

Prevalence of Ancylostomiasis in Pet Cats from Banyuwangi City, East Java Province

Aditya Yudhana¹, Ratih Novita Praja², Fifi Anik Suroiyah³

¹PSDKU Banyuwangi, Department of Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga, Indonesia

²PSDKU Banyuwangi, Department of Microbiology, Faculty of Veterinary Medicine, Universitas Airlangga, Indonesia

³Faculty of Veterinary Medicine, Universitas Airlangga, Wijaya Kusuma Street 113, Banyuwangi, Indonesia

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Abstract: Ancylostomiasis is disease caused by hookworm parasite known as *Ancylostoma spp.* The number of cat owners has increased year to year in Banyuwangi City. This condition may also increase the risk factor of disease transmission related to Ancylostomiasis, which can be transmitted from cat to owner. The purpose of this research is to determine the prevalence of Ancylostomiasis infection in pet cats. This research used 138 samples divided into 73 male pet cat feces and 65 female pet cat feces using the floatation method. From 138 samples of examined pet cat feces, in 22 samples (15.9%) the egg of *Ancylostoma spp.* was positively found. Meanwhile, from 138 samples of examined pet cat feces, 9 samples from male cat (6.5%) positively contained the egg of *Ancylostoma spp.* and 13 samples from female cat (9.4%) positively contained the egg of *Ancylostoma spp.* A control program needs to be applied for diseases caused by an *Ancylostoma spp.* infection in cats that are beneficial to the animal and public health aspects. This study's results could also be used for further study, such as disease mapping, molecular epidemiology, and development of new anthelmintic drugs against Ancylostomiasis.

1 INTRODUCTION

Ancylostomiasis is disease caused by a hookworm parasite known as *Ancylostoma spp.* Among various nematode parasites in cats, the hookworm belonging to family ancylostomatidae is of great importance due to their blood-sucking activities and chronic pathogenesis. These parasites are further divided into two subfamilies: ancylostominae and necatorinae. The buccal capsule of these worms is sub-globular, their lips and leaf crown are absent, their oral opening is unarmed, or with teeth and cutting plates (Bhatia et al., 2010). *Ancylostoma spp.* is a blood-feeding parasitic intestinal nematode which infects dogs, cats, and other mammals throughout the temperate and tropical areas in the world. In addition to the veterinary importance, *Ancylostoma spp.* can also cause zoonotic disease in humans (Periago and Bethony, 2012). The larvae of *Ancylostoma caninum* hatch from eggs and develop into infective larvae via two molts. The infective larvae then infect host animals such as dogs and cats, migrate into the intestine, and develop into adult worms following two more molts. If the

infective larvae invade humans, they can cause cutaneous larvae migrans (CLM) or “creeping eruptions,” which are hypersensitive reactions in response to the migration of *A. caninum* larvae; however, they cannot develop into adult worms just by migrating under the skin (Yang et al., 2012).

The infection route of *Ancylostoma spp.* cannot be separated from three factors, namely hosts, agents, and the environment. Infection occurs if there is an infective larvae of *Ancylostoma spp.* as a source of infection and the availability of host that is sensitive to a condition from environment that causes contact between both. Cats that live in dirty and humid areas have more risk of disease transmission because a dirty environment is a suitable place to the development of infective larvae form of *Ancylostoma spp.* (Borthakur, 2011). Management system in a cat is one of the factors that play a role in the transmission of ancylostomiasis. Pet and stray cats certainly have different levels of infection risk. Stray cats are more vulnerable to disease due to dirty environmental conditions, food that is not always enough, and the absence of good care from humans or veterinarians.

Meanwhile, pet cats have a better environmental condition, regular feeding, and more care from the owner, which can minimize risk of disease transmission (Oktaviana et al., 2014). The number of cat owners has increased from one year to the next in Banyuwangi City. This condition may also increase risk factor of disease transmission regarding Ancylostomiasis, which can transmit from the cat to the owner. It is important to conduct research in prevalence aspect because there is no recording data or current study about Ancylostomiasis from pet cats in Banyuwangi City before. Besides, Ancylostomiasis is transmissible to humans, and cats are the pets most often found in public or in communities.

2 MATERIAL AND METHODS

This research was an observational analytic research with cross sectional design. In this study, 138 feces samples were obtained from pet cats in their owners' houses around Banyuwangi City. Cat feces were obtained by asking directly to the cat owners. Cat owners were given plastic pots for collecting samples from their cats. The feces were taken as fresh as possible and 5% formalin added to soak all feces as preservatives into plastic pots and then labels which display the time of taking and the origin of cats which samples were taken from. The samples collected were immediately examined in Laboratory of Instrument Faculty of Veterinary Medicine Airlangga University PSDKU Banyuwangi.

The prevalence of Ancylostomiasis infection was measured by examination of feces using a concentration method named the flotation method. The principle of this method is based on the specific gravity (BJ) of the *Ancylostoma spp.* egg being lighter than BJ of solution used, so the eggs can float to the surface. The procedure of flotation method is as follows: ± 2 grams of feces were taken, put into a plastic glass, added with a little aquadest, and stirred until becoming homogeneous. The solution was then filtered. After that, it was poured into a centrifuge tube until ¾ of the tube was filled up. The tube was then rotated at 1500 rpm for 5 minutes. The supernatant was discarded, then added with saturated sucrose for ¾ of the tube volume and re-stirred until becoming homogeneous. The tubes were rotated with a speed of 1500 rpm for 5 minutes. Then, the tube was put on the tube rack perpendicularly, added with saturated sucrose solution through dropping using pipette until the surface becomes convex and

left for 3 minutes. Glass cover was put on a convex surface carefully, then put on a glass object and examined under microscope with 100x magnification.

The prevalence of Ancylostomiasis was calculated using the formula: the number of infected samples divided with total sample and multiplied with 100%. The data obtained in this study were presented descriptively and the proportion of Ancylostomiasis infection prevalence between male and female pet cats were divided based on the data.

3 RESULTS AND DISCUSSION

The prevalence of Ancylostomiasis in pet cats in Banyuwangi City was studied, and the results are presented in Table 1. A total of 138 pet cat fecal samples were examined using floatation methods, and it was found that 22 (15.9 %) samples positively contained the egg of *Ancylostoma spp.* Meanwhile, from 138 samples of examined pet cat feces, 9 samples from male cats (6.5%) positively contained the egg of *Ancylostoma spp.*, and 13 samples from female cats (9.4%) positively contained the egg of *Ancylostoma spp.*

Table 1: Prevalence of Ancylostomiasis from Pet Cats in Banyuwangi City.

Pet Cat		Ancylostomiasis Infection		Total Sample	Prevalence (%)
		Positive	Negative		
Sex	Male	9	64	73	6.5
	Female	13	52	65	9.4
Total		22	116	138	15.9



Figure 1: Hookworm Egg *Ancylostoma Spp.* Found in Positive Sample (Magnification 100x).

Based on the examination of 138 samples of pet cats in this study, the prevalence of Ancylostomiasis infection was 15.9%. Specifically, male pet cats had a prevalence of 6.5%. This data is lower if compared to female pet cats because cats which had their samples taken and had positive Ancylostomiasis contamination were generally above one year old. Cats above one year old can be considered as being in adult phase, which means that they have stronger body condition and immune system, thus having a lower risk for infectious diseases. Adult male cats also play a role as survivors in the environment and become the top predator. Our results also suggests that the prevalence of Ancylostomiasis in Banyuwangi City in female cats is higher than in male cats. This could happen because the ages of female cats which had their samples taken from and had positive Ancylostomiasis contamination were under six months old. Cats under six months of age have lower antibody than adult, thus having one of the risk factors that make pet cats also more susceptible to Ancylostomiasis infection.

The results from this study were have different from the study conducted in Brazil by Lorenzini (2007) which mentions that the prevalence of Ancylostomiasis in the pet cats under treatment by veterinarians was 6%. The study was conducted by taking samples from feces of pet cats which were regularly checked to the veterinarian. Different data could also be found from a research conducted in Australia by Holyoake (2008), which mentions that the prevalence of Ancylostomiasis in pet cats was only 0.2%. High results for gastrointestinal parasite were found in Nigeria by Sowemimo (2012) with prevalence reaching 57%. The study was conducted in two urban areas in Nigeria. From each region, 100 samples were taken from pet cats raised in each urban area, and the total samples obtained amounted to 200. From the first region, the prevalence of Ancylostomiasis obtained was 69%, while in the other region it was 45%. A research conducted in Bangkok, Thailand, by Jittapalapong et al. (2007) mentions that the prevalence of Ancylostomiasis was 9.9%, and that result showed lower prevalence than previous study. Oktaviana et al. (2014) conducted a research in Bali using 80 samples divided into 40 stray cat feces and 40 pet cat feces. From 40 samples of examined stray cat feces, 19 samples (47.5%) positively contained the egg of *Ancylostoma spp.* Meanwhile, from 40 samples of examined pet cat feces, 10 samples (25.0 %) positively contained the egg of *Ancylostoma spp.* These data become important because Bali is the nearest place from Banyuwangi, which can increase

risk factor of Ancylostomiasis transmission through pet cats.

Ancylostomiasis is mostly prevalent throughout tropical, subtropical and temperate regions (Mizgajska-Wiktor and Uga, 2006), where visceral larva migrans is one of the most important parasitic disease of man transmitted by carnivores (Dalimi and Mobedi 1992; Fisher 2003). The most reliable reason for the increased prevalence of gastrointestinal helminthes in pets is the natural predator-prey relationship, poor hygiene, and lack of anthelmintics drug administration (Dryden, 2007). The major pathogenesis of severe parasitic infestations is mechanical damage to tissues due to the migration of the larvae through the organism (*A.tubaeforme*), anaemia, decrease of vitamins, and interference with the immune system. The decline of physical condition is due to release of such substances as enzymes and toxins (Behnke 1991; Loukas and Prociv 2001; Bowman et al. 2003). This may be the reason for the presented cases of constipation, anorexia, severe dehydration, and epilepsy. Increased Hb and PCV and decreased total protein and albumin may be due to severe parasitic infestation. Hookworms cause anaemia because blood loss is the greatest 10–15 days after onset of the infection and *A.tubaeforme* may cause fatalities in heavily infested kittens. Even though the cat is treated with specific and along with supportive therapy, it will be dead regardless, which may be due to the delayed hospital visit by the owner and thus leads to severity of the concomitant helminthic infestation.

Abu-Madi et al. (2008) mentions that factors such as geographical areas may affect the level of prevalence. Other factors include climate, consistency of cats staying in place and the roaming range from the cat itself. In China, *A. caninum* was reported twice in Sichuan province, southwest China, with a prevalence of 25% and 51%, respectively (Feng et al, 2011), while an overall higher prevalence (95.1%) of *A. caninum* infections in cats was detected in Guangzhou (southern China). The predominant species of hookworms in cats was *A. caninum* in China, while *A. tubaeforme* was considered to be the predominant species in Australia (Silva et al, 2006), which strongly supports our suggestion that the prevalent species is related to its geographical distribution. Cats could well be the main host for Ancylostomiasis in Banyuwangi City. The prevention of parasitic disease is possible through health institution care for pets, including regular anthelmintic treatments, preventing the contamination of the environment from feces, and

promoting responsible pet ownership (Overgaauw, 1997).

4 CONCLUSIONS

The prevalence of Ancylostomiasis in pet cats in Banyuwangi City was 15.9%. From 138 samples of examined pet cat feces, 22 samples (15.9%) positively contained the egg of *Ancylostoma spp.* Meanwhile, from 138 samples of examined pet cat feces, 9 samples from male cats (6.5%) positively contained the egg of *Ancylostoma spp.*, and 13 samples from female cat (9.4%) positively contained the egg of *Ancylostoma spp.* A control program needs to be applied for diseases caused by an *Ancylostoma spp.* infection in cats, which are beneficial to the animal and public health aspect. Pet cats need to be given more attention for its health. In addition, further research about epidemiology of Ancylostomiasis in cats needs to be done.

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