

## Short Communication

# Species Diversity and Distribution of Ticks (Acari: Ixodidae) in Zabol County, Eastern Iran

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## Abstract

**Background:** Ticks are important vectors of human and animal pathogens. They are considered as main vectors for transmission of many viral, bacterial, rickettsial and parasitological pathogens. The aim of the present study was to find out species diversity of ticks, which infested the domestic ruminants in Zabol County, Eastern Iran in 2012.

**Methods:** Ticks were selected randomly from sheep, goats, cattle and camels. The ticks were collected from the body of infested animals and stored in 70% ethanol, then transported to the laboratory of Zabol University of Medical Sciences. Following examinations under stereomicroscope, ticks were identified using available taxonomic keys.

**Results:** In this study, a total number of 469 adult ticks (381 males and 88 females) were collected. Ticks were classified into 2 genera and 9 species including: *Hyalomma dromedarii* (17.3%), *Hy. schulzei* (1.8%), *Hy. marginatum* (0.5%), *Hy. anatolicum excavatum* (12.60%), *Hy. anatolicum anatolicum* (11.2%), *Hy. asiaticum asiaticum* (11.0%), *Rhipicephalus sanguineus* (21.2%), *Rh. bursa* (10.2%) and *Rh. turacunis* (13.911%). The frequency of genus *Hyalomma* (54.6%) was higher than *Rhipicephalus*. *Rh. sanguineus* was the predominant tick species and accounted for 21.26% of the ticks. The ratio of males was more than the female ticks.

**Conclusion:** *Hyalomma* and *Rhipicephalus* species are commonly distributed in the study area. Further investigations are needed to identify the role of above tick species as vectors of pathogenic organisms.

**Keywords:** Epidemiology, Ticks, *Hyalomma*, *Rhipicephalus*, Iran

## Introduction

Ticks are blood-sucking ectoparasites which transmit serious diseases to animals and humans. They are considered as main vectors for transmission of many viral, bacterial, rickettsial and parasitological pathogens (Garcia 2007). Several tick species are important in veterinary medicine as vectors of theileriosis, babesiosis and anaplasmosis. In addition, Lyme disease, ehrlichiosis, babesiosis, rocky mountain fever, Colorado tick fever, tularemia, Q fever, spotted fever, tick paralysis and tick encephalitis are the most common diseases which have been transmitted to human by ticks. They transmit diseases, produce paralysis, weight loss and cause economic damages to livestock (Wall 2001).

In view of the disease relationships of ticks, *Rhipicephalus* species are important vectors of ovine babesiosis and ovine ehrlichiosis. *Hyalomma anatolicum* transmits *Theileria lestoquardi*, *Th. annulata* and Crimean-Congo hemorrhagic fever virus (Jongejan and Uilenberg 1994, Chinikar et al. 2009).

Tick species are widely distributed around the world. The first record of *Hyalomma* in Iran was described by Delpy (1937). *Hyalomma anatolicum anatolicum*, *Hy. anatolicum excavatum*, *Hy. asiaticum asiaticum*, *Hy. detrium*, *Hy. aegyptium*, and *Hy. dromedarii* are commonly distributed in Iran (Rahbari et al. 2007).

Nasiri et al. (2010) reported the presence of *Hy. marginatum* (44.67%), *Hy. anatolicum* (43.17%), *Hy. asiaticum* (6.37%), *Hy. dromedarii* (5.55%) and *Heamaphysalis sulcata* (0.24%) species in Ilam.

Salimabadi et al. (2010) carried out a study in Yazd Province, and reported 7 species of ticks including: *Hy. dromedarii*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. detritum*, *Hy. asiaticum*, *Rh. Sanguineus* and *Dermacentor marginatus*. Numerous studies on the distribution of tick fauna in Iran have been conducted (Delpy 1936, Abbasian 1961, Mazlum 1971, Razmi et al. 2007, Rahbari 2007, Nabian et al. 2007, Telmadarraiy et al. 2009).

Rehman et al. (2004) reported different species of Ixodidae (hard ticks) in Rawalpindi and Islamabad, Pakistan. Five species of ticks, *He. sulcata* 74%, *Hy. anatolicum* 14%, *Hy. anatolicum anatolicum* 12%, *Hy. marginatum* 0.1% and *He. erinacei* 0.1% have already been found. The prevalence of *He. sulcata* and *Hy. anatolicum* was highly significant in this region.

This article was conducted to collect and identify the tick species prevalent in domestic animals in Zabol County.

## Materials and Methods

Sistan and Baluchestan is located in the Southeast of Iran and Zabol is in the North of this Province with hot and dry desert climate. Zabol lies on the border along with Afghanistan. The latitude and longitude GPS coordinates of Zabol (Iran) is: Lat: 31.0385, long: 61.4962.

This survey was carried out to investigate the prevalence of hard tick species (Acari: Ixodidae) on cattle in Zabol County during 2012. Sampling was done during the activating seasons of ticks (i.e. summer and spring). Veterinary staff provided us with the

latest information about infested flocks. The survey was conducted in some randomly selected villages.

The number of ticks was determined according to the Cochran formula:  $(n = \frac{z^2 pq}{d^2})$  where,  $n$ = sample size,  $Z$ = 1.96,  $P$ = 0.56 prevalence estimated,  $q$ =  $1-p$ ,  $d$ = 0.45. A total number of 469 hard ticks were collected from sheep, goats, cattle and camels. The ticks were collected from the body of infested animals and stored in 70% ethanol, then transported to the laboratory of Zabol University of Medical Sciences. Following examinations under stereomicroscope, ticks were identified using available taxonomic keys (Kaiser et al. 1963, Walker et al. 2007).

## Results

A total number of 469 adult ticks (381 males and 88 females) were collected from, sheep, goats, cattle, and camels. Ticks were classified into 2 genera and 9 species. Table 1 shows the frequency of different species of male ticks. *Rhipicephalus sanguineus* was the predominant tick species and accounted for 21.26% of the ticks. The frequency of genus *Hyalomma* (54.6%) was higher than *Rhipicephalus*. The ratio of males was more than the female ticks.

Table 2 shows the frequency of different tick species on various hosts. The maximum number of ticks was collected from sheep and goats 253(66.4%), followed by camels 73(19.16%) and cattle 55 (14.43%).

*Rhipicephalus* species were observed in sheep and goats. Moreover, *Hy. dromedarii*, *Hy. schulzei* and *Hy. marginatum* were commonly found on camels and rarely in cattle.

**Table 1.** Subspecies and numbers of male ticks collected in Zabol, during 2012 (Percentage of male ticks was calculated)

Species	Number	Percentage
<i>Hy. dromedarii</i>	66	17.32
<i>Hy. schulzei</i>	7	1.83
<i>Hy. marginatum</i>	2	0.525
<i>Hy. anaticum excavatum</i>	48	12.60
<i>Hy. anaticum anaticum</i>	43	11.28
<i>Hy. Asiaticum asiaticum</i>	42	11.02
<i>Rh. sanguineus</i>	81	21.26
<i>Rh. bursa</i>	39	10.23
<i>Rh. turacunis</i>	53	13.91

**Table 2.** The host of collected ticks in Zabol, during 2012

species	Host			
	Cow	Camel	Goat	Sheep
<i>Hy. dromedarii</i>	4	62	-	-
<i>Hy. schulzei</i>	-	7	-	-
<i>Hy. marginatum</i>	-	2	-	-
<i>Hy. anaticum excavatum</i>	17	2	23	6
<i>Hy. anaticum anaticum</i>	26	-	13	4
<i>Hy. asiaticum asiaticum</i>	8	-	27	7
<i>Rh. sanguineus</i>	-	-	42	39
<i>Rh. bursa</i>	-	-	19	20
<i>Rh. turacunis</i>	-	-	23	30
<b>Total</b>	55	73	147	106

## Discussion

This article reports a study conducted to collect and identify the tick species prevalent in domestic animals in Zabol, during year 2012. A total of 9 tick species was identified (Table 1).

*Hyalomma* and *Rhipicephalus* had the most prevalence in this area. The frequency of genus *Hyalomma* (54.6%) was higher than that of *Rhipicephalus*. *Rhipicephalus sanguineus* was the predominant tick species and explained 21.26% of the ticks. *Hyalomma dromedarii* was the second most common species.

A similar study was also reported from Meshkinshahr (a northwest area in Iran) in 2009 by Telmadarraiy, in which most of the ticks belonged to Genus *Rhipicephalus* and *Hyalomma* (Telmadarraiy et al. 2009).

*Rhipicephalus sanguineus* ticks are widely distributed around the world and one of the most common species in sheep herds in Northeast of Iran (Razmi et al. 2007).

In view of the importance of these species, *Hyalomma* ticks are widespread in North Africa, southern Europe, Middle East, Central Asia and China (Durrani et al. 2009), including the species that are vectors of various diseases in humans and domestic animals. *Hyalomma anaticum anaticum* is known as vectors of some pathogens as, *Th. lestoquardi*, *Th. annulata* and Crimean-Congo hemorrhagic fever virus (Jongejan and Uilenberg 1994). Different species of ticks play an important role for the transmission of Crimean-Congo hemorrhagic fever (CCHF) across the country. According to the

findings, geographical distribution of CCHF cases corresponds most closely with the distribution of *Hyalomma* ticks, although, some species of *Dermacentor* and *Rhipicephalus* genera have the ability of transmission (Chinikar et al. 2009).

In this study, a total number of 469 adult ticks (381 males and 88 females) were collected. The ratio of males was more than that of female ticks. The report of tick fauna in Iran provided by Rahbari et al. (2007) indicated that the number of ticks on each animal was low and male ticks were more than the females. Nasiri et al. (2010) collected ticks from sheep in Abdanan Township and showed that the frequency of male and female ticks was (77%) and (23%), respectively.

Several studies on the distribution of tick fauna have been reported. Salimabadi et al. (2010) reported 7 species of *Hy. dromedari*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. detritum*, *Hy. asiaticum*, *Rh. sanguineus* and *De. marginatus* in Yazd Province. A study in Ilam Province exhibited 5 species of *Hy. marginatum*, *Hy. anatolicum*, *Hy. asiaticum*, *Hy. dromedari* and *He. sulcata* (Nasiri et al. 2010). Rehman et al. (2004) reported different species of Ixodidae (hard ticks) in Rawalpindi and Islamabad of Pakistan. The prevalence of *He. sulcata* and *Hy. anatolicum* was highly significant in this region. In the above mentioned studies, the researchers reported the genus of *Dermacentor* and *Heamaphysalis* which were not found in our article.

As was found in this article, Camels are the most suitable host for *Hy. dromedarii*, *Hy. schulzei* and *Hy. marginatum*. Kaiser and Hoogstraal (1963) emphasized that *Hy. schulzei* is the common species in the Saravan area of Sistan and Baluchestan, Iran. Abbassian-lintzen (1960–1961) and Mazlum (1971) found that these ticks usually occur on camels. In Ethiopia, camels were infested with *Hy. dromedarii* (Zelege and Bekele 2004).

Nazifi et al. (2011) reported hard ticks infestation of one-humped camels in Qeshm Island. *Hyalomma dromedarii* was the predominant tick species. Other hard ticks were *Hy. anatolicum excavatum*, *Hy. asiaticum asiaticum*, *Hy. marginatum*, *Hy. impeltatum* and *Rh. bursa*.

Moreover, we found *Hy. asiaticum asiaticum* which infested cattle, sheep and goats. Abbasian-Lintzen (1961) described it as the single species in south-eastern Iran near the Pakistan borders, but Nabian et al. (2009) reported the presence of *Hy. asiaticum asiaticum* ticks in all four zoogeographical zones of Iran.

Our results showed that *Rhipicephalus* species were in sheep and goats and that *Rh. sanguineus* was the predominant tick species. In the present study most of samples were collected from sheep and goats because they are the dominant livestock of the surveyed area.

## Conclusion

As the incidence of the tick-borne disease increases and the geographic areas in which they are found is expanding, it becomes increasingly important to distinguish tick species, which is essential to promote tick and tick-borne disease control.

The results obtained from the present study serve as the starting point for future epidemiological studies and further investigations are needed to detect the vector role of ticks in this area.

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