

# Gastro-Intestinal Helminths Detected by Coprological Examination in Stray Dogs in the Erzurum Province -Turkey

Ibrahim BALKAYA \*  Hamza AVCIOGLU \*

\* Ataturk University, Faculty of Veterinary Medicine, Department of Parasitology, 25240 Erzurum - TURKEY

Makale Kodu (Article Code): KVFD-2010-3105

## Summary

The purpose of this study was to determine the extensity of gastro-intestinal helminths in stray dogs in Erzurum province (Turkey). During the investigation, stool samples were collected from 172 dogs of different ages and sex from dog housing of Erzurum Metropolitan Municipality at different times and examined by Fulleborn flotation and Benedek sedimentation methods. Helminth infection was detected in 91 (52.9%) of 172 fecal samples. Six types of helminth eggs were identified; 1 trematoda, 1 cestod and 4 nematod. Species responsible of infection were identified as; *Alaria* spp. 2.9%, *Taeniidae* spp. 2.9%, *Toxocara canis* 20.3%, *Toxascaris leonina* 38.4%, hookworm 2.3% and *Trichuris vulpis* 0.6%. *T. canis* infection was more frequently seen in dogs younger than 1 year of age which was found statistically significant ( $P<0.001$ ). Consequently, it was considered that stray dogs in Erzurum were infected by zoonotic helminths and the control measures should be taken against this threat.

**Keywords:** Stray dog, Stool, Helminth, Erzurum

## Erzurum Sokak Köpeklerinde Dışkı Bakısına Göre Saptanan Gastrointestinal Helmintler

### Özet

Bu çalışma Erzurum ilindeki, sokak köpeklerinde bulunan gastrointestinal helmintlerin yaygınlığını belirlemek amacıyla yapılmıştır. Araştırmada Erzurum Büyükşehir Belediyesine ait köpek barınağından değişik zamanlarda toplanan değişik yaş ve cinsiyetteki toplam 172 köpekten dışkı örneği alınmış ve Fülleborn yüzdürme ve Benedek'in çöktürme yöntemi ile kontrol edilmiştir. Bakısı yapılan toplam 172 dışkı örneğinin 91'inde (%52.9) helmint enfeksiyonu saptanmıştır. Enfekte dışkılarda 1'i trematod, 1'i cestod ve 4'ü de nematod olmak üzere 6 tür helmint yumurtası tespit edilmiştir. Enfeksiyondan sorumlu cins ve türler; *Alaria* spp. %2.9, *Taeniidae* spp. %2.9, *Toxocara canis* %20.3, *Toxascaris leonina* %38.4, kancalı kurt %2.3 ve *Trichuris vulpis* %0.6 olarak teşhis edilmiştir. *T. canis* enfeksiyonuna, 1 yaşından küçük köpeklerde daha fazla rastlanmış ve bu istatistiksel olarak anlamlı bulunmuştur ( $P<0.001$ ). Sonuç olarak Erzurum ilindeki sokak köpeklerinin zoonotik öneme sahip helmintlerle enfekte olduğu ve bu tehlikeye karşı önlem alınması gerektiği kanısına varılmıştır.

**Anahtar sözcükler:** Sokak köpeği, Dışkı, Helmint, Erzurum

## INTRODUCTION

Cats and dogs are animals which intimately oriented themselves to human life. Today, a large number of families keep cats or dogs at their homes or in their gardens. A great number of cats and dogs roam about in the streets, especially in under developed countries. Humans have provided benefits from the close companionship relations between humans and dogs for centuries. However, on the other hand they have been exposed to various diseases

infected from those animals. The parasites which live in dogs as well as have a place in terms of human health includes helminthes such as *Echinococcus granulosus*, *E. multilocularis*, *Toxocara canis*, *Ancylostoma caninum*, *A. braziliense*, *A. tubaeforme*, *Uncinaria stenocephala*. Among these parasites, the larvae of *Echinococcus* spp. causes the cystic echinococcosis in humans and livestock animals; the larvae of *Toxocara* spp. in Visceral Larva Migrans (VLM);



İletişim (Correspondence)



+90 442 2315532



balkayaibrahim@hotmail.com

while the larvae of *Ancylostoma* spp. lead to Cutaneous Larva Migrans (CLM), in humans <sup>1</sup>.

In different provinces of Turkey, various studies have been performed on dogs regarding stool examination and necropsy; helminth infections in dogs have been detected in high rates and gastrointestinal helminths have been identified such as *Dipylidium*, *Joyeuxiella*, *Taenia*, *Mesocostoides*, *Echinococcus*, *Dipyllobothrium*, *Toxocara*, *Toxascaris*, *Ancylostoma*, *Uncinaria*, *Spirocerca*, *Trichuris*, *Capillaria*, *Angiostrongylus*, *Strongyloides* <sup>2,3</sup>.

Various investigations have been performed in other countries of the world. In Nigeria, in accordance with autopsy results of 180 stray dogs, *Ancylostoma caninum*, *Toxocara canis*, *Trichuris vulpis*, *Taenia ovis*, *Taenia hydatigena*, and *Dipylidium caninum* were determined at the rates of 65.6%, 41.1%, 41.1%, 35%, 67.8%, and 97.8%, respectively and *Echinococcus granulosus* was reported in one dog <sup>4</sup>. In Holland, *Toxocara* spp. and *Trichuris* spp. were recorded as 2.9% and 0.7%, respectively as per the faeces of 272 owned dogs <sup>5</sup>. In Venezuela, 24.5% *Ancylostoma* spp., 11.4% *T. canis*, 2.9% *T. vulpis*, 2.3% *D. caninum*, 0.5% *Alaria* spp., 0.3% *Strongyloides* spp. and 0.2% *Spirocerca lupi* were reported based on the stool examination of 614 dogs <sup>6</sup>.

The purpose of the study was to determine the prevalence of gastrointestinal helminth infections upon investigating the fecal samples of stray dogs in the animal house of Erzurum Metropolitan Municipality, to set forth the risk factors regarding those and to inform the local authority about the need for taking the required measures about zoonosis helminths.

## MATERIAL and METHODS

Stools of stray dogs in Erzurum Metropolitan Municipality Animal Housing were used in this study. In order to determine gastrointestinal helminth fauna in stray dogs, dog faeces was sampled from a total of 172 dogs and analysed by using Fulleborn flotation and Benedek sedimentation methods.

Stools were sampled from dogs into plastic, closed faeces containers, the samples were numbered and the age and sex of the dogs were recorded. The dogs were divided into two groups, namely young (up to 1 year of age) and old (over 1 year) for whom stools were sampled as per age.

The samples of faeces were brought to the laboratory on the same day and examined by using Fulleborn flotation and Benedek sedimentation methods. Flotation method utilized saturated saline water. Benedek sedimentation method was applied to determine the probable larvae and eggs and the sediment was analysed under stereomicroscope by dropping 1% methylene blue solution <sup>7</sup>. The larvae identified in stool examination were diagnosed in

accordance with their characteristics specified in relevant literature <sup>8</sup>.

Statistically, chi-square test was used and infection status was assessed in terms of age and sex.

## RESULTS

During the study, fecal examination was performed for 172 dogs in Erzurum Metropolitan Municipality Animal Housing. Helminth infection was detected in 91 (52.9%) of these. Six types of helminth eggs were identified; 1 trematoda, 1 cestod and 4 nematod (*Table 1*). Species responsible of infection were identified as; *Alaria* spp. 2.9%, *Taeniidae* spp. 2.9%, *Toxocara canis* 20.3%, *Toxascaris leonina* 38.4%, hookworm 2.3% and *Trichuris* spp. 0.6% (*Table 1*). Not less than 1 and not more than 3 helminth species were observed in infected dogs. *T. canis* infection was more frequently seen in animals younger than 1 year of age which was found statistically significant ( $P < 0.001$ ). *Table 2* shows the distribution of helminth species in infected animals as per age and sex.

**Table 1.** The helminth species in stray dogs

**Tablo 1.** Sokak köpeklerinde bulunan helmint türleri

Helminths	n	np	p
Trematod			
<i>Alaria</i> spp.	172	5	2.9
Cestod			
<i>Taeniidae</i> spp.	172	5	2.9
Nematod			
Hookworms	172	4	2.3
<i>Toxocara canis</i>	172	35	20.3
<i>Toxascaris leonina</i>	172	66	38.4
<i>Trichuris vulpis</i>	172	1	0.6
Total *	172	91	52.9

n, The number of samples examined; np, Number of positive samples; p, prevalence (%),

\*Some dogs, one more than the helminth species were infected,

n, incelenen örnek sayısı; np, pozitif örnek sayısı; p, prevalans (%),

\* bazı köpekler 1'den fazla helmint türüyle enfekteydi

## DISCUSSION

Most of the helminths found in dogs concern the human health closely due to the health of livestock. Especially the dogs roaming about in streets pose danger for human health due to zoonosis helminths unless necessary precautions are taken by local authorities. There are various helminth species in dogs. Despite the fact that the presence of helminth infections is readily detected by stool examination, this examination cannot be performed in stray dogs and also anthelmintic drugs cannot be administered. Therefore, stray dogs pose a potential

**Table 2.** Helminths found in stray dogs, according to age and gender distribution**Tablo 2.** Sokak köpeklerinde bulunan helmintlerin yaşa ve cinsiyete göre dağılımı

Categories	n	np *(p)	Helminths					
			<i>Alaria</i> spp.	<i>Taeniidae</i> spp.	Hookworm	<i>T. canis</i>	<i>T. leonina</i>	<i>T. vulpis</i>
Age								
≤1	140	69 (49.3)	5 (3.57)	5 (3.57)	2 (1.4)	16 (11.4) <sup>a</sup>	55 (39.3)	1 (0.7)
>1	32	22 (68.8)	-	-	2 (6.25)	19 (59.4) <sup>b</sup>	11 (34.4)	-
Total	172	91 (52.9)	5 (2.9)	5 (2.9)	4 (2.3)	35 (20.3)	66 (38.4)	1 (0.6)
Sex								
♂	101	54 (53.5)	3 (3)	4 (4)	3 (3)	20(19.8)	40 (39.6)	1 (1)
♀	71	37 (52.1)	2 (2.8)	1 (1.4)	1 (1.4)	15 (21.1)	26 (36.6)	-
Total	172	91 (52.9)	5 (2.9)	5 (2.9)	4 (2.3)	35 (20.3)	66 (38.4)	1 (0.6)

n, The number of samples examined; np, Number of positive samples; p, prevalence (%);

<sup>a,b</sup>Some dogs, one more than the helminth species were infected, <sup>a,b</sup>P< 0.001

n, incelenen örnek sayısı; np, pozitif örnek sayısı; p, prevalans (%);

<sup>a,b</sup> bazı köpekler 1'den fazla helmint türüyle enfekteydi. <sup>a,b</sup>P< 0.001

risk factor for humans as they have zoonosis helminth infections.

Many studies have been performed in Turkey in order to determine helminth infections in dogs. The prevalence of gastrointestinal helminths in dogs based on fecal examination has been reported at rates of 35-37.7% in Konya<sup>2,9</sup>, 58.3-86.96% in Ankara<sup>3,10,11</sup>, 73.8% in Kars<sup>12</sup>, 46% and 33.6% in Afyonkarahisar and Eskişehir, respectively<sup>13</sup> and 41% in Aydın<sup>14</sup>. In this study, presence of gastrointestinal helminth was detected in 91 (52.9%) out of 172 dogs according to stool examination. This result was observed to be lower than that of Ankara and Kars and higher when compared to the results obtained in Konya, Afyonkarahisar, Eskişehir and Aydın.

In the investigations performed, helminths observed in dogs and their prevalence varies by the investigators and the study area. In accordance with the results of stool examination, *Toxocaris leonina*, *Toxocara canis*, hookworms, *Taenia* spp. and *Dipylidium caninum* were reported to be the most prevalent species<sup>2,3,10,15,16</sup>. In accordance with the stool examination performed within this study, *Toxocaris leonina* and *Toxocara canis* were identified as the most prevalent species supporting the literature given. In addition, *Alaria* spp. eggs were detected in 5 (2.9%) of 172 dogs in the fecal examination performed in accordance with Benedek's sedimentation method.

Umur and Arslan<sup>12</sup> reported the eggs of *Taenia* spp. in stools inspection as 9.5% whereas Orhun and Ayaz<sup>17</sup> as 14.8%. In the other studies performed, the eggs of *Taenia* spp. were observed at the rates of 2.9%, 23.9% and 7.5% in Afyonkarahisar, Eskişehir<sup>13</sup> and Aydın<sup>14</sup>, respectively. *Taeniidae* spp. was detected at the rate of 2.9% in Erzurum. These eggs may be considered as the eggs of *E. granulosus* due to the fact that identification of species could not be performed with the eggs of *Taeniidae* spp. in stool

examination and that no ring was seen in the macroscopic inspection.

Hookworms have an important place in respect of human health as they result in Cutaneous Larva Migrans. Dogs may be exposed to hookworm infection in all periods of their lives. On the ground that immune system has not fully developed in young animals and that galactogen infection is present, the prevalence and severity of infection is greater than that of older animals<sup>18</sup>. The prevalence of hookworms in Turkey is reported to be at the rates of 4.8-73.8% as per necropsy and stools inspection<sup>10,13,19</sup>. Among hookworms, *U. stenocephala* was reported to be between the rates of 2.45-57.1 in Turkey<sup>2,10,12,14</sup>. Hookworm infection was observed with a rate of 2.3% in this study. The fact that this result is observed at lower levels compared to the other studies performed in our country is considered to be related with the fact that Erzurum has a continental climate and low level of humidity hence these parasites are more frequent in places with high level of humidity whereas less frequent where the level of humidity is lower.

*T. canis* leading to Visceral Larva Migrans in humans has been reported at the rates of 14.8% in Konya<sup>2</sup>, 13.2-17.58 in Ankara<sup>10,20</sup>, 35.7 in Kars<sup>12</sup>, 13.9% in Van<sup>17</sup>, 36.2% in Afyonkarahisar, 47.8% in Eskişehir<sup>13</sup>, and 20% in Aydın<sup>14</sup>. During this study, *T. canis* was observed in 35 (20.34%) of 172 dogs. This result has been identified as higher compared with the results obtained in the studies performed in Konya, Ankara, Van and Aydın; as comparable with the results obtained in Kars and Afyonkarahisar, and as lower than that of Eskişehir. In the studies performed, *T. canis* has also been reported as more frequent in the dogs being fed with offal<sup>5,10,21,22</sup>. In this study, the prevalence has been determined to be higher (59.4%) one year old and younger dogs supporting literature data. In this study, *T. canis* infection was more frequently seen in animals younger than 1 year of age which was found statistically significant (P<0.001).

The prevalence of *T. leonina* in Turkey has been reported with the rates of 14.8% in Konya<sup>2</sup>, 34.06-43% in Ankara<sup>10,20</sup>, 47.6 in Kars<sup>12</sup>, 1% in Aydın<sup>14</sup>, 47.8% and 60.9 in Afyonkarahisar and Eskişehir<sup>13</sup>, respectively in accordance with stool examination. *T. leonina* infection has been observed in 66 (38.4%) of 172 dogs as per stool examination in this study. This result has been specified as higher compared with the results obtained in the studies performed in Konya and Aydın; as comparable with the results obtained in Ankara, and as lower than that of Kars, Afyonkarahisar and Eskişehir.

The prevalence of *Trichuris vulpis* in dogs has been reported as 6.61% in Elmadağ, Ankara<sup>10</sup> and 1.5% in Aydın<sup>14</sup>. *Trichuris vulpis* has been detected only in 1 (0.6%) dog in Erzurum whereby this result has been evaluated as being at a lower level than the results obtained in other provinces of our country.

Güçlü and Aydenizöz<sup>2</sup> reported that they have found 36% of female dogs and 38.88% of male dogs infected with various parasites in Konya yet they have not detect a significant difference related with sex. Çerçi<sup>10</sup> has stated that the rate of gastrointestinal helminths are comparable with each other as per sex in Elmadağ county of Ankara. No statistical significance has been found between sexes for the helminthes identified in this study.

In consequence, helminth infections in dogs have been considered as very important as regards to both animal and human health in Erzurum as well as the other regions of our country. Stray dogs pose a potential risk due to the fact that helminths are zoonosis parasites endangering human and animal health. Therefore, uncontrollably and disorderly rambling of these dogs lead to the continuous contamination of the environment. Thus, the importance of keeping stray dogs under inspection by taking the necessary precautions and the necessity of their maintenance and treatments has been set forth.

## REFERENCES

- Glickman LT, Shofer FS:** Zoonotic visceral and ocular larva migrans. *Vet Clin North Am: Small Anim Pract*, 17, 39-53, 1987.
- Güçlü F, Aydenizöz M:** Konya'da köpeklerde dışkı bakılarına göre parazitlerin yayılışı. *T Parazitol Derg*, 19, 550-556, 1995.
- Zeybek H, Tatar N, Tokay A:** Ankara yöresi kırsal alan köpeklerinde parazitler ve bunların yayılışı. *Etlik Vet Mikrobiyol Derg*, 17, 17-26, 1992.
- Dada BJ, Adegboye DS, Mohammed AN:** A survey of gastro-intestinal helminth parasites of stray dogs in Zaria, Nigeria. *Vet Rec*, 104, 145-146, 1979.
- Overgaauw PA:** Prevalance of intestinal nematodes of dogs and cats in The Netherland. *Vet Q*, 19, 14-17, 1997.
- Ramirez-Barrios RA, Barboza-Mera G, Muñoz J, Angulo- Cubillán F, Hernández E, Gonzáles F, Escalona F:** Prevalence of intestinal parasites in dogs under veterinary care in Maracaibo, Venezuela. *Vet Parasitol*, 121, 11-20, 2004.
- Kaya G:** Parazitolojide Temel İlkeler ve Laboratuvar Teknikleri. Mustafa Kemal Üniversitesi Veteriner Fakültesi, Yayın No: 1, Hatay, s. 37-61, 2003.
- Soulsby EJJ:** Helminthes, Arthropods and Protozoa of Domesticated Animals. The Williams and Wilkins Company, USA, pp. 206-216, 1968.
- Ayçiçek H, Sarımehmetoğlu O, Tanyüksel M, Özyurt M, Gün H:** Ankara yöresi sokak köpeklerinde görülen bağırsak helmintlerinin yayılışı ve bunların halk sağlığı bakımından önemi. *T Parazitol Derg*, 22, 156-158, 1997.
- Çerçi H:** Ankara İli Elmadağ İlçesi kırsal yöre köpeklerinde görülen mide-bağırsak helmintlerinin yayılışı ve insan sağlığı yönünden önemi. *T Parazitol Derg*, 16, 59-67, 1992.
- Hasslinger M A, Burgu A, El-Seify M A, El-Assaly T:** Comparative studies of helminth status stray dogs-human health consequence. *Tierarzt Umsch*, 48, 603-606, 1993.
- Umur Ş, Arslan MÖ:** Kars yöresi sokak köpeklerinde görülen helmint türlerinin yayılışı. *T Parazitol Derg*, 22, 188-193, 1997.
- Kozan E, K Sevimli F, Birdane F M:** Afyonkarahisar ve Eskişehir illerindeki sokak köpeklerinde görülen gastrointestinal Cestod ve Nematod enfeksiyonları. *T Parazitol Derg*, 31 (3): 208-211, 2007.
- Ünlü H, Eren H:** Aydın Yöresi Sokak Köpeklerinde Dışkı Bakısına Göre Saptanan Mide Bağırsak Helmintleri. *T Parazitol Derg*, 31 (1): 46-5, 2007.
- Hackett F, Walters TMH:** The prevalence of cestodes in farm dogs in Mid-Wales. *Vet Parasitol*, 7, 95-101, 1980.
- Taşan E:** Elazığ kırsal yöre köpeklerinde helmintlerin yayılışı ve insan sağlığı yönünden önemi. *Doğa Bilim Derg*, 8, 160-167, 1984.
- Orhun R, Ayaz E:** Van Yöresi Köpeklerinde Bulunan Endoparazitler ve Halk Sağlığı Yönünden Önemi. *T Parazitol Derg*, 30, 103-107, 2006.
- Kalkofen UP:** Hookworm in dogs and cats. *Vet Clin North Am*, 17: 1341-1354.
- Dalimi A, Sattari A, Motamedi GH:** A study on intestinal helminthes of dogs, foxes and jackals in the western part of Iran. *Vet Parasitol*, 30, 142, 129-133, 2006.
- Doğanay A, Öge H:** The prevalence of ascariasis in stray dogs in Ankara. *Ankara Univ Vet Fak Derg*, 40, 552-562, 1993.
- Korkmaz M, Yılmaz M, Üner A, Altıntaş N:** İzmir sokak köpeklerinde *Toxocara canis* görülme sıklığı. *T Parazitol Derg*, 24, 211-213, 2000.
- Rubel D, Zunino G, Santillan G, Wianivesky C:** Epidemiology of *Toxocara canis* in the dog population from two areas of different socio-economic status, Greater Buenos Aires, Argentina. *Vet Parasitol*, 115, 275-286, 2003.