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Arthropod Parasites of Rodents in Khorram Abbad district, Lorestan Provincen of Iran

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Abstract

Ectoparasites are considered as the main vectors of zoonotic diseases. They play an important role for transmission of wide variety of diseases such as CCHF, leishmaniosis and plague to human and vertebrates. Mammals, especially rodents, are the most important reservoirs of zoonotic diseases. The aim of this study was to identify the ectoparasites of rodents captured in Korram-Abad, Lurestan Province, Iran during year 2002-2003. Rodents were live trapped from 24 localities in six major land-resource areas. A total of 167 alive rodent specimens were transported to the laboratory and after anesthetizing by chloroform their ectoparasites were removed. Collected ectoparasites were mounted and identified. Altogether 218 ectoparasites related to 3 orders, 6 families, 6 genera, and 7 species were systematically recognized. Fleas with 3 species had the most number of species, mites and lice allocated the most (64.67%) and the least (3.21%) frequency of ectoparasites, respectively. Ectoparasites were more prevalent in Zagheh area (38.99%). *Haemolaelaps glasgowi* (42.2%) was the most common ectoparasite while, *Nosopsyllus irranus* only constituted approximately 0.91% of specimens. Zagheh area could be a high-risk zone for zoonotic disease transmission due to poor hygienic circumstances

Keywords: *Ectoparasite, Rodent, Zoonotic, Iran*

Introduction

Ectoparasites play an important role for transmission of diseases to human and animals. Understanding of reservoir host and their ectoparasites will provide a clue for control of diseases in a given area.

There are no documented papers on ectoparasites of rodents in Khorram Abad, Lorestan province so far. However, a few studies in which ectoparasites of rodents and other small mammals in adjacent regions have been documented, e.g. report of Maghami (1) for ectoparasites of domestic animals in Iran, Eghbali (2) for ectoparasites of rodents in Semnan; Bochkov et al. for introducing a new species of myocoptid mites on *Calomyscus* sp. in Iran (3), Moniri, Sahabi, Vatandoost and Piazak for the study of ectoparasites of *Nesokia indica* and *Meriones* spp. in Ardestan (4).

The aim of this study was to determine the species composition and infestation parameters for parasitic arthropods associated with certain rodent species and to determine the presence of known vector species.

Materials and Methods

Host collection Rodents were live trapped at 24 different localities in six major land-resource areas including: Zagheh, Weysian, Chaghalvandi, Papi, Chegeni, and Central in Khorramabad (Fig.1). The collection was carried out on various occasions every month from July 2002 through May 2003. For these purpose different rodents from 24 epidemiologically locations in

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Khorramabad were live-trapped and examined for their ectoparasites.

A combination of three sizes of Sherman live traps were randomly set in different habitats (e.g., woodland transects, woodland, old fields, refuse heaps, beside dump, in and around demolished buildings at different localities. Traps were baited with favorable food of rodents. Wheat and other cereals, mixed bread and butter were used during autumn and winter and cucumber, walnut, almond, apple, sunflower seed and corn during spring and summer. Sausage, salami, bread and biscuit mixed with almond oil, and pop walnut with oil were used in urban localities during the year.

Collecting of ectoparasites Captured animals were transported to the laboratory and their ectoparasites were picked up in different ways as follows:

Specimens were anesthetized with chloroform, and then placed in a white tray. The host hairs were brushed and ectoparasites were collected by fine- tipped forceps. Alive specimens were hanged above a water container in wire cage and after a few days, ectoparasites were collected from water. Some ectoparasites leaving their host while hosts anesthetization; after that they were also collected.

Anesthetized specimens were placed in a nylon bag and left for a while in refrigerator and after freezing, ectoparasites were collected.

Anesthetized specimens were sprayed with aerosol insecticides and after shaking, the cage ectoparasites were separated. Alive specimens were hanging above a water tray while gently blowing the hairs, appeared ectoparasites picked up. Ectoparasites were stored in 70% ethanol for their preservation and identification.

Identification There are different methods for providing microscopic slid of ectoparasites for identification, but all methods including four stages: clearing, frustrate dehydration and mounting, which carried out as follows:

Specimens were washed with water several times. They were cleared in %10 KOH for 1-24 h. Subsequently, specimens were washed with water. Specimens were placed in 5% acetic acid for 0.5-1 h. Then were washed with water. Subsequently they were transmitted to 50% ethanol for 1 h. Abdomen pressured for evacuation of their contents. Specimens were placed in 70%, 90% and pure ethanol for 1-24 h, respectively. Specimens were then placed in clove juice for 1-24 h. In this stage, only fleas were maintained in xylol for 1-24 h. Finally, specimens were fixed in between microscope slides and cover glass using canadabalzam. Mounted specimens were identified and affixed scientific name label at left and information (including host, area, date, collector, etc) label at right of slides.

Results

Results of our study revealed that altogether 218 ectoparasites belonging to 3 orders, 6 families, 6 genera and 7 species from 168 individuals and 9 species of live trapped rodents were collected (Table 1), including:

Order Siphonaptera
Ceratophillidae
Nosopsyllus iranus
Nosopsyllus fasciatus
Pullicidae
Xenopsylla baxtoni

Order Anoplura
Hopleupeuridae
Neohaematopinu slaeviusulus
Order Acari
Lealapidae (mite)
Haemolaelaps glasgowi
Macronyssidae (mite)
Ornithonyssus sylviarum
Ixodidae (tick)
Haemaphysalis sp.

In this study, no small mites (e.g., Glycyphagids, Myobiids, Listrophorids, and Trombiculids) were recorded. Fleas with 3 species had the most biodiversity in all study areas. In addition, mites and lice allocated the most (64.67%) and the least (3.21%) frequency of

ectoparasites, respectively (Fig. 2). Overall, Zagheh area, had the most ectoparasites of rodents (38.99%) (Fig. 3).

The most common ectoparasite was *Haemolaelaps glasgowi* (with 42.2% abundance) while, *Nosopsyllus irranus* only constituted approximately 0.91% (Fig. 4). According to this study, the most species of ectoparasites of rodents (7 species) were obtained at 1800-2000 meters above sea level.

Fig. 1: Distribution map of 24 different localities in six major land-resource areas including: Zagheh, Weysian, Chaghalvandi, Papi, Chegeni, and Central in Khorramabad in 2003-2002; 1= Doureh Wild life.; 2= Sarab-e-Changaii Recreation Area.; 3=Tashkan Wild life.; 4= Pol-e-Kashkan Recreation Area.; 5= Azna Mamil Wild life.; 6= Makhmal Kouh State Park.; 7=West Koregah Urban Area.; 8= Kakasharaf Wild life.; 9= Chagalvandi Wild life.; 10= North Beiranvand Wild life.; 11=South Beiranvand Wild life.; 12= Dera Zari Wild life.; 13= Tel-e-Komas Wild life.; 14= Chambagh Wild life.; 15= Weisian Wild life.; 16 = Shurab State Park.; 17= Zagheh Wild life.; 18= Razan Wild life.; 19= Pol-e-Horou Wild life.; 20= Ghaedrahmat Wild life.; 21= Chamsangar Wild life.; 22= Keshvar Wild life.; 23= Nogian Recreation Area.; 24= Taf Recreation Area.

Table 1: Parasitic arthropods removed from rodents in Khorramabad in 2002-2003, as shown by the number of rodents of each species and localities, and the numbers and life stages of infesting arthropod

Taxonomy, and parasite species	Host/parasite data	
	Numbers and stages	Localities
Meriones persicus (64)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1F	ZA
Nosopsyllus fasciatus	1F	ZA
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	14F, 5N	ZA, RA, NO, TA, SB, NB
Ornithonyssus sylviarum	4M, 27F, 7N	ZA, PH, SH, CH, KE, WS
Ticks (Acari: Ixodidae)		
Haemaphysalis sp.	32L	ZA, RA, DO, TA
Lice (Insecta: Anoplura)		
Neohaematopins laeviusulus	3F	ZA, PH
Apodemus sylvaticus (28)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1M, 4F	GA, NO
Nosopsyllus fasciatus	1F	ZA
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	6M, 24F, 16N	ZA, RA, TA, CH, PH, NO, KE
Lice (Insecta: Anoplura)		
Neohaematopins laeviusulus	2F	ZA, CH
Mus musculus (15)		
Fleas (Insecta: Siphonaptera)		
Nosopsyllus fasciatus	1M	KK
Nosopsyllus iranus	1F	AM
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	8N	WK, SC
Ticks (Acari: Ixodidae)		
Haemaphysalis sp.	8L	TK, SH, ZA
Microtus socialis (16)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1F	KE
Nosopsyllus fasciatus	1F	ZA
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	3F, 7N	RA,PH
Ticks (Acari: Ixodidae)		
Haemaphysalis sp.	6L	ZA, NO, RA
Lice (Insecta: Anoplura)		
Neohaematopins laeviusulus	1M,1F	KE, ZA
Calomyscus bailwardi (9)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1F	DZ
Mites (Acari: Mesostigmata)		
Ornithonyssus sylviarum	3F,1N	CV, SB
Ticks (Acari: Ixodidae)		
Haemaphysalis sp.	5L	ZA, DZ

Table 1: Continued…

Cricetulus migratorius (7)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1M	ZA
Nosopsyllus iranus	1F	GA
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	6N	RA, GA
Ornithonyssus sylviarum	2F,4N	RA
Ellobius foscocapillus (15)		
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	1F	ZA
Rattus rattus (12)		
Fleas (Insecta: Siphonaptera)		
Xenopsylla baxtoni	1M	WK
Mites (Acari: Mesostigmata)		
Haemolaelaps glasgowi	2F, 1N	TS, MM
Ornithonyssus sylviarum	1F	TA
Ticks (Acari: Ixodidae)		
Haemaphysalis sp.	2L	SC
Ciurus anomalus (2)		

M, male; F, female; L, larva; N, nymph

[a] ZA= Zagheh.; RA= Razan.; NO = Nogian.; TA = Taf.; SB = South Beiranvand.; NB = North Beiranvand.; PH = Pol-e-Horou.; SH = Shurab.; CH = Chamsangar.; KE = Keshvar.; WS = Weisian.; DO = Doureh.; GA = Gaedrahmat.; KK = Kakasheraf.; TS = Tashkan.; WK = West koregah.; SC = Sarab-e- Changaii.; TK = Tel-e-komas.; DZ = Dera zari.; CV= Chaghalvandi.; MM = Makhmal Kouh. ; AM = Azna Mamil.

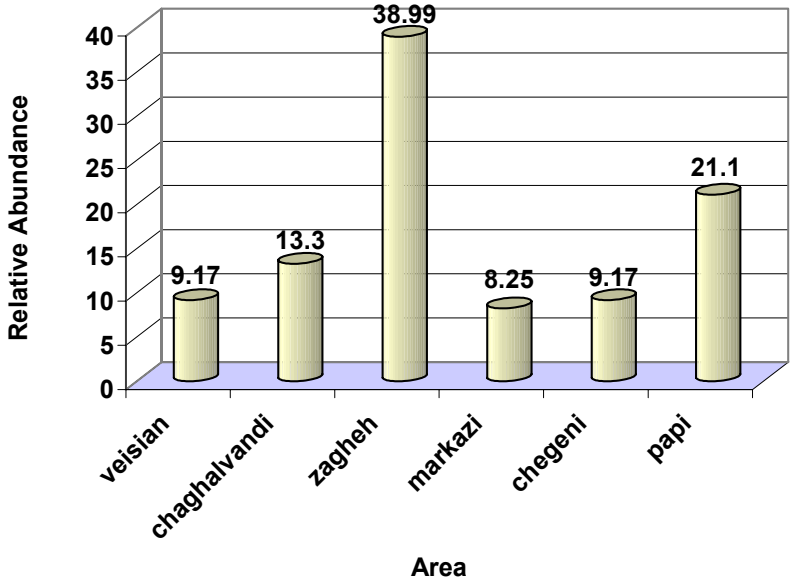

Fig. 2: Relative frequency of orders of ectoparasites

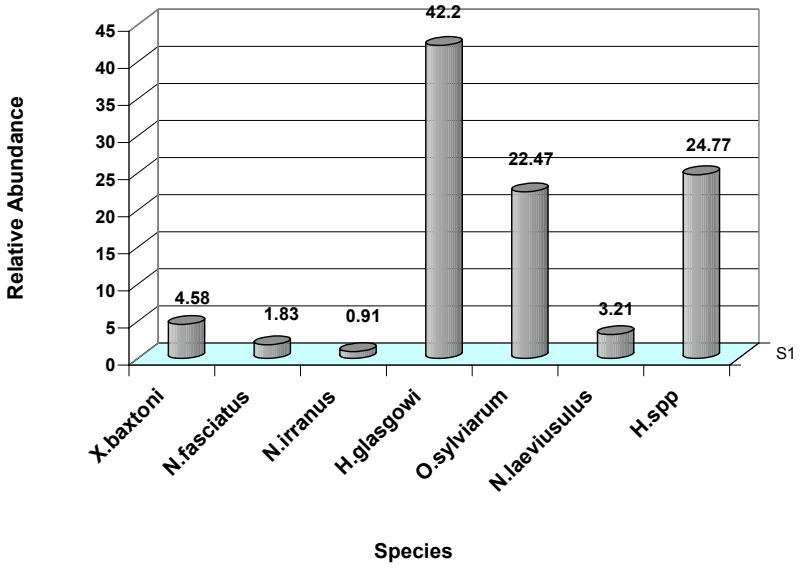

Fig. 3: Relative frequency of ectoparasites in six areas of study

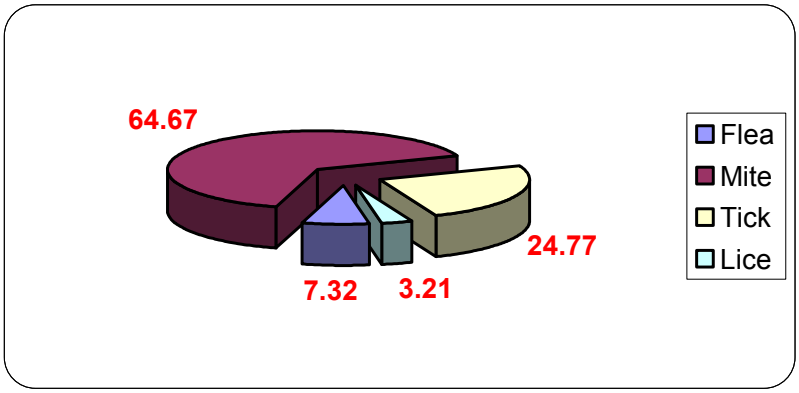

Fig. 4: Relative frequency of species of ectoparasites

Discussion

We identified only 7 arthropod species, fewer than expected, based on information for the same host species in other states (2). The reason for part of this discrepancy is that we did not recover small mites; probably our recovery technique was unsuitable for collecting them. Small parasitic mites specially myobiidae (Acari: prostigmata) rodents ectoparasites in Iran are described (5). If the low number is not an artifact of the collection techniques, it might be due to prey techniques in different species of rodents, such as squirrel and the southern mole-vole specimens. In spit of diverse topography and habitats, in a few land-resource areas especially south plain, trap success was lowest, whereas we were observing rodent tracks during the day. On the other hand, some of the specimens in our survey had died in the traps, and few ectoparasites would have been expected to remain on them. In addition, there were insufficient data to determine seasonal abundance of the ectoparasite species collected, but most of the ectoparasites were collected during the spring and autumn seasons.

In this study, we found one species of widely distributed ectoparasites approximately from most of the host species: the mite *Haemolae-*

laps glasgowi (Table 1). It was not surprising because this species is the most common ectoparasite of rodents although Myobiid mites are known as rodent mites of Iran (5). Bochkov et al. introduced a new mite species from Iran: *Trichoecius calomysci* (Acari: Myocoptidae) in 1999, but in our survey no new mite species identified (3). In addition, they described Myobiidae family in 2000 (5).

In Siphonaptera order, *Xenopsylla baxtoni* was the prevailing species and this species known as major vectors of plague in its foci at most area of world so it could be one of more important rodent ectoparasites of Khorramabad as an important potential vector. Also according to this study, Zagheh area could be a high-risk zone for zoonotic disease transmission due to poor hygienic conditions and the most occur of fleas and mites.

In our study only larval stage of *Haemaphysalis* sp was found, however in other studies, all stages of tick were found (2, 4, 6- 8).

Only 2 Iranian squirrels (*Sciurus anomalus)* were examined in this study. However, no one was parasitized by ectoparasites, because they had been died in the traps, when we found them.

Overall, we have documented the presence of several species of wide-ranging parasitic arthropods on rodents in Khorramabad and those which are known as vectors of zoonotic pathogen including: the flea *Xenopsylla baxtoni* (a vector of the bacterial agent that causes plague-(9), tick (*Haemaphysalis* sp.) can be a pest of livestock (9), mite *Ornithonyssus sylviarum* (a serious pest of domestic and wild birds (6, 8).

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