

**Short communication****Hard Ticks on Domestic Ruminants and their Seasonal Population Dynamics in Yazd Province, Iran**

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**Abstract**

**Background:** Ticks are the main vectors for transmission of different pathogens to human and animals. This survey was performed to find out distribution of ticks, which infested the domestic ruminants in Yazd Province, central Iran during year 2008-2009.

**Methods:** A total number of 30 villages from both mountainous (20%) and plateau (80%) regions of the province were selected randomly. Ticks were collected from the body of infested animals and transported to the laboratory of Medical Entomology, School of Public Health, Tehran University of Medical Sciences and then were identified to space level using valid identification key.

**Results:** A total of 583 hard ticks were collected. The ticks were classified into three genera and 7 species including: *Hyalomma dromedarii* (55.92%), *Hy. marginatum* (13.20%), *Hy. anatolicum* (9.78%), *Hy. detritum* (4.98%), *Hy. asiaticum* (3.94%), *Rhipicephalus sanguineus* (11.84%), and *Dermacentor marginatus* (0.34%). The highest seasonal activities occurred in summer. The prevalence of the Ixodidae ticks was more evident in plateaus area in Yazd Province. Among the hosts including: cow, goat, sheep and camel, the ticks that collected from camel was more prevalent. The ratio of male was more than female ticks. *Hyalomma dromedarii* was the predominant tick species and accounted for 55.92% of the ticks.

**Conclusion:** Some of the collected ticks may play an important role for transmission of vector borne disease to human; therefore, the results of this study will provide a clue for vectors of tick-borne diseases in the region for local authorities for implementation of disease control.

**Keywords:** Ixodidae, Ticks, Iran

**Introduction**

There are several works on biology, distribution and systematics of hard and soft ticks in Iran. (Brumpt 1935, Deply 1936, 1938, Baltazard et al. 1952, Abbassian-Lintzen 1960, Maghami 1968, Mazlumi 1968, Janbakhsh and Ardalan 1970, Filopova et al. 1976, Robinson and Spradling 2006, Aghighi et al. 2007, Telmadarraiy et al. 2007). Ixodid ticks are parasitizing wild as well as domestic animals such as sheep and goat in Iran and maintaining natural foci of many hazardous diseases for human (Hoogstraal and Wassef

1979, Hoogstraal and Valdez 1980). Ecological aspects of various species of ticks encountering domestic animals in North West of Iran also reported (Rahbari 1995). The distribution of soft ticks, Argasidae, from human dwellings, poultries, and animal shelters in Hamadan Province was reported (Vatandoost et al. 2003). Fauna of hard and soft ticks (Families: Ixodidae and Argasidae) in West Azerbaijan Province highlighted (Telmadarraiy et al. 2004). There are also some reports on distribution of tick fauna in Iran (Nabian and Rahbari 2008, Rahbari et

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al. 2008). Seasonal activity of ticks and their importance in tick-borne infectious diseases in West Azerbaijan has been reported (Salari Lak et al. 2008). Different species of ticks play important role for transmission of the disease through the country. Tick-borne relapsing fever is an acute febrile and endemic disease in Iran. During 1997–2006, a total of 1415 cases have been reported from the entire country (Arshi et al. 2002, Masumi Asl et al. 2009). Crimean-Congo haemorrhagic fever (CCHF) is a viral haemorrhagic fever also considered as a public health problem in Iran. The virus is found in the cattle and ticks (Telmadarraiy et al. 2010).

The objective of this study was to determine the species and distribution of ticks infesting domestic ruminants in Yazd Province of Iran.

## Materials and methods

### Study area

Yazd is located in center of Iran. In the study area the total numbers of 30 villages were selected randomly and survey was conducted in these villages.

### Tick collection

Tick collections were carried out on domestic ruminants. Ticks were collected from

sheep, cow, goat, and camel. The collected specimens were transferred into the holding tubes and counted, then were identified by morphological characteristics using the key identification guide of Kaiser and Hoogstraal (1963).

## Results

A total of 583 ticks were collected from 30 villages. They were collected from, sheep, goat, cattle, and camel. All of the ticks belonged to the family Ixodidae. The identified tick specimens belonged to seven species, including three genera of *Hyalomma*, *Dermacentor* and *Rhipicephalus*. From which 82.84% comprise the *Hylaomma* species. *Hylaomma dromedarii* was the most abundant of the total ticks. Dynamic of population of tick revealed that they were more prevalent during summer and spring. The figure of density and activity of ticks in winter were low, i.e.; 12.69% of the total ticks collected (Table 1). The occurrence of hard ticks was more noticeable in plateau area (Table 2). Table 3 shows frequency of different hard ticks' species on various hosts. The camel was found the most appropriate host for ticks. The relative frequencies of sex of the tick were 57% male and 34% female.

**Table 1.** Numbers of hard ticks in different seasons collected in Yazd during 2008–2009

Species	Seasons				Total	percentage
	spring	summer	autumn	winter		
<i>Hy. dromedarii</i>	98	110	53	65	326	55.92
<i>Hy. marginatum</i>	31	36	8	2	77	13.20
<i>R. sanguineus</i>	59	10	0	0	69	11.84
<i>Hy. anatolicum</i>	6	41	7	3	57	9.78
<i>Hy. detritum</i>	0	10	19	0	29	4.98
<i>Hy. asiaticum</i>	8	6	5	4	23	3.94
<i>D. marginatus</i>	0	0	2	0	2	0.34
<b>Total</b>	202	213	94	74	583	100

**Table 2.** Topographical preference of hard ticks collected in Yazd, 2008–2009

Species	Mountain		Plateau	
	Number	Percentage	Number	Percentage
<i>Hy. dromedarii</i>	0	0	326	55.92
<i>Hy. marginatum</i>	1	0.17	76	13.03
<i>R. sanguineus</i>	0	0	69	11.84
<i>Hy. anatolicum</i>	1	0.17	56	9.61
<i>Hy. detritum</i>	0	0	29	4.98
<i>Hy. asiaticum</i>	0	0	23	3.94
<i>D. marginatus</i>	2	.34	0	0
<b>Total</b>	<b>4</b>	<b>0.68</b>	<b>579</b>	<b>99.32</b>

**Table 3.** The host of collected ticks in Yazd during 2008–2009

Species	Host			
	Cow	Camel	Sheep	Goat
<i>Hy. dromedarii</i>	17	306	3	0
<i>Hy. marginatum</i>	34	12	31	0
<i>R. sanguineus</i>	0	0	59	10
<i>Hy. anatolicum</i>	32	9	12	4
<i>Hy. detritum</i>	8	0	21	0
<i>Hy. asiaticum</i>	14	3	6	0
<i>D. marginatus</i>	0	0	0	2
<b>Total</b>	<b>105</b>	<b>330</b>	<b>132</b>	<b>16</b>

## Discussion

The findings of the current study show the occurrence of seven species of hard ticks in Yazd Province. The population frequencies of the species of genus *Hyalomma* were higher than the others. *Hyalomma dromedarii* was the most frequent species. The host preference of main hard ticks was camel, sheep, cow, and goat, respectively. Sex ratio of ticks were 57% male and remaining female. The occurrence of hard ticks was more noticeable in plateaus and this attributed the geographical condition of Yazd Province which is located in the plateau. The hard ticks were more prevalent during summer and spring respectively. In parallel to our study, results of tick fauna in Lorestan Province revealed that genera *Hyalomma*,

was active during the summer (Tavakoli 1997). Study in West Azerbaijan Province exhibited seven species of hard ticks of *Rh. bursa*, *Hy. aegyptium*, *Hy. schulzei*, *Boophilus annulatus*, *D. niveus*, *Haemaphysalis. sulcata*, *H. inermis* (Telmadarraiy et al. 2004) which were not found in our study. Seven species of ticks including *Hy. marginatum*, *Hy. detritum detritum*, *Hy. anatolicum anatolicum*, *Rh. bursa*, *H. sulcata*, *D. marginatus* and *B. annulatus* have been reported from East Azerbaijan (Piazak 1991). Nabian et al (2007) emphasized that *Hy. marginatum* occurred as a dominant tick in the north of Iran, they described thirteen hard tick species of *Hy. anatolicum anatolicum*, *Hy. marginatum*, *Hy. detritum*, *H. punctata*, *H. parva*, *H. concinna*, *H. choldokovsky*, *Ixodes ricinus*, *Rh. sanguineus*, *Rh. bursa*, *B. annulatus*, *D. niveus*, and *D. marginatus*. Result of the study in West Azerbaijan revealed occurrence of several species of ticks including *H. inermis*, *H. punctata*, *H. sulcata*, *H. numidiana*, *H. concinna*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. detritum*, *Hy. dromedarii*, *Hy. asiaticum*, *Hy. schulzei*, *H. aegyptium*, *Rh. bursa*, *Rh. sanguineus*, *D. marginatus*, *B. annulatus*, *Ornithodoros lahorensis*, and *Argas persicus*. Frequency of ticks during different seasons was different (Salari Lak et al. 2008). Results of Meshkinshahr district reported the most frequency of the genera *Hyalomma* and

*Rhipicephalus*, the seasonal activity of ticks was in spring and summer (Telmadarraiy et al. 2009). Ticks collected from sheep in Abadan Township also confirm the high prevalence of genus *Hyalomma* (Nasiri et al. 2009). In Ethiopia, camel were infested with *Hy. dromedarii* (Zelege and Bekele 2004). Nabian et al. (2009) found seven *Hyalomma* species on goat, sheep, cattle and camels in different zoogeographical zones of Iran including: *Hy. anatolicum*, *Hy. excavatum*, *Hy. asiaticum*, *Hy. marginatum*, *Hy. detritum*, *H. schulzei* and *Hy. dromedarii*.

The geographical distribution and ecological preferences of *Haemaphysalis* in domestic animals in Iran were studied (Rahbari et al. 2007). They found seven species of *Haemaphysalis* on cattle, sheep and goats.

Based on our findings, it is concluded that *Hy. dromedarii* and *Hy. marginatum* are dominant ticks species in this area and camel was the most suitable host.

The species of *Hy. dromedarii* distributed from North Africa to the south as far as Senegal, Mali, Chad, Sudan, and Kenya; Canary Islands. Turkey (eastern), Palestine, Syria, Iraq, Saudi Arabia, Yemen, Oman, Armenia, Azerbaijan, Iran, Afghanistan, Pakistan, Kirghizia (Fergana Valley), Uzbekistan, Turkmenistan, Tajikistan, India, and China (Xingjian) (Hoogstraal 1956). Adults parasitize livestock, preferring camels. Life cycle of this tick can be one-host, two-host, or three-host. Immature ticks feed on small or large mammals, dependant upon life-cycle.

The distribution of *Hy. marginatum* contains Morocco, Algeria, Tunisia, north-western Libya; Portugal, Spain, France (extreme southern), Italy, former Yugoslavia (Bosnia, Herzegovina, Croatia, Macedonia, Montenegro, and Serbia), Albania, Greece, Cyprus, Bulgaria, Romania, Moldova, Ukraine, and Russia to the north as far as Rostov and Volgograd Oblasts; Turkey, Syria, Palestine, Egypt (Sinai), Iraq,

Iran, Georgia, Armenia, Azerbaijan, Kazakhstan, Turkmenistan, Kirghizia, Uzbekistan, Tajikistan, Afghanistan, Pakistan, India, and China. Principal hosts of adults are all kinds of livestock. Immature ticks feed on birds, hares, and hedgehogs. Life cycle is two-host.

In conclusion, *Hyalomma* genus that is the principal vector of Crimean-Congo Hemorrhagic Fever (CCHF) in the world, was found as the highest genus in Yazd Province, and prevention measures should be considered to reduce its population in order to prevent CCHF epidemics.

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