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Zoonotic and other gastrointestinal parasites in cats in Lumajang, East Java, Indonesia

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Abstract

Relationship between humans and cats has negative impact associates with zoonotic diseases. It is the reason why studies on the prevalence of gastrointestinal (GI) parasites in cats are important. Some of zoonotic GI parasites in cats are *Toxocara* spp, *Ancylostoma* sp, and *Toxoplasma gondii*. The current study was conducted to investigate the prevalence of GI parasites in owned and stray cats in Lumajang East Java Indonesia. One hundred and twenty fecal samples were collected from owned and stray cats on November 2018 to January 2019. The samples were examined by direct smears, sedimentation and flotation techniques. Identification of parasites was determined based on the morphology of worm eggs and protozoan cysts. The results showed that gastrointestinal parasites were found in 68.33% (82/120) examined samples, respectively, 48.33% (29/60) and 88.33% (53/60) from owned cats and stray cats. We found 7 genera of parasites, 4 genera of worm eggs and 2 genera protozoan oocyst. The egg worm were *Toxocara cati* (40 %), *Toxocara leonina*. (10.33%), *Ancylostoma* sp. (18.33%), *Diphylobothrium* sp. (3.33%) and *Dipylidium caninum* (1.67%). The protozoan oocyst were *Isospora felis* (27.5%), *Isospora rivolta* (13.33%) and *Eimeria* spp. (8.33%). *Toxocara cati*, *Ancylostoma* sp. (hookworm), *Diphylobothrium* sp. and *Dipylidium caninum* were zoonotic parasites. Rate infection in younger and older cat were no significant difference. One cat can be infected one or more parasite. To conclude, the prevalence of zoonotic GI parasites both in owned and stray cats were high. It is necessary to plan a program to control this zoonotic parasites.

Introduction

Cats are common pets in all countries. The close relationship between humans and cats has positive and negative impact. Negative impact associates with zoonotic diseases which can be dangerous for human health. Domestic cats and also wild felids are a potential source of a number of infectious disease agents such as several zoonotic parasites,[1] while another reseacher reported that stray cats can act as potential sources of soil contamination with zoonotic parasites.[2]

The gastrointestinal (GI) parasites are cosmopolitan pathogens and some species of parasite are zoonotic. For promoting public health protection, many researchers in the world have been interested in the epidemiology of GI parasites in cats, including in Egypt,[3] in Europe,[4] in Iran,[5] in China[6] in Serbia,[7] and in Poland.[2] They found parasites such as *Toxocara* sp, *Toxascaris leonina*, *Ancyloastoma* sp, *Trichuris* sp, *Dipylidium caninum*, *Taenia* sp, *Capillaria* spp, *Paragonimus* sp, *Cystoisospora* sp, *Toxoplasma gondii, Sarcocyst* spp, *Isospora* spp., *Blastocystis* sp. and *Giardia* sp.[2-7]

Considering the role of parasites in human beings and domestic animals helath, therefore this study aimed to estimate the prevalence of GI parasites, including the zoonotic parasites in owned and stray cats in Lumajang, East Java, Indonesia. This knowledge is important to formulate the effectively zoonotic disease control program.

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Materials and Methods

Sample Collection

Collecting samples were carried out on November 2018 to January 2019. One hundred and twenty fecal samples were collected from 60 owned and 60 stray cats in Lumajang, East Java, Indonesia. Term of owned cat is a household cat that lives in housing and is maitained by the owner, while stray cat is domestic cat that lives in market and has no owner. Stray cats were caught and caged by reseacher. During the first defecation of the owned cat, excrement was collected by the owner at the house, while stray cat was collected by reseacher. The faeces was placed into a disposable plastic container with 5% formalin for fixation worm egg and 2,5% potassium dichromat for fixation protozoan cysts and all of samples were stored at about 4°C for examination. Data such as the age and gender of cats were recorded.

Parasites Examination

All cat faeces were transported to Department of Veterinary Parasitology, Faculty of Veterinary Medicine Universitas Airlangga for examination. The samples were evaluated by direct wet smears, sedimentation and sugar fluotation method. Direct wet smears were observed by put faeces on slide with a drop of aquades and directly the prepared slides were examined under light microscope at 100x and 400x magnification.

Sedimentation and sugar fluotation method. Faeces samples were diluted with

aquades (1:9) and then were filtered. Filtrat was centrifugated 1500 rpm for 5 min and supernatant was discharge. This step was repeated until supernatant was clear. A small of sediment was put on slide with a drop of aquades and was examined under light microscope. Remaining sediment was added with sugar solution and was centrifugated 1500 rpm for 5 min. Centrifuge tube was put on the rack and was added sugar solution until full and the solution sugar covered mouth of tube. Tube was covered by covee slip and was waited for 5 min. Cover slip was took and put on slide and examined under light microscope at 100x and 400x magnification.

Parasites were identified based on morphological and morphometric features of worm eggs and protozoan (oo) cysts. The overall prevalence of gastrointestinal parasites was estimated as the number of cats found to be positive for the presence at least one species of parasite divided by the total number of cats examined. The prevalence of each parasite was calculated as the number of infected individuals over the total number of cats examined.

Statistical Analysis

The comparison between between kind and age of cats were carried out using the Chi-squared test with program SPSS (Statistical Package for Social Sciences). The statistical significance was difined if values of $P<0.05$.

Results

Of the 120 faecal samples, 68.33% (82/120) were positive constaining at least one species of GI parasite. The prevalence of parasites in stray cats was higher than in owned cats, 88.33% (53/60) for stray cats and 48,33% (29/60) for owned cats (Table 1).

A total of 8 species of GI parasite were identified microscopically both in owned cat and stray cat faeces, 5 species of worm and 3 species of protozoan (Table 2.). That parasites in both owned and stray cats, respectively, were *Toxocara cati* (18.33% or 11/60 and 61.67% or 37/60), *Toxocaris leonina* (3.33% or 2/60 and 18,33% or 11/60), *Ancylostoma* sp. (11.67% or 7/60 and 25% or 15/60), *Diphylobothrium* sp. (5% or 3/60 and 1.67% or 1/60), *Dipylidium caninum* (3.33% or 2/60 and 0%), *Isospora felis* (15% or 9/60 and 40% or 24/60), *Isospora rivolta* (8.33% or 5/60 and 18.33% or 11/60) and *Eimeria* spp. (5% or 3/60 and 11.67% or 7/60). And overall, the prevalence of intestinal parasites in the younger (< 1 year) and older (≥ 1 year) cats had no significant difference.

One cat can infect by single or mix parasites and the cats frequently mix infected two parasite species or three, even four parasite species. In this study, mix parasites infections were observed in the owned and stray cat populations (Table 3). *Toxocaris leonina* and *D. caninum* eggs and *Eimeria* sp oocyst always found together with other species. *Toxocaris leonina* always together with *T. cati*. *D. caninum* egg and *Eimeria* sp oocyst especially together with *Ancylostoma* sp.

Discussion

The prevalence GI parasite infection in cat in Lumajang was high (68.33%) which in stray cats was higher (88.33%) than in owned cats (48.33%). With these intersting results, the author assumed that owned cats get better care by their owners, while stray cats find own food and often scavenge garbage. The prevalance of GI parasites infections both in stray cats and owned cats in Lumajang Indonesia was very high. The high prevalence of GI infection in cats, aspecially in stray cats, also reported by previous reseachers. Epidemiological studies have confirmed that stray cat populations are a very important reservoir of worm and protozoan parasites and stray cats are as

Table 1. The prevalance of infections with gastrointestinal parasites in faecal examined cats.

Cat	Parasite	Location			Total
		North	Center	South	
Owned Cat	Worm	3/20 (15%)	4/20 (20%)	8/20 (20%)	29/60 (48.33%)
	Protozoa	4/20 (20%)	3/20 (15%)	3/20 (15%)	
	Worm and Protozoal	0	1/20 (20%)	3/20 (15%)	
Stray Cat	Worm	9/20 (45%)	4/20 (20%)	6/20 (30%)	53/60 (88.33%)
	Protozoa	0	4/20 (20%)	2/20 (10)	
	Worm and Protozoal	9/20 (45%)	12/20 (60)	7/20 (35%)	
	Total	25/40 (62.5%)	28/40 (70%)	29/40 (72.5%)	82/120 (68.33%)

Table 2. The prevalence of each species of gastrointestinal parasites in faecal examined cats.

Parasite	No of cat positive (%)						Total (n=120)
	Owned Cat (n=60)			Stray Cat (n=60)			
	< 1 th	≥ 1th	Total	< 1 th	≥ 1 th	Total	
Toxocara cati.	5(8.33)	6 (10)	11(18.33)	18(30)	19(31.67)	37 (61.67)	48(40)
Toxascaris leonina	1(1.67)	1(1.67)	2 (3.33)	4(6.67)	7(11.67)	11(18.33)	13(10.33)
Ancylostoma sp.	2(3.33)	5(8.33)	7(11.67)	4(6.67)	11(18.33)	15(25)	22(18.33)
Diphylobothrium sp.	2 (3.33)	1(1.67)	3 (5)	0	1(1.67)	1(1.67)	4(3.33)
Dipylidium caninum	0	2(3.33)	2 (3.33)	0	0	0	2(1.67)
Isospora felis.	6 (10)	3 (5)	9 (15)	11(18.33)	13(21.67)	24 (40)	33(27.5)
Isospora rivolta	1(1.67)	4(6.67)	5 (8.33)	5(8.33)	6 (10)	11(18.33)	16(13.33)
Eimeria spp.	2(3.33)	1(1.67)	3 (5)	4(6.67)	3(5)	7(11.67)	10(8.33)

potential sources of soil contamination with zoonotic parasites.[2] The prevalence of GI parasite infection in stray cats in Iran 95.6% and 86.4%[5,8] and in Egypt 91%[3]. The prevalence in in owned cat in Europe 50.7%,[4] in China 41.39 %[6] and in Serbia 40.19%.[7]

In this research, four of 5 worm were zoonotic parasites, including, *Toxocara cati*, *Ancylostoma* sp., *Diphylobothrium* sp. and *Dipylidium caninum*. *Toxocara cati* was the most common parasite found in both owned and stray cat faeces, 18.33% (11/60) and 61.67% (37/60), respectively. According to,[2] *Toxocara* was an important zoonotic risk that cause larva migrans syndromes and ocular toxocarosis for the human population, especially children. Their research reported that the prevalence of *T. cati* in stray cats was found to be 27.9 % in Poland. Reseacher from Europe and China also reported that *T. cati* was dominant parasite infected 19.7% and 17.78% of household cats, respectively.[4,6]

In this study, *Ancylostoma* sp. or hookworm was the second zoonotic parasites in cats after *T. cati*. The prevalence of hookworm in owned cats was 11.67% (7/60), while in srtay cats was 25% (15/60). Several reports of human infections by feline hookworm infections have been reported from soil contaminated cats faeces.[1] Hookworm eggs hatch develop to become infective (filariform) larvae that can penetrate the skin of animals or human hosts. Hookworm is one of the four most common soil-transmitted helminths (STH). STH have been documented as causing impairment of growth and nutrition because it causes to damage the intestinal mucosa leading to bleeding, loss of iron and anemia.[9]

Other species worm that infected cats in these study was *Toxocaris leonina*. The prevalence was (10.33%) and it was lower than in Korean (31.5%)[10]. Human infection by *T. leonina* has not been reported,[11] it is non zoonotic worm.

Diphylobothrium sp. and *Dipylidium caninum* was encountered with low prevalence in comparison with other species. Diphylobothriid typeworm also found very low prevalence (0.2%) in ferral cats in Korea.[12] *Diphylobothrium* sp can infect cat or human by eating raw or undercooked fish. Fish infected with *Diphyllobothrium* larvae may be consumed in any country in the world. The prevalence of *D. caninum* infection in stary cats in Egypts was lower (5%),[3] while in Iran was lowest (2.9%).[5]

In recent study, all of protozoan were non zoonotic parasite, they were 27.5%, 13.33% and 8.33% for *Isospora felis, I. rivolta* and *Eimeria* sp, respectively. These findings were lower than prevalence in China and Italy.[6,13] In China the prevalance *I. felis* and *I. rivolta* infection in cat, respectively, were 11.39% and 9.17%,[6] while in Italy were 3% and 2.3% and they did not found *Eimeria* sp. *Isospora felis* and *I. rivolta* appear to be non pathogenic for cats.[6]

The prevalence of intestinal parasites in the younger (<1 year) and older (≥1 year) cats had no significant difference. These finding was similar with result reseach in China,[6] but different with report in Italy[13] which reported that parasite infections were identified in significantly more cats younger than 18 months of age (P<0.05), and most often associated with the presence of compatible clinical signs (P<0.05).

As well as the results of this study that found one cat can infect by single or mix parasites and the cats frequently mix infected two parasite species or three, even four parasite species, many researcher also reported it.[3,6] Indeed, 81.3% domestic cats in Ode – Irele and Oyo communities, Southwest Nigeria were reported that they were infected with two or more parasites.[14]

Table 3. The prevalence of single and mixed parasaite infections in cats.

Infection		The prevalence in cat (%) Owned Cat n=60	Stray Cat n=60	Total (n=120)
Single Parasite	*Toxocara cati*	7 (11.67)	8 (13.33)	15 (12.5)
	Ancylostoma sp.	2 (3.33)	6 (10)	8 (6.67)
	Diphylobothrium sp.	2 (3.33)	0	2 (1.67)
	I. felis	5 (8.33)	3 (5)	8 (6.67)
	I. rivolta	3 (5)	1(1.67)	4 (3.33)
Mixed 2Parasite	*T. cati; T. leonina*	2 (3.33)	3 (5)	5 (4.17)
	T. cati, Ancylostoma sp	1(1.67)	0	1 (0.83)
	T.cati, I. felis	0	9 (15)	9 (7.5)
	T. cati, I. rivolta	0	2 (3.33)	2 (1.67)
	T. cati, Eimeria sp	0	2 (3.33)	2 (1.67)
	Ancylostoma sp., *D. caninum*	1 (1.67)	0	1 (0.83)
	Ancylostoma sp., *Eimeria* sp	1 (1.67)	0	1 (0.83)
	Ancylostoma sp., *I.felis*	0	2 (3.33)	2 (1.67)
	Ancylostoma sp., *Diphylobothrium* sp.	0	1 (1.67)	1 (0.83)
	Diphylobothrium sp., *I. felis*	1 (1.67)	0	1 (0.83)
	I. felis, I. rivolta	2 (3.33)	1 (1.67)	3 (2.5)
Mixed 3Parasite	*T. cati, T. leonina, Ancylostoma* sp.	0	1 (1.67)	1 (0.83)
	T. cati, T. leonina, Eimeria sp	0	2 (3.33)	2 (1.67)
	T. cati, T. leonina, I. felis	0	1 (1.67)	1 (0.83)
	T. cati, T. leonina, I. rivolta	0	2 (3.33)	2 (1.67)
	T.cati, Ancylostoma sp., *Eimeria* sp.	0	1 (1.67)	1 (0.83)
	T. cati , Ancylostoma sp., *I. felis*	0	1 (1.67)	1 (0.83)
	T. cati, I. felis, I. rivolta	0	2 (3.33)	2 (1.67)
	Ancylostoma sp., *I, felis, I. rivolta*	0	1(1.67)	1 (0.83)
	Ancylostoma sp., *Dipylidium caninum, Eimeria* sp	1 (1.67)	0	1 (0.83)
Mixed 4Parasite	*T. cati, Ancylostoma* sp, *I. felis, Eimeria* sp.	1 (1.67)	1 (1.67)	2 (1.67)
	T. cati, T. leonina, I. felis, Eimeria sp.	0	1 (1.67)	1 (0.83)
	T. cati, T. leonina, I. felis, I. rivolta	0	1 (1.67)	1 (0.83)
	T. cati, Ancylostoma sp., *I. felis, I. rivolta*	0	1 (1.67)	1 (0.83)
Total		29 (48.33)	53(88.33)	82 (68.33)

Conclusions

The prevalence of zoonotic gastrointestinal parasites both in owned and stray cats in Lumajang Indonesia were high. It is necessary to plan a program to control this zoonotic parasites.

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