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Original Article

Study on the Prevalence of Haemoparasites of Pigeon (*Columba livia*) In Lapai-Nigeria

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ABSTRACT

Study was conducted to assess the prevalence of Haemoparasites of *Columba livia* in lapai Niger State Nigeria. Parasites are increasing in alarming rate, invading organisms ranging from bacteria to humans causing infections in them. Infections can range from slight weakening to even death of the organism. A total of fifty (50) *Columbia livia* were examined for the presence of haemoparasites in 2010, through the use of blood smears stained with giemsa as described in Cheng (1986) and Roberts and Janovy (2009) methods. The giemsa method detected 39(78%) of the birds infected with one or more haemoparasite, while the non-infected birds' were 11 (22%), with the infected birds having three genera haemoproteus, plasmodium and leucocytozoon present. Some of the birds were singly infected while others had multiple infections. For the single infection, plasmodium (30%), Haemoproteus (14%) and leucocytozoon (4%), for the double infection , haemoproteus and plasmodium (14%), haemoproteus and leucocytozoon (4%) and plasmodium and leucocytozoon (4%) while for triple infection it was (8%). the leucocytozoon and some double infection had low prevalence whereas plasmodium had the highest prevalence rate The effects of parasitism on birds are often severe, haematozoa have a debilitating effect on their avian hosts and deter host energy from reproductive effort and towards immune defenses.

Key words*: Plasmodium* prevalence, birds, Lapai

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INTRODUCTION

Columba livia (pigeon) is a domesticated columbid species widely sold or traded in Nigerian markets to augment income (Adang *et al*., 2008). It is a species of culinary interest and has become common in Lapai area of Niger State, Nigeria. It feeds on wide range of food items, which include grains, slugs, earthworm, and insects (Adang, 1999), which in many instance may carry infective stage of haemoparasites (Soulsby, 1982). Pigeon of the order Columbiformes are ubiquitous and can be found in virtually every town and city around the globe (Marquez et al, 2007). They have long been subject of intense ornithological and parasitologica study (Akinpelu, 2008). The impact of blood parasites on the fitness of their avian host

has been the focus of numerous studies (Garvin *et al*, 2003). The annual variability of these parasites and how they impact on the fitness of their avian host are unknown (Akinpelu, 2008). Over the past two decades, the cost of these infections on the host fitness has been documented through both correlative (Allander, 1997) and experimental (Merino *et al*, 2000) studies that demonstrated that infections may be costly to avian reproductive success. Most of the studies were based on the assumption that haematozoa have a debilitating effect on their avian hosts and deter host energy from reproductive effort and towards immune defenses (Garvin *et al*, 2003). Diseases are the most important limiting factors to livestock productivity in most sub-Saharan African countries (Natala *et al*, 2009). The effects of parasitism on birds are often severe (Daranzoa *et al*., 1999). Many studies show that pigeons too are affected by diseases. Various protozoan blood parasites significantly may retard growth development, cause morbidity, and productivity, it at times result to death, especially, the squabs (Cheng, 1973., Soulsby, 1982., Fatihu *et al*, 1991). These are considered as greatest impediment to profitable pigeon production in Nigeria (Galloway, 1972). Pigeons often harbor zoonotic parasites and some of these may be transmissible to humans in the African environment and the globe at large. Zoonotic diseases from pigeons to humans may be as a result of man feeding upon pigeons or using pigeons as pet or in cultural display. Information on ectoparasites and protozoan parasites of domesticated pigeons in this region (North central of Nigeria) appears to be poorly documented (Natala *et al*., 2009). In cited publications the occurrence of blood parasites in birds, particularly migratory species, is from surveys conducted on breeding ground where infections are believed to be acquired (Bennett *et al*., 1974). The ornithological fauna of West Africa is highly diverse; the blood parasites have had only limited study (Wink & Bennett, 1976., Kirkpatrick & Smith, 1988). It is known that vectors of *Leucocytozoons* are Dipterans of the family Simulidae and the vectors of *Plasmodium* and Microfilaria are some species of Mosquitoes belonging to the family Culicidae (Valkuinas, 1997). Hippoboscids flies are incriminated vectors of *Haemoproteus* spp of Columbiforms while *Trypanosoma* spp are vected by Tse-tse flies.

MATERIALS AND METHOD

Study area

Lapai town, is the headquarter of Lapai L. G.A of Niger State is about 74km from Minna and 69km to Bida. It is located at latitude 9^0.34N and longitude 6^0.30E. The climate of the town is influenced by two main dominant trade winds; the North-East and South-East trade winds. The rainfall in the area begins April, while the dry season commence as from November.

Sample collection and Analysis

Fifty (50) pigeons were purchased from Lapai Market and transported in cage to the Laboratory of Biological Sciences Department, Ibrahim Badamsi Babangida University Lapai. They were all tagged with masking tape on their legs and each numbered to avoid multiple sampling. The pigeons were kept in the laboratory for some hours and fed until the experiment was conducted.

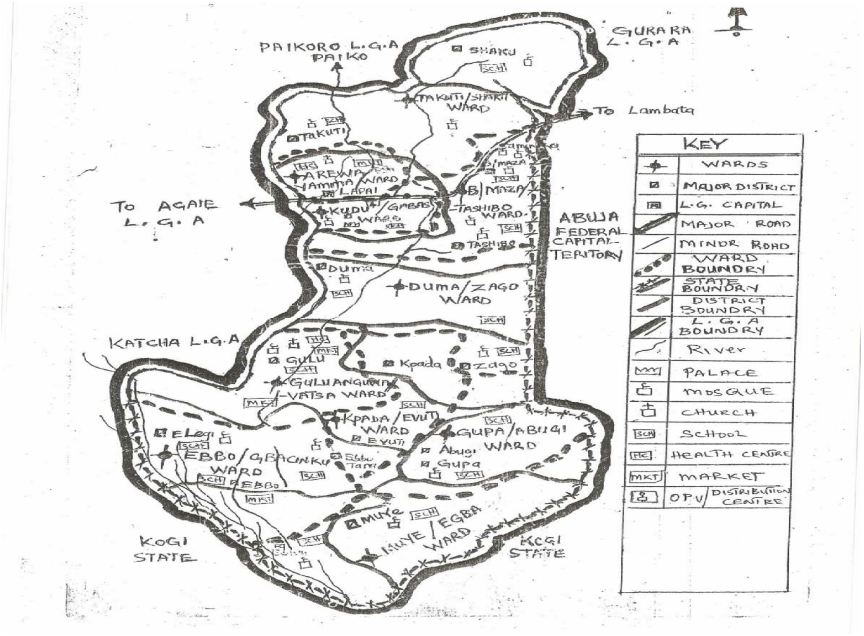

Fig 1: Map of the study area

Plate i: Diagram of rock pigeon (*Columba livia*)

Blood samples were collected by prinking the vein using syringe and needles (Smith, 1997). Approximately, 2ml of blood was collected from each of the birds into a sample bottles containing sodium salt of Ethylene Diamine Tetra Acetic acid (EDTA), the bottles were rocked and rolled gently to allow for uniform mixing of the blood with the anti coagulant. Thin blood smears were made immediately on different slides. The slides were numbered using masking tape to avoid multiple viewing. Two thin smears were made of each blood sample, air-dried and fixed with methanol for five (5) minutes and stained with diluted Giemsa. Staining lasted for twenty (20) minutes, after which staining were washed off with water and left to dry. The slides were later examined using

microscope under oil immersion objective (×100) for haemoparasites (Akinpelu, 2008). Cheng (1986) and Roberts and Janovy (2009) method were used in the identification of parasites based on their morphology, such as the halter-shaped appearance and presence of gametocyte within the erythrocytes in *Haemoproteus*, and the red-stained microgametocyte in *Leucocytozoon* as well as presence of merogony in erythrocytes and round to oval schizonts and deeply staining merozoites in *Plasmodium*.The data collected from the experiment were analyzed and the percentage prevalence determined

RESULTS

The research showed that out of the 50 birds examined, 39 (78%) were infected with three genera of Haemoparasites comprising *Haemoproteus* sp 7 (14%), *Plasmodium* sp 15 (30%), and *Leucocytozoon* sp 2 (4%), while non infected birds were 11 (22%), giving a total of 50(100%) table 1. The birds had higher prevalence of *Plasmodium sp* in the sample analysed.

Table 1: Prevalence of *Haemoparasites* in *Columba livia* In Lapai, Niger State Nigeria.

Infection type	Parasite	Frequency of occurrence	
		Total	Percentage %
No not infected	-	11	22
	H	7	14
Single	P	15	30
	L	2	4
	H +P	7	14
Double	H+L	2	4
	P+L	2	4
Triple	H+ P+L	4	8
Total	-	50	100%

H= *Haemoproteus* sp P= *Plasmodium* sp L = *Leucocytozoon* sp

Some of the birds were singly infected while others had multiple infections. For the single infection, plasmodium (30%), Haemoproteus (14%) and leucocytozoon (4%), for the double infection , haemoproteus and plasmodium (14%), haemoproteus and leucocytozoon (4%) and plasmodium and leucocytozoon (4%) while for triple infection it was (8%). the leucocytozoon and some double infection had low prevalence whereas plasmodium had the highest prevalence rate. Plates 1-3 show the various stages of haemoparasites in the red blood cell of the infected birds.

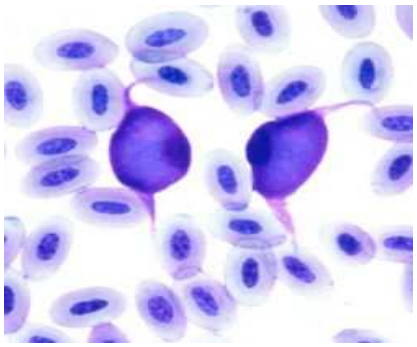

Plate1: RBCs infected with *Plasmodium*

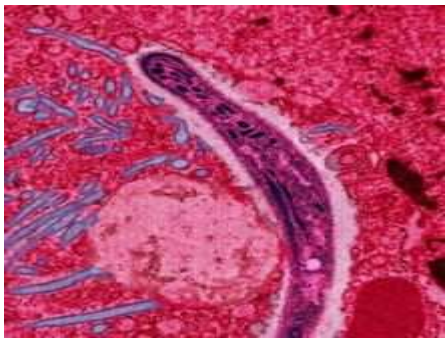

plate : RBCs infected with *Leucocytozoon*.

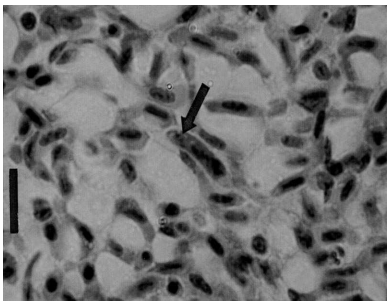

Plate 3: RBCs infected with Haemoproteus

DISCUSSION

The results of this study provide an indication of the prevalence of blood parasites in bird species of the genus *Columba* found in Lapai, local government area of Niger State, Nigeria The overall high prevalence of the blood parasites is due to the wet season where the availability vectors is in abundance for instance, the mosquito breeding rate generally is high during raining season.

Three genera of blood parasites were present, which include *Haemoproteus*, *Plasmodium*, and *Leucocytozoon*. *Plasmodium* had the highest prevalent rate whereas *Leucocytozoon* was the least prevalent as well as some double infected birds were also observed with least occurrence *Haemoproteus* and some birds infected with two genera of (*Haemoproteus* and *Plasmodium*) prevalence were the same.

The difference in the prevalence may involve behavioural aspect or some physiological conditions intrinsic to the species that may make the host more or less susceptible to the parasites. In this study, it can conclude that *Plasmodium* is more prevalent than *Haemoproteus* and *Leucocytozoon* in domestic pigeons of Lapai area of Niger State. The pigeon (*Columba livia*) harbor many blood parasites.

The high prevalence of *Plasmodium* in this study, is similar with the study carried out by Akinpelu, 2008 in Ile-Ife with plasmodium having the highest prevalence rate, a study in Kampala, on the ecto-gastro-intestinal and haemo-parasites of live pigeons, where prevalence of was also high (Daranzoa *et al*., 1999), as well the study in Zaria where prevalence of Plasmodium was the highest in the infected birds (Natala *et al*., 2009). The higher prevalence of Plasmodium was possibly due to the high

abundance of its vectors (mosquito) in the study area a temperate region. The prevalence of *Haemoproteus* found in this study is low compared to the study carried out in Kampala where prevalence rate was high (Daranzoa *et al*., 1999.) and in Southern Brazil (Marques *et al*., 2007).
This study indicates low prevalence of *Leucocytozoon*, which is similar with the study in carried out by Akinpelu in Ile-ife on prevalence and intensity of blood parasites in wild pigeons and dove. The presence of *Plasmodium* and *Leucocytozoon* in the blood of pigeon was an indication of the presence of *Culex* and Simulium species of mosquitoes respectively, as they are the established vectors of these haemoparasites (Natala *et al*., 2009). Double occurrence of blood parasite in pigeons is rare compared to some birds.
Animals kept under intense management and or domestication should have an extremely low or zero parasite tolerance with proper hygiene and good management (Adang *et al*., 2008). High parasitic infection may be an indication of poor management and control efforts in either the animal or the immediate environment where infection or re-infection (directly or indirectly) may emanate.

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Generally, the reasons for these differences may involve behavioural aspect or some physiological conditions intrinsic to the species that may make the host more or less susceptible to the parasites (White, 2007). Apart from rain fall and differences in habitat composition, differences in prevalence may be influenced by proximity to breeding for vectors, relative levels of host resistance, local temperature differences, and time of collection during the day and age of host among the others (White, 2007).

CONCLUSION

The overall high prevalence of the blood parasites is due to the wet season where the availability vectors is in abundance for instance, the mosquito breeding rate generally is high during raining season.
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REFERENCES

Adang, K. L., Oniye, S. J., Ajanusi, O. J., and Ezealor, A. U. (2008). Gastrointestinal helminths of the domestic pigeons (*Columba livia*). *Science World Journal*, 3(1).

Adang, K. L. (1999). *Some Aspect of the Biology of Four Columbid Species in Zaria*. Zaria, Nigeria: Ahmadu Bello University.

Akinpelu, A. I. (2008). Prevalence and intensity of blood parasites in wild pigeons and doves (family columbidae). *Science Alert Journal*, 109: 114 *http://scialert.net/absract/?doi=ajava.2008.109.114*

Allander, K. (1997). Reproductive investment and parasites susceptibility in the great tit. *Journal of Functional Ecology*, 11:348-364.

Cheng, T. (1973). *General Parasitology*. New York and London : Academic Press

Soulsby, E. J. L. (1982). *Helminths, Arthropods and Protozoa of Domestic Animals*. (7th Ed). London: Baillere Tindel. Pp 763-777.

Cheng, C. T. (1986). *General Parasitology*. (2nd Ed). San Diego-USA: Academic Press Elsevier.

Dranzoa, C., Ocaido, M. and Ketete, P. (1999). The ecto-gastro-intestinal and Haemo-parasites of live pigeons (*Columba livia*) in Kampala. *Journal of Avian Pathology*, 28: 119-124

Fatihu, M. Y., Ogbogu, V. C., Njoku, C. V. and Sarror , D. I. (1991). Comparative study of gastrointestinal helminths of poultry in Zaria. *Rev. Elev. Med. Vet. Pays. Trop*, 44(2): 175-177

Galloway, H. J. (1972). *Farm Animal Health and Disease Control*. London: Longman.

Garvin, M. C., Marra, P. P. and Crain, S. K. (2003). Prevalence of hematozoa in overwriting American red start. *Journal of Wildlife Diseases*, 3: 115-118.

Marques, S. M., Cuadros, R. M., Da Silver, S. C. and Braldo, M. (2007). Parasites of pigeons (*Columba livia*) in urban areas of Lages, Southern Brazil. *Journal of Communicaciones*, 62: 3-4 *http://www.scelo.cl/pdf/parasitol/v62n3-4/art14.pdf*

Merino, S. Moreno, J. and Arriero, E. (2000). Are avian blood parasites pathogenic in the wild? A medication experimenr in blue tits. *Journal of Royal Society of London*, 267: 2507-2510.

Roberts, L. S. and Janovy, J. (2009). Foundations of Parasitology. (8th Ed). New York: McGraw-Hill Company inc. pp. 332

Valkuinas, G. (1997). Bird haemosporida. *Jounal of Acta Zoology*, 3-5

Verma, P. S. and Agarwal, V. K. (2006). *Cell Biology, Molecular Biology, Genetics, Evolution and Ecology.* New Delhi-India: S Chand and Company Ltd.

White, H. (2007). *Rock Pigeon, Columba livia*. *http://www.diamond* dove.info/bird14%20Rock%20Dove.htm. 2009/12/20

Wink, M. and Bennett, G. F. (1976). Blood parasites of some birds from Ghana. *Journal of Wildlife Diseases*, 12:587-590