

Baboons as potential reservoirs of zoonotic gastrointestinal parasite infections at Yankari National Park, Nigeria

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Abstract

Background: Zoonoses pose a risk to public health.

Objective: To carry out the investigation of the prevalence of gastrointestinal parasites of baboons, *Papio anubis*, frequenting the Wikki base Camp in Yankari National Park, Nigeria

Method: Formol-ether concentration technique was used to isolate parasite eggs and cysts from faecal samples.

Results: Parasites recovered were *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Strongyloides stercoralis*, *Fasciola* sp, *Schistosoma mansoni*, *Hymenolepis nana*, and *Trichostrongylus* sp, and cysts of protozoan parasites *Entamoeba histolytica*, *E. coli*, and *Iodamoeba butschii*.

Conclusion: Most of the parasites identified are known to have high pathologic involvement in humans, implicating the baboons as potential source and reservoirs for human zoonotic parasitic infections although further molecular work would be necessary to ascertain if these gastrointestinal parasites are the same strains that infect humans

Keywords: *Papio anubis*, gastrointestinal parasites, zoonoses, Yankari

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Introduction

Zoonoses, infectious diseases transmitted from animals to humans, pose a risk to public health. An estimated 71% of emerging human pathogens of zoonotic importance have wildlife origins¹. Some of the factors which may account for this include alteration of the environment, increasing human populations causing an increased level of contact between humans and infected animals, increasing movements of people, and an increased trade in animals and animal products¹.

The ability of infectious disease agents to cross the species barrier has long been recognised³. The role of wildlife in transmitting infections to humans^{1,2}, and in maintaining infection through spillover and spillback mechanisms has been explored in many organisms¹ but more so in non-human primates^{2,3}. Non-human primates often carry gastrointestinal parasites that have been found to be shared between humans and primates^{3,4,5}. These parasites are found in both free-ranging naturally occurring populations as well as populations found

near human-inhabited areas^{6,7}. To recognize and combat zoonotic diseases, we need to identify pathogens, their vertebrate hosts, and consider this in relation to their methods of transmission.

In Yankari National Park in Nigeria, the warm Wikki spring is a favourite tryst for baboons and tourists. Baboons spend considerable periods inside the water swimming and roam freely on the camping grounds in front of the base camp offices, dropping faeces which pollute the soil, predisposing campers to soil borne infections. Aside from putting the health of resident workers in wildlife conservation areas at risk, tourists who frequent and share leisure sites such as the spring waters for bathing/swimming and camping sites with the wildlife are also at risk.

Against this background, the study sought to investigate the prevalence of gastrointestinal parasites in three troops of baboons visiting the Wikki spring base camp, and the possibility of any risk of zoonotic infections.

Methods

Yankari National Park is located in Bauchi State in the north-eastern part of Nigeria. The park area of about 2,224 square kilometres consists mainly of savannah woodland and riverine forest vegetation along the banks of the river Ghaji (figure. 1). Three natural springs are located within the park of which the Wikki warm spring is the most famous.

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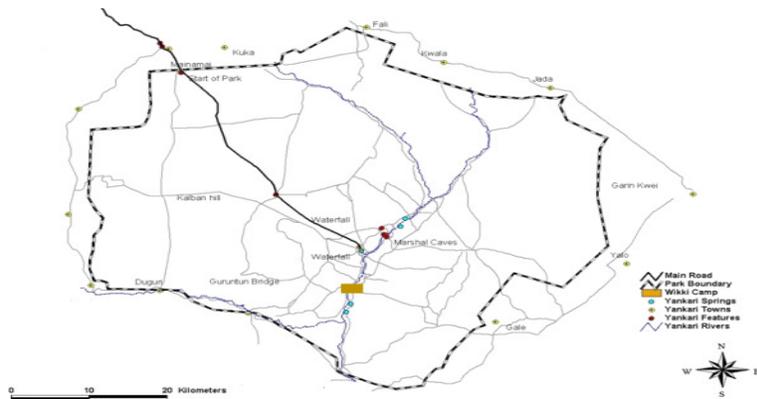


Figure 1: Map of Yankari National Park showing the location of the Wikki Camp

Faecal samples collection and examination

Fresh faecal droppings of baboons were collected between 07h00 and 11h00 from three separate baboon groups that frequent the Wikki Spring, hostel, and chalet areas. Each group was territorial and defended their area against other groups. The groups frequenting the hostel and chalet area was composed of 15 and 8 individuals, respectively. Because faecal samples were not identified to an individual, it is possible that some samples represent multiple samples from the same individual. Samples were taken from the middle of the faecal dropping and preserved immediately in 10% formal-saline solution in bijou bottles and stored until required for analysis. Formol-ether concentration technique⁸ was used to isolate parasite eggs and protozoan cysts from the faecal samples. 1g of the faecal specimen mixed with 10ml of 10% formal-saline solution was put in a

centrifuge tube, thoroughly homogenised, and mixed with 3mls of ether and vigorously shaken for 30 seconds. The preparation was centrifuged at 3000rpm for 2 minutes. Faecal debris and fatty deposits at the liquid interphase was loosed with a glass rod and the centrifuge tube rapidly inverted to decant the supernatant. A drop of Lugol's iodine was added to the deposit to aid the identification of protozoan cysts on observation under a light microscope.

Results

A total of 46 faecal samples were collected and examined. Seven helminth and nematode species were identified and the cysts of *Entamoeba histolytica*, *E. coli* and *Iodamoeba butschii* were also recovered (table 1).

Table 1: Gastrointestinal parasites recovered from 46 faecal samples of *Papio anubis* at Yankari National Park, Nigeria

	Parasite species	Number infected
Helminth and nematode species	<i>Ascaris lumbricoides</i>	16
	<i>Ancylostoma duodenale</i>	3
	<i>Hymenolepis nana</i>	1
	<i>Fasciola</i> sp.	2
	<i>Schistosoma mansoni</i>	2
	<i>Strongyloides stercoralis</i>	3
	<i>Trichostrongylus</i> sp.	1
	Total	28
Protozoa species	<i>Entamoeba histolytica</i>	46
	<i>Entamoeba coli</i>	46
	<i>Iodamoeba butschii</i>	20

Discussion

In a review of the over 140 zoonotic parasites shared between humans and animals^{1,2}, the intestinal parasites recovered in this study are amongst those known to have high pathologic involvement in humans. Heavy infection with *A. lumbricoide*s causes diarrhoea, vomiting, and occasionally occlusion of the intestinal tract. The larval stages of these parasites reside in various organs causing trauma and pathology in different viscera⁹. The protozoan parasites *E. histolytica* and *E. coli* are considered to be easily transmissible from animals to humans through contaminated food, water and hands¹⁰. They are known to be the most common causative agents of debilitating diarrhoea in humans.

However, it should be noted that although baboons at YNP showed natural infections with eggs and cysts of helminth, nematode and protozoan parasites that are morphologically similar to those found in humans^{5,11}. It would require molecular work to ascertain if these gastrointestinal parasites are of the same strain that infect humans¹². For instance, *Oesophagostomum bifurcum* found in non-human primates is a different strain from that which infects humans¹³. Further studies exploring the infection of the workers at YNP with these gastrointestinal parasites would confirm if baboons are indeed reservoir hosts. Also, coprologic studies of gastrointestinal parasites of baboon population far from human habitation could reveal if the parasites found in the baboons at the Wikki Camp are a result of spillover and spillback from humans.

Conclusion

There is no doubt that anthropogenic changes which increase contact between humans and wildlife will inevitably play a role in the emergence and re-emergence of zoonotic diseases^{11,14}. Parasitic disease control programmes should emphasize; limited contact with non-human primates, and vaccination against potentially threatening diseases¹⁴.

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