ORIGINAL ARTICLE

Epidemiology of Cutaneous Leishmaniosis in South Fars Province, Iran: A Retrospective Decade Long Survey

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Abstract

Background: Fars province in south Iran is an endemic focus of Leishmaniosis. This study was designed to evaluate the epidemiological status of cutaneous Leishmaniasis in Fars province, South Iran, from 2007 to 2016.

Methods: This study was a retrospective-analytical cross-sectional study. The study population consisted of all people with Leishmaniasis, who referred to the infectious disease center in four cities of Larestan, south Fars province, from 2007 to 2016. Chi-square test and ANOVA were used in data analysis. The significance level was considered as 5%.

Results: In the period 2007-2016, 4599 cases of cutaneous Leishmaniosis were registered. The highest number of cases occurred in 2008. The mean age in 2007 and 2016 was 17.7±17.1 and 12.9±16.5, respectively. Women were the majority of cases, from 2007 to 2012. Hand ulcers were the most prevalent part of the body in all these years, except 2016. In terms of seasonal distribution, most of the cases occurred in winter and the least in summer. Afghan and Pakistani immigrants produced the majority of cases.

Conclusion: The trend of cutaneous Leishmaniosis has declined in Larestan city from 2007 to 2016. However, Leishmaniosis is still a major public health problem. Since the majority of cases were related to Afghan and Pakistani immigrants, it is necessary to ward off these people.

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Introduction

Leishmaniasis belongs to the group of protozoan diseases.[1, 2] Its spread to the body of mammals, particularly humans, is carried out by *female phlebotomine insects.*[3] The disease is classified into three medical forms: cutaneous, visceral, and mucosal, the most typical of which is the cutaneous form.[3] Cutaneous leishmaniasis is classified into urban (dry) and rural (wet) types. Leishmania tropica being responsible the urban type and *Leishmania major* being responsible the rural type.[3] While *Leishmania* was limited to tropical and subtropical rural regions in the previous years, it has become a main and increasing health problem with increasing tourist travel and ecotourism.[4] WHO has recognized leishmaniasis as the sixth main disease in tropical and subtropical areas.[3] Leishmaniasis is endemic in 98 countries,[5] with more than 350 million persons at danger, globally;[6-8] moreover, about 0.7-1.3 million novel cases are added every year.[4, 9, 10] The yearly incidence of visceral leishmaniasis is predicted at 0.4 to 0.2 million, and of these, about 20,000 to 40,000 expire.[11] According to the World Health Organization report, about 12 million persons in these 98 countries have leishmaniasis, and three-quarters of novel cases are cutaneous leishmaniasis.[12] Furthermore, yearly, about 1,500,000 cases of cutaneous leishmaniasis are reported in tropical, subtropical, and temperate countries.[13] This

disease is extremely prevalent in certain of the poorest countries and has received fewer care than other infectious diseases such as malaria, tuberculosis and AIDS; similarly, Less investment has been made by the international community and the pharmaceutical industry to do more investigation and develop treatment for this disease.[14] About two-thirds of the cases of cutaneous leishmaniasis have been reported from six countries: Afghanistan, Algeria, Brazil, Colombia, Iran and Syria.[14] The prevalence of leishmaniasis in different provinces of Iran different from 1.8 to 37.9%,[3, 15] and although near 20,000 cases of the disease are reported from different parts of Iran yearly,[16] the real rate is predicted to be five times higher.[3] The greatest main endemic places of this disease in Iran are Turkmen Sahara and Lotfabad in the northeast, Abardezh Varamin, Isfahan and Yazd in the central area, Fars and Sistan and Baluchistan in the south and southeast and Ilam and Khuzestan in the west and southwest.[17] Leishmaniasis is an significant health and economic problem.[3] So, because of the endemic nature

Table 1: Comparison of the frequency (%) of qualitative characteristics of people with leishmaniasis by the year of occurrence

Variables	Year of occurrence									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Age, year										
≤ 10	506 (48.1)	520 (39.5)	215 (35.2)	110 (39.6)	118 (49.8)	90 (55.2)	125 (47.2)	138 (54.3)	97 (52.5)	165 (68.8)
11–20	194 (18.5)	304 (23.0)	140 (23.0)	61 (21.9)	35 (14.8)	22 (13.5)	41 (15.5)	34 (13.4)	28 (15.1)	23 (9.6)
21–30	142 (13.5)	214 (16.2)	115 (18.8)	40 (14.4)	27 (11.4)	16 (9.8)	36 (13.6)	25 (9.8)	20 (10.9)	19 (7.9)
31–40	74 (7.0)	116 (8.8)	54 (8.9)	30 (10.8)	17 (7.2)	17 (10.4)	29 (10.9)	23 (9.1)	16 (8.6)	11 (4.6)
41–50	59 (5.6)	84 (6.4)	37 (6.1)	12 (4.3)	19 (8.0)	5 (3.1)	10 (3.8)	9 (3.5)	11 (5.9)	7 (2.9)
>50	76 (7.2)	81 (6.1)	49 (8.0)	25 (9.0)	21 (8.9)	13 (8.0)	24 (9.1)	25 (9.8)	13 (7.0)	15 (6.3)
Gender										
Male	462 (44.0)	627 (47.5)	313 (49.8)	136 (48.9)	118 (49.8)	77 (47.2)	137 (51.7)	130 (51.2)	101 (54.6)	134 (55.8)
Female	589 (56.0)	692 (52.5)	297 (50.2)	142 (51.1)	119 (50.2)	86 (52.8)	128 (48.3)	124 (48.8)	84 (45.4)	106 (44.2)
Organ										
Face	264 (23.4)	265 (20.1)	101 (16.6)	61 (21.9)	47 (19.8)	54 (33.1)	61 (23.0)	71 (28.0)	43 (23.2)	86 (35.8)
Hand	409 (38.9)	535 (40.6)	241 (39.5)	127 (45.7)	71 (30.0)	36 (22.1)	80 (30.2)	76 (29.9)	62 (33.5)	66 (27.5)
Foot	128 (12.2)	185 (14.0)	123 (20.2)	45 (16.2)	27 (11.4)	15 (9.2)	41 (15.5)	52 (20.5)	25 (13.5)	26 (10.8)
Other	7 (0.7)	17 (1.3)	13 (2.1)	3 (1.1)	6 (2.5)	5 (3.1)	9 (3.4)	13 (5.1)	8 (4.3)	7 (2.9)
Multi organ	260 (24.7)	317 (24.0)	132 (21.6)	42 (15.1)	86 (36.3)	53 (32.5)	74 (27.9)	42 (16.5)	47 (25.4)	55 (22.9)
Diagnosis					NR*	NR	NR	NR	NR	NR
Laboratory	516 (49.1)	677 (51.3)	304 (49.8)	139 (50.0)						
Clinical	535 (50.9)	642 (48.7)	306 (50.2)	139 (50.0)						
Building type					NR	NR	NR	NR	NR	NR
New	504 (48.0)	666 (50.5)	307 (50.3)	118 (42.4)						
Old	542 (51.5)	642 (48.7)	301 (49.4)	160 (57.6)						
Tent	5 (0.5)	11 (0.8)	2 (0.3)	0 (0.0)						
Leishman type					NR	NR	NR	NR	NR	NR
Urban	831 (79.1)	794 (60.2)	269 (44.1)	72 (25.9)						
Rural	220 (20.9)	525 (39.8)	341 (55.9)	206 (74.1)						
Place	NR	NR	NR	NR						
City					48 (20.3)	50 (30.7)	77 (29.1)	156 (61.4)	93 (50.3)	75 (31.3)
Village					189 (79.7)	113 (69.3)	188 (70.9)	91 (35.8)	81 (43.8)	152 (63.3)
Tribes					0 (0.0)	0 (0.0)	0 (0.0)	7 (2.8)	11 (5.9)	13 (5.4)
Nationality	NR	NR	NR	NR						
Iranian					228 (96.2)	149 (91.4)	245 (92.5)	244 (96.1)	170 (91.9)	222 (92.5)
Afghan					9 (3.8)	14 (8.6)	20 (7.5)	10 (3.9)	15 (8.1)	18 (7.5)
Job	NR	NR	NR	NR						
Housewife					50 (21.1)	27 (16.6)	46 (17.4)	35 (13.8)	23 (12.4)	23 (9.6)
Child					88 (37.1)	63 (38.7)	97 (36.6)	118 (46.5)	80 (43.2)	126 (52.5)
Student					58 (24.5)	40 (24.5)	58 (21.9)	54 (21.3)	39 (21.1)	52 (21.7)
Rancher–Farmer					16 (6.8)	7 (4.3)	2 (0.8)	3 (1.2)	4 (2.2)	7 (2.9)
Worker					0 (0.0)	0 (0.0)	0 (0.0)	12 (4.7)	11 (5.9)	6 (2.5)
Employee					10 (4.2)	10 (6.1)	20 (7.5)	8 (3.1)	2 (1.1)	5 (2.1)
Unemployed					6 (2.5)	2 (1.2)	7 (2.6)	6 (2.4)	3 (1.6)	5 (2.1)
Others					9 (3.8)	14 (8.6)	35 (13.2)	18 (7.1)	23 (12.4)	16 (6.7)
Shape	NR	NR	NR	NR				NR	NR	NR
Dry					76 (32.1)	70 (42.9)	136 (51.3)			
Humid					161 (67.9)	93 (57.1)	129 (48.7)			
Travel History	NR	NR	NR	NR				NR	NR	NR
Have					72 (30.4)	45 (27.6)	56 (21.1)			
Haven't					165 (69.6)	118 (72.4)	209 (78.9)			
Concurrent	NR	NR	NR	NR				NR	NR	NR
Family infection					42 (17.7)	5 (3.1)	16 (6.0)			
Have					195 (82.3)	158 (96.9)	249 (94.0)			
Haven't										

* No report

of leishmaniasis in maximum parts of Iran, particularly Fars province and southern areas of this province, as well as the absence of applied studies in understanding the epidemiology of the disease in these parts, this study was planned to assess the epidemiological status of leishmaniasis.

Materials and Methods

Study Type

The present study was a retrospective-analytical cross-sectional study.

Study Area

The study population consisted of all people with leishmaniasis who referred to the communicable disease center in four cities of Larestan (Lar, Gersh, Evaz, Khonj), in the south of Fars province in the period 2007-2016.

Ethical Considerations

The present study was the result of a research project approved by Larestan University of Medical Sciences (Ethics Code IR.LARUMS.REC.1398.015). The patients' information was kept confidential

Checklist

A checklist including information on age, sex, place of residence, occupation, diagnosis, the season of occurrence, affected organ, number of wounds, type of leishmaniasis, the type of building, nationality, wound shape, travel history to endemic areas, and history of concomitant family members was used for data collection. The researchers reviewed the records of all leishmaniasis cases from 2007 to 2016 by daily visits to the Larestan center for infectious diseases, which contained information about four cities in the southern Fars province.

Statistical Analysis

After completing the checklists, the data were entered into SPSS, version 25. During all stages of completing the checklist and entering data into the software. Tables and graphs represent descriptive statistics of the variables. Frequency (percent) was used to measure qualitative variables, and mean, and standard deviation was used for quantitative variables. The chi-square test was used to compare the qualitative variables and ANOVA to compare the means between the subgroups. The significance level was considered 5%.

Results

In the present study, data about 4599 people with Leishmaniasis were evaluated. According to Table 1, in all the years under the study, the age group less than ten years showed the most frequent cases of leishmaniasis. From 2007 to 2012, women had more leishmaniasis than men, while men had a higher percentage of cases from 2013 to 2016. For most of the years, the hand was more involved in leishmaniasis than other parts of the body. The majority of leishmaniasis cases were urban inhabitants by 2008, with more rural areas in 2009 and 2010. Most cases had no history of traveling to endemic regions and no history of co-infection in the family (Table 1). In all variables (Age, Gender, Organ, Job, Building type, Leishman type, Place, Nationality, Shape, History of travel to endemic areas and Concurrent Family infection) except for the diagnosis, there was a significant difference between different years ($P<0.05$).

Table 2 also presents the quantitative information of individuals with the year of the disease; accordingly, the highest mean number of wounds in patients was also in 2011 (2.9±2.5). The youngest affected individual was a one-month-old infant, and the oldest was a 77-year-old man. The mean age at different years showed a significant difference ($P<0.05$); also, there was a considerable difference between the frequencies of ulcers during different years ($P<0.05$).

The lowest number of cases occurred in summer and the highest in winter (Figure 1). Seasonal trends in gender subgroups showed that males were more affected by the disease than females throughout the year, except in the autumn when females outnumbered males (Figure 2).

Figure 3 also shows the seasonal trend of the disease by the year of occurrence over 5 years. The highest number of cases was seen in 2008 and the lowest in 2012, with a declining trend until 2012, but again in 2013 the number of cases increased (Figure 4).

Discussion

The present study obtained great results by examining data from 4599 cases of cutaneous leishmaniasis. The trend of Leishmaniasis has been declining in Larestan city from 2007 to 2016. However, in a study conducted by Zare et al. In the period from 2010 to 2015 in Fars province, it was found that the incidence of cutaneous

Table 2: Comparison of the mean and standard deviation of quantitative characteristics of the individuals with leishmaniasis by the year of occurrence

Variables	Year of occurrence									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Age	17.7±17.1	19.2±16.9	20.8±17.7	20.1±18.5	18.8±17.9	17.1±16.1	19.4±19.7	17.6±17.1	17.3±17.0	12.9±16.5
Number of lesions	2.7±2.5	2.6±2.1	2.2±2.0	2.3±2.1	2.9±2.5	2.2±1.7	2.54±2.1	2.0±1.9	2.6±2.3	2.1±1.7

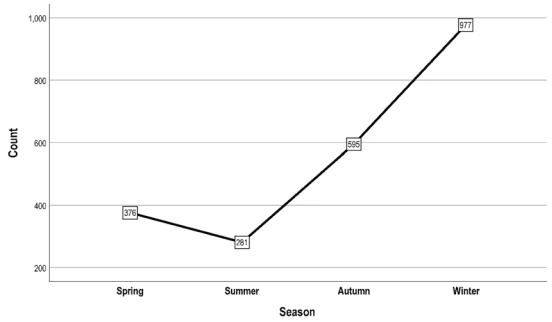

Figure 1: Seasonal trend of leishmaniasis cases, 2009-2016

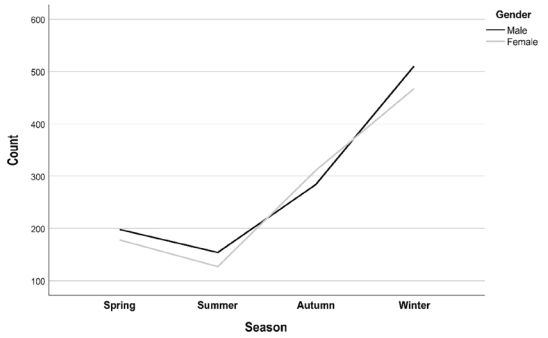

Figure 2: Seasonal trend of gender-specific leishmaniasis cases, 2009-2016

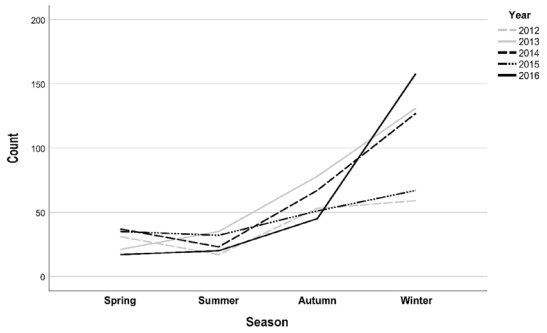

Figure 3: Seasonal trend of leishmaniasis cases by year

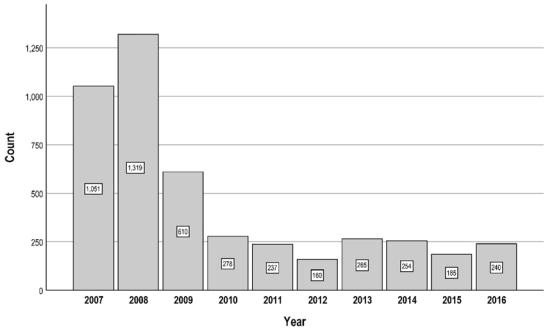

Figure 4: Number of cases of leishmaniasis by the year of occurrence

leishmaniasis in Fars province has increased.[18]

In a study conducted by Norouzinezhad et al. In 2011-2013 in Iran, it was found that the highest incidence of cutaneous leishmaniasis in Iran was related to Ilam, Fars, and Khorasan Razavi provinces.[19]

The findings of the present study showed that most cases of cutaneous leishmaniasis in the south of Fars province were less than ten years old. In the study of Jorjani et al. conducted in Golestan province in Northern Iran, it was found that the majority of cutaneous leishmaniasis cases were in children under nine years of age.[20] In the study of Davami et al. In Jahrom city in Fars province, more than one third of cutaneous leishmaniasis cases occurred in children under ten years of age.[21] This result is similar to the present study finding, but in another study by Soltani and colleagues in Southwestern Iran, most of the cases were in the age group of 20-30 years.[22] Another study in Yemen found that children less than 16 years old had the most cases of cutaneous leishmaniasis.[23] A survey by Fattahi Bafghi et al. In Fars province showed that most cases of cutaneous leishmaniasis in the age group of 20 to 29 years.[24]

The results of this study showed that by 2012 most of the cases were women, whereas from 2013 to 2016, the majority of cases were men. A similar study found that men were more likely to have cutaneous leishmaniasis than women.[22] The study found that, except in 2014 and 2015, in other years, rural residents were more likely to have leishmaniasis than urban dwellers, which is in contrast to the results of Sultani et al.[22] Another study in Brazil found that men and residents in the countryside were more likely to have cutaneous leishmaniasis.[25]

Khosravani et al.'s study carried out in the south of Fars province showed that the highest percentage of wounds was related to the hand, and about 60% of patients had wet wounds.[26] The study also found that Hand ulcers were the most prevalent part of the body in all years except 2016. In 2016, the largest number of ulcers were on the face.

Another study in southern Iran also found that most the patients had wet lesions, Hand ulcers were the most prevalent part of the body, and the highest prevalence of lesions occurred in autumn.[27]

According to Figure 1, the majority of cases occurred in winter and lowest in summer, respectively. In a study conducted in Iran, it was found that most cases occurred in November and December.[20] However, another study showed that most cases of cutaneous leishmaniasis occurred in autumn.[26] Soltani et al., in their research, concluded that most cases occur in winter.[22] Also, Ramezankhani and colleagues concluded that there was a direct relationship between temperature, relative humidity, and slope of the region with disease incidence; however, a negative correlation was found between the maximum wind speed, rainfall, elevation and vegetation with the

incidence of cutaneous leishmaniasis.[28]

The study found that most people with cutaneous leishmaniasis were children, housewives, students, farmers, and ranchers, respectively. A study in Colombia found that human activities such as deforestation associated with agriculture, livestock production, and mining activities are major contributors to the cutaneous leishmaniasis epidemic.[29] A study by Akhlagh et al. found that truck driver were the most important occupational group in the cutaneous leishmaniasis.[30]

In our study, it was found that about 70% of patients had no history of traveling to endemic areas. In contrast, a similar study in western Iran found that about 87% of patients had a history of travel to endemic areas.[30] There was no significant difference in the method of diagnosis in this study; however, in another similar study, it was found that the most important way to diagnose the disease was through laboratory tests.[30]

One of the most critical limitations of the present study was the failure to report information on some variables due to incomplete patients' records and the strength of the study was the long time considered and consequently, a huge sample size to report and evaluate data on cutaneous leishmaniasis.

It is recommended that further studies should be carried out to identify the most important factors associated with the increase in the number of cases, given that the disease is endemic in the southern region of Fars province.

Conclusion

As to the trend of Cutaneous Leishmaniasis, although the number of cases has decreased over the past decade, the number of patients continues to be significant; as a result, the disease has substantial economic and health consequences for the individual and society. Subgroups associated with the occurrence of the disease have undergone major changes over the years, and their distribution is irregular, so sufficient recognition, and attention to all of these variables is essential. Particular attention should be paid to environmental and living health issues, as well as training sessions for urban and rural residents to identify the underlying factors and ways to prevent them.

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Conflict of Interest: None declared.

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