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RESEARCH ARTICLE

DETERMİNATİON AND DİSTRİBUTİON OF THE TİCK SPECİES COLLECTED FROM INFESTED CATTLE IN SİVAS, TURKEY

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ABSTRACT

In our country, the diseases caused by some factors that are carried by ticks are more common among people in recent years. On the other hand, tick-borne protozoan diseases of domestic animals such as theileriosis, babesiosis constitute major health problems and the medical importance of the tick increased due to both cases. In this study, we aimed to determine the main tick species that particularly we found in the cattle in our region. The ticks, which were collected from 250 cattle raised in 25 villages of Sivas Province where livestock farming is common, were identified. The study was conducted in March-June 2008. Ticks collected from villages were examined under a stereomicroscope using the related keys, and their species were identified. It was found out that 378 of 637 ticks (59,4%), which were collected from 250 cattle, are ticks of *Hyalomma* genus that is known to carry viruses that are causative agents of the disease Crimean-Congo Hemorrhagic Fever in our region, 248 (38,9%) are of *Rhipicephalus genus,* 10 (1,5%) are of *Haemaphysalis,* 1 (0,1%) is of *Dermacentor genus.* Ticks are important for human and animal health for their being vectors. The determination of tick species in a region is important, for it enables the implementation of the appropriate control methods, taking under control common tick infestations and reduction of the deadly viral and parasitic diseases accordingly.

INTRODUCTION

Based on the results of the studies conducted between 1953 2006 in Turkey, it was reported that there were 24 tick species from the Ixodidae family and 6 tick species from the Argasidae family. The species determined to suck blood from humans in these studies are *Argas persicus, A. reflixus, Ornithodorus lahorensis, O. coniceps, Ixodes ricinus, Hyalomma marginatum, Rhipicephalus sanguineus, Haemaphysalis punctata* (Çakır *et al*., 2002). The disease of Crimean-Congo Hemorrhagic Fever (CCHF) seen in the increasing numbers around Sivas and Tokat since 2000 causes deaths. Additionally, in the studies conducted in this region, babesiosis and theileriosis are also often seen in domestic animals (Kalkan, 2008). In our country, there are case reports related to tick-borne diseases in humans and domestic animals. Lyme disease is the leading among them (Güner *et al*., 2003; Hız *et al*., 2005). They act as vectors in the spread of such diseases as babesiosis, theileriosis, anaplasmosis among domestic animals (İça *et al*., 2007; İnci *et al*., 2003; Karatepe *et al*., 2003).

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In this study, it was aimed to determine the tick species that could infest the cattle raised in the region and, at the same time, create risk for humans, and the types of the ticks collected were identified.

MATERIALS AND METHODS

25 different villages that were selected using random sampling method in our region, where stock farming is common, were visited in the period between March 2008 and June 2008, 250 cattle that were raised in these villages were examined for ticks, and present ticks were collected. It was determined that all the cattle were infested. Tick collection process was carried out using gloves and forceps due to the contamination risk of zoonotic agents. Ticks were removed carefully without damaging their structural forms and kept in flasks containing 70% alcohol and 5% glycerin until the determination of their genus and species. They were examined in the department laboratory using stereomicroscope (Carl Zeiss Jena), and their species identification was made according to morphological features using tick keys (Karaer *et al*., 1997; Merdivenci, 1969). Because *Boophilus* genus was included in *Rhipicephalus* genus in recent studies, *Boophilus* genus was included in the same group in our study as well.

Statistical analysis

The data obtained in this study were loaded into SPSS software (Ver: 15.0), Mann-Whitney U test and Chi-square test were used to evaluate the data, and the level of error was taken as 0.05.

RESULTS

At this stage of the study, the determination of the ticks collected from the cattle raised in Sivas region was made. 637 ticks that were collected from infested 250 cattle in 25 different villages of Sivas were examined under a stereomicroscope using appropriate keys. It was found out that 378 (59,4%) of these ticks were of *Hyalomma* genus, 248 (38,9%) were of *Rhipicephalus* genus, 10 (1,5%) were of *Haemaphysalis* genus, and 1 (0,1%) was of *Dermacentor* genus (Table 1, Figure 1, Figure 3). When the number of tick genus was compared by groups, the difference between groups was found significant ($p<0.05$); when the measurements by groups were compared in pairs, the difference between *Haemaphysalis* spp. and *Dermacentor* spp. genus was found insignificant ($p>0,05$) while the difference between other groups was found significant ($p<0,05$). When the determination of species of the ticks collected in the spring and early summer was made, it was found out that mostly *H. marginatum* (38%) and *H. anatolicum* (21%) were found. *R. turanicus* and *R. Annulatus* species followed these species (Table 2, Figure 2, Figure 3).

Table 1. Distribution by genus of the ticks collected from the cattle

Tick genus	Ticks (n=637) Number	%
Hyalomma spp.	378a	59.4a
Rhipicephalus spp.	248b	38.9b
Haemaphysalis spp.	10c	1.5c
Dermacentor spp.	1c	0.2c
Total	637	100

The data shown with the same letters are at P <0.05 probability level, the difference between groups is not significant.

Table 2. Distribution by species of the ticks collected from the cattle

Tick species	Ticks (n=637) Number	%
Hyalomma anatolicum	136a	21.2a
Hyalomma marginatum	242b	38.0b
Rhipicephalus turanicus	103c	16.2c
Rhipicephalus sanguineus	44de	6.9de
Rhipicephalus bursa	22d	3.5d
Rhipicephalus annulatus	79f	12.4f
Haemaphysalis parva	10e	1.6e
Dermacentor marginatus	1g	0.2g
Total	637	100

The data shown with the same letters are at P <0.05 probability level, the difference between groups is not significant.

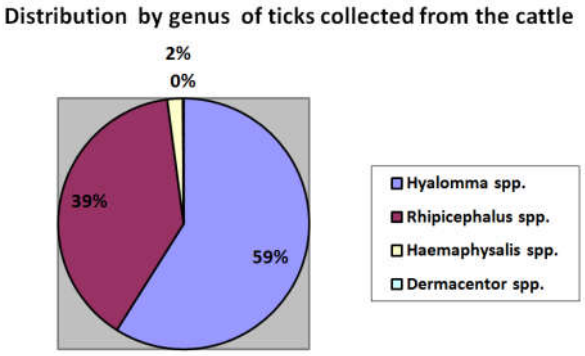


Figure 1. Distribution by genus of ticks collected from the cattle

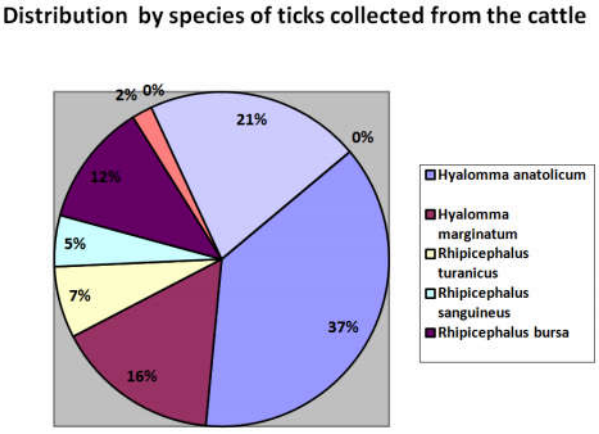
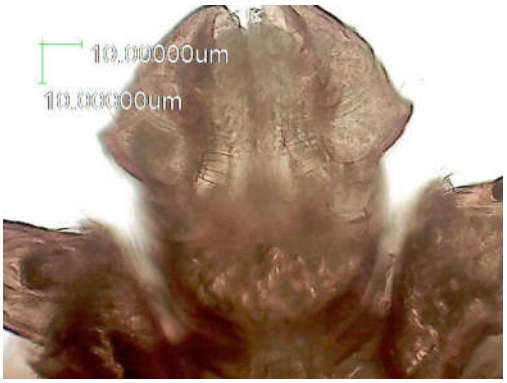


Figure 2. Distribution by species of the ticks collected from the cattle

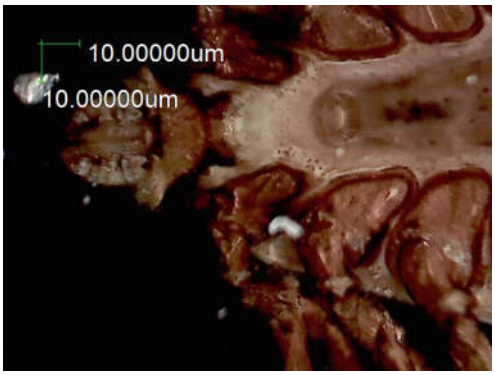
a. Rhipicephalus sanguineus

b. Rhipicephalus sanguineus



c. Haemaphysalis parva

d. Hyalomma marginatum



e. Rhipicephalus turanicus

Figure 3. Ventral view of ticks collected from the cattle

When the number of tick species was compared by groups, the difference between groups was found significant ($p<0.05$); when the measurements by groups were compared in pairs, the differences between *Rhipicephalus sanguineus* and *Rhipicephalus bursa,* and *Rhipicephalus sanguineus* and *Haemaphysalis parva* were found insignificant ($p>0,05$) while the difference between other groups was found significant ($p<0,05$).

DISCUSSION

After the First World War in Europe, it was understood that ticks were vectors for many protozoan, bacteria, rickettsia and viruses that are pathogen for humans and domestic animals, and the studies on ticks increased after this awareness. By now, more than 300 species of the ticks that are spread to anywhere in the World except the Polar Regions have been found. In Turkey, as the result of the studies conducted, 32 tick species from two families and 10 genus were identified. With the initial studies, species such as *Argas persicus, A. reflixus, Ornithodorus lahorensis, O. coniceps, Ixodes ricinus, Hyalomma marginatum, Rhipicephalus sanguineus, Haemaphysalis punctata* were found out to suck blood from humans (Merdivenci, 1969). With the following studies, subspecies of *H. anatolicum anatolicum* and *H. a. Excavatum* and *R. Bursa* were added to this list (Karaer *et al*., 1997). In another study, in which the infested cattle, sheep and goats were examined in Zara District located in the North-East of Sivas, some other species were found to be at a dominant ratio Mamak *et al*. (2006), identified mostly *Hae. Parva* among the cattle and *D. Marginatus* among the sheep. Climatic, geographical and vegetal differences and wildlife characteristics constitute these differences. Yukarı *et al*. (2002), collected 3280 ticks in total from the cattle, sheep and goats in 14 different settlement areas in Burdur region between September 1999 and August 2000, and reported that they found *D.marginatus, Hae. parva, R. turanicus, R. annulatus* and *H. marginatum* species among the cattle, and *D. marginatus, D. niveus, Hae. parva, R. turanicus, R. bursa, H.a. excavatum, I.ricinus, O. Lahorensis* species among the sheep. Yay *et al*. (2004), conducted a research on tick infestation in cattle and sheep in 16 different settlement units between January 2002 and November 2002. Within this research, 2064 ticks were collected in total, and when distributed by species the species found were *R. turanicus, R.sanguineus, R. bursa, H.a. anatolicum, H.a. excavatum, H.detritum, Hae. sulcata, Hae. parva, R.annulatus, D.marginatus, O. Lahorensis.* While Çakır *et al*. (2002), found *H.marginatum, R.bursa, B.catcaratus, I.ricinus, D.marginatus, D.niveus, R.sanguineus* in domestic animals, they found a different species, *H.aegyptium,* among turtles. In his book "Research on tick species in Turkey (1969)," Merdivenci reported that *R.annulatus, D. marginatus, Hae. inermis, Hae. punctata, Hae. sulcata, Hae. parva, Hae. concinus, H. anatolicum, H. detritim, H. aegyptium, H. marginatum, R. bursa, R. turanicus* and *O. Lahorensis* species existed in Sivas and Tokat Regions (Merdivenci, 1969). Today, no certain difference has been detected in species in the region, and depending on the seasonal characteristics and the blood-sucking periods of the species, the incidence percentage was detected to have differed and the population was detected to have increased.

Many tick species were determined to be active during the month of June. More amounts of ticks can exist on animals in damp regions and the diseases such as babesiosis and theilleriosis, for which ticks act as vectors, are more frequently encountered. However, tick infestation can be encountered in areas with low humidity and the diseases transmitted by these can be seen as well. In this study, in which we determined the tick species in our region by collecting the ticks from infested animals, we found out that the species identified in this study were not different from those identified in the studies conducted in other regions. However, we found out the incidences of *Hyalomma* to increase, as it had been reported by İça et al. previously, and we think that this forms an important risk particularly for Crimean-Congo Hemorrhagic Fever disease. The transmission risk of babesia species through many hard tick species is another important aspect of the situation. In a study conducted in Kayseri, which is a neighbor to Sivas, 866 cattle in 12 farms in Kayseri Region were

examined in order to detect the tick infestation in the cattle, and 188 (21,7%) of the cattle were found to be infested. 1585 ticks were collected in total, and of these, 2.27% were nymphs of *Rhipicephalus turanicus*, 2.14% were nymphs of *R. bursa*, 0.94% were nymphs of *R. sanguineus*, 17.16% were nymphs of *Hyalomma marginatum*, 24.73% were nymphs of *H.anatolicum excavatum*, 19.62% were nymphs of *H.a.anotolicum*, 1% was nymphs of *Dermacentor niveus*, 16.71% were nymphs of *Rhipicephalus annulatus*, 0.25% were nymphs of *Ornitodorus lahorensis*, 7.31% were nymphs of *Hyalomma spp*., and 7.82% were nymphs of *Rhipicephalus annulatus*. When the distribution by season is considered, *Rhipicephalus* species were encountered in the spring, *Hyalomma* species were encountered between the end of the spring and beginning of the autumn, *R.annulatus* species were encountered in September, October and November, *D.niveus* species were encountered in December, January, and February, *O.lahorensis* species were encountered in December. Immature forms of *Hyalomma* species were encountered more frequently in the summer and autumn, *R. Annulatus* species were encountered more frequently in October, November and December (İça *et al*., 2007; İça *et al*., 2007).

In our study, the ticks collected from the cattle raised in Sivas Region, and the ticks collected in 25 villages were examined under a stereomicroscope using keys. It was found out that of 637 ticks in total collected in the villages, 378 (59,4%) were ticks of *Hyalomma* genus, 248 (38,9%) were of *Rhipicephalus g*enus, 79 (12,4%) were of *Rhipicephalus* genus, 10 (1,5%) were of *Haemophysalis* genus, and 1 (0,2%) was of *Dermacentor* genus. When the results obtained in these two regions that are close to each other were compared, the percentage of *Hyalomma spp.* was 60,91% in Kayseri and 59,4% in Sivas while the percentage of *Rhipicephalus spp.* was 22,06% in Kayseri and 38,9% in Sivas. This can be due to the differences in the seasons when the ticks were collected. It is obvious that *Hyalomma spp.* population became dominant compared to other species. The existence of some differences in this region that is closer to the Black Sea Region is normal. However, *Hylomma spp.* was the third in the same study with 19,7% (Mamak, 2006). As a result, the importance of the ticks, particularly due to their being a vector, is obvious in terms of human and animal health. Therefore, the implementation of the appropriate methods of struggle against ticks, controlling the tick infestation that is common and, accordingly, reducing the viral and parasitic diseases should be able to be achieved.

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