a light microscope (x10) for cyst and proglottids of cestodes.

Nematodes, when found, were extended in hot water, and fixed in fresh 70% alcohol. They were cleared in lactophenol and viewed under a light microscope. Cestode parasites were flattened in 5% formol saline by placing them between two microscope slides for about 15 minutes.

Ecto-parasites and helminths were identified according to Soulsby [15]. Prevalence and mean intensity of infection were computed according to Bush et al., [16]. Student t-test and Chi-square test were used to test for significant differences between the mean weights of infected and non-infected pigeons, and between prevalence rates in male and female specimens.

Results

The pigeons (*Columba livia*) were of mean weight 215±11g. An overall prevalence of 28%, 4%, and 24%, was computed for cestode, nematode and lice infections, respectively. Single infection with cestodes was more prevalent (26%), followed by double infection with cestodes and lice (8%), and double infection with cestodes and nematodes (2%). The mean weight of infected and non-infected pigeons were 224±14g and 205±17g, respectively. These were not statistically significantly different (t_{46}= 0.87, P=0.20).

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***Corresponding author:** Amuzie CC, Department of Animal and Environmental Biology, Rivers State University, Port Harcourt, Nigeria, Tel.: +234-803-6729-346; E-mail: ekeh.chidinma@ust.edu.ng

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Three ecto-parasites were recovered from the hosts: the pigeon fly, *Pseudolynchia canariensis*, and two species of lice- *Columbicola columbae* and *Chelopistes meleagridis*. They were both of the order Phthiraptera belonging to the suborder Ischnocera. The prevalence and mean intensity of the ecto-parasites are presented in Table 1. *Columbicola columbae* was the most prevalent followed by *C. meleagridis*. The pigeon fly, *P. canariensis*, occurred in very low prevalence.

Table 1: Prevalence (%) and mean intensity (±sem) of ecto-parasites of Pigeons (C. livia), Diobu, Port Harcourt, Nigeria

Parasite	Number of infected Hosts	Prevalence (%)	Mean intensity (±sem)
Pseudolynchia canariensis	2	4.0	1.0 (±0.0)
Columbicola columbae	12	24.0	5.3 (±0.74)
Chelopistes meleagridis	4	8.0	1.0 ((±0.0)

Key: sem = standard error of the mean

The endo-parasites were comprised of the nematode, *Ascaridia columbae*, and the cestodes, *Raillietina echinobothrida* and *R. tetragona*. Of both cestodes, *Raillietina tetragona* was more prevalent; *A. columbae* infection was very low, infecting only two of the specimens examined. The prevalence rates of the gastrointestinal helminth parasites are presented in Table 2.

Table 2: Prevalence (%) and mean intensity (±sem) of endo-parasites of Pigeons (*C. livia*), Diobu, Port Harcourt, Nigeria

Parasite	**Number of infected Hosts**	**Prevalence (%)**	**Mean intensity (±sem)**
Raillietina echinobothrida	5	10.00	3.2 (±1.74)
Raillietina tetragona	9	18.00	6.3 (±2.51)
Ascaridia columbae	2	4.00	2.0 (±0.00)

Key: sem = standard error of the mean

Table 3: Prevalence (P%) and Mean Intensity (MI) of Parasite Infection in Pigeons from Mile III based on Sex of Host Specimens

Parasite	**Male**		**Female**	
	P(%)	MI	P(%)	MI
Ecto-parasites				
Pseudolynchia canariensis	4.35	1.0±0.00	3.70	1.0±0.00
Columbicola columbae	21.74	4.00±1.00	18.52	7.4±0.87
Chelopistes meleagridis	8.70	1.5±0.50	3.70	1.0±0.00
Endo-Parasites				
Ascaridia columbae	4.35	2.0±0.00	3.70	2.0±0.00
Raillietina echinobothrida	8.70	6.5±3.5	11.11	1.0±0.00
Raillietina tetragona	21.74	5.2±2.70	14.81	6.25±5.25

±=standard error of the mean

In one specimen, the nematode, *A. columbae,* co-occurred with *R. echinobothrida.* Infection with lice and *R. tetragona* co-occured in four specimens. Co-infection of both cestodes was not encountered.

The prevalence and mean intensity of infection were also computed based on the sex of the specimens (Table 3). Ten out of the twenty-three male specimens were un-infected as well as seventeen out of the twenty-seven female specimens. Infection was more prevalent in male specimens than in the female specimens except for *R. echinobothrida* whose prevalence was higher in female hosts. However, Chi-square test showed the difference to be insignificant ($\chi^2_{0.05,7}$= 15.01, P=0.036).

Discussion

Three ecto-parasites were found infecting pigeons of Diobu, Port Hacourt. *Pseudolynchia canariensis* occurred at a very low prevalence of 4.0% as against 17.6% by Natala *et al.*,[2] in Zaria, Nigeria; 63.72% by Radfar *et al.,* [13] in Iran, and 100.0% reported by both Dranzoa *et al.,* [10] in Uganda, and Marques *et al.,* [5] in Brazil. The frequent cleaning and disinfection of cages and pens used by the traders in the Diobu market must have contributed to keeping the prevalence of these flies low. The flies are known to transport the louse, *C. columbae* [10], and to be the vectors of *Haemoproteus columbae* [2]. They are therefore of economic importance to breeders.

Chelopistes meleagridis occurred at a prevalence rate of 8.0% while *C. columbae* had the highest prevalence of 24.0%. These were however, lower than the reports of Dranzoa *et al.* [10] in Uganda, and Radfar *et al.,* [13] in Iran. Radfar et al., [13] reported *C. columbae* in pigeons of Khorasan, Iran, at a prevalence rate of 79.41%. Dranzoa *et al.,* [10] and Portugaliza and Bagot [17] reported that lice infestation could result into infectious diseases, inadequate feeding and restlessness in infected pigeons. Although the pigeons were reared using the extensive management system, which does not require much attention and care, the care provided by the traders maintained low parasite infestation levels.

A very low diversity of endo-parasites were recovered from the pigeons examined in this research. This is in agreement with the findings of [12,18]. One nematode parasite, *A. columbae*, was recovered from the pigeons investigated and at a very low prevalence. Natala *et al.,* [2] reported that low intensity of nematode parasites in pigeons was due to die-off of eggs in unfavorable conditions. Adang et al., [1] reported that such low prevalence could be because of the feeding habit of the species stating that they do not search within the soil where nematode eggs are buried.

Ascaridia columbae are known to cause haemorrhagic enteritis, reduction of reproductive potential in host, and sometimes, death [2,12,19-20].

Raillietina tetragona and *R. echiobothrida* are commonly reported in surveys of helminth parasites of pigeons. Adang *et al.,* [1], reported that *R. echinobothrida* was the more pathogenic of the two resulting into hyperplastic enteritis. They recorded a prevalence of 10.6% for *R. Echinobothrida* infection which is similar to the 10% recorded in this study. However, they reported a higher prevalence of *Raillietina tetragona* (27.1%) as compared to 18.0% reported in the present research. They also noted that *R. tetragona* could lead to intestinal obstruction, and a reduction in both weight and reproductive potential of infected hosts.

A higher prevalence of cestodes over nematodes is recorded in this research. Adang *et al.*, [1], Natala *et al.,* [2] and Dranzoa *et al.*, [10] also reported higher prevalence rates of cestodes than nematodes. Elmajdoub and Mshiheet [12] noted that ants and beetles served as intermediate hosts of the cestodes. It therefore follows that hygienic management practices that eliminate these intermediate hosts assist in keeping cestode infections at bay.

Conclusion

Generally, a lower diversity of both ecto- and endo-parasites were reported in the pigeons of Diobu area, Rivers State, Nigeria, when compared with available literature from the northern parts of the country. The parasites also occurred in lower prevalence rates. The sanitary conditions maintained by the traders in the study location are presumed to have contributed to the low prevalence rates of both ecto- and endo-parasites. Breeders and traders of the domesticated pigeon (*C. livia*) are therefore encouraged to continually maintain hygienic conditions in order to reduce the prevalence of ecto and endo- parasites thereby maintaining yield and health of the birds.

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