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Short communication

INTESTINAL NEMATODES IN DOGS AND CATS IN BANJA LUKA,
REPUBLIKA SRPSKA

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Abstract: Some intestinal nematodes of dogs and cats show zoonotic potential, and therefore they are of public-health significance. In the territory of the city of Banja Luka, 149 samples were examined (131 of dogs and 18 cats), with 40 samples of dog feces collected from two public areas in the city. Parasitological examination (saturated zinc sulfate floatation and determination of larvae and adult parasites in feces) resulted in the following data: *Toxocara canis* (9.16%), *Ancylostomatidae* (5.34%), *Trichuris vulpis* (7.63%), *Toxascaris leonina* (1.52%), *Toxocara cati* (33.3%), *Trichuris spp.* (5.5%) and *Hydatigera taeniaeformis* (5.5%). On the basis of the obtained results we can conclude that the intestinal nematodes are more widespread than is generally assumed and therefore represent a health problem for dogs and cats in the territory of Banja Luka.

Keywords: intestinal nematodes, dogs, cats, Banja Luka

INTRODUCTION

Dogs and cats are hosts of a large number of intestinal nematodes and protozoa, some of which have zoonotic potential and can cause human infections. Among nematodes, the following ascarids are significant: *Toxocara canis*, *Toxascaris leonina* and *Toxocara cati*, *Ancylostomatidae* of the genus *Ancylostoma* spp. and *Uncinaria* spp. Cestode parasites of the genus *Echinococcus* spp. are highly pathogenic and in some cases human infections can end with fatal outcome. Dogs and cats in urban green areas (city parks, walkways, city beaches, etc.) serve as a source of parasitic elements, which can be easily transferred to people, especially to small children. Some cities have regular control of parasitic contamination of green areas

whereby preventive measures can be implemented and thus prevent contamination of public areas (Pavlović et al., 2014). Human infections with ascarids *Toxocara canis*, *Toxocara cati* and *Toxascaris leonina* lead to visceral larva migrans syndrome, while infections with *Ancylostoma caninum*, *Ancylostoma tubaeforme*, cause cutaneous larva migrans syndrome (Zajac and Conboy, 2012). *Toxocara canis* is worldwide-distributed ascarid among dogs, and according to the literature the prevalence of toxocariosis ranges from 3.06% to 82.6% (Papini et al., 2012). Similar prevalence was observed with *Toxocara cati* in cats (Zajac and Conboy, 2012) and in the literature data on the prevalence vary from 7.5% (Barrientos Serra

et al 2003) up to 59.6% (Labarthe et al., 2004). The Ancylostomatidae in dogs and cats have less zoonotic potential than nematodes of the genus *Toxocara* and *Toxascaris*, but it has been found that a significant percentage of dogs and cats can be infected with ancylostomas - 4.03% (Ilić et al. 2017a and 2017b). Contamination of

public areas with canine feces infected with zoonotic nematodes increases the possibility of human infection (Ilić et al. 2017a and 2017b). There is no available data on the frequency of human infections with these nematodes in the area of Banja Luka and / or Republika Srpska.

MATERIAL AND METHODS

Sampling

In the period from 01.01.2016 to 21.07.2018. a total of 149 fecal samples of dogs and cats were collected. Samples were divided into two groups: 1. samples of feces and parasitic elements from owned dogs and cats (109); 2.

fecal samples from dogs collected from green, public areas in the territory of Banja Luka (40). Fecal samples from green, public areas were collected in two parks on the territory of the city: city park "Mladen Stojanović" and "park for dogs" (Figure 1).

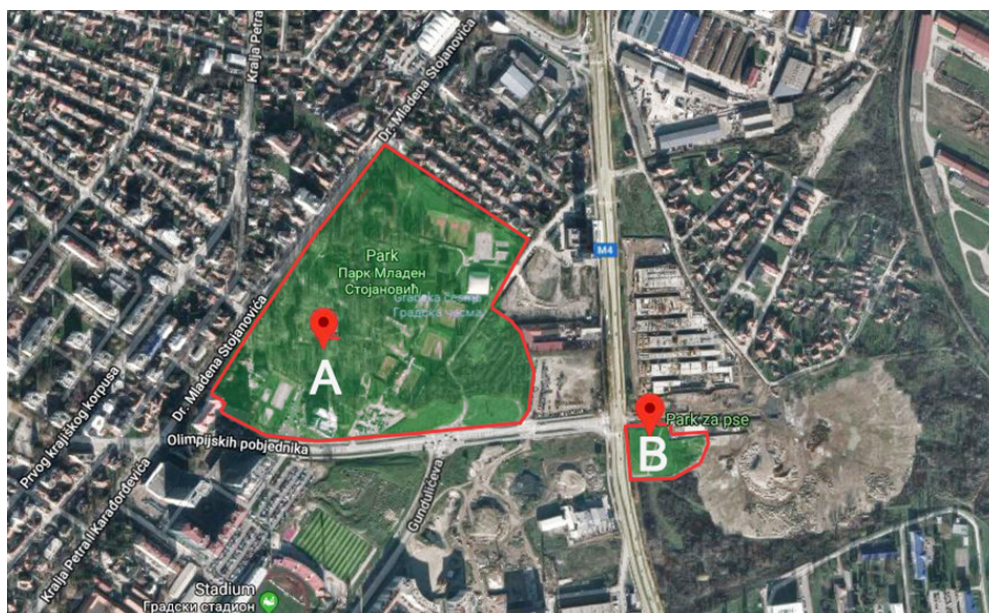


Figure 1. 1: Public green areas where feces samples were collected (Legend: A-park Mladen Stojanović, B-park for dogs)

Coprological examination

Coprological examination of fecal samples was carried out in two laboratories in the territory of Banja Luka: Laboratory for Microbiology at the Medical Faculty in Banja Luka and “in-house”

laboratory of the Veterinary Ambulance "BL vet" Banja Luka. First, the feces was macroscopically examined for parasitic elements: tapeworm proglottids, larvae, parts and / or adults. In case of macroscopically

visible parasitic elements, they are washed in water or physiological saline. Based on general morphology and size, smaller nematodes were processed into Aman's lactophenol and observed under a light microscope, on the basis of which the genus and / or species was identified. The nematodes were washed in 0.9% saline solution, observed under a stereomicroscope, cleared in a solution of phenol alcohol (80%) until morphological characters sufficient for a diagnosis of the species were detected (Monnig, 1950). Cestodes were observed natively, scolex was cut off with scissors and placed on a slide after which a cover slip was carefully pressed with several drops of Aman's lactophenol. Microscopy of the cestodes

was carried out after 2 hours. After macroscopic examination, fecal samples were examined using saturated zinc sulfate solution flotation technique (1.30-1.40). Minimum 3 grams of feces was homogenized with 40-50 ml of flotation liquid, filtered into a pure plastic glass and the sample was transferred to two 15 ml tubes, on top of which there were cover glasses. After 20 minutes of flotation, the cover glass was carefully shifted to the cover slip and examined microscopically at a magnification of 10x. Coprological diagnosis was based on the structure and size of the concentrated parasitic elements: eggs and larvae (Monnig, 1950) (Fig. 2).



Figure 2: Morphological characteristics of nematode eggs - left *Toxascaris leonina*, right *Toxocara canis*, 200x

RESULTS AND DISCUSSION

A total of 149 samples were examined, of which 113 were samples of dogs and 18 samples of cats. The total number of positive samples for parasitic elements was 26.17%. Of the 149 samples, 40 feces samples were of dogs collected from two public areas in Banja Luka. Of the 40 examined dog feces samples from public areas, parasitic elements were found in 7

samples, which makes 17.5% (*Toxocara canis*, Ancylostomatidae, *Trichuris vulpis*). The most commonly detected species in owned dogs are *Toxocara canis*, Ancylostomatidae, *Trichuris vulpis*, *Toxascaris leonina*. In cats, *Toxocara cati* (33.3%), *Trichuris spp.* (5.5%) and *H.taeniformis* (5.5%) were detected,. The results obtained are shown in Table 1.

Table 1. Results of coprological examination of dogs and cats in Banja Luka

Type of parasite	Public areas (n= 40)		Owned dogs and cats (n = 109)		Total (n = 149)	
	no. positive	%	no. positive x	%	no. positive x	%
<i>Trichuris vulpis</i>	4	10,0	6	6,59	10	7,63
<i>Ancylostoma caninum</i> / <i>Uncinaria stenocephala</i>	1	2,5	6	6,59	7	5,34
<i>Toxocara canis</i>	2	5,0	10	10,9	12	9,16
<i>Toxascaris leonina</i>	0	0	2	2,19	2	1,52
<i>Toxocara cati</i>	\	\	6	33,3	6	33,3
<i>Trichuris spp.</i>	\	\	1	5,5	1	5,5
<i>H.taeniformis</i>	\	\	1	5,5	1	5,5

Worldwide contamination of soil and green city areas with feces of dogs and cats containing eggs of intestinal parasites is not a rare phenomenon. It is interesting to note that in the literature there are large differences in the results of the contamination of public surfaces with parasitic elements in relation to the location and time of the study. High prevalence ranging from 40 to 73% was detected in Argentina (Rubel et al 2005), up to 47% in parts of Italy (Habluetzel et al 2003), and up to 73% in some parts of Belgrade in Serbia (Colovic-Calovski et al., 2014). On the other hand, a low prevalence of only 3.3% was detected in Poland (Borecka, 2005), and some Italian cities - 3.6% (Papini et al., 2012). According to our findings this

research is the first study of this kind in the area of Banja Luka as well as in the territory of Republika Srpska. Compared with some other studies from the surrounding countries, a relatively low number of positive samples was collected from the public area (17.5%). The relatively low number of samples in our study should be taken into account, but at the same time the material was sampled from two public surfaces where dogs are regularly kept. Microclimate conditions throughout the year can significantly affect the variability and embryonation of eggs of these nematodes, so that cooler temperatures during the spring months can significantly reduce the infectivity of the eggs. Also, the age of the dog can play a

significant role, because puppies are more suitable hosts for these parasites. A relatively small number of stray dogs in the area of Banja Luka is certainly one of the main factors for the low prevalence of contamination by the eggs of these nematodes. Taking this into account, we come to the conclusion that most dogs in the green areas of the city actually are owned dogs, and we consider that the total number of examined samples obtained from dog owners together with randomly collected samples from green areas can serve as an objective indicator of contamination in the whole city. Obviously, citizens of Banja Luka are intensely performing dehelminthisation of dogs and cats because in most cases they are staying in apartments or urban areas of the city. However, regular coprological control remains an imperative, because only in this way can parasitic diseases be diagnosed regularly (Kulisic et al 1998). On the other hand, a relatively high number of positive samples were obtained in the laboratory of the Veterinary Ambulance "BL-vet" Banja Luka, which leads to the conclusion that the dehelminthisation protocols should always be controlled by coprological examination. In the literature, there are few data on cats as sources of contamination with these nematodes in urban areas. Dogs are generally regarded as the main source (Nijssen et al., 2015). However, the

prevalence of 33.3% of cats' fecal contamination with *Toxocara* eggs opens the question of the role of cats in the process of contamination of public areas in Banja Luka. Considering the habits of cats, accessibility to all city areas, and unhindered access to dormitories, playgrounds and sand playgrounds, unlike dogs who are physically disabled to enter most of these places, it is quite clear that cats can represent a significantly greater source of infection for children, who are more likely to develop a broad clinical symptomatology (Carvalho, 2011). There are more medical studies that discuss about the importance of human toxocariasis as well as clarification of the role played by other parasites from this group in a man as a random host. Studies showing seroprevalence among people ranging from 2% to 37% (Magnaval et al 2001) clearly indicate the importance of these parasitic diseases in the field of public health, as well as the necessary multidisciplinary cooperation between experts in human and veterinary medicine (Colovic-Calovski et al 2014).

The obtained results indicate that it is necessary to continue the regular control of public surfaces at the level of contamination with parasitic elements and to determine the seroprevalence of toxocariasis in humans in the territory of Banjaluka.

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