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Gastrointestinal Parasite infection in Semi- captive Primates at Drill Ranch, Cross River State, Nigeria

By

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Abstract

Gastrointestinal parasites in semi-captive primates is of serious concern to Non-Human Primates (NHP) as it can impact on the health and well-being of the semi-captive animal as well as it's keeper because of potential zoonotic implications. This study was conducted at the drill ranch to assess the gastrointestinal parasite species richness as well as diversity and intensity in two groups of primates. The study was conducted using the floatation method. Parasites identification was limited to only morphological features of the parasites using low power microscope. Results revealed that parasitic infection was very high in semi-captive drill monkeys group (76%), more than in semi-captive Chimpanzees group (24%). Eight different parasite taxa including Gardia, Entamoeba; Ancylostoma, strongyloides and Schistosoma spp. were identified in the semi-captive primates groups and the infection intensity was very high in the drill monkeys group (3000eggs/gram). The identified gastrointestinal parasites were similar to some already reported by previous authors in Nigeria. It was therefore recommended that regular deworming should be done on the semi-captive primates and that, efforts should be made by the ranch authorities to decongest the enclosures as reasonably as it is possible because primates with a higher density in the enclosures like the drills, had higher parasitic infections intensity.

Keywords: *Gastrointestinal parasites, semi-Captive Primates, Drill Ranch, Nigeria.*

INTRODUCTION

Gastrointestinal parasites are known in human and Non-human primates. Annelids, helminthes, and protozoa have parasite representatives in man, apes and monkeys. However, regular health services such as hygienic and deworming measures have had to low prevalence of helminthes infection in non-human primates (Goodall *et al*., 2016). Protozoa parasite such as Entamoeba histolytica, Gardia sp, Cryptosporidium spp. and Balantidium coli are frequently reported in NHP, such as apes and monkeys, (Levecke et al., 2007). Gastrointestinal parasites in non-human primates are regarded as major causes of gastro-enteritis, watery diarrhea, hemorrhage, dysentery and extra-intestinal infection such as liver abscess and even death. Entamoeba histolytica causes intestinal and extra-intestinal amoebiasis, Balantidium is intestinal parasitic protozoa in man while Gardiasis caused by Gardia spp. and Crytosporoshosis caused by Cryptosporidium spp. are known as causes for failure of young animals to thrive. Wild primate population, as members of biologically diverse arboreal or terrestrial habitats are regarded as major source of emerging infectious diseases and may hold valuable clues to the origins and evolutions of some important zoonosis, (Wolfe *et al.*, 1998). Primates over the years have been identified as reservoirs of human gastrointestinal parasites, (Souls and Ezenwa, 2012). The anthropoid primates and to a lesser degree simian primates share broadly similar physiologic and genetic characteristics and thus susceptible to gastrointestinal parasites, Wolfe *et al.*, (1998). The ability of parasitic infections to cross primate-species boundary to affect man has been documented by Blouin (2002).

Gastrointestinal parasites infections have been reported in a range of NHP hosts which include Gorillas (*Gorilla gorilla*), Egbetade *et al*., (2014), Chimpanzees (*Pan troglodytes*); Mbaya *et al*., (2009); Red patas (*Erythrocebus patas*), Adedokun *et al*., (2002) and Drill monkeys (*Mandrillus leaucophaeus*), Bukie *et al.*, (2023) in Nigeria.

Captive primates are known to be important transmitters of many described human diseases; however, there is paucity of information in catalogued gastrointestinal parasites on semi-captive primates at the Drill Ranch. The main objective of this

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study was to assess the gastro-intestinal parasites of semi-captive primates at Drill Ranch. While the specific objectives were: To catalogue a database of parasites known to infect captive primates at the ranch. Assess the prevalence, intensity and diversity of gastro-intestinal parasites of semi-captive primates at the ranch. Compare prevalence, intensity and diversity of gastro-intestinal parasite of semi-captive primate at the ranch.

MATERIALS AND METHODS

Study Area

This study was conducted in the drill ranch located in the foot of Afi Mountain Wildlife Sanctuary (AMWS), Boki; Cross River state Nigeria. The Drill Ranch was founded by a Non-Governmental Organization (NGO), PANDRILLUS, to promote the survival of endangered African Primates, the Drill Monkeys as well as the endangered Chimpanzees and other animal species. PANDRILLUS' main activity is the rehabilitation and breeding of these primates. Figure1.

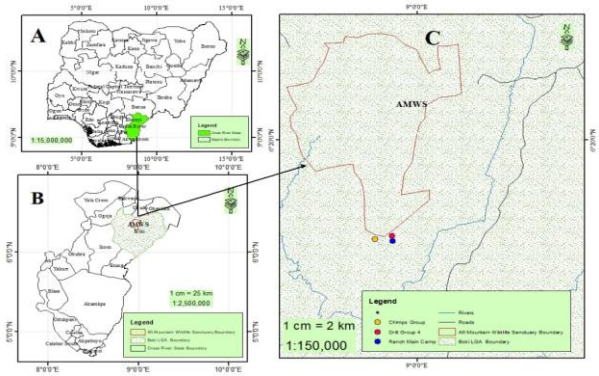

Figure 1: Map showing the location of the data collection sites.

Materials/Reagent

The study made use of the following materials and reagents; microscope, test tubes, slide, cover glass, cotton wool, feces samples, sodium chloride solution, glass rods, beakers, Pasteur pipette, timer, Normal saline, iodine and counter.

Sample Collection

A total of 60 fecal samples were collected non-invasively from 2 groups of primates in the study site.46 samples were collected from identified semi-captive drill monkeys, while 14 samples were also collected from identified semi-captive chimps. The animals were waited upon for them to defecate and a thumb size fecal sample approximately 2grams weight was collected for endo-parasite identification and quantification.

Methods

The floatation method was used in this study of endo-parasites identification and quantification. The laboratory tube was filled with saturated sodium chloride solution and added an estimated 1 gram of feces using a rod to emulsify the specimen in the solution. The tube was filled with the saturated sodium chloride solution and mixed properly after which, it was then strain to remove large fecal particles from the fecal suspension. The suspension was returned to the tube stand, the tube was in a completely vertical position in a rack. Pasteur pipette was used to add further solution to ensure the tube was filled to the brim. Careful measures were taken to place a clear cover glass on top of the test tube. The solution in the test tube was then left undisturbed for about 30 – 40 minutes so as to enable clear floatation of the cyst and eggs. The cover glass was then taken away and the feces was placed on a slide and examined with the use of a microscope using a 10X and 40X magnifying lens. Iodine was then added beneath the cover glass to enable identification of the cysts. The number of eggs per gram of feces was counted, as described by Cheng, (2013).

Data Analysis

T-test was used to determine the prevalence (proportion of individuals with parasite infection in the population), intensity of parasite infection (egg per gram feces) and diversity all across the group. ANOVA was used to determine mean difference between groups.

Results

Catalogue of Identified Endo Parasites of semi-captive Primates at drill ranch.

The result of Identified endo parasites of semi-captive primates at drill ranch is presented in table 1 and figures 2 and 3. eight (8) different species of endo parasites were identified. These were: *Giardia lamblia, Entamoeba coli, Ascaris lumbrecoides, Ancylostoma duodena, Trichostrongylus spp., Strongyloides stercoralis; Strongyloides fuelleboni and Schisotoma mansonii.*

Table 1: Catalogue of endo-parasite of semi-captive primates at drill ranch.

Parasite	Developmental Stage	Description
Gl	Trophogoite	Flagellate on the pointed and ventral side.
Ec	Cyst	It has thick rear round shape, has 4-8 nucleus in chromatin dot inside and bigger than that of entamoeba historical
Al	Egg	Oval in shape Has embryo covering the shape outside Has double layer Body wall is very thick made up of one nucleus
Ad	Egg	Oval in shape 8 nucleuses in chromatin dot Double layer stain reddish inside nucleus in
Ts		Iodine

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Sm	Egg	
Sf	Egg	
	Egg	
Ss		Blackish, thin outer layer, oval in shape contain 4-8 nuclei.

Note:
Gl = *Giardia lamblia*
Ec = *Entamoeba coli*
Ad = *Ancylostoma duodena*
Al = *Ascaris lumbrecoides*
Ts = *Trichostrongylus spp.*
Sm = Schistosoma mansonii
Ss = Strongyloides stercoralis
Sf =Strongyloides fuelleboni

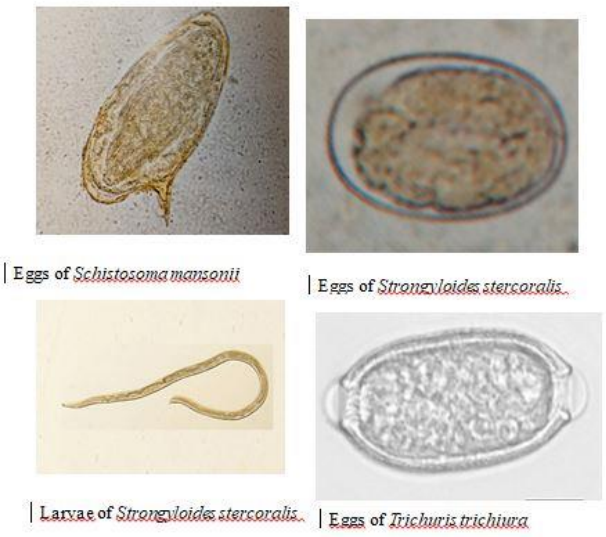

Figure 2: Some identified endo-parasites of semi-captive primates at Drill Ranch

Source: Field survey (2024).

Prevalence, intensity and diversity of Endo parasites of semi-captive primates at drill ranch.

The results of the prevalence, intensity and diversity of endo parasites of semi-captive primates at drill ranch are presented in figure 4, and table 2. The result shows a very high prevalence of infection (76%) in drills and (24%) in the Chimps while the intensity was also highest in Drills (3000 eggs/gram) and lowest in Chimpanzee (930 eggs/gram). The diversity of endo parasites of semi-captive primates at drill ranch was either single, double or rarely triple infections in the two primate group.

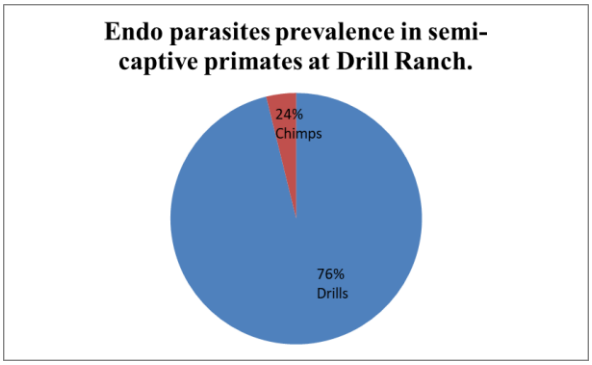

Figure 3: Endo parasites prevalence in semi-captive primates at Drill Ranch

Table 2. Endo parasites intensity and diversity in semi-captive primates at Drill Ranch..

Primate Group	Intensity (egg/gram)	Diversity (Number of different parasite taxa in feces)
Drill monkeys	3000	8
Chimpanzees	930	7

Discussion

As presented in table 1 and figures 2 and 3 above, eight different taxa of endo parasites were identified and catalogued in semi-captive primates at Drill Ranch. Some of these parasite taxa have been reported in Nigeria by (Bukie *et al*., 2023; Bukie *et al*., 2021, Adegbulu *et al*, 2015 and Mbaya and Udendeye, 2011). Of the eight species of endo parasites identified, Five were helminthes (Ascaris , Ancylostoma, Tricuris; Trichostrongylus and strongyloides spps.) while three were protozoan (Entamoeba, Schistosoma and Giardia spp.).

As presented in figure 4 and table 2, Drill monkeys were mostly affected by parasites giving an infection intensity of 76% while the Chimps infection intensity was only 24%. This finding is in conformity with those of Olarewaju *et al*., (2020), where more than 85% of the sampled animals were infected either with single or double infection of mostly eggs of Ascaris and Tricuris spp. Also, the Drill monkeys had the highest parasitic load of 3000 eggs/gram, belittling previous findings such as that of Bukie *et al*., (2023) and Bukie *et al*., (2021) that reported low parasite infestation in wild drill monkeys and an intensity of 1350 eggs/gram in a group of captive primates at Makurdi Zoological Garden (MZG). The Chimpanzee group was infected with the least number of parasite taxa. This is also at variance with what was observed by Stoner (2004), in Costa Rica and reported the presence of several protozoa and nematode parasites in Howler monkeys such as, *Entamoeba spp.* including E. coli, Trichuris , Anatrichosoma,; Strongyloides; and Ascaris spp. The Drill Ranch, remain the only captive and breeding center of the endangered drill monkeys in Nigeria that has attracted several

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visitors including the former president of the country, Rtd. Gen. Olusegun Obasanjo. It is therefore imperative that the ranch authority do all it can to protect the health of the semi-captive primates. It is on this note that, it was recommended that routine health checks and regular deworming of the semi-captive primates should be carried out, to reduce the parasitic load or eliminate them completely in order for the animals to enjoy a healthy life which all living things are entitled to.

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