

Cutaneous Leishmaniasis in school children in a border area at south-west of Iran

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Abstract. Cutaneous leishmaniasis (CL) is a zoonotic disease, endemic and notifiable in southwestern Iran and children are frequent victims of the disease but studies regarding the disease are scarce. The aim of this study was to evaluate the epidemiology of the disease in school children in the city of Dehloran, southwestern Iran. In 2009 we studied the epidemiology of CL in the city of Dehloran. A questionnaire was completed, recording demographic and disease characteristics. Microscopic examination was carried out for leishmaniasis detection. The overall prevalence of CL was 10.2%. There was a significant difference between percentage of male and female with cutaneous leishmaniasis ($P<0.05$). Although all age groups were affected, the highest incidence of disease was observed in the age group of 10–14 years ($P<0.05$). Most involved organ was face (42%). 76.5% of patients presented with a single lesion. The lesions ranged from approximately 0.1 to 3.5 cm. The prevalence rate of cutaneous leishmaniasis (CL) was significantly different between native residents and non-natives ($P<0.05$). Dehloran is one of focuses of cutaneous leishmaniasis in Iran. Cutaneous leishmaniasis is common in school children of Dehloran and measures should be planned for future control programs. In addition, further investigations are required to clarify the possible reservoirs and vectors in the area.

Keywords: Cutaneous leishmaniasis; Epidemiology; Dehloran.

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Introduction

Cutaneous leishmaniasis (CL) is endemic in some countries in the Middle East, on the Mediterranean coast and in central Asia (Barsky et al., 1978). WHO estimates an

incidence of 12 million cases amongst 350 million at risk, and an annual incidence of 600,000 cases (<http://www.who.int/mediacentre/factsheets/fs116/en/>), with 90% of cases occurring in Afghanistan, Algeria, Iran, Iraq, Saudi Arabia,

Syria, Brazil, and Peru (Desjeux, 2004). There are at least two species of Old World Leishmania, responsible for CL in Iran (Alimoradi et al., 2009). Zoonotic cutaneous leishmaniasis (ZCL) is common in many rural areas of Iran, including 15 of the 30 provinces. About 80% of leishmaniasis cases reported in our country are of the ZCL form (Yaghoobi-Ershadi and Akhavan, 1999). In addition, there are reports of atypical infections, which constitute exceptions to the rules (Yaghoobi-Ershadi, 2001). In our country, *L. major* is causative agent of zoonotic cutaneous leishmaniasis (ZCL) and *L. tropica* causes anthroponotic cutaneous leishmaniasis (ACL). ZCL is endemic in central, northeast, southwest and southeast parts of Iran (Nadim et al., 1994), whereas ACL has been an endemic disease in some large and medium sized cities of our country such as Mashhad, Tehran, Shiraz, Kerman, Bam and Yazd (Nadim, 2000). CL is a serious public health problem in Dehloran, Ilam province, at southwest of Iran, located in border areas between Iran and Iraq and has been reported in this area since 2003 (Tashakori et al., 2003). In Dehloran a study of the epidemiological characteristics of the disease was carried out in 2010 (Mirzaie et al., 2010). In this study in a 3 year study 1320 individuals presented active lesions. In a recent study in the city, all of the examined samples were assigned as *L. major* (Asgari Nezhad et al., 2010).

This study is a population-based survey, designed to determine the epidemiological measures in school children of Dehloran to be used in planning a more accurate control program.

Materials and methods

Study area

The city of Dehloran with more than 35,000 people across the border between Iran and Iraq is situated 220 km south of Ilam, the capital of Ilam province, southwestern Iran. Different ethnic groups such as Lor, Kord, and Arab are settled in this Iranian border area, and several inhabitants usually move across the border with concern to their jobs, trade and business, tourism, or visiting their relatives in

the neighboring country, Iraq. Because it is located close to tropical areas such as Iraq and Khuzestan, Dehloran has hot and arid climate. The average annual temperature is 27.4°C, at an altitude of 215 m above sea level, with annual precipitation of 26.51 mm and a relative humidity of 11%.

Sampling

This study was conducted during autumn of 2009 in the city of Dehloran, Ilam province, southeast of Iran. For epidemiological study, all school children (7,555) of the city of Dehloran were examined. Each school was visited and in each class, a list was prepared and questionnaires were completed by interview for collecting epidemiological data including sex, age, place of lesion, number of ulcer/s or scar/s, and education level of children's parents. Clinically information that was recorded in a separate form for each case, included site, size, and number of the ulcers or scars as well as the course of the disease. Possible traveling experience and date of traveling to other endemic areas inside or outside the country were also questioned. The patients with lesions were referred to the local clinics or health centers, to take skin scrapings by an experienced laboratory technician for light microscopic examination. Oral consent was obtained from the participants and the parents of school children before sampling. All patients with confirmed CL were treated by proper drugs in a local clinic, accordingly. Statistical analysis of the epidemiological data and disease characteristics were performed using chi-square, Fisher's exact test, or linear trend exact tests using SPSS.

Parasitology and laboratory methods

For microscopic examination, for each patient, two Giemsa- stained slides were prepared. Samples were collected by a sterile scalpel and blade from the swollen edge of the skin lesions of cases and thin smears were prepared. Smears were fixed in methanol, stained by Giemsa. At least 100 microscopic fields with $\times 1,000$ magnification under a light microscope were observed for the detection of Leishmania amastigotes before considering the samples as negative.

Results

A total of 7555 school children aged 5-19 years, comprising 3944 boys (52.2%) and 3611 girls (47.8%) were examined physically for the presence of active lesions or scars of CL (table 1). The prevalence of CL was 10.2% (scar 9.7% (735 cases) and active lesion 0.4% (32 cases)).

There was a significant difference between the sexes and prevalence of active lesions or scars ($P<0.05$). The majority of cases occurred in individuals 10–14 years than other age groups. The age groups and sex distribution of CL are presented in table 1 and figure 1.

Table 1. The prevalence of active lesions and scars in different age groups and sexes of school children in the south-western Iranian city of Dehloran

Age group (years)	Male			Female			Total	
	No. of studied	Active lesion	Scar	No. of studied	Active lesion	Scar	Active lesion	Scar
5-9	773	3(0.4%)	49(6.3%)	711	5(0.7%)	43(6%)	8(0.5%)	92(6.2%)
10-14	1509	8(0.5%)	270(17.9%)	1417	6(0.2%)	147(7.6%)	14(0.5%)	417(14.3%)
15-19	1662	6(0.4%)	93(5.6%)	1483	4(0.1%)	133(4.2%)	10(0.3%)	226(7.2%)
Total	3944	17(0.4%)	412(10.4%)	3611	15(0.4%)	323(8.9%)	32(0.4%)	735(9.7%)

Table 2. The prevalence of CL by parents education level in the south-western Iranian city of Dehloran

Groups	No. investigated	Active lesion		Scars	
		No.	%	No.	%
1. Illiterate	1598	6	0.4	123	7.7
2. Intermediate education	4400	20	0.5	468	10.6
3. Higher education	1557	6	0.4	144	9.2
Total	7555	32	0.4	735	9.7

Uncovered parts of the body, the face and hands were mostly involved. Lesions are located on the face (42%), hands (34.8%), legs (18%), and other parts (5.2%). Figure 2 shows the distribution of CL lesions on the body. The number of lesions per patient ranged from 1 to 12. A single lesion was found in 76.5 percent of the patients, 2 lesions in 12.8 percent, 3 lesions in 5.6 and more than 3 lesions in 5.1 percent of the patients (figure 3).

The lesions ranged from approximately 0.1 to 3.5 cm. The studied school children in Dehloran comprised of 6,431 native and 1,124 non-native individuals. The proportion of infected cases was 8.4% in native and 20.5% in non-native inhabitants with significant differences ($P<0.05$). None of the patients showed a history of traveling to other endemic areas at least 1 year prior to their contraction of the ulcer. Distribution of the active lesions and scars in groups with different educational

levels of the parents is presented in table 2. The highest prevalence was seen in the second group; however, the statistical analysis indicated that there was a significant difference between educational level of the parents and CL prevalence ($P<0.05$).

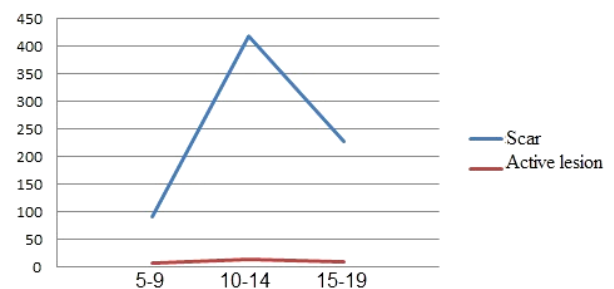


Figure 1. Distribution of number of cutaneous leishmaniasis patients (active lesions and scars) in different age groups in school children in the south-western Iranian city of Dehloran



Figure 2. Location of lesions on the body, in school children in the south-western Iranian city of Dehloran

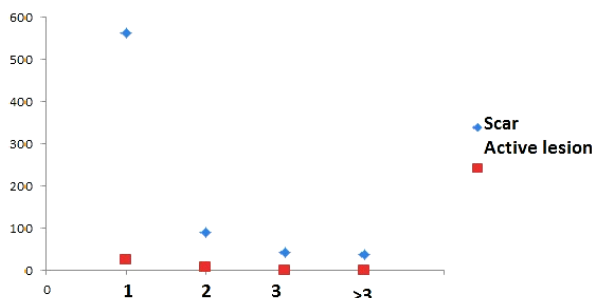


Figure 3. Number of cutaneous leishmaniasis lesions (active lesions and scars) in school children in the south-western Iranian city of Dehloran

Discussion

CL is a serious public health problem and has been reported in this area since 2003 (Tashakori et al., 2003). Some epidemiological studies have been done on CL in our country. Also new foci of ZCL have been reported from most parts of the country. In the outbreak of CL in Sabzevar County, rates of scars and ulcers were 10.4 and 3%, respectively (Yaghoobi-Ershadi et al., 2003). An epidemiological study in Ardestan in 2001 revealed the prevalence of 3.2% for scars and 1.3% for ulcers, with the most affected age group of 10-14 years having a rate of 2.7%. The result of these studies show that CL is endemic in our country (Yaghoobi-Ershadi et al., 2001). In this study CL cases were more frequent in males (55.9%) as compared with females (44.1%) with significant difference ($P < 0.05$), and males seemed to be at a higher risk than females of acquiring CL. This difference could be due to more frequent exposure of boys to sandfly bites during their playing outdoors. The result of this comparison was consistent with those reported earlier. (Sharifi et al., 1998; Talari et

al., 2006a; Al-Samarai and AlObaidi, 2009). In contrast some authors reported higher rates in females (Fazaeli et al., 2009; AL-Zaidawi, 1997). These differences can be explained with regard to considering factors such as study design, study population, climatic variations, and culture. In the population survey, the ulcers were observed among all age groups; however, the highest rate of both scar and active lesion was recorded in the age group of 10-14 years ($P < 0.05$). This is to be expected because school children in this age group play outdoors more than other age groups. This finding was in agreement with those reported by other authors (Yaghoobi-Ershadi et al., 2001).

The higher percentage of the lesions were on the face, followed by hands, which may be due to several factors, such as children's outdoor activities near colonies of rodents, or sleeping outdoors or indoors without a bed net, which increases exposure to sand fly bites during their active hours; it is also probable that the vectors can penetrate the domiciliar environment. Because Dehloran has hot summers, so people prefer to sleep out on house yards and majority of children leave their face and hands out of the cover, exposed to the bites of sandflies. Most of the school children had single and double lesions (89.5%) and only 10.5% showed multiple lesions. The same result has been reported by some other researchers in some endemic areas (Talari et al., 2006b). However, the prevalence of multiple lesions has been reported to be more frequent with *L. major* infection (Momeni and Aminjavaheri, 1994; Ashford, 2000). Educational level of the parents was significantly ($P < 0.05$) related to the prevalence of CL in school children, and 80.5% of parents were illiterate or had intermediate education. Parental education is important to improve the socioeconomic status and standard of living and this may confirm the importance of health education in the control program of CL. The rate of CL between native and non-native settlers was statistically significant ($P < 0.05$). In fact, this difference might be due to non-immune nature of non-natives who have presently migrated for various reasons from non-endemic areas to the city of Dehloran. This result was consistent with the previous

observations, in which only nine samples from patients in this area were assigned as *L. major* (Tashakori et al., 2003). In conclusion, CL infection is prevalent in this city. Although Dehloran is a known foci in Iran and *Tatera indica* (Rodentia: Gerbillidae) is the main reservoir host of ZCL in Ilam Province (Javadian et al., 1998), the sandfly vectors are still unknown in the city of Dehloran, and there is no published data on investigating the sandfly vector in this area. However, further studies, including demonstration of the natural vectors and reservoirs with a greater number of CL cases, are needed to investigate the transmission mechanisms of parasite in this area. Also preventive methods and urgent precautions should be undertaken. The physical conditions of the houses and buildings should be upgraded. Persons who live in an endemic area especially non-natives should be trained about CL, sand fly life cycles and preventive measures.

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