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ECTOPARASITES AND GASTROINTESTINAL HELMINTH OF DOMESTIC PIGEONS IN AWKA, SOUTHEASTERN NIGERIA

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ABSTRACT

The keeping of pigeons as pets and its consumption for protein, is a potential source of zoonotic diseases. The study of ectoparasites and gastrointestinal helminth of domestic pigeons (*Columba livia domestica*) in Awka, was conducted between November 2021 and January 2022. The objectives were to determine the ectoparasites and gastrointestinal helminths associated with the pigeons, and the prevalence of the parasites in relation to sex. A total of 30 adult pigeons (12 males and 18females) were examined for ectoparasites through physical observation using a magnifying hand lens, and gastrointestinal helminths through dissection and observation of the alimentary canal under the objective lens of the microscope. Chi-square test was employed to determine the possible association between parasite prevalence and the sexes. Three ectoparasites recovered were *Columbicola columbae* (33.33%), *Menopon gallinae* (20.00%), and *Gonoides gallinae* (13.33%). There was no significant difference in the prevalence of parasite species ($P=0.165$; $P<0.05$). Four gastrointestinal helminth parasites also recovered includes *Raillietina tetragona* (13.33 %). *R. cesticillus* (10.00 %), *R. echinobothrida* (3.33 %) (cestodes) and one nematode, *Ascaridia columbae* (33.33 %). There was significant difference in the prevalence of parasite species ($P=0.008$; $P<0.05$). The males recorded a higher prevalence of infections (25.00%) than the females (11.11 %) for the gastrointestinal parasites but had equal prevalence of ectoparasites infestations (33.33 %) each. There was no significant difference in prevalence of gastrointestinal helminths among gender ($P=1.000$, $P>0.05$). The study showed that pigeons play host to ectoparasites and intestinal helminths and as such necessary and precautionary control measures against pigeon-associated parasitic diseases should be implemented.

Keywords: *Columba livia domestica*, Gastrointestinal helminths, Ectoparasites, *Ascaridia columbae*

INTRODUCTION

Pigeons (*Columba livia domestica;* Order: Columbiformes), comprising about three hundred species are ubiquitous birds found globally both in tropics, subtropics and temperate regions of the world (Marques *et al*., 2007; Parsani and Momin 2010). Humans use pigeons as pets, social, religious, ceremonial, and ritual purposes, and also as laboratory animal models (Levi, 1974; Aggrey and Cheng, 1992; Vogel *et al*., 1994). As domesticated birds in Nigeria, they live as free-range birds scavenging primarily on seeds, grains, vegetation, and invertebrates such as insects (Adang *et al.,* 2007), thereby predisposing the pigeon to several disease-causing agents including among which are ectoparasites and helminths (Adang *et al*., 2009; Belgium and Hehrin, 2012; Alam *et al*., 2014).

Several ectoparasites and gastrointestinal helminths associated with pigeons has been reported in many studies (Husseini *et al*.,2015; Saeed *et al*., 2020;Laku *et al*., 2018;Alkharigy*et al*., 2018; Abdullahi *et al*., 2019).Other studies have reported pigeon-associated gastrointestinal helminths such as *Ascaridia columbae*, *Capillaria* spp., *Dispharnyx* spp. and *Tetrameres* spp. (Harlin, 1994; Dovc *et al*., 2004). In Nigeria, ectoparasites such as *Menopon gallinae*, *Columbicola columbae*, *Pseudolynchia canariensis*, and gastrointestinal helminths which includes *Raillietina tetragona*, *Raillietina cesticillus*, *Amoebotaenia cuneata*, and *Hymenolepis carioca* has been reported (Adang *et al*., 2009).

Parasitic infection in birds generally results in stunted growth, reduced egg production, and susceptibility to other illnesses. Ectoparasites may also cause loss of other economic values to the birds. Control methods can only be effective after a thorough investigation of these parasites and their host-parasite relationships (Dranzoa*et al.,* 1999).

There is paucity of information on the parasites associated with domestic pigeons in the study area. This study was to provide more information on the ectoparasites and gastrointestinal helminths of pigeons in the area. The findings will aid in the control of the parasites associated with pigeons.

MATERIALS AND METHODS

Study Area

The study was conducted in Awka, Anambra State, Southeastern, Nigeria. Awka, the capital of the state lies between latitude 6º13᾽15.6”N and longitude 7º04’51.1” E. The study area experience 8 months of rainy season (March – October) and 4 months of dry season (November – February) in a year. The temperature range in Awka is between 27 -30ºC between June and December but rises to 32 -34ºC between January and April. The relative humidity of the area is about 70% in the dry season reaching 80% during the wet season (Irikannu *et. al.,* 2021). The study area has a major market for sales and purchase of chickens and other poultry products.

Collection of specimens

Thirty (30) pigeons, comprising 12 males and 18 females were purchased from Eke-Awka market in Awka, Anambra State and was transported to Parasitology Laboratory of the Department of Zoology, Nnamdi Azikiwe University.

Examination for Ectoparasites

The birds were euthanatized by placing them in a glass jar containing cotton wool soaked with 10ml of chloroform and covered for 4 to 5 minutes. The euthanatized birds were then examined for ectoparasites and helminths using a

magnifying hand lens.The plumage of the bird was thoroughly brushed onto a white tray for the collection of ectoparasites. The feathers of the head, the neck, under the wings, body, legs, and cloaca were raised and thoroughly examined with a hand lens for ectoparasites (Adang *et al*., 2009). Recovered ectoparasites were relaxed and dehydrated in 70% alcohol before being mounted on a microscopic slide and examined under dissecting and light microscopes. The ectoparasites were counted and kept in bottles containing 70% alcohol and a drop of glycerine (Adang *et al*., 2009).

Examination of Gastrointestinal Tract for Helminths

The gastrointestinal tract of each pigeon was cut out and the various parts were ligated, then severed into Petri dishes containing normal saline and was allowed to stand for 20 minutes to aid worm detachment. The gastrointestinal tract was sectioned longitudinally and examined for helminths under the objective lens of the microscope. The gizzard's horny coating was pulled off to reveal embedded parasites. Nematodes recovered were extended in heated 70% alcohol and fixed in normal 70% alcohol. They were cleared in lactophenol for examination under a light microscope(Laku *et al*., 2018). Cestode parasites were relaxed in the water and preserved in 70% alcohol. The helminths were counted and preserved in labelled universal bottles. The ectoparasites and helminths were identified using keys developed by Soulsby (1982).

Statistical Analysis

The parasite prevalence was computed according to Bush *et al*., (1997) while the Chi-square test was employed to determine the possible association between parasite prevalence and the sexes.

RESULTS

The most prevalent ectoparasite recovered was *Columbicola columbae* 10(33.33%) while *Gonoides gallinae* 4 (13.33%) was the least (Table 1). There was no significant difference in the prevalence of parasite species (P=0.165; P<0.05)

Table 1: **Prevalence of ectoparasites of domestic pigeon in the study area.**

Parasite	**Number of hosts infected**	**Prevalence (%)**
Columbicola columbae	10	33.33
Menopon gallinae	6	20.00
Gonoides gallinae	4	13.33
Total	20	66.67%

$\chi 2 = 3.600$, df = 2, P = 0.165

The most prevalent gastrointestinal helminth recovered was *Ascaridia columbae* 10 (33.33%) while *Raillietina echinobothridia* 1 (3.33%) was the least (Table 2). There was significant difference in the prevalence of parasite species (P=0.008; P<0.05).

Table 2: Prevalence of gastrointestinal helminth parasites of domestic pigeons in the study area

Parasite Taxa	Parasite species	Number of hosts infected	Prevalence (%)
	Raillietina tetragona	4	13.33
Cestoda	*R. cesticillus*	3	10.00
	R. echinobothridia	1	3.33
Nematoda	*Ascaridia columbae*	10	33.33
Total		18	60.00%

$\chi 2 = 11.765$, df = 3, P = 0.008

The prevalence of gastrointestinal helminths was higher in males 3(25.00%) than in females 2(11.11%). There was no significant difference in prevalence of gastrointestinal helminths among gender (P=0.317, P>0.05). An equal prevalence of ectoparasites (33.33%) was recorded in both males and females. However, there was no significant difference in sex prevalence. There was no significant difference in prevalence of gastrointestinal helminths among gender (P=1.000, P>0.05).

Table 3: Prevalence of gastrointestinal helminth and ectoparasites of domestic pigeons in relation to sex.

	Helminths			Ectoparasites	
	Number examined	Number infected	Prevalence (%)	Number infected	Prevalence (%)
Male	12	3	25.00	4	33.33
Female	18	2	11.11	6	33.33
Total	30	5	16.67%	10	33.33%

Helminths: $\chi 2 = 1.000$, df = 1, P = 0.317; Ectoparasites: $\chi 2 = 0.000$, df = 1, P = 1.000

DISCUSSION

The ectoparasites recovered from the study includes *C. columbae, Menopon gallinae* and *Gonoides gallinae.* Some of the ectoparasites were previously reported by Adang *et al*. (2009) in their study in Zaria, Nigeria. In this study, *C. columbae* had a prevalence of 33.33%. Dranzoa *et al*. (1999) recorded a high prevalence of 94.1 % for *C. columbae.* Although the recovered ectoparasites in this study are lice, other reported ectoparasites of pigeons such as mites (*Dermanyssus gallinae*) and ticks (*Argas reflexus*) could migrate to homes and infest man (Laku *et al*., 2018). Furthermore, the effects of such zoonotic infestation could range from being harmless to the development of allergy, and symptoms of anaphylactic shock. Thus, the need for domestic pigeon handlers to ensure they wear adequate protective clothing to reduce chances of infection.

Among the gastrointestinal helminths recovered, *Raillietiella tetragona* and *Ascaridia* sp. are frequently occurring parasites of pigeons in Africa and beyond (Msoffe *et al*., 2010; Natala *et al*., 2009; Parsani *et al*., 2014). This study recorded a prevalence of 13.33 % and 33.33 % for *Raillietina tetragona* and *Ascaridia columbae* respectively. Msoffe *et al*. (2010) found an overall prevalence of 6.0% for *R. tetragona* and 15.5% for *A. galli* in the pigeons in Tanzania. Similarly, Laku *et al*. (2018) reported a

prevalence rate of 38.00% and 6.00 % for *Raillietina tetragona* and *Ascaridia columbae* respectively in Port Harcourt, Nigeria. Borghare *et al*. (2009) however, reported a higher prevalence of 76.66% for *Ascaridia* sp. in the pigeons of Nagpur, and Mushi *et al*. (2000) 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 different areas favourable for the parasites and their vectors.

In this study, ectoparasites and gastrointestinal helminths were observed in both male and female pigeons, although in an unequal prevalence. This indicates that both males and females are all exposed to the acquisition of ectoparasites, and their sex-related physiognomy may not confer any differences in infestation (Adang *et al*. 2008b). Senlik *et al*., (2005) made similar observations in their study. Also, Mijinyawa and Junaid (2017), and Jahantigh *et al*, (2016) reported no significant difference in the helminth infection rates between male and female pigeons. Similarly, no significant difference was observed across sexes in our study. Therefore, infestation and infection of ectoparasites and gastrointestinal helminths on male and female pigeons may be due to chance.

CONCLUSION

Findings from the present study showed that there was a high prevalence of ectoparasites and gastrointestinal helminths in domestic pigeons. This may suggest that there may be negative impact of parasite on the well-being of the doves.However, the high prevalence of the parasites in the area is of public health importance. Pigeon handlers are advised employ chemotherapy for treatment of the birds and consciously use protective clothing while working to avoid contracting infection.

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