

GASTROINTESTINAL PARASITES OF BIRDS IN ZOOLOGICAL GARDEN OF UNIVERSITY OF ILORIN

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SUMMARY

Infection with gastrointestinal parasites is a major health issue in captive birds; prevalence data of gastrointestinal parasites of birds in Zoological gardens in Nigeria are limited. This study was carried out to determine the gastrointestinal parasite kept at University of Ilorin Zoological garden. A total of 21 fecal samples from 9 birds were examined using fecal sedimentation technique. The overall prevalence of gastrointestinal parasites was found to be 71.4%, with the highest prevalence of infection recorded in Ostrich, Crowned crane and African fish eagle (100% each), followed by domestic pigeon and White-faced whistling duck. While Marabou stock, White peafowl and Emu were the least with 50.0% each. The distribution of gastrointestinal parasites in the study area revealed a total of four species of parasites which includes two protozoans (*Coccidian* and *Eimeria* spp.) and two nematodes (*Capillariaspp* and *Ascaris* spp.) The intensity of gastrointestinal parasites of birds in the study area revealed that *Ascaridiagalli* recorded the highest intensity of 358 epg, followed by *Capillariaspp* with 104 epg while *Eimeriaocysts* recorded the least intensity of 70 epg. The study concludes that the birds at the University of Ilorin Zoological garden harbor parasites which are of great importance to their health and also that of the staff and visitors in the zoo because most of the fecal samples examined did not show any obvious clinical signs.

Keyword: Parasite, Birds, Gastrointestinal, Zoological garden

INTRODUCTION

Zoological gardens can be defined as a place where wild animals of choice are reserved for the purpose of keeping genetic resources, domestication for captive breeding, research and training, recreation and economic reasons (Ayodele *et al.*, 1999). There are times when strange domestic and companion animals are also on display. There is a long tradition of maintaining some wild animal species in captivity (e.g., for centuries, birds of prey have been kept for falconry). Until recently however, breeding groups of a wide range of wild animals have been established against the tradition of keeping wild animals for their aesthetic purpose only. The reasons have been commercial, scientific, conservation and welfare purposes. Intensive management under captive or semi-captive conditions is likely to play an increasingly important role in the conservation of endangered species in the future. It is however worrisome that, parasitic diseases have been one of the major problems causing the death of these animals while in captivity (Varadharajan and Kandasamy, 2000).

In 2003, Nigeria was a seasonal breeding home of 906 species of birds (FEPA, 2003), three of the twelve species that are indigenous to Nigeria are already threatened. These are the Anambra waxbill (*Estrildapopliopareia*), Ibadan Malimbe (*Malimbusibadanensis*) and Jos plateau indigo bird (*Viduaryae*) (Aminu-Kano, 2001). Several of

these birds are kept in Nigerian zoos. Parasites that affect these birds in the wild are usually of little effect on the birds, or no distress to the health of the individuals in the wild. However parasitic infections are among the most common sanitary problems affecting birds in captivity, especially those in high-density populations (Otegbade and Morenikeji, 2014). Even though there is a large body of literature on avian medicine including parasitic diseases (Olsen and Orosz, 2000), little has been documented about the epidemiology of gastrointestinal parasites in zoo birds. Only a few coprological surveys have been conducted on a wide range of avian species displayed in the zoos (Akinboye *et al.*, 2010; Gurler *et al.*, 2010; Opara *et al.*, 2010; Papini *et al.*, 2012). Common parasites invading the gastrointestinal (GI) tract of avian species in a broader sense are helminths and protozoans. Helminths are generally cestodes, nematodes and trematodes.

Nematodes are viewed as the most important considering number of species and the harms they cause to birds (Uhuo *et al.*, 2013). It is a common phenomenon to have multiple GI parasitic infections in Birds. These affect their normal activities as it manifests in severe pains in the birds (Radfar *et al.*, 2012). Parasites and infectious diseases of wildlife are the major concern to the conservation of wildlife species (Grogan, 2014). It can affect host survival and reproduction directly through pathological effects and indirectly by reducing host conditions (Murray *et al.*, 1999).

There is no doubt that a regular program of surveillance and measures of gastrointestinal parasites with the correct diagnosis, effective treatment and proper prophylaxis would assist in maintaining the good health of zoo birds. This study provides baseline information on the prevalence of gastrointestinal parasites of captive birds in the University of Ilorin zoological garden.

MATERIALS AND METHODS

Description of the study area:

The University of Ilorin Zoo was established in 1985 to complement the University's biological sciences departments in teaching and research. The Zoo is located at the main gate of the University within latitude 8°30'N and longitude 4°35'E. It has a children's playground and picnic grounds. A major attraction to the zoo is the 150 meters long and 45 meters high suspended canopy walkway which has continued to attract visitors to the zoo. The fact that most of the forest vegetation has been left undisturbed and the presence of a stream which flows through the zoo creates a serene and near-natural environment that makes the zoo unique. The zoo attract over 55,000 visitors in comprising of schools, religious bodies, clubs and societies on excursions and picnics as well as individuals and families on sightseeing.

Data collection:

Freshly passed fecal samples of birds were collected early in the morning before the routine cleaning of all cages in the zoo. All samples were picked with a new sterile polystyrene spatula for each bird species to avoid cross-contamination. In cases of small and medium-sized zoo birds, multiple fecal droppings were pooled from all birds of the same species to collect an adequate amount of feces for parasitological examination. These samples were collected inside a Screw-capped bottle that contains 10% formalin. Fecal samples were then taken to the laboratory for qualitative examination.

Parasitological Techniques:

Table 1. Checklist of birds at University of Ilorin zoological garden

S/N	Species	Scientific Name	No of Species
1	Ostrich	<i>Struthiocamelus</i>	1
2	Marabou Stock	<i>Leptoptiloscrumeniferus</i>	2
3	Domestic Pigeon	<i>Columba domestica</i>	4
4	Crowned crane	<i>Balericapavonina</i>	2
5	White faced whistling duck	<i>Dendrocygnaviduata</i>	2
6	White Peafowl	<i>Pavocristatus</i>	2
7	Emu	<i>Dromaiusnovaehollandiae</i>	2
8	Fantail Pigeon	<i>Columba liviademestica</i>	5
9	African Fish Eagle	<i>Haliaeetusvocifer</i>	1
	Total		21

Source: Field Survey, 2021

The sedimentation technique was used by taking 3 g of a fecal sample and mixed with 40 ml of distilled water in a beaker and the emulsion was filtered via a tea strainer into another beaker. The filtrates were poured into a test tube and were allowed to settle for 5 minutes and the supernatant was carefully removed using micropipette. The sediment was re-suspended in 5 ml of distilled water and was allowed to sediment for 5 minutes. The supernatant was discarded carefully and the sediment was strained by adding one drop of methylene blue. A drop of the stained sediment was placed on the microscope slide using a micro pipette. The eggs and larvae of parasites were observed and identified with the aid of an atlas on each slide. The total number of parasite eggs seen were counted and the intensity was calculated. The data collected was analyzed using descriptive statistical analysis of simple percentage and mean.

RESULTS AND DISCUSSION

Table 1 shows the number of bird species available in the study where Fantail Pigeon was the highest (5 observations), followed by the domestic pigeon with 4 observations. While, Ostrich and African fish eagle with 1 observation each. The prevalence of gastrointestinal (GI) parasites as shown in Table 2 revealed that GI parasites prevalence in the University of Ilorin zoological garden (Unilorin zoo) was 71.4%. The highest infection was recorded in Ostrich, Crowned crane and African fish eagle feces (100% each), domestic pigeon and white face whistling duck with 75.0% infection each, followed by Fantail pigeon while Marabou stock, White peafowl and Emu with 50% infection. Table 3 indicated the distribution of GI parasites in the study area, in which *Ascaridiagallirecorded* the highest with 53.3% and highest intensity (358 epg), followed by *Capillaria* spp (26.7%) and *Coccidia* sp (13.3%) with an intensity 104 and 74epg respectively. While *Eimeriaocyst* was the least with 6.7% GI infection as well as the lowest intensity (70 epg) as shown in Table 4.

Table 2. Prevalence of Gastrointestinal Parasite of birds at University of Ilorin zoological garden

Birds Species	Number of Sample Examined	Number Infected (%)
Ostrich	1	1(100.0)
Marabou Stock	2	1(50.0)
Domestic Pigeon	4	3(75.0)
Crowned crane	2	2(100.0)
White faced whistling duck	3	2(75.0)
White Peafowl	2	1(50.0)
Emu	2	1(50.0)
Fantail Pigeon	5	3(60.0)
African Fish Eagle	1	1(100.0)
Total	21	15(71.4)

Source: Field Survey, 2021

Table 3. Distribution of Gastrointestinal Parasite of birds at University of Ilorin zoological garden

Birds Species	Number Infected (%)	Species of Parasites (%)			
		<i>Ascaridiagalli</i>	<i>Coccidia</i> spp	<i>Capillaria</i> spp	<i>Eimeriaococyst</i>
Ostrich	1	1(100.0)			
Marabou Stock	1			2(100.0)	
Domestic Pigeon	3	2(100.0)			
Crowned crane	2	1(50.0)	1(50.0)		
White faced whistling duck	2		1(50.0)		1(50.0)
White Peafowl	1	1(100.0)			
Emu	1	1(100.0)			
Fantail Pigeon	3	2(66.7)		1(33.3)	
African Fish Eagle	1			1(100.0)	
Total	15	8(53.3)	2(13.3)	4(26.7)	1(6.7)

Source: Field Survey, 2021

Table 4. Intensity of Gastrointestinal Parasite of birds at University of Ilorin zoological garden

Birds Species	Number of Sample Infected	Mean intensity (epg)
<i>Ascaridiagalli</i>	8	358.22
<i>Capillariaspp</i>	4	103.89
<i>Eimeriaococyst</i>	1	69.72
<i>Coccidiasp</i>	2	73.63

Source: Field Survey, 2021

DISCUSSION

The overall prevalence of gastrointestinal parasites of birds in University of Ilorin zoological garden showed an infection rate of 71.4% and a total of four species of parasites including two protozoans (coccidian and *Eimeria* spp.) and two nematodes (*Capillaria* spp and *Ascaris* spp.) were recorded. *Ascaridiagalli* was the most prevalent followed by *Capillaria* spp and Coccidian while the least was *Eimeria* spp. This finding was in agreement with Otegbade and Morenikeji (2014) that also recorded four species of parasites (coccidian, *Capillaria* spp., *Ascaris* spp. and *Strongyloides* spp.) in the study area. However, the overall prevalence of 71.4% recorded in the study area is higher than that of Otegbade and Morenikeji (2014) which reported an overall prevalence of 21.9% in all the zoological gardens sampled in southwest Nigeria. Papini *et al.* (2012) also found an overall prevalence of 35.6% GI infection in all the birds sampled both in pet birds and the ones in the zoo. This study however is in line

with Opara *et al.* (2010) and Akinboye *et al.* (2010) who equally recorded a prevalence of 76.6% and 61.5% in Nekede and University of Ibadan Zoo respectively. The prevalence of GI parasites in birds in captivity is a result of such factors as housing confinement, feeding regiment, inconsistency in the treatment program, or the existence of climatic conditions which favour the parasites (Magona and Musisi, 1999).

All the parasites found in this study were transmitted fecal-orally through contaminated soil, food, and water. As a result, these may play a key role as sources of parasite infection to birds in captivity. Gastrointestinal helminths were more prevalent than protozoans and this comprised mainly of nematodes. This finding corroborates the reports of Rossanigo and Gruner (1995) that nematodes were the major cause of helminth diseases. This is because they do not require any intermediate host to infest.

The most frequently encountered gastrointestinal parasite is the *Ascaridiagalli*, the largest nematode affecting birds' small intestines. They are usually not

pathogenic in slight infection. However, they can produce overt clinical disease and even death if their number is sufficiently high enough to cause anemia, severe inflammatory response, and starvation (Fedynich and Thomas, 2009).

None of the infected birds with *Ascaris* spp. and *Coccidia* spp showed clinical signs in this study. *Capillariesspp.* is a small roundworm that infects the small intestine and infection is usually asymptomatic, but birds with heavy parasite burden may show clinical signs of anorexia, diarrhea, emaciation, reduced water intake, ruffled feathers, and weakness (Yabsley, 2009). None of the infected birds with *Capillaria* spp. in this study showed clinical signs. Intestinal coccidiosis occurring in birds includes species of the genera *Eimeria*, *Isospora*, *Tyzzeria*, and *Wenyonella* (Friend and Franson, 1999). Clinical signs of intestinal coccidiosis include watery, mucoid, or bloody diarrhea, decreased egg production, emaciation, lack of appetite, lethargy, lack of coordination, ruffled feathers, and weight loss (Yabsley, 2009). None of the infected birds with intestinal coccidiosis showed clinical signs in this study.

CONCLUSION

Results from this study show that the birds in captivity at the University of Ilorin zoological garden harbor parasites that can be of zoonotic importance, not only to the birds but to the staff as well. Though the birds did not show any obvious clinical signs despite the presence of parasites in the fecal samples examined. It may mean that there is a low to moderate load of parasites in the birds as of the period of this study. The implication of this is that an undetermined number of captive animals may be parasitized without even showing outward or overt physiological signs of infection. This is zoonotically important as these animals may be serving as reservoir hosts for some parasites that are pathogenic to humans.

Therefore, it is recommended that policy barring tourist from feeding the animals while on tour should be enforced to prevent visitors from infecting the animals and vice versa. Keeping a top notched hygiene must not be compromised and epidemiological investigation with modern diagnostic methods as well as treatment programs for parasites be studied.

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الطفيليات المعدية المعوية للطيور في حديقة الحيوان بجامعة إيلورين

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تعد العدوى بالطفيليات المعدية المعوية مشكلة صحية رئيسية في الطيور الأسيرة. تعتبر بيانات إنتشار الطفيليات المعدية المعوية للطيور في حدائق الحيوان في نيجيريا محدودة. أجريت هذه الدراسة لتحديد الطفيل المعدى المحفوظ في حديقة الحيوان بجامعة إيلورين. تم فحص ٢١ عينة فضلات برازية من ٩ طيور باستخدام تقنية الترسيب الغائطي. بلغ معدل إنتشار الطفيليات المعدية المعوية ٧١,٤% مع تسجيل أعلى معدل إنتشار للعدوى في النعام وطائر الكركي المتوج ونسر السمك الإفريقي (١٠٠%) لكل منهم بليها الحمام الداكن والبط ذو الوجه الأبي ، في حين كان مخزون طائر أبو سعن والطاوس الأبيض والإمو (طائر إسترالي) أقل نسبه بحوالي (٥٠%) لكل منهم. أظهر توزيع الطفيليات التي تشمل إثنين من الأوليات : إيميريا *Eimeria* ، كوكسيديان *Coccidian* ، وإثنين من الديدان الخيطية: إسكارس *Ascaris* ، كابيلاريا *Capillaria*.

كشفت كثافة الطفيليات المعدية المعوية للطيور في منطقة الدراسة أن إسكارديا جالي *Ascardiagalli* سجلت أعلى كثافة 358 epg ، تليها *Capillaria spp.* بمعدل 104 epg ، بينما سجلت بويضات الإيميريا أقل شدة بحوالي 70 epg. خلصت الدراسة إلى أن الطيور في حديقة الحيوان بجامعة إيلورين توفر مأوى لطفيليات ذات أهمية كبيرة بالنسبة لصحة الطيور وكذلك لصحة الموظفين والزائرين في حديقة الحيوان لأن معظم عينات الفضلات التي تم فحصها لم تظهر أى علامات سريرية واضحة.