The Prevalence of Alimentary Tract Worms in Domestic Cats and Stray Cats at Campus Area of Semarang State University, Central Java

(PREVALENSI CACING SALURAN PENCERNAAN PADA KUCING LIAR DAN KUCING PELIHARAAN DI AREA KAMPUS UNIVERSITAS NEGERI SEMARANG, JAWA TENGAH)

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ABSTRACT

The aims of this study were to identify and measure the prevalence of alimentary tract worm in stray and domestic cats in the campus area of Semarang State University (Universitas Negeri Semarang/Unnes). As many as 30 cat feces samples: 10 stray cats samples (SC), 10 limited range domestic pet cats (LDC), and 10 indoor domestic pet cats (IDC) were used in this study. Examination of the feces samples was done by using the flotation method to identify the eggs of worms. Based on feces examination, eggs of four worms species i.e. Ancylostoma caninum, Clonorchis sinensis, Dipylidium caninum and Toxocara cati were found. Based the prevalence of worm eggs: A. caninum was found infected 4 out of 30 samples (13.3%), C. sinensis was found infected 2 out of 30 samples (6.6%), D. caninum was found infected 2 out of 30 samples (6.6%), and T. cati was found infected 10 out of 30 samples (33.3%).

Keywords: prevalence; alimentary tract worm; cats; Semarang State University

ABSTRAK

Penelitian ini bertujuan untuk mengidentifikasi jenis cacing dan mengukur tingkat prevalensi infeksi cacing pada kucing liar dan kucing peliharaan di wilayah kampus Universitas Negeri Semarang. Sebanyak 30 sampel kucing yaitu 10 kucing liar (SC), 10 kucing peliharaan yang bebas berkeliaran (LDC), dan 10 kucing peliharaan dalam rumah (IDC) digunakan dalam penelitian ini. Pemeriksaan feses pada kucing menggunakan metode apung/flotasi untuk mengidentifikasi telur cacing yang terdapat pada feses kucing. Pada penelitian ini teridentifikasi empat jenis cacing yang menginfeksi kucing liar dan peliharaan di area kampus Unnes yaitu Ancylostoma caninum, Clonorchis sinensis, Dipylidium caninum dan Toxocara cati. Berdasarkan prevalensi telur cacing: Ancylostoma caninum ditemukan menginfeksi 4 dari 30 sampel (13,3%), Clonorchis sinensis ditemukan 2 dari 30 sampel (6,6%), Dipylidium caninum ditemukan 2 dari 30 sampel (6,6%), dan Toxocara cati ditemukan 10 dari 30 sampel (33,3%).

Kata-kata kunci: prevalensi; cacing saluran pencernaan; kucing; Universitas Negeri Semarang
INTRODUCTION

Cats are carnivorous animals that can be found in almost all over the world because of their excellent adaptability. As time went on, cats that were once known as religious symbols, have now become rat population control and also one of the favorite animals. The population of cats in Indonesia, according to the World Society for the Protection of Animals (WSPA, 2008) is 15,000,000 and ranks as the third most cat after the United States and Russia. With the large number of cats in Indonesia that spread in various cities, making cats not only maintained and lived in the wild.

Based on where they live, cats can be categorized into three, among others: 1) Domestic pet cats, 2) Stray cats and 3) Feral cats. Domestic pet cats are cats that live one house with their owners, the food needs are fully giving by the owner. Domestic pet cats are divided into three based on their roam space, that is Indoor, Limited range, and Free range. Home cats with the Indoor category are not allowed to leave the house and are usually tame, the Limited range category is cats that are allowed to leave the house, but are only limited to neighbors and are still under the supervision of the owner. Free-range cats are cats that are allowed to go anywhere by their owners without supervision usually, cats in this category are not all tame. Stray cats are cats that live freely in urban areas without owners who rely on food from humans but by finding their own food. Feral cats are cats that live wild in places far from human life like in the forest. Food obtained is from the results of hunting and none of its needs are provided by humans (Hildreth et al., 2010).

Many diseases that infect cats such as viruses, bacteria, fungi, and parasites. Types of the parasites that are often found in the alimentary tract of cats were Ancylostoma spp., Toxocara spp., Strongyloides spp., Toxoplasma gondii, Cryptosporidium spp., Sarcocystis spp., Echinococcus multilocularis, Giardia duodenalis, and Toxoplasma gondii (Oktaviana et al., 2014; Elmore et al., 2010). Factors that influence the prevalence of parasitic infections include environmental and animal factors. Environmental conditions for the highly influential infection of cat parasites. A dirty environment allows contamination of higher than pet cats (Nealma et al., 2013)

The prevalence of worms as the alimentary tract can vary due to geographical region. Several factors could affect the frequency of a species of the parasite in a population. Presence of veterinary care, habits of the local animal populations, a season of the year and the cat population composition (Abu-Madi et al., 2008). Internal parasites can decrease endurance by absorbing essential nutrients and interfering with vital organs (Agustina, 2013), the worm infection can make cats more susceptible to various diseases (Ward, 2009). Alimentary tract worm constitutes a major source of diseases for cats in the tropics and has been recognized as important public health problems in several parts of the world (Raji et al., 2013).

Many surveys regarding cat worms have been conducted in the world since a long time ago. The data of worms prevalence in feces cats reported in the Republic of Korea was 82.2%. More than 29 worms species including adults or eggs were detected in visceral and feces samples of the examined cats. A variety of Cestodes, including Spirometra erinacei, Taenia taeniaeformis and unidentified species of tapeworm were detected (Sohn and Chai, 2005).

In Romania reported that the overall prevalence of endoparasites in household cats was 34.3% (Mircean et al., 2010), the data also reported in Lisbon that found intestinal parasites in 23/74 samples and identified as T. cati, Isospora felis, Ancylostoma tubaeforme, Dipylidium caninum, Uncinaria stenocephala and T. Ieonine (Duarte et al., 2010). In Japan was reported 43.1% of cats infected by internal parasites (Yamamoto et al., 2009). Studies of alimentary tract worms of cats in several parts of the countries have been limited to the cat population (Raji et al., 2013).

Research on the prevalence of worm egg species in cat feces in the campus area of Semarang State University has never been done before. In Semarang City, there is no available information about the prevalence and distribution of alimentary tract worms in cats. Reports on the prevalence and spread of alimentary tract parasites can be used as consideration in taking action to control parasitic diseases.

Data on parasites in cats at the Bogor Agriculture University is a similar study in the campus area of Semarang State University. The prevalence of gastrointestinal worms in cats at the Bogor Agriculture University was 83%. The identified parasites were hookworms, Toxocara spp., T. Ieonine, and Isospora felis (My et al., 2013). Given the potential of the alimentary tract parasite as a zoonotic agent, this research needs
to be done to determine its existence. The aims of this study were to identify and measure the prevalence of alimentary tract worm in stray cats and domestic cats in the campus area of Semarang State University. Information obtained about zoonotic parasites can later provide awareness to the community on the Semarang State University about the dangers of zoonotic parasites.

RESEARCH METHODS

This research is exploratory research with survey method. Field survey of stray cats and pet cats was done in the campus area of Semarang State University. The sampling location chosen was based on purposive sampling technique. The sampling location was based on the existence of a large number of stray and pet cats and the environmental conditions that had been in the previous field survey in the campus area of Semarang State University.

There were 11 sampling locations such as Rectorate, Central Library, FBS (Faculty of Arts and Language), FIS (Faculty of Social Science), Kalimasada Road, Setanjung Alleyway, Cempakasari Alleyway, Pete Alleyway, Pisang Alleyway, Waru Alleyway, and Rambutan Alleyway. The sample examination was carried out in the Biology Department Laboratory, Faculty of Mathematics and Natural Sciences, Semarang State University.

The method used to identify and calculate worm eggs was plain flotation method. Observed under a light microscope worm eggs were identified based on structural according to Purnomo et al. (2009) and Prianto et al. (2001). All of the data were analyzed descriptively. Prevalence is how often a disease or condition occurs in a group of species (Pujiastuti, 2015). The formula used to analyze the level of infection with worms in cats was carried out by using prevalence calculations according to Oktaviana et al. (2014), as follows: Prevalence = [(the number of samples infected with worms) x (the number of samples checked)] / 100%.

RESULTS AND DISCUSSION

As many as 30 cat feces samples: 10 stray cats samples (SC), 10 limited range domestic pet cats (LDC), and 10 indoor domestic pet cats (IDC). Based maintenance system, which stray cat was found infected with six positive of 10 samples (60%), while the limited range domestic cat was found infected with three positive of 10 samples (30%), and indoor domestic pet cat was found infected one positive of 10 samples (10%) (Table 1).

Table 1. The prevalence is based on the type of cat around the campus area of Semarang State University

<table>
<thead>
<tr>
<th>Types of cats sample</th>
<th>Number of samples</th>
<th>Positive samples</th>
<th>Prevalance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>10</td>
<td>6</td>
<td>60%</td>
</tr>
<tr>
<td>LDC</td>
<td>10</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td>IDC</td>
<td>10</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>10</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Note: (SC) stray cats; limited range domestic pet cats (LDC); indoor domestic pet cats (IDC)

The results showed that the highest prevalence of worm infections in stray cats (SC) was 60% because stray cats that have no owners and live by in any place. Stray cats have uncontrolled breeding because its population increased continuously (Sucitrayani et al., 2014; Hilderth et al., 2010). Another factor that made of the high prevalence of worm infections in stray cats is because most cats forage in trash cans. Stray cats live in moist and dirty areas where these environments are ideal conditions for the development of an infective form of worm larvae (Oktaviana et al., 2014). Abu-Madi et al. (2008) state that geographical factors of a region can affect prevalence rates, other factors include climate, cat population in an area and space to roam from the cat itself.

Regional conditions (climate, humidity, temperature and soil conditions) are important things that may affect prevalence rates (Sucitrayani et al., 2014). Environmental conditions in the area of the Semarang State University have a tropical climate with a temperature of 30-34°C, light intensity ranges from 520-870 Lux, and humidity is 43-62%. The tropical climate has high humidity so that it is a fertile ground for the life of parasitic worms. High humidity is an optimum condition for the development and dissemination of various species of worm disease (Sucitrayani et al., 2014). In other conditions according to Sures et al. (2017), the lower temperatures making egg development takes longer or inhibits egg development.

Limited range domestic pet cats (LDC) showed that the worm was infected 30%, not much different from stray cats (SC), because the
system of caring for cats were released outside the house even though the owner provided food and water to drink. Cats are kept outside the house usually facing directly to the outside environment, so they can be infected with worms. The infection may occur if cats swallow infective worm eggs on the ground or eat intermediate hosts (insects, earthworms, and snails that contain eggs or infective worm larvae), accidentally eat food in the neighborhood contaminated with infective eggs or larvae, and contact between infected cats or pollutant when

![Figure 1. Map of sampling in the campus area of Semarang State University](image)

![Figure 2. Result observation of worm eggs: (A) *Ancylostoma caninum*; (B) *Clonorchis sinensis*; (C) *Dipylidium caninum*; (D) *Toxocara cati* (40x10 objective magnification)](image)
The species of worm based on eggs found in this study were *A. caninum*, *C. sinensis*, *D. caninum*, and *T. cati* (Figure 2). The prevalence of *A. caninum* was found infected with four positive of 30 samples (13.3%), *C. sinensis* was found infected with two positive of 30 samples (6.6%), *D. caninum* was found infected with two positive of 30 samples (6.6%), and *T. cati* was found infected with 10 positive of 30 samples (33.3%) (Table 2).

The prevalence of alimentary tract worm in stray cats (SC), limited range domestic (LDC) pet cats, indoor range domestic pet cats (IDC) in the area of Semarang State University was presented in Table 2. The result showed that the prevalence of *T. cati* in Semarang State University was highest (33.3%) from all prevalence types of worms infection in cats, compared to other research in Iran, such as Zibaei et al. (2007) reported 92.9% of stray cats infected by *Toxocara* spp. The prevalence of *Toxocara* spp. in cats in Europe have been reported in Italy, Riggio et al. (2013) found *T. cati* in 22% of cat feaces samples. In Spain, Gracenea et al. (2009) found *T. cati* eggs in 22% of cat feaces samples with distinct higher incidence in kittens. In Romania, *T. cati* were infected 20.3% of household cats (Mircean et al., 2010), Epe et al. (2004) detected *T. cati* eggs in 3,9% of feline fecal samples in Germany, while Barutzki and Schaper (2003) found Ascarids eggs in 6.4% of fecal samples. In Denpasar, (Nealma et al., 2013) reported 60% stray cats infected by *T. cati*.

This could play a significant role in contributing to the incidence of cutaneous larva migrans in the human population. *Toxocara cati* is an ascarid nematode which was the next most common intestinal parasite observed in this study with a relatively high prevalence of 33.3%. The high prevalence of *T. cati* infection recorded poses a high risk to humans in view of the large number of eggs about 200,000 eggs produced per day by a female of this parasite that are deposited in the soil along with cat’s feces (Glickman and Schantz, 1981). These eggs can survive for a long time in the environment and could be accidentally ingested by humans in which they can cause visceral larva migrans or human *Toxocariasis* due to larva migration, a commonly reported zoonotic helminthiasis (Holland and Smith, 2006).

The prevalence of *A. caninum* in stray cats and domestic pet cats in the area of Semarang State University was 13.3%. It was lower than occurrence in Brazil that was *A. caninum* (67.3%) (Coelho et al., 2011). The prevalence in Korea was 33% in stray cats (Sohn and Chai, 2005), in Colombia which was 7.4% in house cats (Echeverry et al., 2012). The high or low prevalence of *Anyclostoma* spp. can be caused by ideal environmental conditions for its development. According to Bowman et al. (2002), the optimal temperature for the development of

### Table 2. The worms prevalence in the cats of Semarang State University campus area

<table>
<thead>
<tr>
<th>Species of worm eggs identified</th>
<th>Positive samples</th>
<th>Prevalence (%)</th>
<th>Average Number of worm egg</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ancylostoma caninum</em></td>
<td>4/30</td>
<td>13.3%</td>
<td>10</td>
</tr>
<tr>
<td><em>Clonorchis sinensis</em></td>
<td>2/30</td>
<td>6.6%</td>
<td>6</td>
</tr>
<tr>
<td><em>Dipylidium caninum</em></td>
<td>2/30</td>
<td>6.6%</td>
<td>3</td>
</tr>
<tr>
<td><em>Toxocara cati</em></td>
<td>10/30</td>
<td>33.3%</td>
<td>54</td>
</tr>
</tbody>
</table>
Anyclostoma spp. larva were 20°C. In addition, Anyclostoma spp. has the stability to actively infect stray and pet cats in various ages. The main transmission route of Anyclostoma spp. is through penetration into the skin directly by the third larvae (Bowman et al., 2002). Anyclostoma spp. larvae that normally mature in the alimentary tract worms of animals can cause cutaneous larva migrans in people. Zoonotic Anyclostoma spp. known to cause this condition include A. braziliense, A. caninum, A. ceylanicum, and A. tubaeforme. Other species of Anyclostoma spp. found in animals, including wildlife and captive exotics, might also be able to cause cutaneous larva migrans (Acha and Szyfres, 2003).

Cats are the definitive host of some Cestodes. Cestodes that have been reporting infected cats were Diphyllobothrium sp, Joyeuxiella sp, Spirometra sp, D. caninum, T. taeniaeformis and Echinococcus sp. The prevalence of D. caninum found in this research was 6.6%. Other research reported that in Iranian stray cats detected Cestodes were Joyeuxiella pasqualei (34.3%), D. caninum (49.5%), T. Taeniaeformis (12.3%) and Spirometra sp. (3.8%) (Zibaei et al., 2007). The prevalence of cat Cestodes in Japan reported Spirometra erinaceieuropaei (8.3%), D. caninum (1.4%), Taeniidae (0.2%) and D. nihonkaiense (0.1%) (Yamamoto et al., 2009). Diplylidium latum is a tapeworm that has a serious attention of public health because it is a zoonotic agent. Some previous studies reported that thus tapeworms were infecting humans (Revenga, 1993; Nicoulaud et al., 2005).

The prevalence of Clonorchis sinensis in this study was 6.6%. Other research reported that result in Shantou (the eastern city of Guangdong province) was 2.1% in cats (Fang et al., 2007). Prevalence of C. sinensis infection in dogs and cats in subtropical southern China were 20.5% and 41.8%, respectively (Lin et al., 2011). C. sinensis has the potential to cause zoonotic disease in humans which called Clonorchiasis (Tang et al., 2016). Cats are infected with C. sinensis are likely because they eat fresh raw fish or undercooked fish that may contain metacercaria. Fish is one of the intermediate hosts of C. sinensis. Clonorchis sinensis can be transmitted to humans and animals by eating raw or undercooked fish containing metacercariae (Petney et al., 2013).

CONCLUSION

Types of worm eggs found in feces of cats in the study area were A. caninum, C. sinensis, D. caninum and T. cati. Based the prevalence of worm eggs, A. caninum was found infected with four positive of 30 samples (13.3%), C. sinensis was found infected with two positive of 30 samples (6.6%), D. caninum was found infected with two positive of 30 samples (6.6%), and T. cati was found infected with 10 positive of 30 samples (33.3%).

SUGGESTION

It is necessary to control diseases caused by infection of the alimentary tract worms in cats that are beneficial for the health of the cat. Cats lover need to pay attention to their health. In addition, further research is needed on alimentary tract worm epidemiology in cats.

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REFERENCES


