Available online at www.easletters.com

ISSN No: 2349-2864

Entomology and Applied Science Letters, 2016, 3, 4:57-60

Survey on seasonal changes of ixodidae ticks in Qazvin city and suburbs in 2015

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Abstract

Ticks are very important in animal husbandry and they can transmit different disease. Of the different transmitted disease by the ticks some of them such as theileriosis and babesiosis are widely distributed in our studied area and hence this study was done about sheeps ixodidae ticks of Qazvin city to obtaining epidemiological importance aspects from sheep disease that are transmitted by ticks in this area. The samples was collected from sheep of Qazvin industrial slaughterhouse and livestock market from all body parts of body every two weeks and then stored in 70% ethanol, and transported to the laboratory. Identification of ticks was based on available taxonomic keys. Based of our results in this study the species diversity of founded ticks were Rhipicephalus bursa, Rhipicephalus sanguineus, Hyalomma anatolicum anatolicum, Hyalomma anatolicum excavatum, Hyalomma marginatum marginatum, Haemaphysalis sulcata, Haemaphysalis punctate, Dermacentor marginatus. Average ticks in every understudied sheep in spring, summer, autumn and winter has been estimated as 1.64, 3.16, 1.85 and 1.79, respectively. So, the highest rate of infection was in summer and the lowest rate was in spring. From 500 ticks that were found about 28, 27, 22, 15, and 8 percent were associated to under the tail and around the anus, groin, ears, under the shoulder, and other parts of the body. So, the highest rate of ticks was in the under the tail an anus and the lowest rate was under the shoulder. Rhipicephalus and Hyalomma species are commonly distributed in the Qazvin city and suburbs. Further investigations are needed to distinct the role of tick species as vectors of infectious diseases.

Keywords: Qazvin, hard tick, ixodidae, sheep

INTRODUCTION

Increasing ticks and diseases transmitted to livestock after feeding by tick are of the problems which cause diseases and mortality in livestock farms every year. Due to the lack of complete awareness of tick role and the ways of the tick-borne diseases transmission as well as lack of proper implementation of scientific methods to eradicate them, the loss rate has been often heavy. Furthermore, the tick-borne diseases impose much loss to the country's livestock industry each year. The hard ticks (Ixodidae) are hematophagous arthropods and have wide distribution. Hard ticks are obligatory parasites of animals and humans [1, 2].

The hard ticks play an important role in economic losses. Milk production decrease and weight loss, paralysis, anemia, skin irritation and transmission of various pathogens are complications due to hard ticks infections [3].
Ticks are important vectors of theileriosis, babesiosis and anaplasmosis. In addition, Lyme disease, ehrlishiosis, 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 [4]. *Rhipicephalus* species are transmit ovine babesiosis and ovine ehrlichiosis [5], and *Hyalomma anatolicum* transmits Theileria lestoquardi, *Th. annulata* and Crimean-Congo hemorrhagic fever virus [6]

The aim of this study is to assess the seasonal changes of sheep infection with different species of hard tick and to determine distribution of tick on body. The epidemiological aspects of ticks, their importance, and their control at Qazvin region will be more clarified by conducting this study; so, tick-borne disease epidemiological situation can be evaluated by getting knowledge about vector tick, their position and presence in every region.

MATERIALS AND METHODS

This study was conducted in 2015 and in different seasons in order to evaluate the hard tick-infection among sheep of Qazvin city and suburbs. In order to collect samples the sheep of Qazvin industrial slaughterhouse and livestock market were examined (all body parts, including the tail, around the anus, ear, under shoulder, groin) every two weeks; so, all ticks of their body were collected and their number and location were recorded. To separate ticks from the animals' body, alcohol- soaked cotton was put on tick for a few seconds and then it picked up using forceps in the direction that had stuck to body.

The collected samples were put in containers containing a mixture of glycerin and 75 % alcohol with a ratio of 1:9 which prevented the sample from drying and possibly fractures. The samples were transferred to Tabriz Islamic Azad University Laboratory of Parasitology, Faculty of Veterinary to determine the species of tick. The samples were placed inside a Petri dish and alcohol of the ticks was removed using filter paper. Then, particles on the ticks were removed using a small painting brush, and finally their genus and species were identified using loop and microscopes as well as diagnostic keys [7, 8].

RESULTS

In this survey 500 ticks was collected and assessed from all understudied sheep of the city of Qazvin during a year. Tick species found in this study were including: *Hyalomma a. anatolicum*, *Hyalomma a. excavatum*, *Hyalomma m. marginatum*, *Rhipicephalus sanguineus*, *Rhipicephalus bursa*, *Haemaphysalis sulcata*, *Haemaphysalis punctata*, and *Dermacentor marginatus*.

Table 1: The rate of the sheep infection in different seasons

	Spring	Summer	Autumn	Winter	Total
All Ticks	90	300	85	25	500
Rh. Bursa	20	60	17	8	105
Hy. M. marginatum	14	47	15	5	81
Rh. sanguineus	13	40	12	4	69
Ha. sulcata	10	36	12	3	61
Hy. anatolicum excavatum	10	34	12	2	60
Hy. anatolicum anatolicum	9	34	7	2	52
De, marginatus	8	34	7	1	50
Ha. punctata	6	13	3	0	22

In this conducted survey on seasonal infection prevalence, the number of ticks in spring, summer, autumn, and winter were 90, 300, 85, and 25, respectively. So, the highest rate of infection was in summer followed by spring, and the lowest rate was in winter (Table 1). Based on the results of chi-square test infection rate in different seasons had significant differences ($p<0.05$).

Table 2: Average number of ticks of infected sheep in different seasons

	Spring	Summer	Autumn	Winter
All Ticks	90	300	85	25
Number of infested sheeps	55	95	46	14
Mean of Ticks per sheeps	1.64	3.16	1.85	1.79

According to the information shown in table 2, average ticks in every understudied sheep in spring, summer, autumn and winter has been estimated as 1.64, 3.16, 1.85 and 1.79, respectively. So, the highest rate of infection was in summer and the lowest rate was in spring.

Table 3: Distribution of tick collected from different parts of the infected sheep body

	tail and around the anus	groin	ear	under the shoulder	Other parts	total
Number of Ticks	140	135	110	75	40	500
Percentage	28	27	22	15	8	100

According to the results, 500 ticks were found that 28, 27, 22, 15, and 8 percent were associated to under the tail and around the anus, groin, ears, under the shoulder, and other parts of the body. So, the highest rate of ticks was in the under the tail an anus and the lowest rate was under the shoulder (table 3). Based on the results of chi-square test infection rate in different parts of the animals' body had significant differences ($p<0.05$).

DISCUSSION

Ticks are of the important parasites in livestock industry which have the ability to transfer different diseases. Some of ticks like theileriosis and babesiosis have high distribution in the understudied region and therefore this study was conducted on sheep's hard tick distribution on body and seasonal existence of them and also to find further epidemiological aspects of diseases caused by tick in Qazvin city sheep.

Considering that the different tick species have the ability to transfer certain types of pathogens, therefore, identifying different species of ticks in every region, their frequency, and their distribution have a great impact on the understanding of epidemiological diseases and consequently the diseases control. Furthermore, given that much research is being conducted on anti-tick vaccine, identify tick species of any region is important from this point of view.

Based on the results the tick species found in this study were: *Hyalomma a. anatolicum, Hyalomma a. excavatum, Hyalomma m. marginatum, Rhipicephalus sanguineus, Rhipicephalus bursa, Haemaphysalis sulcata, Haemaphysalis punctata,* and *Dermacentor marginatus*.

The *Rhipicephalus bursa* and *Rhipicephalus sanguineus* are the most common ticks in Iran and it was demonstrated that have a wide distribution in different parts of the country [9]. Study conducted on tick species diversity in Tabriz city and its suburbs indicated that *Hyalomma a. anatolicum* had the highest rate which was followed by *Rhipicephalus sanguineus* and *Rhipicephalus bursa*, and *Haemaphysalis sulcata* had the lowest rate [10]. In Mohabad city, the *Hyalomma a. anatolicum* had the highest rate which was followed by *Rhipicephalus bursa, Hyalomma a. excavatum*, and *Rhipicephalus sanguineus* while *Haemaphysalis punctata* had the lowest rate [10, 11]. Also, in Ardabil city it has been shown that *Rhipicephalus bursa* (32.4%) had the highest rate which was followed by *Rhipicephalus sanguineus* and *Hyalomma a. anatolicum* while *Hyalomma a. excavatum* had the lowest rate (15.6%) [12].

Generally, *Hyalomma a. anatolicum* is one of the important ticks in diseases transferring since it involved in infectious diseases transfer like *theileria annulata, theileria parva*, Q fever, and Crimean Congo hemorrhagic fever (CCHF). In sheep, it was reported that the *Hyalomma a. anatolicum* is involved in theileria hirci transmission, which is a malignant Theileria in Iranian sheep [10, 13].

Rhipicephalus bursa and *Rhipicephalus sanguineus* are of important ticks in Iran which have a role in pathogens transferring to sheep. In this regard it can be noted some important pathogens such as *Babesia mutasi*, *Babesia ovis*, *Theileria ovis*, and *anaplasma marginale* [10].

According to Mazloum (1971), *Rhipicephalus bursa* is found in western parts of Iran such as Kordestan. Azarbaijan, and Lorestan provinces as well as other areas like Caspian Sea coast, Tehran and Khorasan provinces, while *Rhipicephalus sanguineus* is found mainly in south eastern part and generally in sheep and goats [9].

In this study the distribution of collected ticks from different parts of sheep body was evaluated according which 500 ticks were found that 28, 27, 22, 15, and 8 percent were associated to under the tail and around the anus, groin, ears, under the shoulder, and other parts of the body. So, the highest rate of ticks was under the tail an anus and the lowest rate was under the shoulder that is consistent with the results obtained by in Marand and its suburbs [14] and in Ardebil [12] but is inconsistent with the results of Tabriz and its suburbs [10], as well as in Mohabad [11] in which the ear area had the most infections.

Although most researchers have been reported especial hosts for ticks, there is no consensus about this idea. However, new experiments based on the parasites placement location prove that most of the ticks prefer especial parts of body for feeding. Also, the results of studies show that the areas of head and ear, groin, shoulder, and perineum are more exposed to the Ixodidae ticks. Considering that on one hand, the head and tail have a greater contact with grassland during pasture as well as the areas of under the shoulders and groin have also a greater contact during animal movement and sleeping, on the other hand these areas of the sheep body have a thin skin; so, the four mentioned areas have the most infections [10].

In this conducted survey on seasonal infection prevalence, the number of ticks in spring, summer, autumn, and winter were 90, 300, 85, and 25, respectively. So, the highest rate of infection was in summer followed by spring, and the lowest rate was in winter.

Also, according to the results of this study, the average ticks in every understudied sheep in spring, summer, autumn and winter has been estimated as 1.64, 3.16, 1.85 and 1.79, respectively. So, the highest rate of infection was in summer and the lowest rate was in spring, while in the study in Khorasan, the highest rate of infection was in summer but the lowest rate was in autumn (November) [7].

Based on the observation of this study, tick-infection of sheep in Qazvin was high in terms of the ticks number on the sheep such that the average number in each sheep was 2-3 ticks.

In the study conducted by Rahbari et al (1995), Hashemzadeh-Farhang et al. (2010), and Asadi ghorbani & Nematollahi (2003), it was reported that the ticks number of each sheep were 3-4 [14, 11, 15].

Therefore, it can be concluded that tick infection of sheep in Qazvin city is not high in terms of ticks number on the sheep but, in terms of species diversity is very important which needs a sever control due to their capability of disease transmission; so blood parasitic diseases have a high prevalence in the sheep flocks of Qazvin.

One of the important findings of this study is the high prevalence of *Hyalomma m. marginatum* and relatively high prevalence of *Rhipicephalus sanguineus* in understudies region which is inconsistent with earlier findings; so, the great importance of these tricks becomes clearer in terms of the transmission of theileriosis, babsiosis, and anaplasmosis.

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