



Research Article

Prevalence of Gastrointestinal Parasites in Domestic Dogs in Oye and Ikole Local Government Areas, Ekiti State, Nigeria

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ABSTRACT

The study assessed the prevalence of gastrointestinal parasites in domestic dogs (GITs) in Oye and Ikole Local Government Areas of Ekiti state, Nigeria. Faecal samples (50), were collected from each of the two LGA and analyzed using sheater sugar floatation technique. In Oye LGA, different GITs detected were *Toxocara canis* 14.0% (7/50); *Ancylostoma* sp, 2.0% (1/50); *Blastocystis* sp, 2.0% (1/50); *Fasciola* sp, 2.0% (1/50); *Strongyloides*; 24.0% (2/50), *Isospora* sp, 2.0% (1/50) and *Opisthorchis* sp, 2.0% (1/50), having a total prevalence percentage of 28.0% (14/50) which is not statistically significant. Moreover, in Ikole LG, multiple GITs were observed which includes *Toxocara canis* 12.0% (6/50); *Cryptosporidium* sp, 4.0% (2/50); *Strongyloides* sp, 8.0% (4/50); *Moniezia* 2.0% (1/50), and *Giardia* sp 2.0% (1/50). Out of the gastrointestinal parasites detected, *Toxicara canis* and *Strongyloides* has the highest prevalent percentage of 32.0% (16/50). For multiple infection, 44.0% (22/50) was found in Oye LGA whereas 40.0% (20/50) was detected in Ikole LGA. In respect to male and female domestic dogs, the prevalence percentage of infection in both sexes was 34.0% (17/50) with female having the higher prevalence of infection, although the difference is not statistically significant X^2 29.203, $p > 0.05$. Going by the age of the domestic dogs assessed, the result detected higher prevalence of infection in puppies and young adults compared to other age categories X^2 21.181, $p > 0.05$. Therefore, the study suggested consistent awareness proper hygiene practice as well as routine vaccination so as to prevent further spread of domestic dog related diseases.

Keywords: Dog; Gastrointestinal parasites; *Giardia*; Prevalence; *Toxocara*

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INTRODUCTION

The primary factor influencing the health of pets, particularly domestic dogs, was found to be intestinal parasite infections (Merkouri *et al.*, 2022). In addition to causing chronic illnesses or subclinical diseases that affect an animal's health and may result in death, intestinal parasites can also pose a risk to human health, particularly in areas where dogs do not receive proper medical care (Drissi *et al.*, 2022). Children who are exposed to dog and cat feces and people who own domestic animals that do not

receive proper veterinary care are the most vulnerable groups since dog faeces are the primary source of contamination that spreads throughout the environment (Drissi *et al.*, 2022). Dogs are carriers, transmitters, and reservoirs of a number of zoonotic intestinal parasites (GI) that pose a major risk to human health (Ahmed *et al.*, 2021). The dog was the first domesticated animal and has a long history of living alongside humans (Morand *et al.*, 2014). Humans can use dogs for hunting, security, police support, military duty, companionship, and, more

recently, aid for people with impairments (Traub *et al.*, 2005; Gracenea *et al.*, 2009). This coexistence has led to the spread of disease agents. These substances are significant intermediary hosts for dog parasites and have the ability to infect one or more animal species (Esposito *et al.*, 2023). Dogs frequently get intestinal parasite infections (Ahmed *et al.*, 2014). The most common organisms responsible for gastrointestinal diseases in dogs are parasites, primarily protozoa and helminths. These parasites result in bleeding, diarrhea, vomiting, anorexia, a lifeless coat, and irritation of the intestinal mucosa. Anaemia and even mortality may ensue from them (Martinez *et al.*, 2008). The most common intestinal parasites in dogs include *Toxocara canis*, *Ancylostoma caninum*, *Taenia hydatigena*, *Echinococcus* species, *Dipylidium caninum*, *Trichuris*, *Giardia* species, and *Cryptosporidium* species (Obioma *et al.*, 2023).

The spread of intestinal parasites in dogs occurs through the oral-fecal route these parasites spread primarily through the discharge of eggs or larvae and oocysts or cysts into the environment. Zoonotic agents can be separated by direct contact with the definitive host, contaminated food and water, or indirect contact with animal excreta and secretions (Esposito *et al.*, 2023). It is generally believed that dogs that live near people play a significant role in the spread of zoonotic diseases, which can lead to health problem (Merkouri *et al.*, 2022). To develop and implement effective control and prevention methods that lessen the impact of zoonotic diseases on public health, dogs must be monitored for zoonotic gastrointestinal parasites (GI) parasites. This is particularly true in cities where people and dogs interact often. In various parts of the world, studies conducted in the past several years have evaluated the prevalence of gastrointestinal parasites in dogs (Fang *et al.*, 2015).

MATERIALS AND METHODS

Study Area

Oye-Ekiti Local Government Area is located in Ekiti State, Nigeria with 661.91 km² in the southwestern region of the country. It lies at latitude 7.7998° or 7° 47' 59" north, longitude 5.3324° or 5° 19' 57" east. This area is predominantly rural, with agriculture being the mainstay of the local economy. Cattle farming, alongside crop production, forms an essential part of the livelihood for many households.

The area is characterized by a tropical climate, with distinct wet and dry seasons that influence livestock health and the prevalence of parasitic diseases. The wet season, which lasts from April to October, brings heavy rains and increases humidity, creating ideal conditions for the survival and transmission of gastrointestinal parasites. On the other hand, the dry season (November to March) reduces rainfall and humidity, but the environmental conditions during this period can still support the survival of certain parasitic larvae and eggs on pastures and in the environment.

Ikole Local Government Area, is also located in the tropical region of Ekiti state with 321 km² in south west region. It bordered by Kwara and Kogi States to the north and north east, Ekiti east to the east, and Gboyin and Oye local government to the south and west respectively. The area is predominantly rural, with agriculture being the main stay of the local economy. The Area was described with dense vegetation making it habitable for nomadic grazing and hunting.

Faecal Examination

The different dog faeces were gathered, brought to the lab, treated separately, and then inspected under a microscope using the sugar sheater procedure. In a test tube, 15 ml of sugar sheater's solution was mixed with 1g of faeces. After carefully mixing and straining, it was gathered into a different test tube, smeared and covered with a cover slip. For fifteen to thirty minutes, the slides were viewed under light microscope for the parasite's identification.

Data Analysis

Data was entered into Excel spread sheet and cleaned. The data were analyzed using the statistical package for social sciences IBM-SPSS version 25.0. Chi-square statistic was used to determine the association between sex of cattle and parasitism. A p-value < 0.05 was considered statistically significant.

RESULT

Prevalence of single parasitism of gastrointestinal parasites in domestic dogs in Oye and Ikole Local Government Areas, Ekiti State, Nigeria

Out of the 50 faecal samples collected from Oye local government, eight (8) were found positives with different gastrointestinal parasites (single parasitism) ranging from *Toxicara canis* 14.0% (7/50), *Blastocyst* sp 2.0% (1/50), *Fasciola* sp 2.0% (1/50), *Isospora* sp

2.0% (1/50), *Strongyloides* 4.0% (2/50), *Ophistocyst* sp 2.0% (1/50), and *Ancylostoma* sp 2.0% (1/50). Meanwhile some of the expected parasites were found absent such as *Cryptosporidium*, *Giardia*, and *Moniezia*. In contrast, fifty samples were also collected from Ikole site, after laboratory screening, 5 were found positive with different parasites like *Toxicara canis* 12.0% (6/50), *Cryptosporidium* sp 4.0% (2/50), *Giardia* sp 2.0% (1/50), *Moniezia* 2.0% (1/50), and *Strongyloides* sp 8.0% (4/50) (Table 1).

Prevalence of poly-parasitism of gastrointestinal parasites in domestic dogs in Oye and Ikole Local Government Areas, Ekiti State, Nigeria

With regard to poly parasitism in Oye site, 44.0% (22/50) poly- parasites were identified: *T.canis* + *Fasciola* 4.0% (2/50), *T. canis* + *Ancylostoma* 2.0% (1/50), *T. canis* + *Isospora* 2.0% (1/50), *T. canis* + *Cryptosporidium* 4.0% (2/50), *Eimeria* + *Cryptosporidium* 2.0% (1/50), *Strongyloides* + *Physaloptera* 2.0% (1/50), *Taenia* + *Balantidium* 2.0% (1/50), *Taenia* + *Balantidium* + *Entamoeba* 2.0% (1/50), *T. canis*+ *Eimeria* + *Balantidium* 2.0% (1/50), *Taenia* + *Balantidium* + *Entamoeba* 2.0% (1/50), *T. canis*+ *Eimeria* + *Balantidium* 2.0% (1/50), *Balantidium* + *Acanthocephala* 8.0% (4/50), *Acanthocephala* + *Moniezia* 6.0% (3/50), *T. canis* + *Fasciola* + *Blastocystis* + *Entamoeba* 2.0% (1/50), *T. canis* + *Dipylidium* + *Entamoeba* + *Eimeria* + *Fasciola* + *Isospora* 2.0% (1/50).

Also, in Oye, some of the expected parasites were not detected. They includes *Ancylostoma* + *Blastocystis*, *Ancylostoma* + *Entamoeba*, *Eimeria* + *Balantidium*, *Ancylostoma* + *Strongyloides* + *Entamoeba*, *T. canis* + *Eimeria* + *Ancylostoma*, *Ancylostoma* + *Cryptosporidium*, *T. canis* + *Boxtonella sulcata* + *cryptosporidium*, *T. canis* + *Boxtonella sulcata* + *Moniezia*, *Strongyloides stercoralis* + *Cryptosporidium* + *Moniezia*, *Strongyloides stercoralis* + *Cryptosporidium* + *Moniezia*, *Entamoeba* + *Ancylostoma* + *Balantidium* + *Eimeria*, and *Blastocystis* + *Physaloptera* + *Moniezia* + *Dicrocoelium*. (Table 2).

Furthermore, result from Ikole site which is 40.0% (20/50) for polyparasitism includes *Ancylostoma* + *Blastocystis* 2.0% (1/50), *Eimeria* + *Balantidium* 2.0% (1/50), *Ancylostoma* + *Strongyloides* + *Entamoeba* 4.0% (2/50), *Balantidium* + *Acanthocephala* 2.0% (1/50), *Acanthocephala* + *Moniezia* 4.0% (2/50), *T. canis* + *Eimeria* + *Ancylostoma* 2.0% (1/50), *Ancylostoma* + *Cryptosporidium* 2.0% (1/50), *T. canis* + *Boxtonella sulcata* + *Moniezia* 8.0% (4/50), *Strongyloides stercoralis* + *Cryptosporidium* + *Moniezia* 2.0% (1/50), *T. canis* + *Ancylostoma* + *Taenia* + *Cryptosporidium* 2.0% (1/50), *T. canis* + *Ancylostoma* + *Taenia* + *Cryptosporidium* 2.0% (1/50), *Entamoeba* + *Ancylostoma* + *Balantidium* + *Eimeria* 2.0% (1/50), *Blastocystis* + *Physaloptera* + *Moniezia* + *Dicrocoelium* 2.0% (1/50) (Table 2).

Table 1: Prevalence of none and single parasitism of gastrointestinal parasites in domestic dogs in Oye and Ikole Local Government Areas, Ekiti State, Nigeria

GIT Parasites	Oye (%)	Ikole (%)	Total (%)
No Parasites	14 (28.0)	16 (32.0)	30 (30.0)
Single Parasites	14 (28.0)	14 (28.0)	28 (28.0)
<i>Toxicara canis</i>	7 (14.0)	6 (12.0)	13 (13.0)
<i>Cryptosporidium</i>	0 (0.0)	2 (4.0)	2 (2.0)
<i>Blastocystis</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Ancylostoma</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Fasciola</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Isospora</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Strongyloides</i>	2 (4.0)	4 (8.0)	6 (6.0)
<i>Moniezia</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Opisthorchid</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Giardia</i>	0 (0.0)	1 (2.0)	1 (1.0)
Total	28.0% (14/50)	28.0% (14/50)	28.0% (28/50)

Table 2: Prevalence of Protozoans and Helminthes parasites in Ikole Local Government Areas, Ekiti State, Nigeria

Protozoan/Helminthes	22 (44.0)	20 (40.0)	44 (88.0)
<i>T. canis</i> + <i>Fasciola</i>	2 (4.0)	0 (0.0)	2 (2.0)
<i>T. canis</i> + <i>Ancylostoma</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>T. canis</i> + <i>Isospora</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Ancylostoma</i> + <i>Blastocystis</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Ancylostoma</i> + <i>Strongyloides</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>T. canis</i> + <i>Cryptosporidium</i>	2 (4.0)	0 (0.0)	2 (2.0)
<i>Eimeria</i> + <i>Cryptosporidium</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Eimeria</i> + <i>Trichuris</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Strongyloides</i> + <i>Physaloptera</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Ancylostoma</i> + <i>Entamoeba</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Eimeria</i> + <i>Balantidium</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Taenia</i> + <i>Balantidium</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Taenia</i> + <i>Balantidium</i> + <i>Entamoeba</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>T. canis</i> + <i>Eimeria</i> + <i>Balantidium</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Ancylostoma</i> + <i>Strongyloides</i> + <i>Entamoeba</i>	0 (0.0)	2 (4.0)	2 (2.0)
<i>Balantidium</i> + <i>Acanthocephala</i>	4 (8.0)	1 (2.0)	5 (5.0)
<i>Acanthocephala</i> + <i>Moniezia</i>	3 (6.0)	2 (4.0)	5 (5.0)
<i>T. canis</i> + <i>Eimeria</i> + <i>Ancylostoma</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Ancylostoma</i> + <i>Cryptosporidium</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>T. canis</i> + <i>Boxtonella sulcata</i> +	0 (0.0)	1 (2.0)	1 (1.0)
<i>Strongyloides stercoralis</i> + <i>Cryptosporidium</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>T. canis</i> + <i>Boxtonella sulcata</i> + <i>Moniezia</i>	0 (0.0)	4 (8.0)	4 (4.0)
<i>Strongyloides stercoralis</i> + <i>Cryptosporidium</i> + <i>Moniezia</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>T. canis</i> + <i>Ancylostoma</i> + <i>Taenia</i> + <i>Cryptosporidium</i> +	0 (0.0)	1 (2.0)	1 (1.0)
<i>T. canis</i> + <i>Fasciola</i> + <i>Blastocystis</i> + <i>Entamoeba</i>	1 (2.0)	0 (0.0)	1 (1.0)
<i>Entamoeba</i> + <i>Ancylostoma</i> + <i>Balantidium</i> + <i>Eimeria</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>Blastocystis</i> + <i>Physaloptera</i> + <i>Moniezia</i> + <i>Dicrocoelium</i>	0 (0.0)	1 (2.0)	1 (1.0)
<i>T. canis</i> + <i>Dipylidium</i> + <i>Entamoeba</i> + <i>Eimeria</i> + <i>Fasciola</i> + <i>Isospora</i>	1 (2.0)	0 (0.0)	1 (1.0)
χ^2 , p value	49.410, p>0.05		

Prevalence of infection with gastrointestinal parasites in different age group and sex of domestic dogs in Oye and Ikole Local Government Areas, Ekiti State

In this result, different age groups of dogs were examined. For 0-6 months (puppy), 36.0% (18/50) and 24.0% (12/50) were found infected with GI. For >6-12 months (juveniles) 34% (17/50) were examined and 26.0% (13/50) were found infected. Moreover, for >12-24 months (Young adults) 18.0% (9/50) were examined and 12.0% (6/50) became infected. And for >2 yrs-6 yrs (Adults) 12.0% (6/50) were examined and 6.0% (3/50) infected, but no (senior) >7 yrs were examined in Oye site. From this result in Oye puppy and juvenile were the most prevalent in terms of GI. In Ikole site, 0-6 months (puppy) 10.0% (5/50) were examined and 8.0% (4/50) infected. >6-12 months (juveniles) 20.0% (10/50) were examined and 10.0% (5/50) infected. >12-24 months (Young adults) 20.0%

(10/50) were examined and 18.0% (9/50) infected. >2 yrs-6 yrs (Adult) 46.0% (23/50) were examined and 34.0% (17/50) infected. Lastly for >7 yrs (senior) 4.0% (2/50) were examined and 4.0% (2/50) were examined and 2.0% (1/50) were found infected with GI. The result indicates puppy has the highest prevalence, then young adult followed by adult dogs. (Table 3)

With regards to sex, in Oye LGA, 34.0% (17/50) were found infected with GI out of. 44.0% (22/50) male dogs and 56.0% (28/50) female dogs that were examined. Females were found to have more prevalence of infection than males in Oye site. Moreover, 52.0% (26/50) males were examined in Ikole site and 18.0% (13/50) were found infected whereas 48.0% (24/50) females were examined and 34.0% (17/50) were found infected resulting into equal prevalence in both sexes χ^2 , 29.203 p > 0.05 (Table 3).

Table 3: Prevalence of infection with gastrointestinal parasites in different age group and sex of domestic dogs in Oye and Ikole Local Government Areas, Ekiti State

Age	Oye		Ikole	
	No examined (%)	No infected (%)	No examined (%)	No infected (%)
0-6 months (puppy)-1	18 (36.0)	12 (24.0)	5 (10.0)	4 (8.0)
>6-12 months (juveniles)-2	17 (34.0)	13 (26.0)	10 (20.0)	5 (10.0)
>12-24 months (Young adults)-3	9 (18.0)	6 (12.0)	10 (20.0)	9 (18.0)
>2 yrs-6 yrs (Adults)-4	6 (12.0)	3 (6.0)	23 (46.0)	17 (34.0)
>7 yrs (Senior)-5	0 (0.0)	0 (0.0)	2 (4.0)	1 (2.0)
χ^2 , p value	(21.181, p value < 0.05)			
Sex				
Male	22 (44.0)	17 (34.0)	26 (52.0)	19 (38.0)
Female	28 (56.0)	17 (34.0)	24 (48.0)	17 (34.0)
χ^2 , p value	(29.203, p value > 0.05)			

DISCUSSION

The study demonstrates the prevalence of gastrointestinal parasites in domestic dogs, prevalence of infection in different sexes and infection in various age groups of domestic dogs in Oye and Ikole Local Government Areas of Ekiti State, Nigeria. Fifty (50) fecal samples were chosen from each of the two municipal governments for the study. In Oye LGA, different GITs detected were *Toxocara canis* 14.0% (7/50); *Ancylostoma* sp, 2.0% (1/50); *Blastocystis* sp, 2.0% (1/50); *Fasciola* sp, 2.0% (1/50); *Strongyloides*; 24.0% (2/50), *Isospora* sp, 2.0% (1/50) and *Opisthorchis* sp, 2.0% (1/50), having a total prevalence percentage of 28.0% (14/50) which is not statistically significant. Moreover, in Ikole LG, multiple GITs were observed which includes *Toxocara canis* 12.0% (6/50); *Cryptosporidium* sp, 4.0% (2/50); *Strongyloides* sp, 8.0% (4/50); *Moniezia* 2.0% (1/50), and *Giardia* sp 2.0% (1/50). Out of the gastrointestinal parasites detected, *Toxicara canis* and *Strongyloides* has the highest prevalent percentage of 32.0% (16/50). For multiple infection, 44.0% (22/50) was found in Oye LGA whereas 40.0% (20/50) was detected in Ikole LGA. In respect to male and female domestic dogs, the prevalence percentage of infection in both sexes was 34.0% (17/50) with female having the higher prevalence of infection, although the difference is not statistically significant χ^2 29.203, $p > 0.05$. Going by the age of the domestic dogs assessed, the result detected higher prevalence of infection in puppies and young adults compared to other age categories χ^2 21.181, $p > 0.05$.

The above result supports the findings of Ayimode *et al.* (2016), who found that the most prevalent parasites in dogs include *Toxocara canis*, *Dipylidium caninum*, *Trichuris vulpis*, *Echinococcus* species, and *Ancylostoma caninum* which need to be controlled in order to prevent spread there by endangering lives of humans and domestic dogs. Furthermore, the findings of this study concurred with those of Ogunkoya *et al.* (2009) and Mustapha *et al.* (2016), who reported similar information on *Toxocara* and *Strongyloides* as leading parasites attached to domestic dogs. Depending on the kind of infection and parasite density, these infections cause severe health problems for dogs as well as a range of clinical symptoms, including vomiting, anorexia, anemia, unthriftiness, malaise, irritability, mild diarrhea, melena, and poor hair coat and owners are the prone target for contraction.

Moreover, the view of *Toxocara canis* and *Strongyloides* being the prevalent was parallel to that of Ezema *et al.* (2019), who reported that *Ancylostoma* was the common species, but according to Ehimiyein *et al.* (2018), *Taenia* was the most common species observed. Going by the findings of Degefu *et al.* (2011) and Ayomide *et al.* (2016), the parasite can infect people and cause ocular and visceral migrans. Additionally, several gastrointestinal illnesses were noted, which is consistent with the findings of Ezema *et al.* (2019) who reported different multiple infection with gastrointestinal parasites with regard to domestic dogs.

Looking at dogs of various sexes, regarding gastrointestinal parasite infections, Mustapha *et al.*

(2016) reported a higher prevalence of infection in females than males, which was also found related by this finding, which was obviously in contrast to the findings of Exema *et al.* (2019) who found a prevalence of 43.3% for male dogs and 27.0% for female dogs and the difference was statistically significant at $p < 0.05$.

Finally, going by the age group of the dogs, findings indicate prevalence of infection in young dogs compared to adult, expressing that puppies were the most heavily infected dogs with gastrointestinal parasites followed by juveniles in one study area. However, in the other study area, both young adults and adults were found to be more prevalent with GI than any other category of dogs and the findings were in line with that of Ehimiyein *et al.* (2018), who reported that adult females can spread helminths through the placenta or milk, and this may be related to the fact that individuals who are primarily carriers lose infectious eggs after developing immunity from prior infection exposure Soulsby (2018).

CONCLUSION

In conclusion, gastrointestinal parasites in dogs were found in both study areas which made dog owners and public at risk of contracting diseases. Hence public health enlightens campaigns and focuses on preventive measures should be considered.

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