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Epidemiological Trend of Cutaneous Leishmaniasis in an Endemic Focus Disease During 2009-2016, Central Iran

Kutanöz Leishmaniasis'in 2009 ve 2016 Yılları Arasında Orta İran'da Endemik Bir Bölgedeki Epidemiyolojik Trendi

Doroodgar Moein[1], Doroodgar Masoud[2], Nematian Mahmood[3], Doroodgar Abbas[4]

[1]Shahid Beheshti University of Medical Sciences, Faculty of Medicine, Tehran, Iran
[2]Aja University of Medical Science, Faculty of Medicine, Tehran, Iran
[3]Kashan University of Medical Sciences, Vice Chancellor of Health, Group of Communicable Diseases, Kashan, Iran
[4]Kashan University of Medical Sciences Faculty of Medicine, Department of Medical Parasitology, Kashan, Iran

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ABSTRACT

Objective: Cutaneous leishmaniasis (CL) is one of the common parasitic diseases in tropical and subtropical areas and is one of the important health problems in Iran. In order to investigate epidemiological aspects of CL disease in city of Aran va Bidgol in Isfahan province, this study was carried out in this central region of Iran.

Methods: This cross-sectional study was conducted in over a period of eight years between 2009-2016. Direct smears were prepared from all patients and were examined by a light microscopy. The basic demographic and clinical data of patients with CL disease referred to health care centers were collected and then were analyzed by using the SPSS software.

Results: Overall, 926 patients, including 542 (58.5%) males and 384 (41.5%) females with confirmed CL were identified. The CL disease was more common among males (58.5%). The highest and lowest incidence of the CL disease were estimated as 238.5 and 44.2 per 100000 people in 2009 and 2016, respectively. The highest incidence of the CL disease (26.3%) was observed in the age group of 0-9 years. Most of the cases (54%) were seen in autumn. More lesions (44.7%) were seen on the hands. Of the patients, 65.4% were treated by systemic glucantime regimen.

Conclusion: According to the results of this investigation, although there is a trend of decrease in the incidence of the CL disease in this 8-year period, incidence of the CL disease is still high. This is an alarming condition and careful planning for control and prevention of the disease is highly recommended.

Keywords: Epidemiology, Cutaneous leishmaniasis, Iran

ÖZ

Amaç: Kutanöz leishmaniasis (KL), tropik ve subtropik bölgelerde görülen sık parazitik enfeksiyonlardan biridir ve İran'daki önemli sağlık sorunlarındandır. İsfahan Bölgesi'ndeki Aran va Bidgol şehrinde KL'yi epidemiyolojik açıdan araştırmak için bu çalışmayı Orta İran'da yaptık.

Yöntemler: Bu kesitsel çalışma 2009 ve 2016 yılları arasında 8 yıllık dönemde yapıldı. Bütün hastalardan smear alındı ve ışık mikroskobu ile incelendi. Sağlık merkezlerine yönlendirilen KL tanılı hastaların temel demografik ve klinik bilgileri toplandı ve SPSS programı ile analiz edildi.

Bulgular: Dokuz yüz yirmi altı KL tanısı konmuş hastanın 542'si (%58,5) erkek, 384'ü (%41,5) kadındı. KL erkeklerde daha fazlaydı (%58,5). En yüksek ve en düşük KL insidansı 100000'de 238,5 ve 44,2 ile sırasıyla 2009 ve 2016'da saptanmıştır. En yüksek insidans %26,3 ile 0-9 yaş grubu hastalarda saptandı. Sonbahar en sık hasta görülen mevsimdi (%54). En çok lezyon ellerde görüldü (%44,7). Hastaların %65,4'ü sistemik glucantime rejimi ile tedavi edildi.

Sonuç: Çalışmamızın sonuçlarına göre, 8 senelik dönemde KL insidansı düşme trendinde olsa da halen KL insidansı yüksektir. Bu, telaşlandırıcı bir durumdur; hastalığın kontrolü ve önlenmesi için dikkatli bir planlama yapılması oldukça önemlidir.

Anahtar Kelimeler: Epidemiyoloji, Kutanöz leishmaniasis, İran

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Address for Correspondence/Yazar Adresi: Doroodgar Abbas MSc, Kashan University of Medical Sciences Faculty of Medicine, Department of Medical Parasitology, Kashan, Iran
Phone Tel: +98 913 36 23 454 **E-mail/E-Posta:** adoroudgar@gmail.com **ORCID ID:** orcid.org/0000-0003-3247-9637

Türkiye PARAZİTOLOJİ Dergisi

INTRODUCTION

Leishmaniasis is a devastating disease that causes serious health problems around the world (1). The genus of *Leishmania* is responsible for the leishmaniasis, a group of diseases that were seen much in the tropics and subtropics. The genus of *Leishmania* is an obligate intracellular protozoan parasite which is transmitted by the bite of infected female Phlebotomine sand flies (Family: Pscychodidae) (2-4). Cutaneous leishmaniasis (CL) is one the leishmaniasis and most common form of the disease, is characterized by the appearance of a skin lesion of one or more ulcers. CL was seen in two forms zoonotic cutaneous leishmaniasis (ZCL) and Anthroponotic CL (ACL). ZCL and ACL caused by *Leishmania major* and *Leishmania tropica* respectively. CL disease causes skin ulcers on exposed parts of the body (5,6). Annually, it is estimated that leishmaniasis between 600000-1000000 new cases occur around the world. Approximately, 95% of CL cases happen in the Americas, the Mediterranean basin, the Middle East and Central Asia. More than two third of new CL cases happen in Afghanistan, Algeria, Brazil, Colombia, Iran and the Syria in 2015 (4). In Iran, CL transmission occurs in 17/31 provinces in the country and about 20.000 cases of CL are reported in many parts of Iran annually. But the real numbers are probably three to five times higher the reported extent. There are two forms of the CL, ACL (urban or dry CL) and ZCL (rural or wet CL) (4-6). In many provinces, especially in rural areas and in large and medium-sized cities ZCL and ACL are common respectively. Zoonotic CL is endemic in many rural areas. Over 80% of CL cases in Iran are ZCL type (3,6-10). The prevalence of CL infection has been reported in different provinces at a variable rate of 1.8% to 37.9% (9). Aran va Bidgol is one the populous county in the Isfahan province and is one of the most important foci of ZCL. Results of a study conducted in the Aran va Bidgol region have shown that *Leishmania major* parasite is the causative agent of the CL disease among patients and *Rhombomys opimus* and *Phlebotomus papatasi* are the main reservoir host and vector in the dissemination of the parasite respectively (11). In order to provide a proper plan for the prevention and control of the disease in this region, it is important to know the epidemiological aspects of the CL disease. Therefore, the epidemiological aspects of CL were investigated in the city of Aran va Bidgol between 2009-2016.

METHODS

This cross-sectional study was conducted in over a period of eight years between 2009-2016.

Study Area

Aran va Bidgol with an area of 6051 km^2 lies 235 km by road southwest of the capital Tehran and 210 km from the Isfahan province is in central Iran. This city is located on the southwest border of the central desert of Iran with a typical climate of hot and dry in summer, cold and dry in winter and very little rainfall (100-150 mm) during the year. Its average elevation is 912 meters above sea level and its coordinates are 34°03′28″N 51°29′03″E (Figure 1).

Data Collection

To examine the epidemiological aspects of the CL disease in the Aran va Bidgol district during 2009-2016, this study was conducted and data all of patients with CL disease that were reported from the health care centers were collected. At first, CL infection was clinically diagnosed by a physician and then confirmed by observation of *Leishmania* parasites by direct smear microscopy from lesions. For all patients, the smear was obtained (from the edges of the lesion) and prepared after fixed with pure methanol and staining with Giemsa. The information obtained was recorded in a checklist containing demographic information such as sex, age, occupation, location of residence, nationality of patients, history of travel in the paste to endemic areas of the disease, season, place or number of acute lesion(s), date of occurrence of lesion(s), results of clinical examination and laboratory tests, the type of treatment regimen.

Statistical Analysis

The chi-squared tests were used to analyze collected data in SPSS for Windows 16.0.

RESULTS

Overall, 926 confirmed CL cases were reported in the city of Aran va Bidgol during 2009 to 2016 period. Five hundred forty-two cases were male (58.5%) and three hundred eighty-four cases (41.5%) were female. The disease was common in men and women and statistic test showed that there was no significant association between the sex and disease (p=0.982).

Most of the lesions were observed in 0-9 years age group (26.3%), while the lowest rate was found in 50-59 years age group (6.7%). 42.8% of patients with CL were in the age group of 0-19 years (Table 1). There was no significant relationship between the job and disease (p>0.05). The age of the patients varied from one month to 90 years and up to 40 lesions was observed in an Iranian 25-year-old worker. In terms of occupation, 23.3% were homemaker, 22.5% young children, 15.6% workers, 15.2% students, and so on (Table 1). No significant correlation was found between age groups and active disease (p=0.973).

Due to the location of the lesion in the body, hands were the most affected (44.7%) and then legs (23.3%), face (19.2%) and so on. 79.3% of patients with CL lived in urban and 26.1% in rural centers (p>0.05). 48.5% of patients had a single lesion, 24.5% had two lesions and the rest had multiple lesions. 42.3% of cases had a history of traveling to endemic areas CL. 86% of patients with CL were Iranian and the rest belonged to other nations. Cases of CL

Table 1: Distribution of cutaneous leishmaniasis disease characters in 926 CL patients in the city of Aran va Bidgol, 2009-2016

Characters	Categories	No (%)
Gender	Male	542 (58.5)
	Female	384 (41.5)
Age group	0-9	244 (26.3)
	10-19	153 (16.5)
	20-29	160 (17.3)
	30-39	128 (13.8)
	40-49	91 (9.8)
	50-59	62 (6.7)
	≥60	88 (9.6)

Table 1 contiuned

Job	Homemaker	216 (23.3)
	Student	144 (15.6)
	Worker	208 (22.5)
	Child	141 (15.2)
	Farmer	33 (3.5)
	Driver	10 (1.1)
	Other	174 (18.8)
Place of lesion	Hands	414 (44.7)
	Feet	216 (23.3)
	Face	178 (19.2)
	Trunk	29 (3.1)
	Other places	89 (9.7)
Residence	Urban	684 (73.9)
	Rural	242 (26.1)
Travel history	Yes	392 (42.3)
	No	534 (57.7)
Nationality	Iranian	796 (86)
	Non-Iranian	130 (14)
Season	Spring	22 (2.4)
	Summer	301 (32.5)
	Autumn	501 (54.1)
	Winter	102 (11)
Year	2009	220 (23.8)
	2010	95 (10.3)
	2011	105 (11.3)
	2012	242 (26.1)
	2013	64 (6.9)
	2014	106 (11.4)
	2015	46 (5)
	2016	48 (5.2)
Treatment	Systemic glucantime	605 (65.4)
	Topical glucantime	103 (11.2)
	Topical glucantime & cryotherapy	89 (9.6)
	Cryotherapy	79 (8.5)
	Not indicated	7 (0.7)
	Other	43 (4.6)

during autumn were higher compared with those during summer. The number of cases was higher in the months of October, November and December (20%, 24% and 13%, respectively). The lowest frequency of CL cases was seen in spring (2.4%) (Table 1). The most cases were observed in 2012 (26.2%) and the lowest (5%) was in 2015. The highest annual incidence of CL was

Figure 1. Geographical location of Aran va Bidgol County in Map of Iran, region of study

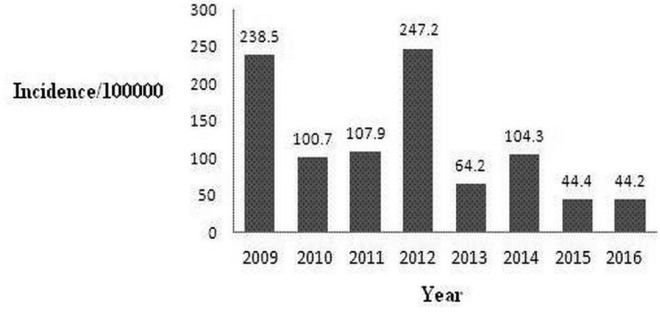

Figure 2. Annual incidence of cutaneous leishmaniasis per 100.000 Populations in city of Aran va Bidgol between 2009-2016

estimated to be 247.2 per 100.000 in 2012 and the least 44.2 per 100,000 in 2016 (Figure 1). The most common treatment regimen was systemic Glucantim (65.4%) (Table 1). Chi-square test showed that there was a significant difference between the treatment regimen and the disease (p=0.736).

DISCUSSION

The incidence of the CL disease is increasing throughout the world and in various parts of the Islamic Republic of Iran. We conducted the present study to investigate epidemiological aspects and the incidence of CL in the city of Aran va Bidgol, Isfahan province. In this study, 926 confirmed patient with CL were observed in an 8-year period. According to the misdiagnosed and self-healing cases and available scientific references (3), it is estimated that the real cases to be 3 to 5 times higher, nearly 5000 local populations were infected with CL in this city. The results of the present study showed that both sexes and all age groups were at risk for CL disease. Similar findings have been reported in various studies conducted in Iran (6,10), in Libya, South-West of Kerman, Morocco, Qom province, Kerman province (12-16). In our study, most patients were male (58.5%). Similar results have been reported in some other studies, including Golestan province, Yazd province, and Bushehr province (15,17,18). The higher incidence of CL disease in men compared to women can be justified by the behavior of men as wearing less clothing, more presence outside the home to carry out normal social and/or occupational activities or working in open environments after sunset and throughout the night, when the infected sand

flies bite and bloodsucking. In this study, considering the job of patients with CL, the highest prevalence of CL was observed in housewives. Other studies, including studies conducted in Iran, Fars province, Bushehr province and Qom province reported similar results. (14,18,19) But our result is inconsistent with the findings of a study conducted in Isfahan (20). In the present study, the higher prevalence of CL in housewives could be due to economic and carpet weaving activities in low light rooms in the days. In these places, sand flies can continue to bloodsucking and infected human. Our study also indicated that the majority of the CL patients belonged to the 0-9 year age group (26.3%). Our finding is consistent with the results of the studies in Omidieh and Ahvaz (21,22) and is inconsistent with the results of some internal and external investigations conducted in Fars province, Kermanshah, Isfahan, Khatam County, Morocco and Libya (12,19,20,23,24). The highest frequency of CL was showed in the age group of 0-9 years. More infections in this age group can be justified by these reasons when the level of endemicity of CL disease is high; the disease occurs in children under one year or children under school age and on the other hand, may be due to the low immune system susceptibility of children to fight CL parasites. According to the finding of this study, about 65% of patients with CL were observed in the second half of the year (autumn and winter seasons), which indicates the dominant rural type of the CL disease in this region. The results showed that nearly 51.5% of patients had more than one lesion on the body. Several studies that described the epidemiological aspects of the CL disease have reported that most patients had multiple wounds (14,18,20,22,25). Our results are consistent with the findings of these studies. The results of this study showed that 65.4% of patients with CL were treated with systemic glucantime. According to multiple lesions in different parts of the patient's body and with regards to the use of the glucantime drug as the first line in CL treatment in Iran, this regimen has been used more than others.

As can be seen in Figure 2, the highest incidence of CL was estimated at 2012 and the lowest at 2016. Changes in managerial and environmental factors may cause fluctuations in the incidence rate of the CL disease in different years. Although in recent years, there has been a downward trend in the CL disease incidence in the city of Aran va Bidgol. However, the CL incidence in this city is more than the average rate of CL incidence in Iran (27 per 100,000 in 2011) (8) and CL is still a public health problem in the city of Aran va Bidgol. Conflicting results have been reported in many studies based on an increased of the CL incidence rate in the investigated areas (19,25). The declining trend may be due to some factors, including, control of the parasite vectors and reservoir hosts, early diagnosis and treatment of the disease and increasing people's awareness on the use of personal protection methods. The incidence time graph of the CL disease in the 8 years period study, showed an increase and decrease in CL incidence during this study. Other investigations have reported similar findings (15,24,26-30).

CONCLUSION

This study showed that the CL disease is endemic in the city of Aran va Bidgol and at the present time, this disease is an important public health problem in this region.

Considering the high incidence rate of the disease in this endemic region, to prevent an outbreak of the disease, it is necessary to control strategies is carried out as in the past. It is recommended, before beginning sand flies activities, a rodent control program run at a radius of 500 meters around the at-risk villages. Also health education and raising of awareness of the area residents about observing health principles, the cycle of disease transmission and personal protection in preventing the disease are very important. Also, it is suggested, periodic and regular visits are performed by health experts from the region.

* Ethics

Ethics approval consent: This study was conducted on the basic demographic and clinical data of the patients with CL disease were collected from health care centers.

Informed Consent: Patient approval was received.

* Authorship Contributions

Concept: D.M., D.A., Design: D.A., D.M., Data Collection or Processing: D.A., D.Ma., N.M., D.A., Analysis or Interpretation: D.M., D.Ma, Literature Search: D.M., D.A., D.Ma, Writing: D.A.

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