A Study on Rodent Ectoparasites in the North district of Tehran, Iran During 2007-2009

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ABSTRACT

Rodent ectoparasites seems have a main role in transmission of some zoonotic pathogens from commensal rats to human and pets such as leishmaniasis, plague, CCHF, etc. So rodents as the main reservoirs, are potential health dangers in human communities. The aim of this study was to determine the prevalence and frequency of identified ectoparasites in north of Tehran**.**

Rodents were captured with live traps during 2007-2009. After transferring to the laboratory and identifying, their ectoparasites were collected and mounted for species identification by using valid keys. Sixty four rodents included two species: *Rattus norvegicus (*82.8%) and *Mus musculus* (17.2%) were captured. 1755 ectoparasites collected from 43 infested *R.norvegicus* were related to 5 genera and 6 species: *Ornithonyssus bacoti (*71.7%), *Hoplopleura spp (*17%), *Hoplopleura oenomydis (*11.3%), *Polyplax spinulosa (*3.8%), *Nosopsyllus fasciatus* (3.8%), and *Ixodes ricinus* (1.9%). 11 *Mus musculus* were free of ectoparasites. Among all arthropods, mites and ticks had the most (97.4%) and the least (0.1%) frequency in *R.norvegicus*, respectively. Also, *Ornithonyssus bacoti* was a prevalent species (71.7%) with mean abundant 32.2. *I.ricinus* with 1.9% prevalence was the least prevalent ectoparasites. 11 *M.musculus* were free of ectoparasites.

Keywords: Rodent; Rattus spp.; Mus musculus; Ectoparasite; Tehran; Iran

INTRODUCTION

The commensal rats are potential health dangers in big cities. Other than the economic losses, they have a main role in transmitting some important viral, bacterial, protozoan and helminthic diseases to human and animals directly or indirectly [6, 12-13, 20]. These small vertebrates are suitable for hospitality of some groups of arthropods that are known as ectoparasite. They are well - adapted for living on the external surface of rodents bodies (permanent or temporary). Rats are known to harbor four groups of arthropod ectoparasites: fleas, ticks, mites and lice [2-3]. Ectoparasites are irritating pests of human and animals.

Rats are a health problem in the north of Tehran and rat control programs have been always performmed, but there is no paper about ectoparasites and their role in public health in mentioned area above.

The aim of this study was to collect and identify the arthropod ectoparasites that parasitizing rodents in north district of Tehran (capital of Iran) to provide some information about the species diversity, the prevalence and frequency of these small creatures and the risks associated with contacts of rodents with people and pets in this region.

MATERIALS AND METHODS

This descriptive study was carried out over a period of 19 months between July 2007 and November 2009 in 5 area (namely Evin, Darake,Velenjak, Darband and Dar-Abad) in north of Tehran.

Rodents were collected by Sherman live traps. The traps were baited with cheese and bread and remained opened from afternoon until the morning when they were checked for the presence of rodents. The caught rodents after coding and recording necessary characters were transferred to the animal- room laboratory of Paramedical School of Shahid Beheshti Medical University.
Rats were killed with Diethyl-ether and their morphometric characters were recorded, then they were put on a white paper sheet and combed with a soft tooth-brush to remove the ectoparasites. Ectoparasites were collected with using a water-colour brush to be stored in 70% ethanol inside coded glass tubes. First, they were counted and grouped according to morphotype, and then they were taken to the Dept. Medical Entomology in Pasteur Institute. Some samples were taken from each morphotype group for clearing with KoH 10%, dehydrating and mounting with Canada Balsam for identifying. Rodents were identified by morphometric characters [7] and ectoparasites with valid entomological keys [21].

RESULTS

During this study 64 captured rodents of both sexes after identifying represented 2 species: *Rattus norvegicus* and *Mus musculus* (*Muridae* family). No case of *Rattus rattus* was captured. 53 Norway rats, *Rattus norvegicus* (82.8%) and, 11 House mice *Mus musculus* (17.2%).

67.2% of the rodents were infested with ectoparasites. All of the 11 examined house mice did not present any ectoparasites. In the other hand 43 (81%) out of 53 *R.norvegicus* had infestation with 1 or 2 ectoparasites (Figure.1).

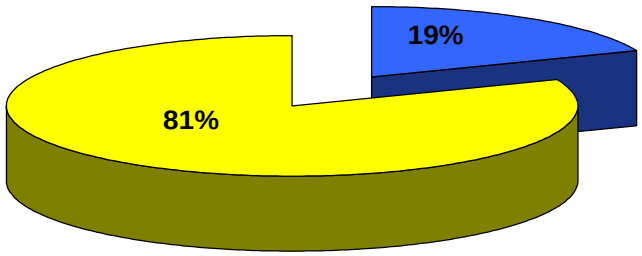

Figure 1. Ratio of infected and uninfected *R.norvegicus* in north district of Tehran,2007-2009

28 rats (65%) with one and 15 rats (35%) with two ectoparasites were infested. Collected ectoparasitic arthropoda that were recovered from Norway rats belonged to four main groups including 6 species: fleas, mites, lice and ticks.

Lice with 3 species had the most biodiversity in our study. The most and the least prevalence belonged to *Ornithonyssus bacoti* and *Ixodes ricinus* (71.7% versus 1.9%) respectively.

The prevalence of each ectoparasitic species in *Rattus norvegicus* is shown in table1.

Table 1. Prevalence of 6 ectoparasitic taxa collected from 53 *R.norvegicus* captured from north district of Tehran,2007-2009.

	Taxon	infested.No	%
Mites	Ornithonyssus bacoti	38	71.7
Lice	Hoplopleura spp.	9	17
	Hoplopleura oenomydis	6	11.3
	Polyplax spinulosa	2	3.8
Fleas	Nosopsyllus fasciatus	2	3.8
Ticks	Ixodes ricinus	1	1.9

From 1755 identified ectoparasites collected from 43 *Rattus norvegicus*, 1711 (97.4%) were *Ornithonyssus bacoti*, 37 (2.2%) belonged to three different species of lice, 5 (0.3%) *Nosopsyllus fasciatus* and 2 (0.1%) *Ixodes ricinus* (table 2).

Table 2. Ectoparasites species frequency collected from 43 *R.norvegicus* in north district of Tehran, 2007-2009

Total No. of Ectoparasites	No.	%
	1755	100
Mite		
Ornithonyssus bacoti	1711	97.4
Lice		
Hoplopleura spp.	24	1.4
H.oenomydis	10	0.6
Polyplax spinulosa	3	0.2
Overal	37	2.2
Flea		
Nosopsyllus fasciatus	5	0.3
Ticks		
Ixodes ricinus	2	0.1

O.bacoti and *I.ricinus* allocated the most (97.4%) and the least (0.1%) frequency of ectoparasites in our study respective

DISCUSSION

Ectoparasitic arthropods as vectors of zoonotic pathogens have an important role in causing diseases such as anaplasmosis, ehrlichiosis, rickettsiosis, plague, lyme borreliosis, viral encephalitis, tularemia, CCHF, zoonotic leishmaniasis, murine typhus, etc. They can also transmit disease to human by: feces, urine, saliva, milk and blood [22, 23]. Captured rodents in our study, *Rattus norvegicus* and *Mus musculus* were reported in some studies in Iran as vector of some ectoparasites[8, 10, 14-15, 17]. Other studies in some countries have similar results[4-5, 18]. Study in Bandar Abbas after control program showed four rodent species: *R. norvegicus*, *R. rattus*, *Tatera indica*, and weasel, their ectoparasites were *Xenopsylla buxtoni*, *Rhipicephalus spp*, *polyplax gerbili*, *Hoplopleura captiosa*, *Ornithonyssus bacoti*, *Laelaps nuttal Dermanyssus americanus*, *Dermanyssus sanguineus*, *Haemolaelaps glasgowi* and *Echinolaelaps echidninus*[8]. In his study the most common rat species was *R. norvegicus* (51.4%). In another survey in Iran the captured rodents were *R.norvegicus* (74%), *R.rattus* (16.9%), *M.musculus* (7.8%) and one hamster. Among these rodents, 40.3% were infested with some ectoparasites like *Xenopsylla cheopis*, *X.astia*, *Hyalomma sp*, *Rhipicephalus spp*, *Laelaps nuttali* and *Polyplax spinulosa* [10].

Other studies also have showed prevalence of some ectoparasites in *R. norvegicus* such as *Echinilaelaps echidnini*, *Hoplopleura spp*, *Nosopsyllus fasciatus* in Iran([14-15), *X.buxtoni* in Qatar[1] and *X.cheopis*, *Ctenocephalides felis*, *P.spinulosa*, *L.nuttali*, *E,echidninus* and *Atricholaelaps glasgowi* in Brazil [12].

In present study captured rodents represented two species: *R. norvegicus* and *M. musculus.* All of 11 *M. musculus* were free of ectoparasites because they usually live in houses and have cleaner habitats [17]. On the other hand brown rats, *R. norvegicus* (sewer rat) usually live in sewer ducts, water canals and beneath rubbish or woodpiles, so they are more infected.

In current study 81% *R .norvegicus* were infested with 1 or 2 ectoparasites. 28 rats (65%) with one and 15 rats (35%) with two ectoparasite were infested. The most prevalence belonged to

Ornithonyssus bacoti (71.7%) and followed by *Hoplopleura spp* (17%), *Hoplopleura oenomydis* (11.3%), *Polyplax spinulosa* (3.8%), *Nosopsyllus fasciatus* (3.8%) and *Ixodes ricinus (*1.9%), respectively.

The most and the least frequency belonged to *O. bacoti* (97.4%) and *I. ricinus* (0.1%).The frequency of the other ectoparasites was *Hoplopleura spp* (1.4%), *H. oenomydis* (0.6%), *P. spinulosa* (0.2%) and *N. fasciatus* (0.3%).The most common ectoparasite was *O. bacoti* with mean abundant 32.3 per each rat. *O. bacoti* (tropical rat mite) is potentially the most significant ectoparasite of rodents because it bites human and infests other wild and domestic animals, specially, rodents [24]. *O. bacoti* is a vector of filarial nematodes and Hantman virus and is a vector of *rickettsia akari* and bubonic plague in the laboratory [11, 16].

Two *Ixodes ricinus* were found in the external auditive conduct of a young male Norway rat. The presence of *I. ricinus* on the rats increase the risk for transmission of tick-borne zoonotic pathogens. One of the most important of them is Lyme borreliosis. In a study in Faroe islands in the North Atlantic, Jaenson and Jensen suggested that *I. ricinus* has a main role in transmission cycles for Lyme disease bacteria [9].

CONCLUSION

However all of these ectoparasites have medical and veterinary importance but, rat control is a temporary measure for the prevention and control of rat-borne disease, it has been observed that with the elimination of rodent hosts, the ectoparasites become more annoying to man, so for having an effectiveness control program, eradication of both the ectoparasites and the hosts is essential and suggested here, along with increase in public knowledge is rcommended.

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