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Original Article

Current Status of Tick Fauna in North of Iran

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Abstract

Background: The distribution and ecological preferences of ticks of domestic animals in North of Iran were studied four times a year from 2002 to 2005.

Methods: A total of 1720 tick specimens were collected from cattle, sheep and goats from different localities of Caspian Sea areas consisting of Guilan, Mazandaran, Golestan and Ardebil provinces, Iran.

Results: Fourteen tick species were identified as *Hyalomma anatolicum anatolicum* (5.23%), *H.marginatum* (20.34%), *H.detritum* (3.48%), *Haemaphysalis punctata* (12.79%), *Haem. Parva* (0.58%), *Haem.concinna* (0.58%), *Haem.choldokovsky* (6.97%), *Ixodes ricinus* (2.32%), *Rhipicephalus sanguineus* (19.76%), *Rh.bursa* (4.65%), *Boophilus annulatus* (9.88%), *Dermacentor niveus* (6.39%), *D. marginatus* (1.74%) and *Ornithodoros lahorensis* (5.23%). Both *Dermacentor* and *Ornithodoros* were found only in Ardebil with cold climatic conditions and high altitude. The only ticks, which were found in forest area, were *Boophilus annulatus* and *Ixodes ricinus*.

Conclusion: The veterinary and public health importance of the above species should be emphasized.

Key words: *Ticks, Domestic ruminant, Fauna, Iran*

Introduction

The tick studies started by Delpy in Iran (1, 2), Abbasian. Lintzen and Mazlum described a list of adult ticks collected from domestic animals (3-5). Filipova *et al*. presented data for 642 ixodid tick taken from small-size mammals, chiefly rodents in different zoogeographical zone of Iran (6). Hoogstraal studied ixodid ticks parasitizing wild sheep and goat in Iran with focusing on maintaining natural foci of many hazardous diseases for human (7, 8). Rahbari published ecological aspects of various species of ticks encountering domestic animals in North West of Iran (9). Razmi published a list of tick species of domestic animal in North East of Iran (10). The recent research showed that the increased effects of climatic factors affected the interactions between vectors, hosts and pathogens, mainly because the climatic changes associated with vectors.

It seems that there is a gap of study in the recent years. Therefore, the objective of this study was to determine the species and distribution of ticks infesting domestic ruminants in North part of Iran.

Materials and Methods

Epidemiological studies on parasitic diseases of animal in Iran determined four

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divided ecological zones (11). This study was carried out in 2003-2005 and the tick specimens were collected from animals which grazed in open rangeland pasture in zone 1 in the North consisting Guilan, Mazandaran, Golestan and Ardebil provinces of Iran. Tick samples were collected randomly from domestic animals in seasonal activity of ticks from whole body of 629 sheep, 336 goats and 151 cattle. Collected ticks were counted and preserved in 70 % alcohol. The speciation was done by using the identification key of Delpy and Walker *et al*. (2, 12).

Results

The tick specimens, belonging to 14 species and subspecies were collected from cattle, sheep, and goats, in zone 1. Out of 1720 collected ticks, 350 *Hyalomma marginatum* ticks (20%) were identified in Golestan Province as most abundant species while *Haemaphysalis parvum* and *Haem. concinna* (0.58%) were as the most rare species infesting flocks.

Species diversity of ticks is summarized in Table 1. The only tick, which was found in forest area, was *Boophilus annulatus* and *Ixodes ricinus*.

Table 1: The distribution of tick species in four different provinces in the North of Iran

	Guilan	**%**	**Mazandarn**	**%**	**Golestan**	**%**	**Ardebil**	**%**	**Total**	**%**
H.a.anatolicum	10	5.26	20	3.38	60	9.37	0	0	90	5.23
H.marginatum	0	0	0	0	350	54.68	0	0	350	20.34
H.detritum	30	15.8	20	3.38	0	0	10	3.33	60	3.48
Haem.punctata	0	0	220	37.28	0	0	0	0	220	12.79
Haem.parva	10	5.26	0	0	0	0	0	0	10	0.58
Haem.concinna	10	5.26	0	0	0	0	0	0	10	0.58
Haem..choldokovskyi	0	0	0	0	80	12.5	40	13.33	120	6.97
Ixodes ricinus	20	10.52	20	3.38	0	0	0	0	40	2.32
Rh.sanguineus	0	0	250	42.37	90	14.06	0	0	340	19.76
Rh.bursa	0	0	0	0	60	9.37	20	6.66	80	4.65
B.annulatus	110	57.89	60	10.16	0	0	0	0	170	9.88
D.niveus	0	0	0	0	0	0	110	36.6	110	6.39
D.marginatus	0	0	0	0	0	0	30	10	30	1.74
O.lahorensis	0	0	0	0	0	0	90	30	90	5,23
Total	190	11.04	590	34.3	640	37.2	300	17.44	1720	

Discussion

The occurrence of suitable hosts and favorable climate conditions in Iran benefit the maintenance of ticks and tick-borne disease in nature. The land exploitation of these last decades has dramatically reduced the diversity of Iranian environment and significantly modified the distribution and the abundance of the tick species, which strongly adapted to domestic animal in each area. If this trend contin-

ues, it is possible to hypothesis that some new records of tick species will gradually replace the others, the continues observations on tick population in any content is able to confirm this hypothesis.

Haemaphysalis choldokovskyi was found in sheep pastured in surrounding area of Golestan and Ardebil, in low number, hence it can be concluded that recently *Haem. choldokovskyi* beside of mountainous area adapted to some part of Caspian Sea, but Delpy concluded that it was distributed in high altitude territories (2). There is no report of attempts to isolate any pathogenic agent from it and there is a gap of knowledge about its biological aspects.

Haem. parva is a rare species in Guilan, but it was reported from Caspian sea area, mountainous and semi dessert zones; the immature stages are frequently found on small rodents such as social vole (6). The adults are frequently found on sheep and goat (4, 5), carnivores are also host of adult (7). Hoogstraal *et al.* previously identified it from wild sheep and believed that the range of this species extends to Italy and also some parts of Libya (8). This tick has been known to transmit *Theileria sergenti*, Crimean-Congo hemorrhagic fever virus (13).

Haem. punctata was recorded throughout rocky mountain slopes of Mazandaran Province, thought Mazlum, reported its occurrence in mountainous area in wooded, brushy locations in north part of Iran but he believed that its range had been expanded in the most of provinces in Iran (5), the larvae feed small animals such as great gerbil, the nymphs also feed on small mammals and birds (6), while our results showed that cattle and sheep were preferable host of the adult. It is well known vector for *Babesia motasi* and *B. major* (14, 15), it has also been demonstrated to carry *Rickettsia siberica* (16) and to cause tick paralysis (17).

Haem. concinna is found in east of the Caspian Sea zone to South mountainous areas. It is less common or at least less commonly encountered than the others are. It is a relatively common tick in sheep pasture regions in Caspian Sea zone. Filipova believed *Haem. concinna* was very host-specific for wood mouse, but occasionally is found on Persian jird, Turkistan rat and house mouse (6). Delpy found the adult tick on sheep, cattle, and horse in mountainous areas in this region (2) but Mazlum emphasized that cattle could be the most important host for adult tick(5). *Haem. concinna* was infected to *Rickettsiae* of spotted-fever group (18) but it is not considered an important vector of this agent. *Haem. concinna*, which was collected in Kazakhstan, revealed *Anaplasma bovis* (19) and *Rickettsia hulinii* (20). The ability of *Haem. concinna* to transmit *Borrelia* was determined under laboratory conditions in China (21). This tick was also found infected with the causative agents of tularemia (22).

Hyalomma anatolicum anatolicum recorded over widely scattered area from Golestan to Guilan, is a vector of causative organism of tropical theileriosis (23) and transmits a variety of pathogenic organism such as *Theileria lestoquardi, Th. equi, B. cabali, Trypanosoma theileri* and Crimean- Congo hemorrhagic fever virus (12), several cases of Crimean-Congo fever have been reported in human since summer 1999 in different areas of Iran (24) and Jabbari *et al* emphasized its occurrence in Golestan Province (25). Therefore, it is a treat to animal improvement program and is known as an important tick vector in Iran (26).

In contrast to the study of Mazlum who emphasized that *Rhipicephalus bursa* occurred as a dominant tick in most sheep area (5), we found *Rh. bursa* as the minor species in Golestan and Ardebil which

were only collected from sheep but *Rh. sanguinus* was the most numerous and prevalent tick which was found in Golestan, Mazandaran and Ardebil. Our observations demonstrated that most of sampled animals in Ardebil area were infested with *Dermacentor niveus* and *D. marginatus* whereas Mazlum determined them in most mountainous areas (5). *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. Our results showed that *Ixodes ricinus* and *Boophilus annulatus* are restricted in Guilan and Mazandaran provinces. It is a common tick in ruminants (4, 5). Walker *et al.* emphasized that *Ixodes ricinus* was a main vector for *Borrelia burgdirferi* and *Anaplasma phagocotophilia* (12). Morisod *et al*. described that *Babesia bovis* was transmitted by *Ixodes ricinus* (27).

In conclusion we observed that *Ixodes ricinus* is often found together with *Boophilus annulatus*. This tick transmits the protozoan *Babesia bigemina* and *Babesia bovis* and *Anaplasma marginale* to cattle (12).

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