Identification of Ectoparasites and Gastrointestinal Tract Endoparasites in Stray Cats at Traditional Market of Bojonegoro City

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Abstract

This study aims to determine the ectoparasites and endoparasites on gastrointestinal tract that infest stray cats in Bojonegoro traditional market. The samples in this study were ectoparasites and feces from 40 stray cats in Bojonegoro traditional market. The ectoparasite samples were examined using the permanent attachment method without staining, while the feces samples were examined using three methods, namely native, simple sedimentation and fulleborn floatation. A positive sample is considered if a parasite is found that matches the characteristics of a parasite in cats sourced from scientific references. The results of the examination of 40 stray cats found 27 positive ectoparasites, 23 positive worms and 6 positive protozoa. The types of ectoparasites found were *Ctneocephalides felis* (67.5%), *Otodectes cynotis* (15%) where age and gender did not affect the prevalence, while the endoparasites found were *Toxocara cati* (42.5%), *Ancylostoma* sp. (22.5%) and *Isospora felis* (15%), age has effect on the prevalence obtained and sex has no effect.

Keywords : Stray cats, Ectoparasites, Endoparasites, gastrointestinal.

Introduction

Parasites in cats are one of the organisms that can cause disease in both hosts and humans. Stray cats in the market have a greater potential to be attacked by parasites because the dirty and humid market environment conditions support the growth of parasites more rapidly (Mudji *et al.,* 2017). Many studies related to parasites in straycats in the market have been carried out but have never been carried out in Bojonegoro Regency.

The traditional market is one of the locations where there are many stray cats because this place is very strategic for wild cats to find food, live and breed (Mudji *et al.,* 2017). The traditional market of Bojonegoro City is the largest market which has a building area of 11000 m^2 with a total of ±1469 traders of which 36 are traders of animal products such as meat, fish and chicken which are a source of food for stray cats (Rodyanto *et al.,* 2016), so there are many stray cats gather in this market.

Different geographic areas and market conditions allow for different types and distribution of ectoparasites and gastrointestinal tract endoparasites in stray cats (Fauziyah *et al.,* 2020), so that this study is expected to provide information about the types and prevalence of ectoparasites and digestive tract endoparasites that infects stray cats in the traditional market of Bojonegoro City, as well as factors that influence it such as age and gender on the prevalence of parasites obtained.

Materials and Methods

This research was conducted in June-August 2021. The samples were feces and ectoparasite specimens of stray cats were taken from the traditional market of Bojonegoro City. Sample examination was carried out at the Biology Laboratory of SMAN 1 Bojonegoro and the Satwa Sehat Indonesia Clinic.

The materials used in this study were faecal samples and ectoparasite specimens from stray cats. Materials needed for ectoparasite examination include 10% KOH, alcohol with graded concentrations (30%, 50%, 70%, 95% and 96%), xylol and nail polish for preparations. The endoparasite examination requires potassium dichromate (K2Cr2O7) 2% and formalin 10% for preservation, saturated sugar solution, and aquadest.

The tools used in this study were a flea comb, sample pot, storage box, paper labels,

cotton bud, tweezers, blade, scalpel, object glass, cover glass, digital weigher, funnel, stirring cup, plastic cup, plastic spoon, tea filter, centrifuge tubes, centrifuges, pasteur pipettes, tube racks, microscopes, handscoons, masks, nets, cameras, cages along with places to eat and drink.

Research Procedure

The procedure of this research was started by catching stray cats using nets and cage traps, then kept overnight to get samples of ectoparasites and endoparasites in the fresh feces. The collected samples were labeled and preserved to maintain sample quality. The examination of ectoparasites was carried out by the native method and the permanent mounting method without staining, while the examination of endoparasites was carried out in three ways, the native method, the sedimentation method and the fulleborn floating method. The data obtained from ectoparasites and digestive tract endoparasites were identified based on Soulsby (1986).

Data Analysis

The data from the identification were calculated the prevalence rate and categorized based on the table from Williams *et al.* (1996). The prevalence results obtained were then analyzed using the Chi Square Test in the SPSS for Windows 22.0 program to determine the difference in the effect between male and female sexes and the effect between ages above one year and under one year on the prevalence of ectoparasites and endoparasites of the digestive tract obtained.

Results and Discussion

40 Stray cats were taken from the traditional market in Bojonegoro City, 27 cats were found to have ectoparasite infestations, 23 cats were found to have worm eggs and six were found to have protozoa. The types of ectoparasites obtained were the flea *Ctenocephalides felis* in 27 cats and the mite *Otodectes cynotis* in six cats. The types of endoparasites found were *Toxocara cati* worm in 17 cats, *Ancylostoma* sp worm in nine cats and the protozoan *Isospora felis* in six cats. The prevalence results of each species can be seen in Table 1.

Table 1 Prevalence of Parasites in Stray Cats in Traditional Markets in Bojonegoro City by Species

Species	Positive	Prevalence	Category
C. felis	27/40	67,5%	*Frequently*
O.cynotis	6/40	15%	*Often*
T. cati	17/40	42,5%	*Commonly*
Ancylostoma sp	9/40	22,5%	*Often*
Isospora felis	6/40	15%	*Often*

The prevalence rate of *Ctenocephalides felis* is influenced by environmental conditions that support the development of fleas. Fleas are able to survive and reproduce at a temperature of 13˚C - 35˚C with a relative humidity of 50% - 92%. The traditional market of Bojonegoro City itself is located in an area with temperatures ranging from 21˚C - 33˚C and a relative humidity level of ±77%, making it optimum for flea development.

Ctenocephalides felis found in this study has morphological characteristics, namely it has no wings, small triangular head, has pronatal comb and genal comb of the same length (Figure 1).

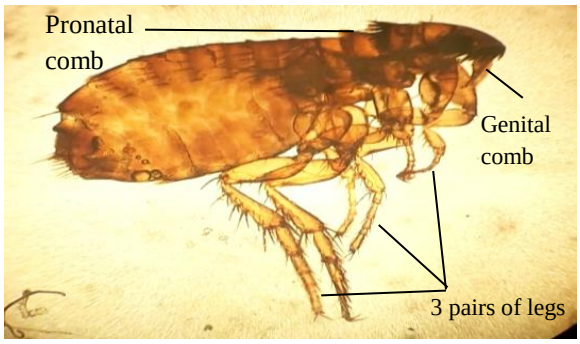

Figure 1 View of the entire body of *Ctenocephalides felis* at 100x magnification.

The prevalence rate of *Otodectes cynotis* is affected because the traditional market in Bojonegoro City is located in an area with a humidity level of less than 80%, and the air temperature is hot enough to allow the mites to dry quickly. The presence of cats scattered throughout the market may also be the cause of the lack of direct transmission between cats, according to Bowman *et al.* (2002) transmission of *Otodectes cynotis* from one host to another occurs through direct contact. *Otodectes cynotis* found in this study had morphological characteristics, namely the body is oval in shape, has 4 pairs of legs, has a short pedicle, the male mites have suckers in all pairs of legs, while the female mites are only found in tarsi I and II, and III and IV tarsi have satae (Figure 2).

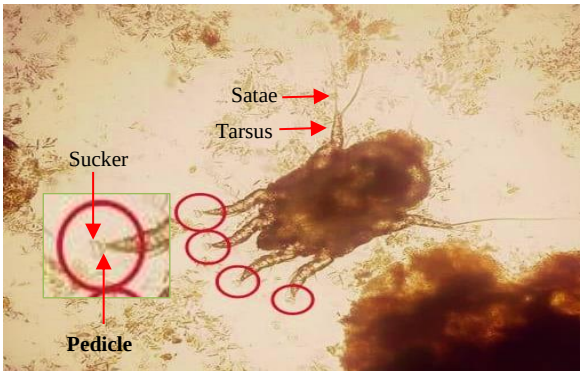

Figure 2 View of *Otodectes cynotis* mite with 400x magnification.

Stray cats in traditional markets are more susceptible to infection with endoparasites, because they have a habit of foraging in dirty places such as trash cans and doing a lot of activities on the ground (Mareta, 2019).

Toxocara cati found in this study was at the egg stage. *Toxocara cati* eggs have morphological characteristics that are round with a size of 64.9-71.89 m, dark brown in color, have thick walls and rough like lace (Figure 3). Eggs of *Ancylostoma* sp. The morphological characteristics found in this study were round-oval with a blunt tip, measuring 58.4-66.8 x 41.3-46.2 m, thin-walled consisting of 2 layers and containing two to eight blastomeres (Figure 4).

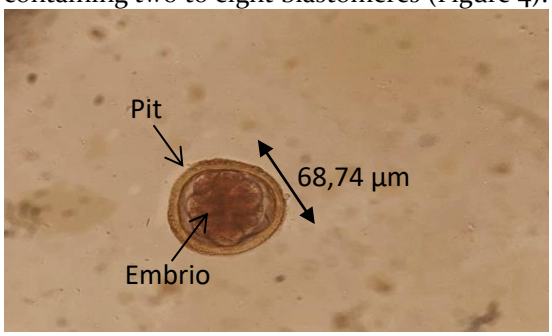

Figure 3 View of Toxocara cati eggs 400x magnification with fullborn floating method.

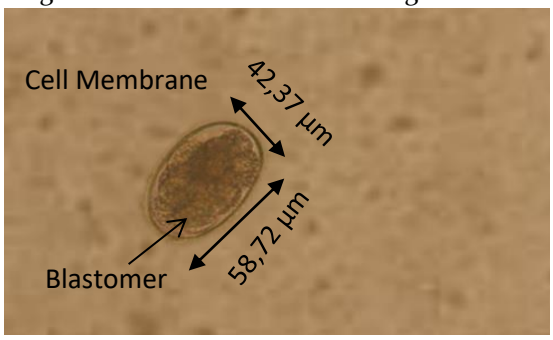

Figure 4 View of *Ancylstoma* sp. eggs. magnification 400x sedimentation method.

In this study, it was found that *Isospora felis* at the oocyst stage, ovoid in shape, has a size of 33.5-46.7 x 27.3-35.8 m, has thin and smooth walls, has no micropyle and there are 2 sporocysts (Figure 5).

Figure 5 *Isospore felis* 400x magnification by floating method.

Effect of Age and Gender on Ectoparasite Prevalence in Stray Cats at Traditional Markets in Bojonegoro City

Based on the chi square analysis of the age of cats under one year and above one year on the prevalence of ectoparasites, there was no significant difference or ($p > 0.05$), this indicates that there is no effect between the age of one year and under one year. The results of microscopic examination showed that 12 cats (30%) aged over one year and 15 cats (37.5%) under one year were positive for ectoparasite infestation (Table 2).

Table 2 Prevalence of Ectoparasites in Stray Cats in Traditional Markets in Bojonegoro City by Age

Age	Positive	Prevalence	Category
>1 Year	12/40	30%	*Commonly*
<1 Year	15/40	37,5%	*Commonly*
TOTAL	27/40	67,5%	

Based on the chi square analysis of male and female sexes on the prevalence of ectoparasites, there was no significant difference or ($p > 0.05$), this indicates that there is no influence between male and female sex. The results of microscopic examination showed that 10 cats (25%) which were male and 17 cats (42.5%) which were female were positive for ectoparasite infestation (Table 4.4).

Table 3 Prevalence of Ectoparasite Infestation in Stray Cats at Traditional Markets in Bojonegoro City by Gender

Gender	Positive	Prevalence	Category
Male	10/40	25%	*Often*
Female	17/40	42,5%	*Commonly*
TOTAL	27/40	67,5%	

Stray cats in the traditional market of Bojonegoro City with male and female sexes of all ages are thought to have the same movement and spread when looking for food, there by increasing the opportunity for each cat to be attacked by ectoparasites.

Effect of Age and Gender on Endoparasites Prevalence in Stray Cats at the Bojonegoro Traditional Market

Based on the chi square analysis of the age of cats under one year and above one year of endoparasite infection, there was a significant difference or ($p < 0.05$), then this indicates that there is an effect between the age of one year and under one year. The results of microscopic examination showed that 11 cats (27.5%) aged over one year and 16 cats (40%) under one year were positive for endoparasite infection.

Table 4 Prevalence of Endoparasite Infection in Stray cats in Bojonegoro Traditional Market by Age

Age	Positive	Prevalence	Category
>1 Year	11/40	27,5%	*Commonly*
<1 Year	16/40	40%	*Commonly*
TOTAL	27/40	67,5%	

Based on the chi square analysis of the male and female sexes on the prevalence of endoparasites, there was no significant difference or ($p > 0.05$), this indicates that there was no influence between male and female sex. The results of microscopic examination showed that 11 cats (27.5%) were male and 16 cats (40%) which were female were positive for endoparasite infection.

Table 5 Endoparasite prevalence in Stray cats in Bojonegoro Traditional Market by Gender

Gender	Positive	Prevalence	Category
Male	11/40	27,5%	*Often*
Female	16/40	40%	*Commonly*
TOTAL	27/40	67,5%	

Cats under one year of age are more susceptible to infection with endoparasites than cats over one year of age. Older animals have better immunity to protect against infectious agents than younger animals (Susilo *et al.,* 2014).

Conclusion

The types of ectoparasites in stray cats in the traditional market of Bojonegoro City are *Ctenocephalides felis* and *Otodectes cynotis.*

Types of digestive tract endoparasites in stray cats in traditional markets in Bojonegoro City are *Toxocara cati*, *Ancylostoma* sp. and *Isospora felis*.

The prevalence of digestive tract ectoparasites and endoparasites in stray cats in the traditional market of Bojonegoro City were *Ctenocephalides felis* (67.5%), *Otodectes cynotis* (15%), *Toxocara cati* (42.5%), *Ancylostoma* sp. (22.5%) and *Isospora felis* (15%).

Age and gender have no effect on the prevalence of ectoparasites, while the prevalence of digestive tract endoparasites has no effect on the prevalence, while gender has no effect.

References

Bowman, D. D., Hendrix, C. M., Lisay, D. S., Barr, S. C. 2002. Feline Clicical Parasitology. Iowa (US): Iowa State Univetsity Press Bowman DD. 2014. Georgis' Parasitology for Veterinarians 10th Edition. Eslevier. St. Louis. Missouri US

Fauziyah, S., A. H. Furqoni., N. F. Fahmi., A. Pranoto., P. G. Baskara., L. R. Safitri dan Z. Salma. 2020. Ectoparasite Infestation Among Stray Cats Around Surabaya Traditional Market, Indonesia. Journal of Tropical Biodiversity and Biotechnology, 5(3): 201-210.

Mareta, F. J. 2019. Prevalensi Infeksi Protozoa Saluran Pencernaan Pada Kucing di Kabupaten Lumajang. [Skripsi]. Fakultas Kedokteran Hewan. Universitas Airlangga. Surabaya.

Mudji, E. H dan Yohana, M. 2017. Diagnosis Toxoplasmosis Pada Kucing Liar (*Felis silvestris catus*) Menggunakan Antigen Rapid Test Kit di Pasar Keputran Surabaya. Agroveteriner, 5(2):1-5.

Rodyanto, M. R., Maya, A. N., Ana, H. 2016. Redesain Pasar Unit Kota Bojonegoro. Arsitektura, Vol. 14, No. 2

Soulsby, E. J. L. 1986. Helminths, Arthropods and Protozoa of Domestic Animals. 5 the Edition. The English Language Book Soc and Bailliere Tindall. London.

Susilo, J., A. J. Siswanto., A, Heni dan B. Triwibowo. 2014. Infeksi Cocidia pada Sapi Potong di Balai Penelitian Tanah Bogo Probolinggo Lampung Timur. Buletin Laboratorium Veteriner. 3(1):52-54.

Williams, E. H. Jr and L. Bunkley-Williams. 1996. Parasite of offshore big game fishes of Puerto Rico and the western Atlantic. Puerto Rico Department of Natural and Environmental Resources, San Juan, PR, and the University of Puerto Rico, Mayaguenz, PR, 382 p., 320 drawings.