



Epidemiology of Cutaneous Leishmaniasis, West South of Iran, 2006-2014

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ABSTRACT

The World Health Organization recommended that comprehensive studies should be conducted on leishmaniasis, which is of the six important diseases in tropical regions. This study was carried out to investigate the epidemiological status of cutaneous leishmaniasis in Jahrom city of Fars province in southern Iran. In this analytical-descriptive study 1140 patients with cutaneous leishmaniasis were included. All patients were registered in the Disease Surveillance System of the Health Deputy of Jahrom University of Medical Sciences from 21 March 2006 to 20 March 2014. We extracted underlying and epidemiological variables of patients who were under treatment and follow-up procedures. Data were analyzed by descriptive statistics and chi-square test using SPSS17 at significance level of 0.05. Findings showed that 58.3% of patients were males, 64.3% of them were living in villages, and the majority of them were above 30 years of age. Moreover, 64% of them had a previous history of living in or traveling to a leishmaniasis endemic region in Iran. Hands were the most affected part of the body (39.4%) followed by face (23%). This study showed that cutaneous leishmaniasis was hypo-endemic in Jahrom also the disease was more prevalent in rural areas. Leishmaniasis control programs in Jahrom requires an intersectoral collaboration of all involved organizations along with the proper education of the people at risk.

Key words: Epidemiology, Cutaneous Leishmaniasis, Zoonosis, Iran

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INTRODUCTION

Leishmaniasis is a zoonotic disease that has three forms: visceral (also known as kala-azar), cutaneous, and mucocutaneous [1]. The causative agent of cutaneous leishmaniasis (CL) is transmitted by the bite of infected female phlebotomine sandflies from human and animal sources (mainly domestic and wild rodents) to healthy people [2].

Approximately, 310 million persons live under the risk of leishmaniasis infection, and it is estimated that there are 12 million infected people worldwide. There are two million new cases each year, out of which 500,000 cases have visceral leishmaniasis and 1.5 million cases (CL) [3]. The majority of all CL cases (90%) occur in seven countries: Afghanistan, Algeria, Brazil, Iran, Peru, Saudi Arabia, and Syria [4].

CL is one of the most prevalent and significant parasitic diseases in Iran after malaria. In Iran, CL is found in two forms: rural (zoonotic cutaneous leishmaniasis) and urban (anthroponotic cutaneous leishmaniasis). Approximately, 20,000 new CL cases are reported in different areas each

year; however, the actual figure is several times higher than the reported ones. Khorasan, Yazd, Bushehr, Fars, Khuzestan, Ilam, and Isfahan Provinces have the highest incidence of this disease in Iran. The lowest incidence of CL has been reported from western and northwestern Provinces [5].

Years of life lost due to disability caused by leishmaniasis reach almost 2 million years worldwide [6]. Moreover, this disease puts a huge financial burden on families, communities, and countries, especially in developing countries [7, 8]. Recovery from CL may last several months. Even in a successful treatment, the scar caused by it may remain, which can cause mental and emotional problems in the patient [9]. The probability of infection and the average number of lesions increase with higher exposure to CL-carrying mosquitoes [10].

Fars Province in Iran is a CL- endemic area [11]. Jahrom in the southwest of Fars Province with the population of approximately 218,000 is a high-risk and infected region in this Province. The National Leishmaniasis Control Program in Iran emphasizes the necessity of determining epidemiological characteristics of the disease in epidemic regions once every five years [12-15]. On the other hand, since the incidence of CL has increased in recent years, and due to the lack of information about epidemiological aspects of the disease in Jahrom, this study was conducted to evaluate the epidemiological aspects of CL.

MATERIALS AND METHODS

In this retrospective study, the statistical population included all individuals diagnosed with CL, based on clinical and test results and underwent treatment and follow-up procedures in medical centers of Jahrom from 21 March 2006 to 20 March 2014. All patients were registered in the Disease Surveillance System of the Health Deputy of Jahrom University of Medical Sciences.

Information on these patients was recorded in specific forms. Required data, such as age, gender, job, place of residence (city or village), treatment history, infected part of the body, lesion number, onset date, nationality, treatment failure, relapse after systemic and local treatment, clinical resistance, treatment discontinuation, and treatment delay (time interval from the onset of symptoms until diagnosis and treatment

initiation) was extracted from the related forms. In this way, data of 1,140 patients was extracted and analyzed using Statistical Package for the Social Sciences Version 17.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (frequency and relative frequency) and chi-square test at the significance level of 0.05 were employed to analyze the collected data.

The definitions related to the endemicity of the disease that have been proposed by the National CL Guideline in Iran which are listed below categorize the endemic foci as follows:

Hyper-endemic: Foci with high incidence of new CL cases (> 85%) among children aged 0-6 years (with at least 25% under one year of age).

Hypo-endemic: Foci with at least, 20% incidence of new CL cases among people older than 15.

Meso-endemic: Foci with the incidence rate of new CL cases somewhere between the hyperendemic and hypoendemic foci.

In this research project, all ethical considerations were taken into account by omitting the names of subjects and presenting all data in groups. Moreover, this project was approved by the Ethical Committee of Jahrom University of Medical Sciences (under code no. IR.JUMS.REC.1394.369).

RESULTS

In total, we investigated data related to 1,140 patients with CL in Jahrom city. 58.3% of patients were men. The mean age of the patients was 24.11 ± 18.46 years. The highest and lowest incidence rates belonged to the age group >30 years old and 13-15 years old with 381 (33.4%) and 45 (3.9%) cases, respectively. The youngest and oldest patients were 4 months and 92 years old, respectively. In total, 64.3% of the patients were villagers and the rest lived in the urban areas. The age distribution of the patients in term of gender is presented in Table 1.

The highest frequency of CL was observed among students (20.9%) and housewives (18.9%). Moreover, 90.3% of the infected persons were Iranian and the rest Afghan and Iraqi citizens. Only 214 patients (18.8%) did not have diagnosis delay and the rest had treatment delay from the time the lesions appeared until the time they were diagnosed and specific treatments began. Also 572

patients (50.2%) had one lesion (with an average diameter of 1.92±1.42cm) (Table 2).

Table 1: Age distribution of patients with cutaneous leishmaniasis in term of gender

Age Group (Year)	Male	Female	Total
	Number (%)	Number (%)	Number (%)
<1	27 (4.1)	31 (6.5)	58 (5.1)
1-3	39 (5.9)	48 (10.1)	87 (7.6)
4-6	53 (8)	52 (10.9)	105 (9.2)
7-9	35 (5.3)	37 (7.8)	72 (6.3)
10-12	29 (4.4)	21 (4.4)	50 (4.4)
13-15	26 (3.9)	19 (4)	45 (3.9)
15-19	56 (8.4)	25 (5.3)	81 (7.1)
20-24	124 (18.6)	36 (7.6)	160 (14)
25-29	66 (9.9)	35 (7.4)	101 (8.9)
≥30	210 (31.6)	171 (36)	381 (33.4)

Table 2: Frequency of patients with cutaneous leishmaniasis in term of demographic and epidemiologic factors

Variables	Number	Percent	P
Job status	Armed forces officer	17	1.5
	Heavy truck driver	53	4.6
	Agricultural worker	34	3
	Elementary laborer	129	11.3
	Housekeeper	216	18.9
	Student	238	20.9
	General office clerk	44	3.9
	Unemployed	16	1.4
	Others	148	13
	<6 years-old Children	245	21.5
Number of Lesion	1	872	50.2
	2	226	19.8
	3-4	177	15.5
	5-7	106	9.3
	8-10	33	2.9
Nationality	>10	26	2.3
	Iranian	1029	90.3
	Afghan	109	9.5
Diagnosis Delay (month)	Iraqi	0.2	2
	<1	214	18.8
Diagnosis Delay (month)	1	308	27
	2	308	27
	3	122	10.7
	4	84	7.4
	5	32	2.8
	≥6	72	6.3

As figure 1 shows, hand and face were the most affected body parts with 449 cases (39.4%) and 262 cases (23%), respectively.

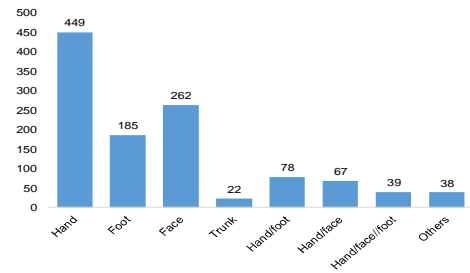


Figure 1: Frequency of patients with cutaneous leishmaniasis in term of lesion place

According to Figure 2, the prevalence of the disease was month-dependent so that the incidence of CL increased substantially from 22 September, hit the peak in December, and then followed a decreasing trend and reached the lowest level in May (1.4%).

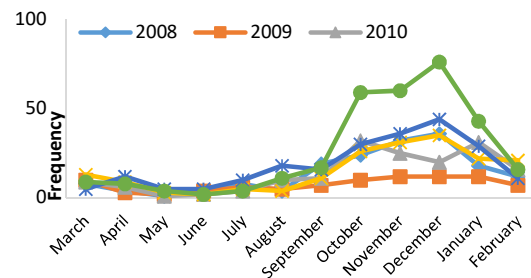


Figure 2: Frequency of patients with cutaneous leishmaniasis in term of months from 2008 to 2013

This study indicated that incidence of new CL cases was at its minimum in 2010 (n=90), but gradually increased in the following years and hit the peak in 2014 (n=309). The periodical prevalence of CL in Jahrom has had a growing trend since 2010, and it reached its peak (135.64 per 100,000) in 2014 (Figure 3).

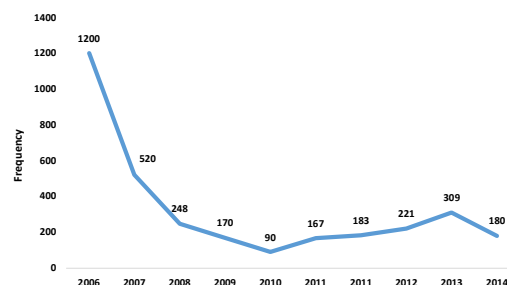


Figure 3: Time trend of incidence of cutaneous leishmaniasis in Jahrom from 2006 to 2014

In total, 944 cases (82.8%) of the lesions were dry (without secretion); in addition, 203 (17.8%) subjects had another CL patient in their family. Only 13 patients (1.1%) had a previous history of CL infection. According to obtained data, 730 (64%) of the patients had previously travelled to an endemic region in the past year. Five hundred and ninety-nine (52.2%) of the patients were referred to the CL treatment center in the city by the system outside of the healthcare system networks. In terms of prescribed treatment regimes, 492 patients (43.2%) received cryotherapy, 437 (38.3%) systemic therapy, and 96 (8.4%) only local therapy.

The chi-square test showed a significant correlation between gender and lesion place ($p < 0.0001$) so that frequency of lesions in covered areas of body such as hands, feet and trunk was lower among females. There was no significant relationship between diagnosis delay and nationality or lesion number ($p > 0.05$); whereas, nationality and lesion number were significantly correlated ($p = 0.037$) so that frequency of number of lesions was higher among Iranians.

DISCUSSION

CL is endemic in the majority of Iran's provinces. This types of diseases are still regarded as an important health problem in different parts of the world, specifically in the Mediterranean region, some African countries, and almost all Middle Eastern countries including Iran. CL is highly prevalent in some provinces of Iran, including Fars, Khuzestan, Isfahan, and Kerman, and has a growing trend. The scope of this health issue has expanded due to environmental factors such as uncontrolled migrations, population variations, agricultural development, water supply projects, and entry of infected people from endemic areas to non-infected ones, and has imposed a significant economic burden on the society [16, 17].

Results of the present study showed that the prevalence of the disease hit the peak in 2014 (135.64 per 100,000). Comparison of the ten-year incidence of the disease in the city shows that the disease has a five-year growing trend followed by a five-year decreasing trend. This variation can be attributed to development of immunity in previously infected people, resulting in lower population at risk in the following years. However, with the increase in the susceptible population,

the disease exhibits a growing trend again. Meanwhile, the preventive measures taken by the healthcare system, including holding educational sessions on hygienic matters and transmission routes, preventive methods, elimination of rodent hosts, and spraying insecticides should not be ignored. This finding is consistent with and similar to those of other studies [7, 18, 19].

In terms of gender, 58.3% of patients were men and the rest women, indicating a significant between-gender difference. This finding is consistent with those of some similar studies [18, 20], but is inconsistent with those of the studies conducted in Fasa [19] and Lar [11]. Higher prevalence of CL among men may be because women's bodies are more covered with clothing. In addition, due to the lower presence of women in areas with risk of sandfly bites, such as abandoned places and wilderness areas at night, the chances of infection are lower in them.

In terms of age, the highest frequency (33.4%) was observed among the working age population (>30 years old) who migrated to endemic regions looking for job and were infected due to their lack of knowledge concerning CL transmission routes [16]. Since more than 20% of new cases in this study were among the age group with more than 15 years of age, this city is categorized as an endemic focus for CL [12].

In addition, hands (39.4%) and face (23%) were the most frequent lesion sites. Since sandflies have a short proboscis, they cannot bite through clothing; therefore, they attack exposed parts of the body, which have soft tissues, to suck blood. Moreover, chemical and olfactory attractants, such as higher density of CO₂ in these parts, attract sandflies. Studies conducted in Yazd [21], Fasa [19], and Saudi Arabia [22] confirmed that the majority of lesions occurred on limbs and face.

In the present study, 64% of the patients (drivers, seasonal workers, military personnel, and passengers) had travelled to CL endemic regions in the past few months. Previous studies mentioned migration to endemic foci as a factor that increases the infection rate [7, 18, 23].

On the other hand, treatment delay (of even more than six months in some cases) was observed in 81.2% of the participants in the present research. Therefore, the necessity of greater concentration of the healthcare system on public education,

specifically in endemic regions, to improve knowledge about the CL epidemiology is felt more than ever before.

The highest prevalence of the disease was in the fall (40.5%) and winter (40.2%), which is consistent with the findings of previous studies [22, 24]. In Saudi Arabia, the highest incidence of CL was observed between 21 May to 22 October [22]. A study in Multan in Pakistan showed that all infections occurred in winter, indicating that sandflies bite in warm seasons (spring and summer), but the symptoms first appear in cold seasons after the latency period [25].

This study also showed a high number of lesions (up to more than 30 lesions) in some cases. This finding may be due to the mosquitoes' blood-feeding habits as they bite differently at each stage of feeding, or may be because of the abundance of infected mosquitoes in the region.

In this study, both the wet and dry lesions were observed; however, the latter were more frequent. Despite this, since the determination of parasite type was not among the objectives of this study and the disease type was judged only based on the appearance of the lesion, a concrete conclusion cannot be drawn in this regard.

CONCLUSION

According to the results, CL is a hypo-endemic problem in Jahrom. The majority of patients were young and adult men, who had previously travelled to endemic regions. Therefore, increasing the knowledge of people at risk about the transmission routes, preventive methods, and complications resulting from infectious diseases, specifically CL, on the one hand, and holding suitable educational courses and allocation of more resources by the University of Medical Sciences, along with intersectoral collaboration between responsible organizations and agencies on the other hand, is essential in controlling CL.

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Conflict of Interest

The authors declare that they have no conflict of interest regarding the manuscript.

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