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Cutaneous leishmaniasis in Al Hassa, Saudi Arabia: Epidemiological trends from 2000 to 2010

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ABSTRACT

Objective: To study epidemiological trends related to cutaneous leishmaniasis (CL) in Al Hassa, an endemic area in Saudi Arabia. **Methods:** This retrospective study included the spatial/temporal analysis of the reported cases of CL using the available surveillance database for the disease at the regional Vector Control Unit, from 2000 to 2010. **Results:** The incidence of CL was declining at a stable rate especially during the last 3 years of the study (2008–2010). An interesting finding was the percentage of expatriates affected was increasing over the last 10 years compared to that of the Saudis. **Conclusions:** A definite declining trend in the incidence of CL was observed in Al Hassa. Further studies are warranted to assess whether special public health measures are needed for better control of CL in expatriate populations in Saudi Arabia.

1. Introduction

Worldwide estimates suggest that there are 1.5–2.0 million new cases of cutaneous leishmaniasis (CL) and about 350 million people at risk of infection^[1]. CL is endemic in various parts of the Middle East. The Eastern Province of Saudi Arabia, including the Al-Hassa Oasis, is a known endemic area for CL. The common vector of CL here is the sand-fly (*Phlebotomous papatasi*) and the alternative natural hosts include desert rodents^[2–4]. Both zoonotic and anthroponotic CL occurs in Kingdom of Saudi Arabia with *Leishmania major* and *Leishmania tropica* being the main causative agents^[5] in the Eastern Province and specifically in Al Hassa.

Leishmania tropica has been reported to be the major etiological agent^[2]. Our study gave a brief overview of surveillance data related to CL in an endemic area in Saudi Arabia over a period of 11 years. We felt the need

for the study to find if the declining trend of CL has been maintained, especially as some other endemic regions have reported an upsurge in the incidence of old world CL in recent times. We have tried to correlate our data as a follow up to the large retrospective study by Al-Tawfiq and AbuKhamsin, which covered the epidemiology of CL in the same region over a 46 year period from 1956 to 2002^[2].

2. Data and methods

2.1. Study area

Al Hassa Governorate is located in eastern Saudi Arabia (25°23'0" N, 49°36'0" E). Al Hassa is bounded on the north by Kuwait, on the east by the Arabian Gulf, on the south by the desert Ruba al-Khali, or the Empty Quarter. Most of the population is congregated in the largest towns in the area, namely, Al-Hofuf and Al-Mubarraz. The rest of the population is scattered through more than 50 small villages or is nomadic (Hegar-Bedouin communities). The Governorate's population is about 1 094 188 (2010 estimate),

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60% of which is in the urban areas, 35% in the rural and 5% in the Hegar areas.

2.2. Data collection

This retrospective study included the spatial/temporal analysis of the reported CL cases using the available surveillance database for the disease at the Vector Control Unit, Local Health Directorate, Al Hassa, Saudi Arabia. In Al Hassa, Saudi Arabia, primary health care services are provided free of charge through an integrated network of 58 primary health care centers, 30 centers in urban areas and 28 in rural and Bedouin areas. Suspected cases of CL are referred from the primary health center of the resident to three specialized clinics (two urban and one rural), where clinical examination and laboratory investigations are carried out. Diagnosed cases receive treatment through these three centers. Samples are further examined in the central laboratory at the Vector Control Unit (Directorate of Health, Al Hassa). Treatment is mandatory and all patients with CL are offered free medication. Cases diagnosed with CL from the three specialized clinics are to be notified through a special form on a weekly basis to the Central Vector Control Unit for registration and surveillance database system. The case investigation form includes details of socio-demographics: age at diagnosis, gender, nationality, date of diagnosis, residence and referral health center and similar cases in the close family. Clinical data include methods of diagnosis (clinical examination and laboratory investigations), localization of the lesions and treatment received (type, dose, route and duration). A monthly report

is then forwarded to the local Health Directorate and then to the Department of Communicable Diseases Control at the Ministry of Health. In the current study, we have included the completed dataset that ranged from year 2000 to 2010.

2.3. Data analysis

All data were entered and analyzed using Epi-Info (Centers for Diseases Control and Prevention, Atlanta, Georgia, Version 3.4.3, 2007) and Excel Microsoft office package. Categorical data were expressed using frequencies, percentage and proportions with trend analysis when applicable. For continuous data, median, mean and standard deviation were used for expression. The number of cases was standardized to a population of 100 000 based on the estimated number of population of the study area in the given year to calculate the incidence rate.

3. Results

3.1. Number and incidence rate of CL cases

A total of 9 962 cases with age ranging from 3 months to 81 years were diagnosed and notified with CL during the period from 2000 to 2010. Table 1 displays the number of reported CL cases over an 11 year period from 2000 to 2010. The number of cases decreased by 37.8% by year 2001 and by another 20.5% in year 2002, increased by about 3.0% in year 2003, and then reduced by 15.7% in year 2004. Another peak in 2005 (10.1% increase) was followed by a 53.6% decrease in year 2008 (Figure 1). Based on the officially notified cases

Table 1

Distribution of notified cutaneous leishmaniasis cases in relation to nationalities and gender in Al Hassa, Saudi Arabia from 2000 to 2010.

Year	All cases			Saudis			Non-Saudis		
	Ratio ^a	Male	Female	Ratio ^a	Male	Female	Ratio ^a	Male	Female
2000	2.4:1.0	1 384	572	1.4:1.0	678	495	9.2:1.0	706	77
2001	2.9:1.0	925	321	1.6:1.0	434	276	10.9:1.0	491	45
2002	2.5:1.1	705	286	1.4:1.0	295	207	5.2:1.0	410	79
2003	4.1:1.0	822	199	1.6:1.0	265	168	18.0:1.0	557	31
2004	5.1:1.0	719	142	1.7:1.0	188	111	17.1:1.0	531	31
2005	5.2:1.0	795	153	1.7:1.0	214	126	21.5:1.0	581	27
2006	4.6:1.0	692	150	1.4:1.0	186	128	23.0:1.0	506	22
2007	4.7:1.0	674	143	1.7:1.0	192	116	17.9:1.0	482	27
2008	4.7:1.0	313	66	1.5:1.0	84	55	20.8:1.0	229	11
2009	5.4:1.0	375	69	2.0:1.0	103	52	16.0:1.0	272	17
2010	5.4:1.0	386	71	2.0:1.0	131	65	42.5:1.0	255	6
Total	3.6:1.0	7 790	2 172	1.5:1.0	2 770	1 799	13.5:1.0	5 020	373

^aMale-to-female ratio.

and the population size for the period from 2000 (population of 830 152) to year 2010 (population of 1 063 112) in Al Hassa, the yearly reported CL cases were the highest (1 956 cases) during year 2000 (incidence rate of 243/100 000). Figure 1 also demonstrates that the incidence rate of CL started to be steady from year 2008 to 2010 with an incidence rate of around 40/100 000.

3.2. Gender distribution

The total CL cases reported during that period was 9 962 including 7 790 males and 2 172 females with the male to female ratio of 3.5:1.0. As represented in Table 1, the number of cases in males and females respectively decreased by 33.2% and 43.9% in 2001, by 21.8% and 16.5% in 2002, by 12.4% and 25.7% in 2004, and by 53.6% and 53.9% in 2008. The male to female ratio ranged from 2.4:1.0 in 2000 to 5.4:1.0 in 2010 (Table 1). The incidence rate of CL was always higher in males than in females in Al Hassa from 2000 to 2010 (Figure 1).

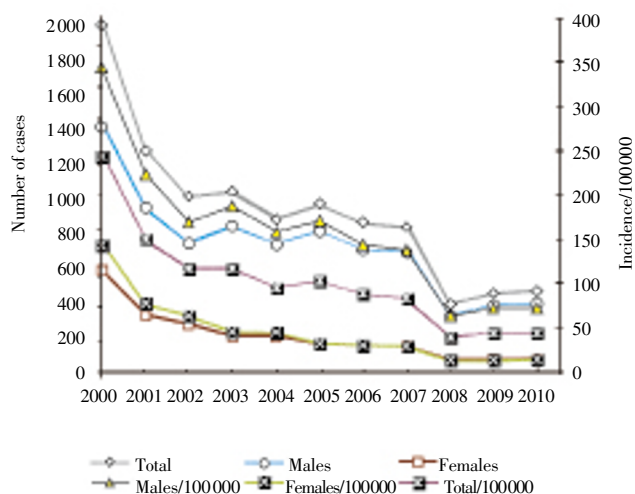


Figure 1. Reported cases of cutaneous leishmaniasis and incidence per 100 000 population in Al Hassa between 2000 and 2010 distributed by genders.

3.3. Distribution by nationalities

Figure 2 demonstrates the distribution of CL cases in relation to nationalities. The number of cases was higher in Saudis than that in expatriates from 2000 to 2002, and the Saudis to non-Saudis ratio was around 1.5:1.0, 1.3:1.0 and 1.0:1.0 in years 2000, 2001, and 2002 respectively. This was followed by reversal of ratios ranging from 1.4:1.0 to 1.9:1.0 by year 2009. By 2009, about 65% of the total notified cases were reported in expatriates. In year 2010, the non-Saudis to Saudis ratio was 1.3:1.0.

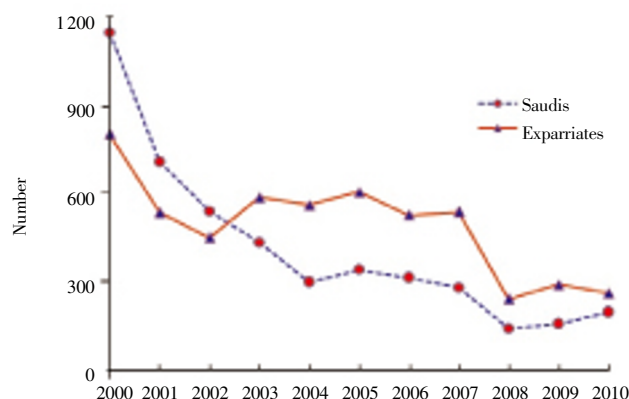


Figure 2. Reported cases of cutaneous leishmaniasis among Saudis vs non-Saudis in Al Hassa from 2000 to 2010.

Table 1 shows the distribution of CL cases in relation to nationalities and gender. Among the Saudi cases, the male to female ratio ranged from 1.4:1.0 in 2000 to 1.7:1.0 in 2006, followed by an increase from 1.5:1.0 in 2007 to 2.0:1.0 in 2010.

3.4. Age distribution

Figure 3 depicts the age distribution of the notified CL cases. The figure shows that the CL cases were mainly reported in the age group of 15–45 years. Starting with 2003, there was an increase in the cases of CL among those in the age group of 15–45 years where this age strata represented more than 50% of cases without noticeable decline since 2003. Additionally, the cases in the <15 years age group also accounted for a large proportion from 2000 to 2002, ranging from 42.2% in year 2000 to 36.2% in year 2002.

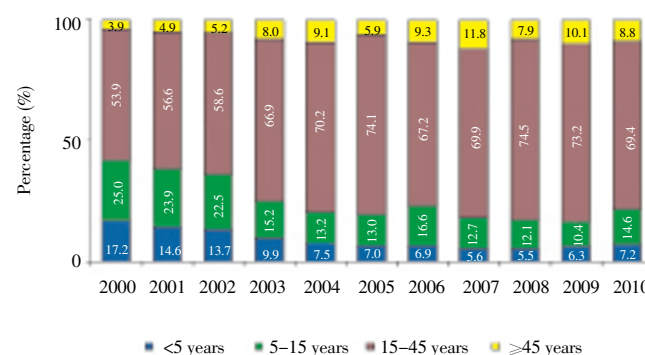


Figure 3. Age distribution of reported cases of cutaneous leishmaniasis in Al Hassa from 2000 to 2010.

Table 2 shows the distribution of CL cases in relation to age and gender. Both the male and female Saudis seemed to be affected at a relatively similar age till 2003, which was then followed by an increase in the age of the male Saudis compared to females (females were affected at younger age

Table 2

Distribution of notified cutaneous leishmaniasis cases in relation to age and gender in Al Hassa, Saudi Arabia from 2000 to 2010 (years).

Year	Age of Saudis		Age of non-Saudis	
	Male	Female	Male	Female
2000	9.0 (16.5±9.5)	8.0 (14.4±9.1)	30.0 (29.2±6.6)	29.5 (23.3±9.9)
2001	10.0 (16.7±9.6)	7.5 (14.9±8.8)	29.0 (30.5±12.9)	26.0 (27.1±8.9)
2002	9.0 (18.2±7.7)	7.0 (13.5±9.8)	30.0 (30.3±9.3)	31.0 (22.4±5.9)
2003	12.0 (20.6±7.4)	9.5 (15.3±8.3)	35.0 (31.6±11.9)	29.5 (29.8±3.7)
2004	12.0 (21.0±3.8)	8.0 (14.7±2.8)	35.0 (32.4±10.8)	29.5 (25.4±3.9)
2005	14.0 (21.9±4.2)	7.5 (16.1±4.4)	34.0 (30.6±5.1)	31.0 (28.0±2.3)
2006	12.5 (19.9±4.5)	8.5 (15.6±1.9)	37.0 (32.1±8.7)	31.0 (28.5±2.2)
2007	16.0 (24.8±8.5)	12.5 (20.2±8.1)	36.0 (32.6±9.8)	20.5 (23.5±5.7)
2008	13.5 (22.9±5.6)	9.0 (14.5±3.7)	33.5 (30.8±8.3)	30.0 (25.9±1.9)
2009	13.0 (25.9±5.4)	8.5 (18.6±1.8)	38.5 (31.6±6.2)	30.5 (24.8±5.0)
2010	15.0 (23.5±3.7)	7.4 (15.3±2.0)	39.5 (31.8±7.3)	35.0 (30.3±4.8)

The age is reported as median followed by mean±SD in the parentheses.

Table 3

Number of notified cutaneous leishmaniasis cases in Al Hassa, Saudi Arabia from 2000 to 2010 distributed by residence and nationalities.

Years	Total ^a	Bedouin area		Rural area		Urban area	
		Saudis	Non-Saudis	Saudis	Non-Saudis	Saudis	Non-Saudis
2000	1 939	14 (0.7)	15 (0.8)	402 (20.7)	192 (9.9)	769 (39.7)	547 (28.2)
2001	1 170	15 (1.3)	24 (2.1)	238 (20.3)	175 (15.0)	416 (35.6)	302 (25.8)
2002	898	13 (1.4)	20 (2.2)	206 (22.9)	199 (22.1)	229 (25.5)	231 (25.7)
2003	958	17 (1.8)	49 (5.1)	157 (16.3)	133 (13.9)	230 (24.0)	372 (38.8)
2004	809	20 (2.5)	76 (9.3)	104 (12.9)	116 (14.3)	154 (19.0)	339 (41.9)
2005	844	12 (1.4)	46 (5.5)	93 (11.0)	183 (21.7)	187 (22.1)	323 (38.3)
2006	758	21 (2.8)	45 (5.9)	101 (13.3)	94 (12.4)	167 (22.0)	330 (43.5)
2007	798	11 (1.4)	42 (5.2)	111 (13.9)	106 (13.3)	144 (18.0)	384 (48.1)
2008	368	7 (1.9)	15 (4.1)	66 (17.9)	55 (14.9)	72 (19.6)	153 (41.6)
2009	428	3 (0.7)	24 (5.6)	61 (14.3)	71 (16.6)	86 (20.1)	183 (42.8)
2010	442	9 (2.0)	8 (1.8)	94 (21.3)	88 (19.9)	86 (19.5)	157 (35.5)
Total	9 412	142 (1.5)	364 (3.9)	1 633 (17.4)	1 412 (15.0)	2 540 (27.0)	2 998 (31.9)

^aCases without definitive classified residence were excluded. The data in the parentheses are the percentage (%) of cases in the total of the same year.

compared to male Saudis). Among the expatriates, especially among the males, the age of affection was higher compared to Saudis with fluctuations between 30 to 35 years; the female expatriates affected were relatively younger than the male expatriates.

3.5. Distribution by locality

The incidence decreased from 272.8/100 000 in 2000 to 38.1/100 000 in 2010 in urban areas and from 470.0/100 000 in 2000 to 48.9/100 000 in 2010 in rural areas. Bedouin area had the least number of notified cases in Al Hassa compared to the urban and rural areas, and this area demonstrated a slow decline in the incidence compared to other areas till 2009 (Figure 4). Table 3 depicts the distribution of notified CL cases in relation to localities and nationalities in Al Hassa from 2000 to 2010. The urban areas showed dominance of Saudi cases from year 2000 to 2002 followed by more effects among non-Saudis, and Bedouin areas showed the same trend. In the rural areas, there was no much difference in

relation to affection by nationalities of the cases.

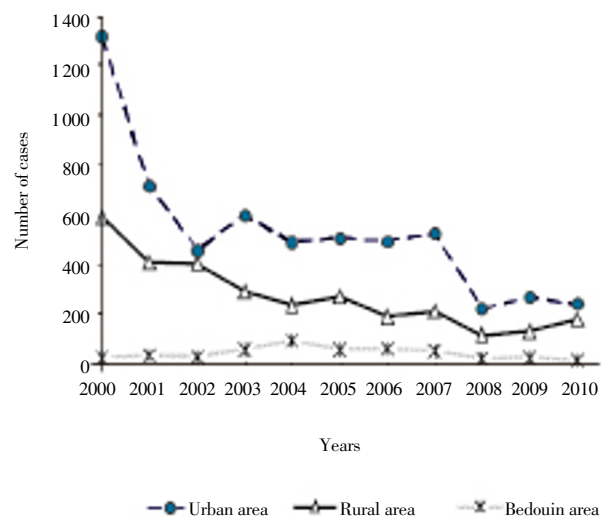


Figure 4. Residential distribution of cutaneous leishmaniasis cases in Al Hassa from 2000 to 2010.

3.6. Seasonal variation of CL

Figure 5 shows the number of notified CL cases by months of the year from 2000 to 2010. The number of cases showed a steep increase starting from November, reached a peak during January and February and then declined by March and April. In May, the peak valley appeared.

3.7. Nature of lesions and affected sites

Initially, the number of cases with two or more lesions increased till 2005, especially among Saudi males. Solitary lesion represented more than 50% in this period. Non-Saudis males demonstrated multiple lesions compared to other groups. Figure 6 depicts the sites of the encountered CL in relation to age groups. Facial lesions were more common among those younger than 15 years, while lesions on upper and lower limbs affected older patients.

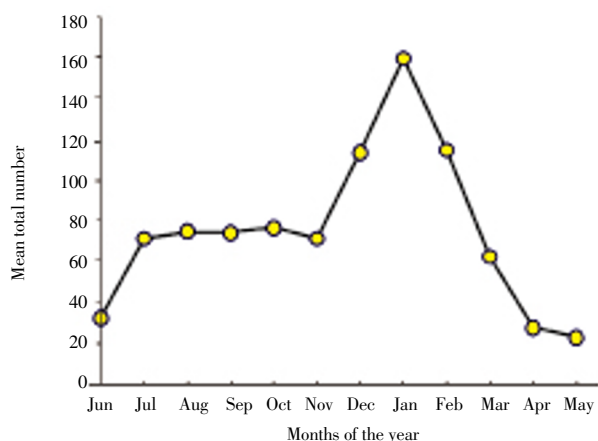


Figure 5. Monthly/seasonal distribution of cutaneous leishmaniasis cases in Al Hassa from 2000 to 2010.

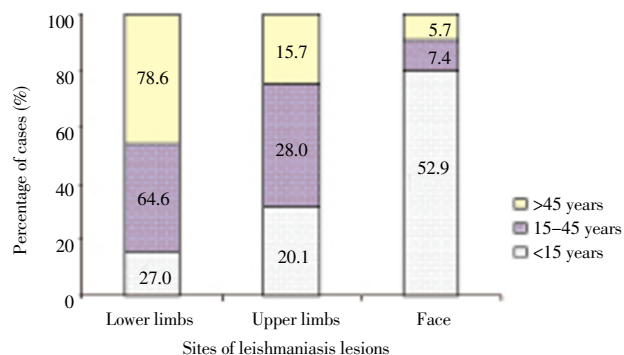


Figure 6. Distribution of lesions in relation to body sites among notified cases of cutaneous leishmaniasis in Al Hassa from 2000 to 2010.

Lesions are not mutually exclusive. Few cases were reported affecting the trunk and back of patients (4 cases in 2000, 3 in 2001, 11 in 2003, 3 in 2005, 9 in 2006, 6 in 2008, and 1 in 2010).

4. Discussion

Epidemiological investigation for CL has shown interesting and varying trends in different regions. A declining trend has been seen in most regions[6]. Some studies however have significantly noted a re-emergence of CL in some regions, thereby suggesting a change in the public health approach to CL[7]. Our study also focused on whether there were any such unexpected trends with regard to CL in Al Hassa, which is an endemic area for CL. The point of reference for our study was the large retrospective study on CL conducted by Al-Tawfiq and AbuKhamsin in the same area[2]. They showed that CL had a very high incidence, almost reached epidemic proportions in 1973 and thereafter declined to a plateau in the mid-1980s. During a 46 year period from 1956 to 2002, 1 862 unique cases of CL were identified. Our study confirms the downward trend for the incidence of CL, showing a clear decline especially during the period 2008–2010[2].

As investigated by Al-Tawfiq and AbuKhamsin, a majority of the cases presented with single lesions of the dry type, with face being the commonest site affected. Our study also had similar findings with the majority of cases presenting with single lesions on face[2]. Most recent epidemiological studies of old world CL have shown a similar trend with single lesions on face or limbs being the most common form of presentation[6,8–11].

Seasonal incidence of CL was similar between our study and the study of Al-Tawfiq and AbuKhamsin, and both studies showed the incidence increased during September and reached a peak in January/February related with the activity of the vector[2]. Furthermore, the majority of the cases occurred in an age group less than 15 years as supported by both our study and the study of Al-Tawfiq and AbuKhamsin[2]. However, the incidence in the non-Saudi population was higher in an older population (15–45 years). In general, CL tends to affect a younger age group in most endemic areas, though other studies have suggested that the most affected age group is slightly older (20–30 years)[6,9,12] compared to our study.

The gender distribution was almost equal in the study of Al-Tawfiq and Abu Khamsin[2], while our study showed a definite male preponderance with male to female ratio being 5.3:1.0 by year 2010, which could possibly be explained by the fact that the males are more exposed to the vector as a result of their occupational activities[10]. It should be noted however that though the same trend has been found in surveys in some endemic areas[10,12–15], some other endemic areas have actually shown a higher incidence in females[9].

The distribution by nationality showed interesting results. In the study of Al-Tawfiq and AbuKhamsin, a big majority (98.3%) were found in Saudis[2], while our study showed

that the relative incidence in the expatriate population is increasing. By 2009, about 65% of the total notified cases were expatriates, which may be attributed to various factors such as a general increase in the expatriate population, better awareness and hence protection against the vector among the Saudis. An earlier study in Arar (another endemic area in Northern Saudi Arabia) has also shown the CL frequency seems to be increasing in expatriates compared to the indigenous population, with the disease severity also tending to be greater^[16].

Many patients affected by CL, especially expatriates, are likely to take treatment from private sector hospitals or outside the country, hence their number might be under-reported. The accuracy of the data collection procedures could not be directly verified by us. Other important relevant data like species identification and biopsy findings were not included in our study.

Our study shows a declining trend in Al Hassa of Saudi Arabia as far as the incidence of CL in general is concerned. However, CL seems to be showing an interesting and different epidemiological trend in the expatriate population. Further studies are warranted to study this aspect and to assess whether special public health measures are needed for better control of CL in expatriate populations in Saudi Arabia.

Conflict of interest statement

We declare that we have no conflict of interest.

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