Toxocara cati INFECTIONS IN DOMESTIC CATS FROM TWO COMMUNITIES IN SOUTH-WESTERN NIGERIA

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Abstract

An epidemiological survey was undertaken to study the prevalence and intensity of infection with *Toxocara cati* in some selected domestic cats from two communities in south-western Nigeria. Faecal samples of 200 cats were collected through a direct rectal swab using a long forceps from households with cat from Ode Irele and Oyo communities between April and September 2008 and examined for eggs of *T. cati* using a modified Kato-katz technique. An overall prevalence of 48.5% was recorded for *T. cati* infection. The overall mean intensity of *T. cati* infection as determined by eggs per gram of faeces (epg) was 387.20 ± 101.20. The highest prevalence of infection was recorded in cats above 48 months (> 48 months old). There was no significant difference in prevalence and intensity of infections between male and female cats (p>0.05). The prevalence of *T. cati* was significantly higher (p<0.05) in Ode Irele Community (65%) than in Oyo Community (32%). Due to high prevalence of *T. cati* recorded in these communities, it is necessary that public health authorities and pet owners in these communities pay more attention to *T. cati* infection, and that the general public is educated on the hazards and zoonotic importance of this parasite.

Keywords: *Toxocara cati,* visceral larva migrans, prevalence, cat, south-western Nigeria.

Introduction

Toxocara cati is a common parasite of cats, belonging to the family Felidae and has a cosmopolitan distribution (Yamaguchi *et al* 1996; Sadjjadi *et al* 2001; Sharif *et al,* 2007). The *T. cati* has been reported to be a causative agent of visceral larva migrans in humans (Fisher, 2003). Paratenic hosts, such as man and small rodents can be infected with *T. cati* by accidentally swallowing infective eggs of the parasite (Beaver, 1969; Beaver *et al* 1984). Cats infected with *T. cati* are of high potential risk to infect humans especially children. The eggs ingested accidentally by humans, hatch into larvae in the intestine and then invade the host's viscera, resulting in a disease known as visceral larva migrans (VLM).

Studies by various researchers have revealed that the rate of infection with *Toxocara* sp. in the human population depends on the history of pica, the abundance of pet animals, personal hygiene, prevalence of *Toxocara* sp. in animals and the intensity of the eggs in the contaminated environment (Charleston, 1977, Kazura, 1996). It has been reported that *T. cati* is mostly prevalent throughout tropical, sub-tropical and temperate regions (Buijs, 1993). Previous studies in Nigeria and other parts of the world have shown that *T. cati* is one of the frequently encountered parasites among cat populations (Okaeme, 1986; Umeche and Ima, 1988; Overgaauw, 1997; Rembiesa and Richardson, 2003; Labarthe *et al* 2004; Changizi *et al* 2007). In a study of intestinal helminth infections of 52 cats conducted from Calabar, Nigeria, a prevalence of 28.85% was reported for *T. cati* (Umeche and Ima, 1988).

A prevalence of 42% for *T. cati* infection was also reported among 181 cats whose faecal specimens were examined from Dublin, Ireland (O'Lorcain, 1994). In another study in Shiraz City, Southern Iran, Sadjjadai *et al* (2001) reported a prevalence of 52.8% for *T. cati* infection in a cross-sectional survey undertaken among

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108 stray cats. In a recent study conducted in urban areas of Sari, Northern Iran, Sharif *et al* (2007) reported a prevalence of 44% for *T. cati* among 100 stray cats examined.

Due to close association and proximity of man with his domestic animals (cats in particular), there exist possibilities of human infection with helminth parasites of these animals. Although, the larvae of non-human ascarids, such as *T. cati,* are capable of limited development in human hosts, this may in some circumstances, lead to serious public health problems e.g. encephalitis and granulomatous lesions (Woodruff *et al* 1981). Since cats constitute a potential source of *T. cati* infection in man (McColm and Hutchinson, 1980; Markell, *et al* 1992), there is the need to study the prevalence and intensity of this parasite because no previous parasite surveys have been conducted in these communities. In addition, previous studies on parasites of cats in Nigeria have excluded intensity from their investigations. Therefore, the present study was undertaken to provide information on the prevalence and intensity of *T. cati* in population of cats in Ode Irele and Oyo communities in south-western Nigeria.

Materials and methods

Areas of study

Ode Irele and Oyo are two peri-urban communities in south-western Nigeria. Ode Irele is a town in Irele Local Government Area of Ondo State, Nigera located between latitudes 06º17′57′N and 06º43′ 21′N and Longitudes 04º 49’ 47’ E and 05º 10′ 26′ E. Oyo is a town in Oyo West Local Government Area of Oyo State, Nigeria located between Latitudes 03º 35′N and 04º 10′N and Longitudes 007º 2′E and 007º 40′E. According to the 2006 Population Census, Irele Local Government Area (LGA) has an estimated population of 145, 166 while Oyo West LGA has an estimated population of 217,563 (NPC, 2006).

The climates of both areas are characterized by two broad seasons, the rainy season (April-October) and the dry season (November-March). The annual relative humidity is about 77.1% (Iloeje, 1978). The inhabitants of both communities have similar cultural and occupational background, mostly traders, private business owners and civil servants. These people often share a close relationship with semi-domesticated cats, often allowing them in to their houses.

Collection of faecal samples and laboratory procedure

Households with cats were identified and visited, discussions were held with them in the two communities on the purpose of this study. One hundred cats were selected form each community making a total of 200 cats examined for this study. Faecal samples were collected from each cat through a direct rectal swab using a long forceps into clean 30 ml universal bottles between April and September, 2008.

Each faecal sample collected was mixed thoroughly with 10% aqueous formaldehyde for preservation. For each cat sampled, approximate age, gender, mode of life and the occupation of each cat owner were collected. Samples were examined for *T. cati* eggs in the laboratory by means of the modified Kato-katz procedure (Forrester and Scott, 1990). This involved passing a sub-sample of each specimen through double-ply gauze to remove rough materials and washing with water, as necessary. The filtrate was then centrifuged at 2,500 rpm for 5 minutes, the supernatant fluid decanted, and the tube allowed to drain for one minute. 50 mg of the substrate was transferred onto a clean microscope slide, covered with a cover-slip, soaked overnight in 50% glycerine-malachite green solution and carefully pressed to spread evenly. The slide was then examined under a microscope at x100 magnification for *T. cati* eggs, which were counted with a tally hand counter. The number was multiplied by 20 to convert to eggs per gram (epg) of faeces.

Statistical analysis

Differences in parasite prevalence and host and gender were determined using the *chi*-squared ($\div^2$) tests. Differences in egg output were determined using Mann-Whitney U tests for dichotomous variables and Kruskal-Wallis tests for explanatory variables with more than two levels.

Results

An overall prevalence of 48.5% was recorded for *T. cati* infection among domestic cats investigated from the two communities. The prevalence of *T. cati* was significantly higher in Ode Irele (65%) than in Oyo (32%) ($\div^2 = 21.800$ $df = 1$; $p<0.05$). (Table 1).

Table 1: Prevalnce of *Toxocara cati* in cats relative to location.

Location	Number examined	Number infected	%
Ode Irele	100	65	65
Oyo	100	32	32
Total	**200**	**97**	**48.5**

Key to Table 1: $\div^2 = 21.800$, $df = 1$; $p<0.05$).

Prevalence of T. cati relative to host age and gender

The prevalence of *T. cati* increased from 43.1% among

cats of age-group 0-6 months old until it reached the highest value of 63.2% in cats of age above 48 months old (Table 2). There was no significant difference in prevalence of *T. cati* infections among the age-groups ($p>0.05$). The lowest prevalence of *T. cati* (41.7%) was recorded in cats of age-group 25-36 months old.

In male cats, the prevalence of infection was highest (100%) in cats of age-group 37-48 months and lowest in cats of age-group 25-36 months. In female cats, the highest prevalence of infection (66.7%) was recorded in cats of age-group 13-18 months while the least (40%) was recorded in cats of age-group 37-48 months. There was no significant difference in the overall prevalence of infection between male (46.1%) and female cats (51.8%) ($\div^2 = 0.631$, $df = 1$; $p>0.05$) (Table 2).

Table 2: Prevalence of *Toxocara cati* by age and gender in cats examined between April and September, 2008.

Age-groups (months)	Male cats		Female cats		Both sexes	
	Number examined	% infected	Number examined	% infected	Number examined	% infected
0-6	48	41.7	24	45.8	72	43.1
7-12	29	44.8	24	54.2	53	49.1
13-18	10	40.0	3	66.7	13	46.2
19-24	12	58.3	12	50.0	24	54.2
25-36	6	33.3	6	50.0	12	41.7
37-48	2	100.0	5	40.0	7	57.1
>48	8	62.5	11	63.6	19	63.2
Total	**115**	**46.1**	**85**	**51.8**	**200**	**48.5**

Intensity of T. cati relative to host age and gender

The mean intensities of *T. cati* infection of cats, determined by eggs/g (epg) of faeces, are shown in Table 3. The overall arithmetic mean intensity recorded for *T. cati* infection of the cats was 387.80 ± 101.20. The highest intensity of *T. cati* infection in both sexes was recorded in cats of age above 48 months and this was comparable to the intensities of cats in younger age-groups. In male cats, the highest intensity was recorded in cats above 48 months while the least value was recorded in cats of age-group 37-48 months. In female cats the highest intensity was also recorded in cats of age above 48 months while the least was recorded in cats of age-group 13-18 months. The overall intensity of *T. cati* was higher in male (419.30 ± 157.50) than in female cats (345.18 ± 107.29), however, there was no significant difference in the intensity of infection between the two sexes ($U = 5436.0$, $df = 1$; $p>0.05$).

Discussion

The overall prevalence of *T. cati* infection recorded in this study (48.5%) from the two communities was found to be higher than the value (28.85%) obtained from the study investigated among 52 cats in Calabar, Nigeria (Umeche and Ima, 1988). The prevalence value recorded in this study was similar to the result obtained (48.2%) in Estonia, Hungary by Talvik *et al* (2006). The prevalence of *T. cati* recorded in this study was also comparable to prevalences of *T. cati* of 42% obtained in Dublin, Ireland by O'Lorcain (1994), 42.5% reported from Mexico City by Martinez-Barbabossa *et al* (2003), 42.6% in Shiraz city, Iran by Zibaei *et al* (2007) and 44% from Sari City, Iran by Sharif *et al* (2007). In some studies higher prevalences of *T. cati* had been reported. In Belgium, Vanparijs and Thienport (1973) reported a much higher prevalence of 88% among 500 cats. A study on 230 autopsied adult cats in Copenhagen, Denmark found that 79% were infected with *T. cati* (Engbaek *et al* 1984).

The prevalence of *T. cati* in this study was higher in older cats than in the younger ones. This is similar to the findings of O'Lorcain (1994), but in contrast to the findings of Oldham (1965) where higher prevalence of *T. cati* was reported in younger cats, which may be due to transmammary passage (Swerczek *et al* 1971). The

Table 3: Intensity of *Toxocara cati* by age and gender in cats examined between April and September, 2008.

Age-groups (months)	Male Cats			Female Cats			Both Sexes		
	Number examined	Mean ± SEM		Number examined	Mean	SEM	Number examined	Mean	SEM
0-6	48	586.3	332.1	24	239.2	181.7	72	470.6	229.4
7-12	29	95.9	61.9	24	386.7	262.1	53	227.6	123.6
13-18	10	238.0	224.8	3	20.0	11.6	13	187.7	172.8
19-24	12	728.3	584.3	12	283.3	215.2	24	505.8	308.0
25-36	6	166.7	162.7	6	596.7	568.9	12	381.7	289.4
37-48	2	60.0	20.0	5	60.0	50.6	7	93.1	35.2
>48	8	632.5	533.9	11	634.6	266.1	19	633.7	263.5
Total	**115**	**419.3**	**157.5**	**85**	**345.2**	**107.3**	**200**	**387.8**	**101.2**

higher prevalence recorded in older cats might have been due to exposure to infective *T. cati* eggs, since infections of cats with *T. cati* can occur either through ingestion of infective eggs or from eating rodents (that can act as paratenic hosts for helminth parasites like *T. cati*) containing larvae in their tissues. There was no significant difference in the prevalence of *T. cati* infection between the sexes in this study which is in agreement with the findings reported from Dublin, Ireland (O'Lorcain, 1994).

In contrast, Oldham (1965) reported a significant difference between the sexes with regard to *T. cati* infection. The intensity of *T. cati* (i.e. eggs per gram of faeces) recorded in this study was highest in older cats (i.e cats above 48 months) suggesting that kittens are not the only hosts responsible for the dissemination of *T. cati* eggs into the environment. Therefore, adult or older cats should not be overlooked with regard to routine anthelminthic treatment.

Toxocara cati has been reported to be the most common intestinal roundworm and zoonotic parasite in cats. Most domestic cats in the study-areas usually go outdoors and are likely to be exposed to helminth eggs, particularly in areas with a high density of domestic or stray cats. Places used for defecation are often shared by several cats and this may lead to contamination of cats' paws with infective eggs as they bury their faeces. Therefore, it is important for human and animal health reasons, that domestic cats in these communities should be kept free from *T. cati* infection by treating them periodically with an effective anthelminthic. This is to prevent contamination of the environment, because this parasite (*T. cati*) produces large numbers of eggs (about 200,000 eggs/day) which can survive for a long time in the environment. In addition, treatment of queens with effective anthelminthic such as selamectina as suggested by Evans *et al* (2001) prior to queening will reduce the likelihood that parasite will infect the kittens. This measure is important since *T. cati* has been implicated as a causative agent of visceral larva migrans (VLM) (Fisher, 2003) and ocular larva migrans OLM (Petithory *et al* 1993) in humans, and therefore, care must be taken to reduce the risk of infection to animals and humans.

The high prevalence of *T. cati* in domestic cats recorded in the two communities indicate that children (i.e both pre-school and school-aged children) may be at risk, and if all the preventive and treatment requires are not taken to account, the prevalence may increase drastically. It is therefore imperative that people should be educated about the danger of close association with pets such as cats.

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