






## Stray Cat Gastrointestinal Protozoa Prevalence and Infection Degree in Madiun Public Health Center and Traditional Market

<sup>1\*)</sup>Hayuning Nurrodhiya, <sup>2)</sup>Djoko Legowo , <sup>3)</sup>Endang Suprihati , <sup>3)</sup>Poedji Hastutiek ,  
<sup>3)</sup>Mufasirin , <sup>4)</sup>Dadik Rahardjo 

1) Student, Faculty of Veterinary Medicine, Universitas Airlangga

2) Division of Veterinary Pathology, Faculty of Veterinary Medicine, Universitas Airlangga

3) Division of Veterinary Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga

4) Division of Veterinary Public Health, Faculty of Veterinary Medicine, Universitas Airlangga

\*Corresponding author: [hayuning.nurrodhiya-2019@fkh.unair.ac.id](mailto:hayuning.nurrodhiya-2019@fkh.unair.ac.id)

### Abstract

This study determine the prevalence and protozoa infection degree of gastrointestinal in stray cats at Public Health Center and Traditional Market of Madiun City. 80 fecal sample collected. Fecal samples examined with direct smear, sedimentation, and floatation method. Positive samples calculated using the *Lucient-Brumpt* method. The result of the examination in Public Health Center showed that 37,5% stray cat infected by *Isospora* sp., *Entamoeba* sp., and *Cryptosporidium* sp., with  $1167.33^a \pm 168.373$  infection degree. The examination result in Traditional Market showed that 62,5% stray cat infected by *Isospora* sp., *Entamoeba* sp., and *Cryptosporidium* sp., with  $1186.00^a \pm 148.577$  infection degree. The result of *Chi Square* analysis obtained  $p < 0,05$  indicated that there were significant differences between stray cat including faecal collection location, age, type of cat and faecal condition. The result of *Kruskal Wallis* analysis of the degree infection obtained  $p > 0,05$  indicated that there were no significant differences.

**Keywords:** stray cat, protozoa of gastrointestinal, prevalence, infection degree

### Introduction

Madiun City is one of small cities in East Java Province, which not yet reported any cases of gastrointestinal protozoan prevalence and infection degree in stray cats. Gastrointestinal protozoa are zoonotic and wild cats are one of the animals that are susceptible to infection with gastrointestinal parasites (Praptanto, 2020).

Protozoa cause visible clinical symptoms diarrhea (Robbie *et al.*, 2020). Gastrointestinal protozoa include *Entamoeba* sp., *Eimeria* sp., *Toxoplasma gondii*, *Isospora* sp., *Balantidium coli*, *Giardia* sp., and *Cryptosporidium* sp. (Levine, 1995). Research conducted by Pagati *et al.* (2018) in Surabaya City reported that the prevalence rate of gastrointestinal protozoan infections in cats reached 68.89%. Another study conducted by Wijayanti and Marbawanti (2014) in Banjarnegara Regency Market and Hospital showed that the prevalence of *Toxoplasma gondii* in stray cats in markets was 32% and hospitals was 27%.

Age and cat strain affect the prevalence of gastrointestinal protozoan infections. Young cats will have a higher prevalence rate than older cats (Mareta, 2019). Domestic cats have high adaptability and more resistant to gastrointestinal protozoa infections (Susanty, 2005).

Infection degree also needs to be considered so that the veterinarian can provide the right

treatment. Infection degree classified into three, namely mild, moderate, and severe. The degree of infection is mild (less than 20,000 oocysts/gram), moderate infection (more than 20,000 to 60,000 oocysts/gram), and severe infection (more than 60,000 oocysts/gram) (Arsyitahlia *et al.*, 2019).

This research expected to provide information about the prevalence and degree of gastrointestinal protozoan infection in stray cats so that veterinarians can provide further treatment and the public will be more concerned and careful in maintaining environmental cleanliness and the dangers of this parasitic infection.

### Methods

Stool sampling carried out at the Madiun City Market and Health Center. Stool samples examined at the Laboratory of Veterinary Parasitology Division, Faculty of Veterinary Medicine, Airlangga University. The research conducted in December 2022-January 2023.

The research used fresh feces samples from 80 cats. Each sample was 5 grams and potassium bichromate was added as a preservative. Each sample pot labeled with the age, sex, type of cat, condition of the feces and place where the feces collected.

Samples examined at the Parasitology Laboratory, Faculty of Veterinary Medicine,



Airlangga University using native, sedimentation, floatation, and *Lucient-Brumpt* methods. Identification of protozoa by observing the shape and size of the protozoa and measuring using optilab image.

The prevalence and infection degree analyzed using Chi-Square and Kruskal Wallis Test with the SPSS program.

### Result and Discussion

From 80 samples, 40 samples were positive and 40 samples were negative. The prevalence of gastrointestinal protozoa in stray cats at the Madiun City Health Center was 37.5% and 62.5% at Madiun City Market, the details presented in Table 1.

Single gastrointestinal protozoan infection found in this study consisting of *Isospora* sp. infection with 26 positive samples, *Entamoeba* sp. with 9 positive samples and *Crptosporidium* sp. with 5 positive samples, presented in Table 2. The complete types of protozoa found based on sex, age and race presented in Table 3.

**Table 1.** Stray Cats Gastrointestinal Protozoa Prevalence on Health Center and Market

Sampling Location	Positive Sample	Negative Sample
Health Center	15/40 (37.5%)	25/40 (62.5%)
Market	25/40 (62.5%)	15/40 (37.5%)
<b>Total</b>	40/80 (50%)	40/80 (50%)

**Table 2.** Single Infection Percentage

Protozoa	Total	%
<i>Isospora</i> sp.	26	65
<i>Entamoeba</i> sp.	9	22.5
<i>Cryptosporidium</i> sp.	5	12.5
<b>Total</b>	40	

**Table 3.** Types of Gastrointestinal Protozoa based on Sex, Age, and Race

Male	Total Sample	Positive Sample	Positive Sample	
			Protozoa	Total
<1 year	17	15	<i>Isospora</i> sp.	8
			<i>Entamoeba</i> sp.	4
			<i>Cryptosporidium</i> sp.	3
>1 year	21	6	<i>Isospora</i> sp.	5
			<i>Entamoeba</i> sp.	1
			<i>Cryptosporidium</i> sp.	0
Total	38	21		21
<b>Female</b>				
<1 year	18	10	<i>Isospora</i> sp.	7
			<i>Entamoeba</i> sp.	2
			<i>Cryptosporidium</i> sp.	1
>1 year	24	9	<i>Isospora</i> sp.	6
			<i>Entamoeba</i> sp.	2
			<i>Cryptosporidium</i> sp.	1
Total	42	19		19
<b>Cat Type</b>				
Domestic	75	35	<i>Isospora</i> sp.	22
			<i>Entamoeba</i> sp.	8
			<i>Cryptosporidium</i> sp.	5
Race	2	2	<i>Isospora</i> sp.	2
			<i>Entamoeba</i> sp.	0
			<i>Cryptosporidium</i> sp.	0
Mix	3	3	<i>Isospora</i> sp.	2
			<i>Entamoeba</i> sp.	1
			<i>Cryptosporidium</i> sp.	0
Total	80	40		40

The prevalence rate based on sex was 55% for male wild cats and 45% for female wild cats. The results of the Chi Square analysis obtained an insignificant result, 0.370, indicating that there was no real difference in the value ( $p > 0.05$ ).

The prevalence rate of gastrointestinal protozoa in wild cats aged less than 1 year was 71% with 25 out of 35 samples positive. The prevalence of gastrointestinal protozoa in domestic cats aged more than 1 year was 30% with 15 of 45 positive samples. The results of the Chi Square analysis obtained a significant result, namely 0.001, which shows that there is a real difference ( $p < 0.05$ ).

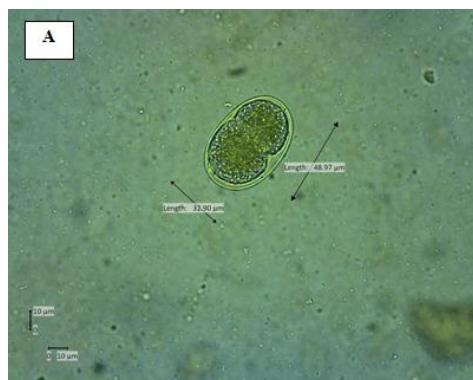
The prevalence rate based on the cat race also has the same significant difference as the age difference in wild cats. Domestic cats have a prevalence rate of 47%, race cats 100%, and mixed cats 100%. The results of the Chi Square analysis obtained significant results, namely 0.028 which indicated a significant difference ( $p < 0.05$ ).

Prevalence rates based on the stool condition obtained results of 19% diarrhea and 21% without diarrhea/normal. The results of the Chi Square analysis obtained a significant result, 0.001 which indicated a significant difference ( $p < 0.05$ ), details can be seen in Table 4.

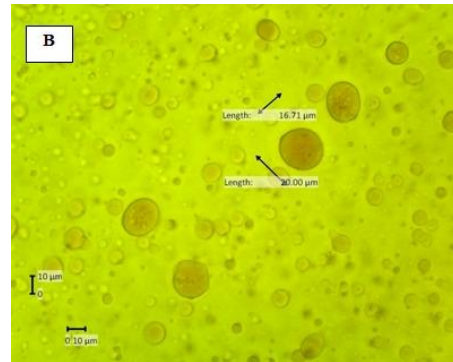
**Table 4.** Gastrointestinal Protozoa based on Stool Condition

Stool Condition	Total Sample	Positive Sample	Protozoa	Total
Diarrhea	19	19	<i>Isospora</i> sp.	10
			<i>Entamoeba</i> sp.	4
			<i>Cryptosporidium</i> sp.	5
Normal	61	21	<i>Isospora</i> sp.	16
			<i>Entamoeba</i> sp.	5
			<i>Cryptosporidium</i> sp.	0
<b>Total</b>	<b>80</b>	<b>40</b>		<b>40</b>

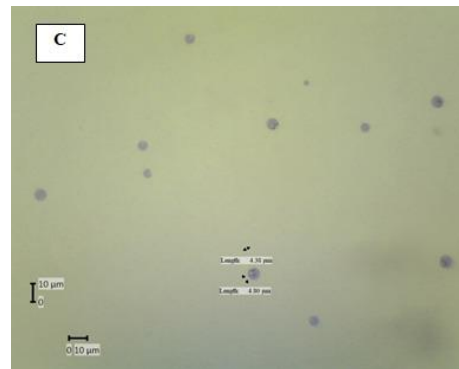
The protozoa found in this study could be seen in **Figure 1**.



**Figure 1A.** *Isospora* sp. 400x magnification



**Figure 1B.** *Entamoeba* sp. 400x



**Figure 1C.** *Cryptosporidium* sp. 1000x

This study found the oocyst stage of *Isospora* sp. which in sporulation phase. *Isospora* sp. size was 32.90 x 48.97 µm and oval shape. This study was in accordance with Soulsby statement (1986) that the oocysts of *Isospora* sp. size was 38-51 µm and has oval shape. *Entamoeba* sp. found in this study was at cyst stage measuring 16.71 x 20.00 µm and ovoid in shape. *Entamoeba* sp. found in accordance with the statement of Suwanti et al. (2012) where the cyst stage has a size of 3.5-20 µm and has round shape. *Cryptosporidium* sp. has a round shape that almost oval and 4.38 x 4.80 µm size. This was in accordance with Levine (1995) which states that *Cryptosporidium* sp. has 3-5 µm size.

The prevalence of *Isospora* sp. infection obtained in this study was 22.5% at the Madiun City Health Center and 42.5% at the Madiun City Market. *Entamoeba* sp. infection was 10% in the Madiun City Health Center and 12.5% in the Madiun City Market. *Cryptosporidium* sp infection was 5% at the Madiun City Health Center and 7.5% at the Madiun City Market. There was difference in prevalence from research conducted by Mareta (2019) where 45.8% infected with *Isospora* sp in Lumajang and research conducted by Afyah (2015) where 7% infected with *Cryptosporidium* sp. in Surabaya. The result differences caused by differences in sample type, maintenance system, regional conditions, and research time.

**Table 5.** Gastrointestinal Protozoa Infection Degree

Sampling Location	Positive Sample	Mean ± SD	Protozoa	Positive Sample	Mean ± SD
Health Center	15	1167,33 <sup>a</sup> ±168,373	<i>Isospora</i> sp.	9	1209,89 <sup>a</sup> ±179,196
			<i>Entamoeba</i> sp.	4	1147,50 <sup>a</sup> ±162,763
			<i>Cryptosporidium</i> sp.	2	1020,00 <sup>a</sup> ±0,000
Market	25	1186,00 <sup>a</sup> ±148,577	<i>Isospora</i> sp.	17	1204,12 <sup>a</sup> ±160,314
			<i>Entamoeba</i> sp.	5	1156,00 <sup>a</sup> ±76,026
			<i>Cryptosporidium</i> sp.	3	1133,33 <sup>a</sup> ±196,299

Another study conducted in Baghdad, Iraq used 121 cats where the prevalence rate of gastrointestinal parasites was 48.7%. The gastrointestinal protozoan found was *Isospora* sp. 6.61% and *Cryptosporidium* sp. 31.4% (Kalef et al., 2022). Differences in prevalence due to different regions, environmental conditions and sampling times. Research in Iran also had different results with this study where the prevalence of *Isospora* sp. 21.4% and *Entamoeba* sp. 5.7% (Khademvatan et al., 2014).

*Toxoplasma gondii* did not found in this study, this could be due to several factors. This study only use microscopic methods which had a relatively lower success rate (Rahman and Nur, 2022). *Toxoplasma gondii* has similar shape to *Isospora* sp. so it necessary to carry out further tests with PCR examination (Prayekti, 2020). Environmental conditions and humidity also affect the discovery of *Toxoplasma gondii* (Nurcahyo and Priyowidodo, 2019).

The infection degree results obtained 1167.33a ± 168.373 average value at the Madiun City Health Center and 1186.00a ± 148.577 at the Madiun City Market. The results of the Kruskal Wallis analysis showed that the results were not significant (p>0.05), this means that the degree of gastrointestinal protozoan infection was not influenced by the type of protozoa and the sampling location. Details seen in Table 5.

### Conclusion

The results of examining 80 stray cat feces samples at the Madiun City Health Center and Market were the prevalence rate obtained was 37.5% at the Madiun City Health Center and 62.5% at the Madiun City Market. The protozoan species that found were *Isospora* sp., *Entamoeba* sp., and *Cryptosporidium* sp. There were age, race, stool condition, and infection degree differences in the prevalence of gastrointestinal protozoal infections. Sex and infection degree did not have significance differences in the prevalence of gastrointestinal protozoan infections in the Madiun City Health Center and Market.

It is necessary to pay attention to sanitation and hygiene in the Madiun City Health Center and Market area and provide education to the people of Madiun City regarding zoonotic gastrointestinal protozoa diseases.

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