



Contents lists available at ScienceDirect

## Asian Pacific Journal of Tropical Disease

journal homepage: www.elsevier.com/locate/apjtd



Document heading doi: 10.1016/S2222-1808(12)60057-7 © 2012 by the Asian Pacific Journal of Tropical Disease. All rights reserved.

## Progressive increasing of cutaneous leishmaniasis in Kashan district, central of Iran

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## ARTICLE INFO

## Article history:

Received 15 April 2012

Received in revised form 27 April 2012

Accepted 28 May 2012

Available online 28 August 2012

## Keywords:

Epidemiology

Cutaneous leishmaniasis

Central of Iran

Kashan district

Prevalence

Ulcer

Scar

Parasite

Clinical examination

## ABSTRACT

**Objective:** To investigate the prevalence of cutaneous leishmaniasis in important endemic focus of Kashan district, central of Iran during 2007–2008. **Methods:** This was a cross-sectional study and 5098 individuals were selected from thirteen rural and urban districts of Kashan city. Information of positive cases including age, sex, job, number and sites of ulcers or scars, date and place of the ulcer, and results of clinical examination and laboratory tests were recorded. Diagnoses of affected cases were based on clinical examination and microscopic observation of the ulcer parasite. The results were analyzed with statistical *Chi*-square test. **Results:** An infection prevalence rate of 6.4% was obtained among 5098 individuals. Regarding to 326 affected cases, 103 (2.0%) and 223 (4.4%) persons were observed with active lesion and scars, respectively. The highest frequency of active ulcer rate (23.3%) was associated with age group of 20–29 years old, while the lowest rate was related to age group of 0–9 years old with 7.8% infection. About 49.5% of the infected cases were under 30 years old. This study showed 64.1% of cases with one and the rest of them with two or more ulcers. Hands (46.6%) were the most affected parts of body. **Conclusions:** There is a progressive increasing of cutaneous leishmaniasis in Kashan district and this is a warning to local health workers to provide prevention as well as control program of the disease.

### 1. Introduction

Cutaneous leishmaniasis (CL) is a worldwide public health and social problem in many developing countries. It can affect the skin and mucous membranes, and is caused by different *Leishmania* species widespread in 88 countries in the New and Old World.

Old World cutaneous leishmaniasis (OWCL) is present in many endemic areas in North Africa, the Mediterranean, the Middle East, the Indian subcontinent and Central Asia. The species responsible for OWCL are mainly *Leishmania major* (*L. major*) and *Leishmania tropica*. *Leishmania infantum*

and *Leishmania donovani* can also cause localized CL but are observed less frequently in the Mediterranean areas<sup>[1,2]</sup>. Diffuse CL is uncommon and is caused by *Leishmania aethiops* in Africa.

In Iran, the annual incidence of CL has gradually increased by 43% over a five year period, from 13 729 cases in 2002 to 24 092 in 2006<sup>[3]</sup>. The true number may be 4 times more than this figure and in fact this disease is considered one of the most important parasitic diseases after malaria. The most likely cause for this upward trend is preponderance in human–sand fly contact, which is probably the product of the development of irrigation schemes and the spread of human populations into the habitats of the vector, *Phlebotomus papatasi* Scopoli, and the rodents that act as reservoir hosts<sup>[4–12]</sup>. CL can be seen in zoonotic or anthroponotic forms. It is endemic in half of the 30 Iranian provinces. Most Iranian cases of CL are caused by *L. major*<sup>[1]</sup>. Zoonotic cutaneous leishmaniasis

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Foundation Project: Supported by Research Assistant, Kashan University of Medical Sciences (Grant No. 8667).

(ZCL) is widespread in the central, southern and eastern provinces of Iran<sup>[13–20]</sup>.

Despite the extensive efforts by the health authorities to control it, new focuses have appeared in different parts of the country.

The disease is a major health problem that causes serious psychological as well as social and economic burden to the community. In national CL control program, the identification and description of the disease have been emphasized.

Because of vicinity of city Kashan to rural type CL foci including, cities of Aran and Bidgol, Esfahan and Qom, this epidemiological study was designed to assess the prevalence of the disease in the city of Kashan in 2007–2008, according to various reports of disease.

## 2. Materials and methods

This cross-sectional study was performed on 5 098 inhabitants in 13 urban and rural areas of the Kashan county, including Fin of Kashan, Zeidye, Abshirin, Sensen, Meshkat, Mahmoud Abad, Ravand, Chaleh ghreh, Shorab, Deh zireh, Ahmad Abad, Joshaghane estrk and regional railways. This city is located next to desert plains and due to altitudes it has two different climates including relatively moderate weather in the mountainous area and hot and dry weather in the desert regions.

Random and clustered sampling method were employed. A multistage sampling method was used in this research. Urban and rural areas were considered as the clusters. A random sampling method was used within each cluster. To determine the infection rate, personal visit by the researcher was made to every house (active survey) from November 2007 to February 2008. The study population included all age groups. The infected patients were examined clinically. Sampling performed on people with suspicious lesions and slides were prepared by staining Giemsa method. Microscopic inspection was performed in parasitology laboratory. Special questionnaires were completed for people with active wounds and scars. The questionnaire included items such as age, sex, job, number, sites and date of occurrence of ulcer(s) or scar(s). The results of clinical examination and laboratory tests in addition to the infection location, previous treatment, date of the drug use and nationality were recorded. Data were analyzed by SPSS: 16 software using *Chi*-square test.

## 3. Results

Overall, a total of 5 098 people were examined in the survey areas.

There were 326 patients (6.4%) showing active lesions and scars. The most frequent infection (19.3%) was observed in

the age group 30–39 years. The most cases of disease 31.6% (103 cases) according to the time of study occurred in 2007 (Figure 1). The results of *Chi*-square test showed that there was a significant association between the sex and disease affliction ( $P<0.0001$ ). According to result, 61.3% of the men and 38.7% of the women were positive to CL. The disease infection ratio was 1.6 in male to female. Active lesion was observed in 2.0% (103 people).

Of the 326 patients, 53 males (26.5%) and 50 females (39.7%) had active lesions. The results of analysis showed that there was a significant correlation between gender and active lesions ( $P<0.05$ ). More female patients showed active lesions than the male ones.

Although wounds in all age groups were observed, the highest frequency of scars (21.5%) was observed in the age group 30–39. And 87.4% of patients with active lesion were patients over the age 10 and only 12.6% were under age 10 ( $P<0.05$ ) (Table 1).

**Table 1**

Frequency distribution of 326 patients with cutaneous leishmaniasis according to age groups in the city of Kashan, 2007, n (%).

Age group	Active ulcer	Scar	Total
0–9	8 (7.8%)	10 (4.5%)	18 (5.5%)
10–19	19 (18.4%)	27 (12.1%)	46 (14.1%)
20–29	24 (23.3%)	31 (14.0%)	55 (16.9%)
30–39	15 (14.6%)	48 (21.5%)	63 (19.3%)
40–49	10 (9.7%)	37 (16.6%)	47 (14.4%)
50–59	11 (10.7%)	27 (12.1%)	38 (11.7%)
above 60	16 (15.5%)	43 (19.3%)	59 (18.1%)
Total	103 (100%)	223 (100%)	326 (100%)

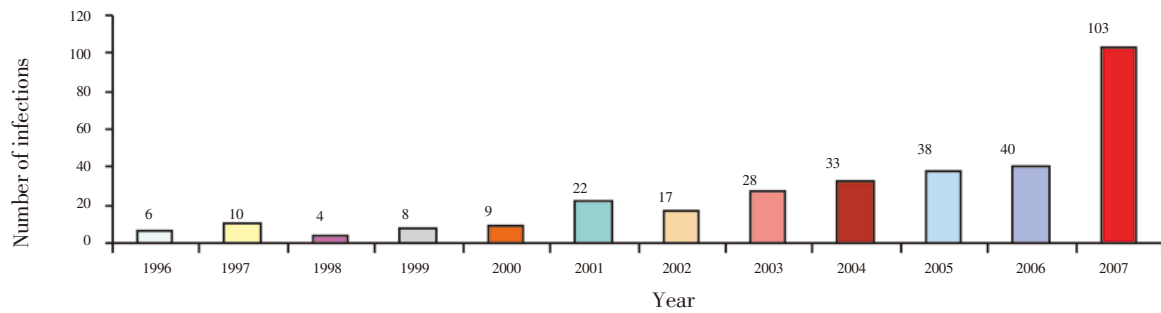
There was a significant relationship between the job and active wound ( $P<0.05$ ). Also the relationship between occupation and scar infection was significant ( $P<0.05$ ). The highest rate of scar according to job was observed in housewife (26.9%) and followed by farmer (21%) (Table 2).

**Table 2**

Distribution of cutaneous leishmaniasis in 326 patients according to occupation, Kashan, 2007, n(%).

Job	Active ulcer	Scar
Householder	22 (31.0%)	59 (26.9%)
Student	20 (19.4%)	23 (10.3%)
Driver	5 (4.9%)	12 (5.4%)
Farmer	10 (9.7%)	47 (21%)
Others	36 (35.0%)	82 (36.8%)
Total	103 (100%)	223 (100%)

The location of wounds was in hands (46.6%), legs (30%), face (18.5%) and other body parts (4.9%) respectively. Among patients with active wound, 64.1% had one wound, 17.5% two wounds, 5.8% three wounds and 12.6% had four or more active wounds. Nine wounds was the maximum frequency observed (1%) in this study. Overall, 98.1% of patients with active lesions were Iranian who either lived there or had a history of traveling to the infected areas. The rest were Afghan patients. The results of analysis showed that there was a significant relationship between sex and scar ( $P<0.05$ ).



**Figure 1.** Cutaneous leishmaniasis frequency distribution in 326 patients according to years of infection, Kashan city, central of Iran.

The locations of scars were in hands (51.8%), legs (23.9%), face (19.4%) and other body parts (5%), respectively. Among patients with scar, 66.2% had one scar, 16.7% two scars, 7.2% three scars and 9.9% had four or more scars. The maximum frequency was observed with 20 (0.9%) scars. More than three-quarters of patients (75.8%) were infected in the city of Kashan. The estimated disease incidence was 37.6 people per hundred thousand people in the city of Kashan.

#### 4. Discussion

In this study the prevalence of CL were 6.4%. In one study to examine the frequency of CL in North West region of Kashan in 1999, the CL prevalence was estimated 3.8% in villages including Meshkat, Abshirin, Sen Sen and Mahmoud Abad[21–22].

Comparing report by Doroodgar *et al*, on status of CL of 1999 with our results indicates that the prevalence of CL has increased during the last decade in Kashan region and nearly has doubled[22].

In the present study, 2% of patients had active CL and the most frequency of infections (23.3%) was observed in the age group 20–29 years, while 1.5% of patients had active lesions in the North West Kashan in 1999 and the highest frequency of infection (34.3%) was in the age group 10–20[21], so the prevalence of active lesions has been increased in Kashan district.

In one study in the city of Aran and Bidgol (close to Kashan district) in 1997, active ulcer and scar prevalence among residents of the study area was 7.1% and 35.6%, respectively, however, findings of this study are inconsistent with the results of the present study[23].

Conforming to Yaghoobi Ershadi *et al* the prevalence of rural CL was 4.6% in the city of Ardestan (the prevalence of scar was 3.3% and active wound was 1.3%)[9]. In this study prevalence of leishmaniasis in the city of Kashan focus (6.4%) was higher than Ardestan, in addition, the prevalence of active lesions (2%) was higher than Ardestan (1.3%)[23].

In this study, more than three-quarters of patients with active lesions had no traveling to outside of Kashan or to the contaminated area in Iran and they were infected in the city

of Kashan and recovered completely by March 2008.

Nadim *et al* claimed the prevalence of rural leishmaniasis has seasonal changes and the cases of disease approach to nearly zero in late March.

Comparing the result of a study by Doroodgar *et al* in the city of Aran and Bidgol (vicinity of Kashan) and the geographical and ecological similarity of our studied district, it seems the type of disease is ZCL[24].

In the present study, there was a significant association between the sex and disease, the proportion of female patients with active lesions were significantly more than the male patients, whereas no such relationship was observed in the study conducted in North West Kashan region in 1999[22].

Our results demonstrated, both sexes at different age groups were susceptible to the disease. The higher rate of infection of the disease in women may be attributed to the economic affairs related to carpet weaving in rooms and basements with deem light. In such places sandflies are active in days and continue blood sucking on victims.

The results of this study showed that the disease process has been upward in the city of Kashan since 2002 until 2007. The incidence of disease was estimated 37.6 people per hundred thousand in the city of Kashan in 2007.

In general, CL has been rising in recent years in Iran. The incidence of disease has changed in five years and reached from 20.8/100000 cases in 2002 to 37/100000 cases in 2007 (unpublished data).

Although CL is not a serious health problem and often the lesions improve gradually, however, due to many reasons including socio-economic and psychological problems, the health authorities should pay attention to prevent the incidence of the disease.

#### Conflict of interest statement

We declare that we have no conflict of interest.

#### Acknowledgements

This study was financially supported by research assistant,

Kashan University of Medical Sciences. The Grant No. is 8667.

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