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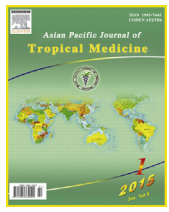

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Situation analysis of cutaneous leishmaniasis in an endemic area, south of Iran

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ABSTRACT

Objective: To update current situation of the cutaneous leishmaniasis (CL) in Kazerun County, southwest of Iran and to analyse the epidemiological aspects of the disease during 2005–2015.

Methods: Data on CL were obtained from the Health Center of Kazerun County, and then were analysed and mapped using SPSS and Arc GIS 10.3.

Results: A total of 700 cases of CL were recorded during the study period with an overall decreasing trend from 2005 to 2015. More than 60% of the patients were inhabitants of rural areas and males were infected more than females. Although there was not a significant difference between gender, job categories, residence and CL infection ($P > 0.05$), age groups were significantly different ($P < 0.05$). But there was no significant correlation between monthly cases of the disease with average temperature ($P > 0.05$). Most of the acute lesions were found to be present on the hand, leg and face, respectively. The average CL incidence in the study area was calculated as 24.9/100 000 population. A hot spot for the disease was found in southern part of the area ($P < 0.05$).

Conclusions: This study revealed that CL is present in Kazerun country. Thus, effective monitoring and sustained surveillance system is crucial in counteracting the disease, and if possible, to eliminate it.

1. Introduction

Leishmaniasis is an arthropod-borne disease caused by over 20 protozoan species belonging to the genus *Leishmania*. The Eastern Mediterranean region (EMR) of the World Health Organization (WHO) faces a major public health problem with regards to Leishmaniasis [1]. Four forms of the disease occur; Zoonotic Cutaneous Leishmaniasis (ZCL), Anthroponotic Cutaneous Leishmaniasis (ACL), Zoonotic Visceral Leishmaniasis (ZVL) and Anthroponotic Visceral Leishmaniasis (AVL). Three forms of the diseases (ZCL, ACL and ZVL) either independently or concurrently exist in 14 of the 22 countries of EMR region [2]. These countries include Afghanistan, Egypt, Iran, Iraq, Jordan, Libyan Arab Jamahiriya, Morocco, Pakistan, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia and Yemen. Many of the above-mentioned countries have experiences in the potential occurrence of the disease nearly an interval of ten years. Reports from WHO in 2008 confirmed that over 100 000 new cases have occurred in 12 countries in the EMR [2,3].

Epidemiologically, CL is presently endemic in 98 countries worldwide, including Iran [4]. It is estimated that between 500 000 and 1 000 000 new cases are reported annually in the world, however, due to under-reporting, only a smaller percentage (19%–37%) is verily reported to health systems. Among the reasons pertaining to CL under-reporting, the following three reasons are highlighted to play a key role. First, the refusal of patients to receive medical attention when the disease, presumed to cure by itself. Second, socioeconomic restraints hamper patients from medical care. Third, leishmaniasis is not incorporated in national policies as a serious public health problem [2].

Both urban and rural settings can experience outbreak of CL. Potentially severe, disfiguring and debilitating, CL infections exhibit lesions on infected individuals, especially on exposed

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parts of the body including the face, neck, arms and legs. Poverty has been partly linked to CL, as sufficient financial breakthrough is needed for treatment and case management [5].

In EMR countries, the causative agent of ZCL is the *Leishmania major* (*L. major*), and this is mainly transmitted by the bite of a female sand fly *Phlebotomus papatasi* (*P. papatasi*) [6]. Several factors contribute to the transmission of this disease, and these include, but not limited to, population movements (migration and the introduction of non-immunized individuals into areas of previous transmission), socioeconomic factors (poverty, poor housing and reduced sanitation) and environmental risk factors (high density of rodents, deforestation in some cases, and rodents) [7]. The cutaneous form of the disease (CL) also occurs in Iran, and closely associated with human environments. In the zoonotic forms of Leishmaniasis, vertebrate animals, with the exception of man, serve as reservoir hosts in which man is portrayed as the final host [5,8].

Contrary to the distribution of *L. major*, which necessarily depends on the presence of appropriate reservoir host, *P. papatasi* is widely distributed in semi-arid regions and feeds on both mammals and birds. In north-eastern and central areas of Iran, the great gerbil, *Rhombomys opimus* exhibits a host interaction with *L. major*, mostly active in semi-arid condition, and breeds mainly in spring, exposing them sand fly infection much earlier. Leishmaniasis is transmitted almost always by the bite of an infected sand fly, however other reports have revealed that the disease can also be transmitted through skin contact especially in CL [9].

The annual incidence of CL in Iran is averaged at 32 in 100 000 populations. It was reported in 2012 that the highest incidence was dominant in age groups of 1–4 and 5–9 years, projecting a respective incidence of 43 and 40 per 100 000 populations. Remarkably, males were more infected (57%) than females (43%) [10].

In addressing the issue of CL, the framework for action on CL in the Eastern Mediterranean region 2014–2018 has targeted surveillance techniques in detecting and reporting at least 75% of all CL cases within at-risk populations, case management skills in providing all detected CL cases accessible diagnostic and treatment intervention, reduction in the epidemiological exposure of CL in at-risk population and conducting sufficient and efficient research in curtailing the disease [11,12]. Epidemiologically, spatial distribution analysis of leishmaniasis has been recognized to be very essential in understanding the transmission of the disease, particularly in situations where a stronger correlation exist between spatial distribution of leishmaniasis and its hosts. Importantly, effective monitoring and evaluation is necessary in public health intervention for CL, and in the assessment of the betterment of service delivery to patient. This requires a considerate data collection and data analysis in ascertaining the efficiency of health interventions for CL. It is very well recommended by WHO to integrate surveillance system and control measures for leishmaniasis. A clear demarcation should be made between protection of individual hosts of the disease, and impeding leishmaniasis transmission by the use of community interventions [13].

Several studies have been conducted in Iran and based on their findings 17 out of 31 provinces of the country have endemic foci of CL [6]. It is confirmed climatic conditions influence the incidence of ZCL in Iran. The results of a study in this regard indicated that ZCL incidences in Golestan Province tend to be more prevalent in areas with higher temperature, lower relative humidity, lower total rainfall, higher evaporation and lower number of rainy days [14]. Another contributing factor in ZCL prevalence is age dependency. A study conducted in Qom province portrayed the most highly infected age group was 5–9 years old for ulcers with a rate of 6.56% [15]. Another study has recognized seasonal variations in ZCL incidence where the active season of *P. papatasi* extended from late April to early October in indoor areas [16]. This species is dominant in plain areas and lowlands [17–19]. A study conducted in Yazd Province, Central Iran, confirmed the rate of ulcers and scars among the inhabitants to be 24.6% and 30.4%, respectively. In that survey, endemic foci of CL has been detected in Yazd Province and the most highly infected age group was 10–14 with a rate of 28.4% [20]. An epidemiological study in Ardestan town in central Iran has indicated the most highly infected age group was 10–14 with a rate of 2.74% [21].

A modelling of CL distribution in Iran showed that over 60% probability of presence was considered as areas with high potential of CL transmission. These areas include arid and semiarid climates, mainly located in central part of the country [22].

Fars Province has the highest incidence of CL after Ilam in Iran and there are different foci of both ZCL and ACL in this province [10]. A nested-PCR epidemiological survey conducted in rural regions of Marvdasht, has confirmed the isolation of *L. major* as the agent and *P. papatasi* as the vector for leishmaniasis [23] Another study in Karameh district is in agreement with the fact *P. papatasi* is a vector responsible for the transmission of leishmaniasis [24]. Findings from a study in this province have demonstrated inter-and intragenic variations among *Leishmania* species and isolates from patients [25]. *Meriones libycus* has been shown to be the primary reservoir of ZCL in the rural areas of Arsanjan County in Fars province [26]. The close association of *Meriones libycus* and *P. papatasi* with human habitations in this province provides a convenient environment for CL transmission within the province. A post-earthquake epidemic of CL in rural Zarrindasht town has been studied, and the incidence of CL after the earthquake was significantly higher than previously recorded [27]. The above-mentioned studies show CL has different foci in Fars Province and therefore epidemiological studies are necessary to understand the pattern of the disease and its changes in the area to combat it appropriately.

The aim of this study was to update current situation of the CL in Kazerun County, south of Iran and to analyse the epidemiological aspects of the disease.

2. Materials and methods

2.1. Study area

This study was conducted in Kazerun, in the Fars Province of south-western Iran. The population of Kazerun as at 2011 was 254 704, including 67 290 families; out of them 53% are inhabitants of urban areas. It is situated on a plain among high limestone ridges on the north–south trunk road. The town is extensive, with well-built houses. The weather of the study area comprises of an average temperature of 31 °C, wind speed of 8 km/h and a humidity of 22%. The map of the study area is depicted in Figure 1.

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