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The Prevalence, laboratory confirmation, clinical features and public health significance of cutaneous leishmaniasis in Badrood city, an old focus of Isfahan Province, Central Iran

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PEER REVIEW

Peer reviewer

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Comments

The study proved that the disease-causing parasite was *Leishmania major* based on the clinical, laboratory and epidemiologic evidences. This is an excellent study in which the researchers gives recent information about the cutaneous leishmaniasis prevalence. The results gained can help to construct native health policies for reducing the disease burden.

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ABSTRACT

Objective: To investigate the status of cutaneous leishmaniasis (CL) during 2008 through 2012 in Badrood City.

Methods: This is a descriptive–analytical study that was conducted during 2008–2012. The statistical population consisted of all patients, who were under treatment and follow up with the diagnosis of CL through laboratory confirmation (amastigotes view in the lesion smear) and clinical symptoms. The impression smears were prepared from the sides of ulcers of all patients by scraping; then, they were fixed in methanol, stained by standard Geimsa method, and observed exactly under the microscope. For this purpose, a researcher–made questionnaire was completed; after extracting the information, the results were analyzed using the SPSS version 17.

Results: Among the number of 499 patients studied, 297 cases (59.5%) were male and the 202 cases (40.4%) were female. Slides prepared from the lesions of these patients had a *Leishmania* parasite with large vacuole (the features of *Leishmania major*). The highest cases of disease were related to the year 2012 with 190 patients, and later 2010, 2009, 2008, and 2011 respectively had the highest cases. In total, 26 patients (5.2%) have had the disease history. The highest incidence of the disease was respectively in the months of September (143 cases), August (112 cases) and October (106 cases). The most ulcers (38.08%) were observed on the hand; then the foot and face had the maximum number of the ulcer. Also, in most patients (53.9%) over an ulcer were observed.

Conclusions: The results of this study showed an increase in the prevalence of CL during the years 2008 to 2012. It can be said that the main reason for this increase is people's lack of awareness of the disease transmission method. The increased disease process can be controlled through education and appropriate prevention methods.

KEYWORDS

Cutaneous leishmaniasis, Epidemiology, Prevalence, *Leishmania major*, Iran

1. Introduction

Cutaneous leishmaniasis (CL) is a dermal infectious disease. Ulcer of CL takes about a year and then heals but

the scar remains forever. The cause of the disease attributes to various species of the genus *Leishmania*, which is an obligatory intracellular protozoan. The CL is transmitted by sand fly bites in the family of Psychodidae[1–4].

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The CL is endemic in 88 countries in the different regions of the world^[5–8]. This disease is common in many tropical and subtropical areas of the world. Leishmaniasis occurs in the triple forms of cutaneous, visceral, and mucocutaneous^[9,10]. According to studies in Iran, CL is also one of the common and important diseases that is extensive in the various urban and rural areas in 15 of 30 provinces of Iran^[11]. The CL is considered as one of the health problems in Iran. Annually approximately two million new cases of disease are occurring around the world that over 90% of those are seen in the countries of Afghanistan, Pakistan, Iran, Iraq, Syria, Jordan, Algeria, Tunisia, Morocco and Saudi Arabia.

In 2008, 26 000 cases in total have been reported and recorded in Iran. More than 90% of cases have happened in 88 counties of Iran, and transmission of the disease takes place in the 17 provinces^[12]. The CL is seen in the two types of dry and wet in different parts of Iran^[13,14]. In the wet form of the CL or the rural CL, different species of rodents especially rats (gerbil) and in the dry form or the urban CL, infected humans and dogs act as a reservoir hosts. Different species of sand flies are vectors for transmitting pathogenic organisms to the man^[15–18].

While the CL does not cause the mortality, but due to the creation of the nasty appearance induced by a lesion, it brings about to worry; furthermore, the consequences of the treatment such as economic costs, long duration of the treatment and relapse of the disease are important^[19]. The wet CL is in different parts of Iran and has numerous foci in the country that one of these foci is Badrood city. Due to the geographical conditions of the region and abundance of reservoir hosts (rodents), Badrood city is one of the endemic regions of the disease in the desert region of Kashan. With regard to the importance of the issue and its effects on health and medicine, this study aimed to investigate the epidemiology of CL in the recent five years in order to present educational and prevention actions.

2. Materials and methods

This was a descriptive and analytical study across sectional research. To specify the frequency of the CL during the years of 2008–2012, Badrood city and three villages of Arisman, Sarasiab, and Abbas–Abad with a total population of 14 373 people were studied. To detect cases of CL, a biopsy of the suspicious lesion's edges, where more probably there were parasites, was done by a scalpel sterilized via a flame. Two smears were prepared for each patient. Then impression smears were fixed with methanol and stained for 20 min with the Giemsa. After washing and drying of smears, the Leishman bodies or amastigotes were searched in them.

Information including age, gender, geographical area, the number of lesions, month, the duration of ulcer healing, lesion site on the body and catching place, were collected by using a questionnaire. The necessary permission for

the study previously had been received from the health and treatment network of Natanz County. After extracting information, the results were analyzed by using the statistic package for social science version 17.

3. Results

The results of the study showed that a total of 499 cases with the CL have been identified during the five years. Figure 1 represents the number of cases in the different years during 2008–2012. According to this figure, there was the highest number of cases of CL in 2012 followed by 2011, 2010, 2009 and 2008 respectively. Of the total number, 372 and 127 patients were living in cities and villages, respectively (Figure 2). The results showed that most cases have been reported in the therapeutic units in September, August and October respectively (Figure 3).

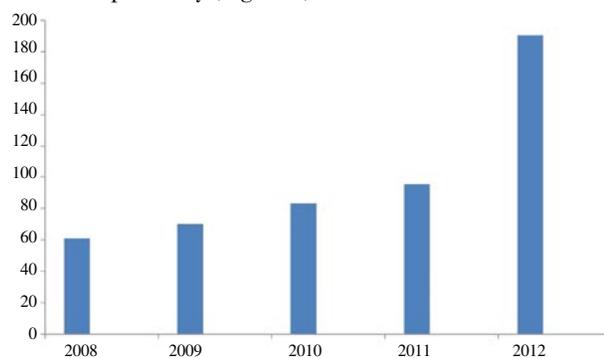


Figure 1. Changes of the CL cases in Badrood city, Isfahan province, Central Iran (2008–2012).

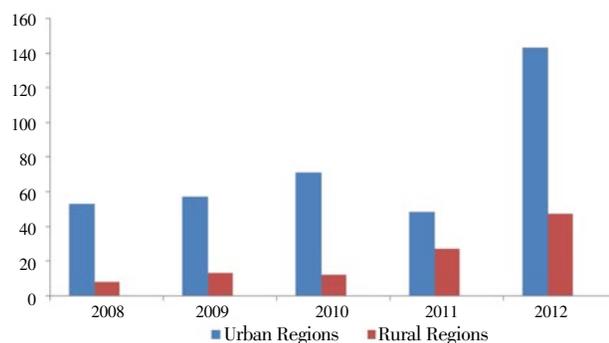


Figure 2. Changes of the CL cases by geographical location in Badrood city, Isfahan province, Central Iran (2008–2012).

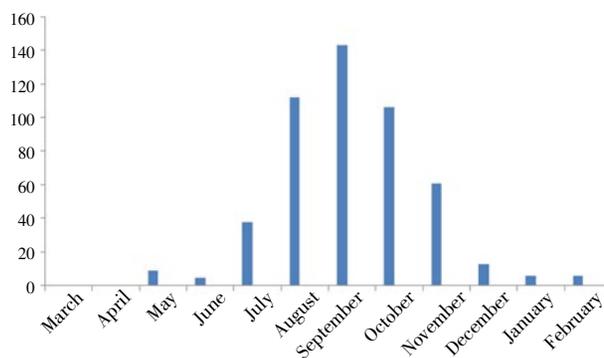


Figure 3. The number of CL cases by the month in Badrood City, Isfahan Province, Central Iran (2008–2012).

Of the total number of patients, 297 cases were men and 204 cases were women (Figure 4). Patients were divided into 15 age groups; more patients were in age groups 21–25, 26–30, and 16–20 years old (Figure 5). In the survey about the ulcer site on the body, the maximum number of lesions was found to be on hand, foot and face, respectively (Figure 6). Totally 26 cases (5.2%) have been infected to the disease for the second time (Figure 7).

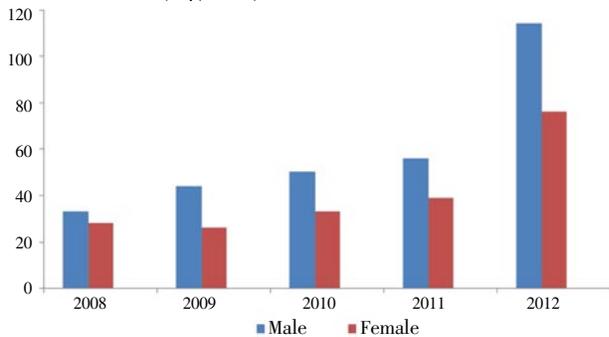


Figure 4. The number of CL cases by the sex in Badrood city, Isfahan province, Central Iran (2008–2012).

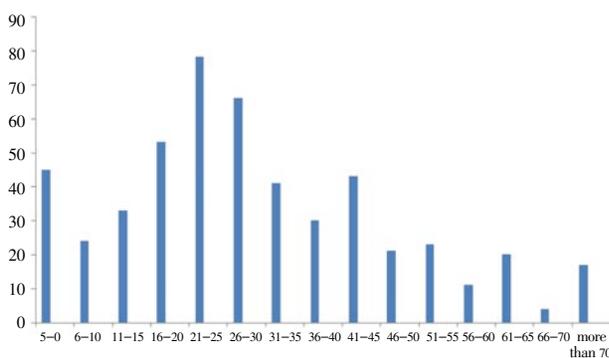


Figure 5. The number of CL cases by the age groups (years) in Badrood city, Isfahan province, Central Iran (2008–2012).

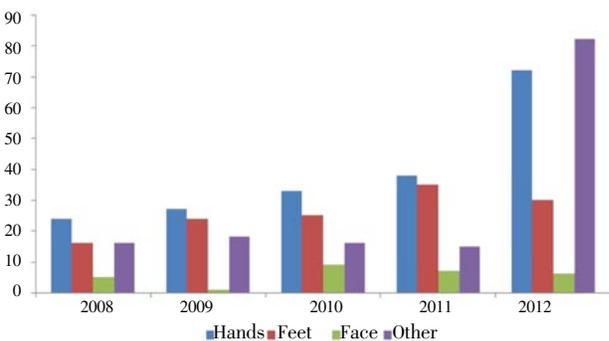


Figure 6. The number of CL cases by the ulcer site on the body in Badrood city, Isfahan province, Central Iran (2008–2012).

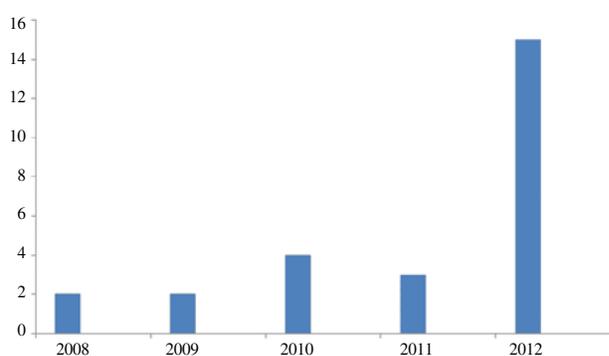


Figure 7. The number of cases which have been infected to the CL for the second time or more in Badrood city, Isfahan province, Central Iran (2008–2012).

The results related to the number of patients' lesions showed that most cases (269, 53.9%) had more than one lesion (Figure 8). By examining the results of the time duration of lesion healing, it became clear that 92.9% of patients after two months have reached almost complete treatment (Figure 9).

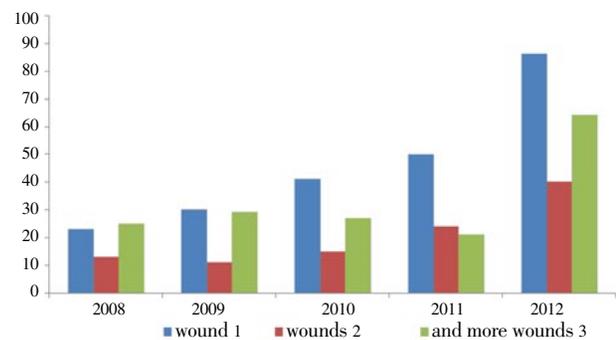


Figure 8. The number of CL cases by frequency of ulcers in Badrood city, Isfahan province, Central Iran (2008–2012).

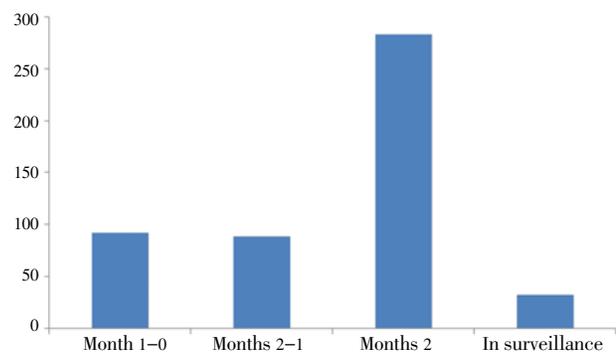


Figure 9. The number of CL cases by time duration of disease in Badrood city, Isfahan province, Central Iran (2008–2012).

4. Discussion

The study showed that the CL is considered as one of the most common diseases in Badrood city and its prevalence has increased during 2008–2012. In 2008, about 26 000 CL cases has been recorded and reported in Iran; more than 90% of cases happened in 88 counties of Iran and the disease is transmitted in the 17 provinces. Also, Badrood is considered as one of the endemic regions of this disease in Iran^[12]. The counties of Shiraz, Mashhad, Isfahan and provinces of Golestan, Kerman, Khuzestan, Ilam, Yazd, Sistan–Baluchestan, Semnan, Qom, North Khorasan, and Bushehr have had most CL cases in 2010. In the world, Iran and Saudi Arabia have most of the disease catching.

The most main reasons for the spread of the disease can be the climatically proper conditions and animal and human sources of infection. Based on experts' opinion and reviews conducted in the city of Badrood, just 30% of citizens are fully aware of the disease. Therefore, the basic measures to reduce the incidence rate of the disease in this city is necessary. In addition, educational programs by different methods should be held for the promotion of awareness of the people on the transmission and prevention of the disease.

The five–year plan of control and prevention of this disease because of high prevalence in Isfahan province has been started since 2008 and involves regions where more than five cases per 1 000 000 people are reported. According to a study conducted in 2012, the CL had the sudden double

growth rate compared to one year ago. An increase in the number of vector sand flies in the environment, the continuous lack of waste disposal, stacking animal fertilizers in rural homes, old dwellings, the empty houses, half-finished buildings and the place next to it, are considered as the most important factors of increase in the number of this disease.

In this study, the number of men diagnosed with the disease was more than that of women. This result is consistent with the results of studies conducted by Mohajeri in Mashhad county^[20], Rajabi in Isfahan county, Silveira in Brazil and Tohid in Mashhad county^[21–23]. In all of these researches, the percentage of male cases has been higher than female patients. One of the reasons for higher catching in males than in females can be induced by a relatively full coverage for women. Also, the existence of habits such as sleep in outer places and more contact with the environmental factors for occupational reasons can be other factors for the increased catching in men^[24].

According to the results of our study, the highest number of cases was related to the age group of 21–25 years and the lowest number was the age group of 66–70 years. In other studies catching percentage of the CL in the different age groups has been surveyed. In studies conducted by Hamzavi, Yaghobi–Ershadi in Yazd, Soleimani and Gurel the highest percentage of catching has been reported in the age group 5–9 years^[25–28]. Also, in the studies conducted by Yaghobi–Ershadi and Uzun the most affected age groups were 4–10 and 10–19 years old, respectively^[29,30].

The results of this study indicate that the seasonal incidence of the disease determines the rural type of the CL; however in terms of endemicity, due to catching of the different age groups, the rural CL occurred in this area is in the form of mesoendemic.

Totally, by comparing the results of several studies, we can deduce that incidence and prevalence of the CL in different age groups depend on the severity of the disease endemicity. In most studies, the reduction of the number of patients has observed in the upper ages that this issue poses the creation of immunity in the CL in some regions^[24].

At present, patients are treated according to treatment protocols of the Ministry of Health. Two types of treatment can be used for the CL disease. Systemic treatment takes 11 to 15 d. The number of ampoules is determined according to the patient's weight. Muscle injection is done based on 5 mg of the glucantime ampoule per kilogram of body weight, at least 12 ampoules and maximum on the basis of a patient's body weight. Topical treatment takes three to six weeks and subcutaneous injection is done once a week. Systemic treatment is used if there were five or more lesions, ulcer diameter longer than 3 cm, a lesion in the joint, facial lesion, and treatment failures or relapses. Cardiac or diabetic patients, pregnant women and nursing mothers have to undergo the kidney test, complete blood count, and electrocardiogram tests, and finally injected under the supervision of a specialist^[12].

The findings of this study show that the disease in the area of Badrud county is in the mesoendemic form. Therefore, the authorities should provide the appropriate training to people to reduce the complications due to the spread of this disease.

Along with the training, controlling the reservoir hosts and vectors and the use of the insecticide-impregnated bednet can play an important role in reducing the problem.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Leishmaniasis constitutes a diverse collection of human diseases ranging in severity from a spontaneously healing skin lesion to overwhelming visceral disease. Worldwide, two million new cases occur each year, and one tenth of the world's population is at risk of infection. Dermal leishmaniasis is a parasitic infection, which is caused by protozoal species in the the genus of *Leishmania*. Although the disease occurs in all continents, it is endemic in tropical and subtropical parts of the globe. In Iran, the infection is widespread in all regions of the country and more than 20000 new cases are found each year. In this regard, the present research was done in Badrood city, in the Central Iran.

Research frontiers

To investigate the epidemiology of cutaneous leishmaniasis in the Badrood city, Iran during 2008 through 2012.

Related reports

In another study on cutaneous leishmaniasis in Ilam province, Western Iran during 2000–2007, there was a relationship between gender and the incidence of disease and the incidence was higher in men than in women. Meanwhile, majority of cases had ulcers on hand and foot. These results are in agreement with this study.

Innovations and breakthroughs

In the present research, authors have proved that impressions prepared from cases had a *Leishmania* parasite with large vacuole (the features of *Leishmania major*).

Applications

The epidemiologic and demographic features of dermal leishmaniasis in Badrood city has not been surveyed in recent years. To combat the disease more effectively and organize a control program, necessary data are required to be determined.

Peer review

The study proved that the disease-causing parasite was *Leishmania major* based on the clinical, laboratory and epidemiologic evidences. This is an excellent study in which the researchers give recent information about the cutaneous leishmaniasis prevalence. The results gained can help to construct native health policies for reducing the disease burden.

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