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### Original Article

## Trend of Cutaneous Leishmaniasis in Kermanshah Province, West of Iran from 1990 To 2012

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### **Abstract**

**Background:** This study was conducted to explain the trend of Cutaneous Leishmaniasis (CL) in Kermanshah Province, western Iran from 1991- 2012.

**Methods:** In this analytical-descriptive study, all of the patients suspected to CL in Kermanshah Province were studied. Smears were prepared from most of them, stained with Giemsa, and examined microscopically for Leishman bodies. A few of the patients were diagnosed according to physician diagnosis and response to glucantime. Questionnaires were completed for all of them. Collected data were analyzed using SPSS-21 and Spearman and Kendall tests.

**Results:** From 1991 to 2012, 1684 cases of CL were recorded. In the years 2011-12 the frequency of CL in the province reached to 7.4/100,000, which showed a remarkable increase in the frequency of new cases CL in the province. In the years 2011-12 about 47% of total cases of CL in the province, was seen in Ghasr-e-Shirin district, which the frequency of CL in this district reached to 264.5/100,000. Frequency of CL in males and females was 57% and 43% respectively. The most cases of CL were seen in housewives (32.1%) and age groups of 20 to 29 years old (19.9%). In addition, the most cases of disease were seen in winter (41.8%) and fall (28.9%).

**Conclusion:** CL is increasing remarkably in warm climates of the province, and Ghasr-e-Shirin must be of particular interest, as the most infected district in the province.

## Introduction

Cutaneous Leishmaniasis (CL) remains a major world health problem in the 21st century (1). There are about 1.5 million new CL each year, of which over 90% occur in Afghanistan, Algeria, Iran, Iraq, Saudi Arabia, Syria, Brazil and Peru (2). It is one of the most important endemic diseases in Iran. Both forms of CL, Zoonotic CL (ZCL) and Anthroponotic CL (ACL) were seen in some parts of the country. CL due to *Leishmania major* (CLM) is still a great and increasing public health problem in many rural areas of 15 out of 30 provinces of Iran and rodents are the most prominent reservoir hosts of this form of Leishmaniasis. (3-6). The major causes of CL in Iran are *L. major* (67%) and *L. tropica* (33%). The major foci of ZCL transmission are in the northern (Golestan), northeastern near Turkmenistan's border, central (Esfahan), western (Kermanshah) near the Iraqi border,

and southern (Khuzestan) provinces of Iran. The major foci of ACL transmission are in the northeast (Razavi Khorasan province) and center of Iran in the city of Bam (Kerman Province) especially after the earthquake in 2003 (7). Annually about 20-40/100,000 cases of CL are reported from the country (8). Indeed, after malaria, CL is the most important parasitic disease transmitted by arthropods in Iran (9). This disease is gradually spread in different parts of the country. At a particular geographical location where the disease has been sporadic in the past, it has grown to epidemic portions. It has been spread into sites where it did not previously exist (10).

Because of the importance of CL in this province and slightly increasing of disease in recent years, this study was designed to assess the status of CL from 1991 to 2012.



Fig .1: Location of Kermanshah Province within Iran and studied areas

## Materials and Methods

At present, Kermanshah Province is known as one of the endemic areas of CL in Iran. This province is located in the west of Iran. It is neighboring in north with Kurdistan, in southeast with Lorestan, in south with Ilam and in east with Hamadan provinces. It is also

in the west adjacent to the Iraq. The province with an area of 24,361 square kilometers contains almost 1.6% of the total land of the country and with population of 1,945,227 has about 2.4% of total population of the country. About 69.7% of the population is in urban areas, 29.3% in rural areas and about 1% are nomadic .According to weather this province

divided to three distinct portion: Warm, moderate and cold climates(11).The most cases of CL has been reported in warm climates, located in the south-west of the province (Fig. 1).

In this analytical-descriptive study, all of the patients suspected to CL in the province were identified by passive case detection from 1991 to 2012, based on the information available at the health center of province. All of the studied patients were residents in the province and non-residents of them were removed from the study. Smears were prepared from the vast majority of patients (97%), dried in air, fixed in 95% ethanol for 3 minutes, and then stained with Giemsa stain. All of the stained smears were observed exactly for leishman bodies under light microscope. A few of the patients (3%) were diagnosed as CL, according to the physician diagnosis based on the shape of the lesion, the patient's history and response to melamine antimonite.

Some information including a history of travel to endemic areas of CL in other provinces of the country, the number of lesions, location of lesions in different parts of the body, gender and age of the patients were recorded in questionnaires. For estimation of frequency of disease in studied population, the

average populations of districts in each period of years were used. Statistical analysis of the epidemiological data was performed using Spearman and Kendall tests in the SPSS -21 software, to determine any significant difference between demographic factors and disease incidence.Seven isolates from patients who had no history of travel to other parts of the country, were cultured in RPMI 1640 medium and their species were determined using RAPD PCR technique.

## Results

From 1991 to 2012, at least 1684 new cases of CL were considered in Kermanshah Province. CL was found to be considerably endemic in some areas of province, such as Ghasr-e-shirin district. Distribution of disease was different among districts of the province ( $P<0.01$ ). Annually frequency of CL in each district of the province was seen in Table 1.

Distributions of the lesions in age groups are detailed in Table 2. The highest frequency of CL was seen in the age groups of 20-29 years old, followed by the 30-49 years old. Distribution of CL according to the age groups was seen in Table 2.

**Table 1:** Annually frequency of CL in districts of the Kermanshah Province, western Iran

Districts	No. of Patients / 100,000 population				
	1991-2000	2001-2005	2006-2008	2009-2010	2011-2012
Ghasr-e- shirin	24	82	56	47.3	264.5
Eslam abad	1.3	1.8	10.2	22.1	12.9
Sarpol-e-zahab	2.7	9.8	15.2	12.7	12.8
Gilan-e- gharb	5.4	24.4	7.2	10.9	8
Kermanshah	1.6	5.3	6.5	5.5	2.6
Songhor	0.3	1.1	1.1	1.6	0.5
Sahneh	0.5	2	2.3	1.3	3.9
Kangavar	0.3	2.3	1.3	2	2.5
Harsin	0.4	2.8	9.8	7.4	1.1
Salas-o-babajani	1	12	16.1	3.5	7.8
Dalahoo	0.2	1.5	5.8	6.3	3.7
Paveh	0.4	0.9	1.3	2.8	0
Javanrood	0.2	1.1	8.1	5.3	0
Ravansar	0.2	1.5	6	7.9	5.5
All of the province	1.5	6.2	6.8	6.2	7.4

**Table 2:** Frequency of CL according to the age groups in Kermanshah Province

Age groups (Year)	1991-2000 (%)	2001-2005 (%)	2006-2008 (%)	2009-2010 (%)	2011-2012 (%)	Total of the years (%)
0-9	3.3	5.4	4	10.1	11.4	6.8
10-19	7.8	9.4	11.7	13.9	11.1	10.8
20-29	28	22.7	32.5	20.5	19.8	24.7
30-39	19.5	13.5	18.5	14.4	14.9	16.2
40-49	17.2	16.6	12.8	17.2	16.4	16
50-59	8.2	9.4	10.2	12.7	13.6	10.8
60-69	6.5	9.4	3.2	6.1	5.9	6.2
>70	9.5	13.6	7.1	5.2	6.9	8.5

In the recent years, there was not any significant difference between males and females according to their infection with CL. In the past years, most of the patients were males (67-85%), but in the years 2011-12, about 57% and 43% of the patients were male and female respectively.

Frequency of disease in the province has affected from living in rural or urban areas. In the last years, most of the patients were citizens of urban areas, but recently (2011-12) most of them were living in rural areas. There were significant difference between frequency of CL in urban and rural residents ( $P<0.01$ ) (Table 3).

**Table 3:** Distribution of CL according to rural and urban populations in Kermanshah Province

Years	Patients in Rural Population (%)	Patients in Urban Population (%)
1991-2000	17.5	82.5
2001-2005	33.8	66.2
2006-2008	33	67
2009-2010	38	62
2011-2012	59.2	40.8
Total of the years	36.3	63.7

Review on occupation of patients with CL indicates that approximately 47% of them were housewives. The rate of infection in agricultures that usually have animal husbandry was 25%. Besides, about 20% of the patients were students. There was significant difference between seasons and number of patients ( $P<0.01$ ). Distribution of CL was varying according to the seasons of the year. The highest frequency of CL was seen in winter and fall (Fig. 1)

Some of the patients with CL had a history of traveling to other endemic areas of the country at least one year prior to their contraction of the ulcer. In the years of 1991-2000, most of the patients (78%) had a history of traveling to other parts of the country. This rate decreased to 32.5%, 66.5%, 56.7% and 48.1% in the years of 2001-2005, 2006-2008, 2009-2010 and 2011-2012 respectively. Lesions of patients in more than 92% of the cases were between 1-4 numbers. The number of lesions reached to 22 in a few patients. In

about 85% of patients, the lesion surface was about less than one  $\text{Cm}^2$ . Distribution of lesions in the body showed that hands were the

most affected location (45%), followed by face and neck (31.8%), feet (18.8%) and other parts of body (4.4%).

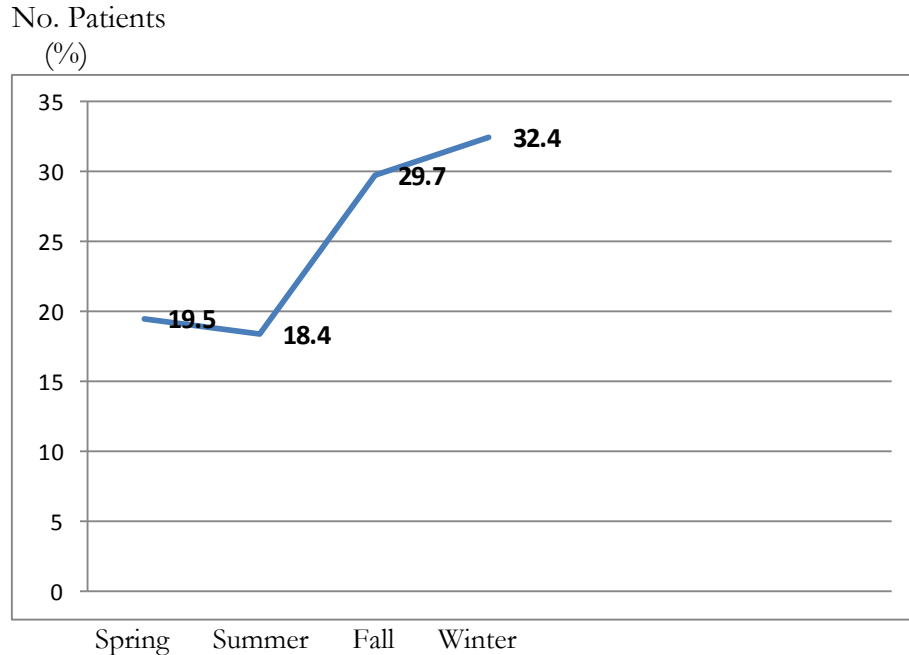


Fig. 1: Distribution of CL according to the seasons of the year in Kermanshah province

## Discussion

From 1991-2012, in about twenty two years period, at least 1684 cases of CL has been identified by passive case detection in the province. Distribution of disease in these years showed a very slightly increasing in the frequency of CL in recent years. For example in 1991- 2000 the frequency of disease in the province was 1.5/100,000, which It reached to 6.8/100,000 and 7.4/100,000 in 2006-2008 and 2011-2012 respectively. Because of the passive sampling in this study, we cannot determine true prevalence or incidence of CL in the province. However, our data showed a very slightly increasing in the frequency of CL in recent years. Increasing in the frequency of disease in Kermanshah Province may be due to some factors including, more attention to CL by clinicians and laboratories, increase in

the quality of diagnosis, and finally, true increase in the incidence of CL in warm climates of the province.

According to Table (1), the most cases of CL was seen in warm climates, located in the south-west of the province, including Ghasr-e-shirin, Sarpol-e- Zahab, Islam abad and Gilan-e-Gharb districts. We know that, in contrast with New World CL, the Old World CL usually occurs in open semi-arid or even desert conditions (12). As we saw, Ghasr-e-shirin was the most infected district of the province in these years. In 2011-12, the frequency of CL in this district reached to 264.5/100,000, which is more than average rate of CL in the country (8). In Kashan, the estimated incidence of CL was approximately 37.6/100,000 during 2007-2008 (13). In Bam, one of the most important endemic areas of

CL in Iran, the incidence of disease was approximately 280 per 100,000(14).

In our opinion by active case detection, one may detect more cases of CL especially in the warm climates of the province, such as Ghasr-e-shirin. CL is a modifiable disease in Iran but the real figures seems to be 4-5 folds (15). CL is re-emerged with further frequency in some parts of the province in the recent years. Emergence or re-emergence of CL has recently occurred in many countries (16-20). ZCL and ACL not only have been prevalent in a number of rural and urban areas of Iran, but also emerged in new foci during recent decades (10, 21-25).

From 1991-2012, the highest frequency of disease was seen in the age groups of 20-29 years old. This may be relevant to the occupation and traveling to other endemic areas rather than ageing. However, in 4 recent years CL is approximately normally distributed among all of the age groups. In Bam, all age groups were affected, although patients in the age groups of  $\leq 10$  years showed the highest rate of infection (22). In Kashan, the highest frequency of infected age groups were observed in 20-29 years old (23.3%) (13).

Until 2011, the most cases (67-85%) of CL in the province were males. However, in 2011-12 this rate decreased to 57%. This may be due to re-emergence and increasing in the frequency of CL in Ghasr-e-shirin that about 47% of disease occurred in it in 2011-12. Few contamination of females than males can be associated with some factors including lesser contact of them with sand flies due to their better coverage in Iran. In Gonbad Kavoods (15), Bam (14) and Ilam (23), 55.3%, 60.5%, and 64.1% of patients were male respectively. These results are in agreement with our study. In Sistan va Baluchestan no significant differences was seen between males and females; indicating that both genders were equally affected (25). On the other hand, in some studies females has showed a higher infection rate than males. It is unclear, but could be due to a variety of environmental and behavioral fac-

tors, genetic or immunological characteristics, variations between studies with regard to factors such as the size of the study population, the study design, climatic variations, and culture (20).

In this study, about 47% of patients were housewives and the rates of infection in agricultures that usually have animal husbandry were 25%. The highest rate of infection in housewives, especially in rural areas might be explained by the fact that housewives in rural areas hardly works not only in home but also in farm and animal husbandry, so they are more exposed to insect bites. Despite the significant differences of lesion rate within different jobs in Sistan va Baluchestan, there was not any correlation between CL prevalence and occupation (25).

Analysis of the lesions distribution in the body showed that the highest rate of lesions were on hands (45%), followed by face and neck (31.8%). In Kashan the most common location of ulcers were on hands (46.6%) (13). In Sistan va Baluchestan the most affected part of the body was upper limb (39.2%) followed by the face (29.9%) (25). In Gonbad Kavoods (42.3%) (15) and Ilam province (52%) (23) the most lesions were on the hands. These observations are consistent with our results. This is one of the usual characteristics of the ZCL; whereas, in the ACL, the most commonly involved site is face, and the upper limb is the second most affected site(26-28). However, this is not always consistent, and there are some reports indicating predominant involvement of the face in ZCL(29,30). In contrast, In Bam 47% of the lesions were on the face, followed by the hands (42%), the legs (5.8%) and other parts of the body (5.2%)(22).

In Iran the most cases of CL has been reported in rural areas (3-4, 9). In Kermanshah Province despite the decrease in rural population from 37% in 1991 to 30.3% in 2012 (11); the frequency of patients in rural areas gradually increased and reached from 17.5% in 1991 to 59.2% in 2011-12 (Table 3). Simi-

larly, most of the patients in Gonbad Kavoods (85.7%) (15) and Ilam province (57.7%) (23) lived in rural areas. In contrast, in Kashan 75.8% of the patients were infected in Kashan City (13).

In the years of 1991-2000, about 78% of patients had a history of traveling to other parts of the country. This rate gradually decreased and reached to 48.1% in the years 2011-2012, indicating obviously increase in local transmission of CL in the province. The highest cases of CL were seen in winter (19-41.8%) and fall (27-34%). In Gonbad Kavoods the highest prevalence of disease was observed in months of October and November (68.4%) (15).

The study of electrophoretic finger prints of the product of RAPD-PCR in seven isolates of the patients in Kermanshah province showed that *Leishmania major* is the causative agent of CL in all of them (31). In another study 20 cases of CL in this province, were studied for characterization of species using RAPD-PCR technique. Results showed that 17 (85%) and three (15%) of isolates were *L. major* and *L. tropica* respectively (32). Highly percentage of CL in rural areas; occurrence of disease in patients without any history of traveling to other endemic areas; location of most of lesions in hands, face and neck; and detection of *L. major* in 24 out of 27 isolates (88.9%) as causative agent of disease, raising the possibility of ZCL as an endemic disease in some parts of the province.

## Conclusion

In some parts of Kermanshah Province, especially in warm climates including Ghasr-e-Shirin, the importance of CL has been increased in recent years. Rapid increasing in frequency of CL is alarming and requires control and prevention measures in highly infected areas including Ghasr-e-shirin. Further epidemiological investigations are required to obtain more information about the original

source of the parasite, vectors and to determine possible reservoir species in this region.

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