

Relationship Trend Analysis of of Cutaneous Leishmaniasis Prevalence and Climatological Variables in Shush County, South-West of Iran (2003-2007)

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Abstract: Cutaneous leishmaniasis (CL) is a main health problem in different parts of Iran, which exists both in zoonotic and anthroponotic forms in various foci of the country. It is a vector borne disease transmitted by the bite of female sand flies (Diptera : Psychodidae). The province of Khuzistan is one of the oldest foci for CL in Iran that has been located in the south-western part of Iran. The present survey was focused to find out the epidemiology of CL in Shush County between 2003 and 2007. The data of this descriptive-analytical cross-sectional study consisted the existing data regarding the prevalence of CL in different seasons, years, climatological factors and genders based on clinical symptoms and presence of amastigotes in Giemsa-stained smears which were registered in Shush County Health centers between 2003 and 2007. The analysis of the collected data showed that Shush County is one of the endemic foci of zoonotic CL caused by *Leishmania major*. The survey showed the rate of CL incidence with the general rate of 0.72 per one hundred populations with the highest rate of incidence of CL in fall and winter. Regarding to the high prevalence of CL in the study area, health care observers should pay more attention in order to prevent the disease spread.

Key words: Leishmaniasis • Epidemiology • Demography • Climatic Factors • Incidence Rate

INTRODUCTION

Leishmaniasis is of the most important parasitic disease with a wide range of clinical symptoms and threatens 350 million persons in 88 countries [1-3]. Cutaneous leishmaniasis (CL) causes skin ulcers in the person skin, in place of the bite of an infected sand fly of the genera *Phlebotomus* and *Lutzomyia*. In the Middle East, more than 350000 cases of CL happen yearly [4]. CL is a main public health disease in various parts of Iran and occurs in rural districts of 15 out of 31 provinces in Iran [5]. Recently, many researches on CL in Iran has performed by different scientists [6-11]. Phlebotomine sand flies are the vectors of leishmaniasis and papatasi fever in Iran [12, 13]. Both zoonotic and anthroponotic cutaneous

leishmaniasis (ZCL and ACL) have been prevalent in different parts of rural and urban areas of Iran. During recent decades, new foci have also emerged [14, 15]. There are at two main species of old world leishmaniasis, responsible for CL in Iran [16]. CL because of *Leishmania major* is still a main and increasing public health problem in different rural areas of 15 out of 31 provinces of Iran [13].

Because of endemicity of CL in most parts of Iran and increasing the reports about CL in all age and gender groups in some regions, the purpose of this survey was to determine the epidemiological and climatological factors related with CL in Shush County. As the epidemiological features of CL in this province has not been investigated in recent years for the implementation of future control measures [16, 17].

MATERIALS and METHODS

Study Area: Shush county, with the center of Shush city, has been located in Khuzistan province, south-west of Iran, bordering Iraq and covering an area of 6.5 square kilometers [18]. The population of the county, in 2006, was approximately 192,162 people. Shush county is among the warmest regions of Iran. The absolute maximum temperature degree in summer is 53°C and the minimum temperature was 1°C. Meteorological data from April to March 2003-2007, including the monthly means, daily minimum and maximum temperatures, relative humidity, maximum wind speed and rainfall in different agroclimatic and topographic zones were obtained from Khuzistan Meteorological Organization.

Clinical Samples and Data Collection: A research-made questionnaire designed was used to collect the data, in the study area and a descriptive-analytical cross-sectional study was done. Clinical samples were consisting of all confirmed cases that referred to health centers of Shush County, from 2003 till 2007 with the symptoms of leishmaniasis and presence of amastigotes in Giemsa-stained smears. For each patient, the initial demographic data including patient's sex, age distribution of patients, the main clinical signs and symptoms including number of scars and scar site in the body, month of diseases occurrence, the incidence rate, treatment and geographical locality were derived by interviewing patients. The relation of the prevalence of CL with the climatological variables including, the mean monthly rainfall (mm), the mean monthly maximum and minimum temperature (°C), wind speed (mps), mean monthly maximum and minimum of the relative humidity (%) collected from Iranian meteorological organization

were calculated in relation to prevalence of the disease. Data were analyzed by using SPSS version 11.0.1 (SPSS Inc., Chicago, IL, USA).

RESULTS

A descriptive-analytical cross-sectional study was done in Shush County, Khuzistan province, south-west of Iran. A total number of 1,389 positive cases of CL were reported in county, during 2003-2007, of which 711 (51.2%) were male, while females accounted for 678 (48.8%). The incidence of the disease in the study area, during 2003-2007, was calculated as 0.72%. The most frequent cases of CL were observed significantly in age group of 5-15 years old (41.5%) and the age group of 5-15, <4, 15-25, 25-35, 35-45, >55 and 45-55 years old were observed in 41.5%, 27.2%, 17.6%, 5.2%, 4.2%, 2.2% and 2.1%, respectively. Analysis of the ulcers distribution in the body showed that most of the lesions including 492 (35.4%), 430 (31%), 279 (20.1%), 84 (6.1%), 78 (5.6%), 24 (1.7%) and 1 (0.1%) of the cases were observed in hands, face, legs, face and hands, other parts of the body and face and legs, respectively.

Highest disease prevalence (n= 307, 22.1%) was observed in January (Figure 1). The highest disease prevalence was in winter, so that 55.1% (n=765) of the disease cases had occurred in this season. The prevalence of CL by different seasons showed that 28.6% (n=399), 10.4% (n=144) and 5.9% (n=71) of the cases occurred in autumn, spring and summer, respectively. The year of 2005, 2003, 2004, 2007 and 2006 with 29.6% (n=411), 24% (n=334), 18.2% (n=253), 15.2% (n=211) and 13% (n=180) cases had the most prevalent of CL in the county. About 59.2% (n=822) and 40.8% (n=567) of cases had lesions like to wet sore or dry sore,

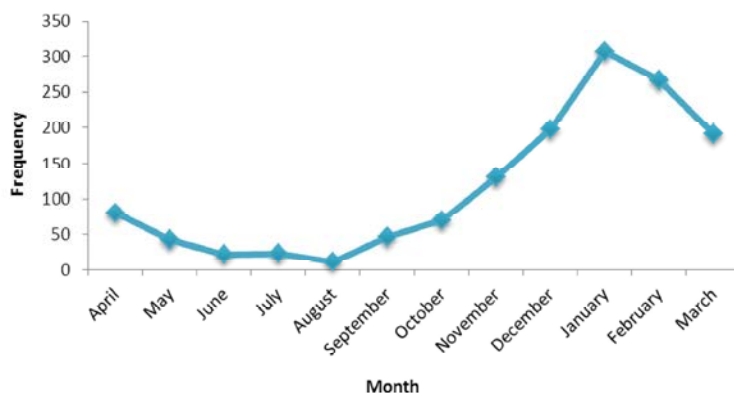


Fig. 1: Monthly prevalence of cutaneous leishmaniasis in Shush County, Khuzistan province, south-west of Iran, from 2003 to 2007.

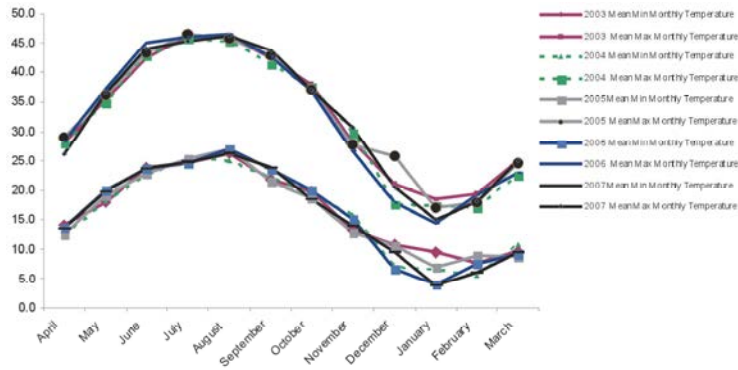


Fig. 2: The mean monthly temperature (°C) in different agroclimatic and topographic zones of Shush County, Khuzistan province, south-west of Iran, from 2003 to 2007.

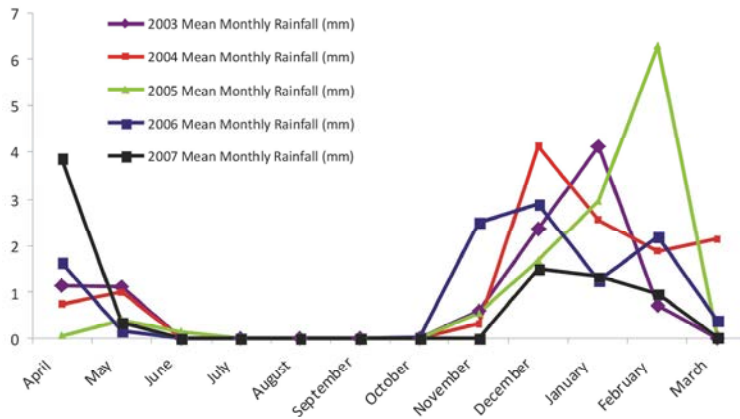


Fig. 3: The mean monthly rainfall (mm) of the studied areas in different agroclimatic and topographic zones of Shush County, Khuzistan province, south-west of Iran, from 2003 to 2007.

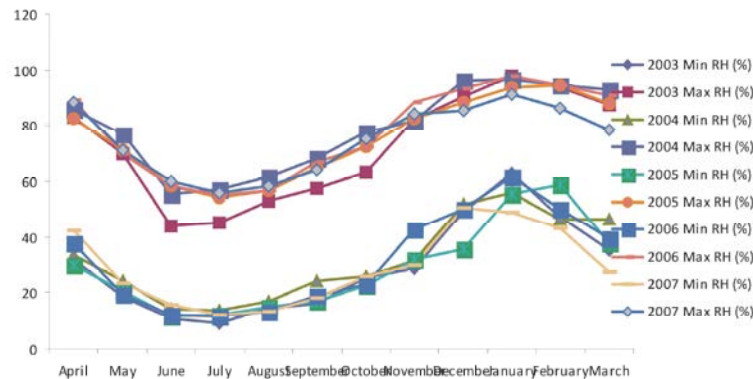


Fig. 4: The mean monthly relative humidity in different agroclimatic and topographic zones of Shush County, Khuzistan province, south-west of Iran, from 2003 to 2007.

respectively. The majority of patients were seen during autumn (28.7%) and winter season (55.1%) that the mean monthly temperature was lower ($p < 0.05$). By the way, the mean monthly rainfall (mm) in different agroclimatic and topographic

zones were more in autumn and winter ($p < 0.05$) (Figs 2,3). The RH values and average wind speed did not have considerable influence on the number of patients and statistically wasn't significant ($p > 0.05$) (Figs 4, 5).

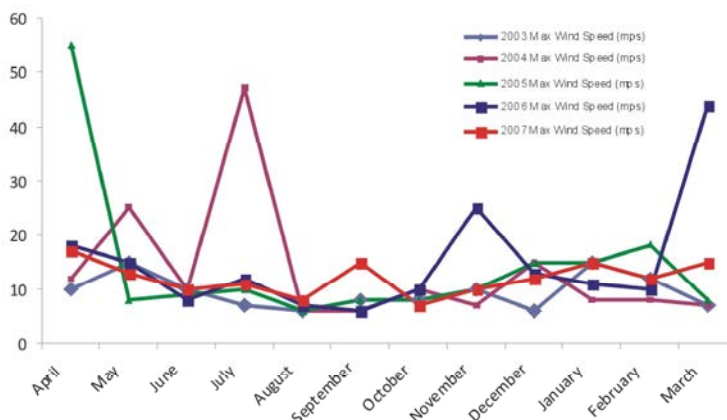


Fig. 5: The average wind speed of the studied areas in different agroclimatic and topographic zones of Shush County, Khuzistan province, south-west of Iran, from 2003 to 2007.

DISCUSSION

Cutaneous leishmaniasis is an important public health problem in Iran including Khuzistan province and its prevention and control is of the Iran health ministry priorities. In this study main epidemiological features of 1,389 cases of CL were diagnosed between 2003 and 2007. The current research is performed to determine the epidemiological aspects in Shush County, south-west of Iran to give recommendations to planning a more reliable control measures for leishmaniasis. In this study, there was a correlation between gender and the incidence of CL and disease were seen more in men in comparison to women. The reason was that more men work or sleep in open areas and also due to men's less covering than women and more exposure to the infected sand flies [19, 20]. Based on several researches the gender difference has been observed in some parasitic diseases that can be attributed to hormonal effects. However, controversy still exists regarding the role of sex hormones in the cellular immune response [21, 22]. Although it is established that sex hormones may affect the establishment and the course of parasitic diseases, different behavioral factors, made males more likely to be exposed to vectors in fields and other transmission environments, are probably equally or more important [23, 24]. The most anatomical sites for lesions concentration were on the hands. Repartition of CL positive cases according to age was also in agreement with previous findings, that's in general CL affect more cases of ≤ 20 years old [25-27]. The reason for this finding is that adults have developed resistance to CL because of

their previous exposure to the parasite. Therefore, use of personal protective equipment including insect repellent, insecticides-impregnated bed nets and covering open body parts is recommended to prevent the disease [28, 29]. The prevalence of CL had considerable changes in the different months of year and the highest rate was observed in January. In the current study, the highest prevalence was in winter. The reason for this finding was related to the sand flies activity. Results of this study showed that most ulcers ($n= 492, 35.4\%$) were in hands which were similar to the results of other studies [30-32]. The reason for this result is that, this part of the body are unprotected and sand flies are not capable of sucking the blood through clothes because of having short mouth appendices and mostly attack open and unprotected parts of the body [29, 33].

CONCLUSIONS

Based on the findings of this study, it could be concluded that CL is posed as a health problem in the study area. Therefore, planning for the disease prevention and control and taking appropriate methods to reduce the incidence of the disease are crucial. Health education via the public media and training, rodents' control, fully protection during transmission season, environmental reform and disposal of garbage, using impregnated bed nets should be also mentioned in the planning. Based on the findings of the study and high incidence and prevalence of the disease in the study area it is concluded that serious public health monitoring should be considered in the study area.

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