RESEARCH ARTICLE

•Arch Hyg Sci 2013;2(2):48-54
•Journal Homepage: http://jhygiene.muq.ac.ir

Outbreak of Zoonotic Cutaneous Leishmaniasis: A Report

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A-R-T-I-C-L-E I-N-F-O

Article Notes:
Received: Feb 27, 2013
Received in revised form: April 21, 2013
Accepted: May 16, 2013
Available Online: June 5, 2013

Keywords:
Cutaneous Leishmaniasis
Outbreak
Qomrood Village, Qom Province, Iran

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Background & Aims of the Study: In recent years, incidence of Leishmaniasis has showed an increasing trend. So we investigated some epidemiological aspects of the Leishmaniasis disease in order to update our information about infection routes and epidemiological characteristics of the disease in Qomrood District, Qom Province, Central Iran..

Materials & Methods: In this descriptive cross-sectional study, patients population includes those have been treated and followed with the diagnosis of cutaneous Leishmaniasis in Qomrood District Health Center clinically or based on laboratory data from the beginning of April to the end of March 2009 and the related information have been documented in summarized epidemiologic data forms of cutaneous Leishmaniasis by the "disease control" personnel of the province health center. Data were analyzed using chi-square test.

Results: The incidence of cutaneous Leishmaniasis in Qomrood rural areas has reached to 32.7/1000 in 2009 which used to be 9/1000 in 2008 The most common sites of skin lesions have been upper and lower extremities. The disease has been appeared in winter and autumn.

Conclusions: According to the current condition, recognizing the vector and reservoir, and to arranging controlling programs in the area according to epidemiological aspects of the disease and mass education are mandatory.

Please cite this article as: Saghafipour A, Rassi Y, Abai MR, Oshaghi MA, Farzinnia B, Mostafavi R, Karimian F. Outbreak of Zoonotic Cutaneous Leishmaniasis: A Report. Arch Hyg Sci 2013;2(2):48-54.

Background

Leishmaniasis is one of the parasitic diseases transmitted by some species of sand flies. The disease has three main presentations: cutaneous (urban and rural); visceral (Kala-azar) and mucosal. World Health Organization (WHO) has defined the disease among ten important diseases in tropical areas of the world and categorized it in uncontrolled and re-emerging diseases group. The disease agent is from Leishmania genus and *phylum Kinetoplastida* and the vector is a fly from *Psycodidea* family and *Phlebotomine* subfamily (1-3).

At the present time Leishmaniasis is seen in 88 countries and 72 of them are developing countries. 350 million people worldwide are exposed to Leishmaniasis. 12 million patients are infected and it is estimated that 2 million

new cases which 1.5 million of them have cutaneous Leishmaniasis are involved annually. 90% of the cutaneous Leishmaniasis cases are reported from 7 countries including Algeria, Brazil, Iran, Peru, Saudi Arabia and Syria (4-6).

There are two types of the urban (dry) and rural (wet) cutaneous Leishmaniasis in Iran and each one has different foci (7). Many rural areas of 17 from 30 provinces of Iran are endemic foci for rural cutaneous Leishmaniasis. Rodents are the main reservoir of rural form (8-11).

Qom province (located in center of Iran) is one of those foci and an epidemic site of Leishmaniasis has been reported in Qanavat region (a city in the Central District of Qom Province, Iran) in 2000 (12). Also, in recent years, incidence of Leishmaniasis has showed an increasing trend in Qomrood District, Qom Province, Central Iran.

Aims of the study: We investigated some epidemiological aspects of the Leishmaniasis disease (including age, gender, wound site, number of lesions, season of the year when the disease occurs) in order to update our information about infection routes and epidemiological characteristics of the disease in Qomrood District, Qom Province, Central Iran.

Materials & Methods

Site Specification: Qom is one of the 31 provinces of Iran, between 50o 06'–51 o 58' E and 34 o 09'–35 o 11' N with 11,237 km², covering 0.89% of the total area of Iran.

Qom province is located in the central part of the country, and its provincial capital is the city of Qom (figure 1). The province contains 1 city, 5 counties, 9 rural districts, and 256 villages.

Based on the most recent census in 2006, the province has a population of approximately 1,200,000 out of which 91.2% resides in urban areas and 8.8% in rural vicinities.

The climate of Qom province varies between a desert and semi-desert conditions. Geographically, the province comprises mountainous areas, foothills and plains. Usually, it experiences a dry climate, with low humidity and scanty rainfall. In the last year, the minimum and maximum temperatures were recorded -14°C in December and +47°C in June, respectively.

The annual rainfall was 86.9 mm and relative humidity was ranged between 8.5 in June and 89.1 percent in December.

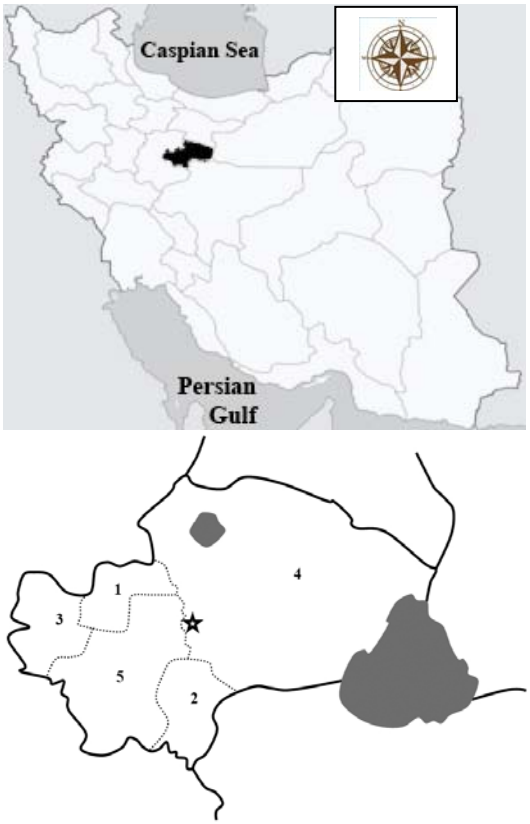

Figure 1) Map of Iran, highlighting the position of Qom Province and its five districts: 1. Jafarabad, 2. Kahak, 3. Khalajestan, 4. Markazi, and 5. Salafchegan (Qom Province)

Population and sampling: This descriptive cross-sectional study was performed during April to the end of March 2009.

All suspected patients with skin lesion(s) referred to regional health centers of the province were examined clinically and parasitological for cutaneous Leishmaniasis. Samples were taken from the borders of the suspected lesion(s), fixed with methanol and

stained using Giemsa and examined under the microscope.

The disease was diagnosed based on clinical examination and microscopic observation of the intracellular amastigotes of the parasite in the Giemsa stained smear. Patients' information including demographic data and clinical history was recorded in specific epidemiological forms. The treatment responses of the patients who received standard therapy were recorded.

Data analysis: Data processing and statistical analysis were performed using chi-square test and SPSS software, version 16.

Results

Results indicate there are 169 patients and the outbreak of disease is 32.7 per thousand people (Equivalent to 3% of at risk population).

Distribution of disease cases at four different age groups indicated the number of cases was zero below one year of age, 12 cases in 1-6 year-old group (7.1%), 36 cases in 7-14 year-old group (21.3%), and 121 cases in the age group above 15 years of age (71.5%). Moreover, the chi-square test revealed that there was a significant correlation between the age and Leishmaniasis ($p<0.01$).

From the total 169 disease cases in 2009, 90 cases (53.2%) were women and 79 cases (46.7%) were men. Results of statistical analysis showed that there was no statistically significant correlation between the patients' gender and the risk of cutaneous Leishmaniasis lesions amon them ($p>0.05$). It was observed in the number of skin lesions that 109 patients (64.4%) had one lesion, 27 patients (15.9%) had 2 lesions and 33 patients (19.5%) had more than 3 lesions. The highest level of disease was in fall with 128 cases (75.7%) belonged to November.

The number of disease cases was zero (0%) in the spring, 16 (9.4%) in the summer, and 25 (14.7%) in winter.

The highest outbreak of disease was related to the villages of Moshkabad, Aliabad, Jafarabad, Seydabad, Farajabad, and Kouh Sefid during the year 2 (figure 1). In the village Moshkabad, the outbreak of disease was 14.6 per thousand people in 2008, but it reached 180 ones per thousand people in 2009. Moreover, the outbreak of disease in village Jafarabad became 10 times more than the previous year. The outbreak of disease became 3.8 times more than the previous year in Kouh Sefid village.

Evaluating the cutaneous Leishmaniasis in this region during the years 1999-2009 indicated that since 1999 the outbreak of this disease was began with 8 cases (2 per thousand people).

The outbreak of disease has been relatively stable except for 2002. In 2002, the number of disease became 91 (The outbreak 21.7 per thousand people). Then, the outbreak of disease was relatively reduced and the number of cases put back again to the relatively stable situation by the appropriate control measures. In 2006 and 2007, the outbreak of cutaneous Leishmaniasis in the region was 8.8 and 5 per thousand population (About 25 case during a year) and in 2008 the outbreak of this disease was reduced to 4.8 per thousand people or 24 cases through the preventive measures, but in 2009 the number of cases suddenly reached 169 cases and the outbreak of disease reached 32.7 per thousand people (figure 2). Comparing to year 2008, this number was more than seven times and was observed as an epidemic in the region.

Based on the location of lesions, 189 Leishmaniasis lesions were evaluated in this study and distribution of lesions on the patient's body was as: hands: 48%; legs: 31%; face: 15; trunk: 5%; head and neck: 1%. As it can be seen, the largest location of lesion was on the hands. Direct smear sample was taken from the people suspected with the cutaneous Leishmaniasis lesion for the laboratory confirmation. In direct smear, 169 samples of Leishman lesions were observed and also 15 positive samples were injected into the base of laboratory sensitive animal tail and the

Leishmaniasis lesions were visible after 30 to 35 days on average. Humidity and rainfall was higher in spring 2009 than year 2008. Moreover, comparing to year 2008, the minimum and maximum temperature and higher humidity were higher in winter 2009 and the rainfall was also higher in January and March.

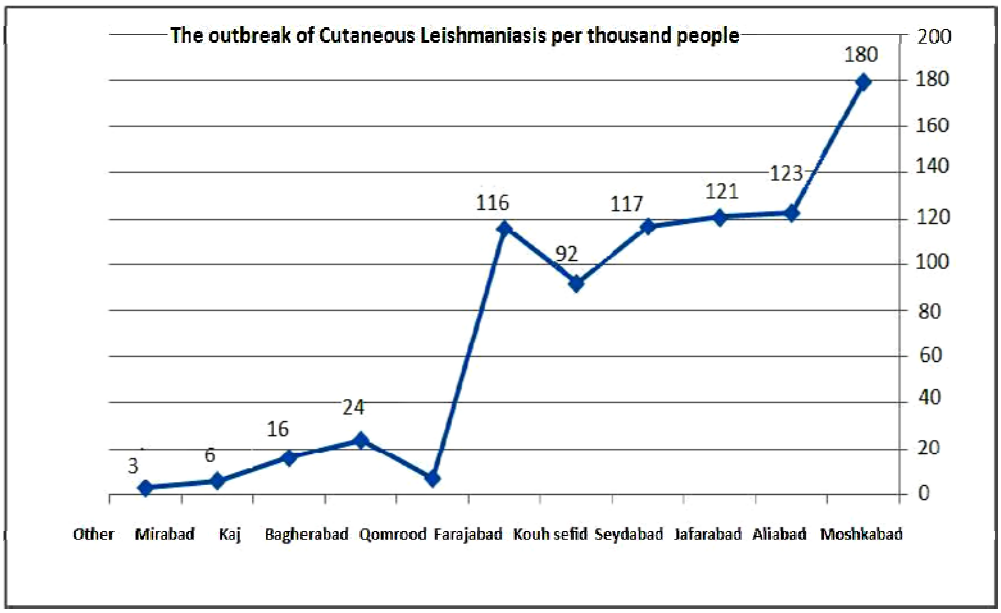

Figure 1) Distribution of cutaneous Leishmaniasis outbreak (per thousand people) in Qomrood District in Qom Province-Iran, during 2009

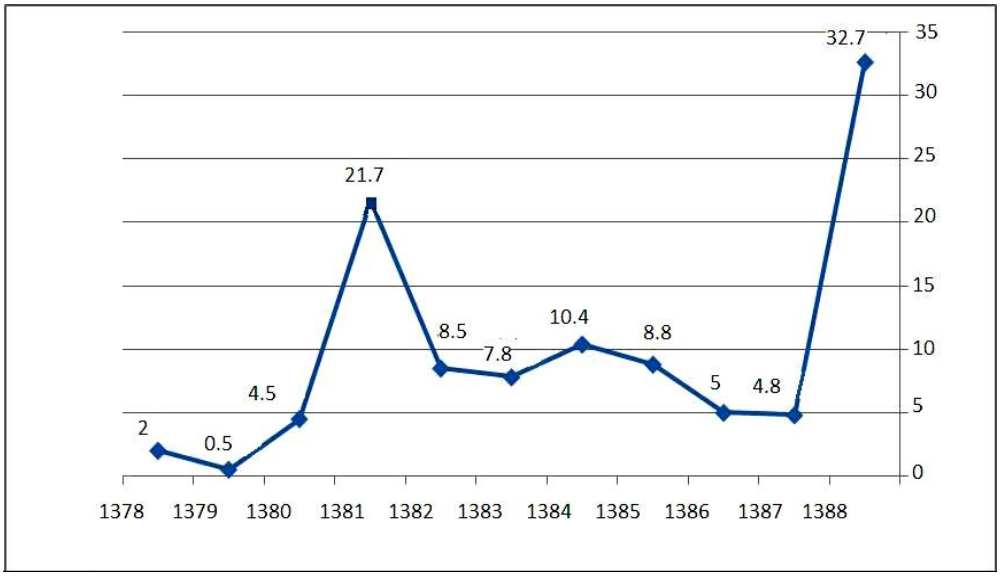

Figure 2) Distribution of cutaneous Leishmaniasis outbreak (per thousand people) in Qomrood District Province-Iran, during 1999-2009

Discussion

This study is the first report of epidemic cutaneous Leishmaniasis in all age and gender groups of Qomrood District, Qom Province, Central Iran.

Despite the fact that the cutaneous Leishmaniasis has been common since 1999 in rural areas of Qomrood District, the outbreak of

this disease became much higher in 2009 and reached the number 32.7 per thousand people. Climate change, which increases the number of flies in the region, the number of rodents, and improper time of implementing the disease prevention programs are among the possible factors affecting the increased number of disease.

Since there was no cold autumn and winter in 2009, the activity period of flies was increased, so that sand flies had been active in the region until the late December and the early January, and the disease cases had been reported until the late February.

Statistics of Management Center for Disease indicate that in line with the current studied area, the average outbreak of cutaneous Leishmaniasis has been increasing in most regions of Iran during the recent years, so that the outbreak of cutaneous Leishmaniasis in Iran had been equal to 22 thousand cases (33.8 per hundred people) and more than 33 thousand cases (35.4 per hundred people) during the years 2008 and 2009, respectively (13). Yaghoobi-Ershadi *et al.* reported a similar epidemic disease in smaller dimensions in Qanavat rural district in the southeastern of Qomrood District in 2002 (12). Since the age group above 15 years of age had the highest prevalence of disease in this area in 2009, it can be stated according to the endemicity classification of cutaneous Leishmaniasis that this region is among the hypo-endemic areas of disease.

Based on the results obtained from the study by Zahirnia *et al.* in Hamadan city (Western Iran), 85.7% of disease cases have been occurred in the age group of 15-44 years (3).

According to the study conducted by Mohammadi Azni *et al*. it was observed that the highest outbreak of disease with 18% had been occurred in the age group of 10-19 years in Damghan city (North-Central Iran) (14). In the study conducted in Haji Abad (in Hormozgan province, Southern Iran), the highest outbreak of scars was observed in the age group of 14-10 years and the highest number of severe wound was seen in the age group of 0-4 years. But in the center of Isfahan (Central Iran), where is hyperendemic, the maximum cases has been related to the children under one year of age (15, 16).

The results indicate that the outbreak of disease is almost equal in both genders because the women in rural areas involve in agricultural activities as same as the men and are equally exposed to the infected bites. The gender distribution model of disease has been like this in most regions such as Hajiabad in Hormozgan, Baft in Kerman (Southeastern Iran), and Bafgh in Yazd (Southeastern Iran) (15, 17, 18).

Most of the patients had one skin lesion. The findings are compatible with the results of studies conducted in many endemic centers of disease (17-19). Among the militants, who suffered from the Leishmaniasis and referred to the military Zanjan (Northwestern Iran) Hospital, the outbreak of cutaneous Leishmaniasis was observed and more than half of the patients had one lesion (19). Furthermore, the most common location of lesions was on the hands with 47.6%; because the hands are without any clothing and are easily exposed to the bites of sand flies carrying the disease.

In the study conducted in the centers of Kalaleh city in Golestan province (Northern Iran) and Damghan in Semnan province (Central Iran), the same condition, which is in consistency with this study, was observed (14, 10). This study has identified that the outbreak of cutaneous Leishmaniasis lesions (75.7%) in most of the cases has been in the autumn. In studies conducted by Rafati *et al*, 76.3% of cases were infected during autumn (during years 1999 to 2005 (20). The maximum cases (35%) have also been infected in the autumn in Kermanshah (Western Iran) based on the season (24). These findings are in consistency with our study.

The outbreak of urban cutaneous Leishmaniasis in Sabzevar (Eastern Iran) had a different seasonal pattern, so that the highest number of cases was occurred in spring and the lowest ones in the winter (21). This condition is due to the different type of Leishmaniasis in Sabzevar compared to Damghan and Kermanshah.

Conclusions: In order to control the cutaneous Leishmaniasis disease in the regions with this disease, it is suggested that:

- Preventive and control measures should be intensified in the years, when the changes in climatic conditions (mild and warm winters) increase the disease vectors and reservoirs population.

- Time of flies become active, the peak of their activity and abundance in different years should be considered in planning for Leishmaniasis control in the upcoming years in order to do control measures (such as impregnating the mosquito nets and killing operation of rodents) at the proper time or before the activity peak of flies population and before the people receive their infected bites.

- The people and all at-risk groups should be educated completely about disease prevention.

- Moreover, it is recommended to conduct more complete studies about the vectors' ecological characteristics and the disease reservoirs such as the activity time of sand flies and rodents, and determining their peak activity time in order to control the disease and reduce its outbreak.

Footnotes

Acknowledgments:

We would like to appreciate staffs of "Health Center of Qomrood District, Qom, Iran". Also, we wish to express our sincere thanks to Dr. Mohammadian and Dr. Mahmoodi for providing facilities needed for this study.

Funding/Support:

This study was financially supported by the School of Public Health, Tehran University of Medical Sciences, Tehran, Iran. (Project No. 8952).

Conflict of Interest:

The authors declare no conflict of interest.

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