

Report

Rodents: another group of animal hosts of visceral leishmaniasis in Meshkin-Shahr district, Islamic Republic of Iran

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Introduction

Visceral leishmaniasis (VL), or kala-azar, is an endemic disease in some areas of Ardabil Province in the north-west and Fars Province in the south of the Islamic Republic of Iran. In other provinces of the country, the disease has been reported in sporadic form [1-4]. Although dogs are the main source of infection for human VL, at least in the endemic foci of the country [1], wild carnivores such as jackals and foxes have also been found infected with *Leishmania* spp. and are considered as animal reservoirs of infection, particularly in areas where sporadic cases of disease have been reported [4,5].

In this investigation, a serological and parasitological survey of VL in rodents was carried out during 1994-96 in the endemic focus of Meshkin-Shahr district of Ardabil Province. This study shows that some of the rodents in highly endemic zoonotic visceral leishmaniasis (ZVL) areas may also have a role in transmission of the disease to children and animals.

Materials and methods

Rodents were trapped alive in various parts of the Meshkin-Shahr area. Before killing

the caught rodents, blood samples were collected from each of them in two heparinized capillary tubes. These samples were tested in the kala-azar laboratory of Imam Khomeini Hospital in the Meshkin-Shahr district by direct agglutination test (DAT), according to the methods described by Harith et al. [6,7].

The spleen and liver samples of seropositive rodents ($\geq 1:100$ in DAT) were cultured in Novy-MacNeal-Nicolle (NMN) + liver infusion tryptose (LIT) medium and checked twice a week for six weeks. A total number of 2514 smears were prepared from the blood (thick and thin) and internal organs, including spleen and liver (impression smears). The smears were prepared from all animals and were stained with standard Giemsa stain and examined microscopically for the amastigote form of *Leishmania*. The promastigotes isolated in the culture media were characterized by isoenzyme technique.

Results

Altogether, 419 rodents of five species were trapped alive in various parts of the Meshkin-Shahr area. Fifteen (15) (3.6%) were *Cricetulus migratorius* (grey hamster)

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and seven (1.7%) were *Mus musculus*; both species were caught inside homes. Three hundred and ninety-four (394) *Meriones persicus* (94.0%), two *Mesocricetus auratus* (0.5%) and one *Alactaga* sp. (0.2%) were trapped outside villages. The results of the parasitological and serological tests are shown in Table 1.

Leishmania spp. were isolated from spleens of two *Mer. persicus* and one *Mes. auratus* in NMN + LIT culture media. The promastigotes isolated from *Mer. persicus* were characterized as *L. donovani* zymodeme LON-50 and promastigotes isolated from *Mes. auratus* were determined as *L. infantum* zymodeme LON-49 by isoenzyme technique.

Discussion

In one study, *Mer. persicus* was reported to be naturally infected with *Leishmania* in East Azerbaijan, in the north of the Islamic Republic of Iran [8]. In the smears prepared from the cutaneous lesion of *Mer. persicus*, considerable numbers of amastigotes were seen. Microscopic examination of the smears prepared from the internal organs and blood of this rodent did not show any amastigotes.

In this study, amastigotes were observed in 16.5% of the rodents after microscopical examination of the smears prepared from internal organs. *L. donovani* LON-50 was isolated from two *Mer. persicus*. Previously, this strain of *Leishmania* had been isolated from rodents in eastern Turkey, and from humans in Ethiopia, Kenya and Sudan (D. Evans, personal communication,

Table 1 Parasitological and serological surveys of 419 rodents caught in the Meshkin-Shahr area during 1994-96.

Species	Number tested	Positive on microscopical exam		Positive on culture medium		DAT, <i>Leishmania</i> antibody titres											
		No.	%	No.	%	Neg.	≥ 1:10	≥ 1:100	≥ 1:200	≥ 1:400	≥ 1:800						
Inside houses																	
<i>Cricetulus migratorius</i> (grey hamster)	15	2	13.3	-	-	3	20.0	3	20.0	1	6.7	4	26.7	1	6.7	-	-
<i>Mus musculus</i>	7	-	-	-	-	1	14.3	6	85.7	-	-	-	-	-	-	-	-
Total	22																
Outside houses																	
<i>Mesocricetus auratus</i> (golden hamster)	2	1	50	1	50.0	-	-	1	50.0	1	50.0	-	-	-	-	-	-
<i>Meriones persicus</i>	394	66	16.8	2	0.5	134	34.0	244	61.9	14	3.6	2	0.5	-	-	-	-
<i>Alactaga</i> sp.	1	-	-	-	-	1	100	-	-	-	-	-	-	-	-	-	-
Total	397																
Total	419	69	16.5	3	0.7	139	33.2	254	60.6	18	4.3	3	0.7	4	1.0	1	0.2

1996). Therefore, it is possible that it is transmitted from rodents to humans in this endemic area.

L. infantum LON-49 was isolated from one of *Mes. auratus*. This species of *Leishmania* is zoonotic and had been previously isolated from humans [2] and dogs in the Meshkin-Shahr area, and from dogs in the Kordan area in Karaj district, west Teheran. In addition to humans and dogs, wild carnivores such as jackals and foxes have been found infected with *Leishmania* in the Islamic Republic of Iran [3,5]. Of course, *L. infantum* has been isolated previously, from *Rattus rattus* in Italy and Iraq [9]. As this study found natural *Leishmania* infection of rodents in ZVL highly endemic areas, rodents may also have a role in transmission of the disease to children, par-

ticularly those rodents living inside homes. Further studies may clarify the exact role rodents play as animal reservoirs of kala-azar in the studied areas.

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