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Identifying and Investigating the Outbreak of Cutaneous Leishmaniasis in Fars Province, Iran

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ABSTRACT

Cutaneous leishmaniasis is one of the most important health problem in the world. Due to the importance of this disease in the region and favorable living conditions for the vectors, this study was conducted to determine the outbreak of disease in villages of Rustam, Mamasani and Fasa in Fars province. The population society consisted of the villages of the Fars province, where some cases of leishmaniasis were observed in previous years and villages that are prone to this disease as well as a number of villages in Fars province. In total, 12 villages with the total population of 15225 and 5000 household were considered. Questionnaires were completed by referring to the rural houses and basic physical examination of family members. Suspicious cases after sampling and diagnostic tests were identified and paperwork was conducted for the patients with cutaneous lesion. Results show that there was a remarkable outbreak of the cutaneous leishmaniasis in Rustam city in 2010 which among 10 patients, four men (40%) and six women (60%), with cutaneous leishmaniasis were identified with a mean age of 47.7. Wet cutaneous leishmaniasis was observed for all 10 patients (100%), therefore, the outbreak of dry cutaneous leishmaniasis was

0%. Thanks to control measures taken by the health center especially center for disease control and prevention the outbreak of the disease was reduced to two patients in 2011 with a mean age of 37, including two women with dry (urban) cutaneous leishmaniasis and wet (rural) cutaneous leishmaniasis. Hands (especially the forearm) are most susceptible to the disease. 80% of patients were observed with a lesion, 10% with two lesions and 10% with three lesions. Importantly, no positive case was found in the cities of Mamasani and Fasa. Results show that outbreak of leishmaniasis in the Rustam city is more than other cities, but it has reduced in this city compared with last year and now its outbreak is relatively low. Immigration to the cities where the disease was prevalent the disease in the city, was the main cause of the observed cases; unfavorable climatic and environmental conditions for mosquitoes and rodents lead to relatively low outbreak of the disease in this city. However, due to high potential for spread of the disease in this city, control measures taken by health center are required.

Keywords: *Leishmaniasis, Cutaneous Leishmaniasis, Rustam City*

INTRODUCTION

Leishmaniasis is one of the most important diseases transmitted by sandflies that is prevalent in three forms based on the clinical features: cutaneous leishmaniasis, visceral (kala-azar) leishmaniasis and mucocutaneous leishmaniasis [1]. Cutaneous leishmaniasis is called Salak in Iran (that means it lasts a year) [2]. Cutaneous leishmaniasis is a skin infection caused by protozoan parasite (genus Leishmania) transmitted by the bite of a variety of phlebotomine sandflies (Pappataci P. and Sergenti P.). Cutaneous leishmaniasis is the most prevalent in two forms: dry (urban) leishmaniasis and wet (rural) leishmaniasis. Annually, 1.5 million people worldwide are infected with the cutaneous leishmaniasis and it is estimated that there are about 12 million cases of cutaneous leishmaniasis in different parts of the world. In Iran, every year, about 15000 people are infected with leishmaniasis that based on the literature, it is in fact four or five times more than the reported rate. It is also estimated that 28 of 1000 people are infected with the leishmaniasis notably in Isfahan and Shiraz Provinces with 1.66 per 1000 people [3].

In Iran, two clinical urban and rural forms of the disease are prevalent; the former is L. *tropica* and the latter is leishmaniasis major [2]. According to the World Health Organization report, about 12 million people in 80 countries are infected with Leishmania species. Although the observed forms of leishmaniasis in Iran do not lead to the morbidity, it need to be taken into consideration due to the heavy health care costs and consequences [3].

Human is prone to the dry or urban leishmaniasis, but dog may be accidentally infected, too. Wet or rural form is mainly caused by rodents. Leishmaniasis is transmitted by the bite of a female blood-sucking sand fly in the unset [10]. This sand fly remains in wall cracks and shadows during the day and is active in the early evening. Its activity depends on whether. It is active in May in temperate regions and its maximum activity is early in the summer [2]. Lesions typically emerge on the face in dry cutaneous leishmaniasis. Therefore, dentists must consider leishmaniasis in diagnosis list of inflations and chronic lip and nose sores [2]. The main response of the body to resist against the leishmaniasis infection is immunity by the cell; T helper cells and resulting cytokines, (particularly interferon-gamma) play a major role in the activation of macrophages and their damaging ability [11].

Although the pentavalent antimony derivatives (sodium stibogluconate, pentostam meglumine antimonia gluconatium) are the first treatment choice for cutaneous leishmaniasis, treatment failure and drug resistance is increasing in many regions. In addition, systemic administration of these drugs has many side effects such as: arthralgia, myalgia, joint pains, reversible increase of liver enzymes, changes in ECG and rarely anemia, leukopenia and thrombocytopenia [3]. For this reason, a number of measures have

been considered for finding the efficient local drugs with the minimal side effects (e.g. herbal drugs). Moreover, Glucantime, azithromycin, trichloroacetic acid 5% cream, gel and extract of the flos plant with Glucantime and local administration of Thio-Ben (a mixture of Tioxolone and Benzoxonium Chloride) that are efficient in healing the cutaneous leishmaniasis are used [5,6,7,15]. Furthermore, R10 extract of the garlic, hydro-alcoholic extract of thyme and yarrow and honey are efficient in leishmaniasis treatment and healing the lesions in mice [8, 13, 14].

A definitive diagnosis is possible by smear, Novy-Mac Neal-Nicolle medium (NNN), cutaneous leishmaniasis test, biopsy and PCR. The direct smear range is one of the best ways for diagnosis of cutaneous leishmaniasis due to ease and accuracy [3]. Application of amplification technique and NASBA isothermal is an ideal method with high specificity in diagnosis of RNA of live parasite of L. *major*. This method for evaluating the course and effectiveness of anti-Leishmania drugs and the early diagnosis of treatment failure in patients with cutaneous Leishmania is a good alternative for medium and insensitive microscopic methods [12].

MATERIAL AND METHODS

Study area

Rostam and Mamasani cities with a population of more than 200,000 and Fasa city with a population of over 104,000 people are considered in this study. Masiri is center of the Rustam city and the city Nurabad is the center of the Mamasani city. Rustam and Mamasani have two kinds of cold and temperate climates. Rustam city and Mamasani are located at an altitude of 920 meters above sea level and Fasa city is at an altitude of 1450 meters above sea level. Rustam city has two e plains: Rostam 1 and Rostam 2 with very fertile lands. This city is rich in terms of medicinal plants. More than 200 villages in Rustam and Mamasani and more than 50 villages in Fasa were investigated. These cities due to having the regions with favorable living conditions for Phlebotomus sand fly are threatened by the leishmaniasis. Villages and regions that are studies in this statistical population include: villages of Dehno- Sadat Vosta, Dehno – Tal Bando, Goodarz – Eslam Abaad, Goodarz– Tel-e Afghan, Goodarz-Talgar, Goodarz-Gooarz, Masiri-Shoosini, Masiri-Goorab, Masiri-Bardkooh, Masiri-Masiri, Kopon-Kopon and Parinaz in the Rustam city as well as villages of Dasht-e Tir Taj, Tishgari, Cheshmeh Darreh, Sarenjelak, Ali Abaad, Mirza Mohammadi, Mashayekh, Kolah Siah, Dolat Abaad, Haft Barm, Soren Abaad, Baba Gorin in the Mamasani city and Fasa cities and Zahedshahr, Nobandegan, Sheshdeh and Qarah Bolagh and four central sections in Fasa including the Koshk Ghazi and Kheirabaad.

Following the reports by the center for disease control and prevention the diseases of Rustam city, main places of this regions that suffered from leishmaniasis in recent years (based on the data obtained from this center) were considered in this study. These regions included villages Dehno – Sadat Vosta, Dehno – Tal Bando, Goodarz – Eslam Abaad, Goodarz – Tel-e Afghan, Goodarz-Talgar, Goodarz-Gooarz, Masiri-Shoosini, Masiri-Goorab, Masiri-Bardkooh, Masiri-Masiri, Kopon-Kopon and Parinaz in the Rustam city as well as villages of Dasht-e Tir Taj, Tishgari, Cheshmeh Darreh, Sarenjelak, Ali Abaad, Mirza Mohammadi, Mashayekh, Kolah Siah, Dolat Abaad, Haft Barm, Soren Abaad, Baba Gorin, Koshk Ghazi and Kheirabaad in Mamasani and Fasa cities. Total population of 15225 and 5000 household were considered, of whom, 12 clusters of 40 with 480 households of Rustam city were selected using the cluster method and a population of 11265 people and 4000 families in Mamasani and Fasa were considered of who, eight clusters of 40 with 320 households were selected and analyzed.

These villages were investigated by determining the number of the patients with leishmaniasis in 2010-2011 by distributing the questionnaires and giving information to the people about the signs and symptoms of the disease and the way it is transmitted. Then, informed people referred to the determined health centers and were examined and tested. Positive tests by doing paperwork (including individual characteristics, type of leishmaniasis, lesionsize, number of lesions, places that people immigrated before

disease, environmental conditions of the living place of the patients, the patient and examining the other family members and so on) were carefully studied. Leishmaniasis lesions were distinguished from other fungal ulcers. In order to diagnose leishmaniasis, lesion zone was sampled and slides were stained with Giemsa and then examined under the microscope. A sample of positive slide for one of the patients is shown in Figure 1.

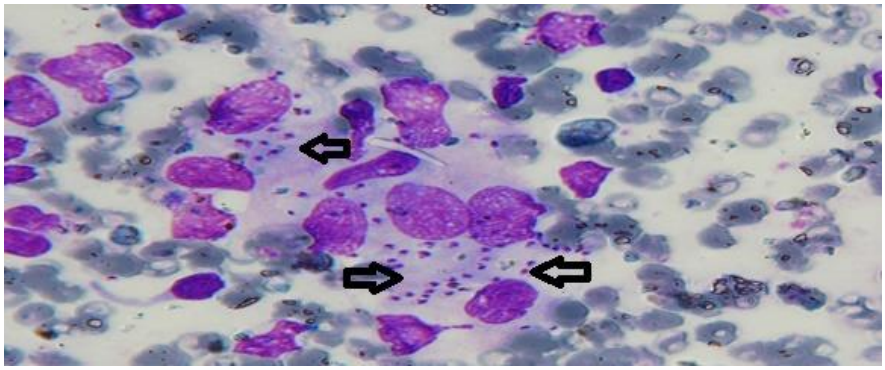

Figure-1: Microscopic image of cutaneous leishmaniasis in a farmer men. Leishman bodies (Amastigotes form of parasite can be seen)

RESULTS

Rustam city has the third rank in Fars province in terms of the number of the people with leishmaniasis. 10 (4 men and 6 women) of 15225 people who were examined in 2010 were infected with leishmaniasis. Figure 2 shows the distribution of cutaneous leishmaniasis based on their age. Most of the patients were in age group of 30-50 (Figure 3).

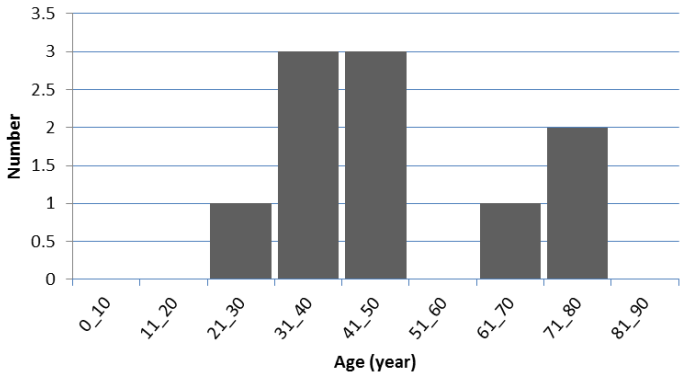

Figure-2: Frequency distribution of leishmaniasis in terms of age groups in Rustam city of in 2010.

Also in 2011, after several stages of rodent killing and stray dog killing by veterinary network and eliminating favorable living conditions for mosquitoes, the number of the patients with leishmaniasis was reduced to two people including two housewives, as shown in figure 5.

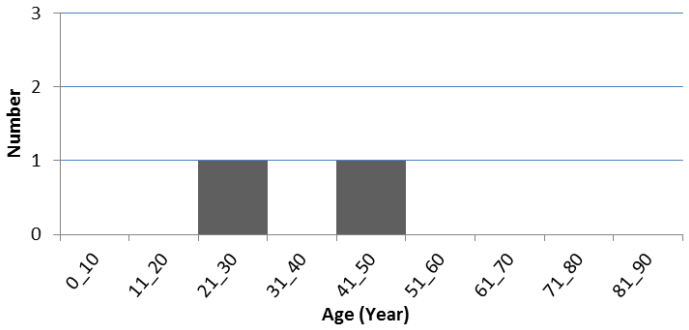

Figure-3: Frequency distribution of leishmaniasis in terms of age groups in Rustam city of in 2011

According to records of patients, Figure 4 was plotted based on the patients' job. In 2010, five patients (50%) were housewives and 5 patients (50%) were farmers. In 2011, as shown in Figure 5, both patients are housewives.

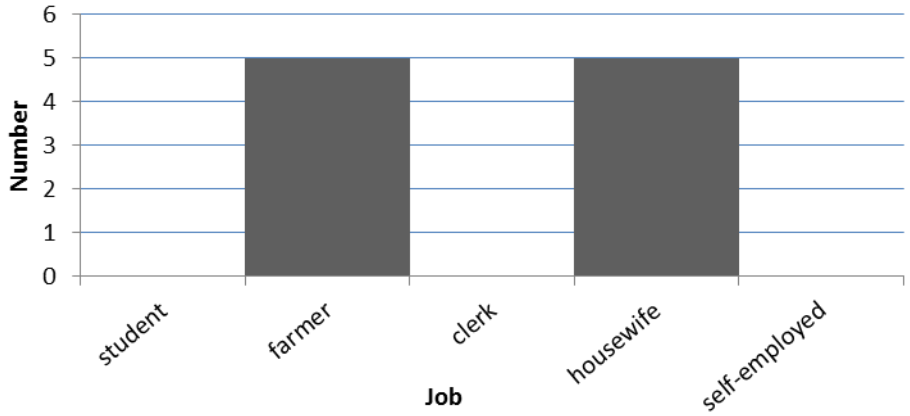

Figure-4: Distribution of patients in terms of job in 2010

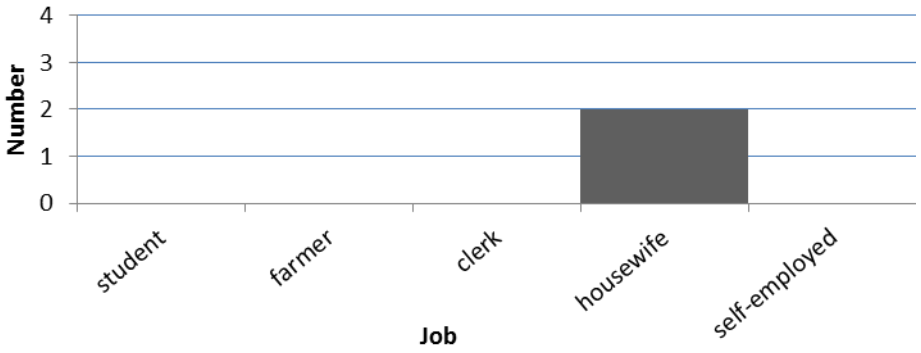

Figure-5: Distribution of patients in terms of job in 2011

Leishmaniasis distribution in 12 selected villages in terms of the number of the patients is shown in Figure 7. Comparative evaluation of the patients in recent years in Rustam city indicates the maximum rate of this disease in 2010.

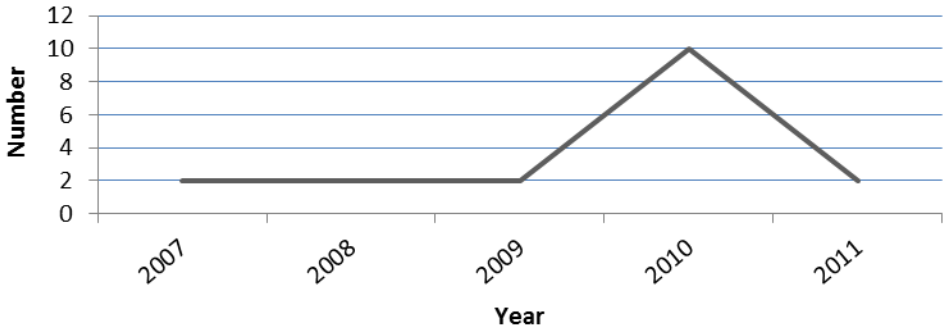

Figure 6: Comparison of the frequency distribution of the leishmaniasis from 2007 to 2011 in Fars province

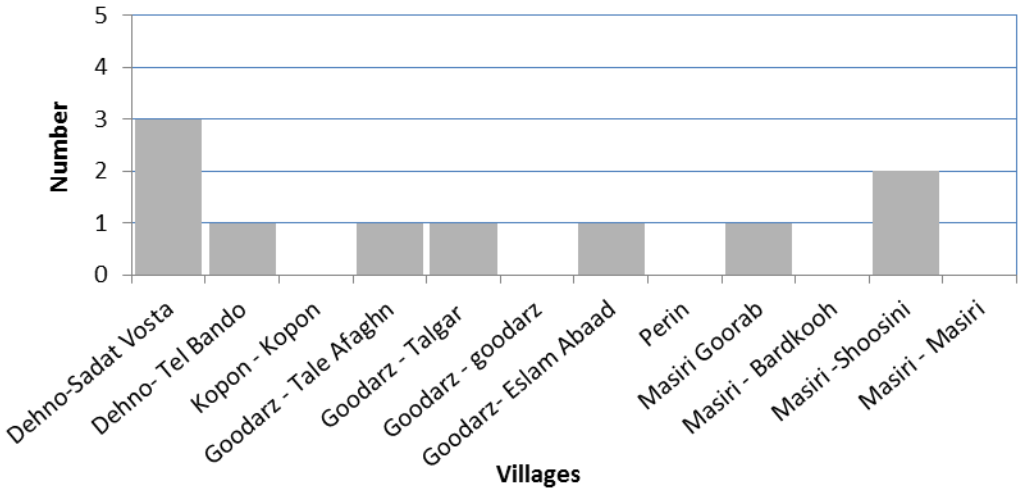

Figure-7: Frequency distribution of leishmaniasis in the villages under study in 2010 in Fars province

Of 10 patients with leishmaniasis in 2010, 10 people (100%) were infected with rural or dry leishmaniasis and no one was infected with urban or wet leishmaniasis. Moreover, 80% of the patients had one lesion, 10% with two lesions and 10% with three lesions. Two patents were identified by other studies in 2010, one with dry (urban) leishmaniasis from Masiri-Bardkooh and the other with wet (rural) leishmaniasis from Amir-Oub (as reported by the center for disease control and prevention the diseases of Rustam city). However, no positive case in Fasa and Mamasani was observed in this paper.

DISCUSSION AND CONCLUSION

Results show that cutaneous leishmaniasis is more prevalent in the Rustam city compared to other cities under study. This disease is more prevalent in Fasa and Mamasani may be due to the cold weather and desirable performance of veterinary center in dealing with the stray dogs and good control of the disease in these cities. The outbreak of the leishmaniasis in Rustam city is reduced compared the last year and now it is less prevalent. This disease is mainly caused by the immigration to the regions with the leishmaniasis that are the unfavorable living places for the mosquitoes and rodents and for this, this disease is less prevalent there.

However, due to the high potential for spread of the disease in the city, health center must control it. According to the patient records based on a comprehensive questionnaire, maximum immigration has been to Ahwaz and Bibi Hakimeh. According to previous information obtained from the center for disease control and prevention the outbreak of the disease in Rustam city before 2010, sporadic cases of cutaneous leishmaniasis in the villages such as Kopon, Perin, Goodarz have been reported. The following plans are recommended for disease control and prevention seeker in the city.

Eliminate the disease vectors: mosquito breeding and reproduction areas should be destroyed. Mosquito eggs and lives in dark and damp places. These places are usually used for accumulation of wastes, construction wastes, household sewage in public places, and living place of the dog at home, wall cracks and so on.

Control the source of disease: man is the source of the urban leishmaniasis. Therefore, a number of fundamental actions should be taken including: lack of rest in open places, especially at night - covering the open parts of the body at rest - the use of bed nets when resting, installing the door and window mesh –using the ointments for throwing insects away –referring to the health and treatment centers and using the free of charge services and covering the lesion with a clean cloth during treatment. In rural leishmaniasis, the living places of the rodents should be damaged up to a radius of 500 meters from the houses.

Optimize the environment: the accumulation of wastes, construction wastes around residential houses, household sewage in public places should be prevented, wasteland surrounding residential houses that are used for accumulation of litter and debris should be enclosed, and exterior walls of buildings should be rehabilitated to be non-porous. Damp and dark basements should be cleaned, every now and then under sofas, cabinets, behind the wardrobes should be clean and tidy so that mosquitoes cannot live there. Stray dogs should be killed, too Refer to the health centers: in case of leishmaniasis, refer to the nearest health and treatment center for receiving the prevention and treatment services.

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