

A Survey on Fauna of Ticks in West Azerbaijan Province, Iran

*Z Telmadarraiy¹, A Bahrami², H Vatandoost¹

¹Dept. of Medical Entomology and Vector Control, School of Public Health, Tehran University of Medical Sciences, Iran

²Dept. of Medical Entomology, Tarbiat Modarres University, Iran

Abstract

Tick are considered as the main vector for transmission of various diseases to human being. This study was carried out to investigate the fauna of species belonging to two families of ticks, Ixodidae and Argasidae in west Azerbaijan province, Iran. A total number of 62 villages were selected randomly, from the study area 3278 ticks were collected with cluster sampling method, after collection they were identified by morphological characteristics using stereomicroscope device. The ticks were classified into seven genera and 15 species including following species: Concerning Ixodidae families, *Rhipicephalus* (42%), *Hyalomma* (41%), *Boophilus* (7%), *Dermacentor* (7%), and *Haemaphysalis* (3%). Genus *Rhipicephalus*, comprised *R. bursa* (73%), *R. sanguineus* (27%), had the highest prevalence in summer. The species of *Hyalomma* were *H. asiaticum* (27%), *H. marginatum* (25%), *H. aegyptium* (14%), *H. dromedarii* (13%), *H. schulzei* (12%) and *H. detritum* (9%). Their peak frequency occurred in autumn. The single species of genus *Boophilus* was *B. annulatus*. Its activity occurred in spring and summer seasons. In genus *Dermacentor*, *D. marginatus* (61%) and *D. niveus* (39%) were total species of this genus that had the highest prevalence in summer and autumn. In genus *Haemaphysalis*, *H. sulcata* (61%) and *H. inermis* (39%) were recorded as the main species. Their highest seasonal frequency occurred in summer. Among soft ticks only *Argas persicus* and *Ornithodoros lahorensis* were collected. *A. persicus* was active during the summer and winter during the nights and the second species was active during the spring and winter. In conclusion, it should be emphasized that prevalence of the families Argasidae and Ixodidae ticks were more evident in mountainous area in west Azerbaijan province.

Key words: Argasidae, Ixodidae, Ticks, Azerbaijan, Iran

Introduction

Ticks biology and their distribution studies in Iran were initiated in 1810 when Dupre visited this country (1). Razi Institute, Pasteur Institute of Iran, Faculties of Veterinary and School of Public Health, continued their works on Iranian ticks (2). In 1935, Brumpt had conducted a study on genus *Ornithodoros* ticks (3). Subsequently, Delpy published a paper on the family of Ixodidae genus *Hyalomma* in 1936 (4). Baltazard explained the characteristics of *Ornithodoros* ticks (5). The role of ticks in transmission of *Borrelia* was reported by Janbakhsh in 1956 (1). Abbasian listed the name of Iranian

ticks in 1960 (2). The book entitled "Ectoparasites of domestic animals' ticks" was published by Maghami in 1968 (6). Mazlum published his research on the geographical distribution, seasonal activities and host preference of ticks in 1971 (7). The aim of this study was to study fauna of hard & soft ticks (families: Ixodidae & Argasidae) in west Azerbaijan province.

Materials and Methods

West Azerbaijan province is located in North West part of Iran. A total of 62 villages were selected randomly. Ticks collection was carried out from animals, in human dwellings and

poultry shelters in about 30 minutes. Each occasion ticks were mostly collected in cracks, crevices, ceiling, animal body and floor, then transferred into the holding tubes. All the specimens were identified based on morpho-logical characteristics and the keys given by Janbakhsh (1956) (1) and Hoogsteraal 1956 (8).

Results

During the study a total number of 3278 ticks were collected from 62 villages and then were identified at the species level. Table 1 and 2 shows the relative percentage of Argasidae and Ixodidae ticks in whole area of study. Table 3 and 4 shows frequency of different hard and soft ticks' species on various hosts, respectively. The seasonal activities of Argasidae and Ixodidae ticks are presented in tables 5 and 6, respectively. Table 7 shows comparison of different genera of ticks in mountainous and plateau regions. Results showed that the frequency of ticks in mountainous areas is more than plateau areas.

Table 1: percentage of prevalence of hard ticks in the study area in West Azerbaijan 1998

Species	Percentage
<i>R. bursa</i>	31
<i>R. sanguineus</i>	11.3
<i>Hy. asiaticum</i>	10.5
<i>Hy. marginatum</i>	10
<i>Hy. aegyptium</i>	5.3
<i>Hy. dromedarii</i>	5.5
<i>Hy. schulzei</i>	5
<i>Hy. detritum</i>	4
<i>B. annulatus</i>	7.6
<i>D. marginatus</i>	4.2
<i>D. niveus</i>	3
<i>H. sulcata</i>	1.6
<i>H.inermis</i>	1
Total	100

Table 2: The percentage of prevalence of soft ticks west Azerbaijan 1998

Species	Percentage
<i>A. persicus</i>	46
<i>O.lahorensis</i>	54
Total	100

Table 3: Numbers of hard ticks on host collected in west Azerbaijan 1998

Species	Host							Total
	Cow	Buffalo	Sheep	Goat	Horse	Duck	Poultry	
<i>R. bursa</i>	187	34	75	90	0	0	0	386
<i>R. sanguineus</i>	38	18	33	52	0	0	0	141
<i>Hy. asiaticum</i>	95	10	26	0	0	0	0	131
<i>Hy. marginatum</i>	84	0	42	0	0	0	0	126
<i>Hy. aegyptium</i>	11	0	12	43	0	0	0	66
<i>Hy. dromedarii</i>	44	0	20	5	0	0	0	69
<i>Hy. schulzei</i>	52	0	12	0	0	0	0	64
<i>Hy. detritum</i>	28	12	9	0	0	0	0	49
<i>B. annulatus</i>	64	0	0	20	11	0	0	95
<i>D. marginatus</i>	0	0	13	41	0	0	0	54
<i>D. niveus</i>	0	0	7	27	0	0	0	34
<i>H. sulcata</i>	0	0	7	13	0	0	0	20
<i>H. inermis</i>	0	0	3	10	0	0	0	13
Total	603	74	259	301	11	0	0	1248

Table 4: Numbers of soft ticks on host collected in West Azerbaijan 1998

Species	Host							Total
	Cow	Buffalo	Sheep	Goat	Horse	Duck	Poultry	
<i>A. persicus</i>	0	0	0	0	0	122	818	940
<i>O.lahorensis</i>	110	0	890	90	0	0	770	1090
Total	164	0	890	90	0	116		2030

Table 5: Numbers of hard ticks in the seasonal collected in West Azerbaijan 1998

Genera	Spring	Summer	Autumn	Winter	Total	percentage
<i>Rhipicephalus</i>	116	393	18	0	527	42.23
<i>Hyalomma.</i>	89	59	346	11	505	40.47
<i>Boophilus</i>	60	30	0	5	95	7.61
<i>Dermacentor</i>	0	46	42	0	88	7.05
<i>Haemaphysalis</i>	0	33	0	0	33	2.64
Total	265	561	406	16	1248	100

Table 6: Numbers of soft ticks in the seasonal collected In West Azerbaijan 1998

Genus	Spring	Summer	Autumn	Winter	Total	percentage
<i>Argas</i>	245	293	127	275	940	46.31
<i>Ornithodoros</i>	372	231	175	312	1090	53.69
Total	617	524	302	587	2030	100

Table 7: Topographical of ticks collected in west Azerbaijan 1998

Genus	<i>Boophilus</i>		<i>Dermacentor</i>		<i>Rhipicephalus</i>		<i>Haemaphysalis</i>		<i>Hyalomma</i>		<i>Argas</i>		<i>Ornithodoros</i>		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
MOUNTAIN	62	65	59	67	392	74	19	58	268	53	592	63	621	57	2013	61.41
PLATEAU	33	35	29	33	135	26	14	42	237	47	348	37	469	43	1265	38.59

Discussion

Considering the occurrence of 13 species of hard ticks in west Azerbaijan province listed in Table 1, the population frequencies of the species of genus *Rhipicephalus* were higher than the other genus. Variation among *Hyalomma* was more demonstrated. This genus comprises about 40% of total collected species in the area. The main hard ticks were collected from cow, goat and sheep respectively (Table 3). The soft ticks which are mentioned in Table 4 indicated that, *Ornithodoros* is mainly collected from places where sheep, cow, and goat are rearing. Poultry and duck were the most favorable host of blood source for *Argas* (Table 4). The only species that was found on horse was *Boophilus* (Table 3).

The occurrence of hard and soft ticks was more noticeable in mountainous area. This is related to the favorite climatically condition as well as abundance of herds. The hard ticks were more prevalent during summer and autumn (Table 5), however, soft tick occurs mainly in spring and winter (Table 6). Two genera of soft ticks had minimum activities during autumn. An investigation carried out in Takab (west Azarbaiejan province), revealed the presence of *Ornithodoros tholozani* (family: Argasidae) in the region (9). In another study conducted in east Azerbaijan, only the seven species of genera *Hyalomma* (*Hy. Marginatum*, *Hy. detritum detritum*, *Hy.anatolicum anatolicum*), *Rhipicephalus* (*Rh. bursa*), *Haemaphysalis* (*Hae.sulcata*), *Dermacentor* (*D.marginatus*), and *Boophilus* (*B.annulatus*) were reported (10). Ababassian and Mazlum were not able to find *Haemaphysalis inermis* in Azerbaijan province (2, 7) that was contradictory with our findings.

Tavakolli et al carried out similar study in Lorestan province, and found that genera *Hyalomma*, *Rhipicephalus*, and *Haemaphysalis* were active during the summer which was parallel to our study, but *Dermacentore* occurs mainly in spring. From the results it can be concluded that the prevalence of genera and

their variation was wider in west Azerbaijan province (11). In a study in Hamadan province two species of soft ticks were found including; *O.tholozani* and *O.canstrinni*, which were not found in our study (12). Aghighi et al in a survey on the tick born diseases in Qazvin province, Iran. They found *O.tholozani*, *O.canstrinni* and *O.erraticus*. The infection of *O.tholozani* by *Borellia persica* and *O.erraticus* by *B.microti* has been confirmed (13). Hunfeld and Brade have reviewed tick-borne disease in Europe. They found that *Lricinus* transmits different arboviruses bacteria, spirochetes and *Babesia* to human being. *Phipicephalus sanguinesu* and *Dermacentor marginatus* which is the vector of arbovirus in Europe were found in our study area. Further epidemiological and molecular works are recommended to find the possibility of arbovirus transmission in Iran (14).

Acknowledgments

The authors would like to appreciate Dr.SM Hazrati and his colleagues for their kind collaboration in Urumia Research Center to carry out the research.

References

1. Janbakhsh B (1956). Report on studies of the tick vectors of relapsing fever in Iran, Rep. Inst. Par.Mal. 5th Med. Congr., Iran. p.34.
2. Abbassian-Lintzen R (1960). A preliminary list of ticks (Acarina: Ixodidae) occurring in Iran, and their distributional data. *Acarologia*, 2(1): 43-61.
3. Brumpt E (1935). Presentation de deux *Ornithodotus canstrinii* Bir 1895, vivants originaires d Ispahan (Perse). *Bull Soc Path Exot*, 28 : 51- 3.
4. Deply L (1936). Notes sur les Ixodidés du genre *Hyaloma* (koch). *Ibid*, 14: 206-45.
5. Baltazard M, Bahmanyar M, Pournaki R, Mofidi Ch, Chama M (1952). *Ornithoderes tartakovsky* Olenov 1931

- et *Borrelia* (Spirochaeta) *latychevi* Sofiev 1941. Note préliminaire. *Ann Parasit Humaine et compare*, 27: 311-28.
6. Maghami, G (1965). External Parasite of Live stocks in Iran. *Insitute of Razi*, 20: 81- 3.
 7. Mazlum Z (1971). Differents Ticks occurring in Iran (geographical distribution, seasonal activities, hosts), *Bull. Faculty of Veterinary*, 27(1): 1-32.
 8. Hoogstraal H (1956). *African Ixodoidae*, I. Ticks of the Sudan (with special reference to equatorial province and with preliminary reviews of the genera *Boophilus*, *Margaropus*, and *Hyalomma*) .Washington, D. C.1101.
 9. Tileco R (1997). Investigation on the infection of *Ornithodoros tholozani* in Takab, West Azerbaijan province, Iran, School of Public Health & Institute of Health Research, Tehran University of Medical Sciences, Master of Science (MSc) thesis in Medical Entomology p. 81.
 10. Piazak N (1991). Preliminary studies on the presence of lyme disease in Iran through the study of *Ixodes ricinus* population. School of Public Health & Institute of Health Research, Tehran University of Medical Sciences Master of Science (MSc) in Medical Entomology PP. 158.
 11. Tavakoli M (1997). Survey on geographical distribution of ticks in Lorestan province (western Iran). Tarbiat Modarres University, MSc thesis p. 112.
 12. Vatandoost H, Ghaderi A, Javadian E, Zahir Nia AH, Rassi Y, Piazak N, Kia EB, Shaeghi, M, Telmodarreyi Z, Abolhasani M (2003). Distribution of soft ticks and their infection with *Borrelia* in Hamadan province, Iran. *Iranian Journal of Public Health*, 32 (1): 22-4.
 13. Aghighi Z, Assmar, M, Vatandoost H (2001) Distribution of soft ticks and their infection with *Borrelia* in Qazvin, Iran. *Modarress*, 3 (2): 111-14.
 14. Hunfeld K-P, Brade V (2004). Zoonotic *Babesia*: Possibly emerging pathogens to be considered for tick-infested humans in central Europe. *International Journal of Medical Microbiology*, 293(37): 93-103.