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Survey Study on the Prevalence of Cutaneous Leishmaniasis in Iraq

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Abstract

Human cutaneous leishmaniasis (CL) is caused by *Leishmania* sp. parasite and endemic in Iraq. The current study was including analysis of available database from Iraqi CDC to determine the distribution of CL cases for the period (2008-2015 years) in Iraq. Total reported cases for this period were 17001 (range 2.9-10.5 per 100,000 individuals). Highest reported cases were recorded in the year 2015 (4000 cases). Male infections cases of CL (50.8%) were more than female infections (49.2%). Highest infections of CL were observed in the age group (5-14yr.) as (34.6%), While the lowest infection of CL were observed in the age group (≥1yr.) as (4.3%). Highest infection case of CL was observed in the middle and west of Iraq (53%). In contrast, the lowest reported cases of CL were observed in the North of Iraq (1%). Monthly distribution of CL in winter was more than in summer months. This study concluded that the CL cases in continuously increasing. The aim of the study is to monitor the causes of CL distribution in Iraq.

Keywords: (Cutaneous Leishmaniasis, Prevalence, Endemic diseases in Iraq)

دراســـــة مسحيـــــة لأنتشـــــار اللشمانيـــــا الجلديـــــة فـــي العـــــراق

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الخلاصة:

اللشمانيا الجلدية البشرية تتسبب بواسطة انواع من طفيلي االشمانيا *Leishmania* spp. وتستوطن في العراق. الدراسة الحالية تضمنت تحليلا احصائيا لحالات اللشمانيا الجلدية المسجلة من قبل مركز السيطرة على الامراض الانتقالية العراقي (CDC) للمدة (2008–2015) في العراق. الحالات الكلية المسجلة لهذه المدة كانت 17001 حالة (مدى 2.9–10.7 حالة لكل 100,000 نسمة). أعلى حالات مسجلة كانت في العام 2015 (4000 حالة). النسبة المئوية لحالات أصابة الذكور كانت (50.8%) وهي اكثر من النسبة المئوية لحالات اصابة الاناث والتي كانت (49.2%). أعلى حالات اصابة باللشمانيا الجلدية شوهدت في الفئة العمرية (5–14 سنة) حيث كانت (34.6%) بينما شوهدت أدنى الحالات في الفئة العمرية (أقل من سنة واحدة) حيث كانت (4.3%). أعلى حالات اصابة شوهدت في وسط وغرب العراق (53%) بالمقابل شوهدت أدنى الحالات في شمال العراق (1%). الانتشار الشهري لحالات اللشمانيا الجلدية في الشتاء كان أعلى مما في الصيف.الدراسة الحالية أستنتجت أن حالات الاصابة باللشمانيا الجلدية في تزايد مستمر. هدف الدراسة هو مراقبة حالات أنتشار اللشمانيا الجلدية في العراق.

Introduction

Leishmaniasis is a parasitic disease, clinically divided into three forms: cutaneous, mucocutaneous and visceral. Geographically, the disease is divided into: / Old World leishmaniasis found in Africa, Asia, the Middle East, the Mediterranean, and India (produces cutaneous or visceral) and New World leishmaniasis found in Central and South America (produces cutaneous, mucocutaneous, and visceral) [1].

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Cutaneous leishmaniasis (CL) is occurring in both New and Old World disease. It is caused by species of *Leishmania tropica, L. major* and *L. aethiopica*. CL is more common in rural than urban areas. The incubation period is 2-8 weeks. The symptoms differ in the regions, according to the species of parasite and the immune patient response. CL begins as an erythematous papule increase in size produced a nodule, eventually ulcerates and crusts over. The border is raised and distinct.

The ulcer is painless unless share with bacterial or fungal infection. The sores may change in size and stay over time. The clinical manifestations involve the nose, mouth and pharynx [2, 3]. CL in Iraq was declined during the anti-malaria control program and anti-malaria house spraying with DDT, but when this was discontinued in the mid-1960s, the incidence was returned. During the Gulf War (1991), cases number of CL were peaked with an incidence of 45/10,000 population in 2008 [4]. Information about possible vector species of CL in Iraq is limited and little species of Phlebotomus as *P. sergenti* and *P. papatasi* are known in the country [5].

It seems that the majority of CL cases reported in Iraq are caused by *L. tropica* [6]. Another study found that the cause of CL in Iraq is *L. major* in percent more than *L. tropica* [7]. Also, it is an important health problem, as a secondary bacterial infection [8].

Generally, CL cases in Iraq in the period (1989-2011) were less than in Syria and Saudi Arabia but more than in Jordan. Risk factors for this disease are represented by malnutrition, poor sanitary, age, and gender, geographical and seasonal distribution [9].

The prevention of the disease certainly is better than the cure. Primary prevention can be achieved by identifying risk groups and tackling known risk factors to prevent sand fly bites [10, 11]. . Prevention of disease by a vaccine is still under way to now. A combination of killed promastigotes plus bacillus Calmette-Guérin vaccine was tested in Iran, Sudan, and Ecuador [12, 13]. Other ways of prevention may success by avoiding sandflies, using of insecticides spraying, using of pyrethroid-impregnated bed nets, destruction of rodent burrows, controlling of outdoor activities, wearing protective clothes, using of sleeves and pant legs, sleeping in air-conditioned places and window screening [14].

The aim of present study is to evaluate the incidence rate of CL in Iraq and attempt to limit the causes of this incidence.

Methodology

The retrospective study included analysis of the reported cases of Coetaneous Leishmaniasis. The study was used the available surveillance database for the disease from the Iraqi CDC (Communicable Diseases Control Center) at the ministry of health/Baghdad, Iraq. Data of current study were collected for the period (2008-2015). Data of disease was sent by the primary health centers and hospitals distributed in all provinces to Iraqi CDC. The diagnosis of cases achieved by physicians' works in these health associations. The diagnosis method they dependent is taking smears of skin lesion, air dried, fixed with methanol, and stained with Giemsa stain then cultured in NNN media. Data of the current study were included all 18 provinces of Iraq.

Obtained data were arranged according to the age groups as follow:

G1, G2, G3, G4, and G5 which included cases less than 1yr, 1-4 yr., 5-14 yr., 15-45 yr., and more than 45 yr. respectively. Also, obtained data were arranged according to the seasonal variation and the geographical distribution of Iraqi provinces from north to south.

Statistical analysis

Different statistical analysis of excel, SPSS (V. 23) and Biostat programs were used in this study including descriptive, percentage, ANOVA, t-tests, Pearson X^2 and result considered significantly with $P<0.05$.

Results and Discussion

Incidence

Dependence on the available database of Iraqi CDC the total cases of CL in Iraq for the period (2008-2015) were 17001 cases. The mean of recorded cases was 2,125.125 (102.4831-4,147.7669) with a big variance among the years 1119111.839, standard deviation 1,057.8808, and standard error 374.0174. Highest reported cases of CL was recorded in 2015 (4000 cases) in percent of 23.5%. The results were cleared that the percent of CL reported cases were increased from (5.9%) in the year 2013 to (23.5%) in the year 2015. According to these results, the total of the incidence rate of CL cases for this period of years calculated as (45 per 100,000). A maximum reported incidence rate was observed in 2015 which was 10.5/ 100,000 (4000 cases). A minimum reported cases was observed in 2013

which was 2.9/100000 (1005 cases). The range of prevalence of disease for study period was 2995 in median 1907 (SE 165). The percentile 25% and 75% represented one and three quarters of total cases were (1321.75 and 2765.75) respectively. Lowest standard deviation of recorded cases of CL was noticed in 2013 which was 0.21, Table-1.

Table 1-The incidence rates of CL cases /100,000 in Iraq to the period (2008-2015)

year	CL Cases	SD	%	Incidence/100,000
2008	**1096***	**25.6**	**6.4**	**2.9**
2009	**1397***	**30.1**	**8.2**	**3.7**
2010	**2687***	**72.6**	**15.8**	**7.1**
2011	**2291**	**46.1**	**13.4**	**6.0**
2012	**1523**	**44.3**	**8.9**	**4.0**
2013	**1005**	**0.21**	**5.9**	**2.9**
2014	**3002**	**6.46**	**17.6**	**7.9**
2015	**4000***	**86.1**	**23.5**	**10.5**
Total	**17001**	**------**	**99.7**	**45**

Mean	**2,125.125**
Mean LCL	**102.4831**
Mean UCL	**4,147.7669**
Variance	**1119111.839**
Standard Deviation	**1,057.8808**
Mean Standard Error	**374.0174**
Minimum	**1,005.**
Maximum	**4,000.**
Range	**2,995.**
Median .	**1,907**
Median Error	**165.7321**
Percentile 25% (Q1)	**1,321.75**
Percentile 75% (Q3)	**2,765.75**

***P-value<0.05**

The incidence rate of CL cases has more variable from 2/100,000 to 45/100,000 [15]. According to this estimate, the results of recent study consider in the limit range. We are noticed that the highest incidence rate of CL was increased from 2008 to 2010, this result was supported by another study in Iraq [4, 16], which cleared that the incidence rate was 5.5/10,000 in 1994 and increased up to 45/10,000 in 2009. Although the incidence rate of CL was decreased from 2010 to 2012 as its clear below in Figure-1.

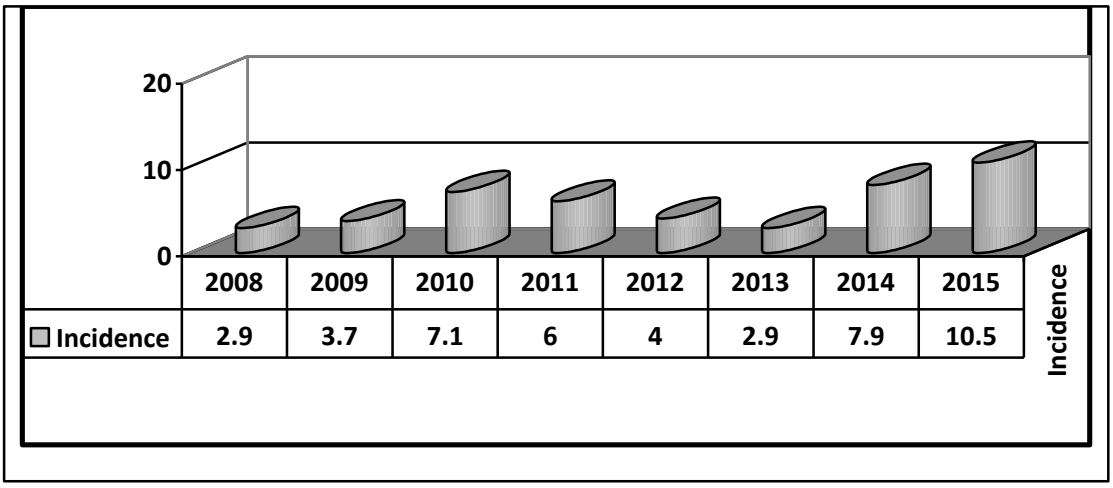


Figure 1- The incidence rate of CL in Iraq for the period (2008-2015).

We are noticed that the rate has increased from 2013-2015. This may explain as miss recording of data of this this period of this disease. Another study was found that the incidence of CL in Iraq was doubled from 2/100,000 (in 2007) to 4/100,000 population (in 2008) and 6.6/100,000 population (in

2009). Therefore in 2008 and 2009, CL cases were considered as outbreaks [15]. Although the widespread of CL throughout the country, three provinces in the northeast where recorded rare cases. Two epidemics consider outbreaks of CL have been reported, in Al-Qadisiah Province (300 cases in 2008) and in Baghdad- Rahmania (400 cases in 2009) [17]. A total of CL cases was decreased as (1829-1250 cases) in (1989 – 2008), but it back to increase to (3113 cases) in 2010[5]. .The results were referred to an outbreak cases of CL in Iraq in 2015 explained as a result of emigration event in different regions of the state. The war of terrorist and military operation which correlated with emigration may be considered as a main cause of prevalence of disease. Emigrant champs may be foci of this type of disease and finally transform the disease to the towns and cities. Littlest of health sanitation in the country play a main role to outbreak the communicable diseases. According to the available database of Iraqi CDC, the identified type of CL included more percent of *L. major* than *L, tropica*. Therefore, the chance to prevalent the disease is big. This result was supported with another study in Iraq [7].

Gender and Age Groups

The study was detected that the CL male infection (50.8%) more than female infection (49.2%). The highest infection of CL was observed in the age group (5-14yr.) as (34.6%). The lowest infection of CL was observed in the age group (≥1yr.) as (4.3%). The age groups (≥1yr.), (15-45yr.) and (<45yr.) were recorded more infection in male than female while the age group (1-4yr.) and (5-14yr.) were recorded more infection in female than male, Table-2.

Table 2-The frequency of CL cases by sex and age group for 8 years in all provinces of Iraq

Age distribution G= group	Male		Female		Total	%
	Mean	SD	Mean	SD		
G1 (≥1 yr.)	**9.8***	**7.1**	**7.8***	**7.4**	**744**	**4.3**
G2 (1-4 yr.)	**38.6***	**30.3**	**50.1***	**34.5**	**4015**	**23.6**
G3 (5-14 yr.)	**59.7***	**47.6**	**59.5***	**47.4**	**5882**	**34.6**
G4 (15-45 yr.)	**37.9***	**37.1**	**36.4***	**35.5**	**4488**	**26.4**
G5 (<45 yr.)	**25.6***	**17.5**	**15.7***	**12.7**	**1872**	**11.1**
Total	**4842****	------	**4685****	------	**17001**	**100**
(%)	**50.8**	------	**49.2**	-------	------	**100**
*P-value<0.05, ** P-value<0. 01						

These results were supported by another study which found that the male infection cases with CL were more than in female [18]. Also, our results were agreed with a study in Iraq at 2009 which reported that the male infection cases of CL were more than female and they explained the different of incidence in gender to the variation of studies with the relationship of the size of the population under study. The current study was reported that the age range (5-14 years) was the highest incidence of CL. This result was agreed with another study which indicated that the age range over 15 years and younger [4].

Distribution in provinces

The highest infection case of CL for the period (2008-2015) was observed in the middle and West of the Iraq. Also, high reported cases were observed in the South and East of the state. While lowest cases were observed in the North of country. We are noticed that the highest cases of CL were concentrated in the middle and west of the state represented 53% of the total cases, after that the high recorded cases of CL were noticed in the south and east of the state which was 46% of the total cases, while the north of Iraq was recorded the lowest cases of CL which was 1% only. The lowest reported cases of CL were detected in provinces of North of Iraq Duhok which were zero. Generally, the middle provinces of Iraq were reported highest cases than the north and south of the state. The highest reported cases of CL in Iraq were noticed in the province of Salahuddin which was 288 as a mean of 8 years (2008-2015) Table-3.

Table 3- Percent of CL cases incidence for 8 years in provinces of Iraq.

Provinces of Iraq	Mean for 8yr.	%
Dohuk	0	0
Erbil	0.3	0.03
Muthanna	3.3	0.28
Sulaimania	4.5	0.38
Tamim	9.0	0.76
Babil	10.5	0.90
Najaf	13.3	1.13
Qadisiyah	14.1	1.19
Wasit	22.4	1.90
Baghdad/rusafa	24.3	2.06
Thi-Qar	32.0	2.70
Nainawa	37.3	3.15
Karbala	40.4	3.41
Anbar	59.0	4.98
Baghdad/ karkh	110	9.29
Diyala	138	11.6
Basra	176	14.8
Missan	209	17.6
Salahuddin	288	24.2
Total of Mean for 8yr.	**1191**	**100**

The cause of disappear of CL cases in the North of Iraq is due to absence of the vector of disease, the sand fly which prefer the tropical and sub-tropical regions[19].

In addition, the highest reported cases in the North of Baghdad and in the West of Iraq are correlating with the emigration movement in these regions [20].

The study showed signification of the different between geographical distribution represented by provinces and the numbers of [21]. CL cases under probability levels 0.005 & 0.001[22].

Our findings were supported with previous studies which reported that five provinces of Iraq are considered as foci of leishmaniasis as Mosul, Baghdad, Kerbala, Muthanna and Misan [21]. .

Seasonal variation

Generally, monthly distribution showed that Winter months were reported higher infection cases of CL than Summer months. The highest percent of collected CL cases for the period (2008-2015) were observed in February that was 29.4% cases whereas the lowest percent of these cases were observed in July that was 0.7% cases, Figure-2.

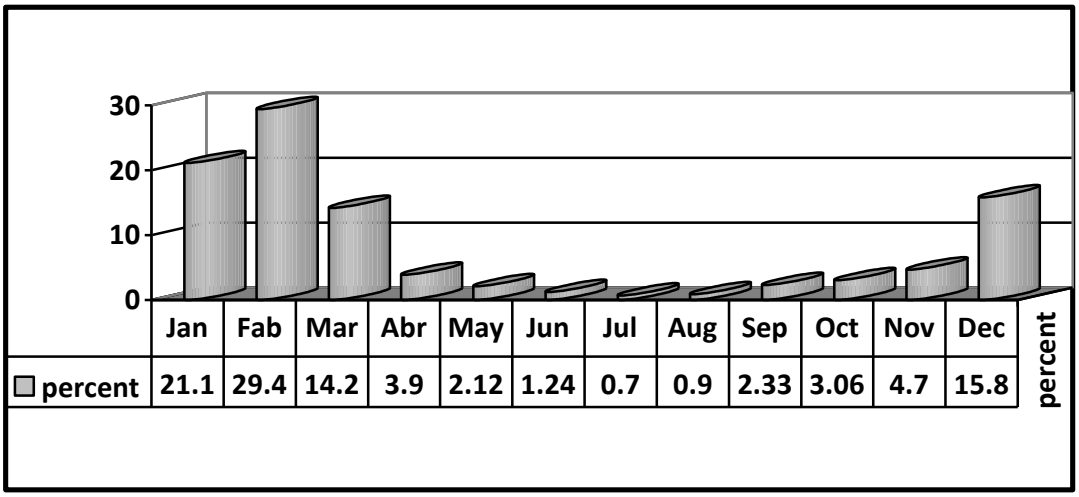


Figure 2- The percent of collected cases of CL for the period (2008-2015)

The result of the recent study was nearest of a study in Tikrit/Iraq which reported that the incidence rate of CL was maximized in October, January, and February. It was explained the cause of this incidence as related developments in eggs, adults of sand fly and their distribution with taking the pitting of human in consideration [23].

It's clear that the incidence of CL cases in Iraq is due to highly distribution of sand flies. Distribution of sand flies is depending on local environmental factors (as precipitation and temperature), physical factors (as geographical barriers and habitat availability), and biotic factors (as an abundance of vertebrate hosts). Both biotic and abiotic properties are highly correlated with altitudinal gradients, most obvious of which is climate. Climatic factors as rainfall, winds and temperature may be the most important factors affecting the distribution of sand fly species. The altitude and bioclimatic structure have an important impact on the distribution of sand fly species [24, 25]. The altitude can effect on the distribution of sand flies by the diversity of habitats, relief, and gradient on climate [26]. The possible relationship between the altitude and Leishmaniasis may be related to many factors as the suitable temperature for the evaluation of Leishmania in the sand flies [27]. Multiple of species of sand flies in Iraq may give a chance to distribute the CL. *P. papatasi* populations which transfer the *L. tropica* are distributed in Iraq. Our finding has been supported by the results related to the seasonal activity of sand flies [28, 29].

Decreasing of CL cases in Summer is due to absent of Sand fly in Summer. No sand flies could be collected in the middle of July and August [30, 31].Additionally, the future studies on vector bionomics, population dynamics, and morphological variations will be most important to the understanding of the epidemiology of CL. Low socioeconomic status, large families, and human behavior in outdoor habits are other difficulties for applying appropriate personal protective measures. Health education, vector control and notification of the disease will be an important starting point to prevent the increase of the disease Iraq. Establishing a disease monitoring system and continued research activities related to effective control of parasite, vector and last the Leishmaniasis.

Conclusion

The study was concluded that the CL disease is sex, age, seasonal and geographical dependent and it is with continuously increasing in Iraq.

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