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Research Article

Gastrointestinal Parasitism and Host Condition in Captive Olive Baboons at the Kenya Institute of Primate Research – Prospective Assessment

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ABSTRACT
Gastrointestinal (GI) parasite infections remain a significant health concern in non-human primates, with implications for host fitness, welfare, and zoonotic disease transmission. This study investigated the prevalence, composition, and effects of GI parasites on body weight in a captive colony of Olive Baboons (*Papio anubis*) at the Kenya Institute of Primate Research (KIPRE). Faecal samples from 52 subjects (11 males and 41 females) were examined using standard parasitological techniques. The overall prevalence of GI parasitic infections was 78.8%, with protozoan infections predominating. Identified parasites included *Balantidium* spp. (21.2%), *Entamoeba* spp. (11.5%), and *Trichuris trichiura* (3.8%), with frequent mixed infections: *Balantidium* spp. + *Entamoeba* spp. (32.7%), *Balantidium* spp. + *T. trichiura* (3.8%), and *Balantidium* spp. + *Entamoeba* spp. + *T. trichiura* (5.8%). No significant associations were found between infection status and host sex (p = 1.000), age (p = 1.000), or body weight (p = 0.5306). Mean body weights did not differ significantly between infected (15.50 ± 4.79 kg) and non-infected (14.46 ± 4.95 kg) baboons, nor between single (16.10 ± 5.06 kg) and multiple (14.98 ± 4.60 kg) infections. The high infection prevalence indicates constant exposure within the colony; yet stable host condition suggests subclinical infections moderated by adequate care. Continuous monitoring and hygiene management are recommended to sustain primate welfare.

Keywords: Captive colony; Gastrointestinal parasites; Infection prevalence; Olive Baboon; Protozoa

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INTRODUCTION

Gastrointestinal parasitism remains a major health concern in both wild and captive non-human primates (NHPs) (Vonfeld *et al*., 2022). In baboons, parasites such as *Balantidium coli* and *Entamoeba histolytica/dispar* (protozoa) and *Trichuris trichiura* (helminth) are commonly reported and may cause varying degrees of morbidity depending on host immunity, environmental hygiene, and management practices (Ravasi *et al*., 2012; Dib *et al*., 2023). In captivity, infection dynamics are shaped by host factors such as age, sex, and nutritional status, as well as by housing and veterinary management (Islam *et al*., 2022). Although prevalence

may be high, overt disease is uncommon when animals receive adequate nutrition and veterinary care (Dib *et al*., 2023). At the Kenya Institute of Primate Research (KIPRE), captive olive baboons (*Papio anubis*) are routinely monitored for health as part of ongoing colony management. Building on the retrospective analysis (2012–2013) presented in the first-phase (Abdussamad *et al*., 2025), this second-phase prospective study investigates gastrointestinal parasitism in captive olive baboons at KIPRE, focusing on parasite prevalence, composition, and associations with host factors (sex, age, and body weight) to clarify the relationship between infection status and host condition and to inform colony health, welfare, and zoonotic risk management.

MATERIALS AND METHODS

Sampling Sites and Population

The study was conducted at the Kenya Institute of Primate Research (KIPRE), Nairobi, Kenya. Captive non-human primates housed across multiple KIPRE units were included. A total of 52 olive baboons (*Papio anubis*) of both sexes and varying age categories (juvenile and adult) were examined out of 248 individuals presented for routine testing and treatment. Detailed descriptions of the study site have been provided in the first phase of this two-part investigation (Abdussamad *et al*., 2025).

Duration of Sampling

Faecal sampling and health interventions were carried out over three consecutive sessions—May 27–29, June 3–5, and June 10–12, 2024—with sampling performed daily between 9:00 a.m. and 3:00 p.m.

Collection Method

Animal restraint was achieved using a restraining net, followed by chemical immobilization with ketamine (10 mg/kg IM) and xylazine (0.5 mg/kg IM) to ensure safe handling. Immobilized primates were then transported in a wheelbarrow to the procedure room, where faecal samples were collected directly from the rectum using sterile gloves and placed into sterile stool containers for laboratory analysis. Routine testing and treatment procedures included tuberculosis screening, in which 0.1 ml of purified protein derivative (PPD) was injected intradermally into one upper eyelid and reactions were observed at 24, 48, and 72 hours. Deworming was carried out using Nilzan-Plus (levamisole + oxyclozanide + cobalt) at 0.4 mg/kg administered orally via stomach tube and ivermectin at 0.3 mg/kg subcutaneously. Animals presenting with open wounds received Penicillin–Streptomycin Combiotic at 15 mg/kg IM for wound treatment.

Laboratory Analysis

Faecal samples were processed using the Formol–ether concentration technique and examined microscopically for the presence of gastrointestinal parasites. Parasites were identified morphologically following the criteria described by Soulsby (1982). Each animal was categorized as infected or non-infected and as having single or multiple infections.

Data Analysis

Descriptive statistics were computed for prevalence by sex and age, and associations were analyzed using Fisher's Exact Test (two-sided). Differences in mean body weight between groups were evaluated using unpaired t-tests following verification of data normality and homogeneity of variances. All statistical analyses were performed using GraphPad Instat version 3.05 (32-bit for Windows 95/NT; GraphPad Software Inc., San Diego, CA, USA; copyright 1992–2000), with a significance threshold set at $p < 0.05$.

Ethics Statement

All animal handling and restraint procedures were conducted as part of routine veterinary management at KIPRE. Chemical and physical restraints were applied only for necessary health interventions (e.g., TB testing, deworming, sampling) under supervision of qualified veterinary personnel, following institutional welfare guidelines.

RESULTS

Prevalence and Parasite Composition

Out of 52 baboons (Table 1), 41 (78.8%) were infected with at least one gastrointestinal parasite. Protozoa were the most common, with *Balantidium* spp. (21.2%) and *Entamoeba* spp. (11.5%) predominating, while helminthic infection was limited to *Trichuris trichiura* (3.8%). Mixed infections were frequent, particularly *Balantidium* spp. + *Entamoeba* spp. (32.7%), followed by *Balantidium* spp. + *T. trichiura* (3.8%), and triple infections involving *Balantidium* spp., *Entamoeba* spp., and *T. trichiura* (5.8%).

Associations between Host Factors and Infection Status

No significant associations were detected between host factors and gastrointestinal parasite infection status (Table 2).

Table 1. Distribution of Gastrointestinal Parasites Identified in Captive Olive Baboons

Parasite Taxon	Type	Number Infected (%) (n = 52)
Balantidium spp.	Protozoa	11 (21.2)
Entamoeba spp.	Protozoa	6 (11.5)
Trichuris trichiura	Nematode	2 (3.8)
Balantidium spp. + *Entamoeba* spp.	Mixed	17 (32.7)
Balantidium spp. + *T*. trichiura	Mixed	2 (3.8)
Balantidium spp. + *Entamoeba* spp. + *T. trichiura*	Mixed	3 (5.8)

Table 2. Association between Host Factors and Gastrointestinal Parasite Infection Status in Captive Olive Baboons (*Papio anubis*) at the Kenya Institute of Primate Research

Host Factor	Category	Infected n (%)	Non-infected n (%)	Total n (%)	Statistical Test	P-value	Significance
Age	Adults (n = 44)	34 (77.3)	10 (22.7)	44 (84.6)	Fisher's Exact Test	1.000	ns
	Juveniles (n = 8)	7 (87.5)	1 (12.5)	8 (15.4)			
Sex	Males (n = 11)	9 (81.8)	2 (18.2)	11 (21.2)	Fisher's Exact Test	1.000	ns
	Females (n = 41)	32 (78.1)	9 (21.9)	41 (78.8)			
Body Weight (kg)	Infected (n = 41)	15.50 ± 4.79	—	—	Unpaired t-test	0.5306	ns
	Non-infected (n = 11)	14.46 ± 4.95	—	—			
Infection Type	Single (n = 19)	16.10 ± 5.06	—	—	Unpaired t-test	0.4611	ns
	Multiple (n = 22)	14.98 ± 4.60	—	—			

ns = not significant ($p > 0.05$)

DISCUSSION

The present study constitutes the second phase of a two-part investigation on gastrointestinal parasitism in captive olive baboons (*Papio anubis*) at the Kenya Institute of Primate Research (KIPRE). The findings from the first phase (Abdussamad *et al*., 2025), which was a retrospective study, are not part of the present dataset but are referenced here for comparison and contextual interpretation. That earlier phase reported a high overall prevalence (78.8%) of gastrointestinal parasites, dominated by protozoa—particularly *Balantidium* spp. and *Entamoeba* spp.—while helminthic infections, limited to *Trichuris trichiura*, were rare. Mixed infections were frequent, and no significant associations were found between infection status and host factors such as sex, age, or body weight, suggesting uniform exposure and subclinical infections across the colony.

In contrast, the current prospective phase focused on evaluating the relationship between gastrointestinal parasitic infection and host condition in a contemporary captive population under improved management practices. The persistence of *Balantidium* spp. and *Entamoeba* spp. as predominant protozoa aligns with the earlier findings (Abdussamad *et al*., 2025), indicating their stable presence within the colony ecosystem. The continuing low occurrence of helminths likely reflects sustained effectiveness of targeted deworming and sanitation measures, which reduce exposure to soil-transmitted infective stages.

The consistent absence of significant associations between host factors (sex, age, and body weight) and infection status across both phases supports the view that captive management creates uniform exposure conditions and mitigates overt pathology (Stoner, 1996; Benavides *et al*., 2012). Moreover, the lack of

measurable effects on body weight suggests that infections remain largely subclinical, buffered by adequate nutrition and regular veterinary supervision (Chapman *et al*., 2005). Frequent mixed infections observed in both investigations reinforce the likelihood of overlapping faecal–oral transmission routes, underscoring the importance of sustained hygiene, effective waste disposal, and environmental management to reduce reinfection risks (Mbora and McPeek, 2009; Benavides *et al*., 2012; Ravasi *et al*., 2012).

Taken together, the comparative insights from the two phases indicate that gastrointestinal parasitism remains endemic but largely controlled within the KIPRE baboon colony, with protozoa persisting as the main parasitic challenge under otherwise stable health conditions.

CONCLUSION

Gastrointestinal parasites continue to be prevalent among captive olive baboons at KIPRE, dominated by protozoan infections (*Balantidium* spp. and *Entamoeba* spp.) with minimal helminth involvement (*Trichuris trichiura*). Although infection persists, its impact appears subclinical, showing no significant association with host sex, age, or body weight. Comparative evaluation with the first phase underscores the long-term stability of infection dynamics, reflecting effective colony management and a balanced host–parasite relationship.

Regular faecal surveillance and targeted deworming should be continued to sustain the low prevalence of helminthic infections, while strict enclosure hygiene and waste management practices are essential to disrupt protozoan transmission cycles. Maintaining balanced nutrition and consistent veterinary monitoring will further enhance host resilience and minimize subclinical effects of infection. In addition, longitudinal and immunological studies are recommended to track chronic parasitism, evaluate host immune responses, and assess potential zoonotic implications over time.

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