



Prevalence of Gastrointestinal Helminths in Stray Dogs in Van Province

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ABSTRACT

Objective: This study was carried out on 124 dogs between February 2018 and November 2018 to determine the prevalence of gastrointestinal helminths in stray dogs in Van.

Materials and Methods: Collected stool samples, after macroscopic examination, were examined by native, flotation and sedimentation methods in terms of eggs and larvae.

Results: According to the results of the study, 43 (34.68%) of 124 dogs were detected as infected with various types of helminths. The most common species were respectively *Toxascaris leonina* (16.13%), *Toxocara canis* (12.90%), *Ancylostoma caninum* (5.64%), *Taenia* spp. (4.84%), *Dipylidium caninum* (3.22%), *Uncinaria stenocephala* (3.22%), *Capillaria* spp. (3.22%), *Fasciola hepatica* (2.70%) and *Dicrocoelium dentriticum* (1.35%) 35.14% of the female dogs were infected with parasites, while this rate was 34% for males. Statistically, infection status in males and females does not differ significantly by gender (Chi-Square: 0,17 p>0.05). When the distribution by age is examined, it is 0.5-2 years with the highest rate of 45.3%, 2-6 years with 27.7% and 5-9 years with 25%. According to age, infection status does not show a statistically significant difference (Chi-Square: 4.64, p> 0.05).

Discussion: As a result, it was concluded that the subsi substantial presence of zoonotic helminths in stray dogs in the province of Van poses a threat to human health and protective measures should be taken against it.

Keywords: Van, Dog, Helminth, Prevalence

INTRODUCTION

Dogs are one of the animals that adapt to people's lives and their relationship with humans goes back thousands of years. Dogs play an important role in the epidemiology of parasitic infections and pose a problem for public health (Papzahariadou *et al.*, 2007; Bridger and Whitney, 2009). Dogs host more than 60 important zoonotic interferences such as *Dipylidium caninum*, *Ancylostoma caninum*, *Toxocara canis*, *Trichuris vulpis* and *Echinococcus* spp. (Papzahariadou *et al.*, 2007; Himsworth *et al.*, 2010). Humans and animals are infected with these parasites, and diseases can remain asymptomatic

for a long time while they may show clinical symptoms. (Robertson *et al.*, 2000). Stray animals play an important role in the spread of parasitic diseases, one of the major health problems in developing countries. Especially in large cities, stray dogs roam freely in Turkey and this number is increasing day by day. Dogs transmit diseases to humans by spreading eggs, larvae and cysts of parasites through their feces. Dogs play an important role in the epidemiology of parasitic infections and pose a problem for public health; therefore, it is very difficult to control the parasitic diseases of stray dogs (Papzahariadou *et al.*, 2007;

Bridger and Whitney, 2009). It has been reported that parasitic diseases such as *A. caninum*, *E. granulosus*, *Heterophyes heterophyes*, *D. caninum*, *T. canis*, *Strongyloides stercoralis* are transmitted to humans by dogs, causing such serious diseases as cyst hydatid, visceral and skin larvae migrans (Güralp *et al.*, 1977; Güralp, 1981; Doğanay, 1983; Doğanay and Öge, 1993).

The aim of this study was to investigate the spread of gastrointestinal helminths, which are important for public health, by examining the feces of stray dogs brought to Van Metropolitan Municipality Animal Care Center and Rehabilitation Center. In addition, it was planned 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.

MATERIALS and METHODS

Feces of stray dogs in Van Metropolitan Municipality Animal Care Center and Rehabilitation Center were used in this study. The study was conducted between February 2018 and November 2018. During this time, 124 feces were collected once a week from stray dogs brought to the Van Animal Hospital and Rehabilitation Center. Feces were sampled from dogs into plastic, closed feces containers; the samples were numbered, and the age and sex of the dogs were recorded. In order to determine gastrointestinal helminth fauna in stray dogs, dog feces were sampled from a total of 124 dogs and analysed by using Fulleborn flotation and Benedek sedimentation methods (Solusby,

1986). The Chi-square test was used to determine the statistical relationships between risk factors of age and sex prevalence of gastrointestinal worms in stray dogs.

RESULTS

Helminth infection was detected in 43 (34.68%) of these. Nine types of helminth eggs were identified; 5 nematode, 2 cestode and 2 trematodes. The most common type was *Toxascaris leonina* (16.13%), followed by *Toxocara canis* (12.90%), *Ancylostoma caninum* (5.64%), *Taenia spp.* (4.84%), *Dipylidium caninum* (3.22%), *Uncinaria stenocephala* (3.22%), *Capillaria spp.* (3.22%), *Fasciola hepatica* (2.70%), and *Dicrocoelium dentriticum* (1.35%) (Table 1).

Table 1. Distribution of digestive system helminths in street dogs in Van according to gender

Gender	EFD (n:74) n/(%)	EMD (n:50) n/(%)	Total (n:124) n/(%)
<i>T. leonina</i>	12 (16.22)	8 (16)	20 (16.33)
<i>T. canis</i>	10 (13.51)	6 (12)	16 (12.9)
<i>A. caninum</i>	5 (6.75)	2 (2.7)	7 (5.64)
<i>Taenia spp.</i>	4 (5.4)	2 (2.7)	6 (4.84)
<i>D. caninum</i>	3 (4.1)	1 (2)	4 (3.22)
<i>Capillaria spp</i>	3 (4.1)	1 (2)	4 (3.22)
<i>U. stenocephala</i>	2 (2.7)	2 (2.7)	4 (3.22)
<i>F hepatica.</i>	2 (2.7)	-	2 (2.7)
<i>D. dentriticum</i>	1 (1.35)	-	1 (1.35)

EFD: Infected Female Dogs, EMD: Infected Male Dogs

Table 2. Distribution of the digestive system helminths in street dogs in Van according to age groups

Detected Parasites	Age Groups			Total (n:124) (n/%)
	0.5-2 Year (n:53) (n/%)	2-5 Year (n:47) (n/%)	5-9 Year (n:24) (n/%)	
<i>T. leonina</i>	8 (15.09)	7 (14.89)	5 (20.83)	20 (16.13)
<i>T. canis</i>	7 (13.21)	5 (10.63)	4 (16.67)	16 (12.90)
<i>A.caninum</i>	4 (7.64)	2 (4.26)	1 (4.17)	7 (5.65)
<i>Taenia spp.</i>	-	4 (8.51)	2 (8.33)	6 (4.84)
<i>D. caninum</i>	-	3 (6.38)	1 (4.16)	4 (3.22)
<i>Capillaria spp.</i>	1 (1.88)	1 (2.12)	2 (8.33)	4 (3.22)
<i>U. stenocephala</i>	-	2 (4.26)	2 (8.33)	4 (3.22)
<i>F.hepatica.</i>	-	2 (4.26)	-	2 (1.61)
<i>D. dentriticum</i>	-	1 (2.12)	-	1 (0.80)

The rate of female dogs infected with parasites were 35.14%, while for males it was 34% (Table 1). According to gender, the infected status in dogs is not statistically significant (Chi-Square: 0.17, p>

0.05). The distribution of those dogs infected with gastrointestinal helminths according to their age; while it was 0.5-2 years with the highest rate of 41.07%, 2-5 years with 27.66%, followed by 5-9 years

with 25% (Table 2). In the point of age, infecting status of dogs does not show statistically significant difference (Chi-Square: 4.64, $p > 0.05$). The distribution of the gastrointestinal helminths in stray dogs according to single and mixed infection is mentioned in Table 3.

Table 3. Distribution of gastrointestinal helminths in single and mixed infection status in stray dogs

Helminth species	Infected Dog	Infection rate (%)
<i>T. leonina</i>	11	25.58
<i>T. canis</i>	8	18.60
<i>A. caninum</i>	3	6.98
<i>Taenia spp.</i>	2	4.65
<i>D. caninum</i>	2	4.65
<i>U. stenocephala</i>	2	4.65
<i>T. leonina</i> + <i>T. canis</i>	4	9.30
<i>T. canis</i> + <i>D. caninum</i>	2	4.65
<i>T. leonina</i> + <i>T. canis</i>	1	2.33
<i>T. leonina</i> + <i>Taenia spp.</i>	2	4.65
<i>T. leonina</i> + <i>T. canis</i> + <i>Capillaria spp.</i>	2	4.65
<i>F. hepatica</i> + <i>D. dentriticum</i> + <i>U. stenocephala</i>	1	2.33
<i>T. canis</i> + <i>F. Hepatica</i> + <i>U. stenocephala</i>	1	2.33
<i>A.caninum</i> + <i>Capillaria spp</i> + <i>Taenia spp.</i>	2	4.65

DISCUSSION

Most parasites that live in the gastrointestinal tract of dogs threaten animal and human's health. The etiology, diagnosis, treatment and protection of particularly zoonotic parasitic diseases are of great importance. A great deal of research in Turkey and the world has been done to determine helminth infections in stray dogs. In studies conducted abroad; helminth infection detected in dogs according to feces examination; It was determined as 39.2% in Greece (Haralabidis *et al.*, 1988), 64.33% in Egypt (El-Seify and Nabhi, 1998), 86.97% in Nigeria (Ugochukwu and Ejimandu, 1985) and 78.1% in Ethiopia (Zelalem and Mekonnen, 2012). According to research conducted in Turkey, the prevalence of gastrointestinal helminths in dogs based on fecal examination has been reported at rates of 73.8% in Kars (Umur and Arslan, 1997), 35% in Konya (Aydenizöz, 1997), 76% in Sivas (Atak *et al.*, 1997), 80.99% in Ankara (Çerci, 1992), 60% in Van (Orhun and Ayaz, 2006), 19.4% in Kayseri (Yıldırım *et al.*, 2007), 41% in Aydın (Ünlü and Eren, 2007), 51.9% in Erzurum (Balkaya and Avcioglu, 2011), 46% in Afyonkarahisar (Kozan *et al.*, 2007),

58% in Siirt (Nas and Biçek, 2018) and 32.7% in Diyarbakir (Sayın İpek and Kochan, 2017). In these studies, different results were obtained. In this study, presence of gastrointestinal helminth was detected as 43 (34.68%) out of 124 dogs according to feces examination. The results of this research are low compared to the average in Turkey. In this study, helminth infection in the stray dogs in Van province were lower according to various studies in Turkey. We think that the reason for this low rate is the spread of health services for stray dogs and the regular control of slaughterhouses.

In this study, *Toxocara leonina* was observed in 20 (16.13%) of 124 dogs. In studies in Turkey, *T. leonina* rates were reported to be infected 1-60.9%. This study compared to the studies conducted in different countries of the world; it was detected higher in Korea, Mexico, Hungary, Switzerland and China, while it was lower than in South Africa (Minnaar *et al.*, 2002; Kim and Huh, 2005; Eguía-Aguilar *et al.*, 2005; Fok *et al.*, 2001; Sager *et al.*, 2005; Wang *et al.*, 2006). This result has been identified as higher compared with the results obtained in the studies performed in Diyarbakır, Van, Kayseri and Ankara, as lower than that of Eskişehir, Afyon, Hatay, İstanbul, Erzurum and Aydın (Doğanay and Öge, 1993; Orhun and Ayaz, 2006; Kozan *et al.*, 2007; Ünlü and Eren, 2007; Yıldırım *et al.*, 2007; Balkaya and Avcioglu, 2011; Sayın İpek and Koçhan, 2017).

Toxocara canis has been identified as the second most common species in the city of Van province, with a rate of 12.90% after *T. leonina*. This result has been identified as higher compared with the results obtained in the studies performed in Kayseri and Ankara; and as lower than that of Eskişehir, Afyonkarahisar, Hatay, Istanbul, Erzurum, Aydın, Diyarbakır and Van (Kozan *et al.*, 2007; Yaman *et al.*, 2006; Öncel, 2004; Balkaya and Avcioglu, 2011; Ünlü and Eren, 2007; Sayın İpek and Koçhan, 2017; Orhun and Ayaz, 2006; Yıldırım *et al.*, 2007; Doğanay, 1983).

Dogs can be exposed to hookworm infection in all cycles of their lives. Hookworms have an important place in respect of human health as they result in Cutaneous Larva Migrans. *Ancylostoma caninum* is an important zoonosis that causes larval migrans. In our study, it was detected as 5.64% in stray dogs. This species has been reported to be 16.66% in Hatay, 8.6% in Diyarbakir, 8.7% in Van, 1.1% in Kayseri and 0.8% in Konya (Orhun and Ayaz, 2006; Yaman *et al.*, 2006; Yıldırım *et al.*, 2007; Işık *et al.*, 2014).

In dogs, *Taenia* spp. eggs with feces examination are difficult to diagnose as species and genus. In Turkey; *Taenia* spp. eggs were reported 7.5% in Aydın (Ünlü and Eren, 2007), 2.9% in Afyonkarahisar (Kozan *et al.*, 2007), 23.9% in Eskisehir (Kozan *et al.*, 2007), 2.9% in Erzurum (Balkaya and Avcioglu, 2011), 14.8% in Van (Orhun and Ayaz, 2006), 4% in Istanbul (Öncel, 2004), 2.8% in Kayseri (Yıldırım *et al.*, 2007) and 3.8% in Diyarbakır (Sayın İpek and Koçhan, 2017). In this study, *Taenia* spp. eggs were determined as 4.84%. This proportion is supporting research done in Turkey.

In our study, *Dipylidium caninum*, which is an important helminth species of dogs, was determined a rate of 3.22%. Compared to other studies conducted in this study, *D. caninum* 12.5% in Hatay (Yaman *et al.* 2006), 6.4% in Istanbul (Öncel, 2004), 4.3% in Eskişehir (Kozan *et al.* 2007) and 3.5% in Van (Orhun and Ayaz, 2006) was found to be lower than the reported rates; while it was found to be higher compared to 2.9% in Afyonkarahisar (Kozan *et al.* 2007), 2.8% in Kayseri (Yıldırım *et al.*, 2007) and 2.8% in Diyarbakır (Sayın İpek and Koçhan 2017). According to the results of this study and other studies in Turkey, *D. caninum* species reveals could be seen in every region in Turkey.

In research done in Turkey, the prevalence of *Uncinaria stenocephala* according to fecal examination was reported to be between the rates of 2.45-57.1%, while it was 2.2-14.5% in studies conducted abroad (Doğanay, 1983; Çerçi, 1992; Işık *et al.*, 2014; Umur and Arslan, 1997; Haralabidis *et al.*, 1988; Le Nobel *et al.*, 2004; Ramirez-Barrios *et al.*, 2004; Vanparijs *et al.*, 1991). In this study; *U. stenocephala* was determined as 3.22%. This finding was lower than the rate obtained in the survey conducted in Kars and it was found to be higher than those in Konya.

Tınar *et al.* (1989) found *Capillaria aerophila* in one of 100 dogs. In another study in Ankara, *Capillaria* spp. was found in 2.23%. In this study, *Capillaria* spp. was found 3.22%. (Tınar *et al.*, 1989; Elements *et al.*, 2017). This study supports studies conducted in Turkey.

In the study, 1.65% *Dicrocoelium dentriticum* and 2.7% *Fasciola hepatica* were determined. In a study conducted in Ankara, it was found *Fasciola* spp. 1.79% and *Dicrocoelium* spp. 3.13% (Öge *et al.*, 2017). Trematodes such as *F. hepatica* and *D. dentriticum* are generally not seen in dogs. In this study, we

think that *F. hepatica* and *D. dentriticum* species are found in fecal examination, which may be due to their feeding style. In studies conducted on dogs according to fecal examination, the rate of those infected with one type of parasites is more common than mixed infections (Asano *et al.*, 2004; Ayçiçek *et al.*, 1998; Ünlü and Eren, 2007).

In a study conducted in dogs in Ankara, 22.45% of those infected with one species, 26.54%, of two species, 18.36% of three species, 18.36% of four species, 10.20% of five species and 4,08% of six species were reported to be infected with helminth (Doğanay, 1983). Ayçiçek *et al.* (1998) reported that 48.11% of stray dogs were infected with one species, 26.4% with two species, 14.15% with three species, according to autopsy results in Ankara. Aydenizöz (1997) reported that in Konya, 19.6% of dogs infected with helminths were infected with one species, 37.26% with two species, 23.53% with three species 3.92% with four species, 9.80%, with the five species and 5.88% with six species. In Aydın, Ünlü and Eren (2007) reported that they encountered infections with the most single species (80.5%) in dogs infected with helminths and with least four species (1.2%) such as Asano *et al.* (2004) reported in Japan. In this study; stray dogs in Van province infected with the gastrointestinal helminths were identified as 65.12% with one species, 20.93% with two species and 13.95% with three species. This study is compatible with the studies (Asano *et al.*, 2004; Ayçiçek *et al.*, 1998; Ramirez-Barrios *et al.*, 2004; Ünlü and Eren, 2007).

In this study, the infection rates in dogs 0.5-2 years old was 45.3%, in those 2-5 years old 27.7%, and in those 5-9 years old 25%. There is no statistically significant difference between the age groups (Chi-Square: 4,64, $p > 0,05$). These results are in line with those of some researchers (Minnaar *et al.* 2002; Sager *et al.* 2005). However, in some studies (Doğanay and Öge, 1993; Ramirez-Barrios *et al.*, 2004; Pullola *et al.*, 2006; Ünlü and Eren, 2007), it has been reported that age has a significant relationship with parasitic infection in dogs.

CONCLUSION

As a result; the prevalence of helminth infections of gastrointestinal detected in stray dogs in Van province was found to be significant. It is thought that these helminths are important zoonoses and cause significant diseases in humans. For this reason, stray dogs should be taken under control against these parasitic diseases and it is thought that

the risk of zoonotic infection may be reduced if the drug is administered routinely.

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