

Orjinal Araştırma Makalesi/ Original Paper

Van İlindeki Kedilerde Gastrointestinal Parazit Enfeksiyonları Gastrointestinal Parasite Infections in Cats in Van Province

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ÖZET

Amaç: Bu çalışma, Van ilindeki kedilerde bulunan gastrointestinal parazitlerin varlığını ve yayılışlarını belirlemek amacıyla yapılmıştır.

Materyal ve Metot: Çalışmanın materyali Mart 2017-Mart 2018 tarihleri arasında alınan toplam 140 kedi dışkı örneğinden oluşmaktadır. Dışkı örnekleri natif, flotasyon, sedimentasyon muayenesi ve karbolfuksin boyama yöntemi uygulandıktan sonra mikroskopik olarak 10X, 40X ve 100X büyütmelerde incelendi.

Bulgular: Bu çalışmada incelenen toplamda 140 kedinin 67'sinin (%47.86) dışkısında gastrointestinal parazitler tespit edilmiştir. Yapılan araştırma sonucunda; *Isosporas* pp. ookisti %43.28 (n:29), *Toxocara cati* yumurtası %37.31 (n:25), *Toxoplasma gondii* benzeri ookist %16.41 (n:11), kancalı kurt yumurtası %11.94 (n:8), *Joyeuxiella* spp. yumurtası %11.94 (n:8), *Cryptosporidium* spp. ookisti %10.44 (n:7), *Toxascaris leonina* yumurtası %7.46 (n:5) ve *Dipylidium caninum* yumurtası %5.97 (n:4) oranında tespit edilmiştir. Tek türle %67.16 (n:45), iki türle %20.40 (n:14) ve üç türle %11.94 (n:8) oranında enfekte kedi tespit edilmiştir.

Sonuç: Sonuç olarak; Van yöresindeki kedilerde gastrointestinal helmintlerin bu kadar yaygın bulunması ve bunların bir kısmının zoonoz olması insan sağlığı açısından da risk oluşturmaktadır. Bu yüzden kedilerin periyodik aralıklarla muayenelerinin ve gerekli tedavilerinin yapılması, koruyucu tedbirlerin alınması ve insanların bu konularda bilinçlendirilmesi gerektiği kanaatindeyiz.

Anahtar Kelimeler: Kedi, Gastrointestinal parazitler, Van, Türkiye.

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ABSTRACT

Objective: This study was conducted to determine the presence and spread of gastrointestinal parasites in cats in the Van province.

Material and Method: The study consists of a total of 140 cat feces samples collected between March 2017 and March 2018. Stool samples were examined microscopically at 10X, 40X and 100X magnifications after applying native, flotation, sedimentation examination and carbol-fuchsin staining method.

Results: Gastrointestinal parasites were found in the feces of 67 (47.86%) of a total of 140 cats examined in this study. As a result of the research *Isospora* spp. oocyst 43.28% (n:29), *Toxocara cati* egg 37.31% (n:25), *Toxoplasma gondii*-like oocyst 16.41% (n:11), hookworm egg 11.94% (n:8), *Joyeuxiella* spp. egg 11.94% (n:8), *Cryptosporidium* spp oocyst 10.44% (n:7), *Toxascaris leonine* egg 7.46% (n:5), and *Dipylidium caninum* egg 5.97% (n:4) at a rate of gastrointestinal parasites in cats have been identified. Infected cats were detected 67.16% (n:45) with one species, 20.40% (n:14) with two species and 11.94% (n:8) with three species.

Conclusion: As a result, since gastrointestinal helminths are so common in cats in the Van province and some of them are zoonotic, it also carries risks for human health. Therefore, we believe that periodic examinations of cats and necessary treatments are required, as well as protective measures and raising awareness of people on these issues.

Key Words: Cat, Gastrointestinal parasites, Van, Turkey.

INTRODUCTION

Parasitic diseases are common worldwide and many of them are zoonotic. Relationship between humans and domesticated animals like cats and dogs play an important role in society as those animals have benefits for social and emotional development on human beings, but they can also pose a potential risk to their health. As a potential risk, cats can be carriers of viral, bacterial, and parasitic diseases.

Cats can become carriers of many zoonotic diseases that mostly affect children as a result of contaminating parks, playgrounds, and streets with their feces (Schnieder, 2006).

Cats and dogs that increase in number and live on the street in Turkey, especially in large cities, pose significant health problems (Tınar et al., 1989; Doğanay, 1992; Umur and Arslan 1998; Yaman et al., 2006; Kozan et al., 2007). Cats are known to harbor

many parasites in their intestines. Among these parasites, Protozoa such as *Cryptosporidium* spp., *Isoospora felis*, and *Isoospora rivolta*, helminths such as *Ancylostomatidae*, *Joyeuxiella pasqualei*, *Toxocara cati* are widely available. Most of the gastrointestinal helminths carried by stray cats are of great importance in both veterinary and human health and play a critical role in transmitting these parasites to pets and humans. Also, stray cats play an important role in human health as they are reservoirs for many zoonotic helminths (Calvete et al., 1998; Bowman et al., 2002; Schnieder, 2006).

This study was conducted to determine the presence and spread of gastrointestinal parasites in cats in the Van province.

MATERIAL and METHOD

This study material consists of a total of 140 cat feces samples collected between March 2017 and March 2018 (84 stray cats, 36 cats under the control of veterinarians in the Van municipal animal shelter and 20 cats brought to veterinary pet clinics in Van province for treatment). Collected feces samples

were brought to Parasitology Laboratory of Veterinary Faculty in Van Yüzüncü Yıl University for examination samples are examined macroscopically and after applying native, flotation, sedimentation examinations, and carbol fuchsin staining method, and finally it was examined microscopically at 10X, 40X, and 100X magnifications (Soulsby, 1982).

BULGULAR

In this study, parasites were detected in the feces of 67 (47.86%) of total 140 cats, including 49 (58.33%) of 84 stray cats, 15 (41.67%) of 36 cats protected in the shelter and of 3 (15%) of 20 cats brought for treatment in pet clinics (Table 1). Also, *Isoospora* spp. oocyst 43.28%, *Toxocara cati* egg 37.31%, *Toxoplasma gondii*-like oocyst 16.41%, hookworm egg 11.94%, *Joyeuxiella* spp. egg 11.94%, *Cryptosporidium* spp. oocyst 10.44%, *Toxascaris leonine* egg 7.46%, and *Dipylidium caninum* egg at 5.97% have been identified in cats (Table 2). Cats infected with one species were 67.16%, cats infected with two species were 20.40% and cats infected with three species were 11.94% (Table 3).

Table 1. Epidemiological data on cats examined

| Epidemiological information | Number of animals studied | Number of infected animals | Infection % |
|---|---------------------------|----------------------------|-------------|
| Female cat | 97 | 48 | 49.48 |
| Male cat | 43 | 19 | 44.18 |
| Street cats | 84 | 49 | 58.33 |
| Cats under protection in the shelter | 36 | 15 | 41.67 |
| Cats brought for treatment in pet clinics | 20 | 3 | 15 |
| Total | 140 | 67 | |
| According to the infection conditions | | | |
| Infected with one species | | 45 | 67.16 |
| Are infected with two species | | 14 | 20.90 |
| Infected with three species | | 8 | 11.94 |

Table 2.The species and the prevalence of Parasitic in the Gastrointestinal System in cats.

| Parasitic species | Infected cat Number of parasite species (n = 67) | Infection % |
|---------------------------------------|---|-------------|
| <i>Isospora</i> spp. | 29 | 43.28 |
| <i>Toxocara cati</i> | 25 | 37.31 |
| <i>Toxoplasma gondii</i> -like oocyst | 11 | 16.41 |
| <i>Joyeuxiella</i> spp. | 8 | 11.94 |
| Hookworm egg | 8 | 11.94 |
| <i>Cryptosporidium</i> spp. | 7 | 10.44 |
| <i>Toxascaris leonine</i> | 5 | 7.46 |
| <i>Dipylidium caninum</i> | 4 | 5.97 |

Table 3.The prevalence of mixed parasites infection of infected cats

| Infection with | Parasitic species | Infected cat Number of parasite species (n = 67) | Infection % |
|----------------------|---|---|-------------|
| Infection with one | <i>Isospora</i> spp. | 13 | 19.40 |
| | <i>Toxocara cati</i> | 10 | 14.92 |
| | <i>Joyeuxiella</i> spp. | 5 | 7.76 |
| | <i>Toxoplasma gondii</i> -like oocyst | 4 | 5.97 |
| | <i>Cryptosporidium</i> spp. | 4 | 5.97 |
| | Hookworm egg | 3 | 4.47 |
| | <i>Toxascaris leonina</i> | 3 | 4.47 |
| | <i>Dipylidium caninum</i> | 3 | 4.47 |
| Infection with two | <i>Isospora</i> spp.+ <i>Toxocara cati</i> | 4 | 5.97 |
| | <i>Toxocara cati</i> + <i>Toxascaris leonina</i> | 2 | 2.98 |
| | <i>Toxocara cati</i> + Hookworm egg | 2 | 2.98 |
| | <i>Isosporas</i> pp.+ <i>Joyeuxiella</i> spp. | 2 | 2.98 |
| | <i>Isospora</i> spp.+ <i>Toxoplasma gondii</i> -like oocyst | 1 | 1.49 |
| | <i>Toxocara cati</i> + <i>Dipylidium caninum</i> | 1 | 1.49 |
| | Hookworm egg+ <i>Joyeuxiella</i> spp. | 1 | 1.49 |
| | <i>Isospora</i> spp. + <i>Cryptosporidium</i> spp. | 1 | 1.49 |
| Infection with three | <i>Isospora</i> spp.+ <i>Toxocara cati</i> + <i>Toxoplasma gondii</i> -like oocyst | 4 | 5.97 |
| | <i>Isospora</i> spp.+ <i>Toxocara cati</i> + Hookworm egg | 2 | 2.98 |
| | <i>Isospora</i> spp.+ <i>Toxoplasma gondii</i> -like oocyst + <i>Cryptosporidium</i> spp. | 2 | 2.98 |

DISCUSSION

Parasitic diseases are common worldwide, many of which have zoonotic properties and can cause infections in natural conditions from vertebrate animals to humans or vice versa. Cats are popular hobby animals because they are easy to care and can be easily domesticated by humans, but despite these benefits, they can also pose a potential health risk to humans. The risk of parasitic disease transmission between cats and from cats to humans may increase due to the possibility that cats living at home may occasionally come into contact with stray cats, and stray cats may also come into contact with cats in the wild decidedly. Adult cats bury their feces in fruit and vegetable gardens, causing contamination during soil maintenance time and irrigation. Besides, some cats do not have the habit of burying their feces, and the spread of cat feces to the environment by water, wind, insects, and animal movements increases the risk of infection (Ataş et al., 1997; Hough, 2007; Dabritz and Conrad, 2010; Robert-Gangneux and Dardé, 2012).

In different regions of Turkey, many studies have been conducted emphasizing the helminths carried by cats and dogs, their rate of distribution, and their importance in terms of human and animal health. A total of 60 helminth species are reported, including about 20 species in cats and 40 species in dogs living in Turkey (Mimioğlu et al., 1960; Güralp et al., 1977; Dinçer et al., 1980; Saygı et al., 1990; Çerçi, 1992; Doğanay, 1992; Ekinçi et al., 1993; Durukan, 1995; Güçlü and Aydenizöz, 1995; Ataş et al., 1997; Umur and Arslan, 1998; Şenler et al., 2003; Yaman et al., 2006). According to autopsy and fecal examinations in cats, 13.3-100% helminth is reported. In studies conducted in different countries, it is reported that helminth infections in cats and dogs have a spread rate of 27% -97.5% according to autopsy and feces examinations (Worley, 1964; Vanparijs and Thienpont 1973; Cowper, 1978; Stalbauer, 1984; Haslinger et al., 1988; Schmid and Roberts, 1989;

Ridley et al., 1994; El-Shehabi et al., 1999; Sadjjadi et al., 2001).

Two species of *Isospora*, *I. felis* and *I. rivolta*, are found in cats. Isosporosis, which is especially common in young animals, mild infections also usually do not attract attention, but when mixed with other infections, symptoms such as loss of appetite, stagnation, diarrhea, anorexia, watery stools, apathy are seen in the cat (Schnieder, 2006; Tzannes et al., 2008; Gates and Nolan, 2009; Lappin, 2010). *Isospora* spp. has been reported in cats in Turkey 2.8-43% (Burgu et al., 1985; Doğanay, 1992). In a study which has been employed in Kırıkkale, it has been reported that 65.9% *Isospora* spp. oocyst of cats. (Korkmaz et al., 2016). In this study, it was found that the cats were infected with *Isospora* spp. at a rate of 43.28%, in parallel with the study conducted in Kırıkkale.

Cats can sometimes pose a risk to human health in terms of some parasites. *Toxocara cati* is considered one of the factors that can create visceral larva migrans in humans. Recently, *T. cati* has been reported to cause a high rate of ocular toxocarosis in humans (Bowman et al., 2002; Schnieder, 2006; Lee et al., 2010; Villeneuve et al., 2014; Yang and Liang, 2015; Beugnet et al., 2015). The rate *Toxocara* spp. eggs in cats in Turkey have been reported as 3.9 to 62.5% (Burgu et al., 1985; Doğanay, 1992). In a study conducted in Kırıkkale province, *Toxocara* spp. was reported to be detected at a rate of 48.9% (Korkmaz et al., 2016) In this study, *T. cati* was found in 37.31% and *T. leonina* in 7.46% in cats. This study is compatible with the study conducted in Kırıkkale province. The high rate of *T. cati* in this study showed that it is epidemiologically important.

The prevalence of hookworm factors in cats varies according to climate and geographical regions in the world. *Ancylostoma tubeforme* species has been more commonly identified in cats living in warm climate zones, while *Uncinariaste nocephala* has been reported to be more common in cats living in partially cold climate zones (Bowman et al., 2002; Schnieder, 2006; Capari et al., 2013; Rojekkittikhun et al., 2014;

Yang and Liang, 2015). Infective period larvae of dog and cat origin hookworms cause cutaneous larva migrans in humans. *Uncinaria stenocephala* has been reported in cats in Turkey, as well as *Ancylostoma* spp. eggs in cat feces at a rate of 2.7% (Doğanay, 1992; Gurler et al., 2015). Hookworm eggs have been reported in cats in Kırıkkale have been reported as 4.2% in cats (Korkmaz et al., 2016). In this study, hookworm parasite eggs were detected in cats at a rate of 11.94%, which suggests that hookworm is an important parasite in Van province cats.

There are reports of the prevalence of *J. pasqualei*, one of the cat's cestodes, in different parts of the world (Calvete et al., 1998; Waap et al., 2014). *Joyeuxiella pasqualei* parasite between 4.65-50% has been reported in Turkey (Doğanay, 1992; Öter et al., 2011). *Joyeuxiella* spp. segments have been reported as 4.2% in cats in Kırıkkale by Korkmaz et al. (2016). In this study, *Joyeuxiella* spp. eggs were found in cat feces at a rate of 11.94%. This study is compatible with the study conducted in Kırıkkale province.

Cryptosporidium spp. is parasitized in the small intestines of numerous animals, including cats. Cryptosporidiosis in cats is usually caused by *Cryptosporidium felis*. Also *Cryptosporidium parvum* and *Cryptosporidium muris* rarely cause infections in naturally infected cats. *Cryptosporidium* spp. although it is widely reported in cats around the world, the prevalence of the parasite in cats varies depending on the test used and the groups taken in the sample (Cirak and Bauer, 2004; Fayer et al., 2006; Schnieder, 2006; Shukla et al., 2006; Taylor et al., 2007; Scorza and Tangtrongsup, 2010; Paoletti et al., 2011). There are reports of the presence of the parasite in Van cats in Turkey (Göz et al., 2005). In this study, *Cryptosporidium* spp. oocyst was found to be 10.44% in fecal samples examined in cats. In this study, it was observed that some of the infected cat feces were watery, but most of the cat feces found in *Cryptosporidium* spp. oocyst was of normal consistency. It has been concluded that the infection has been passed by cats before these cats are preimmun.

There are few studies on the detection of *Toxoplasma gondii*-like oocysts in cats. *Toxoplasma gondii* oocysts have been identified from the feces of cats in different parts of the world (Doğanay, 1992; Tütüncü et al., 2003; Schnieder, 2006; Taylor et al., 2007; Djakovic, 2012; Muz et al., 2013; Lilly and Wortham, 2013; Paris et al., 2014). A study conducted on this subject reported a positive rate of 0.9% in California, America (Dabritz et al., 2007). The presence of oocysts of this parasite is reported in cats in Turkey. *Toxoplasma gondii*-like oocysts have been reported at 8.3% in cat feces in Hatay province in Turkey (Yaman et al., 2006). In this study, 16.41% of *T. gondii*-like oocysts have been identified. It is thought that the difference between the ratios may be due to the difference between the sampling numbers and different geographic reasons.

According to autopsy results in cats, *D. caninum* was found in 46% in Ankara (Burgu et al., 1985), 33.3% in Elazığ (Altaş and Taşan, 1999), 12.5% in Hatay (Yaman et al. 2006). *Dipylidium caninum* was found to be 49.5% in Iran (Zibaei et al., 2007), 0.1% in Germany (Barutzki and Schaper, 2003) and 0.7% in cats found in animal shelters in the Netherlands (Robben et al., 2004). In our study, *D. caninum* was identified as a cestod species at a rate of 5.97%. This ratio differs according to studies conducted in the world and Turkey. We believe that the reason for this difference may be due to the difference in the number of cats sampled, as well as the differences in feeding and geographical conditions.

As a result, in this study parasites like *Toxocara cati* and *Isospora* spp. have been found extensively in cats. Some gastrointestinal parasites are responsible for various zoonotic diseases, such as visceral larval migrans and ocular larval migrans, with a high rate of infection in stray cats. Because of this, appropriate control strategies and measures should be applied to cats and public awareness should be raised in terms of parasitic diseases transmitted zoonotically by cats.

Conflict of interest: The authors declare that there is no conflict of interest.

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