Identification of Gastrointestinal Parasite in Hospitalized Cats at Several Animal Clinics in Surabaya Using Faecal Examination Method

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Abstract

The aim of this study is to identify the parasite species and prevalence of gastrointestinal parasites that infect cats hospitalized at several veterinary clinics in Surabaya using the faecal examination method. The type of this research is an observational with research design used in this study is a cross sectional study. The samples used in this study were 100 cat feces that hospitalized at several veterinary clinics in Surabaya and each took 25 fecal samples. This sample examined using native, sedimentation, and floating methods. The results showed 35% of samples positively infected by gastrointestinal parasites with 28% parasites as single infection and 7% as mixed infection. The gastrointestinal parasites that identified in this study were *Toxocara cati*, *Ancylostoma* sp., *Cryptosporidium* sp., *Isospora felis*, and *Isospora rivolta*. The results of statistical analysis with chi square test showed that sex and age not related to the prevalence of the gastrointestinal parasites in hospitalized cats at several animal clinics in Surabaya.

Keywords: cat, gastrointestinal, parasite, animal clinic, Surabaya

Introduction

Several reports indicate that public interest in pet adoption and ownership has increased during the COVID-19 pandemic (Ho *et al*., 2021). One of the most popular pets is the cat. Cat maintenance is relatively easy, but if the cat's health condition is disturbed it can have a negative impact on the owner because of the risk of infected the disease from cats (Nugraha *et al*., 2018). The incidence of disease in cats that often occurs is a parasitic infection of the digestive tract (Pabundu, 2007). Gastrointestinal parasitic infections in cats can cause a decrease in body immunity because it absorbs important nutrients and interferes with vital organs, thus making cats more susceptible to various diseases (Yudhana and Praja, 2017).

Praptanto *et al*. (2021) reported that 71% of feral cats and 40% of domestic cats in Blitar Regency positively infected by digestive tract parasites. Rabbani *et al*. (2020) reported that in his research on gastrointestinal parasites in cats in Lumajang Regency, 68.33% of samples were positively infected, Endeyanti (2020) also reported that 68.16% of feral cats in the traditional market of Pasuruan City were positively infected by digestive tract parasites. In a similar study, Purnama *et al*. (2019) reported that 43.9% of cats in the East Surabaya shelter were positive for digestive tract parasites. Pagati *et al*. (2018) reported that 68.89% of fecal samples from cat patients at several Animal Hospitals and Animal Clinics in Surabaya were positive of digestive tract protozoa.

The most common digestive tract parasites found in cat feces include *Ancylostoma* sp., *Toxocara cati*, *Strongyloides stercoralis*, *Trichuris* sp., *Dipylidium caninum*, and *Isospora* sp. (Monteiro *et al*., 2016). Khalafalla (2011) also reported that several digestive tract parasites that can infect cats include the worm species *Toxocara cati*, *Ancylostoma tubaeforme*, *Toxascaris leonina*, *Dipylidium caninum*, *Capillaria* spp., *Taenia taeniformis*, *Heterophyes heterophyes*; and the protozoan species *Toxoplasma gondii*, *Sarcocyst* spp., *Isospora* spp., *Giardia* spp. One of the digestive tract parasites that are zoonotic and identical to cats as their definitive hosts is *Toxoplasma gondii*. According to Nurcahyo and Priyowidodo (2019), cats around the world are a latent source of *T. gondii* infection, and various studies in cats around the world show the presence of antibodies to toxoplasmosis as much as 20-90%. Prayekti (2020) also reported that as many as 14% of diarrhea cats at the Animal Hospital and Animal Clinic in Surabaya were positively infected of *T.*

gondii which were examined by microscopic methods.

The diseases caused by gastrointestinal parasites need to be considered because of their widespread distribution and rapid transmission. Some gastrointestinal parasites that infect cats can be transmitted to humans or zoonotic (Robertson *et al*., 2000). As for some digestive tract parasites in cats that can be zoonotic, namely *Ancylostoma* sp., *Toxocara* spp., *Diphyllobothrium* sp., *Dipylidium caninum*, *Toxoplasma gondii*, *Cryptosporidium* sp., *Giardia* sp., and *Entamoeba* sp. (Bowman, 2014; Rabbani *et al*., 2020).

Based on several reports of studies on gastrointestinal parasitic infections in cats in the city of Surabaya, most of them are case studies on stray cats, domesticated cats, and cats in shelters or pet shops. However, there are still few case studies of gastrointestinal parasites that infect cats in veterinary clinics, especially in cats who are hospitalized. Therefore, it is necessary to do a research on digestive tract parasites in cats hospitalized in several veterinary clinics in the city of Surabaya.

Research Methods

Time and Place

The study conducted from March to May 2022. Sampling carried out at four veterinary clinics in the city of Surabaya. Research and examination of samples were carried out at the Laboratory of the Division of Veterinary Parasitology, Faculty of Veterinary Medicine, Airlangga University.

Procedure

One hundred samples of cat feces that hospitalized taken from each clinic by taking fresh cat feces that had been in the litter box, then put into the sample pot and given a 2.5% potassium bichromate solution. The sample pot that already contains cat feces then labeled by cat's identity such as the cat's name, gender, age, place and date of sampling.

The faecal samples that obtained then taken to the laboratory to be examined by three methods of examination of feces including native, sedimentation, and floating methods to see the presence of worm eggs and protozoa. If the examination does not find a protozoan stage or it is diagnosed that there is a protozoan stage but cannot be identified, then the sample is allowed to stand for one to three days so that the sporulation process occurs which aims to facilitate the identification of cyst and oocyst forms.

The results obtained in the form of positive samples or negative samples infected by digestive tract parasites. Samples that were declared positive were continued with the calculation of TCPGT (worm eggs per gram of stool) or OTGT (oocysts per gram of feces) using the McMaster method. Furthermore, the data analyzed and presented descriptively in the form of figures and tables, and the prevalence was calculated. Sex and age data analyzed using the Chi Square test to determine the relationship between sex and age with the prevalence of gastrointestinal parasites in cats hospitalized at several veterinary clinics in Surabaya.

Results and Discussion

The digestive tract parasites found in this study included worm eggs and protozoa. The worm eggs found were *Toxocara cati* and *Ancylostoma* sp., while the protozoa found were *Isospora felis*, *Isospora rivolta*, and *Cryptosporidium* sp.

Toxocara cati eggs were found measuring 67,14 – 77,92 x 53,02 – 68,02 µm, round or oval in shape, golden brown in color, had a slightly mottled surface, and surrounded by a thick albumin wall. This is in accordance with Uga *et al*. (2000) that *T. cati* eggs were 63,7 – 88.1 x 53,3 – 73,3 µm. The egg structure is round or pear-shaped, has a speckled surface, has thick albumin-walled holes (pits) with a wall structure surrounding the hole, and is golden in color (Kusnoto, 2010).

Ancylostoma sp. eggs were found measuring 50,16 – 60,99 x 30,73 – 42,90 µm, oval-shaped, thin-walled, and contained two to eight blastomeres. This is in accordance with the statement of Taylor *et al*. (2016) that the eggs of *Ancylostoma* sp. oval-shaped and thin-walled with a size of 56-75 x 34-47 µm, and the egg contains an embryo consisting of 2-8 blastomeres and contains 8-16 cells.

Cryptosporidium sp. that found was an oocyst stage measuring 6,54 – 7,31 x 4,48 – 5,66 µm, oval in shape, had four sporozoites, and had thick walls. This is in accordance with Galecki and Sokol (2015) who stated that the oocysts of *Cryptosporidium* sp. the average size is 5 – 7,4 x 4,5 – 5,6 µm with an oval shape consisting of 4 sporozoites and has 1 – 8 prominent granules, and is covered by 2 thick walls.

Two species of *Isospora* sp. found in this study, namely *Isospora felis* and *I. rivolta*. The morphology of both is the same, with the oocysts are round or oval, thin-walled and smooth, have two sporocysts and four sporozoites. However, the two species have different oocyst sizes, where

the sporulated *I. felis* oocysts measure 40,06 – 42,98 x 29,25 – 33,59 µm, while the sporulated *I. rivolta* oocysts measure 21,00 – 29,28 x 18,95 – 24,28 µm. This result is in accordance with the statement of Taylor *et al.* (2016) that the sporulated *I. felis* oocysts had a size of 32 – 53 x 26 – 43 µm, while the sporulated *I. rivolta* oocysts were 21 – 29 x 18 – 26 µm. The morphology of the four species of digestive tract parasites can be seen in Figure 1.

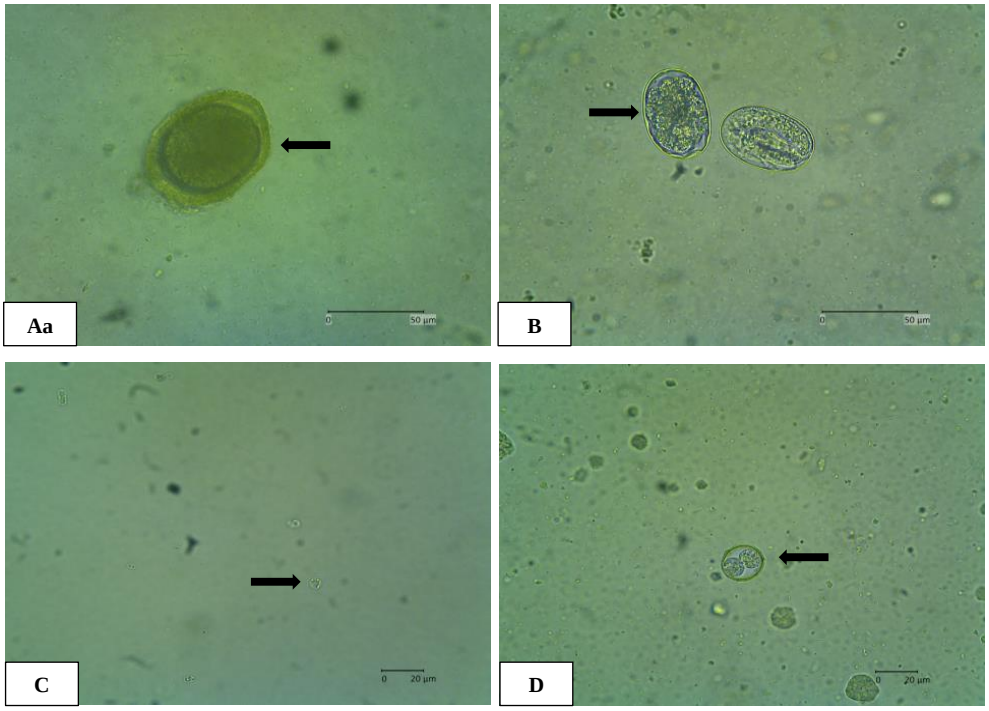

Figure 1. Gastrointestinal parasites in cats a) *Toxocara cati* egg, b) *Ancylostoma* sp. eggs, c) *Cryptosporidium* sp. oocyst, d) *Isospora rivolta* oocyst.

In this study, from the four digestive tract parasites found, three were zoonotic parasites or could be transmitted to humans, so they need to be wary of. The three species are *Toxocara cati*, *Ancylostoma* sp., and *Cryptosporidium* sp. This is in accordance with the statement of Monteiro *et al.* (2016) that digestive tract parasites in cats that are zoonotic are *Ancylostoma* sp., *Toxocara* sp., *Toxoplasma gondii*, *Cryptosporidium* sp., *Giardia* sp., and *Entamoeba* sp.

Ancylostoma sp. can infect cats through food that contaminated with infective eggs or larvae or through the environment when roaming or playing outdoors. A slightly sandy, slightly humid place, and not exposed to direct sunlight is a good medium for the development of *Ancylostoma* sp. (Mogi, 2021). Cats are infected with *T. cati* because they accidentally ingest embryonic eggs from contaminated soil, ingest larvae found in intermediate hosts such as mice, or become infected through milk from mother cats (lactogenic transmission in kittens) (Coati *et al.*, 2004; Overgaauw and van Knapen, 2013). Several recent studies have also reported that direct contact with infected cat fur can also be a source of transmission of *T. cati* through the egg form (Rostami *et al.*, 2020). Cats can also infected with digestive tract protozoa such as *Isospora* sp. and *Cryptosporidium* sp. through food or drink that contaminated by the infective stage of protozoa such as oocysts, cysts, or trophozoites (Sucitrayani *et al.*, 2014).

The prevalence rate obtained in this study was 35% of the samples were positive and 65% of the samples were negative (Table 1), with details of 16 positive samples of digestive tract worms and 23 positive samples of digestive tract protozoa (Table 2).

Table 1 Prevalence of Gastrointestinal Parasites in Hospitalized Cats at Several Veterinary Clinics in Surabaya

Examination Results	Number of Samples	Percentage
Positive	35	35 %
Negative	65	65 %
Total	100	100 %

Table 2 Prevalence of Gastrointestinal Parasites in Cats Hospitalized at Several Veterinary Clinics in Surabaya City based on Type of Parasite

Digestive Tract Parasites	Examination Results	
	Positive	Negative
Worms	16 (16%)	84 (84%)
Protozoa	23 (23 %)	77 (77%)

In this study, the highest number of digestive tract parasitic infections was gastrointestinal protozoa infection, which was 23%. This prevalence shows a higher number than the prevalence of gastrointestinal worm infection which was only 16%. This can be presumably because digestive tract worms can be treated with deworming drugs, while digestive tract protozoa not affected by deworming drugs commonly used in cats (McGlade *et al*., 2003). The wide spread of protozoan diseases and their rapid transmission can also be the cause of the high prevalence of digestive tract protozoal infections (Pagati *et al*., 2018).

In this study also showed that *Isospora* sp. became the highest source of single infection with a prevalence rate was 16%, followed by single infection with *Ancylostoma* sp. was 9%, and *Cryptosporidium* sp. was 3%. This study also found mixed infections between worm species, also between worm species and protozoa. Mixed infections between worm species found in this study were *T. cat*i with *Ancylostoma* sp. (3%). Mixed infections between worm species and protozoa found in this study were include *Ancylostoma* sp and *Isospora* sp. (3%), and *T. cati* with Isospora sp. (1%). The complete results can be seen in Table 3.

Table 3 Prevalence of Gastrointestinal Parasites in Cats Hospitalized at Several Veterinary Clinics in Surabaya City based on Type of Infection

Species	Positive Amount	Percentage (%)
	Single Infection	
Ancylostoma sp.	9/100	9
Cryptosporidium sp.	3/100	3
Isospora sp.	16/100	16
	Mixed Infection	
Toxocara cati & *Ancylostoma* sp.	3/100	3
Toxocara cati & *Isospora* sp.	1/100	1
Ancylostoma sp. & *Isospora* sp.	3/100	3
Total	35/100	35

According to Geurden *et al* (2017) mixed infections of digestive tract parasitic are frequently reported in cats. Mixed infection suspected to occur because of the opportunities that can cause a mixed infection, namely the condition of the infected host, the influence of the infectious agent, and supportive environmental conditions. This is in accordance with the concept of the epidemiological triangle regarding the occurrence of disease due to an imbalance between the host, disease agent, and the environment (Irwan, 2017).

Table 4 Prevalence of Gastrointestinal Parasites in Hospitalized Cats at Several Veterinary Clinics in Surabaya City based Sex and Age

Examination Results	Sex		Age	
	Male (n = 56)	Female (n = 44)	0-12 months (n = 61)	> 12 months (n = 39)
Positive	20 (35,7%)	15 (34,1%)	23 (37,7%)	12 (30,8%)
Negative	36 (64,3%)	29 (65,9%)	38 (62,3%)	27 (69,2%)

The results of the examination in Table 4 show that the prevalence of samples positive for digestive tract parasites was higher in male cats. This was because in the collection of cat feces samples that hospitalized at four veterinary clinics in the city of Surabaya, there are more male cats. The high prevalence rate caused by the male cats having a greater chance to leave the house than female cats, because male cats are looking for female cats to mate so they can be infected by parasites from stray cats (Widhowati *et al*., 2019). Based on the results of the analysis using the Chi Square test, it showed that the prevalence of gastrointestinal parasites in cats was not influenced by gender ($p>0.05$), so

that male and female cats had the same chance of being infected. This is in accordance with Nagamori *et al*. (2018) which states that gender has no effect on the prevalence of digestive tract parasites in cats.

The results of the examination in Table 4.4 also show that the prevalence rate of samples positive for gastrointestinal parasites was higher in cats aged 0-12 months. This was because in taking cat feces samples that are hospitalized at four veterinary clinics in the city of Surabaya, there are more cats aged 0-12 than >12 months old. The age of the cat is one of the important risk factors associated with parasitic infection, where cats aged < 6 months are more likely to be infected with parasites than older cats. The incidence of parasitic infection can occur at any age, although the incidence of infection is highest in kittens or young cats (Arbabi and Hooshyar, 2009). Based on the results of the analysis using the Chi Square test, it showed that the prevalence of gastrointestinal parasites in cats was not affected by age ($p>0.05$), so cats aged 0-12 months and aged >12 months had the same chance of being infected. These results are in agreement with Rabbani *et al*. (2020) which states that age has no effect on the prevalence of intestinal parasitic infections in cats.

The calculation of the number of worm eggs (TCPGT) carried out on 16 positive samples of intestinal worms and the calculation of the number of oocysts (OTGT) carried out on 23 positive samples of digestive tract protozoa. TCPGT and OTGT calculation data can be seen in Table 5.

Table 5 Infection Degree of Digestive Tract Parasite in Cats Hospitalized at Several Veterinary Clinics in Surabaya

Infection Degree	TCPGT or OTGT	Types of Digestive Tract Parasites	
		Worms (n = 16)	**Protozoa (n = 23)**
Mild	1-499	15 (93,75%)	14 (60,87%)
Moderate	500-5000	1 (6,25%)	7 (30,43%)
Severe	>5000	-	2 (8,7%)

Based on Keliat *et al*. (2018) the degree of gastrointestinal worm infection found in this study categorized as mild and moderate, while the degree of gastrointestinal protozoa infection found included in the category, mild, moderate, and severe. Although the degree of infection in this study dominated by the mild category, treatment steps still need to be taken because it can be a source of transmission for other animals and humans.

Conclusion

The types of digestive tract parasites found in cats hospitalized at several veterinary clinics in the city of Surabaya include intestinal worms *Toxocara cati* and *Ancylostoma* sp., and digestive tract protozoa, namely *Cryptosporidium* sp., *Isospora felis*, and *Isospora rivolta*. The prevalence rate of gastrointestinal parasites found was 35% of the samples tested positive with 28% of parasites being the sole source of infection and 7% of parasites being the source of mixed infections. Differences in sex and age not related to the prevalence of gastrointestinal parasites. The degree of gastrointestinal parasitic infection in helminth infections categorized as mild and moderate, while the degree of infection in digestive tract protozoa categorized as mild, moderate, and severe.

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