

Study of Animal Owners' Knowledge of Helminthiasis in Cats at Mayda Animal Care and iVet Clinic Dramaga, Bogor

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Abstract

Animal owners often overlook helminthiasis because it does not cause specific clinical symptoms in mild infections. This study aimed to analyze the medical records of helminthiasis in cats and determine the knowledge of animal owners about helminthiasis through questionnaires at Mayda Animal Care and iVet Clinic Dramaga, Bogor. A cross-sectional study was used to analyze medical record data and then compared using descriptive methods with a secondary data approach. Data analysis was performed using the Chi-square test. The findings of helminthiasis cases in cats at Mayda Animal Care during January–December 2022 amounted to 102 cases, while at iVet Clinic Dramaga, there were 50 cases. Based on the Chi-square test, this study reported a significant correlation ($p < 0.05$) between age and the level of action and education with the level of understanding of animal owners on helminthiasis at Mayda Animal Care and iVet Clinic Dramaga, Bogor.

Keywords: action, anthelmintics, helminthiasis, understanding, knowledge

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INTRODUCTION

Cats are one of the pets many people are interested in because they can adapt well and become friends with humans. Cats who have poor maintenance management may get bacterial, fungal, viral, or parasitic infections. Ectoparasites, or surface parasites, and endoparasites, or inside parasites, can infect a definitive host. Cats are commonly observed to have a percentage incidence of parasite cases of 53.5% helminths, 31.3% protozoa, and 15.2% insects (Oktaviana *et al.*, 2014).

Helminths can be categorized into 3 categories i.e. roundworms (Nematodes), tapeworms (Cestodes), and liver flukes (Trematodes). Cat owners often overlook helminthiasis because it does not show specific clinical symptoms in mild infections. Helminth infections will affect the cat's health, growth, nutrition, productivity, pregnancy, and welfare. Clinical symptoms of helminthiasis include thinness, dull hair, abdominal enlargement, vomiting, and diarrhea caused by cats eating infective worm eggs or infected paratenic hosts (Calista *et al.*, 2019).

The types of parasites often found in the digestive tract of cats are *Ancylostoma* sp., *Toxocara* sp., and *Strongyloides* sp. (Oktaviana *et al.*, 2014). The prevalence of *Toxocara cati* in pet cats in Bogor was 35% (Murniati *et al.*, 2016) and feral cats in the IPB University campus was 53% (Jabbir, 2013).

Information about worm infections in cats and understanding of helminthiasis in cat owners has not been reported in Indonesia, in particular in Bogor, so this study was conducted to analyze the medical records of helminthiasis of cats and the owners' knowledge at Mayda Animal Care and iVet Clinic Dramaga, Bogor.

MATERIALS AND METHODS

Ethical Approval

This study did not require ethics approval because it did not involve animals and there was no interest in animal suffering.

Study Period and Location

This study was performed at Mayda Animal Care and iVet Clinic Dramaga, Bogor during January–December 2022.



Samples

Respondents in this study were animal owners who came to the clinic. A retrospective study was used to evaluate medical record data and animal owner education questionnaires on helminthiasis cases in pet cats. Medical record data in the form of clinical symptoms and treatment by veterinarians at Mayda Animal Care and iVet Clinic Dramaga. Medical record data were categorized by month, sex, age, breed, percentage of disease incidence, and treatment of helminthiasis cases. The sample size of the questionnaire in this study amounted to 50 participants at Mayda Animal Care and iVet Clinic Dramaga, respectively.

Procedures

The diagnosis procedure was done by collect a fecal sample from cats using a fecal spatula, placing it on an object glass, and adding 1–3 drops of physiological NaCl. Next, it was covered using a cover glass and observed under a microscope with an objective lens 10× magnification. If the sample shows eggs with high specific gravity, the flotation method can be used.

The questionnaire were implemented using cross-sectional study through Google Form conducted at Mayda Animal Care and through paper-based conducted at iVet Clinic Dramaga. The study was designed to determine the animal owners' knowledge, understanding, and actions about helminthiasis. The questionnaire consisted of 3 sections. The first section contained an introduction and brief explanation to the animal owners regarding the questionnaire. The second section required the animal owner to fill in demographic information such as name, phone number, age, gender, and education of the animal owner. The third section contained questions to test the animal owners' knowledge, understanding, and actions about helminthiasis. Each section consisted of 15 questions to evaluate the animal owners' knowledge, understanding, and actions related to helminthiasis.

Statistical Analysis

Medical record data were analyzed using descriptive methods compared with a secondary

data approach. Medical record data and information were analyzed through three stages: data reduction, data editing, and data presentation using the Microsoft Excel 2016 application followed by re-verification of data and literature review to draw the correct conclusions.

Questionnaire data were analyzed using Microsoft Excel 2016. A significant difference in animal owners' knowledge, understanding, and actions about helminthiasis from the two veterinary clinics was determined as $p < 0.05$. A Chi-square test was then conducted to determine if there was a significant correlation between the characteristics of animal owners and their level of knowledge, understanding, and actions of animal owners. A scoring method based on percentage answers was used to analyze pet owners' skill levels and scores. If the animal owner answered correctly, they would get 1 point; if they answered incorrectly or chose not to know, they would get 0 points. Each participant's score was calculated using the formula as follows:

$$\text{Level of understanding (\%)} = \frac{\text{number of correct answers}}{\text{total number of answers}} \times 100$$

Animal owners with a score of $< 50\%$ were defined as having a low level of understanding about helminthiasis. Animal owners who scored 50–70% were interpreted as having a moderate level of understanding, while those who scored $>70\%$ were interpreted as having a good level of understanding about helminthiasis (Zhen *et al.*, 2022).

RESULTS AND DISCUSSION

Degree of Worm Infection

Based on medical record data, the prevalence of helminthiasis cases during January–December 2022 period in cats at Mayda Animal Care was 2.50% of 4002 cases, and at iVet Clinic Dramaga was 1.63% of 3124 cases (Table 1). Thus, the incidence of Helminthiasis in cats at Mayda Animal Care is more than the number of helminthiasis cases at iVet Clinic Dramaga.

Helminthiasis cases in cats at iVet Clinic Dramaga are caused by *T. cati*. According to the literature, *T. cati* has a long, white, cylindrical

body shape (Okulewicz *et al.*, 2012). The 3-month-old cat was suspected of being infected with worms by showing clinical symptoms of thinness, abdominal enlargement, diarrhea, lethargy, and *T. cati* worms in the cat's feces.

According to Overgaauw and Knapen (2013), Helminthiasis cats caused by *T. cati* show clinical symptoms such as vomiting, emaciation, and greenish-yellow liquid feces including type 7 diarrhea.

Table 1. Helminthiasis cases during January–December 2022

Month	Mayda Animal Care			iVet Clinic Dramaga		
	Helminthiasis	Samples	Prevalence (%)	Helminthiasis	Samples	Prevalence (%)
January	14	476	2.94	5	340	1.47
February	4	352	1.14	6	290	2.07
March	9	280	3.21	2	186	1.08
April	4	286	1.40	6	244	2.46
May	8	247	3.24	1	206	0.49
June	8	198	4.04	10	230	4.35
July	5	507	0.99	3	156	1.92
August	5	299	1.67	4	293	1.37
September	7	315	2.22	1	279	0.36
October	28	512	5.47	5	325	1.54
November	8	284	2.82	4	352	1.14
December	2	246	0.81	3	223	1.35
Total	102	4002	29.95	50	3124	19.57
Average Prevalence per Month			2.50			1.63

Table 2. Evaluation of owner knowledge of helminthiasis

Animal Owner Characteristics	Critical Value	p-Value
Gender		
• Knowledge	1.243	0.537
• Understanding	2.933	0.231
• Action	1.728	0.422
Age		
• Knowledge	5.004	0.543
• Understanding	11.963	0.063
• Action	15.966	0.014*
Education		
• Knowledge	3.600	0.463
• Understanding	16.192	0.003*
• Action	2.703	0.609

* p < 0.05 = significant correlation; p > 0.05 = no significant correlation.

The life cycle of *T. cati* worms begins with ingesting infective *T. cati* eggs by cats; the eggs hatch in the small intestine and migrate to the lungs, liver, tissues, and muscles. The larvae of this worm in adult male cats will settle in the cat's body tissues called dormant larvae. In contrast, in adult female cats, arrested larvae reactivate during late pregnancy, which is transmitted to kittens through transplacental and trans mammary.

Kittens infected with worms show clinical symptoms of coughing caused by worm larvae migrating to the lungs, then the larvae can be swallowed again and become adult worms in the small intestine. Worm eggs will be excreted with the kitten's feces. *T. cati* is a zoonotic disease with symptoms of Visceral Larva Migrant (VLM) and Ocular Larva Migrant (OLM) in humans exposed to *T. cati* infective eggs orally (Lia *et al.*, 2022).

Risk Factors for Helminthiasis Cases

Based on medical record data, risk factors for helminthiasis in cats at Mayda Animal Care and iVet Clinic Dramaga are suspected to be influenced by age, gender, and breed. Helminthiasis risk factors in cats based on age show that cats aged < 12 months are more at risk than cats aged > 12 months. According to Barutzki and Schaper (2013), helminthiasis often occurs in cats under 12 months old. According to Supraptini (2013), cats under 6 months old can be infected with worms from the mother through transplacental and trans mammary. Cats older than 6 months have a source of infection from the environment. Cats older than 12 months have better immunity than cats less than 12 months old.

Helminthiasis risk factors in cats based on gender show that male cats are more likely to be infected with worms than female cats because male cats often leave the house during mating season (Murniati *et al.*, 2016). Based on breed, helminthiasis risk factors in cats showed domestic cats were more likely to be infected with worms than mixed breed and pure breed. According to Suroiyah *et al.*, 2018, helminthiasis infects many feral cats, especially domestic cats. Feral cats often do not get preventive measures for helminthiasis cases and are often in outdoor environments, so they are more highly infected with worms than purebreed cats (Nijssse *et al.*, 2016).

Treatment of Helminthiasis Cases

Anthelmintics used at Mayda Animal Care are Univerm® and Anthel Cat®, while at iVet Clinic Dramaga are Drontal® and Albenworm liquid. Univerm® contains the active ingredients Praziquantel 50 mg, Pyrantel embonate 144 mg, and Fenbendazole 200 mg. Anthel Cat® contains the active ingredients Praziquantel 20 mg and Pyrantel pamoate 230 mg. Drontal® contains the active ingredients Pyrantel embonate 230 mg, and Praziquantel 20 mg/mL. Albenworm liquid contains the active ingredient Albendazole 20 mg/mL. The active ingredient Praziquantel's mechanism of action can damage the worm's integument, causing tetanic in the worm (Liu *et al.*, 2020). The active ingredient, Pyrantel

embonate, is a cholinergic agonist, so nicotinic cholinergic stimulation will occur, which causes spasms and paralysis of the worm muscles. The active ingredient Albendazole is a broad-spectrum anthelmintic that is larvicidal and ovicidal. The active ingredient Pyrantel pamoate causes depolarization of worm muscles, resulting in increased impulses and inhibiting the cholinesterase enzyme (Noviastuti, 2015; Sukoco *et al.*, 2023). Based on the above statement, the effective anthelmintics treatment for helminthiasis in cats at Mayda Animal Care is Univerm®, while at iVet Clinic Dramaga is Albenworm liquid.

Animal Owners' Knowledge of Helminthiasis

Based on the results of the questionnaire, there was a significant correlation ($p < 0.05$) between the owners' age and the level of preventive measures against helminthiasis in pet cats, the owners' education, and the understanding of helminthiasis (Table 2).

Based on the questionnaire results, pet owners' knowledge of helminth-infected cats' causes and clinical symptoms was high. The high knowledge of animal owners is influenced by age, education, gender, and economy. High education and age of the animal owner guarantee the animal owner has good knowledge. A high economic level will also influence owners to have their cats examined by a veterinarian. Based on the questionnaire results, many animal owners chose the correct answer on the causes of cat worm infection, which is caused by the ingestion of infective worm eggs and contact of the mother's milk with her offspring. Based on the literature, cats ingesting second-stage (L2) infective worm eggs, eating raw meat, and living in dirty cat environments are the causes of cat worm infections (Murniati *et al.*, 2016). Therefore, animal owners' knowledge of the causes of cat helminth infection is high, but there are still cases of helminthiasis.

Based on the questionnaire results, many animal owners chose the correct answer on the clinical symptoms of cats infected with worms in the form of anemia, lethargy, worms in feces or vomit, thinness, dull hair, abdominal

enlargement, vomiting, and diarrhea. Based on the literature that clinical symptoms of anemia are caused by adult worms that suck blood every day so that cats will lose blood (Mogi and Simarmata, 2021). Clinical symptoms of diarrhea and vomiting are caused by digestive tract disorders in cats caused by worms attached to the intestinal lumen, which will cause irritation and inflammation of the intestines (Herbowo and Firmansyah, 2016). Clinical symptoms of abdominal enlargement in cats are caused by worms that absorb protein from food, so cats are at risk of hypoproteinemia in the form of nutritional deficiencies (Calista *et al.*, 2019). Based on the results of the questionnaire, animal owners' knowledge of the clinical symptoms of cats infected with worms is in the high category but there are still cases of helminthiasis.

Based on the questionnaire results, animal owners' understanding of helminthiasis cases is in the high category. The high understanding of animal owners is influenced by their awareness of the importance of pet health. Based on the questionnaire results, many animal owners chose the correct answer that helminthiasis cases need to be considered. However, helminthiasis does not show specific clinical symptoms in mild infections, but in severe infections, it can cause vomiting, diarrhea, anemia, malnutrition, and even death. Pet owners are also enthusiastic about having their cats examined by a veterinarian, so understanding the importance of animal health is very high. A person's understanding will affect the preventive measures (Sarjana *et al.*, 2018). Therefore, the owner's knowledge of helminthiasis symptoms is very good but the owner has not taken preventive measures so there are still cases of helminthiasis.

Based on the questionnaire results, animal owners' actions to prevent helminthiasis cases in their pet cats are in the high category. Animal owners are concerned about preventing helminthiasis cases in their pet cats. Based on the questionnaire results, many animal owners chose the correct answers on preventive measures for helminthiasis in their pet cats, such as giving deworming drugs regularly, cleaning the environment where cats live, and not giving raw

food. Routine deworming is appropriate for preventing helminthiasis. Deworming of cats begins at 2 weeks of age. The frequency of deworming should be according to the animal's condition, the environment, and the risk of the animal being infected with helminthiasis. Cats > 6 months old, not living in the wild, and not in contact with the external environment are dewormed 1–2 times per year at low infection (Roussel *et al.*, 2019). Cats in contact with the external environment should be dewormed 4 times yearly for high infection. Cats that live in the wild and eat raw meat are dewormed more than 4 times a year (Roussel *et al.*, 2019). Therefore, the actions of animal owners in preventing helminthiasis in their pet cats are in the high category but some owners have not taken preventive measures so there are still cases of helminthiasis.

CONCLUSION

Cats helminthiasis case findings at Mayda Animal Care for January–December 2022 totaled 102 cases and 50 cases at iVet Clinic. Adult *T. cati* were found in the feces of cats at iVet Clinic Dramaga. This study reported a significant correlation ($p < 0.05$) between age with the level of action and education with the level of understanding of animal owners about helminthiasis at Mayda Animal Care and iVet Clinic Dramaga, Bogor.

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AUTHORS' CONTRIBUTIONS

RT: Conceptualization, Project administration, Resources, Validation, Writing – original draft. MBY, RT, and GID : Data curation,

Formal Analysis, Resources. All authors have read, reviewed, and approved the final manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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