



Trend Analysis of Cutaneous Leishmaniasis Incidence in Izeh County During 2014-2019

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Abstract

Background: A cutaneous form of leishmaniasis (cutaneous leishmaniasis, CL) is becoming increasingly common, and this study was conducted to investigate the epidemiological features of CL in the county of Izeh in Khuzestan province.

Materials and Methods: This retrospective cross-sectional research was performed during 2014-2019. Basic demographic and clinical information was gathered from patients with CL referring to Izeh health centre and then processed using SPSS software, version 25.0.

Results: Overall, data related to 131 patients were recorded from 2014 to 2019. The incidence of CL showed a decrease from 16.207 to 5.028 per 100000 individuals in Izeh. Based on the analysis of CL incidence in Izeh county, a statistically significant difference was observed through the mentioned six-year study ($P < 0.05$). Male patients with a frequency rate of 65.6% demonstrated a statistically significant association in the CL and the type of gender compared to 34.4% of females ($P < 0.05$). The age group of 20-29 years old (32.1%) had a higher frequency of CL in the age groups. Finally, there was a statistically considerable discrepancy in the frequencies of infected people with CL related to age groups ($P < 0.05$).

Conclusion: Based on the findings and other epidemiological characteristics, Izeh does not seem to be an endemic focus of CL. Nonetheless, it is a concerning situation, and proper preparation is strongly advised for disease control and prevention.

Keywords: Epidemiology, Cutaneous leishmaniasis, Izeh, Khuzestan

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Received: May 12, 2021, Accepted: August 3, 2021, ePublished: September 30, 2021

Introduction

Leishmaniasis, an endemic parasitic disease, has now been nearly dismissed as an infectious disease in society (1, 2). However, it is a prevalent disease, affecting many countries and regions, notably in poor economies worldwide (3-5). It is confirmed that 98 countries are endemic to leishmaniasis (3). There are believed to be 12-15 million cases globally, and 1.5-2 million new patients are found per year (6). Nearly 70% of cutaneous leishmaniasis (CL) were reported from Syria, Sudan, Iran, Brazil, and Peru (3, 6).

There are various kinds of leishmaniasis, including visceral, cutaneous, and mucocutaneous. Relatively, if left untreated, simple CL is frequently scarring but not dangerous by comparison, even when treated, the mucocutaneous and diffuse cutaneous disease may result in fatal secondary infections (7). Although CL usually heals itself and does not endanger life, mentally

and socially harmed infected patients may suffer from it (3, 8, 9). Acute to prolonged and severe infections by *Leishmania* occur based on the *Leishmania* species and the immune response of the host (6). Up to 20 different *Leishmania* parasite species cause leishmaniasis in the world (10, 11).

Infected female phlebotomine sand flies bite transmits leishmaniasis, transferring from an animal to a human through biting (7). The majority of transmission circles worldwide are zoonoses with reservoir hosts including mice, primates, domestic dogs, and wild canids (7, 12). On the other hand, leishmaniasis may be anthroponotic, with sand flies transferring a parasite that can successfully jump from human to human hosts while not needing a reservoir (7). Less than 100 species from approximately 1000 species of sand flies are known to spread the *Leishmania* parasites (13).

Environmental causes such as deforestation,

construction of dams, agricultural programs, and urban expansion are related to leishmaniasis (2). In addition, many of the poorest citizens on earth are influenced by this infection of hunger, population migration, inadequate infrastructure, a fragile immune system, and a shortage of financial capital (2).

According to some studies, there were about 20000 CL cases in Iran per year while assuming that the actual number is four to five times higher (9, 14). According to previous studies, CL is categorized into zoonotic by *Leishmania major* and anthroponotic by *L. tropica* or wet and dry lesions in the rural and urban areas of Iran (14, 15). *Phlebotomus papatasi*, *P. duboscqi*, *P. salehi*, and *P. caucasicus* act as the vectors of zoonotic cutaneous leishmaniasis (ZCL) in Iran (16).

It has been reported that ZCL is spread in a total of 17 provinces of Iran, including Khuzestan province, where ZCL is present in many regions (17). The most prevalent and significant CL species is the *L. major* in the Khuzestan Province (18, 19).

This project aimed to discover the frequency and incidence of this disease in Izeh county at various levels during 2014-2019. It is necessary to conduct epidemiological research to determine whether the current interventions in Izeh County would be effective on an emerging CL strain. Therefore, preliminary knowledge about the disease was gathered and examined in this regard.

Materials and Methods

Izeh County is located in northern Khuzestan Province, and the region is bordered to the north by the Zagros mountains and to the south by Khuzestan plain (Figure 1). The city of Izeh is placed on the latitude of 31°34'8"N, and longitude of 49°34'0"E. Summer temperatures cross

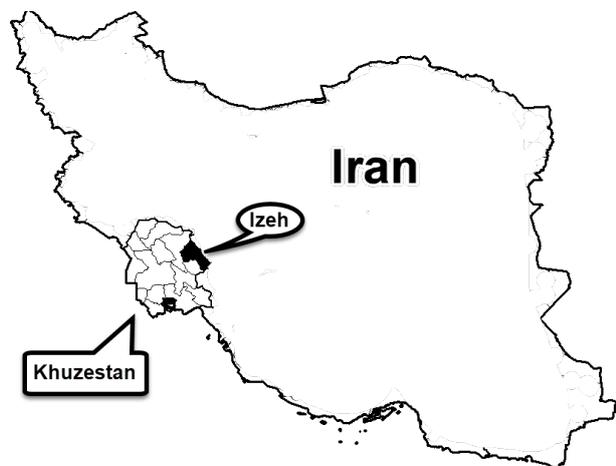


Figure 1. Area of This Research in Izeh County (Khuzestan province) in the Southwest of Iran (2014-2019).

a high of forty degrees Celsius and fall to a low of ten degrees Celsius, owing to the pleasant atmosphere of the region. The applied water reservoirs include natural and seasonal rivers, wells, and ponds. Over the winter, rain can fall occasionally, and annual precipitation varied from 100 mm to 120 mm (20).

A retrospective analysis was performed to ascertain the frequency and occurrence of CL in the 131 cases of CL men and women who referred to the health centre of Izeh county during 2014-2019. Several specific patient characteristics such as age, gender, profession, and year(s) were recorded, and the collected data from the records were carefully arranged in tables to find any associations between the variables using a chi-square analysis. In addition, the censuses population of the province was used to estimate the incidence of the disease in corresponding census years (21). For the period between the two successive censuses and considering the natural population growth rate in the base population, the population of the corresponding year was included in the calculations. The information was then evaluated in SPSS software, version 25.0 (Chicago, IL).

Results

One hundred thirty-one cases of CL were recorded during 2014-2019. The highest and lowest percentages of people suffering from the illness in 2014 and 2019 were 25.2% and 7.6% in 2014 and 2019, respectively. The results of the Kruskal-Wallis H test showed a statistically significant difference in the incidence rate per 100000 population between different study years ($P < 0.05$). Further, the peak annual incidence of the disease in 2014 was 16.5 while the least rate was 5.1 per 100000 population in 2019 (Table 1).

Based on the findings, 34.4% and 56.6% of the patients were females and males, respectively. A Chi-square goodness of fit test was conducted to measure whether the distribution of CL was the same in male and female patients. The results revealed a statistically considerable discrepancy in CL frequencies ($P < 0.05$). It was further found that the frequency of infected people with CL differed in both genders.

Table 1. The Incidence Rate of Cutaneous Leishmaniasis Per 100000 Population in Izeh County (2014-2019)

Years	New Cases	Total Population at Risk	Incidence Rate per 100000 People	P Value
2014	33	200582	16.5	<0.0001
2015	28	199579	14.0	
2016	24	198871	12.0	
2017	16	197934	8.0	
2018	20	197002	10.2	
2019	10	196074	5.1	

CL showed the highest frequency among 20-29-year-olds (32.1%) whereas the lowest rate among the 60-plus years old (3.8%). The chi-square goodness of fit test was performed to measure whether the age of the infected people with CL demonstrated the difference from randomness. There was a statistically considerable discrepancy in the frequencies of infected people with CL ($P < 0.05$). More than half of the examined patients (59.5%) were less than 30 (Table 2). The youngest patient had 1 year old whereas the oldest one had 66 years old.

Regarding the occupation, the highest disease rate was observed in housekeepers (22.1%). The chi-square goodness of fit test was carried out to measure whether the frequency of infected people with CL in the eight occupation groups differed from randomness. A statistically considerable discrepancy was found in the frequency of infected people with CL ($P < 0.05$).

Discussion

Leishmania infections, which are designated as neglected tropical diseases, constitute a significant public health problem and are the most responsible for disabilities following malaria among parasite infections (22).

The number of definite CL cases was 131 during the study time (2014-2019). Thus, our findings showed that CL experienced a decline in the mentioned years.

It was also found that men and women of all ages were sensitive to CL. Nonetheless, the condition was more frequent in males (65.6%). Similar findings were reported in other areas of Iran and the world (9, 14, 23-

25). This sexual disparity can be because men wear fewer clothes and further participate in external activities, sports, and nightwork, exposing them to more sand fly bites compared to women (9, 24, 25). However, men and women were similarly influenced by CL in an analysis performed in southeastern France (26).

Occupational exposure, soldiers, miners, police officers, and loggers are among the most vulnerable to CL infections (25, 27). According to the statistics of our study, a tremendous rate (22.1%) was observed in housekeepers concerning the occupational groups, which is in line with the findings of some studies conducted in the other regions of Iran (9, 14). The increased infection levels in housewives are likely due to economic practices associated with carpeting (24).

Based on the findings, the most notable affected age demographic was related to males and females whose ages varied from 20 to 29 years (32.1%). It can also be attributed to the increased chance of sand fly biting during outdoor activities. The findings of this study are in conformity with the results of studies performed in Kashan (24, 28) while contradicting those of some other studies (9, 29).

The previous evidence suggests that CL disease is rising in Iran and other regions worldwide (9). The estimated CL incidence in 2019 was the least whereas this frequency was the greatest in 2014 (per 100,000 people). Although the calculated average national incidence rate of CL was 27.5 (14), it was calculated 11.0 per 100,000 populations in Izeh County in our study. Therefore, the incidence of CL in Izeh was remarkably lower than expected and compared with the prevalence of CL in Iran. It is possible that this city is not an endemic focus for CL or the frequency of the disease could be decreasing because of several important tasks performed in the CL scheme, including reservoir and vector management and early detection and treatment. Nevertheless, the results indicated that control of the disease, an emphasis on significantly improving the environment, and public health education can nearly eliminate CL in the human population in the Izeh district successfully.

Conclusion

Based on the results of this study, Izeh does not seem to be an endemic focus for cutaneous leishmaniasis. Despite a decrease in the incidence of CL in these six years, its rate is still substantial. Therefore, to overcome the disease, conducting control programs such as vector and reservoir management and an increase in people's awareness of personal protection methods should be revived in the region.

Conflict of Interest Disclosures

The authors declare that there is no conflict of interests.

Table 2. The Characteristics of People With Cutaneous Leishmaniasis From 2014 to 2019 in Izeh County

Characters	Categories	Number	%	P value
gender	Male	86	65.6	<0.0001
	female	45	34.4	
Age group	Under 10	24	18.3	<0.0001
	10-19	12	9.2	
	20-29	42	32.1	
	30-39	21	16.0	
	40-49	16	12.2	
	50-59	11	8.4	
	60 and over	5	3.8	
Occupation	Soldier	17	13.0	<0.0001
	Labour	25	19.1	
	Driver	5	3.8	
	Child	20	15.3	
	Student	7	5.3	
	Housewife	29	22.1	
	Clerk	4	3.1	
	Other	24	18.4	

Ethical Statement

This paper was extracted from a research project entitled "Variation Analysis in the Incidence Trend of Cutaneous Leishmaniasis in Izeh County during 2014-2019 and approved by Ahvaz Jundishapur University of Medical Sciences (with the ethics code of IR.AJUMS.REC.1399.933 and the number of 99s89).

Authors' Contributions

MAM and AB developed the concept and designed the study. In addition, MAM collected the epidemiological data. Further, MD and AB analyzed and interpreted the data. Finally, MAM and AB wrote the manuscript.

Acknowledgment

The authors gratefully acknowledge the Health Center of Izeh and the Student Research Committee of the Research Deputy of Ahvaz Jundishapur University of Medical Sciences (AJUMS) for data collection and financial support for this study.

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