Zoonotic and other gastrointestinal parasites in cats in Lumajang, East Java, Indonesia

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Abstract

Relationship between humans and cats has negative impact associates with zoonotic diseases. It is the reason why studies on the prevalence of gastrointestinal (GI) parasites in cats are important. Some of zoonotic GI parasites in cats are Toxocara spp., Ancylostoma sp., and Toxoplasma gondii. The current study was conducted to investigate the prevalence of GI parasites in owned and stray cats in Lumajang East Java Indonesia. One hundred and twenty fecal samples were collected from owned and stray cats on November 2018 to January 2019. The samples were examined by direct smears, sedimentation and flotation techniques. Identification of parasites was determined based on the morphology of worm eggs and protozoan cysts. The results showed that gastrointestinal parasites were found in 68.33% (82/120) examined samples, respectively, 48.33% (29/60) and 88.33% (53/60) from owned cats and stray cats. We found 7 genera of parasites, 4 genera of worm eggs and 2 genera protozoan oocyst. The egg worm were Toxocara cati (40 %), Toxocara leonina. (10.33%), Ancylostoma sp. (18.33%), Diphyllobothrium sp. (3.33%) and Dipylidium caninum (1.67%). The protozoan oocyst were Isospora felis (27.5%), Isospora rivolta (13.33%) and Eimeria spp. (8.33%), Toxocara cati, Ancylostoma sp. (hookworm), Diphyllobothrium sp. and Dipylidium caninum were zoonotic parasites. Rate infection in younger and older cat were no significant difference. One cat can be infected one or more parasite. To conclude, the prevalence of zoonotic GI parasites both in owned and stray cats were high. It is necessary to plan a program to control this zoonotic parasites.

Introduction

Cats are common pets in all countries. The close relationship between humans and cats has positive and negative impact. Negative impact associates with zoonotic diseases which can be dangerous for human health. Domestic cats and also wild felids are a potential source of a number of infectious disease agents such as several zoonotic parasites,1 while another researcher reported that stray cats can act as potential sources of soil contamination with zoonotic parasites.2 The gastrointestinal (GI) parasites are cosmopolitan pathogens and some species of parasite are zoonotic. For promoting public health protection, many researchers in the world have been interested in the epidemiology of GI parasites in cats, including in Egypt,1 in Europe,4 in Iran,5 in China6 in Serbia,1 and in Poland.2 They found parasites such as Toxocara sp, Toxascaris leonina, Ancylostoma sp, Trichuris sp, Dipylidium caninum, Taenia sp, Capillaria spp, Paragonimus sp, Cystoisospora sp, Toxoplasma gondii, Sarcocystis spp, Isospora spp., Blastocystis sp. and Giardia sp.2-7 Considering the role of parasites in human beings and domestic animals health, therefore this study aimed to estimate the prevalence of GI parasites, including the zoonotic parasites in owned and stray cats in Lumajang, East Java, Indonesia. This knowledge is important to formulate the effectively zoonotic disease control program.

Materials and Methods

Sample Collection

Collecting samples were carried out on November 2018 to January 2019. One hundred and twenty fecal samples were collected from 60 owned and 60 stray cats in Lumajang, East Java, Indonesia. Term of owned cat is a household cat that lives in housing and is maintained by the owner, while stray cat is domestic cat that lives in market and has no owner. Stray cats were caught and caged by researcher. During the first defecation of the owned cat, excrement was collected by the owner at the house, while stray cat was collected by researcher. The faeces was placed into a disposable plastic container with 5% formalin for fixation protozoan cysts and all of samples were stored at about 4°C for examination. Data such as the age and gender of cats were recorded.

Parasites Examination

All cat faeces were transported to Department of Veterinary Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga for examination. The samples were evaluated by direct wet smears, sedimentation and sugar flotation method. Direct wet smears were observed by put faeces on slide with a drop of aquades and directly the prepared slides were examined under light microscope at 100x and 400x magnification.

Sedimentation and sugar flotation method. Faeces samples were diluted with

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RESULTS

Of the 120 faecal samples, 68.33% (82/120) were positive containing at least one species of GI parasite. The prevalence of parasites in stray cats was higher than in owned cats, 88.33% (53/60) for stray cats and 48.33% (29/60) for owned cats (Table 1).

A total of 8 species of GI parasite were identified microscopically both in owned and stray cat faeces, 5 species of worm and 3 species of protozoan (Table 2.). That parasites in both owned and stray cats, respectively, were Toxocara cati (18.33% or 11/60 and 61.67% or 37/60), Toxocaris leonina (3.33% or 2/60 and 18.33% or 11/60), Ancylostoma sp. (11.67% or 7/60 and 25% or 15/60), Diphylobothrium sp. (5% or 3/60 and 1.67% or 1/60), Diphylidium caninum (3.33% or 2/60 and 0%), Isospora felis (15% or 9/60 and 40% or 24/60), Isospora rivolta (8.33% or 5/60 and 18.33% or 11/60) and Eimeria spp. (5% or 3/60 and 11.67% or 7/60). And overall, the prevalence of intestinal parasites in the younger (< 1 year) and older (≥ 1 year) cats had no significant difference.

One cat can infect by single or mix parasites and the cats frequently mixed infected two parasite species or three, even four parasite species. In this study, mix parasites infections were observed in the owned and stray cat populations (Table 3). Toxocaris leonina and D. caninum eggs and Eimeria sp oocyst always found together with other species. Toxocaris leonina always together with T. cati, D. caninum egg and Eimeria sp oocyst especially together with Ancylostoma sp.

Statistical Analysis

The comparison between between kind and age of cats were carried out using the Chi-squared test with program SPSS (Statistical Package for Social Sciences). The statistical significance was defined if values of P<0.05.

Table 1. The prevalence of infections with gastrointestinal parasites in faecal examined cats.

| Cat          | Parasite          | North | Location | South | Total |
|--------------|-------------------|-------|----------|-------|-------|
| Owned Cat    | Worm              | 3/20  | 4/20     | 8/20  | 29/60 |
|              | (15%)             | (20%) | (20%)    |       |       |
| Protozoa     | 4/20              | (20%) | (15%)    | (15%) |       |
| Worm and Protozoal | 0          | (0%)  | (1%)     | (1%)  |       |
|              | (20%)             | (15%) | (15%)    |       |       |
| Stray Cat    | Worm              | 9/20  | 4/20     | 6/20  | 15/60 |
|              | (45%)             | (20%) | (30%)    |       |       |
| Protozoa     | 0                 | (0%)  | 2/20     | (10%) |       |
| Worm and Protozoal | 9/20  | (45%) | (0%)     | (35%) |       |
|              | (20%)             | (15%) | (15%)    |       |       |
| Total        | 25/40             | (62.5%)| 28/40    | 29/40 | 82/120 |
|              | (70%)             |       | (72.5%)  |       |       |
|              | (68.33%)          |       |          |       |       |

Table 2. The prevalence of each species of gastrointestinal parasites in faecal examined cats.

| Parasite          | * 1 th | Owned Cat (n=60) | No of cat positive (%) | Stray Cat (n=60) | Total (n=120) |
|-------------------|--------|------------------|------------------------|------------------|--------------|
|                   | ≥ 1 th | Total            |                        |                  |              |
|                   |        |                  |                        |                  |              |
| Toxocara cati     | 5(8.33)| 6 (10)           | 11 (18.33)             | 18 (30)          | 37 (61.67)   |
|                   |        |                  |                        |                  | 48(40)       |
| Toxocaris leonina | 1(1.67)| 1(1.67)          | 2 (3.33)               | 4 (6.67)         | 7 (11.67)    |
|                   |        |                  |                        |                  | 11(18.33)    |
|                   |        |                  |                        |                  | 13(10.33)    |
| Ancylostoma sp.   | 2(3.33)| 5(8.33)          | 7 (11.67)              | 4 (6.67)         | 11(18.33)    |
|                   |        |                  |                        |                  | 15(25)       |
|                   |        |                  |                        |                  | 22(18.33)    |
| Diphylobothrium sp.| 2(3.33)| 1(1.67)          | 3 (5)                  | 0                | 1(1.67)      |
|                   |        |                  |                        |                  | 1(1.67)      |
|                   |        |                  |                        |                  | 4(3.33)      |
| Diphylidium caninum| 0       | 2(3.33)          | 2 (3.33)               | 0                | 0            |
|                   |        |                  |                        |                  | 0            |
|                   |        |                  |                        |                  | 2(1.67)      |
| Isospora felis    | 6 (10) | 3 (5)            | 9 (15)                 | 11 (18.33)       | 13(21.67)    |
|                   |        |                  |                        |                  | 24 (40)      |
|                   |        |                  |                        |                  | 33(27.5)     |
| Isospora rivolta  | 1(1.67)| 4(6.67)          | 5 (8.33)               | 5 (8.33)         | 6 (10)       |
|                   |        |                  |                        |                  | 11(18.33)    |
|                   |        |                  |                        |                  | 16(13.33)    |
| Eimeria spp.      | 2(3.33)| 1(1.67)          | 3 (5)                  | 4 (6.67)         | 7 (11.67)    |
|                   |        |                  |                        |                  | 10(8.33)     |
The prevalence of zoonotic parasites, including *Toxocara cati*, *Ancylostoma sp.*, *Dipylidium caninum*, and *Diphylobothrium sp.* was found in cats after hookworm infection. Other species of worm that infected cats in this study were *Toxocaris leonina*. The prevalence was (10.33%) and it was lower than in Korea (31.35%)6. Human infection by *T. leonina* has not been reported,11 it is non zoonotic worm. *Dipylidium caninum* sp. and *Diphylobothrium caninum* was encountered with low prevalence in comparison with other species. *Diphyllobothriid typeworm* also found very low prevalence (0.2%) in ferral cats in Korea.12 *Dipylidium caninum* sp. can infect cat or human by eating raw or undercooked fish. Fish infected with *Diphyllobothrium* larvae may be consumed in any country in the world. The prevalence of *D. caninum* infection in stray cats in Egypt was lower (5%), while in Iran was lowest (2.9%).5

In recent study, all of protozoan were non zoonotic parasite, they were 27.5%, 13.33% and 8.33% for *Isospora felis, I. rivolta* and *Eimeria* sp. respectively. These findings were lower than prevalence in China and Italy.6,11 In China the prevalence *I. felis* and *I. rivolta* infection in cat, respectively, were 11.39 and 9.17%, while in Italy were 3% and 2.3% and they did not found *Eimeria* sp., *Isospora felis* and *I. rivolta* appear to be non pathogenic for cats.6

The prevalence of intestinal parasites in the younger (<1 year) and older (≥1 year) cats had no significant difference. These finding was similar with result reseach in China,2 but different with report in Italy13 which reported that parasite infections were identified in significantly more cats younger than 18 months of age (P<0.05), and most often associated with the presence of compatible clinical signs (P<0.05).

As well as the results of this study that found one cat can infect by single or mix parasites and the cats frequently mix infected two parasite species or three, even four parasite species, many researcher also reported it.16 Indeed, 81.3% domestic cats in Ode – Iirele and Oyo communities, Southwest Nigeria were reported that they were infected with two or more parasites.14

Table 3. The prevalence of single and mixed parasite infections in cats.

| Infection                              | The prevalence in cat (%) | Total (n=120) |
|----------------------------------------|---------------------------|--------------|
| **Single Parasite**                    |                           |              |
| *Toxocara cati*                        | 7 (11.67)                 | 15 (12.5)    |
| *Ancylostoma sp.*                      | 2 (3.33)                  | 6 (6.67)     |
| *Dipylidium caninum*                   | 2 (3.33)                  | 2 (1.67)     |
| *I. felis*                             | 5 (8.33)                  | 3 (5)        |
| *I. rivolta*                           | 3 (5)                     | 1(1.67)      |
| **Mixed 2Parasite**                    |                           |              |
| *T. cati, T. leonina*                  | 2 (3.33)                  | 3 (5)        |
| *T. cati, Ancylostoma sp*              | 1 (1.67)                  | 0            |
| *T. cati, I. felis*                    | 0                         | 9 (15)       |
| *T. cati, I. rivolta*                  | 0                         | 2 (3.33)     |
| *T. cati, Eimeria sp*                  | 0                         | 2 (3.33)     |
| *Ancylostoma sp., D. caninum*          | 1 (1.67)                  | 0            |
| *Ancylostoma sp., Eimeria sp*          | 1 (1.67)                  | 0            |
| *Ancylostoma sp., I. felis*            | 0                         | 2 (3.33)     |
| *Ancylostoma sp., Dipylidium bovis*    | 0                         | 1 (1.67)     |
| *Dipylidium bovis sp., I. felis*       | 1 (1.67)                  | 0            |
| *I. felis, I. rivolta*                 | 2 (3.33)                  | 1 (1.67)     |
| **Mixed 3Parasite**                    |                           |              |
| *T. cati, T. leonina, Ancylostoma sp.* | 0                         | 1 (0.83)     |
| *T. cati, T. leonina, I. felis*        | 0                         | 2 (1.67)     |
| *T. cati, T. leonina, I. rivolta*      | 0                         | 1 (0.83)     |
| *I. felis, I. rivolta*                 | 0                         | 2 (1.67)     |
| *Ancylostoma sp., Eimeria sp.*         | 0                         | 1 (0.83)     |
| *Ancylostoma sp., Dipylidium caninum,* | 1 (1.67)                  | 0            |
| *Eimeria sp*                           |                           |              |
| **Mixed 4Parasite**                    |                           |              |
| *T. cati, Ancylostoma sp, I. felis, Eimeria sp.* | 1 (1.67) | 1 (1.67) |
| *T. cati, I. felis, I. rivolta*        | 0                         | 1 (0.83)     |
| *T. cati, I. leonina, I. rivolta*      | 0                         | 1 (0.83)     |
| *T. cati, I. leonina, I. rivolta*      | 0                         | 1 (0.83)     |
| *Eimeria sp*                           |                           |              |

**Conclusions**

The prevalence of zoonotic gastrointestinal parasites both in owned and stray cats in Lumajang Indonesia were high. It is necessary to plan a program to control this zoonotic parasites.

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