Short Communication

Determination of Rodent Ectoparasite Fauna in Sarpole-Zahab District, Kermanshah Province, Iran, 2004-2005

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ABSTRACT

Ectoparasites of various species of rodents were examined from Sarepole Zehab, Kermanshah Province Iran during 2005. This city is bordered with Iraq. A total of 139 rodents included 6 species of hosts were captured during all different seasons and examined for ectoparasites using live trap. The area of study was mainly plateu (70%) and mountanous. The hosts including: *Microtus socialis, Mus musculus, Rattus rattus, Nesokia indica, Meriones persicus and Tatera indica*. The 9 species of ectoparasites recovered included 3 fleas (*Pulex irritans, Xenopsylla buxtoni, Nosopsyllus medus*), one sucking lice (*Polyplax spinolosa*), two ticks (*Rhipicephalus* sp., *Hyalomma* sp.), and 3 mites (*Lealaps nuttalli, Dermanysus sanguineus, Ornithonussus bacoti*). Among all arthropod collected, the lice and flea had the most and least frequency, i.e. 77.7% and 4.4%, respectivelly. The data showed that the ectoparasites on some rodent hosts tend to prefer particular host body sites, and that some ectoparasite species sites may overlap owing to their inaccessibility to the host.

Keywords: Rodents, Ectoparasites, Iran

INTRODUCTION

Most medically important rodents belong to the families of Muridae and the Cricetidae. Rodents play a role in many diseases, such as plague, transmitted by the rat flea *Xenopsylla cheopis* and Weil's disease, a severe form of leptospirosis transmitted via infected rat urine. Rodents play a role in conditions such as echinococcosis (*E. multilocularis*), trichinellosis, Lyme borreliosis, salmonellosis, rat bite fever, tularemia, lymphocytic choriomeningitis, *Hymenolepis diminuta* and rickettsioses such as RMSF, scrub typhus and murine typhus. Haemorrhagic fevers that are transmitted by rodents ("rodent-borne") include Hantaviruses and Arena viruses such as Junin, Machupo and Lassa fever. Infection with *Penicillium marneffei* is essentially a disease of rodents, but can occur in AIDS patients in Southeast Asia (Bell et al. 1988, Vatandoost et al. 2003, Telmadarraiy et al. 2004).

The aim of this study was to find geographical distribution of rodents and their ectoparasites for implementation of any prevention and control measures for zoonotic diseases in the region.

MATERIALS AND METHODS

Geographical information

Sarpole Zahab area, 971 km^2, Longitude 54° 52, Attitude 34° 24́, Elevation 550 meter, precipitation 500 mm, Maximum temperature 44.8 °C, Minimum temperature 3.4 °C.

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Rodent collection

Rodents were live trapped at different localities including Markaziand Humeh Ghaleh-Shahin Zahab and Posht-Tangh Beshive and Patagh**.** The collection was carried out on various occasions in years 2004- 2005. 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 according to the season.

Collecting of ectoparasites

Captured animals were transported to laboratory and their ectoparasites were picked up. Fleas, mites, lice and ticks were collected using brushing against the fur of rodents. In some cases of ticks they were collected by forceps. Ectoparasites were stored in 70% ethanol for their preservation and identification.

Ectoparasite and rodent identification

Ectoparasites specimens were mounted using different stages of clearing, dehydration and mounting procedures. Finally specimens were fixed in between microscope slides and cover glass using Canadabalzam. Different criteria of morphology of rodents were used for species identification.

Field operation, site selection, active reconnaissance, trap timing, trapping method, trap baiting, trap collection, biometrics measurement, data recoding, ectoparasites collection laboratory operation, preparation of rodent skulls, mounting of ectoparasite, identification using valid keys, confirmation of some species by expertise Institute was carried out according to standard methods provided. Some ticks were collected at the immature stage, so that they species name was announced as sp.

RESULTS

In four different epidemiological parts of the county a total of 139 rodents of both sexes were captured and from them 753 sample of ectoparasites were collected. Subsequently all of them were identfied in labratoary. Rodents belong to suborder Myomorpha, family of Muridae (Subfamily: Murinae), Critidae (Subfamily: Gerbillinae and Microtinae) (Table 1). Three species of *Mus musculus, Rattus rattus, and Nesokia indica* were found in all parts of the study area. There was no significant difference in distribution of two commensal rodent in their distribution ($P> 0.05$), However wild rodents was found significantly different in their abundance and frequency ($P< 0.05$). There was significant difference among rodent species in their habitats ($P< 0.05$). *Tatera indica* was found more infested by different ectoparasites than other species (78.1%). The figure for *Microtus socialis* was very low (0.3%).

The ectoparasites were found mainly from different species of flea, mite, lice and ticks (Table 2, Fig.1). Several indicators such as: Ectoparasite Species Richness, Mean abundance, Ectoparasite Catch Range, and Specific Diversity Index were determined for each rodent and ectoparasites. These indicators mainly depend on season, rodent species, ectoparasite species, location, method of catch, geographical situation, ecological condition, rodent predators, seasonal activities, and population dynamics. *Xenopsylla buxtoni* was found in all seasons; however this species was more prevalent in summer. In contrast, *Pulex irritans* are active during winter. *Nosopsyllus medus* was found mainly in spring. *Polyplax spinulosa* are found mainly in autumn. *Hyalomma* sp. and *Laelaps nuttalli* in spring, and *Rhipicephalus* sp. in summer were more abundant.

Table 1. Species composition of rodents, Sarpolezahab District, Kermanshah Province, 2004-2005

Rodent species	Rodents catch at different area								Rodent catch rate		Chi-Square test (*P*-value)
	Markaziand Humeh		Ghaleh-Shahin		Zahab and Posht-Tangh		Beshive and Patagh				
	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	
Mus musculus	9	25.0	8	22.2	10	27.8	9	25.0	36	25.8	0.794
Rattus rattus	6	31.6	4	21.1	3	15.8	6	31.6	19	13.6	0.782
Nesokia indica	8	22.9	7	20.0	5	14.3	15	42.9	35	25.2	0.042
Microtus socialis	3	7.1	0	0	0	0	2	12.5	5	3.6	0.023
Meriones persicus	5	100.0	0	0	0	0	0	0	5	3.6	-
Tatera indica	0	0	0	0	39	100	0	0	39	28.1	0.000
Total	31	30.2	19	45.3	57	13.0	32	11.5	139	100.0	0.000

Table 2. Ectoparasite groups among rodents, Sarpolezahab District, Kermanshah Province, 2004-2005

Rodent species	Rodents catch at different area							Total catch rate			Chi-Square test (*P*-value)
	Fleas		Mites		Lice		Ticks				
	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	Catch No.	Catch rate (%)	
Mus musculus	4	18.2	18	81.8	0	0	0	0	22	2.9	0.003
Rattus rattus	6	50.0	0	0	0	0	6	50.0	12	1.6	1.000
Nesokia indica	4	4.2	0	0	34	35.4	58	60.4	96	12.8	0.000
Microtus socialis	2	100	0	0	0	0	0	0	2	0.3	-
Meriones persicus	7	21.2	14	42.4	10	30.3	2	6.1	33	4.4	0.026
Tatera indica	10	1.7	10	1.7	540	92.0	27	4.6	587	78.1	0.000
Total	33	4.4	42	5.6	584	77.7	93	12.4	752	100.0	0.000

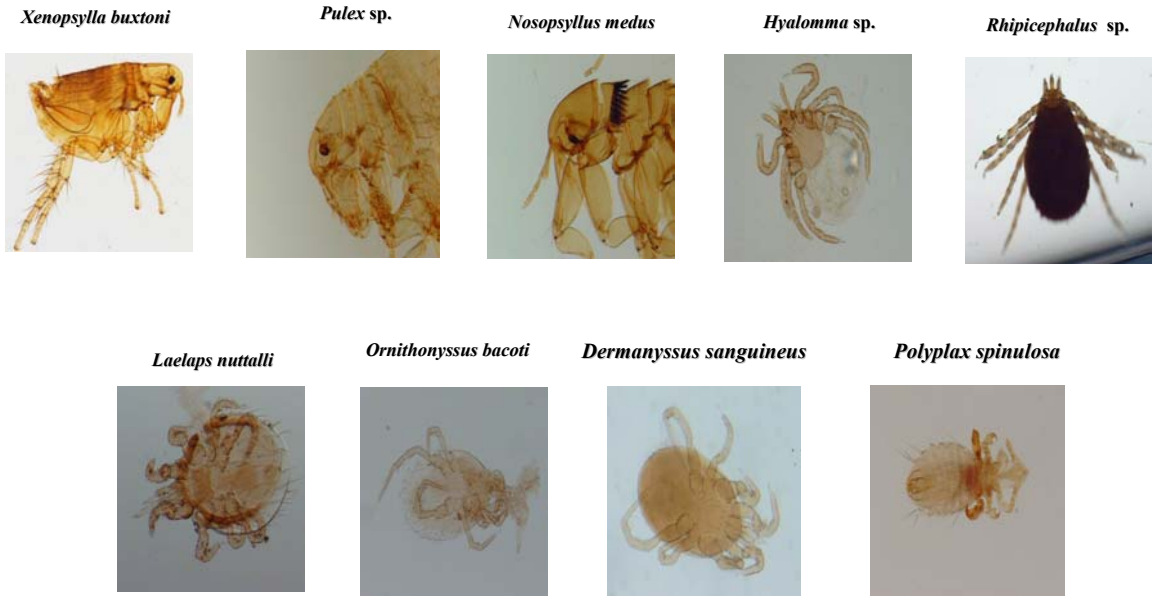

Fig. 1. Different ectoparasites collected from rodents in the study area

DISCUSSION

There are several reports in the world indication variation of those indicators (Abulhab 1984, Meehan 1984, Shoukry et al.1986, Durden et al. 2000, Shayan 2003, Kia et al. 2004). *Laelaps nuttalli*, and *Polyplax spinulosa* was also reported from Mongolia (Chuluun et al. 2005). The prevalence and general indices of some ectoparasites in this area showed differences related to the locality of their rat hosts. Seasonal changes in the general indices of some ectoparasites paralleled seasonal changes in the relative abundance of their rat hosts.

The indices of infestation by the mites *Laelaps nuttalli*, the louse *Polyplax spinulosa* and the flea *Xenopsylla cheopis*, on *Rattus norvegicus norvegicus* in Brazil were related to seasonal period, sex of the host and area of capture (Linardi et al. 1985). Mode of transmission of disease from rodents to human are; feces, urine, saliva, blood and milk. Factors explaining the emergence of a zoonotic or potentially zoonotic disease are usually complex, involving mechanisms at the molecular level, such as genetic drift and shift, and modification of the immunological status of individuals and populations. Social and ecological conditions influencing population growth and movement, food habits, the environment and many other factors may play a more important role than changes at the molecular level. The probability of disease transmission from animals to man is influenced by several factors such as: length of time the animal is infective, length of the incubation period in animals (this is important in some diseases with long incubation periods, because the animals may be studied and euthanatized before they become infective for humans, the stability of the agent. (Acha and Szyfres 1987).

In conclusion, results of our study are able to provide a clue for prevention and control of zoonotic diseases in the region for local authorities and in the emergency situations.

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REFERENCES

Abulhab J (1984) Some ectoparasites of the commensal rodent in Baghdad. Bull Endemic Dis. 24(25): 51-62.

Acha, PN and Szyfres B (1987) Zoonoses and communicable diseases man and animals. Pan American Health Organization, Washington, DC.

Bell JC, Palmer SR, Payne JM (1988) The zoonoses: infections transmitted from animals to man. Edward Arnold Press, London, UK.

Chuluun B, Mariana A, Ho T, Mohd Kulaimi B (2005) Preliminary survey of ectoparasites of small mammals in Kuala Selangor Nature Park. Trop Biomed. 22(2): 243-247.

Durden LA, Hu R, Oliver JH, Cilek JE (2000) Rodent ectoparasites form two location in northwestern Florida. J Vect Ecol. 25(2): 222-228.

Kia E, Telmadarraiy Z, Vatandoost H, Homayouni MM, Satvat M, Jedari M, Kasiri F (2004) Ectoparasites and arthropoda- borne parasites of Brown rat, *Rattus norvegicus* in Ahvaz, southwest Iran. XXII International Congress of Entomology, Queensland, Australia.

Linardi PM, Botelho JR, Cunha HC (1985) Ectoparasites of rodents of the urban region of Belo Horizonte, MG. II. Variations of the infestation indices in *Rattus norvegicus norvegicus*. Mem Inst Oswaldo Cruz. 80(2): 227-232.

Meehan AP (1984) Rat and Mice, Their Biology and Control. Rentokit LTD [Publ]. England. London.

Shayan A (2003) Study of rodents and their ectoparasites in Khoramabad Township [MSc thesis]. Tarbiat Modarres University, Iran.

Shoukry A, Morsy TA, Abu Hashish TA, el Kady GA (1986) Seasonal activities of two commensal rats and flea index in North Sinai governorate, Egypt. J Egypt Soc Parasitol. 16 (2): 385-393.

Telmadarraiy Z, Bahrami A, Vatandoost H (2004) A survey on fauna of ticks in west Azer-baijan Province, Iran. Iranian J Publ Health. 33: 65-69.

Vatandoost H, Ghaderi A, Javadian E, Zahir nia AH, Rassi Y, Piazak Y, Kia EB, Shaeghi M, Telmadarreiy Z, Aboulghasani M (2003) Distribution of soft ticks and their infection with Borrelia in Hamadan Province, Iran. Iranian J Publ Health. 32(1): 22-24.