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# Gastrointestinal parasites of non-human primates and the zoonotic implications in Gashaka-Gumti National Park, Nigeria

RS Houmsou[1]*, U Buba[2], EU Amuta[3] & SL Kela[4]

[1.] *Department of Biological Sciences, Taraba State University, Jalingo*

[2.] *Forestry and Wildlife Unit, Department of Agronomy, Taraba State University, Jalingo, Nigeria*

[3.] *Department of Biological Sciences, College of Science, University of Agriculture, Makurdi, Benue State, Nigeria*

[4.] *Department of Biological Sciences, Federal University Kashere, Gombe State, Nigeria*

*Correspondence: Tel.: +2348032982979; E-mail: rs.houmsou@tsuniversity.edu.ng



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**Abstract**

This study was conducted to evaluate the prevalence, age and sex distribution of gastrointestinal parasites in non-human primates (NHP) in Gashaka-Gumti National Park. A total of one hundred and fifty faecal samples (30 from each species of non-human primates) was collected and examined using formol-ether concentration and double wet smear techniques. Twelve species of gastrointestinal parasites (5 protozoans and 7 helminths) were recovered. *C. aethiops tantalus, C. mona* and *C. nictitans* had the highest number of parasites preponderance with 66.7 % (8/12) each. *Ascaris* sp, 38.7% (58/150) had the highest prevalence followed by *Trichiuris* sp, 18.7% (28/150), *Strongyloides* sp, 18.7% (28/150), *Chilomatix meslini,* 6.7%(10/150) and *Entamoeba coli,* 6.7% (10/150). With regards to the distribution of gastrointestinal parasites between the species of non-human primates, *Ascaris* sp varied significantly with *P. anubis*, 60.0% (18/30) and *C. mona*, 50.0% (15/30) having the highest prevalence ($\chi^2_=$ 12.532; *p=0.014*). Likewise, *Trichiuris* sp was significantly higher in *C. guereza*, 33.3% (10/30) and *C. anethiops tantalus*, 30.0% (9/30) ($\chi^2_=$ 19.581; *p=0.001*). *Chilomatix meslini,* 20.0% (6/30) and *Entamoeba coli,* 20.0% (6/30) were significantly higher in *C. guereza* ($\chi^2_=$ 11.780; *p=0.038*) and *C. aethiops tantalus* ($\chi^2_=$ *13.921; p=0.008*), respectively. The age-related distribution reported *Chilomatix meslini,* 20.0% (3/15) and *Trichiuris* sp, 26.3% (20/76) higher in Infants ($\chi^2_=$ 5.305; *p=0.040*) and adults ($\chi^2_=$ 5.305; *p=0.040*) respectively. Sex did not significantly affect distribution of parasites between non-human primates though *Ascaris* sp, 41.1% (28/6) and *Trichiuris* sp, 21.9% (18/82) were higher in males ($\chi^2_=$ 0.330; *p=0.565*) and females ($\chi^2_=$ 1.285; *p=0.257*) respectively. This study revealed the endemicity of gastrointestinal parasites among the NHP in Gashaka-Gumti National Park which has zoonotic implication to their human counterparts. It is recommended that humans living in the enclaves and visitors should avoid contact with sources of water where the NHP congregate.

*Keywords*: Gastrointestinal, Parasites, Primates, National, Park, Nigeria

**Introduction**

Infectious diseases and parasitic infestations have become a major concern in primates' conservation partly because they are directly responsible for the morbidities and mortalities in the wild primate populations. Gastrointestinal parasites can cause severe parasitosis leading to blood loss, tissue damage, spontaneous abortion, congenital malformation and deaths in non-human primates (Despommier *et al.,* 1995). However, less severe infections are more common and may impede nutritional habits, travel feeding, predator escape and competition for resources and mating (Packer *et al.,* 2003).

In West Africa, several authors have reported gastrointestinal parasites of wild population of non-human primates (Teichroeb *et al*., 2009; Howells *et al*., 2011; Ryan *et al*., 2012; Kouassi *et al*., 2015). In Nigeria, despite the existence of several national parks and increased anthropogenic activities that have resulted into adverse changes in environmental change conditions, humans and domestic animals encroachment into natural habitats; most health related studies conducted on non-human primates are only limited to zoological gardens (Dawet *et al*., 2013; Adetunji, 2014; Bichi *et al*., 2016) with a very few on wild population (Mbaya *et al*., 2009; Bailey & Ross, 2011; Mbaya & Udendeye, 2011). Most population inhabiting such encroached natural habitats seldom maintain hygienic measures to protect their non- human relatives in the wild from gastrointestinal parasites thereby exposing them to infections. Studies on parasitic infections in wild population of non-human primates can provide conservationists and health practitioners with important baseline data on the health status and management of disease outbreak in both humans and their non-human primates. Gashaka-Gumti National Park (GGNP) located in the north-eastern Nigeria is endowed with diver's species of plants, mammals including several species of NHPs, which attracts visitors yearly from various parts of the world. These visitors recreate around the rivers and also share the same water source with the NHPs without much consideration of the risk of disease transmission.

Considering the health significance of these gastrointestinal parasites in man and their anthropozoonotic involvement in non-human primates and vice-versa. There was the need to investigate this problem so that visitors, conservationists and human population living in the enclaves are alerted on the existence of gastrointestinal parasites in the non-human primate populations so as to avoid contact with open water bodies which attract both humans and their non-human primate relatives. This is the second parasitological study of gastrointestinal parasites conducted in Gashaka-Gumti National Park after that of Bailey & Ross (2011) which was only limited to two species of non-human primates (olive baboons and tantalus monkeys). This study was therefore to determine parasites' diversity, occurrence, age and sex related distribution of gastrointestinal parasites in five species of non-human primates in Gashaka-Gumti National Park, Northeast, Nigeria.

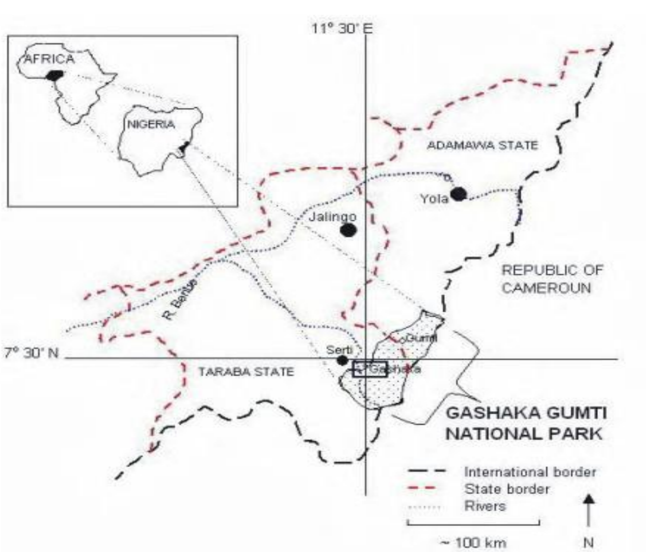


**Figure I**: Map Showing the Gashaka-Gumti National Park

**Materials and Methods**

*Study area*

Gashaka-Gumti National Park (GGNP) is Nigeria's largest National Park situated in the remote mountainous north eastern zone of the country between the boundaries of Adamawa and Taraba States. Ecologically the park is in the Guinea Savannah area of Nigeria, South of River Benue. The park is the main watershed/catchment area of Taraba River, a major tributary of River Benue. The park also shares international boundary with the Republic of Cameroon and it is adjacent to Cameroon's Faro National Park (Figure I).

Geographically, the Park is located between latitudes $6^0$ 55'N - $8^0$ 13'N and longitudes $11^0$ 30'E - $11^0$12'E with an estimated landmass of 6,731 $Km^2$ of undulating terrain and deep rolling valleys. Administratively the park is divided into the Gumti Sector at the northern part located in Adamawa

State and the Gashaka Sector at the southern part in Taraba State (GGNP, 2010).
The climatic and weather conditions range from dry-humid, tropical moist-humid in the lowlands, to sub-temperate climate on the highlands around Chappal Wade, Hendu, Mayo-sabere and Filinga. Rainfall in the northern and southern parts of the park differ annually with precipitation approaching 1,200mm for the former and 3,000mm for the latter part.

*Study animals*
A total of six species of non-human primates were identified at the park. They include Cameroon-Nigeria chimpanzees (*Pan trodoglytes elioti*). Black and white colobus monkey (*Colobus guereza*), Putty nosed monkey also named white-nosed monkeys or greater spot-nosed monkey (*Cercopithecus nictitans),* Tantalus monkey (*Cercopithecus aethiops tantalus*), Mona monkey (*Cercopithecus mona*) and Olive baboon (*Papio anubis*). Only the latter five species were surveyed in this study (Plates 1). Olive baboons and putty-nosed monkeys were habituated groups that had an estimated troop of 32 members for the first and about 15 for the second. The black and white colobus, mona and tantalus were not habituated groups. Members of the groups were estimated at 15 for the black and white colobus and tantalus monkeys while the mona monkeys were estimated to be around 20-25 in a troop. In all, thirty (30) members were sampled from each species of the non-human primates.

*Sample collection and laboratory analysis*
A total of 150 feacal samples was collected between February 2013 and June 2013 with 30 faecal samples from each species of NHP. The samples were collected from males and females of all age groups between 6:00 am - 6:00 pm. Samples were collected immediately after defecation when habituated and semi-habituated groups were followed up during their feeding trips or when they have nested. In order to avoid contamination faecal samples were collected from the centre of each faecal deposit and preserved with 70% ethanol solution in well-labelled universal bottles.
In the laboratory, samples were examined with the wet mount and then using the formol-ether concentration technique as described by Gillepsie (2006). Cysts, eggs and larvae of parasites were identified based on their colour, contents, shape and


**Plate I**: Non-human primates in Gashaka-Gumti National Park sampled for parasites (A) *Colubus guereza* (B) *Cercopithecus nictitans* (C) *Cercopithecus aethiops tantalus* (D) *Cercopithecus mona* (E) *Papio anubis* size under a microscope using identification keys in standard referral manuals (Jesee *et al*., 1970; Hasegewa *et al*., 2009).

*Data analysis*

Data were entered into Microsoft Excel 2010 and exported into SPSS IBM 23.0 for data analysis. Comparison of parasites occurrence between age groups and sex of the non-human primates were determined using $\chi^2$ test. Parasites richness, diversity and abundance in all the non-human primates were determined using the Shannon's and Simpson diversity indices calculated in the BioDiversity Pro 2.0 software. The statistical level of significance was considered at p≤0.05.

**Results**

A total of twelve species of gastrointestinal parasites (5 protozoans and 7 helminths) were recovered from the five species of NHPs. *C. anthops tantalus, C. mona* and *C. nictitans* had the highest number of parasites richness with 66.7 % (8/12) each. The least number of parasites was found in *C. guereza* and *P. Anubis* with 41.7% (5/12) each. Species diversity and parasite richness demonstrated by Shannon's diversity index showed high diversity and parasite richness in *C. aethiops tantalus* (H'= 0.781)*, C. mona* (H'= 0.751) and *C. nictitans (H'=* 0.795) (Table 2). *Ascaris* sp, 38.7% (58/150) was the most prevalent followed by *Trichiuris* sp, 18.7% (28/150) and *Strongyloides* sp, 18.7% (28/150). *Chilomatix meslini, Entamoeba coli* and unknown *Strongyle* sp had 6.7% (10/150) each. The distribution of gastrointestinal parasites between the species of NHPs showed that, *Ascaris* sp varied significantly with *P. anubis*, 60.0% (18/30) and *C. mona*, 50.0% (15/30) having the highest prevalence ($\chi^2$ = 12.532; p=0.014), *Trichiuris* sp was significantly higher in *C. guereza*, 33.3% (10/30) and *C. aethiops tantalus*, 30.0% (9/30) ($\chi^2$ = 19.581; *p=0.001*). *Chilomatix meslini,* 20.0% (6/30) and *Entamoeba coli,* 20.0% (6/30) were significantly higher in *C. guereza* ($\chi^2$ = 11.780; p=0.038) and *C. aethiops tantalus* ($\chi^2$ = 13.921; p=0.008) respectively (Table 3).

The age and sex distribution of gastrointestinal parasites in the five species of NHPs surveyed are presented in Table 4. *Chilomatix meslini* was found

**Table 1**: Population composition of the non-human primates surveyed

| | Primate species (%) | | | | | |
|---|---|---|---|---|---|---|
| | *C. mona* (n=30) | *C. aethiops tantalus*(n=30) | *C. nictitans* (n=30) | *C. guereza* (n=30) | *P. anubis* (n=30) | Total (N=150) |
| Age groups | | | | | | |
| ▪ Infants | 2( 6.7) | 5(16.7) | 4(13.3) | 1( 3.3) | 3( 6.7) | 15(10.0) |
| ▪ Sub-Adults | 13(43.3) | 8(26.7) | 8(26.7) | 13(43.3) | 17(56.7) | 59(39.3) |
| ▪ Adult | 15(50.0) | 17(56.7) | 18(60.0) | 16(53.3) | 10(33.3) | 76(50.7) |
| Sex | | | | | | |
| ▪ Male | 14(46.7) | 13(43.3) | 13(43.3) | 12(40.0) | 16(53.3) | 68(45.3) |
| ▪ Female | 16(53.3) | 17(56.7) | 17(56.7) | 18(60.0) | 14(46.7) | 82(54.7) |

**Table 2**: Parasite richness and diversity indices of gastrointestinal parasites in five species of non-human primates in the Gashaka Sector of Gashaka-Gumti National Park, Nigeria

| Primate species | No. of parasite species per primate species ($n_i$) | Total species of parasites recovered [Protozoans and Helminths (N)] | Parasite richness per primate species ($n_i$/N) (%) | Shannon index (H') | Simpson index (D) |
|---|---|---|---|---|---|
| Overall | | | | 2.740 | 0.205 |
| *P. anubis* | 5 | 12 | 5/12 (41.7) | 0.466 | 0.397 |
| *C. mona* | 8 | 12 | 8/12 (66.7) | 0.751 | 0.208 |
| *C. aethiops tantalus* | 8 | 12 | 8/12 (66.7) | 0.781 | 0.150 |
| *C. guereza* | 5 | 12 | 5/12 (41.7) | 0.636 | 0.220 |
| *C. nictitans* | 8 | 12 | 8/12 (66.7) | 0.733 | 0.185 |

**Table 3**: Prevalence of gastrointestinal parasites in five species of non-human primates in the Gashaka Sector of Gashaka-Gumti National Park, Nigeria

| Parasite species | *C. mona* (N=30) | *C. aethiops tantalus* (N=30) | *C. nictitans* (N=30) | *C. guereza* (N=30) | *P. anubis* (N=30) | Total (N=150) | $\chi^2$ | *P-value* |
|---|---|---|---|---|---|---|---|---|
| Protozoans | | | | | | | | |
| *Entamoeba coli* | 3(10.0) | 6 (20.0) | 0 (0.0) | 1 (3.3) | 0 (0.0) | 10 (6.7) | 13.921 | 0.008* |
| *Entamoeba histolytica* | 0( 0.0) | 1 (3.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (0.7) | 4.027 | 0.402 |
| *Giardia lamblia* | 2( 6.7) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (1.3) | 8.102 | 0.088 |
| *Iodamoeba bütschlii* | 0( 0.0) | 0 (0.0) | 1 (0.0) | 0 (0.0) | 0 (0.0) | 1 (0.7) | 4.022 | 0.402 |
| Helminths | | | | | | | | |
| *Ascaris* sp | 15(50.0) | 7 (23.3) | 10 (33.3) | 8 (26.7) | 18 (60.0) | 58 (38.7) | 12.532 | 0.014* |
| *Enterobius* sp | 2( 6.7) | 1 (3.3) | 1 (3.3) | 0 (0.0) | 2 (6.7) | 6 (4.0) | 2.435 | 0.657 |
| *Prostospyrura muricola* | 1( 3.3) | 0 (0.0) | 1 (3.3) | 0 (0.0) | 0 (0.0) | 2 (1.3) | 3.042 | 0.551 |
| *Strongyle* sp *(unknown)* | 0( 0.0) | 0 (0.0) | 5 (16.7) | 0 (0.0) | 3 (10.0) | 10 (6.7) | 9.643 | 0.047* |
| *Strongyloides* sp | 6(20.0) | 5 (16.7) | 5 (16.7) | 7 (23.3) | 5 (16.7) | 28 (18.7) | 4.048 | 0.400 |
| *Subulura* sp | 2( 6.7) | 3 (10.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 5 (3.3) | 8.276 | 0.082 |
| *Trichiuris* sp | 8(28.6) | 9 (30.0) | 1 (3.3) | 10 (33.3) | 0 (0.0) | 28 (18.7) | 19.581 | 0.001* |

*Significant at p≤0.05

**Table 4**: Distribution of gastrointestinal parasites by age and sex of five species of non-human primate in the Gashaka Sector of Gashaka-Gumti National Park, Nigeria

| | Age (%) | | | | | Sex (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Infants | Sub-adults | Adults | $\chi^2$ | *p-value* | Male (n=68) | Female (n=82) | *p-value* | $\chi^2$ |
| Protozoans | | | | | | | | | |
| *Chilomatix meslini* | 3(20.0) | 2( 3.4) | 5( 6.5) | 5.305 | 0.040* | 5( 7.4) | 5( 6.1) | 0.094 | 0.759 |
| *Entamoeba coli* | 2(13.3) | 5( 8.5) | 3( 3.9) | 2.285 | 0.319 | 3( 4.4) | 7( 8.5) | 1.016 | 0.313 |
| *Entamoeba histolytica* | 0( 0.0) | 0( 0.0) | 1( 1.3) | 0.980 | 0.613 | 0( 0.0) | 1( 1.2) | 0.835 | 0.361 |
| *Giardia lamblia* | 0( 0.0) | 1( 1.7) | 1( 1.3) | 0.262 | 0.877 | 0( 0.0) | 2( 2.4) | 1.681 | 0.195 |
| *Iodamoeba bütschlii* | 0( 0.0) | 1( 1.7) | 0( 0.0) | 1.553 | 0.460 | 0( 0.0) | 1( 1.2) | 0.835 | 0.361 |
| Helminths | | | | | | | | | |
| *Ascaris* sp | 4(26.7) | 23(38.9) | 31(40.8) | 1.058 | 0.589 | 28(41.1) | 30(36.6) | 0.330 | 0.565 |
| *Enterobius* sp | 0( 0.0) | 3( 5.1) | 3( 3.9) | 0.806 | 0.668 | 4( 5.9) | 2( 2.4) | 1.148 | 0.284 |
| *Strongyle* sp *(unknown)* | 0( 0.0) | 5( 8.5) | 5( 6.6) | 1.382 | 0.501 | 4( 5.9) | 6( 7.3) | 0.123 | 0.726 |
| *Prostospyrura muricola* | 0( 0.0) | 1( 1.7) | 1( 1.3) | 0.262 | 0.877 | 1( 1.5) | 1( 1.2) | 0.018 | 0.894 |
| *Strongyloides* sp | 1( 6.7) | 13(22.0) | 14(18.4) | 1.651 | 0.438 | 13(19.1) | 15(18.3) | 0.000 | 0.990 |
| *Subulura* sp | 0( 0.0) | 0( 0.0) | 5( 6.6) | 5.036 | 0.071 | 2( 2.9) | 3( 3.7) | 0.059 | 0.807 |
| *Trichiuris* sp | 3(20.0) | 5( 8.5) | 20(26.3) | 6.983 | 0.030* | 10(14.7) | 18(21.9) | 1.285 | 0.257 |

*Significant at p≤0.05

to be higher in juveniles, 20.0% (3/15) than in adults ($\chi^2_=$ 5.305; *p=0.040*), while *Trichiuris* sp was significantly higher in adults, 26.3% (20/76) than in the young ($\chi^2_=$ 5.305; *p=0.040*). Other parasites like *Ascaris* sp, *Entamoeba coli* and *Strongyloides* sp were distributed across the various age groups. There was no significant difference (*P>0.05*) in the occurrence of gastrointestinal parasites in different sexes of NHP, although the occurrence of *Ascaris* sp was slightly higher in males, 41.1% (30/68) than females, 21.9% (18/82).

**Discussion**

This is probably, the first survey of gastrointestinal parasites in five non-human primates in the Gashaka sector of Gashaka-Gumti National Park, Nigeria. The study revealed a great diversity in parasite preponderance; (12 species, 5 protozoans and 7 nematodes) among the NHPs surveyed. The parasite diversity (fourteen (14) and twelve (12) species) observed is agreement with similar study reported in NHPs of Uganda Kibale forest and Rubondo National park, Tanzania respectively (Gillespie *et al*., 2004; Petråsova *et al*., 2010). Some of the parasites observed in this study are host-specific to both humans and NHPs, sometimes with marked pathogenicity (*Ascaris* sp, *Enterobius* sp, *Gardia lamblia, Strongyloides* sp and *Trichiuris* sp) and no pathogenicity (*C. meslini, E. coli, I. buetschlii*). Other genera such as *P. muricola* and *Subulura* sp are parasites of wild rodents and birds respectively, they can also serve as incidental and pathogenic to the NHPs; adult worms of *P. muricola* can cause mechanical blockage and tissue invasion of the distal portion of the oesophagus (Foster and Johnson, 1939). *Subulura* sp are parasites of the avifauna with coleopterans, dermapterans and orthopterans are intermediate hosts. The infestation of these NHPs by this parasite could be as a result these latter feeding on the intermediate hosts, because most of NHPs are insectivorous. The highest abundance encountered in *C. a. tantalus* may probably be due to the omnivorous nature of these monkeys, compare to the *C. guereza* monkeys that have low parasite abundance and are said to be folivorous, frugivorous and granivorous (Clutton-Brock, 1975; Kavanagh, 1978). Tantalus monkeys were also observed to share the same environment with humans. The low parasite abundance observed in *P. anubis* which are known to be mostly omnivorous might be due its folivorous and granivorous eating habit; biochemical active substances released from digested leaves, grains and roots may serve to destroy some of the parasites in the lumen. Evidence has shown that free roaming NHPs in their natural habitat, through incidental feeding on leaves with antihelmintic properties (Clayton & Wolfe, 1983).

The higher occurrence prevalence of helminths than protozoans infestation observed in the NHPs surveyed might be due to the humid nature of the environment which is suitable for the developmental stage of the helminths. The correlation between environmental factors such as humidity and the high prevalence of gastrointestinal helminths in NHPs were early reported in Kibale National Park, Uganda (Bezjian *et al*., 2008) and Ghana (Teichroeb *et al*., 2009). This high occurrence of gastrointestinal helminths obtained in this study agrees with Rossanigo & Gruner (1995) that identified helminths as the most significant parasites of veterinary importance. In primates, heavy infestation with helminths have been associated with serious pathologies such as anaemia due to iron deficiency, malnutrition, mucosal inflammation, ulceration, weight loss and even death (Roberts & Janovy, 2009). Species prevalence showed that *Ascaris* sp (38.7%), *Trichiuris* sp (18.7%) and *Strongyloides* sp (18.7%) were the most prevailing parasites in the NHPs. However, *Ascaris* sp (38.7%) were more abundant in *P. anubis* while *Trichiuris* sp (18.7%) and *Strongyloides* sp (18.7%) were highest in *C. guereza,* respectively. The relatively high levels of *Ascaris* sp infestation may be due to the improper refuse disposal within the park by encroachers or workers and visitors infested with ascariasis. Infection may also be through ingestion of contaminated water from rivers, streams and ponds as people living in the enclaves depend on these water sources, they were believed to form the habit of defaecating in the open, and the faeces washed into these water bodies and contaminated them. Anthropogenic activities around Parks and reserves have been reported to have significant effect on the transmission dynamics of gastrointestinal parasites between humans and their non-human primates (Pruetz, 2006; Gillespie *et al*., 2010; Howells *et al*., 2011). The NHPs and humans have close phylogenetic relationship coupled with the encroachment of human activities into NHPs habitats and these have resulted into high potential for pathogen exchange (Adetunji, 2014). Therefore, baboons along the buffer zone of the park that may witness frequent human contacts are liable to high parasite infestation. Futhermore, the high prevalence of *Trichiuris* sp and *Strongyloides* sp which may probably be a sub-species specific to the

NHPs found in *C. guereza* that are known to be folivorous and frugivorous could not be explained as no molecular study was carried out to determine the phylogeny of these parasites; whether they are of human origin or otherwise. This is because the eggs and larval stages of *Trichiuris* sp and *Strongyloides* sp respectively in both human and the NHPs have similar shapes and could only be differentiated using molecular methods. Most of the parasites reported are of zoonotic in nature, have a direct life cycle and can be transmitted between human and NHPs. *Chilomatix mesnili* (6.7%) and *Entamoeba coli* (6.7%) were higher significantly found in *C. guereza* (20.0%) and *C.a. tantalus* (20.0%) respectively than in NHPs.. The two protozoans are non-pathogenic and live as commensals in the intestine of both humans and NHPs. They are transmitted by faecal-oral route, through the ingestion of cysts in contaminated water or food. Similar studies have also reported the presence of these protozoan's among monkeys in Taï National Park, Côte d'Ivoire (Kouassi *et al*., 2015), baboons of the Mole National Park, Ghana (Ryan *et al*., 2012), guinea baboons of Fongoli, Senegal (Howells *et al*., 2011) and *Colobus vellerosus* at Boabeng-Fiema, Ghana (Teichroeb *et al*., 2009).

Age and sex distribution of parasites did not vary significantly among the NHPs surveyed. This is because the parasites prevalence cut across age and sex, except for *C. mesnili* and *Trichiuris* sp infestations that were significantly higher among young than adults. The high prevalence *Trichiuris* sp in adults cannot be be easily explained species distribution of the parasites was not studied. In addition, previous studies have not clearly establish differences in age distribution of parasites (Muehlenbein, 2005; Mul *et al*., 2007), but parasites infestation could also depend on the level and frequency of exposure to parasites irrespective of age and sex. This is because most NHPs are social animals and they live in groups thus facilitating parasites transmission among the group.

In conclusion, this is probably the first comprehensive survey of gastrointestinal parasites in five species of NHPs at the Gashaka Sector of Gashaka-Gumti National Park, Nigeria. As much 18.7% of the NHPs surveyed were infested with gastrointestinal parasites. Twelve species of gastrointestinal parasites (5 protozoans and 7 helminths) were detected. The prevalence higher in the young than adults NHP but there was no significant difference in parasites infestation among the sexes. It is therefore recommended that visitors and staff of the park should avoid contamination from water bodies within and around the park. There should be public awareness education to tourists, students on excursion/ field study and inhabitants around the park to desist such practices such as indiscriminate defaecation and inappropriate disposal of refuse within the park which can serve as sources of parasites transmission.

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**Conflicts of Interest**

The authors declare no conflicts of interest.

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