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ORIGINAL ARTICLE

The severity of cutaneous leishmaniasis before and after the earthquake in Bam, southeastern Iran

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Abstract Cutaneous leishmaniasis (CL) is a major disease with significant public health concerns in Iran. The objective of this study was to compare the severity of CL among the patients before and after the earthquake in the city and suburbs of Bam, southeastern Iran. This study was carried out as a descriptive—analytical manner by house-to-house visits in 2010 in Bam, southeastern Kerman province of Iran, where a massive earthquake has recently occurred. Overall, 1,481 individuals were selected as a cluster random sampling. Suspected lesions were detected by direct smear preparation and X^2 test was used for statistical significance at $P < 0.05$. Overall, 1,481 individuals (mean age; 25.7 ± 17.6 years) consisting of 51.4 % males and 48.6 % females were randomly selected. 549 individuals showed history of CL; 23.4 % belonged to before and 13.7 % belonged to after the earthquake. When the overall severity in terms of location, number, size and duration of lesions was considered, the lesions were less severe in the time period after the earthquake ($P < 0.05$) than those before the earthquake. Cutaneous leishmaniasis is currently considered as a growing public health concern

worldwide, mainly due to creation of various risk factors particularly after a major natural disaster. Possibly the establishment of the CL health clinic to serve patients and to coordinate various activities had a major role in planning control strategies and thus reduction in severity of the CL disease.

Introduction

Leishmanasis is a vector—borne disease caused by the *Genus Leishmania*. It consists of three classic forms: visceral, muco- cutaneous and cutaneous leishmaniasis (CL) with significant medical and veterinary public health impact (Alvar et al. 2012; Dewit et al. 2013; Postigo 2010). In Iran, CL is present in two epidemiological forms; anthroponotic CL (ACL) is caused by *L. tropica,* mainly in human which is transmitted by *Phlebotomus sergenti* (Nadim and Aflatoonian 1995; Sharifi et al. 2011a), while zoonotic CL (ZCL) is due to *L. major*, its main animal reservoir host is gerbil with sylvatic life cycle and biological vector is female phlebotomine sand flies (Yaghoobi-Ershadi et al. 2010). Cutaneous leishmaniasis in Bam is of ACL type, where anthroponotic transmission is maintained by *P. sergenti* (Sharifi et al. 2012).

The epidemiological feature of ACL has changed mainly due to creation of various risk factors including population displacement, environmental modifications and individual behaviors (Desjeux 2001; Macpherson 2005). The objective of this study was to evaluate the severity of CL cases after the earthquake compared to the cases occurred before the earthquake.

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Materials and methods

Study area

The present work was carried out in the city and suburbs of Bam with a population of 120,000 including 70,000 in the city and 50,000 in suburbs, located 200 km east to the city of Kerman, the center of Kerman province in southeastern Iran. A massive earthquake struck the city and suburbs of Bam on December 26, 2003. The magnitude was 7.6 on the Richter scale, demolished almost 90 % of the medical and social infrastructures, killed 30,000 individuals and 60,000 became homeless. The earthquake had a significant impact on social behavior and public health aspects of the people in the affected areas (Seyedin et al. 2009).

Study and sampling

This study was carried out as a descriptive—analytical manner by direct house-to-house visits in 2010. Altogether, 1,481 individuals (356 households) were selected as a cluster random sampling consisting of 20 clusters of 20 households; 11 clusters in the city and 9 clusters in the suburban areas.
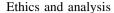
Case detection

All CL suspected individuals were referred to the CL treatment center for further clinical and laboratory examination. Skin scraping was taken from the edge of active lesion, smeared on a glass slide, fixed with methanol, stained by standard Giemsa and examined under a compound light microscope for presence of amastigote stage. Those individuals with history of CL who presented scar were included.

CL treatment clinic

Although, there was a center for treatment of ACL before the earthquake, due to the epidemic condition of CL after the earthquake it was used as a health clinic for control and coordination of various medical and environmental health surveillance. The activities included training, active and passive CL case–findings, diagnosis and identification of cases, vector control measures, environmental management and treatment of patients.

For each patient a questionnaire was completed, recording demographic characteristics and clinical features of the CL cases. The severity was evaluated by a screening score of 1 through 4 for each variable (including location, number, size and duration of lesions) in order of increasing severity (1–4; mild, moderate, sever, highly severe, respectively) was considered.

Ethics and analysis

The consent of the patients was obtained. The CL patients were treated with Glucantime (meglumine antimoniate) free of charge. The data were entered into a computer using a SPSS software version 18. The Chi square test was used for statistical significance at $P < 0.05$.

Results

Overall, 1,481 individuals (356 households) consisting of 51.4 % males and 48.6 % females (mean age; 25.7 ± 17.6 years) were randomly selected (Table 1). 549 individuals (37.1 %) showed history of the CL sore and/or scar; of whom 23.4 % belonged to before and 13.7 % belonged to after the earthquake with a significant difference $(P < 0.01)$. Older groups (>50 years) were more infected than the other age groups. Infection was significantly higher in females than males $(P < 0.01)$ and more common in the city than suburbs (47.7 vs. 20.9 %, respectively).

In terms of severity face was the most infected location (58.1 %) before the earthquake, whereas hands were highly infected (60.1 %) after the earthquake. The size of the lesions remained similar in the two time periods. The duration of the lesions became shorter after the earthquake as compared to those cases before the earthquake $(P < 0.01)$. When the overall severity in terms of location, number, size and duration of lesions was considered, the lesions were less severe in the time period after the earthquake $(P < 0.05)$ than those before the earthquake. This feature is primarily connected to shorter duration of the lesions in the period after the earthquake (Table 2).

Table 1 Baseline information including examined population and history of CL in the city and suburbs of Bam, southeastern Iran

Status	Examined population		history of CL	
	No	%	No	%
Age (year)				
<8	232	15.7	88	34.5
8–20	329	22.2	126	38.3
21–35	382	25.8	134	35.1
36–50	371	25.0	132	35.6
>50	167	11.3	77	46.1
Gender				
Male	762	51.4	244	32.0
Female	719	48.6	305	42.4
Residency				
Urban	893	60.3	426	47.7
Suburb	588	39.7	123	20.9
Total	1,481	100.0	549	37.1

Table 2 Severity of the CL cases before and after the earthquake in the city and suburbs of Bam, southeastern Iran

Severity of lesions	Before earthquake		after earthquake	
	No	Percent	No	Percent
Location				
Face (4)	201	58.1	57	28.1
Hands (3)	122	35.3	122	60.1
Legs (5)	18	5.2	21	10.3
Others (1)	5	1.4	3	1.5
Number				
1	262	75.7	129	63.5
2	62	17.9	52	25.6
3	18	5.2	16	7.9
>4	4	1.2	6	3.4
Size (cm)				
1	59	17.0	82	40.4
1–3	130	34.7	72	35.5
3–5	130	37.9	45	22.2
>5	36	10.4	4	22.2
Duration (month)				
<2	36	10.4	109	53.7
2–6	61	17.6	80	39.4
6–9	126	36.4	12	5.9
>9	123	35.6	2	105
Overall severity = Sum of location, number, size and duration				
Mild 1	362	26.2	323	39.8
Moderate 2	261	18.8	225	27.7
Sever 3	397	28.7	165	24.0*
Very sever 4	364	26.3	69	8.5*

* Significant ($P < 0.01$). For each variable a score of 1–4 (mild, moderate, severe, highly severe, respectively) was assigned

Discussion

Leishmaniasis is a major vector-borne disease with significant morbidity and mortality (Postigo 2010; Desjeux 2004). At present, this disease is expanded to a wider geographical area than before (Alvar et al. 2012; Patz et al. 2000). CL is now considered to be a growing public health concern in several countries (Alvar et al. 2012; Postigo 2010).

The incidence has significantly increased worldwide, mainly due to creation of several manmade or natural disasters including population migration, urbanization, immunosuppression, ecological modification, behavioral risk factors and resistance to standard drugs (Desjeux 2004; Macpherson 2005; Patz et al. 2000; Chakravarty and Sunder 2010).

Currently, in southeastern districts of Kerman province several outbreaks of CL have occurred (Aflatoonian et al. 2013; Sharifi et al. 2011b), mainly due to presence of various risk factors created after the earthquake in Bam.

Despite enormous efforts including health education, spraying, and treatment of patients (Noazin et al. 2013), the number of cases have increased and reached to an epidemic level after the earthquake (Sharifi et al. 2011b).On the other hand, the severity of disease decreased significantly after the earthquake. The explanation for such a decrease is not well known. The only possible explanation is the establishment and full activities of the center for treatment of patients and presence of expert dermatologists, trained general physicians and well equipped facilities. This clinic has recently been known for training activities by the neighboring countries.

In conclusion, although the prevalence of the CL cases has already increased after the earthquake (Sharifi et al. 2011b), the severity decreased, significantly. This later feature is mainly attributed to the establishment of a CL health clinic to coordinate various activities involved in the course of control strategy.

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