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# A STUDY OF TICK FAUNA IN TANDOUREH NATIONAL PARK, KHORASAN RAZAVI PROVINCE, IRAN

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ABSTRACT: A survey was conducted out to investigate the species composition and abundance of hard ticks in Tandoureh National Park, Iran. A total of 537 ticks were collected by drag-sampling the vegetation in different regions of the park during the seasons of tick activity from 2007 to 2009. Six species were identified, namely *Dermacentor niveus* (47.2%), *Rhipicephalus turanicus* (32.9%), *Dermacentor raskemensis* (8.6%), *Hyalomma turanicum* (5.6%), *Haemaphysalis sulcata* (3%) and *Hyalomma aegyptium* (2.6%). Based on our results *D. niveus* and *R. turanicus* were the predominant species collected by dragging in this area. Maximum adult activity was observed from May to June and the least number of ticks were collected in September. Ticks were significantly more numerous on the hillsides where moisture levels were relatively higher. More studies need to be done on ticks, especially on such dominant in Tandoureh National Park species as *D. niveus* and *R. turanicus*, in order to understand their possible role in transmission of various pathogens.

KEY WORDS: ixodid ticks, Tandoureh National Park, Iran

## INTRODUCTION

Ticks and tick-borne disease agents have co-evolved with various wild animal hosts and often live in a state of equilibrium with them. Wild animals serve as reservoir hosts for ticks and tick-borne pathogens of livestock, pets and humans. Tick-borne diseases have only become problems of domestic livestock when wild hosts and their ticks have come into contact with them (Jongejan and Uilenberg 2004). There are many national parks and protected regions in Iran devoted to conserving and replenishing wild animal populations. These areas are appropriate habitats for ticks as well. No domestic livestock are allowed in the national parks, but wild sheep and goats are free to leave the park confines and graze with domestic animals. These movements and the proximity of the grazing ranges of wild sheep, goats and other wild and domestic vertebrates permit the interchange of tick parasites that may be infected by a variety of viruses, rickettsiae, bacteria, piroplasms dangerous to domestic animals and humans (Hoogstraal and Valdez 1980). In order to control the ticks and tick-borne diseases effectively, it is important to know the geographical distribution and prevalence of various tick species which may potentially be involved in transmission of pathogens. Several studies have been done on the tick fauna of domestic animals in Iran (Abbassian-Lintzen 1961; Mazlum 1971; Rahbari et al. 2007b; Nabian and Rhabari 2008a), but little information is available on the species composition of ixodid ticks on wild animals. The aim of this study was to determine the species composition and prevalence of free-living questing ticks in Tandoureh National Park.

## MATERIALS AND METHODS

### Study area

Tandoureh National Park (37.19 N to 37.33 N; 58.33 E to 58.54 E), encompassing an area of approximately 4448 ha, is located 30 kilometers southwest of the Daregaz region in Khorasan Razavi province and close to the Turkmenistan border. This park has significant heights, deep valley's and have mountainous climate. There are rare species of animals and plants in this park thus making it one of the most important wildlife areas nationally and internationally. Some of the important wild hosts for adult ticks in the park are wild sheep and goats, leopards, wild cats, wolves, jackals, foxes, rabbits and wild boars.

Most rain falls in winter and spring, comprising between 72% and 76% of all the annual rainfall. Fluctuations in annual temperature are large. Mean annual temperature is about 14.3°C, and warmest month of the year is July with a mean temperature of about 34.1°C and the coldest month January with a mean temperature of about 2.7°C (Aghamiri et al. 2006).

### Tick sampling

Ticks were collected in different parts of the park by dragging a 1 × 2 m white fabric over the vegetation during spring and summer from 2007–2009. The ticks that were collected at each locality were stored separately in vials containing 70% ethanol, and labeled with the date and the name of the geographic locality. Adult ticks were identified under a stereo-microscope, according to general identification keys (Hoogstraal 1956; Arthur 1960; Estrada-Peña and Estrada-Peña 1991; Estrada-Peña et al. 2004; Walker et al. 2003).

Table. 1. The prevalence of tick species in Tandoreh National Park, Daragaz area, Khorasan Razavi province of Iran

| Tick species | No. Male | No. Female | Total | % |
|---|---|---|---|---|
| *Dermacentor niveus* | 117 | 134 | 251 | 47.1 |
| *Dermacentor raskemensis* | 21 | 25 | 46 | 8.6 |
| *Rhipicephalus turanicus* | 129 | 46 | 175 | 37 |
| *Hyalomma m. turanicum* | 12 | 18 | 30 | 5.6 |
| *Hyalomma aegyptium* | 10 | 4 | 14 | 2.6 |
| *Haemaphysalis sulcata* | 6 | 10 | 16 | 3 |
| Total | 295 | 237 | 532 | 100 |

Table 2. Seasonal frequency of tick infestation during seasonal activity in Tandoreh National Park, Daragaz area, Khorasan Razavi province of Iran

| Month | No. Tick | % |
|---|---|---|
| April | 39 | 7.3 |
| March | 146 | 27 |
| June | 148 | 28 |
| July | 116 | 22 |
| August | 70 | 13 |
| September | 13 | 2.4 |
| Total | 532 | 100 |

## RESULTS

A total of 537 ixodid ticks were collected from different parts of the park, and six species were identified (Table 1). The most frequently collected and abundant tick species in Tandoureh National Park were *Dermacentor niveus* and *Rhipicephalus turanicus* (Table 1). Most ticks were collected in March (27%) and June (28%), and least in August (13%) and September (2.4%) (Table 2). The tick numbers were also significantly higher on hillsides where moisture levels were relatively higher.

## DISCUSSION

In this study *D. niveus* was the most frequently collected tick. This species is distributed in semi-desert and steppe zones from the eastern Mediterranean area to southern Russia, Iran and Afghanistan. Adults parasitize various domestic herbivores, including camels, and wild animals such as sheep, goats, deer, pigs and wolves. Its immature stages feed on rodents, hedgehogs and hares (Hoogstraal and Valdez 1980; Filippova et al. 1983). *Dermacentor niveus* has previously been reported from domestic sheep and goats (Nabian et al. 2008b), *Meriones persicus* (Filippova et al. 1976) and wild sheep and goats (Hoogstraal and Valdez 1980) in Iran. The ecological environment of Tandoureh National Park is apparently favorable for this species. Since *D. niveus* is a known vector of the virus responsible for Crimean-Congo hemorrhagic fever (Yashina et al. 2003) it is important that this species should be thoroughly studied in this region.

*Dermacentor raskemensis* was the second species of this genus collected in the park, but in considerably lower numbers. It is found in steppe, forest and mountainous environmental regions (Filippova 1983), and has been recorded from wild and domestic sheep and goats, foxes and humans in Iran (Hoogstraal and Valdez 1980). *D. raskemensis* has been reported from domestic animals in Khorasan Razavi Province, where it also was considerably less abundant than *D. niveus* (Nabian *et al*. 2008b).

Large numbers of *Rhipicephalus turanicus* were also collected in the present study. This tick is widely distributed in the savanna, steppe, desert and Mediterranean climatic regions of southern Europe, northern Africa and Asia. Many species of domestic and wild animals are hosts for this tick, with large infestations being encountered on sheep (Estrada-Peña et al. 2004). A high incidence of infestation with *R. turanicus* has been reported on sheep in the mountainous area of Khorasan province, Iran (Rahbari et al. 2007b, 2008). Shared pasture between domestic sheep and wild animals

can lead to an exchange of *R. turanicus* between these animals in this area.

*Haemaphysalis sulcata, Hyalomma turanicum* and *Hyalomma aegyptium* were infrequently collected by dragging in the park. *Haemaphysalis sulcata* is widely distributed in arid regions of Asia, North Africa and Southern Europe (Estrada- Peña et al. 2004), and sheep are the most common hosts for the adult ticks. *Haemaphysalis sulcata* has previously been collected in small numbers from sheep in southern and northeastern Iran (Rahbari et al. 2007a). Infestation of wild sheep by this species has been recorded in Tandoureh National Park before (Hoogstraal and Valdez 1980).

*Hyalomma turanicum* is a tick species preferring arid ecozones in Arabia, Middle East and Central Asia (Apanaskevich and Horak 2008). Adult ticks feed on cattle, sheep, horses and wild ungulates. *Hyalomma turanicum* has been recorded as one of the most abundant tick species on sheep and goats in Khorasan Province (Razmi et al. 2003, 2004).

*Hyalomma aegyptium* occurs in the Mediterranean region and the Middle East eastward to Central Asia, Afghanistan and Pakistan (Apanaskevich 2003). Adults of *H. aegyptium* have principally been collected from land tortoises (Hoogstraal and Kaiser 1960; Petney and Al-Yaman 1985; Robbins et al. 1998; Leontyeva and Kolonin 2002; Široky et al. 2006). In Iran the adults of *H. aegyptium* have also been reported from tortoises, *Testudo graeca* (Nabian and Mirsalimi 2002; Tavassoli et al. 2007).

In the locality at which the present study was conducted ticks were more abundant on the vegetation sampled by dragging from March to July and least abundant in September**.** In Tandoureh National Park most rain falls in spring (Aghamiri et al. 2006) and favorable conditions, such as high moisture level, warm temperatures (25–27°C) and intensive growth of vegetation induce questing activity of many species of ticks. In the dry months of summer a marked decrease in free-questing ticks was observed, probably because of low relative humidity and high day temperatures. Based on the results obtained, *D. niveus* and *R. turanicus* are the dominant tick species collected by drag-sampling in Tandoureh National Park and more studies on the role of these species in the transmission of pathogens should be done.

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