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Incidence of Parasitic Infections of Non-human Primates in Kano State Zoological Garden, Nigeria.

Bichi, H. M.[1, 2], Suleiman, I. D.[3] and Jayeola, O. A.[4]

[1]*Department of Environmental Sciences, School of Forestry and Environment, Sam Higginbottom Institute of Agriculture, Technology & Sciences,(Deemed-to-be-University) Allahabad- 211007,UP, India;*
[2]*Department of Forestry and Wildlife Management, Faculty of Agriculture, Federal University Dutsin-ma, P.M.B. 5001, Katsina State, Nigeria;*
[3]*Department of Forestry, Fisheries and Wildlife, Kano University of Science and Technology, Wudil, P.M.B. 3244, Kano State, Nigeria*
[4]*Department of Forestry and Wildlife Management, University of Agriculture, P.M.B. 2240, Abeokuta, Nigeria*

Abstract:*The study entitled "Incidence of parasitic infections of non-human primates" was conducted at Kano State zoological and garden, Nigeria (Africa). The aim of this study is to assess the magnitude of intensity of prevalence of parasitic infestation in non-human primates. Fresh fecal samples were collected from twenty three (23) non-human primates and examined using floatation and sedimentation methods, as a standard parasitological technique. Among the helminths and protozoa recorded are Trichuris, Enterobius spp. and Strongyle spp.and one protozoon (Coccidiaoocyst). The most prevalent of gastrointestinal helminth were; Trichuris with an overall prevalence of 50.00%, followed by Strongyle and Coccidia with 28.57% each. Only 6 animals were found to be positive for parasitic infestation (26.09%). One Red patas monkey (female) was found to have multiple infections of Strongyle eggs, Trichuris eggs and Coccidia. The dog faced Baboon, Chimpanzee and Red Patas monkeys were infested, while none of the Tantalus, Sooty mangabey and Mona monkeys wareinfested in the zoo. There was seemingly high infestation rate in adult male (37.50%) but there was no infestation in young male. It could be concluded that, there was mild gastrointestinal parasite infection among the animals examined in Kano zoological garden. However, low grade infections should not be neglected. Most of the animals examined did not show any obvious clinical signs, suggesting low to moderate infection at sub clinical level.*

Key words: *Non-human primates, Kano zoological garden, parasites, infestation*

I. Introduction

Study of parasitic infection in primates is important to know the infection rate, to prevent morbidity and mortality of animals in the zoo (Kuntz, 1982). A comprehensive study of parasitic and infectious diseases in captive wildlife would aid in the development of possible control measures which may help in enhancing their conservation, survival and performance in captivity. Additionally, description of parasites and diseases in free-living and captive animals may help to evaluate importance of host-parasite relationship in each environment (Carlton, 1970).

Infectious disease within the zoo collection impacts on individual health and welfare, and can have long term impacts on reproduction, longevity, behaviors, population and species viability (Ajayi, 1984). Subclinical and chronic diseases can exert their effects for years and even decades. Ill health, death and reproductive failure in collection animals leads to greater costs (husbandry, veterinary, acquisition) and reduces the financial viability of the zoo as a business. Infectious disease spread to humans or domestic animals can have serious social, economic and ethical costs (Akinboye, 2010).

This study was designed to determine the magnitude of intensity of prevalence of parasitic infestation in non-human primates in Kano Stare zoological garden, Nigeria.

II. Materials And Methods

Study location and animals

Kano Zoo is the largest state government owned zoo in Nigeria (Africa); it was officially opened in 1972 by the military governor of Kano State, AlhajiAudu Bako. The Kano Zoo is located 1 km along Kano-Zaria Road. Kano state is located within the longitude $9^0$30 and $12^0$30 North and the latitude $9^0$30 and $8^0$42 East. It is within the Sudan Savanna zone of west Africa about 840 km from the edge of the Sahara desert and 1,140 km from the Atlantic Ocean. The temperature of Kano usually ranges between a maximum of 33°C and a minimum of 18.85°C although sometimes during winter it falls down to as low as 10°C. The zoo covers an area of about 46 hectares with about 75 different species, comprising about 350 animals. The zoo is open seven days a week, from 7:30am in the morning to 6:30pm in the evening. It was registered by Pan African Association of

Zoos and Aquaria (PAAZA) and International Zoo Educators (IZE) in 2007 and 2010 respectively. The zoological garden have array of species including 23 non-human primates, these are; Sooty Mangabey (Cercocebusatys), Tantalus Monkey (Cercopithecustantalus), Chimpanzee (Pan trogolodytes), Dog faced Baboon (Papio Anubis), Red patas Monkey (Erythrocebuspatas), Mona Monkey (Cercopithecusmona).

Collection of fecal sample

Fresh fecal samples (10-15 gram) were collected from non-human primates of different species during the period from December, 2015 to February, 2016 between 7-9 am. 23 individually identified primates were monitored for defecation and top layers of fresh sample were scooped immediately after defecation. Samples were labeled indicating name, age, sex, species and date of collection, kept inside a cool box at a temperature between 4^0C-2^0C and transported to the Department Parasitology laboratory, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria, where samples obtained were examined using the methods as of Direct wet smear, test tube floatation and sedimentation of (Cheesebrough, 2005) and (FAO, 2010).

Direct wet smear

Wet fecal mounts with and without staining with Lugol's iodine was used to check for the presence of protozoa. One gram of the fecal sample was transferred with an applicator stick unto a grease free slide. A drop of normal saline was then added and emulsified and covers with a clean cover slip. To another slide containing one gram of the fecal sample, a drop of Lugol's iodine was added and viewed under the microscope using 10x and 40x objectives. Helminths and cysts/eggs were identified based on microscopic morphology.

Simple test tube flotation method

One gram of sample was put into a beaker containing 50 ml floatation fluid and stirred thoroughly. The resulting suspension was filtered into labeled test tubes arranged in a rack. The test tubes were gently filled with the suspension leaving a convex meniscus on the top of the tube and a cover slip was carefully placed on top of the test tube and allowed to stand for 20 minutes. The cover slip was carefully lifted and immediately placed on a clean microscope slide and examined under the microscope at 10x and 40x objectives for helminths ova.

Sedimentation method

The sample was added to the normal saline solution, mixed, then washed and filtered through sieve into another beaker. The filter solution was poured into centrifuge tubes and centrifuged for 5 minutes at 1500 revolution per minute using a centrifuge. The supernatant was decanted. One or two drop of the sediment was placed on microscope slide and viewed under a light microscope for identification of ova of helminths and adult helminths respectively. Helminths were identified using the key provided (Cheesebrough, 2005 & FAO, 2010).

III. Result

Out of the total number of 23 non-human primates at Kano zoological garden, only 6 animals were found to be positive for parasitic infestation (26.09%). One Red patas monkey (female) was found to have multiple infections of Strongyle eggs, Trichuris eggs and Coccidia. The Dog faced Baboon, Chimpanzee and Red Patas monkeys were infested, and none of the Tantalus, Sooty mangabey and Mona monkeys were infested in the zoo. There was a high infestation rate in adult male with 37.50% while there was none infestation in young male (Table 1).The overall prevalence of gastrointestinal parasites showed that Red Patas monkey were parasitized by three parasites as recorded in this study. Chimpanzees and Baboon monkeys had only one parasite species each, while Monas and Sooty monkeys had no parasites species.

A total of four parasites were identified in non-human primates in the zoological garden as shown in (table 2), consisting of *Trichuris spp.* (Plate 4), *Enterobius spp.* (Plate 2)*and Strongyle spp.*(Plate 3) and *Coccidiaoocyst* (Plate 1). The most prevalent of gastrointestinal helminth were; T. trichiura with an overall prevalence of 50.00%, followed by Strongylespp. and Coccidiawith 28.57%.

Table 1: Parasitic infection among different sexes and ages of non-human primate in Kano zoological garden

Age	Sex	Number examined	Number positive	% Positive
Young	Male	1	0	0.00
	Female	4	1	25.00
	Sub-total	5	1	20.00
Adult	Male	8	3	37.50
	Female	10	2	20.00
	Sub-total	18	5	27.78
	Total	**23**	**6**	**26.09**

Table 2: Parasitic infection among species of non-human primates in Kano zoological garden

Primate species	No. Examined	No. of infested (%)	Parasites encountered	Intensity of infection
Dog faced Baboon (Papio Anubis)	6	3(50.00)	Trichuris eggs	+++, ++
Chimpanzee (Pan trogolodytes)	2	1(50.00)	Enterobius eggs	++
Sooty Mangabey (Cercocebusatys)	1	0	-ve	-
Tantalus Monkey (Cercopithecustantalus)	5	0	-ve	-
Red patas Monkey (Erythrocebuspatas)	7	2(28.57)	Strongyle eggs + Trichuris eggs + Coccidia oocysts +	+
Mona Monkey (Cercepherusmona)	2	0	-ve	-
Total	**23**	**6(26.09)**		

Note: += Light infection, ++= Moderate infection, +++= Heavy infection, -= Nil.

Plate 1: Microscopic Photograph showingCoccidia oocysts egg. x400

Plate 2: MicroscopicPhotograph showing Enterobius egg.x400

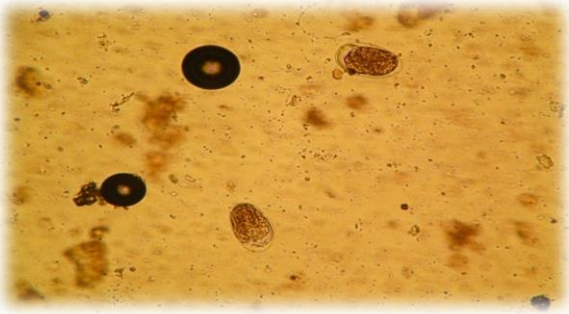

Plate 3: Microscopic Photograph showing Strongyle egg.x400

Plate 4: Microscopic Photograph showing Trichuris egg.x400

IV. Discussion

The parasitic infection (26.09%) in this study is almost similar with 29.00% at MahendraChoudhury zoological park, Punjab in India (Singh et al., 2008), but very low when compared with 61.30% and 60.00% in two zoological gardens in Ibadan, Nigeria (Adetunji, 2014), and to the reports of 64.00% found at a zoological garden in Kenya (Munene et al, 1998), but higher when comparedwith 13.63% in Assam State Zoo (Bichitra, 2012). As some parasites have indirect life cycle, the intermediate host have little chance to come in contact with captive animals and as such, the incidence of cestode and trematode were found to be lower. The prevalence of helminthiasis of non-human primates found in this study could be due to lack of periodic use of antihelminthic on the animals and inadequate hygienic measures in their management. Without proper care, animal handlers may be infected with these parasites either through contact with contaminated water and food, or when handling infected individuals. The problems caused by these parasites to humans are similar to those found in animals but in some cases it can be worse. Further studies should be conducted to determine the risk of contracting zoonotic diseases among workers and animals, given current conditions.

The apparent species susceptibility to helminth infestations in this study could be due to the fact that same species of monkeys are kept in the same cages at Kano zoo, making them prone to sharing infestations and thereby giving a wrong impression of specie susceptibility.

The infection of baboons with more parasites species than other primates is consistent with (Murray, 2000) who reported more parasites in baboons than chimpanzees. On the contrary, high prevalence of intestinal parasites among patas and chimpanzees was reported. Also, it was reported that Mona monkeys had the highest ova and oocyst counts and variety of gastrointestinal parasites followed by white-collared mangabey and chimpanzees (Pan troglodytes) (Mbaya, 2011) . Similarly, several species of protozoa have been identified in captive primates (Gunasekera, 2012) . In another study, the presence of Oesophagostomumspp in stump-tailed macaque was reported while golden langur and hoolock gibbon were found positive for the presence of Trichurisspp(Nath, 2012) . The variation according to species could be attributed to the differences in immune responses to the infections.

V. Conclusion

It could be concluded that, there was mild gastrointestinal parasite infection among the animals examined in Kano zoological garden. However, low grade infections should not be neglected. Most of the animals examined did not show any obvious clinical signs, suggesting low to moderate infection at sub clinical level. This means that an undetermined number of wild 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 man.

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