

Original Article

Occurrence of Soft and Hard Ticks on Ruminants in Zagros Mountainous Areas of Iran

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ABSTRACT

Background: The distribution and preferences of ticks of animals in central of Iran were studied four times a year.

Methods: One thousand seven tick specimens were collected from different localities including Isfahan, Chaharmahalbakhtiary, EastAzarbaijan, West Azerbaijan, Kordestan, Kermanshah, Lorestan and Fars.

Results: Most of sampled animals in this area were infested. We also encountered with a wild goat (*Capra hircus aegagrus*) in Kolah Qazi national park in this part that was infested intensively by *Boophilus kohlsi*. Fifteen ixodid tick species were identified over the study period from cattle, sheep and domestic and wild goats namely *B. kohlsi* (3.6%) *Rhipicephalus sanguineus* (4.5%), *Rh.bursa* (21.9%), *Rh.turanicus* (2.9%), *Dermacentor niveus* (12.9%), *D.raskemensis* (4.1%), *D.marginatus* (7.3%), *Haemaphysalis punctata* (3.5%), *H. Parva* (0.6%), *H. Choldokovskyi* (2%), *Hyalomma anatolicum excavatum* (4.8%), *H.anatolicum anatolicum* (5.2%), *H. asiaticum asiaticum* (7.3%), *H. marginatum marginatum* (13%), and *H. detritum detritum* (5.9%). The only soft tick found was *Ornithodoros canestrinii* which occurred in all localities of Isfahan Province but with significant differences in abundance. Clear pattern of seasonality was evident for this species and it was generally present from November to March, while ixodid ticks were present throughout the year. The largest numbers of adult ixodid ticks were generally present from April to August.

Conclusion: The results showed that *Rh.bursa*, *D.niveus* and *H.marginatum marginatum* are dominant tick species.

Keyword: Tick, Ruminant, Iran

Introduction

The tick studies started by Delpy (1936, 1938) in Iran. Abbasian(1960, 1961) and Mazlum (1968, 1971) described a list of adult ticks collected from domestic animals. Filipova et al. (1976) presented data for 642 ixodid tick specimens taken from small size mammals, chiefly rodents in different zoogeographical zones of Iran. Hoogstraal (1979, 1980) studied ixodid ticks parasitizing wild sheep and goat in Iran with focusing on maintaining natural foci of many hazardous diseases for human. Rahbari (1995) published ecological aspects of

various species of ticks encountering domestic animals in North West of Iran. Razmi (2002) published a list of tick species of domestic animals in North East of Iran. The Zagros Mountains are Iran's second largest mountain range. They have a length of 1500 kilometres from western Iran to the southern parts of the Persian Gulf. The rolling hills around the mountain range are main summer pastures for animals.

It seems that it is a gap of study in the recent years in these areas. Therefore, the objective of this study was to determine the species and distribution of ticks infesting ruminants in Zagros mountainous areas.

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Materials and Methods

This study was conducted in seasonal activity of ticks from eight provinces of Zagros mountainous areas consisting of Isfahan, Chaharmahalbakhtiary, East Azerbaijan, West Azerbaijan, Kurdistan, Kermanshah, Lorestan and Fars. Tick sampling was performed on the whole body of 259 cattle, 334 sheep, 110 goats, and one 6 yr old dead wild goat (*Capra hircus aegagrus*) located in Kolah Qazi national park in Isfahan province.

The collected specimens were counted and preserved in 70% alcohol in glass vial and brought to laboratory for further studies. Determination was done using a stereo-microscope (Zeiss) according to the identification keys (Delpy 1938, Hoogstraal & Kaiser 1959, Kaiser & Hoogstraal 1963, 1964, Walker et al. 2003, Eastrada et al. 2004, Apanaskevich & Horak 2005).

Results

In this study 1007 ticks specimens were collected from 704 animals thus mean intensity for each animal was 1.43. Most of ticks were found on the host during the hot and humid months, but a few collections revealed on autumn and winter months.

A total of 15 species of ixodid ticks were specified. *Rh. bursa* was observed as the most abundant tick (21.9%), whereas *Rh. sanguineus* (4.5%) and *Rh. turanicus* (2.9%) were rare species and the only species from genus *Boophilus* was *B.kohlsi* (3.6%). Important descriptions of tick infested wild goat strongly supported that the tick species in this collection was only *B. kohlsi*.

The most diversity of tick species determined within the genus *Hyalomma* with four species; *H. marginatum marginatum* was found as a common fauna in this place (13%). The infestation to *H. asi. asiaticum*, *H. detritum detritum*, *H.ana anatolicum* and

H.ana. excavatum were 7.3, 5.9, 5.2 and 4.8%, respectively.

Three species of *Haemaphysalis* was recorded, the infestation rate of *H.punctata*, *H. parva* and *H. Choldokovskyi* were 3.5, 0.6 and 2 % respectively. *D. niveus* (12.9%), *D. marginatus* (7.3%) and *D. raskemensis* (4.1%) were identified.

The only soft tick found was *Ornithodoros canestrinii* which occurred at all localities but with significant differences in abundance, clear pattern of seasonality was evident for this species and it was generally present from November to March, while ixodid ticks were present throughout the year. The largest numbers of adult ixodid ticks were generally present from April to August.

Discussion

Mazlum (1971) previously reported all species recorded in this study except *B. kohlsi* and *Rh. turanicus*, Rahbari et al. (2007) reported *B. kohlsi* as a new record for Iran. Aeschliman and Morel (1965) have described the morphological characteristic of this species. This tick is restricted to sheep and goats and occasionally horses and is reported from Syria, Iraq, Israel, Jordan (Hoogstraal, and Kaiser 1960, Shamsuddin and Mohammad 1988), Western Saudi Arabia (Hussein et al. 1988). It is also endemic to West Africa (Walker et al. 2003). Wild goats inhabit throughout Iran except in forest and other tall vegetation, although open rangeland has been grazed occasionally by wild and domestic animals but in this survey, we could not find any specimens of *B kohlsi* in domestic animals although the restricted home range of *Ibex implies* that they could serve as a source of tick infestation for other animals within the same habitat.

H. choldokovskyi was found in sheep pastured in surrounding area of these localities in low number, Nabian and Rahbari (2007)

demonstrated it from some part of Caspian Sea, but Delpy (1938) concluded that it was distributed in high altitude territories.

H. parva is a rare species in this part, but it was also reported from Caspian Sea area and semi desert zones; the immature stages are frequently found on small rodents such as social vole. The adults are frequently found on sheep and goat, carnivora are also host of adult. Hoogstraal et al. (1980) previously identified it from wild sheep and he believed that the range of this species extends to Italy and also some parts of Libya. This tick has been known to transmit *Theileria sergenti*, and Crimean-Congo hemorrhagic fever virus.

H. punctata was recorded throughout rocky mountain slopes of Zagros mountainous areas, though, Mazlum believed that it has been expanded its range in the most of provinces in Iran. Estrada et al. (2004) recorded that the larvae of this tick feed on small animals such as great gerbil, the nymphs also feed on small mammals and birds. It is well known vector for *Babesia motasi* and *B. major*, it has also been demonstrated to carry *Rickettsia siberica* and to cause tick paralysis.

H. anatolicum anatolicum was recorded over widely scattered throughout Iran. It is a vector of causative organism of tropical theileriosis and it transmits a variety of pathogenic organism such as *Theileria lestoquardi*, *Th. equi*, *B. cabali*, *Trypanosoma theileri* and Crimean- Congo haemorrhagic fever virus (Walker et al. 2003). We found that *H. ana. excavatum* is adapted to a variety of climatic conditions and was often less commonly found on livestock than *H. ana. anatolicum*. Walker et al. (2003) described its distribution from the Mediterranean, steppe climatic regions of North Africa to steppe climatic regions elsewhere in its wide range including Iran and Turkmenistan.

H. asiaticum was found in all localities of this area. Abbasian (1961) described it as a species from south-eastern Iran near

the Pakistan borders. The adults parasitize camels and other domestic herbivores and also wild goats and sheep, and gazelles in semi desert and desert environments (Hoogstraal 1980).

The distribution of *H. marginatum marginatum* extended in all rolling hills of these areas with highest percentage in tick population, more or less similar pattern was observed by Mazlum (1971). But Hoogstraal et al. (1988) described *H. detritum detritum* as a tick fauna ranges from southern Europe to the Caspian, with outlying pockets in the mountains of Golestan National Park in northern part of Iran. Walker (2003), assumed that adults of this two-host tick infest cattle, horse, sheep, goats and camels. The immature stages feed on small mammals such as hares and rabbits and occur in the areas with Mediterranean climate of many widespread areas through to central Asia.

According to the study of Mazlum (1971) who emphasized that *Rh. bursa* occurred as a dominant tick in most sheep areas, we also found *Rh. bursa* as the major species in these areas. *Rh. sanguinus* population was low. Our observations demonstrated that most of sampled animals in central areas were infested with *D. niveus* and *D. marginatus*. Mazlum (1971) previously determined and reported them in most mountainous areas. *Anaplasma phagocytophilia* and *Borrelia burgdorferi* recently isolated from *D. marginatus* and there is no important report of its implications of tick borne disease in sheep and goat.

Based on the results it is concluded that *Rh. bursa*, *H. marginatum* and *D. niveus* are dominant tick species in this area and should be noted for their ability in transmission of infectious agents.

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