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Prevalence of Intestinal Parasites in Dogs and Its Importance in Terms of Public Health

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Abstract

The aim of the present study was to examine gastrointestinal parasites in stool samples collected from stray dogs cared in animal shelters of Kırıkkale and Ankara and pet dogs that have been taken to the clinics and animal hospitals for control and treatment, and to evaluate the results for public health. Stool samples of 200 animals were obtained by arriving relevant centres for this purpose. Stool samples obtained were evaluated macroscopically and microscopically. Fülleborn Flotation and Benedek Sedimentation techniques were applied onto the stool samples for microscopic examination; Mc Master technique as used to determine the egg count per stool gram in stool samples which were positive for parasite. Stool samples were also examined for protozoan trophozoites and cysts through Giemsa staining, and for *Cryptosporidium* spp. oocysts through Carbol-Fuchsin staining. According to the results of this study, helminths and protozoans were detected with following rates; *Toxocara canis* by 18%, *Toxascaris leonina by* 9%, *Taenia* spp. by 0.5%, *Ancylostoma* spp. by 7.5%, *Dipylidium caninum* by 0.5%, *Hymenolepis diminuta* by 0.5%, and Fasciolid type egg by 1.5%; protozoans detected in the stool samples were *Isospora* spp. by 14.5%, *Giardia* spp. by 16.5%, and *Cryptosporidium* spp. by 2%. Furthermore, the egg of *Linguatula serrata* (0.5%) was detected in one dog, and mature *Demodex* spp. (2%) was detected in 4 dogs.

Keywords: Helminth, dog, protozoan, zoonosis, Ankara, Kırıkkale.

INTRODUCTION

Dogs have interacted with human beings for thousands of years, and cause significant public health problems by spreading parasites at infective phases with high pathogenicity to humans and pets. The interaction between animals and humans gradually increase in recent years; and animals enter to our houses (Yaman et al., 2006). Dogs are used for many purposes such as military services, public order, hunting, guarding, rescuing etc., and this increases the relationship between these animals and humans. The prevalence of many diseases spread from dogs to humans increases if required preventions are not taken. Dogs wandering around gardens and yards continuously contaminate the environment by parasite eggs and oocysts, and human beings are infected when they eat vegetables and fruits collected from these fields. Such zoonotic parasites threaten the human health, negatively affect the health of domestic butchery animals, and cause economic losses (Orhun and Ayaz, 2006). Dogs acts as final host or intermediate host for more than 60 zoonotic parasites including *Echinococcus* spp., *Toxocara canis*, *Taenia* spp., *Dipylidium caninum*, *Ancylostom*a spp., *Cryptosporidium* spp., and *Giardia duodenalis* (Robertson et al., 2000).

The aim of the present study was to examine gastrointestinal parasites in stool samples collected from stray dogs cared in animal shelters of Kırıkkale and Ankara and pet dogs that have been taken to the clinics and animal hospitals for control and treatment, and to evaluate the results for public health.

MATERIALS AND METHODS

Two hundred stool samples were collected from stray dogs and pet dogs brought to private clinics and animal hospitals in Kırıkkale and Ankara for various reasons by visiting animal shelters in Kırıkkale and Ankara provinces in years 2018 and 2019. Stool samples were directly collected from rectum of each dog, transferred into sterile stool containers, and taken to routine and epidemiology laboratory of Parasitology Department of Veterinary Faculty within Kırıkkale University. Stool samples were examined within the same day. Information including the age, breed, gender, care and diarrhoea status of the animals were recorded.

After fresh stool samples arrived to the laboratory, they were controlled for any mature parasites and parasite proglottids macroscopically. Cestode proglottids were diagnosed by diluting the samples with physiological saline and observing the morphological characteristics of eggs (Senlik, 2016).

Fülleborn Flotation and Benedek Sedimentation techniques were applied onto the stool samples. Stool samples were also examined for protozoan trophozoites and cysts through Giemsa staining, and for *Cryptosporidium* spp. oocysts through Carbol-Fuchsin staining (Heine, 1982).

Results obtained as a result of examinations were evaluated statistically through Chi-square method. All statistical analyses were reviewed by an error ratio of 5%.

RESULTS

Eighty six of 200 (43%) dogs of which stool samples were examined had infective parasites. Among these 86 dogs, 44 (51.1%) were infected by a single agent, 42 (48.9%) were infected by two or more parasites.

Helminths and protozoans were detected with following rates in dogs examined within the scope of the study; *Toxocara canis* by 18%, *Toxascaris leonina* by 9%, *Taenia* spp. by 0.5%, *Ancylostoma* spp. by 7.5%, *Dipylidium caninum* by 0.5%, *Hymenolepis diminuta* by 0.5%, and Fasciolid type egg by 1.5%; protozoans detected in the stool samples were *Isospora* spp. by 14.5%, *Giardia* spp. by 16.5%, and *Cryptosporidium* spp. by 2%. Furthermore, the egg of *Linguatula serrata* (0.5%) was detected in one dog, and mature *Demodex* spp. (2%) was detected in 4 dogs.

The ratio of parasites detected according to the age and gender was presented in Table 1. Accordingly, mixed infection was detected in dogs both below and above 1 year of age. Similarly, mixed parasite infections were the most common among female and male dogs.

Although intestinal parasite ratio was higher in female dogs than male dogs, there was not any statistically significant difference detected between female and male dogs ($p>0.05$) (Table 2).

Table 1. Distribution of parasitic infections by age and gender

		N			Helminth Species						Protozoa Species			Mix infection
			Number of Positive	%	*T.canis*	*T.leonina*	*D.caninum*	*Taenia* spp.	Fasciolid type egg	Ancylostoma spp.	*Isospora* spp.	*Giardia* spp.	*Cryptosporidium* spp.	Mix
Age	≤1	81	45	55.5	8 (9.8%)	-	-	-	1 (1.2%)	1 (1.2%)	7 (8.6%)	2 (2.5%)	-	26 (32.1%)
	>1	119	41	34.6	2 (1.7%)	1 (0.8%)	1 (0.8%)	1 (0.8%)	1 (0.8%)	-	6 (5.0%)	12 (10.1%)	1 (10.8%)	16 (13.4%)
	Total	200	86	43	10 (5.0%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	2 (1.0%)	1 (0.5%)	13 (6.5%)	14 (7.0%)	1 (0.5%)	42 (21.0%)
Gender	Female	97	46	47.4	6 (6.2%)	1 (1.0%)	-	1 (1.0%)	-	1 (1.0%)	8 (8.2%)	3 (3.1%)	-	26 (26.8%)
	Male	103	40	38.8	4 (3.9%)	-	1 (1.0%)	-	2 (1.9%)	-	5 (4.8%)	11 (10.7%)	1 (1.0%)	16 (15.5%)
	Total	200	86	40.5	10 (5.0%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	2 (1.0%)	1 (0.5%)	13 (6.5%)	14 (7.0%)	1 (0.5%)	42 (21.0%)

Table 2. Parasitic infections according to the gender and age of the dogs

			Parasitic infections		Total
			Negative (-)	Positive (+)	
Gender	Female	N	51	46	97
		%	52.6	47.4	100.0
	Male	N	63	40	103
		%	61.2	38.8	100.0
Total		N	114	86	200
		%	57.0	43.0	100.0
Chi-square=1.503; p=0.220					
			Parasitic infections		Total
			Negative (-)	Positive (+)	
Age	>1	N	78	41	119
		%	65.5	34.5	100.0
	≤1	N	36	45	81
		%	44.4	55.6	100.0
	Total	N	114	86	200
		%	57.0	43.0	100.0
Chi-square =8.756 p=0.002					

A statistically significant difference was detected between dogs for parasite infections according to the age. Such difference indicate that parasite infection in dogs below 1 year of age than dogs older than 1 year ($p<0.05$) (Table 2).

A statistically significant difference was detected between dogs from Ankara and Kırıkkale for parasite infections. The parasite ratio in stool samples collected from dogs in Ankara was higher than those in Kırıkkale ($p<0.05$) (Table 3).

The highest positivity rate was detected in Kangal breed dogs for parasite infection. However, there was not any statistically significant difference for presence of parasite according to the dog breeds ($p>0.05$) (Table 4). Comparison of infection intensity in dogs according to the treatment status revealed that there was not any statistically significant difference between treated and untreated dogs for parasite infection There was not any statistically significant difference between owned dogs and stray dogs for existence of parasites ($p>0.05$) (Table 6).

Table 3. Parasitic infections in dogs by province

			Parasitic infections		Total
			Negative (-)	Positive (+)	
Province	Ankara	N	57	56	113
		%	50.4	49.6	100.0
	Kırıkkale	N	57	30	87
		%	65.5	34.5	100.0
Total		N	114	86	200
		%	57.0	43.0	100.0
Chi-square=4.557; p=0.023					

Table 4. Parasitic infections according to dog breeds

			Parasitic infections		Total
			Negative (-)	Positive (+)	
Breed	German shepherd	N	11	8	19
		%	57.9	42.1	100.0
	Pittbull	N	12	6	18
		%	66.7	33.3	100.0
	Kangal	N	7	12	19
		%	36.8	63.2	100.0
	Cross breed	N	58	48	106
		%	54.7	45.3	100.0
	Other breeds	N	26	12	38
		%	66.7	33.3	100.0
Total		N	114	86	200
		%	57.0	43.0	100.0
Chi-square =6.090; p=0.193					

Table 5. Parasitic infection table according to the treatment status

			Parasitic infections		Total
			Negative (-)	Positive (+)	
Parasitic treatment	No parasitic treatment	N	90	68	158
		%	57.0	43.0	100.0
	There is parasitic treatment	N	24	18	42
		%	57.1	42.9	100.0
Total		N	114	86	200
		%	57.0	43.0	100.0
Chi-square =23.166; p=0.563					

Table 6. Parasitic infection condition of owner and stray dogs

			Parasitic infection condition		Total
			Negative (-)	Positive (+)	
Ownership Status	Owned dogs	N	51	31	82
		%	62.2	37.8	100.0
	Stray dogs	N	63	55	118
		%	53.4	46.6	100.0
Total		N	114	86	200
		%	57.0	43.0	100.0
Chi-square =1.530; p=0.216					

DISCUSSION AND CONCLUSION

Canine gastrointestinal system is important since some helminths and protozoans have zoonotic characteristics. Furthermore, some helminths are closely associated with health of butchary animals which have economic value. When stray animals are not exclusively controlled, they pose a risk for human in terms of parasites that they have. Since intestinal parasites of dogs affect the health of humans and other animals, many studies were conducted in order to determine the species and prevalence of such parasites in Turkey. Different results were obtained in these studies. Studies conducted in Turkey detected a parasite infection rate between 19.9% and 78% in dogs according to microscopic inspection (Aydenizoz, 1996; Orhun and Ayaz 2006; Kozan et al., 2007; Işık et al., 2014; Yılmaz et al., 2017; Nas and Bicek, 2018; Karakus and Denizhan, 2019). The parasite infection rate was detected as 43% in our study.

Studies carried out in Turkey usually detected the prevalence of intestinal helminths only (Orhun and Ayaz 2006; Kozan et al., 2007; Balkaya and Avcioglu 2011; Isik et al., 2014; Nas and Bicek, 2018). Limited number of studies focus on detection of both helminths and protozoans. Studies on detection of helminths reported most common types as *T. canis*, *Toxascaris leonina*, hookworms, *Taenia* spp., and *D. caninum* (Umur and Arslan 1998; Orhun and Ayaz 2006; Kozan et al., 2007; Yildirim et al., 2007). Mixed infections were usually detected in this study; however, *T. canis*, *T. leonina* and *Ancylostoma* spp. were the most common individual species; and *Taenia* spp., Fasciolid type egg, *D. caninum,* and *H. diminuta* eggs were the rarest species. Examination of protozoan infection revealed *Isospora* spp., *Cryptosporidium* spp., *Entamoeba* spp., *Sarcocystis* spp., and *Giardia* spp. species (Yılmaz et al., 2017; Denizhan and Karakus, 2019). In this study, *Giardia* spp., *Isospora* spp., and *Cryptosporidium* spp. species were detected with most common species as *Giardia* spp.

Some previous studies conducted in Turkey and other countries of the world reported that age affects the rate of parasite infection in dogs (Ramirez-Barrios et al., 2004; Isik et al., 2014; Nas and Bicek 2018); however, some defend the opposite (Aydenizoz, 1997). Several studies carried out in Turkey detected higher parasite infection rate in younger dogs than older dogs (Unlu and Eren, 2007; Yildirim et al., 2007; Isik et al., 2014; Nas and Bicek, 2018). Similar to other studies, the parasite infection rate in dogs below 1 year was detected higher than dogs older than 1 year in this study. The possible cause for higher infection rates may be the immature parasite immunity in younger dogs.

Yıldırım et al. (2007) reported that female dogs carry agents two-times higher than male agents; however, some authors report that there is not any significant difference for intestinal parasites (Minnaar et al., 2002, Eguia-Aguilar et al., 2005; Unlu and Eren, 2007; Isik et al., 2014). In this study, the rate of infection determined in female dogs was 47.4% and it was in males 38.8%. Our study revealed that there is not any significant difference between female and male dogs for intestinal parasites.

It was noted rare studies compared the dogs for breed. Nas and Bicek (2018) detected the highest parasite rates in Kangal dogs (65.9%) in their study. In this study, German shepherd, Pitbull, Kangal, Cross breed and other breeds were examined. The infection rate in these breeds was 42.1%, 33.3%, 63.2%, 45.3% and 33.3%, respectively. Similar to the study mentioned above, the highest positivity rate was detected in Kangal breed dogs for parasite infection.

Nas (2014) reported in a study conducted on dogs in Siirt province that there is a significant difference between medicated and non-medicated dogs for parasite, and infection rate is higher in non-medicated animals. On the other hand, comparison of treated and untreated animals for parasite infections revealed no statistically significant difference in our study. Anti-parasite is usually implemented to owned dogs and dogs cared in the shelter. However, such treatment is not specific to an agent, and applied without consideration of the diagnosis, species determination, and life cycle of parasites. Therefore, the treatment is not sufficient to purify the dogs from parasites. When the parasite infection rate was compared on province basis, dogs within Ankara province are more infected than those within Kırıkkale province. The possible cause for that may be due to the fact that stool samples collected from Ankara usually belonged to stray animals, and stool samples collected from Kırıkkale usually belonged to pets.

Yıldırım et al. (2007) reported that there is not any significant difference between owned animals and stray animals for parasite infections. On the other hand, Nas and Bicek (2018) reported that the parasite infection rate is higher in stray animals than owned dogs. As reported by Yıldırım et al. (2007), there was not any statistically significant difference between owned and stray dogs for presence of parasites in our study. The possible reason for close rate levels between stray dogs and owned dogs may be associated with the causes that owned dogs are usually used for guard or shepherd dogs and they have contact with external environment and other animals, and anti-parasite treatment is not performed regularly and adequately.

Consequently, significant amount of parasites were detected in dogs in Kırıkkale and Ankara according to microscopic inspection. When it is considered that some of these are zoonotic infections, control of stray dogs by local governments, detection of the agent in owned and shelter dogs and performing an agent-specific treatment, awareness of Veterinaries on this subject, and awareness raising of animal owners should be regarded.

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Conflict of Interest

The authors declare that there is no conflict of interest in the content of the article

REFERENCES

Aydenizöz M. Konya yöresi köpeklerinde helmintolojik araştırmalar. Turkiye Parazitol Derg. 1997; 21: 429-434.

Balkaya I, Avcioglu H. Gastro-intestinal helminths detected by coprological examination in stray dogs in the Erzurum Province –Turkey. Kafkas Univ Vet Fak Derg. 2011; 17 (Suppl A): 43-46.

Eguía-Aguilar P, Cruz-Reyes A, Martínez- Maya JJ. Ecological analysis and description of the intestinal helminths present in dogs in Mexico City. Vet Parasitol. 2005;127:139-146.

Heine J. Eine einfache nachweismethode für Kryptosporidien im Kot. Zbl Vet Med B. 1982; 29: 324-327.

Isik N, Derinbay Ekici O, Kose SI. Gastro-intestinal helminths detected by fecal examination in stray dogs in the Konya province. Eurasian J Vet Sci. 2014; 30 (3), 162-165.

Minnaar WN, Krecek RC, Fourie LJ. Helminths in dogs from a peri-urban resource-limited community in Free State Province, South Africa. Vet Parasitol. 2002; 107: 343-349.

Nas I, Bicek K. Digestive system of helminths founded in dogs according to feces examination in Siirt. DOFEBD. 2018; 1(2): 41-51.

Orhun R, Ayaz E. Prevalence of helminths in dogs in the region of Van and their potential public health significance. Turkiye Parazitol Derg. 2006; 30 (2):103-107.

Ramirez-Barrios RA, Barboza-Mena G,Munoz J, Angulo-Cubillan F, Hernandez E, Gonzalez F, Escalona F. Prevalence of intestinal parasites in dogs under veterinary care in Maracaibo, Venezuela. Vet Parasitol. 2004; 121: 11-20.

Umur S, Arslan MO. The prevalence of helminth species in stray dogs in Kars district. T Parazitol Derg. 1998; 22:188-193.

Unlu H, Eren H. Gastro-intestinal helminths detected by fecal examination in stray dogs in the Aydin province. Turkiye Parazitol Derg. 2007; 31: 46-50.

Yaman M, Ayaz E, Gul A, Muz MN. Investigation of helminth ınfections of cats and dogs in the Hatay province. Turkiye Parazitol Derg. 2006; 30 (3):200-204.

Yildirim A, Ica A, Duzlu O, Yavuz A, Inci A. The prevalence of gastrointestinal helminths in dogs by coprological examination in Kayseri province. J Fac Vet Med Univ Erciyes. 2007; 4(2): 65-71.