

Prevalence and Seasonal Activity of Ticks Infesting Livestock in North West Areas of Iran

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ABSTRACT

Background: The livestock sector represents a significant part of the global economy, particularly in the developing world. Tick infestation and tick-borne zoonoses affect people living in the countryside in developed and developing countries and causes serious health problems.

Aim: To determine of Prevalence and seasonal activity of ticks infesting livestock in northwest areas.

Methods: This study was conducted in two village of western Meshkin Shahr Ardabil province of Iran. Ticks were collected via dragging method randomly from cattle, sheep, buffalo and goat.

Results: Five species of hard ticks (*Rhipicephalus bursa* n=82), (*Hyalomma anatolicum* n=35), (*Hy. dermodarii* n=24), (*Hy. detritum* n=12) and *Hy. marginatum* n=82), 2 species of soft ticks (*Ornithodoros lahorensis* n=72) and *Argas persicus* n=6) were collected. During the survey, a total of 3,114 ticks were collected from different locations and majority of ticks (2432, 78%) were collected in summer followed by 682 (22%) in winter. Statistical analysis was done using SPSS-16 software.

Conclusions: *Hy. marginatum* the main vector of CCHF in this study was the high frequency and ticks infesting livestock was high in Northwest of Iran.

Keywords: Tick, livestock, Infestation, Ardabil, Iran

INTRODUCTION

In the developing world, livestock plays a major role in rural economy¹. The livestock sector contributes a significant part of the global economy, particularly in the developing world. Livestock provides energy, food, raw material, and manure for crops². Ticks are obligate hematophagous ectoparasites (external parasites) of mammals, birds, and sometimes reptiles and also amphibians. The ectoparasites have broad geographic distribution, and are found in almost all the regions of the world. These arachnids are divided into four families namely: Ixodidae, Argasidae, Nuttalliellidae and Laelaptidae³. The economic impact of the ticks include from transmission of severe fatal diseases to the loss incurred in management such as cost of acaricides, development of acaricidal residue in the environment, selection of acaricide resistant ticks, etc⁴. Ticks belonging to families Ixodidae and Argasidae are obligate hematophagous ectoparasites of humans and their animals and transmits pathogens like parasitic protozoa - Babesia, Theileria, Anaplasma, Rickettsia bacteria like Ehrlichia and arboviruses^{5,6}. A number of spotted fever group Rickettsia are associated with ticks and these pathogens can be transmitted via both transovarial and transstadial means. The main genera of importance are ticks of Dermacentor, Rhipicephalus, Haemaphysalis and Ixodes. Tick-borne zoonoses affect people living in the countryside in developed and developing countries. There are several tick-borne diseases as emerging diseases in the last decade⁷. One of the most important tick-borne diseases is Crimean-Congo Hemorrhagic Fever (CCHF). CCHF mortality rate reported in humans are about 30-69%^{8,9}. Incubation period in CCHF is short and the most important clinical symptoms are: sudden fever, chills, severe headache, dizziness, back, and abdominal pain. Additional

symptoms can include nausea, vomiting, diarrhea, neuropsychiatric, and cardiovascular changes¹⁰. The agent of CCHF disease is from the genus Nairovirus and family Bunyaviridae and transmitted to humans by the tick bite but can also acquire the virus from direct contact with blood or other infected tissues from livestock or from infected patients¹¹. Many studies have been done in Iran that showed CCHF infection in 24 provinces out of 31 provinces of Iran and Sistan-va-Balouchistan, Isfahan, Fars, Kohzestan were the most infected provinces of Iran¹²⁻¹⁶. Heavy infestation of ticks caused severe irritation, which made the animals to rub and scratch the skin that might result in loss of hairs^{17,18}. In Meshkinshahr area 38576 household are livings and approximately 80-65% of these household are farmers. Little information is available regarding the epidemiology of tick infestation of cattle, buffalo, sheep and goat in Meshkinshahr area of Iran. Therefore, the present study was undertaken to know the prevalence of hard and soft ticks in relation to age, sex, seasons of the year.

SUBJECTS AND METHODS

Two stage stratified random sampling method was adopted to collect smallest and most inaccessible subgroups within the population. Standard stratification methodology was adopted and each and every district was stratified on the basis of distribution of household. The study was conducted in two village of western Meshkinshahr, Ardabil province (Oorkandi is located at 38.21° North latitude, 47.38° East longitude and Mijande, located at 38.20° North latitude, 47.37° East longitude). The selected villages were not having big farms, the livestock were maintained in the household (each maximum 4-5 numbers). A total of 300 animals (cattle, sheep, buffalo and goat)

were selected randomly. A two stage stratified sampling methods was followed for the sampling. Ticks were collected two times across the year 2011, in winters and summer from domestic animals (cattle, sheep, buffalo and goats) using tweezers and rubber gloves. The Ticks were collected from all parts of the body; each specimen was given a code number. The ticks were brought to the laboratory and identified using appropriate keys (Fig1).

Fig 1. The study area in Northwest of Iran

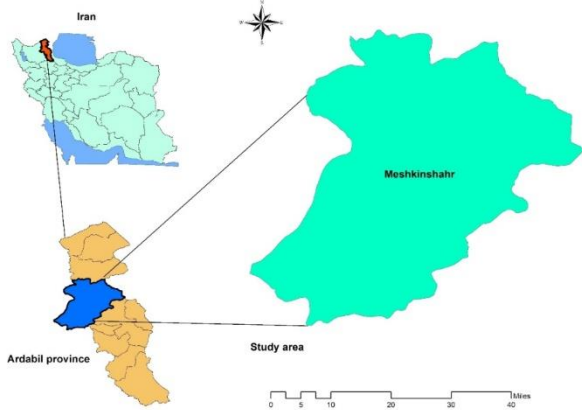
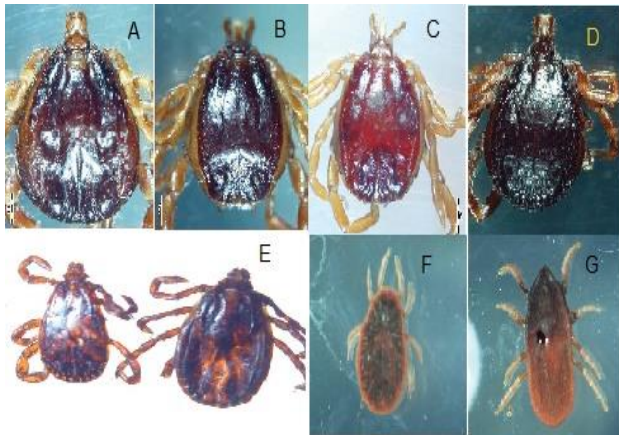


Fig 2. Pictures of collected ticks including hard and soft during study period in Meshkin Shahr, Iran. (A: *H.anatolicum*, B: *H.dromedarii*, C: *H.detrutum*, D: *H.marginatum*, E: *Rhipicephalus bursa*, F: *Argas Percisus*, G: *Ornithodoros lahorensis*)



RESULTS

During the survey, a total of 3,114 ticks were collected from different locations and seasons of the study. The majority of ticks (2432; 78%) were collected in summer followed by 682 (22%) collected in winter. These ticks were collected from four type of livestock including; sheep, cattle, buffalo and goats. The number of livestock include, sheep 133 (44%) the highest and buffalo 16 (5%) the lowest. The sex of animals includes 77% female and remaining were male (Table1). In this study, livestock were divided into five age group. The highest livestock were in 0<2 years old and the lowest are above 0> 8 years old (Fig 2).

Table 1: The total numbers of cattle were tested for tick infestation

Livestock Total (%)	Male (%)	Female (%)
Cattle 119 (40)	23(19)	96(81)
Sheep 133 (44)	32(24)	20(62.5)
Goat 32 (11)	3(19)	13(81)
Buffalo 16 (5)	70(24)	230(76)
Total 300 (100)	128(86)	359 (300.5)

This study indicates that ticks were more on livestock younger than 4 years old (60 %) and were less on older livestock. The total ticks collected in this study were 3114. Out of these ticks were 1001 (32%) soft ticks and 2113 (68%) hard ticks. Infection rates were for soft ticks per one livestock 3/3 tick and hard ticks 7. Among the host inspected for tick infestation, cattle produced the highest number of specimens (1363 = 44%), followed by sheep (1247 = 40%), goat (277 = 9 %) and buffalo (227 = 7%). The results of this study showed 105 that the highest number of tick per livestock were on buffalo (14.2) and lowest number on goat (8.7). During the study period, 235(75%) collected hard ticks and 75(25%) soft ticks were morphologically identified based on the species level.

Table 2: Total numbers of livestock by age group were tested for tick infestation

S.N.	Livestock age<2	3-4	5-6	7-8	>8
Ticks	682	1171	533	523	200
(%)	22.5	37.5	17	16.5	6.5
Livestock	68	117	50	46	19
Tick/ Livestock	9.5	10	10.7	11.4	10.5

All of ticks identified included 2 genus in soft ticks (*Ornithodoros* and *Argas*) and 2 species (*Ornithodoros lahorensis* and *Argas persicus*) and two genus hard ticks (*Rhipicephalus* and *Hyalomma*) and five species of hard ticks (*Rhipicephalus bursa*, *Hyalomma anatolicum*, *Hy.dermadarii*, *Hy.detrutum* and *Hy.marginatum*) (Fig2). The hard ticks *Hyalomma* were the most prevalent species (56%) and *Rhipicephalus* were the lowest prevalent (35%) in the study area (Table3).

Table 3. The composition of collected ticks in northwest of Iran,

Species	82(35%)
<i>Hyalomma marginatum</i>	
Hard ticks	
<i>Hyalomma Anatolicum</i>	35(15%)
<i>Hyalomma dromedarii</i>	24(10%)
<i>Hyalomma detrutum</i>	12(5%)
<i>Rhipicephalus Bursa</i>	82(35%)
Soft ticks	
<i>Ornithodoros lahorensis</i>	72(97%)
<i>Argas persicus</i>	6(3%)

DISCUSSION

Meshkinshahr area is ranch an agricultural area with about 65% of its population dependent on income from agriculture and ranch. Meshkinshahr is a mountainous state in west northern Iran. Our study is the first seasonal investigation in Ardabil province on tick infesting a variety of hosts (cattle, sheep, buffalo and goat). In the present study, five species of Ixodidae ticks and two species of

Argasidae were observed to infest different livestock (cattle, sheep, buffalo and goats). In this study, checked out 300 livestock that the results of this study were in disagreement with the results given by¹⁹⁻²¹. All 300 livestock that checked were infested. The results of this study showed that the Ixodid and Argasidae ticks were more prevalent during spring and summer respectively. The distributions of hard and soft ticks in the two villages were quite similar.

The majority of ticks were collected in summer that this results support the finding of researchers²²⁻²⁴. Through viewpoint of tick infestation of livestock the percentage of tick per sheep, goat, buffalo and cow were equal 100%. Tick infestation of sheep, goats, cattle, camel and horses in the study of Sofizadeh et al in Golestan province was equal 72.1%, 77.3%, 75.8%, 69.3%, and 50.0% respectively ($p > 0.05$)²⁵. Tick infestation of sheep, goats and cattle in the study of Dafri et al in Khuzistan province were equal 48.7% (188 infected sheep among 386 examined), 49.1% (28 infected goat among 57 examined), 46.6% (7 infected cow among 15 examined) respectively²⁶. In this context, the present study has resulted in identification of 8 species from 4 genera of hard and soft ticks belonging to family Ixodidae and Argasidae. Five species of hard ticks including *Rhipicephalus bursa*, *Hy. anatolicum*, *Hy. dermodarii*, *Hy. detritum* and *Hy. marginatum* and two species of soft ticks including *Ornithodoros lahorensis* and *Argas persicus*. That this results support the finding of Telmadarraiy et al ($p > 0.05$)²⁷⁻²⁹. *Hyalomma* and *Rhipicephalus* had the most prevalence in this area. The frequency of genus *Hyalomma* (50%) was higher than that of *Rhipicephalus* (26 %). *Hyalomma* ticks are widespread in North Africa, southern Europe, Middle East, Central Asia and China³⁰. *Rhipicephalus sanguineus* ticks are widely distributed around the world and one of the most common species in sheep herds in Northeast of Iran³¹. Several studies on the distribution of tick fauna have been reported. Salimabadi, reported seven species of *Hy. dromedari*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. detritum*, *Hy. asiaticum*, *R. sanguineus* and *Dermasentormarginatus* in Yazd Province³². A study in Ilam Province exhibited five species of *Hy. marginatum*, *Hy. anatolicum*, *Hy. asiaticum*, *Hy. dromedari* and *Hy. Sulcata*¹⁴. Different species of (hard ticks) in Pakistan is reported³³.

CONCLUSION

The results of the study can provide a basis for the adoption of an effective strategy for the management and control of hard ticks in livestock of northwest of Iran. According to the expanded livestock industry, appropriate situation for the development and distribution of hard and soft ticks, the status of tick-borne diseases and the rate of infestation of animals should be monitored routinely.

Acknowledgements: The authors would like to thank Partners Ardabil university of Medical science and Health Center Meshkinshahr the field work and the farmers who agreed to participate in the tick survey.

Conflict of interest statement: We declare that we have no conflict of interest.

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