

Internal and external parasites prevalence of domestic cats in Konya province

Ceylan Ceylan^{1*}, Merve İder², Ayşe Evci³, Şule Yılmaz⁴, Dilge Sıla Yalçın⁴, Onur Ceylan³

¹Siirt University Faculty of Veterinary Medicine, Department of Parasitology, Siirt, Türkiye

²Selçuk University Faculty of Veterinary Medicine Department of Internal Medicine, Konya, Türkiye

³Selçuk University Faculty of Veterinary Medicine, Department of Parasitology, Konya, Türkiye

⁴Selçuk University Institute of Health Sciences, Konya, Türkiye

*Corresponding: ceylan.ceylan@siirt.edu.tr

Received: 06.10.2024

Accepted: 11.12.2024

Published: 30.04.2025

Abstract

Parasitic diseases caused by helminths, protozoa and ectoparasites endanger both animal and human health by causing clinical changes and transmitting potentially infectious pathogens. The aim of this study was to evaluate the parasitic diseases in domestic cats brought to Selçuk University Veterinary Faculty Animal Hospital (SUVFAH) between 2015 and 2021. In this context, a total of 828 samples, including 743 cat faeces and 85 cat skin samples sent to the laboratory of the Department of Parasitology were examined. In the study, 37.56% (311/828) of domestic cats were infected with at least one parasite species and single (43.67%), double (2.81%) and triple (0.27%) mixed internal parasite infections were determined. This study revealed that *Giardia duodenalis* (34.72%, 258/743), *Isospora* spp. (3.36%, 25/743), and *Entamoeba histolytica* (0.27%, 2/743) as the most common protozoan parasites, while *Toxocara* spp. (1.62%, 12/743), *Joyeuxiella* spp. (1.08%, 8/743), and *Dipylidium caninum* (0.27%, 2/743) were the predominant helminths among the sampled cats. *Otodectes cynotis*, the only ectoparasite species, was detected in 1.7% (2/85). Although the cats enrolled in the study were owned house cats, it was observed that the rates of internal and external parasites were high. Pet owners should take responsibility to prevent parasite infections/infestations in pets. Especially indoor cats with access to the street can be a source of many parasitic agents with zoonotic properties. Domestic cats should be regularly examined by a veterinarian and antiparasitic applications should be made regularly.

Keywords: Cat, ectoparasites, helminths, protozoa, zoonoses

INTRODUCTION

Cats are often seen as popular and loved pets due to their apparent ease of care and potential for domestication; however, despite these benefits, they can pose a danger to humans. Internal and external parasites pose a significant health risk to domestic cats, affecting their well-being and, in some cases, causing serious illness or even death. The risk of transmission of parasitic diseases among cats and from cats to humans might be increased by the possibility of occasional contact between domestic cats and stray cats, and between stray cats and wild cats (Karakuş & Denizhan, 2021). In particular, parasites such as *Ancylostoma* sp., *Echinococcus* sp., *Giardia* spp., *Toxocara canis* and *Toxocara cati*, are significant zoonotic agents causing human infections. Control of these parasites is therefore important not only for the health of cats and dogs, but also for public health and national economies. Understanding the prevalence of these parasites in specific regions is essential for developing effective prevention and control strategies. To date, 68 parasite species have been identified in cats in Türkiye, comprising 13 ectoparasites, 33 helminths, and 22 protozoan species. Parasites and parasitic diseases are a public health concern, as some have zoonotic potential (Barılı et al., 2023). Many studies have been carried out in different regions of Türkiye, mostly in large cities, highlighting the helminths harbored by carnivores including cats, their prevalences, and their role in animal and human health (Altaş & Taşan, 1999; Burgu et al., 1985; Dinçer et al., 1980; Doğanay, 1992; Durukan, 1995).

Konya Province, located in central Türkiye, is a region with diverse climatic conditions, ranging from semi-arid

to temperate, which can influence the distribution and prevalence of parasitic infections in animals. Despite the importance of parasitic infections in domestic animals, there is a paucity of data regarding the internal and external parasites prevalence of domestic cats in this region.

The goal of the current study was to investigate the prevalence of internal and external parasites in domestic cats in the province of Konya. By identifying the most common parasites affecting cats in this area, the research aims to provide valuable information that could inform veterinary practice and public health policy, ultimately improving the health and welfare of both cats and the wider community.

MATERIALS AND METHODS

The study examined a total of 828 samples, including 743 cat faeces and 85 cat skin samples, sent to the Selçuk University Veterinary Faculty Parasitology Department Laboratory between 2015 and 2021. To determine gastrointestinal helminth fauna in owned cats, fecal samples were collected from 743 cats and analyzed using Native, Fulleborn flotation, and Benedek sedimentation methods (Umur et al., 2006). Initially, all fecal samples were macroscopically screened in terms of the presence of nematodes and proglottids of cestodes. 0.9% isotonic saline solution was used for the Native fecal examination method, saturated salt water for the flotation method, and distilled water for the Benedek sedimentation method. According to the literature, oocysts, cysts, and eggs were identified based on morphological characteristics (Umur et al., 2006; Zajac et al., 2021). Skin samples of 85 cats were collected in sterile petri dishes and sent to

How to cite this article: Ceylan C., İder M., Evci A., Yılmaz Ş., Yalçın D.S., Ceylan O., (2025). Internal and external parasites prevalence of domestic cats in Konya province. *Journal of Advances in VetBio Science and Techniques*, 10(1), 1-6. <https://doi.org/10.31797/vetbio.1560726>

the laboratory for analysis. The debris is then placed on a microscope slide, coverslipped, and inspected with a 10× microscope objective. The material was put on a slide, then 10% potassium hydroxide was added in five drops. After placing a cover slip over the sample, it was examined under a microscope to check for the presence of mites, larvae, or ova (Zajac et al., 2021).

RESULTS

As a result of the study ecto and endoparasites were detected in 311 of 828 (37.56%) cats. During the study period, 37.56% (311/828) of the cats tested positive for at least one parasite, including single (43.67%), double (2.81%) and triple (0.27%) internal parasite infections. The prevalence of *Giardia duodenalis* 34.72% (258/743), *Isospora* spp. 3.36% (25/743), and *Entamoeba histolytica* was 0.27% (2/743); the prevalence of *Toxocara* spp. 1.62% (12/743) and cestodes such as *Joyeuxiella* spp. 1.08% (8/743) and *D. caninum* was determined to be 0.27% (2/743). *Otodectes cynotis* was detected at a rate of 1.7 % (2/85). The parasites detected in the study are shown in Table 1 and Table 2.

DISCUSSION

Cats are an essential part of social life, sharing the same environment and sometimes the same home with humans. They may pose a risk to the health of both humans and animals due to the parasites that they can carry (Bowman et al., 2002; Schnieder, 2006). Intestinal parasites harbored by cats include protozoa like *Giardia* spp., *Entamoeba histolytica*, *Isospora* (*I.*) *felis*, and *I. rivolta*, and some cestodes and nematodes such as *Dipylidium caninum*, *Joyeuxiella pasqualei*, and *Toxocara cati*. Some of the infected cats with these parasites in close contact with humans are of zoonotic significance (Bowman et al., 2002).

Giardia intestinalis is a common and important zoonotic

Table 1. Single parasitic infection rates in cats between 2015-2021

Helminths	(n:743)	Positive	Prevalence %
Nematod			
<i>Toxocara</i> spp.		12	1.62
Cestod			
<i>Joyeuxiella</i> spp.		8	1.08
<i>Dipylidium caninum</i>		2	0.27
TOTAL		22	2.97
Protozoans			
<i>Giardia</i> spp.		258	34.72
<i>Isospora</i> spp.		25	3.36
<i>Entamoeba</i> spp.		2	0.27
TOTAL		285	38.35
Ectoparasites	(n:85)		
<i>Otodectes cynotis</i>		2	1.7
TOTAL		2	1.7

protozoan parasite that causes diarrhea and infects the human and animal gastrointestinal tract. Human infection by this protozoan parasite can occur through consuming contaminated food or water, as well as by indirect or direct interaction with infected animals or people (Kar et al., 2015). *Giardia intestinalis*, which has highly variable host specificity, is a multi-complex species including eight (A-H) unique assemblages. The primary zoonotic genotypes Assemblages A and B are the most typically recognized human genotypes but can also be encountered in various hosts. Throughout the world, canine and feline hosts are typically infected with *Giardia* assemblages that have adapted to their respective hosts, of which assemblages C and D are prevalent in dogs and assemblage F in cats. However, some other *G. intestinalis* assemblages have also been reported, including Assemblages C, D, and E in cats, and assemblages A and B in both dogs and cats (Enemark et al., 2020). Feline giardiasis by *Giardia intestinalis* has been recorded in many countries between the rates of 3.6-11.1% (Enemark et al., 2020; Li et al., 2019; Paoletti et al., 2011; Sotiriadou et al., 2013; Tangtrongsup et al., 2020; Yang et al., 2015). *Giardia* spp. have been detected in cats in the range of 4-68.6% in studies based on faecal examination and molecular methods in Türkiye (Burgu et al., 1985; Önder et al., 2021; Sürsal et al., 2020). In our study infection rate in cats was found 34.72%; higher than the other countries and most of the studies conducted in Türkiye. A recent study revealed the molecular prevalence of *G. intestinalis* as 68.6% in diarrhoeic cats in the Central Anatolian region of Türkiye (Sürsal et al., 2020). The prevalence determined in this investigation (34.72%) was lower than the prior report. The prior study's diagnostic method may have been more specific, which could account for this. While the incidence and molecular characterization of *Giardia* spp. in felids have been studied internationally, there is an obvious need for more information on the existence of these protozoans in cats in Türkiye.

Table 2. Mixed parasitic infection rates in cats between 2015-2021

Parasites	n:743	Positive	Prevalence %
<i>Toxascaris</i> spp.+ <i>Isospora</i> spp.		1	0.13
<i>Toxocara</i> spp.+ <i>Giardia</i> spp.		5	0.67
<i>Isospora</i> spp. + <i>Giardia</i> spp.		12	1.62
<i>Giardia</i> spp.+ <i>Dipylidium</i> spp.		1	0.13
<i>Toxocara</i> spp.+ <i>Toxascaris</i> spp		1	0.13
<i>Giardia</i> spp.+ Cestod egg.		1	0.13
Total dual infection		21	2.81
<i>Isospora</i> spp.+ <i>Toxocara</i> spp. + <i>Giardia</i> spp.		2	0.27
Total triple infection		2	0.27

Two *Isospora* species, *I. rivolta* and *I. felis*, cause infections in cats. Isosporosis, particularly common in young animals, is generally unnoticed even in mild infections, but when combined with other infections, the cat may show symptoms characterized by loss of appetite, anorexia, stagnation, diarrhea, and apathy (Gates & Nolan, 2009; Lappin, 2010; Schnieder, 2006; Tzannes et al., 2008). *Isospora* spp. prevalence of cats in Türkiye has been reported to be 2.8-65.9% (Burgu et al., 1985; Doğanay, 1992). Two studies conducted in Van and Kırıkkale reported that 43.28% (Karakuş & Denizhan, 2021) and 65.9% (Korkmaz et al., 2016) of *Isospora* spp. oocysts were found in cats. In this study, the prevalence of *Isospora* spp. in cats was determined as 3.36%, which is in line with most of the previous studies conducted in Türkiye. However, it was found to be much lower than in the Van and Kırıkkale studies. This may be due to the fact that in both studies the majority of the study material were shelter and street cats.

Toxocara cati is a parasite transmitted between cats through breast milk or by feeding on the parasite host (Lee et al., 2010; Schnieder, 2006). This parasite is recognized as one of the causative agents of human visceral larva migrans (Bowman et al., 2002; Lee et al., 2010; Schnieder 2006). Although the parasite is widespread in many geographical regions (Beugnet et al., 2015; Villeneuve et al., 2014; Yang and Liang, 2015), the actual prevalence of *Toxocara* spp. larva migrans is unknown in Türkiye (Taylan Özkan, 2020). In Türkiye, *Toxocara* spp. eggs have been reported in cats at a rate of 3.0-62.5% (Ayaz et al., 2001; Doğanay, 1992; Gürler et al., 2015; Karakavuk et al., 2021; Korkmaz et al., 2016; Öge et al., 2014; Yaman et al., 2006). *Toxocara* spp. eggs were found in 1.62 % of the cats sampled in this study. The rate found was lower than other studies in Türkiye due to the policy of replacing sand pits in children's playgrounds with rubber and the fact that the animals studied were domestic cats.

Data concerning the *Entamoeba* spp. prevalence in cats and dogs is still sporadic and constricted (Shimada et al., 1992), and there are no studies on *Entamoeba histolytica* in cats in Türkiye. A study conducted in Spain reported an *Entamoeba* spp. prevalence of 0.4% in dogs and cats sampled (Gracenea et al., 2009), and another study conducted in Malaysia reported a prevalence of *Entamoeba* spp. of 12.4% in the same animal species (Ngu et al., 2014). In our study, the prevalence of *E. histolytica* in cats was 0.27%. Nonetheless, there appears to be little risk to public health from the zoonotic spread of *Entamoeba* species, particularly the harmful *E. histolytica*. Contrary to the notion that dogs and cats may pose a significant risk of transmitting *E. histolytica* to humans, the available evidence suggests this reverse zoonosis is unlikely to cause major environmental pollution (Eyles et al., 1954). Only the motile and fragile trophozoite, which is not infectious, is shed by infected dogs and cats. However, the infected humans shed extremely resistant and highly infectious cysts (Eyles et al., 1954).

Joyeuxiella pasqualei is a cestode that lives in the duodenum of cats and has a rostellum surrounded by spines on its scolex. There are some studies reporting the *J. pasqualei* prevalence in cats in various parts of the world (Calvete et al., 1998; Ngu et al., 2014; Waap et al., 2014). *Joyeuxiella pasqualei* has been reported in Türkiye between 4.2-50% (Burgu et al., 1985; Dinçer et

al., 1980; Doğanay, 1992; Karakuş & Denizhan, 2014; Korkmaz et al., 2016; Öter et al., 2011; Palaz, 2008; Tüzzer et al., 2010; Yaman et al., 2006). *Joyeuxiella pasqualei* eggs were detected in cat feces at a rate of 1.08 % in the present study. This rate is lower than the results of all other studies conducted in Türkiye. The reason for this is that the other studies conducted in Türkiye mostly focused on shelter and stray cats, whereas in our study only house cats were used. It may also be due to the decrease in contact between house cats living with humans and the intermediate host coprophagous insect as a result of the use of pesticides in houses.

Dipilidiosis is a cestode infection caused by the species *Dipylidium caninum*. Fleas and, less commonly, lice act as intermediate hosts and for an infection to occur, they must be consumed. It is a zoonotic disease, with the majority of human cases occurring in childrens, even though the disease mostly affects domestic and wild animals. Dipilidiosis in humans is an uncommon condition. *D. caninum* is thought to be the most frequent tapeworm infection in pets. (Rousseau et al., 2022). There are reports on the prevalence of *D. caninum* in different parts of the world. *D. caninum* has been found in 0.1% in Germany (Barutzki and Schaper, 2003), 49.5% in Iran (Zibaei et al., 2007), and 0.7% in shelter cats in the Netherlands (Robben et al., 2004), 4.8% in Malaysia (Ngu et al., 2014). In Türkiye, *D. caninum* has been reported in 0.21-65% (Altaş & Taşan, 1999; Burgu et al., 1985; Dinçer et al., 1980; Güralp, 1966; Karakavuk et al., 2021; Karakuş & Denizhan 2021; Palaz, 2008; Yaman et al., 2006). This study revealed that *D. caninum* prevalence was 0.27% in cats from Konya province. This prevalence is compatible with the results of studies conducted worldwide and in Türkiye.

Otodectes cynotis, a member of the Psoroptidae family, is the causative agent of external ear infections in cats, other carnivores (dogs, ferrets, foxes) and rarely in humans (Blot et al., 2003; Otrando et al., 2004; Shanks et al., 2000). Ear infections due to *O. cynotis* have been reported to be quite common in cats and this pathogen is responsible for 50-84% of cases of otitis externa in cats (Blot et al., 2003; Lefkaditis et al., 2007; Otrando et al., 2004; Roy et al., 2011). The disease is more common in young animals and is transmitted from animal to animal by contact (Blot et al., 2003; Otrando et al., 2004). Although many studies (Blot et al., 2003; Lefkaditis et al., 2007; Otrando et al., 2004; Roy et al., 2011) have been conducted worldwide on *O. cynotis* in cats, no prevalence study has been found in Türkiye. *O. cynotis* was detected at a rate of 1.7 % (2/85) in our study. The reason why this rate was detected in owned cats was thought to be the result of contact of owned cats with infected house or stray cats. It can be observed that further studies regarding *O. cynotis* in cats are required in Türkiye.

CONCLUSION

In conclusion, both internal and external parasites in cats, including fleas, ticks and worms, not only threaten cat health but also pose zoonotic risks to humans. Therefore, regular preventive treatment, good hygiene and routine veterinary check-ups are essential to protect both cats and their owners from these threats.

Financial support

The authors have not received financial support from any organisation.

Conflict of interest

The authors declare no conflict of interest.

Ethical statement

In our study, we did not examine live animals. We examined faeces and skin samples, which were sent to the laboratory for diagnostic purposes.

Author contributions

The initial draft, preparation, conceptualization, technique, and study were conceived and written by CC and MI. The tests were carried out by CC, OC, AE, ŞY, and DSY, who also edited and amended the manuscript. Each author accepted the submitted version of the paper and made contributions to it.

Availability of data and materials

All data generated or analyzed during the current study are included in this article. The data that support the findings of this study are available from the corresponding author, CC, upon reasonable request.

REFERENCES

- Altas, M.G. & Taşan, E. (1999). Elazığ ili kırsal yöre kedilerinde ekto ve endoparazitler ve bunların halk sağlığı yönünden önemi. *Fırat Üniversitesi Sağlık Bilimleri Dergisi*, 13 (3), 233-242.
- Ayaz, E., Değer, S., Gül, A., & Yüksek, N. (2001). Van kedilerinde helmintlerin yayılımı ve halk sağlığı yönünden önemi. *Türkiye Parazitoloji Dergisi*, 25, 166-169.
- Barılı, Ö., Tuynun, T., Gençay Topçu, E.B., & Umur, Ş. (2023). The parasites of cats in Türkiye. *Türkiye Parazitoloji Dergisi*, 47 (3), 190-199. <https://doi.org/10.4274/tpd.galenos.2023.85698>
- Barutzki, D., & Schaper, R. (2003). Endoparasites in dogs and cats in Germany. *Parasitology Research*, 90 (3), 148-150. <https://doi.org/10.1007/s00436-003-0922-6>
- Beugnet, F., Bourdeau, P., Chalvet-Monfray, K., Cozma, V., Farkas, R., Guillot, J., Halos, L., Joachim, A., Losson, B., Miró G., Otranto, D., Renaud, M. & Rinaldi, L. (2015). Parasites of domestic owned cats in Europe: co-infestations and risk factors. *Parasites & Vectors* 8, 281. <https://doi.org/10.1186/1756-3305-7-291>
- Blot, C., Kodjo, A., Reynaud, M.C., & Bourdoiseau, G. (2003). Efficacy of selamectin administered topically in the treatment of feline otoacariasis. *Veterinary Parasitology*, 112, (3), 241-247. [https://doi.org/10.1016/s0304-4017\(02\)00449-1](https://doi.org/10.1016/s0304-4017(02)00449-1)
- Bowman, D.D., Hendrix, C.M., Lindsay, D.S., & Barr, S.C. (2002). *Feline Clinical Parasitology*. Iowa State University Press. <https://doi.org/10.1002/9780470376805>
- Burgu, A., Tınar, R., Doğanay, A., & Toparlak, M. (1985). A survey for ecto-and endoparasites of stray cats in Ankara. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 32, 288-300.
- Calvete, C., Lucientes, J., Castillo, J.A., Estrada, R., Gracia, M.J., Peribanez, M.A., & Ferrer, M. (1998). Gastrointestinal helminth parasites in stray cats from the mid-Ebro Valley, Spain. *Veterinary Parasitology*, 75, 235-240. [https://doi.org/10.1016/S0304-4017\(97\)00182-9](https://doi.org/10.1016/S0304-4017(97)00182-9)
- Dinçer, Ş., Cantoray, R., & Taşan, E. (1980). Elazığ sokak kedilerinde görülen iç ve dış parazitler ile bunların yayılım oranları üzerinde araştırmalar. *Fırat Üniversitesi Veteriner Fakültesi Dergisi*, 5, 7-15.
- Doğanay, A. (1992). Türkiye’de kedi ve köpeklerde görülen parazitler. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 39, 336-348.
- Durukan, A. (1995). *Bursa yöresi kedilerinde helmintoloji araştırmalar*. [Doktora Tezi, Uludağ Üniversitesi]. Sağlık Bilimleri Doktora Tezleri / PhD Dissertations.
- Enemark, H.L., Starostka, T.P., Larsen, B., Takeuchi-Storm, N., & Thamsborg, S.M. (2020). *Giardia* and *Cryptosporidium* infections in Danish cats: risk factors and zoonotic potential. *Parasitology Research*, 119, 2275-2286. <https://doi.org/10.1007/s00436-020-06715-2>
- Eyles, D.E., Jones, F.E., Jumper, J.R., & Drinnon, V.P. (1954). Amebic infection in dogs. *Journal of Parasitology*, 40, 163-166.
- Gates, M.C., & Nolan, T.J. (2009). Endoparasite prevalence and recurrence across different age groups of dogs and cats. *Veterinary Parasitology*, 166, (1-2), 153-158. <https://doi.org/10.1016/j.vetpar.2009.07.041>
- Gracenea, M., Mar Gómez, M.S., & Torres, J. (2009). Prevalence of intestinal parasites in shelter dogs and cats in the metropolitan area of Barcelona (Spain). *Acta Parasitologica*, 54, 73-77. <https://doi.org/10.2478/s11686-009-0005-7>
- Güralp, N. (1966). Yomesan’ın köpek ve kedi cestodlarına etkisi. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 13, 253-267.
- Gürler, A.T., Bölükbaş, C.S., Pekmezci, G.Z., Umur, Ş., & Açııcı, M. (2015). Nematode and cestode eggs scattered with cats-dogs feces and significance of public health in Samsun, Turkey. *Ankara Üniversitesi Veteriner Fakültesi Dergisi*, 62, 23-26. https://doi.org/10.1501/Vet-fak_00000002653
- Kar, S., Güven, E., & Karaer, Z. (2015). Hexamitidae. In N. Dumanlı, & Z. Karaer (Eds.), *Veteriner protozooloji* (pp. 5-52). Medisan Yayınevi, Ankara. 2. Baskı
- Karakavuk, M., Selim, N., Yeşilşiraz, B., Atlı, E., Özdemir, H.G., Alan, N., Yalçın, M., Özkurt, O., Aras, M., Çelik, T., Can, Ş., Değirmenci Döşkaya, A., Köseoğlu, A.E., Erkunt Alak, S., Karakavuk, T., Ün, C., Gürüz, A.Y., Döşkaya, M., & Can, H. (2021). Prevalence of gastrointestinal parasites in stray cats of İzmir. *Animal Health production and Hygiene*, 10, (1), 6-11.
- Karakuş, A., & Denizhan, V. (2021). The occurrence of gastrointestinal parasite infections in cats in Van Province. *Van Sağlık Bilimleri Dergisi*, 14, (2), 191-198. <https://doi.org/10.52976/vansaglik.866570>
- Korkmaz, U.F., Gökpinar, S., & Yıldız, K. (2016). Kedilerde bağırsak parazitlerinin yaygınlığı ve halk sağlığı bakımından önemi. *Türkiye Parazitoloji Dergisi*, 40, 194-198.
- Lappin, M.R. (2010). Update on diagnosis and management of *Isospora* spp. infections in dogs and cats. *Topics in*

- Companion Animal Medicine*, 25, 133-135. <https://doi.org/10.1053/j.tcam.2010.07.001>
- Lee, A.C., Schantz, P.M., Kazacos, K.R., Montgomery, S.P., & Bowman, D.D. (2010). Epidemiologic and zoonotic aspects of ascarid infections in dogs and cats. *Trends in Parasitology*, 26, 155-161. <https://doi.org/10.1016/j.pt.2010.01.002>
- Lefkaditis, M.A., & Koukeri, S.E. (2007). A study on the treatment and the prevention of cat ear mite *Otodectes cynotis* using imedaclopride 10% and moxydectine 1% spot on drops. *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca*, 64, 464-467. <https://doi.org/10.15835/buasvmcn-vm:64:1-2:2469>
- Li, W., Liu, X., Gu, Y., Liu, J., & Luo, J. (2019). Prevalence of *Cryptosporidium*, *Giardia*, *Blastocystis*, and trichomonads in domestic cats in East China. *Journal of Veterinary Medical Science*, 81, 890-896. <https://doi.org/10.1292/jvms.19-0111>
- Ngui, R., Lee, S.C., Yap, N.J., Tan, T.K., Aidil, R.M., Chua, K.H., Aziz S., Sulaiman, W.Y., Ahmad, A.F., Mahmud, R., & Lian, Y.L. (2014). Gastrointestinal parasites in rural dogs and cats in Selangor and Pahang states in Peninsular Malaysia. *Acta Parasitologica*, 59, (4), 737-744. <https://doi.org/10.2478/s11686-014-0306-3>
- Otranto, D., Milillo, P., Mesto, P., Caprariis, D., Perrucci, S., & Capelli, G. (2004). *Otodectes cynotis* (Acari: Psoroptidae): examination of survival off the host under natural and laboratory conditions. *Experimental and Applied Acarology*, 32, 171-179. <https://doi.org/10.1023/B:APPA.0000021832.13640.ff>
- Öge, H., Öge, S., Özbakış, G., & Gürcan, S. (2014). Comparison of *Toxocara* eggs in hair and faecal samples from owned dogs and cats collected in Ankara, Türkiye. *Veterinary Parasitology*, 206, (3-4), 227-231. <https://doi.org/10.1016/j.vetpar.2014.10.005>
- Önder, Z., Yetişmiş, G., Pekmezci, D., Kökçü, N.D., Pekmezci, G.Z., Çil, A., Düzlü, Ö., İnci, A., & Yıldırım, A. (2021). Investigation of zoonotic *Cryptosporidium* and *Giardia intestinalis* species and genotypes in cats (*Felis catus*). *Türkiye Parazitoloji Dergisi*, 45, 252-256. <https://doi.org/10.4274/tpd.galenos.2021.46320>
- Öter, K., Bilgin, Z., Tınar, R., & Tuzer, E. (2011). Tapeworm infections in stray dogs and cats in İstanbul, Turkey. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 17, 595-599. <https://doi.org/10.9775/kvfd.2011.4275>
- Palaz, Y. (2008). The prevalence of helminths found in cats in Konya/Turkey. *Biological Diversity and Conservation*, 8, 259-266.
- Paoletti, B., Otranto, D., Weigl, S., Giangaspero, A., Di Cesare, A., & Traversa, D. (2011). Prevalence and genetic characterization of *Giardia* and *Cryptosporidium* in cats from Italy. *Research in Veterinary Science*, 91, 397-399. <https://doi.org/10.1016/j.rvsc.2010.09.011>
- Robben, S.R., le Nobel, W., Dopfer, D., Hendriks, W.M., Boersema, J.H., Fransen, F., & Eysker, M.E. (2004). Infections with helminths and/or protozoan in cats in animal shelters in the Netherlands. *Tijdschr Diergeneesk*, 129, 2-6.
- Rousseau, J., Castro, A., Novo, T., & Maia, C. (2022). *Dipylidium caninum* in the twenty-first century: epidemiological studies and reported cases in companion animals and humans. *Parasites & Vectors*, 15, 131.
- Roy, J., Bedard, C., & Moreau, M. (2011). Treatment of feline otitis externa due to *Otodectes cynotis* and complicated by secondary bacterial and fungal infections with Oridermyl auricular ointment. *Canadian Veterinary Journal*, 52, 277-282.
- Schnieder, T. (2006). Veterinarmedizinische Parasitologie. 6., vollständig überarbeitete und erweiterte Auflage. Germany: Parey.
- Shanks, D.J., McTier, T.L., Rowan, T.G., Watson, P., Thomas, C.A., Bowman, D.D., Hair, J.A., Pengo, G., Genchi, C., Smothers, C.D., Smith, D.G., & Jernigan, A.D. (2000). The efficacy of selamectin in the treatment of naturally acquired aural infestations of *Otodectes cynotis* on dogs and cats. *Veterinary Parasitology*, 91, 283-290. [https://doi.org/10.1016/s0304-4017\(00\)00299-5](https://doi.org/10.1016/s0304-4017(00)00299-5)
- Shimada A., Muraki Y., Awakura T., Umemura T., Sanekata T., Kuroki T., & Ishihara M. (1992). Necrotic colitis associated with *Entamoeba histolytica* infection in a cat. *Journal of Comparative Pathology*, 106, 195-199. [https://doi.org/10.1016/0021-9975\(92\)90048-Y](https://doi.org/10.1016/0021-9975(92)90048-Y)
- Sotiriadou, I., Pantchev, N., Gassmann, D., & Karanis, P. (2013). Molecular identification of *Giardia* and *Cryptosporidium* from dogs and cats. *Parasite*, 20, 8. <https://doi.org/10.1051/parasite/2013008>
- Sürsal, N., Şimşek, E., & Yıldız, K. (2020). Feline giardiasis in Turkey: prevalence and genetic and haplotype diversity of *Giardia duodenalis* based on the β -Giardin gene sequence in symptomatic cats. *Journal of Parasitology Research*, 106, 699-706. <https://doi.org/10.1645/19-183>
- Tangtrongsup, S., Scorza, A.V., Reif, J.S., Ballweber, L.R., Lappin, M.R., & Salman, M.D. (2020). Seasonal distributions and other risk factors for *Giardia duodenalis* and *Cryptosporidium* spp. infections in dogs and cats in Chiang Mai, Thailand. *Preventive Veterinary Medicine*, 174, 104820. <https://doi.org/10.1016/j.prevetmed.2019.104820>
- Taylan Özkan, A. (2020). Chapter twenty-three- sources and seroprevalence of toxocariasis in Turkey, In Dwight, D. Bowman (Eds.), *Advances in parasitology*, (pp. 465-482). Academic Press.
- Tüzer, E., Bilgin, Z., Öter, K., Erçin, S., & Tınar, R. (2010). Efficacy of praziquantel injectable solution against feline and canine tapeworms. *Türkiye Parazitoloji Dergisi*, 34, 17-20.
- Tzannes, S., Batchelor, D.J., Graham, P.A., Pinchbeck, G.L., Wastling, J., & German, A.J. (2008). Prevalence of *Cryptosporidium*, *Giardia* and *Isospora* species infections in pet cats with clinical signs of gastrointestinal disease. *Journal of Feline Medicine and Surgery*, 10, 1. <https://doi.org/10.1016/j.jfms.2007.05.006>
- Umur, Ş., Köroğlu, E., Güçlü, F., & Tınar, R. (2006). Nematoda. In Tınar, R. (Ed.), *Helmintoloji*. (pp. 213-441). Nobel Basımevi, Ankara.
- Villeneuve, A., Polley, L., Jenkins, E., Schurer, J., Gilleard, J., Kutz, S., Conboy, G., Benoit, D., Seewald, W., & Gagne, F. (2014). Parasite prevalence in fecal samples from shelter dogs and cats across the Canadian provinces. *Parasit & Vectors*, 7, 291. <https://doi.org/10.1186/>

- Waap, H., Gomes, J., & Nunes, T. (2014).** Parasite communities in stray cat populations from Lisbon, Portugal. *Journal of Helminthology*, 88, 389-395. <https://doi.org/10.1017/S0022149X1300031X>
- Yaman, M., Ayaz, E., Gül, A., & Muz, M.N. (2006).** Hatay ilinde bakısı yapılan kedi ve köpeklerde helmint enfeksiyonları. *Türkiye Parazitoloji Dergisi*, 30, 200-204.
- Yang, R., Ying, J.L., Monis, P., & Ryan, U. (2015).** Molecular characterisation of *Cryptosporidium* and *Giardia* in cats (*Felis catus*) in Western Australia. *Experimental Parasitology*, 155, 13-18. <https://doi.org/10.1016/j.exppara.2015.05.001>
- Yang, Y., & Liang, H. (2015).** Prevalence and risk factors of intestinal parasites in cats from China. *Bio-Med Research International*, 967238, 5. <https://doi.org/10.1155/2015/967238>
- Zajak, A.M., Conboy, G.A., Little, S.E., & Reichard, M.V. (2021).** *Veterinary Clinical Parasitology*, 9th Edition. Wiley-Blackwell.
- Zibaei, M., Sadjjadi, S.M., Sarkari, B. (2007).** Prevalence of *Toxocara cati* and other intestinal helminths in stray cats in Shiraz, Iran. *Tropical Biomedicine*, 24, 39-43.