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Research Article
Published: 16 Jul, 2018

Journal of Gastroenterology Forecast

Ecto-Parasites and Intestinal Helminth Community of Domesticated Pigeons (*Columba livia*) of Trans-Amadi Abattoir, Port Harcourt, Nigeria

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Abstract

Fifty domesticated pigeons (*Columba livia*) were purchased from Trans-Amadi abattoir, Port Harcourt, Nigeria, between January and April, 2018, for the investigation of the ecto-parasites and intestinal helminth species infecting them. Standard parasitological procedures were observed. The weight of the uninfected pigeons (218.02±8.00g) did not differ significantly from that of the infected specimens (229.96±6.08g). Two ecto-parasites were found on the pigeons. They were both lice species, namely, *Columbicola columbae* and *Chelopistes meleagridis*, and occurred at the prevalence of 58% and 14%, respectively. Three intestinal helminth parasite species were recovered and they were one cestode, *Raillietina tetragona,* one nematode, *Ascaridia columbae* and one protozoa, *Eimeria* sp. The prevalence rates of infection of these intestinal helminth parasites were 38%, 6% and 2%, respectively. Both single and multiple infections were observed. Single infection with lice was the most prevalent followed by infection with only cestodes in the host specimens. The most prevalent multiple infection was that of cestode and lice at a prevalence of 16%. The lice are of public health importance and pigeon handlers are advised to wear protective clothing during contact with the birds to reduce the chances of contracting lice infestation.

Keywords: Ecto-parasites; Intestinal helminths; Zoonotic infestation; Trans-Amadi abattoir; Port Harcourt; Nigeria

Introduction

Pigeons are very common in both rural and urban centres [1,2]. They are kept as pets, used for food and for research purposes [3]. They are often found on streets and in markets around Port Harcourt, Rivers State, Nigeria.

Parasites including helminths and protozoa are among the parasitofauna in intestinal tract and blood of pigeons. Ectoparasites such as mites, fleas, ticks, lice and the pigeon fly; *Pseudolynchia canariensis* are also associated with the birds. Mushi *et al*., [4] recovered the following parasites from pigeons of Botswana: *Haemoproteus columbae, Ascaridia columbae, Dispharynx spiralis, Raillietina* sp. and coccidian oocysts as well as two ectoparasites, namely the pigeon fly, *Pseudolynchia canariensis* and the louse, *Columbicola columbae*. They also reported high antibody titre levels to *Toxoplasma gondii*. Borghare *et al*., [5] examined fecal samples of thirty pigeons in Nagpur. They reported 100% infection prevalence and reported the parasites: *Capillaria* sp., *Ascaridia* sp. and *Heterakis* sp., and cysts of *Balantidium coli*.

Msoffe *et al*., [6] reported the recovery of three helminth endo-parasites from domesticated pigeons of Tanzania. They included the cestodes, *Raillietina tetragona,* and *R. echinobothrida* and the nematode, *Ascaridia galli*. They also found three ecto-parasites on the pigeons: *Pseudolynchia canariensis, Menocanthus stramineus*, and *Menopon gallinae*. Bahrami *et al*., [7] found the following parasites in the fecal samples of pigeons of Iran: *Raillietina* spp, *Tetramers* sp., *Sygnamus* sp., *Capillaria* sp., *Ascaridia columbae* and oocyst protozoa, Phthiraptera, *Ceratophyllus columbae* at the prevalence rates of 24.24%, 8.08%, 9.09%, 14.14%, 4.04%, 7.07%, 8.08% and 6.06%, respectively. Qamar *et al*., [8] recorded *Capillaria* spp in the fecal samples of pigeons from Pakistan.

This work investigates the ectoparasites as well as the intestinal helminth community of pigeons (*Columba livia*) in Trans-Amadi abattoir, Port Harcourt, Rivers State, Nigeria.

Materials and Methods

Fifty adult specimens were purchased from Trans-Amadi abattoir (N04°48 49.086', E007°2

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Received Date: *01 Jun 2018*
Accepted Date: *10 Jul 2018*
Published Date: *16 Jul 2018*

Citation: *Laku CB, Onwuteaka JN, Amuzie CC. Ecto-Parasites and Intestinal Helminth Community of Domesticated Pigeons (Columba livia) of Trans-Amadi Abattoir, Port Harcourt, Nigeria. J Gastroenterol Forecast. 2018; 1(2): 1010.*

Table 1: Prevalence (%) and Mean Intensity (±sem) of External Parasites of Pigeons (*C. livia*), Trans-Amadi Abattoir, Port Harcourt, Nigeria.

Parasite	No. of Infected hosts	Prevalence (%)	Mean intensity (±sem)
C. columbae	29	58.0	3.41 (±0.34)
C. meleagridis	7	14.0	1.86 (±0.26)

Key: sem = standard error of the mean.

44.01') in Port Harcourt, Rivers State, Nigeria, between January and April 2018. Once purchased, they were transported in aerated bags to the Parasitology Laboratory of Department of Animal and Environmental Biology, Rivers State University, for immediate dissection. They were anaesthetized in chloroform vapour and weighed using an electronic weighing balance in grams (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 external parasites were preserved in 70% alcohol for subsequent examination.

Afterwards, feathers on their ventral side were removed and they were dissected to expose their internal organs. The gastrointestinal tract including the gizzard was severed into separate Petri dishes filled with 0.72% normal saline, cut open and examined for parasites. Nematodes, when found, were extended in hot 70% alcohol and fixed in fresh 70% alcohol. They were cleared in lacto phenol for examination under a light microscope. Cestode parasites were flattened in 5% formal saline by placing them between two microscope slides for about 15 minutes. Afterwards, they were washed in several changes of water to remove the fixative, stained overnight in acetocarmine, dehydrated in alcohol series (30%, 50%, 70%, 90% and 100%), cleared in 50/50 alcohol/xylene solution and then in absolute xylene and mounted in Canada balsam.

Faecal stool samples were removed by gently squeezing the anal cloacal orifice onto a microscope slide, smeared and a drop of 0.72% normal saline was added to it for direct examination under a light microscope of x 10 objective. Parasitic identification was carried out according to the keys developed by Soulsby [9]. Prevalence and mean intensity of infection were computed according to Bush *et al*., [10].

Student t-test was used to test for statistical difference in the weight of infected and uninfected hosts, using MS Excel. Chi-square test was used to test for significant differences in the prevalence of parasites in male and female hosts, using Past-exe statistical software.

Results

A total of 50 domestic pigeons (*Columba livia*) purchased from traders in Trans-Amadi abattoir, Port Harcourt, Rivers State, Nigeria, were found to be of mean weight 227.75±5.19g. Parasites recovered from the hosts were comprised of the cestode, *Raillietina tetragona*, nematodes (*Ascaridia columbae*) and the protozoa, *Eimeria* sp. The ecto-parasites were composed of two species of lice- *Columbicola columbae* and *Chelopistes meleagridis*.

The overall prevalence of cestode, nematode, lice and *Eimeria* infections were 38%, 6%, 58%, and 2%, respectively. Both single and multiple infections were observed. Infection with lice alone was more prevalent (38%) followed by infection with only cestodes (22%) in the host specimens. Co-infection of cestode and lice had a prevalence of 16%; co-infection of nematode and lice had a prevalence of 4%; while single infection with only nematode, and co-infection with cestodes and *Eimeria* sp., both occurred at a prevalence of 2%. The mean

Table 2: Prevalence (%) and Mean Intensity (±sem) of Gastrointestinal Parasites of Pigeons (*C. livia*), Trans-Amadi Abattoir, Port Harcourt, Nigeria.

Parasite	No. of Infected Hosts	Prevalence (%)	Mean intensity (±sem)
R. tetragona	19	38.00	5.6 (±1.69)
R. tetragona segments in stool samples	2	4.00	1.0 (±0.00)
A. columbae	3	6.00	8.67 (±5.78)
Eimeria sp.	1	2.00	1.0 (±0.00)

Key: sem = standard error of the mean.

Table 3: Sex-related Prevalence (P%) and Mean Intensity (MI) of Parasite Infection in Pigeons from Trans-Amadi Abattoir, Port Harcourt, Nigeria.

Parasite	Male		Female	
	P(%)	MI	P(%)	MI
Gastro-intestinal Parasites				
A. columbae	7.14	12.5±7.50	4.55	1.00±0.00
R. tetragona	28.57	2.0±0.63	50.00	8.2±2.67
Eimeria sp.	-	-	4.55	1.00±0.00
Ecto-parasites				
C. columbae	57.14	4.0±0.51	45.45	2.7±0.47
C. meleagridis	25.00	2.14±0.26	13.64	2.0±0.58

±=standard error of the mean.

weights of infected and non-infected pigeons were 229.96±6.08g and 218.02±8.00g, respectively. These were not statistically significantly different (t_{48}= 0.81, P=0.21).

Two external parasites were recovered from the hosts: two species of lice- *Columbicola columbae* and *Chelopistes meleagridis*. The lice belonged to the order Phthiraptera, suborder Ischnocera. The prevalence and mean intensity of the external parasites are presented in Table 1. *Columbicola columbae* was more prevalent.

The gastrointestinal parasites recovered were comprised of the nematode, *Ascaridia columbae*, the cestode, *Raillietina tetragona* and the protozoa, *Eimeria* sp. In addition to *Eimeria* sp., segments of *R. tetragona* were also recovered from faecal samples of the pigeons. The prevalence rates of the gastro-intestinal helminth parasites are presented in Table 2.

The prevalence and mean intensity of infection were also computed based on the sex of the specimens (Table 3). Five of the twenty-eight male specimens were uninfected while only two of the twenty-two female specimens were uninfected. Prevalence of infection was generally higher in male specimens except for *R. tetragona* which was higher in female specimens, and *Eimeria* sp. which was also recovered only from a female specimen. The difference was, however, not significant ($\chi^2_{0.05,5}$= 27.68, P=4.209E-05).

Discussion

Five parasites were recovered in this research. The endo-parasites were *R. tetragona, A. columbae* and *Eimeria* sp., while the ecto-parasites were *C. columbae* and *C. meleagridis*. *Pseudolynchia canariensis* commonly reported from pigeons in most parts of the world [3-4, 11-12] was not encountered in this work.

Raillietiella tetragona and *Ascaridia* sp. are frequently reported from pigeons in Africa and overseas [6,11,13]. Msoffe *et al*., [6] found an overall prevalence of 6.0% for *R. tetragona* and 15.5% for *A. galli* in the pigeons of Tanzania. Similarly, Bahrami *et al*., [7] reported a prevalence rate of 24.24% and 4.04% for *Raillietina* spp.

and *A. columbae*, respectively. However, a higher prevalence rate of both parasites was recorded in the birds examined in this research: *Raillietina tetragona* and *A. columbae* had the prevalence rates of 38.00% and 6.00%, respectively. Borghare *et al.*, [5], however, reported a higher prevalence of 76.66% for *Ascaridia* sp. in the pigeons they examined, and Mushi *et al.*, [4] also reported higher prevalence rates for both parasites- *Raillietina* sp. (80%) and *A. columbae* (30%). The differences observed could be due to environmental factors and hygienic conditions of the localities investigated as these may be favourable or less so for parasites and their vectors.

Haag-Wackernagel [14] reported ectoparasites of pigeons such as mites (*Dermanyssus gallinae)* and ticks (*Argas reflexus*) could migrate to homes and infest man. He stated that the effects of such zoonotic infestation could range from being harmless to the development of IgE-mediated (type I) allergy, and to symptoms of anaphylactic shock. Haag-Wackernagel and Spiewak [15] had reported the infestation of humans by the pigeon flea (*Ceratophyllus columbae*) resulting into allergic urticarial reaction. In the present research, two species of lice- *C. columbae,* and *C. meleagridis*- were recovered from the pigeons at prevalence rates of 58% and 14%, respectively. Pigeon handlers are thus, advised to use protective covering while making contact with the birds to reduce the chances of infection. In comparison with some other researchers, Mushi *et al.*, [4] and Radfar *et al.*, [16] reported prevalence rates of 30% and 79.41%, respectively, for *C. columbae*. Dranzoa *et al.*, [12] found *C. meleagridis* at a prevalence rate of 70%. In their research, Balicka-Ramisz and Bogumila [17] reported three species of *Eimeria*: *E. labbeana*, with a prevalence rate of 89–93% in young pigeons and 55-63% in adults, and two less prevalent species- *E. columbarum* and *E. columbae*.

Msoffe *et al.*, [6], did not examine differences in sex of specimens but tested for differences in parasite burdens between nestlings and adults. The researchers found no significant difference in the prevalence of *R. tetragona* between nestlings and adults, but reported that the prevalence of *A. galli* was significantly higher in nestlings than in adults. Similarly, Bahrami *et al.*, [7] reported that young pigeons (below 2 years old), were more susceptible to parasitic infections than older individuals. On the influence of sex on the parasite prevalence rates, Qamar *et al.,* [8] found *Capillaria* sp. were more prevalent in male than in female pigeons, though the difference was not statistically significant. In the present research, only adult host specimens were examined and prevalence of parasites was generally higher in male specimens. This is in consonance with the reports of Folstad and Karter [18] and Poulin [19] who noted that testosterone reduced the immune status of male vertebrates making them more disposed to parasitic infections.

Conclusion

Feral pigeons of Trans-Amadi abattoir, Port Harcourt, Nigeria, suffer from parasitic infections which have been reported for pigeons in other parts of the world. The presence of lice in appreciable prevalence rates is of public health importance and pigeon handlers are advised to consciously use protective clothing while working to avoid contracting infection.

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