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Epidemiology of cutaneous leishmaniasis in Neyshabur, Iran from 2010 to 2014

Mohammad Salehi[1,2], Abdolmajid Ghasemian[3], Seyyed Khalil Shokouhi Mostafavi[3], Mojgan Masoumi[3], Farshad Nojoomi[4*]

[1]*Medical Diagnostic Laboratory of Neyshabour, Center of Medical, Pathological and Genetic Diagnostic Services, Iranian Academic Center for Education, Culture and Research (ACECR), Mashhad Branch, Mashhad, Iran*

[2]*Research Center for HIV/AIDS, HTLV and Viral Hepatitis, Iranian Academic Center for Education, Culture and Research (ACECR), Khorasan Razavi Branch, Mashhad, Iran*

[3]*Department of Microbiology, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran*

[4]*Microbiology Department, Faculty of Medicine, AJA University of Medical Sciences, Tehran, Iran*

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ABSTRACT

Objective: To determine the prevalence of cutaneous leishmaniasis (CL) in Neyshabur, Northeastern Iran from 2010 to 2014.

Methods: In this cross-sectional study, a total of 543 samples from patients aging from 9 months to 74 years were included in Neyshabur, Iran. The sampling of lesions was done using sterile syringes. The slides were stained with Giemsa. The leishman bodies were observed under light microscopy.

Results: The highest and lowest prevalence of CL was among 21–30 years ($P = 0.007$) and a range of 51–60 years ($P = 0.156$), respectively. The overall incidence of CL from 2010–2014 was 32.2% ($n = 175$). The CL incidence showed a decline from 2010–2014, but was not significant from 47/129 (36.4%) cases in 2010 to 18/56 (32.1%) cases in 2014. The CL rate was 101/295 (34.2%) in males and 74/248 (29.8%) in females ($P = 0.275$). The highest and lowest incidence rates of CL in 2014 have been occurred in July and June with 17 (36.9%) and 8 (19.0%) positive cases, respectively.

Conclusions: The incidence of CL in Neyshabur showed a declining trend during 2010–2014. The most susceptible age for leishmaniasis infection was 21–30 years. Leishmaniasis infection rate was not significantly different between men and women.

1. Introduction

Although leishmaniasis has been estimated to be the ninth largest disease burden among all infectious ailments, it has not given enough attention in discussions of burden of tropical disease priorities. The rate of cutaneous leishmaniasis (CL) is higher among Middle East (north parts of Iran) and North and Central Africa and South America regions[1,2]. This situation is to a high level resulted from its complex epidemiology and ecology, the lack of available and simple, easily-applied tools for disease management and the scarcity of current incidence data and often results in a failure on the part of policy-makers to recognize its importance[3-5]. The leishmania agents are a wide variety of vector-born protozoan parasites with great diversity in epidemiological distribution and clinical manifestations[6,7]. It has been demonstrated that *Leishmania major* (*L. major*) and *Leishmania tropica* are the predominant species among rodents in Northeast Iran[8,9]. The disease is spread by more than 30 species of *Phlebotomus* sand flies in the old world and *Lutzomyia* sand flies in the new world[10,11]. Northeast Iran is one of the most active zoonotic cutaneous leishmaniasis foci and has a long common border with central Asian countries such as Turkmenistan, where the disease in rodents has been well studied. Three species including *L. major*, *Leishmania turanica* and *Leishmania gerbilli*, generally circulate in the *Rhombomis opimus* population of the zoonotic cutaneous leishmaniasis foci in this area[12]. The manifestations of leishmaniasis have originally been classified into three major clinical forms, including visceral leishmaniasis, cutaneous leishmaniasis (CL) and mucocutaneous leishmaniasis. *Leishmania tropica* is among neglected tropical diseases of Middle East and North Africa, and over 90% of CL cases are present in seven countries including Afghanistan (Eastern Iran), Algeria, Peru,

Brazil, Iran, Saudi Arabia and Syria[3,13]. Two forms of the disease exist in Iran which are transmitted by *Phlebotomus papatasi* and *Phlebotomus sergenti* s.l[14]. It has been shown that CL is present in northeast and east of Iran, but exactly no previous study has been performed in Neyshabur[15]. Co-infection with HIV was also exhibited in visceral leishmaniasis in northeast of the country[12]. This study was performed to determine the prevalence of CL in Neyshabur, Northeastern Iran from 2010 to 2014.

2. Materials and methods

2.1. Patients and study population

This descriptive-analytical, cross-sectional and epidemiological survey was performed to detect CL cases in Neyshabur city, Northeastern Iran from 2010 to 2014. A total of 543 samples from patients aging from 9 months to 74 years with a suspicious leishmania lesion were included in the study. In fact, small erythematous papules that occurred at the site of the insect bite and also those developed to an ulcerated nodule were included in the study. Whereas the visceral form of the disease was not studied. The formula of the sample size obtaining used here was as following in which approximately 540 samples was obtained [prevalence = 25%, confidence interval (*CI*) = 95%, error level (d) = 5%].

$$x = \frac{Z^2 P (1 - P)}{d^2}$$

where *x* refered to sample size, d was error level, P stood for prevalence, and Z was a constant amount depending on P and d.

2.2. The sampling and diagnosis

The sampling of wound secretions was done using sterile syringes and swabs. The secretions were streaked on glass slide. After 20–30 min, the slides were stained with Giemsa and the microscope slides were visualized by utilizing 100× immersion lenses. The leishman bodies were observed under light microscopy for the confirmation of the disease.

2.3. Statistical data analysis

Data were analyzed with SPSS version 20 (IBM SPSS Statistics for Windows, Version 20, Armonk, NY, IBM Corp.), the *Chi*-square test. $P < 0.05$ (*CI* = 95%) were considered statistically significant. The *t*- and F-tests we used everywhere needed (between 2 groups and among more, respectively).

2.4. Ethical approval

The study protocol was performed according to the Helsinki declaration and approved by the research ethic committee of Iranian Academic Center for Education, Culture and Research. Informed written consent was obtained from study population.

3. Results

The mean (± SD) age of CL patients was (29.20 ± 19.57) years. The highest prevalence of CL was among 21–30 years (*P* = 0.007) and the lowest rate belonged to the age range of 51–60 years (*P* = 0.156). The overall prevalence of CL in Neyshabur from 2010–2014 was 32.2% (*n* = 175). The CL prevalence from 2010 to 2014 has

been depicted in Table 1. It has declined, but not significantly from 47/129 (36.4%) cases in 2010 to 18/56 (32.1%) cases in 2014. Between sex groups, the CL rate was 101/295 (34.2%) in males and 74/248 (29.8%) in females, which was not significant as shown in Table 2 (*P* = 0.275). Among each month of the year 2014, the highest and lowest rates of CL have occurred in July and June with 17 (36.9%) and 8 (19.0%) positive cases, respectively (Table 3). The relation between CL and education level, economy status and preliminary diseases was not assessed.

Table 1
The number and positive rate of CL in each year of study.

Year	Number	Positive cases [*n* (%)]
2010	129	47 (36.4)
2011	132	31 (23.5)
2012	105	34 (32.4)
2013	122	45 (36.9)
2014	56	18 (32.1)
Total	543	175 (32.2)

Table 2
The age and sex of patients in this study.

Demographic features		Number (*n* = 543)	Positive cases (*n* = 175)	Odds ratio	*Cl* 95%	*P*
Age	0–10	111	24	Baseline	1.113–2.441	0.009
	11–20	89	35	2.350	1.263–4.370	0.006
	21–30	113	43	2.227	1.234–4.018	0.007
	31–40	88	30	1.875	0.997–3.525	0.049
	41–50	59	13	1.024	0.477–2.199	0.951
	51–60	36	12	1.813	0.792–4.145	0.156
	⩾ 61	47	18	2.250	1.072–4.724	0.030
Sex	Male	295	101	1.224	0.851–1.760	0.275
	Female	248	74			

Table 3
The prevalence of CL in each month from 2010 to 2014.

Month	Total	Positive cases [*n* (%)]
March	61	16 (26.2)
April	74	16 (21.6)
May	57	15 (26.3)
June	42	8 (19.0)
July	46	17 (36.9)
August	54	17 (31.5)
September	40	15 (37.5)
October	33	12 (36.4)
November	36	15 (41.7)
December	34	15 (44.1)
January	31	15 (48.4)
February	35	14 (40.0)
Total	543	175 (32.2)

4. Discussion

This is the first study of the prevalence of CL in Neyshabur, Northeastern Iran. The mean (± SD) age of patients for CL was (29.20 ± 19.57) years. The highest prevalence of CL was among 21–30 years (*P* = 0.007) and the lowest rate was observed among age range of 51–60 years old (*P* = 0.156). In a study by Momeni and Aminjavaheri in Isfahan, the prevalence of CL among the age range of 10–15 years was higher than other groups, but not significant. Furthermore, no significant relation was seen between sex, clinical signs and the lesions[16]. The overall prevalence of CL in Neyshabur from 2010–2014 was 32.2% (*n* = 175). As shown in Table 1, it has declined, but not significantly from 47/129 (36.4%) in 2010 to 18/56

(32.1%) in 2014. Between sex groups, the CL rate was 101/295 (34.2%) in males and 74/248 (29.8%) in females, which was not significant ($P = 0.275$). Among each month of the year 2014, the highest and lowest rates of CL have been occurred in July and June with 17 (36.9%) and 8 (19.0%) positive cases, respectively. In a study by Razmjou *et al.* in Shiraz, it was recognized among endemic foci of CL, and in three villages in rural areas of Shiraz, among 1 000 inhabitants, this zoonotic disease was 23.2% (reported high prevalence), and the most infected group was ages of 0–9 years[17]. In another study in Southeast Iran, among 3 100 individuals in the city of Mirjaveh, the highest prevalence of active lesions and scars was determined in the age group of 10 years or lower with significant difference ($P < 0.05$) as compared to older age groups. Moreover, no association between sexes and the rate of leishmaniasis was found ($P > 0.05$)[18]. In a survey in Bam District, although all age groups were affected, patients with ages less than or equal to 10 years showed the highest rate of CL infection ($P = 0.000 1$). Moreover, the overall prevalence rate of CL was 5.3%, including 6.3% in females and 4.3% in male patients. Out of 204 cases, the active sores and scars were 1.8% and 3.5%, respectively, with a significant difference between the sexes ($P = 0.005$)[19]. On the other hand, another study in Shiraz showed that *Phlebotomus papatasi* sand flies were the most dominant and infected species with *L. major* where 41 out of 207 (20%) studied individuals harbored *L. major* in suburb area of the city[20]. In another study from Turkemen Sahara, Northeast Iran, the both *L. major* and *Leishmania turanica* in *Rhombomis opimus* were firmly identified[21]. The shortness or weak points of this study were no molecular tests and no assessment of preliminary diseases of patients, such as HIV and diabet, and education level or economy status of them and lack of study over neighboring cities. The strong points are a widespread assessment during several years of CL epidemiology in Northeast Iran and the first study of the disease in this area. The time during was more wide and encompassing. However, we will try to more characterize the leishmania strains in future studies. The incidence of CL in Neyshabur showed a declining trend during 2010–2014. The most susceptible age for leishmaniasis infection was 21–30 years, whereas age range of 51–60 years demonstrated a low disease rate. Leishmaniasis infection rate was not significantly different between men and women.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgments

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