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 *Physoscephalus sexalatus* from *R. norvegicus* apparently comprises a 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 consecutive 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 were prepared. In suspicion to cutaneous leishmaniosis, case of presence of any papule on the surface of ears, two and liver were prepared. Then rodents were dissected and 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.

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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 vulnerable to be trapped than males.

Among the different localities, Shilang-Abad and Seyed-Karim had relatively higher abundance 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 infect humans (24).

In Rattus rattus and Rattus norvegicus which will be discussed in the followings. There are quite a few reports of human infections with Gongylolena spp (1, 9, 21, 22) in the world. In Iran in 1992 Gongylolena sp has been extracted from the buccal mucosa of a woman referred 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 kerreperia, 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 abundance 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).

Physcephalus 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 occurrence of this species in R.norvegicus, in the present study, is apparently the first record in a new host species.

In order to see whether 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 Cysticercus fasciolaris (cited in 17). In histopathologic sections of an appendix in a postmortem examination, a gravid female of Rictularia sp was found in New York (11). This is the first report of Rictularia in man.

In conclusion, in Ahvaz, rodents, especially rats represent a potential risk to the health of human. Abundance 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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Table 1. Prevalences of endoparasites in different species of rodents according to their sex (Ahvaz, 1999-2000)

<table>
<thead>
<tr>
<th>Rodent species</th>
<th>M.musculus</th>
<th>R.rattus</th>
<th>R.norvegicus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. examined</td>
<td>Infected</td>
<td>No. examined</td>
<td>Infected</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>2</td>
<td>4</td>
<td>72</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>organ</th>
<th>Liver</th>
<th>Oesophagus and/or Stomach</th>
<th>Stomach</th>
<th>Small intestine</th>
<th>Large intestine</th>
<th>Bladder</th>
</tr>
</thead>
<tbody>
<tr>
<td>parasite species</td>
<td>Cysticercus fasciolaris</td>
<td>Gongylonema pulchrum</td>
<td>Gongylonema mephistoecum</td>
<td>Stephanofilaria auscella</td>
<td>Hymenolepis diminuta</td>
<td>Strongyloides sp</td>
</tr>
<tr>
<td>No infected rats</td>
<td>10 (13.8%)</td>
<td>9 (12.5%)</td>
<td>2 (2.8%)</td>
<td>1 (1.4%)</td>
<td>9 (12.5%)</td>
<td>8 (11.1%)</td>
</tr>
</tbody>
</table>
| N =72 *first record in Iran** first record in a new host, *R.norvegicus* in the world

REFERENCES


