

Original Article

Ticks and Fleas Infestation on East Hedgehogs (*Erinaceus concolor*) in Van Province, Eastern Region of Turkey

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Abstract

Background: Ixodid ticks (Acari: Ixodidae) and fleas (Siphonaptera) are the major vectors of pathogens threatening animals and human health. The aim of our study was to detect the infestation rates of East Hedgehogs (*Erinaceus concolor*) with ticks and fleas in Van Province, eastern region of Turkey.

Methods: We examined fleas and ticks infestation patterns in 21 hedgehogs, collected from three suburbs with the greater number of gardens. In order to estimate flea and tick infestation of hedgehogs, we immobilized the ectoparasites by treatment of the body with an insecticide trichlorophon (Neguvon®-Bayer).

Results: On the hedgehogs, 60 ixodid ticks and 125 fleas were detected. All of the ixodid ticks were *Rhipicephalus turanicus* and all of the fleas were *Archaeopsylla erinacei*. Infestation rate for ticks and fleas was detected 66.66 % and 100 %, respectively.

Conclusion: We detected ticks (*R. turanicus*) and fleas (*A. erinacei*) in hedgehogs at fairly high rates. Since many ticks and fleas species may harbor on hedgehogs and transmit some tick-borne and flea-borne pathogens, this result is important in terms of veterinary and public health.

Keywords: Tick, Flea, Hedgehog, Turkey

Introduction

Hedgehogs are small, nocturnal animals which have bodies covered with spines. Some ectoparasites of hedgehogs such as ticks and fleas have zoonotic importance (Khaldi et al. 2012). Hedgehogs may act as reservoir hosts for some diseases for instance salmonellosis, leptospirosis and pulmonary capillariosis (McCarthy and Moore 2000, Riley and Chomel 2005, Marie et al. 2012).

Ticks and fleas are blood feeding arthropods that act as vector for transmitting many bacterial, viral, rickettsial and parasitic infections among both domestic and wild animals as well as between animals and humans (Mullen and O'canner 2002). Ticks are the most important ectoparasites affecting wildlife as they transmit many important diseases

in the wildlife, among the livestock and humans (McLean 2008, Castellaw et al. 2011). Ticks are vectors carrying a number of diseases named tick-borne diseases including Lyme disease, Rocky Mountain spotted fever, tick-borne meningoencephalitis, babesiosis and Crimean-Congo hemorrhagic fever (CCHF) (Service 2012). Also several flaviviruses are transmitted by *Ixodes* ticks, that cause encephalitis and haemorrhagic fever among humans (Capinera 2010). Ticks are common in Eurasia and Africa and are usually found in similar habitats to that of hedgehogs (Causey et al. 1970). Hedgehogs are a frequent host of hard tick *I. hexagonus* (Gern et al. 1991, Beichel et al. 1996, Gern et al. 1997). In Switzerland, an enzootic transmission cycle

of *B. burgdorferi* involving hedgehogs and *I. hexagenus*, another tick vector, has been described in urban environment (Gern et al. 1997).

Fleas such as ticks transmit many diseases to humans and animals, viral, bacterial, rickettsial and protozoal diseases, in addition some helminths are transmitted by fleas (Boris 2008). Fleas can transmit *Yersinia pestis*, *Rickettsia typhi*, *R. felis*, *Bartonella henselae*, *Myxoma virus* and some helminthic diseases, such as *Hymenolepis nana* and *Dipylidium caninum* (tapeworms). Most species of fleas are host specific. Rodents are predominant host and 74 % of fleas feed on rodents (Otranto and Wall 2008, Capinera 2010).

The aim of our study was to detect the infestation rates of East Hedgehogs (*Erinaceus concolor*) with ticks and fleas in Van Province, eastern region of Turkey.

Materials and Methods

Study area

Hedgehogs were captured around the city of Van (38° 28' N 43° 20' E) in the, eastern region of Turkey. The city is located around Lake Van and has 370.000 inhabitants. The study was conducted between June 2013–September 2013 in three different localities.

Animal capture and collection of ticks and Fleas

Hedgehogs were captured between June and September 2013 with the aid of spotlight nightly walks through parts of the study area. In order to estimate flea and tick infestation of hedgehogs, we immobilized the ectoparasites by polluting the body with an insecticide including trichlorophon (Neguvon®-Bayer). Immobilized fleas were removed from the hedgehogs by gently shaking the animal over a sheet of paper and then all the fleas counted. We collected all ticks from hedgehogs and conserved them in 70 % ethanol for post identification. Ticks were identified according to Karaer et al. (1997) and fleas were identified according to Dinçer (1971).

Results

Throughout the investigation, 60 ixodid ticks and 125 fleas in total were collected from 21 hedgehogs, collected seven hedgehogs each locality, from three different localities. All the collected ticks belonged to *Rhipicephalus turanicus* species and all fleas belonged to *Archaeopsylla erinacei* species (Fig. 1, Fig. 2). Other ectoparasites, apart from this kind of species, were not observed in this investigation. Rates of the tick and fleas infestations were 66.66 % and 100 % respectively. Table 1 and Table 2 shows localities where hedgehogs were obtained and the numbers and gender distribution of the fleas and ticks that were collected from these hedgehogs.

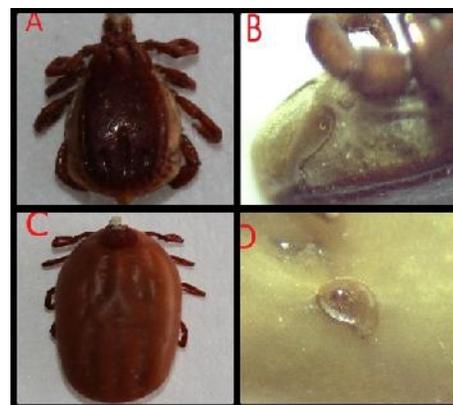


Fig. 1. A) Dorsal view of male *Rhipicephalus turanicus*, B) Spiracular plate of male *Rhipicephalus turanicus*, C) Dorsal view of female *Rhipicephalus turanicus*, D) Spiracular plate of female *Rhipicephalus turanicus*



Fig. 2. A) Female *Archaeopsylla erinacei*, B) Male *Archaeopsylla erinacei*, C) D) Adult ticks on the hedgehog

Table 1. Locality names and numbers of hedgehogs

Locality	n of hedgehog
Kasimba 1 village	7
Göla zı neighborhood	7
Çınarlı neighborhood	7
Total	21

Table 2. Numbers and gender distribution of fleas and ticks obtained from hedgehogs

Locality Ectoparasite	Kasimba 1 village				Göla zı neighborhood				Çınarlı neighborhood			
	Fleas		Ticks		Fleas		Ticks		Fleas		Ticks	
	F	M	F	M	F	M	F	M	F	M	F	M
	4	3	3	2	2	3	2	0	1	3	1	5
	6	1	0	0	4	2	0	0	5	2	4	2
	3	3	4	0	6	1	1	3	5	1	1	3
	3	5	4	1	3	4	3	3	4	0	0	0
	3	4	0	0	6	0	3	1	6	2	2	0
	4	0	0	3	3	3	0	0	3	5	0	0
	3	4	2	0	0	2	1	1	0	3	3	2
	Female= 26		Female= 13		Female= 24		Female= 10		Female= 24		Female= 11	
	Male= 20		Male= 6		Male= 15		Male= 8		Male= 16		Male= 12	
	Total= 46		Total= 19		Total= 39		Total= 18		Total= 40		Total= 33	

Discussion

One of the most important arbovirus transmitted by ticks is Crimean-Congo hemorrhagic fever virus (CCHFV) believed to be survived mainly by *Hyalomma* ixodid ticks in the nature. Ticks and fleas are important vectors of several pathogens and majority of these pathogens are zoonotic. But CCHFV has been isolated in nature among at least 30 tick species including *I. ricinus*, *R. sanguineus*, *R. turanicus*, *R. bursa* and *Dermacentor* spp. ticks in addition to *H. marginatum* (Estrada-Peña et al. 2007, Nijhof et al. 2007, Randolph et al. 2008). Ticks in the genus *Rhipicephalus* belongs to family Ixodidae (hard ticks). *Rhipicephalus turanicus* is a three-host tick species. Adult of *R. turanicus* normally infest cattle, sheep and dogs in Mediterranean region but it can also affect humans (Chochlakakis et al. 2014). Its immature forms generally infest

hedgehogs, gerbils and murid rodents (Estrada-Peña et al. 2004). *Rhipicephalus turanicus* is a vector of Q-fever and north Asian tick typhus caused by *Rickettsia sibirica* (Offenberg et al. 1997).

Some studies performed on hedgehog ticks, prevalence of *R. turanicus* infestation was detected respectively 67.70 % in Urmia City and 5.26 % Tabriz City of Iran (Gorgani-Firouzjaee et al. 2013, Nematollahi et al. 2014), and 77.80 % Tokat City, central Anatolia region of Turkey (Bursali et al. 2013). Rate of the tick infestation in present study (66.66%) was detected approximately similar to studies of Gorgani-Firouzjaee et al. 2013 and Bursali et al. 2013.

Archaeopsylla erinacei is the hedgehog fleas. It is also hosted by cats and dogs other than hedgehogs and it may be transferred

from hedgehogs through direct contact. Adult animal fleas may attack and bite humans. Human cases with fleabite eruption reported in some countries (Pomykal 1985, Naimer et al. 2002).

Prevalence of *A. erinacei* in hedgehogs was detected 55.90 % in Iran, neighboring country of Turkey (Gorgani-Firouzjaee et al. 2013). Our result (100%) was very higher than this study.

Conclusion

We detected ticks (*R. turanicus*) and fleas (*A. erinacei*) in hedgehogs at fairly high rates. Many ticks and fleas species may harbor on hedgehogs and transmit some tick-borne and flea-borne pathogens. Therefore, hedgehogs sharing the same habitats with humans in especially urban and suburban regions may be transmission of some tick-borne and flea-borne diseases from hedgehogs to humans. At least, hedgehogs ticks and fleas can attack to humans and consequently some traumatic lesions can occur in humans.

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The authors declare that there is no conflict of interest.

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