

Ticks fauna of sheep and goats in some suburbs of Mazandaran province, Iran

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Abstract:

BACKGROUND: Ticks are obligatory blood sucking arthropods that can transmit important pathogens. **OBJECTIVES:** The distribution and diversity of ticks fauna were last studied in the north of Iran in 2007. Mazandaran province has a humid climate, which is favourable to animal husbandry such as sheep breeding. Due to humid climate, the likelihood of exposure to tick infestation is increasing. The aim of this study was to determine the ticks fauna of sheep and goats that grazed on the outskirts of Mazandaran in 2012. **METHODS:** During the first 7 months of 2012, a total of 1190 tick specimens were collected from the whole body of sheep and goats from 23 different points of Mazandaran province. Adult male ticks were identified under a stereomicroscope, according to the identification keys. **RESULTS:** The identified tick specimens belonged to six Genus and 11 species, including *Rhipicephalus turanicus* (47%), *Rhipicephalus bursa* (24.6%), *Haemaphysalis punctata* (17.16%), *Rhipicephalus sanguineus* (4%), *Haemaphysalis concina* (3%), *Haemaphysalis parva* (1%), *Hyalomma marginatum* (1%), *Hyalomma anatolicum* (0.6%), *Dermacentor marginatus* (0.6%), *Ixodes ricinus* (0.5%), and *Boophilus (Rhipicephalus) annulatus* (0.3%). *Rh. turanicus* was the most abundant tick. **CONCLUSIONS:** Due to climate change, regular monitoring of distribution patterns of ticks is an important concern to control the ticks and tick-borne diseases.

Introduction

Ticks are serious threat to the health of animals and human beings. They are haematophagous arthropods that can cause paralysis, anemia, skin irritation, and pathogen transmission. Important pathogens such as CCHF virus, *Anaplasma* spp, *Ehrlichia* spp, *Babesia* spp, and *Theileria* spp could be transmitted by various species of ticks.

The distribution of ticks in Iran were studied by Delpy (1936, 1938), Abbasian (1961), Mazlum (1968, 1971), Filippova (1976), Rahbari (1995, 2007 a, b), Razmi (2007, 2011), Nabian (2007, 2008a,b), and Telmadarraiy (2004).

Mazandaran province has a humid climate, which is favourable to animal husbandry such as sheep

breeding. Due to humid climate, the likelihood of exposure to tick infestation is increasing.

The influence of moisture and temperature on the diversity of ticks is well known. Since weather condition changes for years in Iran, regular monitoring of distribution patterns of ticks is an important concern to control the ticks and tick-borne diseases (Rahbari et al., 2007a,b). The aim of this study was to determine ticks fauna of sheep and goats that grazed on the outskirts of Mazandaran.

Materials and Methods

The area of study was Mazandaran province, which is located in the north of Iran. The province had an average temperature of 25°C in summer and about

9°C in winter, and the annual rainfall averages 615 mm in the eastern part of Mazandaran province and more than 886 mm in the western part in last year (2012). According to Iran Veterinary Organization, 2,023,260 sheep and 217,260 goats have been reported in 2011.

During the first 7 months of 2012, a total of 1351 animals (sheep and goats) from 23 different points of Mazandaran province were inspected. The tick samples were collected from the whole body of infested sheep and goats in some suburbs of Mazandaran province including 8 points from Ghaemshahr, 6 points from Sari, 2 points from Babol, 2 points from Mahmoodabad, 5 points from Savadkooh. In this study, Kou estakhr is the most mountainous area that is located in savadkooh with 1770 m above the sea level and Gol neshin is the low-laying area that is located near Sari. The height of other location is placed between 2 these points. Tick samples were counted and separately preserved in 70% ethanol. Adult male ticks were identified under a stereomicroscope, according to the identification keys (Mazlum, 1968, 1971; Walker et al., 2003; Estrada-Pena et al., 2004).

Results

In the present study, 321 (23.76%) out of the total 1351 inspected sheep and goats were infested with ticks. A total of 1190 ticks (590 female and 600 male) were collected from 321 animals (273 sheep and 48 goats). The occurrence of ticks on sheep and goats were 26% and 15.7%, respectively. Many inspected sheep and goats were free of ticks due to indiscriminate use of Ivermectin. Six genera including *Rhipicephalus*, *Haemaphysalis*, *Hyalomma*, *Dermacentor*, and *Ixodes* were determined in this study. The identified tick specimens belonged to six Genus and 11 species, including *Rhipicephalus turanicus* (47%), *Rhipicephalus bursa* (24.6%), *Haemaphysalis punctata* (17.16%), *Rhipicephalus sanguineus* (4%), *Haemaphysalis concina* (3%), *Haemaphysalis parva* (1%), *Hyalomma marginatum* (1%), *Hyalomma anatolicum* (0.6%), *Dermacentor marginatus* (0.6%), *Ixodes ricinus* (0.5%), and *Boophilus (Rhipicephalus) annulatus* (0.3%). *Rh. turanicus* was the most abundant of the studied ticks (Table1).

Table 1. Frequency of Tick species on the studied region.

Tick Species	No	%	Region
<i>Rh. turanicus</i>	282	47%	Ghaemshahr, Sari, Babol, Mahmoodabad, Savadkooh
<i>Rh. bursa</i>	148	24.6%	Ghaemshahr, Sari, Savadkooh
<i>Haem. punctata</i>	103	17.16%	Savadkooh
<i>Rh. sanguineus</i>	24	4%	Ghaemshahr, Sari, Savadkooh
<i>Haem. concina</i>	18	3%	Savadkooh
<i>Haem. parva</i>	6	1%	Savadkooh
<i>Hy. marginatum</i>	6	1%	Savadkooh
<i>Hy. anatolicum</i>	4	0.6%	Sari
<i>D. marginatus</i>	4	0.6%	Savadkooh
<i>I. ricinus</i>	3	0.5%	Savadkooh
<i>B. annulatus</i>	2	0.3%	Savadkooh
Total	600	100%	

Discussion

The north of Iran is in a favorable climate condition to sustain tick in the nature. The influence of weather condition on the distribution and abundance of tick species is well known. Therefore, climate change can cause diversity in tick species in a geographical area (Rahbari et al., 2007a).

Global warming will affect climate condition in Iran, and new ticks species and tick-borne diseases will be spread to Iran.

Rh. turanicus (47%) was the most abundant of the total ticks in the present study. Razmi et al. (2011) reported that *Rh. turanicus* had the highest frequency in northern and southern parts of Khorasan Razavi province. Nabian and Rahbari (2008) identified *Rh. turanicus* as a rare species in Zagros mountainous area. In Africa, *Rh. turanicus* is present at altitudes ranging from just above sea level to over 2000 m and in regions with annual rainfalls ranging from 100 mm to 1000 mm (Walker et al., 2000). In this study, *Rh. turanicus* was identified in low-laying area from the sea level (like Gol Neshin in Sari) and land with 1770 m above the sea level (kou estakhr). *Rh. turanicus* has been identified as a vector of *Babesia ovis* to the susceptible hosts (Shayan et al., 2007).

Nabian et al. (2007) found *Rh. Sanguineous* (42.37%) as the most prevalent species in Mazandaran province. Hosseini et al. (2010) reported *Rh. Sanguineous* (82.4%) as the most abundant species in Ghaemshahr suburbs. Shayeghi et al. (2005) recorded that *Rh. Sanguineous* (1.8%) had a

low number in Mazandaran province (1.18%) in 2002-2003.

The frequency of *Rh. sanguineus* (4%) was low in the present study. This finding is in contrast with the results of Nabian et al. (2007) and Hosseini et al. (2010) and is in line with the finding of Shayeghi et al. (2005). The preferred host for *Rh. sanguineus* is the domesticated dog (Walker et al., 2000). The agent of canine tick fever, *Babesia* spp. in dogs and *Ehrlichia canis* can be transmitted by this tick.

In contrast with the study of Nabian et al. (2007) and Shayeghi et al. (2005) who did not find *Rh. bursa*, this species was observed as the second numerous species (24.66%) in the present study. Hosseini et al. (2010) found this species in a very small number in Ghaemshahr. Mazlum believed that *Rh. bursa* is a dominant tick in most sheep area (Mazlum, 1968, 1971).

Rh. bursa prefers low to medium altitude mountain slopes and is present in steppe and semi-desert environments. However, in the present study *Rh. bursa* was found in land with 1770 m above the sea level (kou estakhr). *R. bursa* can transmit *B. bigemina*, *B. bovis*, *Anaplasma marginalae* to cattle, *B. equi*, *B. caballi* to horses, *B. motasi*, *B. ovis*, *A. ovis* to sheep. CCHF virus was isolated from this tick (Walker et al., 2000).

Haem. punctata (17.16%) was found as the third prevalent species in Mazandaran's countryside. Nabian et al. (2007) recorded this species in a large number (37.28%) in Mazandaran province. Hosseini et al. (2010) found this species in a very small number in Ghaemshahr. Shayeghi et al. (2005) did not find this species in Mazandaran province in 2002-2003. This species was reported by Mazlum (1968, 1971) in the mountainous areas in the north of Iran. In this study, *Haem. Punctate* was just identified in the mountainous area (kou estakhr). *Haem. punctata* is the vector of *B. motasi* and *B. major* and carries *Rickettsia siberica* and causes tick paralysis (Yin et al., 1996).

Haem. concina (3%) and *Haem. parva* (1%) were recorded in our study to have a small number. Nabian et al. (2007), Hosseini et al. (2010) and Shayeghi et al. (2005) did not report these two species in Mazandaran province. Filipova et al. (1976) mentioned *Haem. parva* and *Haem. concinna* are rare species encountered in Iran; they can be found in

Caspian sea, mountainous, and semi-desert zones of the country. Delpy (1938) found *Haem. concina* on sheep, cattle and horses in mountainous areas of Caspian zone. *Haem. parva* transmit *Theileria sergenti* and Crimen-Congo hemorrhagic fever virus (Shchelkanov et al., 2005). *Haem. concina* is observed in the east of Caspian sea zone and the southern mountainous areas (Rahbari et al. 2007b). This tick was found infected with *A. bovis*, *Rickettsia hulinii*, *Borrelia* and *Francisella tularensis* (Rahbari et al., 2007b). Haemaphysalis spp. were dominant species in kou estakhr in September.

Hy. marginatum (1%), *Hy. a. anatolicum* (0.6%), *D. marginatus* (0.6%), *I. ricinus* (0.5%) and *B. annulatus* (0.3%) were observed in a very small number during inspecting infested sheep and goats. Nabian et al. (2007) did not find *Hy. marginatum*, *D. marginatus* and found *Hy. a. anatolicum* (3.38%) and *I. ricinus* (3.38%) in a small number in Mazandaran. The frequency of *B. annulatus* was reported as 10.16% by them. Hosseini et al. (2010) observed *I. ricinus* (15.2%) and *B. annulatus* (1.2%); however, he did not find the other abovementioned species.

Shayeghi et al. (2005) reported the frequency of *Hy. marginatum* (1.66%), *Hy. anatolicum* (1.33%), *D. marginatus* (1.72%), *I. ricinus* (27.45%), *B. annulatus* (8.34%).

According to the finding of Vahedi-Noori et al. (2012) activity of *I. ricinus* in Mazandaran is dependent to the cold and humid month of the year, therefore probably this is the cause that we didn't find this tick in the summer in Mazandaran. *I. ricinus* was found in May and September in Savad Kooch. This tick is mostly found in Northern Turkey that has a high rain fall and tense forest (Aydin and Bakirci, 2007).

Walker et al. (2000) emphasized that *Borrelia burgdorferi* and *A. phagocytophilia* were transmitted by *I. ricinus*. Morisod et al. (1972) described that *B. bovis* was transmitted by this tick.

In the present study, *D. marginatus* was identified just in the mountainous area of Mazandaran province. This finding is in accordance with Nabian et al. (2008) who emphasized this tick could hardly adapt in low-lying areas from the sea.

Black sea climate and tick fauna in Turkey are similar to those of northern Iran (Aydin and Bakirci, 2007). *Amblyomma variegatum* have been found in the border of Turkey to the Syria, with warm and

semidesert climate condition. This tick has not been reported from Iran until now.

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فون کنه ای گوسفند و بز در برخی مناطق حومه استان مازندران، ایران

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چکیده

زمینه مطالعه: کنه ها بندپایان خونخوار اجباری هستند، که قادر به انتقال اجرام بیماریزای مهمی می باشند. **هدف:** توزیع فراوانی و تنوع فون کنه ای شمال ایران آخرین بار در سال ۲۰۰۷ مطالعه شده است. استان مازندران دارای آب و هوایی مرطوب است که شرایط را برای دامپروری و از جمله پرورش گوسفند مساعد می سازد. با توجه به آب و هوای مرطوب امکان آلودگی به کنه زیاد است. هدف از انجام این مطالعه تعیین فون کنه ای گوسفند و بز در حومه استان مازندران در سال ۹۱ بود. **روش کار:** در طی ۷ ماه اول سال ۹۱ پس از بازرسی کل بدن گوسفندان و بزها در ۲۳ نقطه استان مازندران، ۱۱۹۰ نمونه کنه جمع آوری گردید. کنه های نربالغ با استفاده از کلیدهای تشخیص معتبر مورد شناسایی جنس و گونه قرار گرفت. **نتایج:** کنه های شناسایی شده در ۶ جنس و ۱۱ گونه قرار گرفتند، که شامل ری پی سفالوس تورانیکوس (۴۷٪)، ری پی سفالوس بورسا (۲۴/۶٪)، همافیز الیس پونکتاتا (۱۷/۱۶٪)، ری پی سفالوس سنگوئینوس (۴٪)، همافیز الیس کونسینا (۳٪)، همافیز الیس پاروا (۱٪)، هیالوما مارژیناتوم (۱٪)، هیالوما آنتولیکوم (۰/۶٪)، درماستور مارژیناتوس (۰/۶٪)، ایکسودس ریسینوس (۰/۵٪)، بوافیلوس (ری پی سفالوس) (۰/۳٪) بودند. ری پی سفالوس تورانیکوس فراوان ترین کنه بین گونه های شناسایی شده بود. **نتیجه گیری نهایی:** با توجه به تغییرات شرایط آب و هوایی، پایش منظم الگوی فراوانی کنه ها اهمیت زیادی در کنترل کنه ها و بیماریهای منتقله توسط آنها دارد.

واژه های کلیدی: ایکسودیده، گوسفند، فون کنه ای

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