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Hard tick infestation of dogs in the Tuzla area (Bosnia and Herzegovina)

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ABSTRACT

During 2008, 259 ticks were collected from 33 dogs in the Canton of Tuzla (Bosnia and Herzegovina). Two tick species were identified: *Dermacentor reticulatus* (Fabricius, 1794) and *Ixodes ricinus* (Linnaeus, 1758). 193 ticks were collected from 18 dogs from the villages surrounding Tuzla, and 66 ticks from15 dogs from the city of Tuzla. The preferred sites of *Dermacentor reticulatus* attachment on village dogs were the lateral parts of the body, neck and head, while on city dogs it was the neck. Furthermore, on the village dogs a significantly higher number of *Ixodes ricinus* were sampled on the head and lateral part of the body. With regard to city dogs, a significantly higher number of *Ixodes ricinus* were sampled on the head and neck than on the other body parts. The most abundant tick species in both of the examined areas was *Ixodes ricinus*.

Key words: dogs, infested body parts, Ixodidae, Tuzla, Bosnia and Herzegovina

Introduction

Hard ticks (Acari: Ixodidae) are known as important vectors of viruses, bacteria and protozoans, which cause diseases of wild and domestic animals, and also of humans (LINDSTRÖM and JAENSON, 2003; HORNOK and FARKAS, 2009; RANJU et al., 2012). Approximately 10% of the currently known 720 tick species act as vectors of pathogens (JONGEJAN and UILENBERG, 2004; FARKAS et al., 2013). Ticks are considered second only to mosquitoes as vectors of human infectious disease agents worldwide (ESTRADA-PEÑA and JONGEJAN, 1999). In Europe, the common tick *Ixodes ricinus* is the most important vector of diseases to humans (LINDSTRÖM and JAENSON, 2003). Also,

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different species of ticks may infest dogs in different geographical regions (XHAXHIU et al., 2009). Geographical differences may influence the risk of arthropod-borne disease agents and parasite transmission between animals and humans (XHAXHIU et al., 2009). Furthermore, dogs as pet animals are often in close contact with humans and they could be the potential carriers of tick vectors into the human environment (SHIMADA et al., 2003). Thus, information on the tick species found in domestic dogs is a prerequisite for the prevention of tick-borne diseases (SHIMADA et al., 2003). Study of the tick fauna on the territory of Bosnia and Herzegovina is very rare. The lack of data on the tick fauna on dogs in Bosnia and Herzegovina initiated this research which contributes to a better understanding of tick infestation of dogs in Tuzla Canton.

Materials and methods

All the material was collected in one veterinary clinic in Tuzla from March to July 2008. Ticks were collected from dogs during vaccination or during usual veterinary examinations. Furthermore, tick sampling was performed on 9 breeds of dogs from the city of Tuzla, and 4 purebred dogs from villages surrounding Tuzla. 56% of ticks were collected from cross-breed dogs from villages surrounding the city of Tuzla. All ticks were removed with bare hands from seven areas of the animal body (Fig. 1). Dogs were examined by the same researcher and each one was examined for a minimum of 5 minutes. Collected ticks were stored in 70% ethanol and three years later (2011) identified at the Department of Biology of the J. J. Strossmayer University of Osijek . The ticks were identified using standard keys for European ticks (HILLYARD, 1996) by a stereomicroscope. In the analysis of the acquired data, the chi-square test was applied.

Results

During the investigation of tick attachment sites on dogs, a total of 259 specimens of ticks, belonging to 2 species were collected (Table 1, 2). In the collected sample of 259 ticks, there were 7 nymphs, 48 males and 204 females (Table 1, 2). In decreasing frequency, the most infested body sites were the head, lateral side of the body, neck, back, chest, ventral side of the body and the legs (Table 1, 2). The most common species was *Ixodes ricinus* (Linnaeus, 1758) this species comprised 59% of ticks sampled on dog bodies. 193 ticks were sampled on 18 dogs from the villages surrounding Tuzla, while 66 ticks were sampled on 15 dogs from the city of Tuzla. The most numerous tick species in both of the examined urban and rural areas was *Ixodes ricinus*. A significant difference between attachment sites of ticks on the dog bodies was found ($\chi^2 = 138.51$, $P<0.05$; $\chi^2 = 49.54$, $P<0.05$). *Dermacentor reticulatus* (Fabricius, 1794) was sampled on village dogs in a significantly higher number on the head, neck and lateral part of the body, as opposed to the back, legs, thoracic and abdominal parts of the dog body ($\chi^2 = 14.41$, $P<0.05$; $\chi^2 = 19.61$, $P<0.05$; $\chi^2 = 31.75$, $P<0.05$), while no significant difference was observed between

the number of specimens sampled on the head, neck and the lateral part of the dog body ($\chi^2 = 1.73$, P>0.05). Further, a significantly higher number of *Ixodes ricinus* was sampled on the head and lateral part of the dog body compared to other body parts ($\chi^2 = 114.44$, P<0.05; $\chi^2 = 85.51$, P<0.05). However, no significant difference was found between the numbers of specimens of *Ixodes ricinus* sampled on the head and those on the lateral part of the dog body ($\chi^2 = 0.74$, P>0.05). With regard to city dogs, a significantly higher number of *Ixodes ricinus* was sampled on the head and neck than on the back, lateral body parts, legs, thoracic and abdominal parts of dog bodies ($\chi^2 = 23.84$, P<0.05; $\chi^2 = 10.17$, P<0.05). *Dermacentor reticulatus* was sampled in a significantly higher number on the neck than on other body parts of city dogs ($\chi^2 = 41.29$, P<0.05). The largest number of ticks was collected during March and April.

Table 1. Number of ticks collected on dogs from villages surrounding the city of Tuzla

Species / body parts	I head	II neck	III back	IV lateral side	V legs	VI chest	VII ventral side	Σ
D. reticulatus	7♀, 8♂	13♀, 5♂	4♀, 1♂	21♀, 2♂	2♀, 1♂	6♀, 2♂	1♀, 3♂	76
I. ricinus	42♀, 5♂	14♀, 1♂	4♀, 1n	35♀, 4♂	2♀, 1n	4♀, 1♂	3♀	117
Σ	62	33	10	62	6	13	7	193

Table 2. Number of ticks collected on dogs from the city of Tuzla

Species / body parts	I head	II neck	III back	IV lateral side	V legs	VI chest	VII ventral side	Σ
D. reticulatus	1♀, 2♂	8♀, 6♂, 3n	5♀, 1n	-	-	2♀	1♀, 1♂	30
I. ricinus	13♀, 2♂	8♀, 1n	3♀, 3♂	-	3♀	1♀, 1♂	1♀	36
Σ	18	26	12	-	3	4	3	66

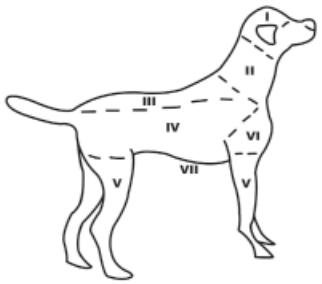

Fig. 1. Parts of the dog body on which ticks were collected

Discussion

This is the first report on the attachment sites of hard ticks collected from dogs in Bosnia and Herzegovina. Recently, the first list of ixodid ticks in Bosnia and Herzegovina

was published (OMERAGIĆ, 2011). A total of 10,050 ixodid ticks classified in 8 species were collected from 26 areas in Bosnia and Herzegovina (OMERAGIĆ, 2011). In our study, the presence of two species of ticks on the dog body has been documented. Also, presence of two tick species on dogs were found in Germany and northern Greece (BEICHEL et al., 1996; PAPAZAHARIADOU et al., 2003). The first studies on tick infestation of dogs were published during the 1980s in Europe (FÖLDVÁRI, 2005). LIEBISCH et al. (1984) recorded seven tick species on dogs in Germany, while GRANDES (1986) found six species on dogs in Spain. Also, PAPADOPOULOS et al. (1996) recorded six tick species on dogs in Greece, while OGDEN et al. (2000) recorded five tick species on dogs in Great Britain and Ireland. In Great Britain and Ireland *Dermacentor reticulatus* occur at low densities (OGDEN et al., 2000), while in Hungary they occur in very high densities (FÖLDVÁRI and FARKAS, 2005). *Dermacentor reticulatus* seems to infest dogs in Bosnia and Herzegovina as much as in Hungary. *Ixodes ricinus* is considered to be the most common and the most extensively studied ixodid tick in Great Britain, Ireland, Germany, Czech Republic, and Greece, because of its important role in the transmission of different rickettsial, bacterial, protozoan and viral pathogens (HUBÁLEK et al., 1993; BEICHEL et al., 1996; PAVLIDOU et al., 2008; SMITH et al., 2011).

The most preferred sites of tick attachment on dogs in Hungary were the head, neck and legs (FÖLDVÁRI and FARKAS, 2005). These results partially overlap with our findings, since in our research most ticks were also collected on the head and neck, but we sampled the lowest number of ticks on the legs of dogs. However, some authors have reported that most of the tick species showed a strong preference for some particular sites on the vertebrate body (PAPADOPOULOS et al., 1996), although this predilection could vary according to the host species (PAPADOPOULOS et al., 1996). Concerning occurrence, veterinary and zoonotic importance, *Ixodes ricinus*, *Dermacentor reticulatus* and *Rhipicephalus sanguineus* are the most important species infesting dogs in Europe (ZAHLER et al. 2000; SHAW et al., 2001; ESTRADA-PEÑA et al., 2004; FÖLDVÁRI et al., 2005).

Two of these above mentioned species were found in the Tuzla area. In our study most of ticks from rural dogs were collected on the head and lateral side of the body, while most ticks from urban dogs were collected from the head and neck (Table 1, 2). Difference in infestation of some body parts between rural and urban dogs probably depend on contact with vegetation and caused by the fact that rural dogs are unrestricted in their movements through agricultural and forested areas. This higher movement range of rural dogs increased the possibility of infestation with ticks. In rural areas habitats are much more homogeneous and the likelihood of picking up a tick will be higher and more evenly distributed (SMITH et al., 2011). The likely reason for the lower number of ticks sampled on dogs in the city of Tuzla is the lack of areas with shrubby vegetation and high weeds in parks and the fact that owners take better care of their pets there than in the villages surrounding Tuzla. In urban areas, some parks and gardens available

for exercising dogs may create hotspots for ticks and the tick population may also be maintained by visiting wildlife (SMITH et al., 2011). By contrast, other dogs in cities may live in areas lacking in parks and therefore may not come into contact with tick habitats (SMITH et al., 2011).

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SAŽETAK

Na području Tuzlanskog kantona uzorkovano je 259 krpelja s 33 psa tijekom 2008. godine. Uzorkovani krpelji svrstani su u dvije vrste: *Dermacentor reticulatus* (Fabricius, 1794) i *Ixodes ricinus* (Linnaeus, 1758). U selima iz okolice grada Tuzle uzorkovana su 193 krpelja s 18 pasa, dok je na 15 pasa iz grada Tuzle uzorkovano 66 krpelja. Na seoskim psima vrsta *Dermacentor reticulatus* uzorkovana je u signifikantno većem broju na glavi, vratu i bočnoj strani tijela, nego li na ostalim dijelovima tijela, dok je vrsta *Ixodes ricinus* uzorkovana u signifikantno većem broju na glavi i bočnoj strani tijela psa. Na gradskim psima vrsta *Ixodes ricinus* uzorkovana je u signifikantno većem broju na glavi i vratu, nego li na ostalim dijelovima tijela, a vrsta *Dermacentor reticulatus* uzorkovana je u signifikantno većem broju na vratu. Najbronija vrsta krpelja na oba područja (selo i grad) je *Ixodes ricinus*.

Ključne riječi: psi, Ixodidae, Tuzla, Bona i Hercegovina