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Study of Endoparasites of Rodents and their Zoonotic Importance In Ahvaz, South West Iran

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ABSTRACT

During an investigation on the endoparasites of rodents in Ahvaz, Khuzestan province, south west Iran, a total of 90 rodents including 14 *Mus musculus*,4 *Rattus rattus* and 72 *R. norvegicus* were trapped from different localities of Ahvaz and its suburbs, during 1998-2000, using live traps. Examination of different tissues, identification of parasite species and serological tests were carried out in School of Public Health and Institute of Public Health Research. Results showed that the variation among helminth species was wide especially those which arthropods are involve in their life cycles. The most prevalent species of rodents was *R. norvegicus* in which *Trypanosoma lewisi* and *Trichosomoides crassicauda* were the most prevalent species of protozoan and helminth parasites, respectively. *Gongylonema monigi, Streptopharagus kuntzi* and *Rictularia ratti* from *R.norvegicus* and *G. neoplasticum* from both *R. norvegicus* and *R. rattus* are reported for the first time in Iran. Report of *Physocephalus sexalatus* from *R.norvegicus* apparently comprises an new host species in the world. The public health importance of zoonotic species are discussed.

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INTRODUCTION

Many rodents, including the commensal species are implicated in the spread of diseases to humans and domestic animals. The causative organisms of many diseases are carried in the blood of rodents and need an arthropod vector to act as an intermediary in the transmission of the diseases to man (12). The development of control methods against zoonotic parasites is dependent on knowledge of their life cycles and transmission pattern in each zoogeographical condition. Such studies are generally part of medical or veterinary public health programmes. In Iran because of different ecological conditions, there are high variety of rodents which implies understanding of zoonotic parasite patterns in each area. Scientific literature relating to rodent borne parasites in Iran insists on the role of rodents as reservoir of protozoan infections particularly leishmaniosis (2, 3, 7, 10, 13, 15, 17, 23, 25) and helminth parasites (7, 14, 16, 17, 18), as well as their infestation with ectoparasites (7, 16, 17). Regarding to what has been said hitherto, we studied the internal parasites of rodents in Ahvaz where high density of rodents and rat-man proximity are considerable. An important aim was to find helminth and tissue protozoan parasites with particular reference to those parasites which present a health threat to man.

MATERIALS AND METHODS

During 1999-2000 trappings were performed in different seasons using live traps. In each locality, baited traps were situated inside houses, along the rodent routes to their burrows, following the permission of householders. On consequetive days, traps were collected and transported to Ahvaz Health Education and Research Center where rodents were bled. Tick and thin blood smears as well as impression smears of spleen

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aseptical condition. The culture media were inspected twice a week for four weeks. Collected and preserved materials were shipped to School of Public Health and Institute of Public Health Research for examination. All smear slides were stained with Giemsa and observed by light microscope using high power (x100). Different organs of carcases including liver, bladder, alimentary tract were separatly searched under dissecting microscope for helminth parasites. Recovered helminth were identified after clearing in lactophenol, using valid references (4,20,24). Sections of muscles and brains were examined microscopically for any cysts after staining with lacto-propionic-orcein.

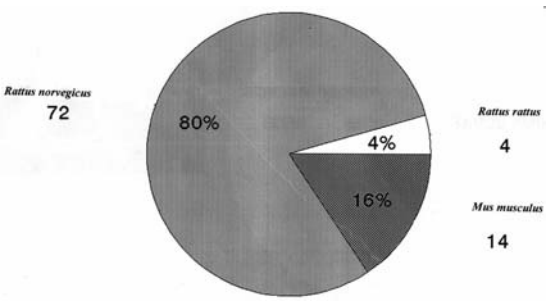
Indirect Immunofluorescent Antibody (IFA) test were perforemd on sera for *Toxoplasma* and visceral *Leishmania* infections using rabbit anti-rat immunoglobulins/ FITC (DAKO) specific conjugate.

RESULTS AND DISCUSSION

During this study a total of 90 rodents were captured including three species; 14 (16%) house mouse, *Mus musculus*, 4 (4%) black rat, *Rattus rattus* and 72 (80%) brown rat, *Rattus norvegicus* (Fig.1). Therefore, the most abundant species in the present study was *Rattus norvegicus*; while in a study which performed on wild rodents in Khuzestan (18), *Tatera indica* was the most dominant species.

For all three species of rodents, more females were captured than males (Table 1). This is probably because females repeatedly exit the nests to gain more food during their pregnancy and lactating, so they are more vulnurable to be trapped than males.

Fig. 1. **Frequency and percentage of different species of rodents trapped in Ahvaz (1999-2000)**



Among the different localities, Shilang-Abad and Seyed-Karim had relatively higher abundancy of rodent population base on the ratio of number of captured animals to number of night traps. This is mainly due to unsupervised housing constructions and lack of health sewage system in these localities.

Endoparasites and their zoonotic importance:

In *Mus musculus* two species of helminth parasites were found . One male was infected with *Hymenolepis nana var. fraterna* and one female with *Syphacia muris. Hymenolepis nana* can fect humans (24).

included only 4% (n=4) of the collected rodents in study, while in Tehran higher proportion of *R.* %), compared to other species of rodents, was .

low number of *R.rattus* captured, 4 species of parasites were identified; three species including *Cysticercus fasciolaris*, *Strongyloides sp* and *Trichosomoides crassicauda* were in a female, simultaneously. In another female *Gongylonema neoplasticum* was found. This indicates that *R.rattus* can harbor a wide variety of parasites, like *R.norvegicus* which will be discussed in the followings. There are quite a few reports of human infections with *Gongylonema spp* (1, 9, 21, 22) in the world. In Iran in 1992 *Gongylonema sp* has been extracted from the buccal mucosa of a woman refferd to Division of Helminthology, School of Public Health and Institute of Health Research (Professor J.Massoud, personal communication).

Among 72 *R.norvegicus* examined, 49 (68%) had at least one species of parasite. In respect to the protozoan parasites, *Trypanosoma lewisi*, the most prevalent species, was found in 10% of *R.norvegicus* (6 infected out of 60 examined). This protozoan parasite has worldwide distribution in rats and rat fleas are its vectors. In Iran, trypanosomes of the subgenera *herpetosoma*, *Schizotrypanum* and *megatrypanum* have been reported in 9 different species of small mammals (2). Infection of rats with *T.lewisi* has also been reported in Tehran (17).

Giardia muris was also found in 2.7% of *R.norvegicus* by direct smears. Examination of sera by IFA test for detecting anti-*toxoplasma* and anti-*Leishmania* antibodies revealed that all sera were negative for *Toxoplasma* ; only one serum of a *R.norvegicus* showed anti-*Leishmania* antibodies with 1:80 titer against *Leishmania* parasites. Since no parasite was found on impression smear slides of liver or spleen of this rat so, it may be concluded that it is because of cross reaction with other infectious agents.

Table 2 shows the frequency of helminth parasites in *R.norvegicus* detected in different organs. The wide variety of helminth parasites in *R.norvegicus,* especially those of spirurids, is partly due to abundancy of beetles in the area, as the residents had also complained, which act as intermediate host for some species. This variety of helminths is in contrast to the results mentioning that in Reyjavik due to the absent of intermediate hosts of many species of helminth parasites, only few parasites in *R.norvegicus* were found (19).The fauna of helminth parasites in this study is also different compared with those reported in wild rodents in Khuzestan province (18), due to the effect of different hosts.

G. monigi, Streptopharagus kuntzi and *Rictularia ratti* in *R.norvegicus* and also *G.neoplasticum* in both *R.rattus* and *R.norvegicus* are new geographical records, reporting for the first time in Iran. *Rictularia sp* has been reported in Khuzestan in wild rodents (18) and in carnivores (6).

Physocephalus sexalatus is a common parasite of pigs and boars and rarely in horse, cow, hare and donkey in the world. In Iran it has also been reported from camel and boar (cited by 4). So, the occurrance of this species in *R.norvegicus,* in the present study, is apparenly the first record in a new host species.

In order to see wether there is any statistical difference between males and females of *R.norvegicus* in infection with different species of parasites, the prevalences of those infections which were high enough to do statistical analysis were set out in Fig.2. Only in infection with *H.nana* there is significant difference between males and females, that means males are statistically more infected than females (P=0.01). However, for other parasites there was no significant difference between the prevalences of infection in males and females. Nevertheless, for *T.crassicauda* and *Strongyloides sp*. which more females and more males were infected with, respectively, the non-significant differences are probably because of the sample size effect.

In addition to *H.nana* and *Gongylonema spp* which were discussed earlier, *H.diminuta* is also a known zoonotic species. The highest prevalence rates of human infections in Iran have been reported in the rural areas of Minab (8). There are rare reports of human infections with *T.lewisi*, *Aspicularis tetrapetra* and C*ysticercus fasciolaris* (cited in 17). In histopathologic sections of an appendix in a postmorten examination, a gravid female of *Rictularia sp* was found in New York (11). This is the first report of *Rictularia* in man .

In conclution, in Ahvaz, rodents, especially rats represent a potential risk to the health of human. Abundancy of beetles and fleas had led to a wide variety of those parasites utilizing arthropods as vector or intermediate host in their indirect life cycles.

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Table1. **Prevalences of endoparasites in different species of rodents according to their sex (Ahvaz, 1999-2000)**

Sex	Rodent species											
	M.musculus			*R.rattus*			*R.norvegicus*			Total		
	No. examined	Infected		No. examined	Infected		No. examined	Infected		No. examined	Infected	
		No.	%		No.	%		No.	%		No.	%
Male	2	1	50	1	0	0	29	19	65.5	32	20	62.5
Female	12	1	8.3	3	2	66	43	30	69.8	58	33	56.9
Total	14	2	14.3	4	2	50	72	49	68.0	90	53	59.0

Table 2. **Prevalences of helminth parasites in *Rattus norvegicus* according to the different organs (Ahvaz, 1999-2000)**

organ	Liver	Oesophagus and / or Stomach			Stomach		Small intestine				Large intestine	Bladder
parasite species	*Cysticercus fasciolaris*	*Gongylonema pulchrum*	*Gongylonema neoplasticum**	*Gongylonema monigi**	*Streptopharagus kuntzi**	*Physocephalus sexalatus***	*Hymenolepis nana fraterna*	*Hymenolepis diminuta*	*Strongyloides sp*	*Rictularia ratti**	*Aspicularis tetrapetra*	*Trichosomoides crassicauda*
No.infected (%)	10 (13.8%)	9 (12.5%)	2 (2.8%)	2 (2.8%)	1 (1.4%)	1 (1.4%)	9 (12.5%)	8 (11.1%)	14 (19.4%)	6 (8.3%)	2 (2.8%)	27 (37.5%)

N=72
*first record in Iran
** first record in a new host, *R.norvegicus* in the world

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