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Research Article - Survey **Open Access**

A parasitological survey on the feces of *Pan paniscus* Schwartz (1929) in Semi-liberty at "Lola ya Bonobo" sanctuary (Kinshasa city, DR Congo)

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ABSTRACT:

In the Congo basin forest, there is health risk for the human populations in term of cross-species pathogen transmission due to presence of many closely related primate species that overlap in their geographic ranges. Non-human primates (NHP) serve as important reservoirs of parasites that cause diseases to man as close interactions between humans and NHP create pathways for the cross-species transmission of zoonotic diseases. This work was assessed with the aim of identifying the intestinal helminthes of *Pan paniscus*. 45 stool samples were examined at the National Veterinary Laboratory (Kinshasa city, Congo DR) from May to June 2012 using direct wet mount, concentration via sodium chloride floatation and sedimentation methods. Identification of parasitic ova was done following established protocols. Results revealed that *Ankylostoma duodenale* had the highest infestation rate (19600 eggs: 86.3%), followed respectively by *Trichuris trichiura* (2900 eggs: 12.8%) and *Strongylus sp.* (200 eggs: 0.9%). The young animals were the less infected than teenagers and adults. The susceptibility variation of host to parasites helminthes could be attributed to the differences in animal immune responses to the infections. Regular parasitological examination of both humans and Bonobos for epidemiological monitoring and the medical treatment of infected animals should be carried out to prevent cross-species pathogen transmission in this sanctuary.

Keyword: *Coprology, helminthes, Bonobo, zoonosis, Congo basin*

INTRODUCTION

Wild animals like non-human primates (NHP) constitute a major reservoir of a broad arrange variety of parasites and humans may be most vulnerable to diseases from them because of their phylogenetic closeness. Indeed, many of parasitic and infectious diseases are zoonotic, having shifted from wildlife populations [1]. The geographic overlap was reported as the key factor for such cross-species pathogen transmission. In Democratic Republic of the Congo (DRC), the risk of disease transmission between wild primates and from wild primates to humans is greatest because this eco-region contains many closely related primate species that overlap in their geographic ranges. Infecting many hosts in such hotspot ecosystem, parasites were involved in emergence of news diseases and resurgence of eradicated diseases which pose a serious and increasing threat to human health and welfare [2-5]. Human emerging infectious diseases of animal reservoirs origin are largely reported in the literature [6]. Direct contact between wild primates and humans was reported to be associated with zoonotic diseases because of their close evolutionary relationship and geographic proximity [5]. Several works investigated the gastrointestinal helminthes of medical relevance in NHP [7-11]. These helminthes can however be responsible of zoonotic infections thus justifying regular parasitological checking/monitoring of animals. This study was carried out with the aim of identifying the naturally occurring gastrointestinal helminthes of *Pan paniscus*.

MATERIALS AND METHODS

Study area

The work site was the sanctuary called "Lola ya Bonobo" located in the south of the scrap forest of the lake "Ma Valée", locality of Kimwenza, commune of "Mont Ngafula" in Kinshasa city (Democratic Republic of the Congo, see: figure 1) where these endemic animals live in semi-freedom.

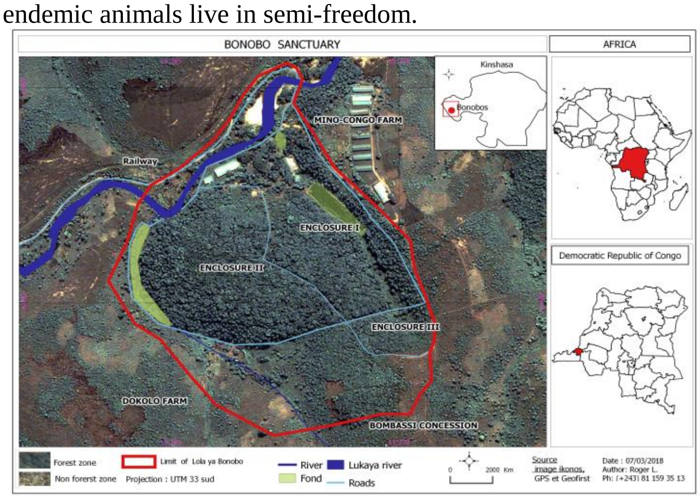

Figure 1: Geographic location of "Lola ya Bonobo" sanctuary

Collection of samples

45 feces samples were examined at the National Veterinary Laboratory (Kinshasa, Congo DR). Samples were collected between 7-9 am from May to June 2012. Top layer of fresh sample

was scooped immediately after defecation and then each sample was put in a labeled sterile bottle and kept in 10% formol. The samples were examined within 4-5 hours. The identification of the helminthes was carried out according to Halternoth & Diller [12] and Kingdon [13].

Examination of samples

Samples obtained were examined using three classical methods as previously reported [10].

Direct wet smear

Wet faecal mounts with and without staining with Lugol's iodine was used to check for the presence of parasites. One gram of the faecal 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 faecal sample, a drop of Lugol iodine was added and viewed under the microscope using 10x and 40x objectives. Eggs were identified based on microscopic morphology.

Simple test tube floatation

One gram of sample was put into a beaker containing 50 ml floatation fluid (40% sodium chloride) 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.

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 rpm 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 (XSP-C model) for identification of ova helminthes and adult helminthes.

Identification of helminthes

Helminthes were identified using the key books [14-17]. The microphotographs of ova were digitalized using computer assisted image analysis software (Motic Images 2000, version 1.3; Motic China Group Co LTD) [18-21].

RESULTS AND DISCUSSION

The Table 1 gives the number of parasites eggs observed.

Table 1: Number of parasites eggs observed

Age group	A number of parasites eggs observed			Total	%
(Feces sample)	*Ankylostoma duodenale*	*Trichuris trichiura*	*Strongylus sp*		
Young people (n=15)	3700	1900	200	5800	25,5
Teenager (n=15)	8200	300	00	8500	37,4
Adult (n=15)	7700	700	00	8400	37,4
Total	19600	2900	200	22700	-
%	86,3	12,8	0,9	-	100

It can deduce from this table that NHP Bonobos were infected by three species of helminthes including *Ankylostoma duodenale*, *Trichuris trichiura* and *Strongylus sp*. Adults and teenagers were equally and the most infected animals (37.4% each) followed by young animals (25.5%). *Ankylostoma duodenale* was the most abundant parasites followed respectively by *Trichuris trichiura* and *Strongylus sp.* (figure 2). Results revealed also that, young animals are specifically infected by *Strongylus sp.* The susceptibility variation of host to parasites helminthes could be attributed to the differences in animal immune responses to the infections [22].

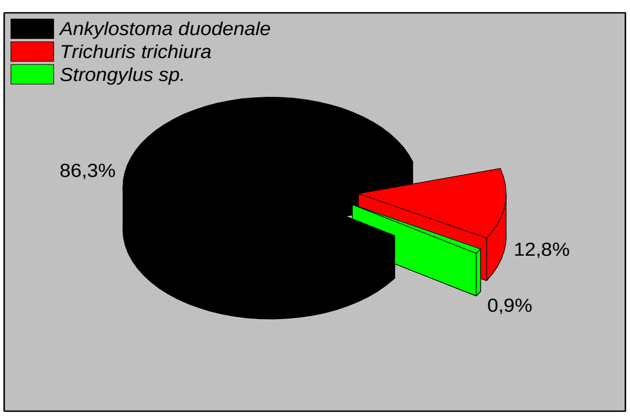

Figure 2 : Occurrence of gastrointestinal helminthes in Bonobos

The figure 3 shows the image of identified helminthes eggs and the host animal *Pan paniscus*.

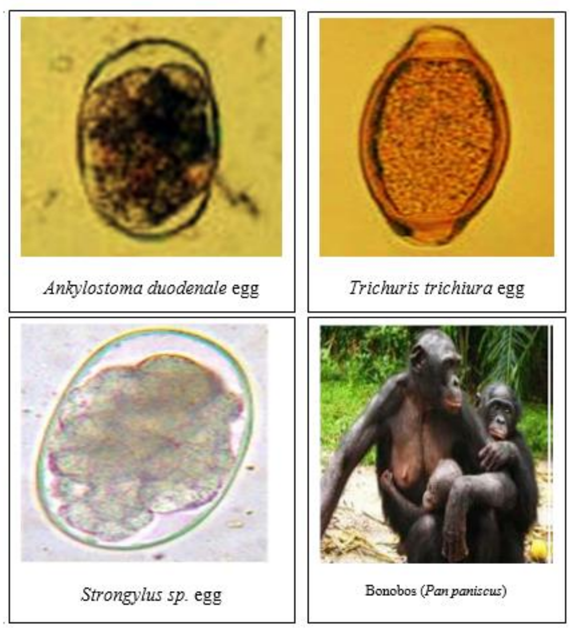

Figure 3: Image of identified helminthes eggs and the host animal *Pan paniscus*

Neglected tropical diseases (NTDs) impose a heavy socio-economic burden on the poor living in Africa by aggravating poverty and social stigma in endemic communities. The goal of current control strategies is to bring these diseases to the point where they are no longer public health problems. The main NTDs of interest include helminthes zoonotic diseases particularly parasites-transmitted helminthiasis (PTHs). NHP were reported to be susceptible to many biological agents that infect human beings. Thus, serving as reservoirs of PTHs, NHP can transmit disease to human (zoonotic diseases) [5].

The present study provided such evidence. Indeed, in this study, NHP were found to harbor three different helminthes species of medical relevance for human (*Ankylostoma duodenale, Trichuris trichiura* and *Strongylus sp*.).

Among the identified helminthes, *Ankylostoma duodenale* displayed the highest infection prevalence. A similar study using other NHP like baboon and monkey as animal models revealed the occurrence of *Trichuris trichiura* (58.06%) followed by hookworm (38.71%) and *Ascaris lumbricoides* (19.35%) [10]. NHP and human, sharing the same ecosystem, there is therefore possibility of inter-specific transmission of such helminthes causing thus zoonotic diseases [9, 23].

Due to the genetic proximity between human and great ape (phylogenetic closeness), these NHP are particularly sensitive to the human illnesses. Indeed, several transmission cases of pathogenic agents from human to great ape have been reported in some eco-tourism zones [24]. The health risk also exists for the human populations particularly in the Congo basin forest in term of cross-species pathogen transmission [25]. The capacity of the NHP resilience facing the health risks in such ecosystems results in an adjustment of the self-medication behavior or zoo-pharmacognosy [26].

CONCLUSION

The present study revealed that Bonobos living in semi-liberty harbor zoonotic helminthes like *Ankylostoma duodenale, Trichuris trichiura* and *Strongylus sp*. Thus, regular parasitological examination of both humans and Bonobos for epidemiological monitoring and the medical treatment of infected animals should be carried out to prevent cross-species pathogen transmission in this sanctuary.

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