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Epidemiology Study of Cutaneous Leishmaniasis in Babylon Governorate

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Abstract:

Cutaneous leishmaniasis disease is considered an epidemic disease in Iraq and neighboring countries like Syria, Jordan, Turkey, Iran and Saudia Arabia kingdom .(WHO,2020). The study was performed to evaluate the Epidemiological status of cutaneous leishmaniasis in the Babylon governorate during the period 1/9/2022 to 1/3/2023 ,one hundred eighteen case visited the Al-Sadeq teaching hospital, Musaib general hospital, Alexandria general hospital, Al-Kifel general hospital and some private clinics in the governorate were studied. The infection was diagnosed by dermatologist physician . The study revealed that the percentage of infection with the CL was 39% with the age 1-14 year and 28% with age 15-24.Male were more infected with the disease (57%) than female (48%).Rural area were more epidemic with this disease (75.43%) in comparing with rural areas. Arms and legs were more exposed to infection (81.%) with ulcer than head (15.79%).Multiple ulcer represent more prevalence in the body (59.64%) comparing with the single(40.35%). Wet ulcer of zoonotic origin were more prevalent in incidence of infection (82.45%) in comparing with dry anthropoid ulcers (17.54 %).

Key words: *Cutaneous Leishmaniasis, Epidemiology,Babil,*

Introduction:

Leishmaniasis is one of the most diverse and complex of all vectors borne diseases. It is caused by an obligatory intracellular protozoan parasite belonging to the genus Leishmania (Sharma and Singh 2009). The parasite is digenetic and thus has two basic life cycle stages in which they reside in the gut of an invertebrate host and an intracellular stage in which they reside in specialized intracellular compartment in a mammalian host(Killic-Kendrick.,1990). The disease is transmitted via female sand flies of the genus *Phlepotomos* in the old world and *Lutzomyia* in the new world (Dostalova and Volf, ., 2012). Sand fly transmits cutaneous leishmaniasis by feeding on a vertebrate host, and they are mostly live in forest areas, caves and burrows in tropical and subtropical regions (Markle and Makhoul., 2004). More than 20 *Leishmania* species are responsible for infection in human(Desjeux ., 2001) . Old world cutaneous leishmaniasis is caused by *Leishmania tropica* in urban area and and *Leishmania major* in dry desert area (Markle and Makhoul., 2004).

Cutaneous leishmaniasis affects mainly developing countries; About 95% of CL cases occur in the Americas, the Mediterranean basin, the Middle East and central Asia . Eastern Middle Region and Algeria constitute an eco-epidemiological “hotspot as together they reported 82% of all new CL cases. Nine countries (Afghanistan, Algeria, Brazil, Colombia, Islamic Republic of Iran, Iraq, Pakistan, Peru and the Syrian Arab Republic) each reported >5000 CL cases, for a total of 195 283, representing >85% of cases and there was a generally increasing trend in the number of new autochthonous CL cases reported between 1998 and 2019..(WHO 2020). The outcome of leishmanial infection in humans depends largely on the immune responsiveness of the host and the virulence of the infecting parasite strain. The protozoan in this genus are capable of producing a broad spectrum of diseases in humans, ranging from asymptomatic infections to horribly disfiguring forms of mucosal leishmaniasis or the potentially fatal visceral form of the disease (Gabriel-Grimaldi and Tesh 1993). The majority of people exposed to Leishmania do not develop the clinical disease (Nylén and Gautam., 2010).

In Iraq two species are present , *L.tropica* which is the cause of anthroponotic cutaneous leishmaniasis and *L.major* which cause the zoonotic cutaneous leishmaniasis. The ACL is found in urban and sub urban region and ZCL found in rural areas. (WHO 2003). Leishmaniasis is endemic in Iraq, where both forms of the disease, cutaneous (Baghdad boil) and visceral (Kala-azar), are found. (Majeed *et al* .,2013). The disease is epidemiologically unstable, with large and unpredictable fluctuations in the number of cases. The total incidence rate of cutaneous leishmaniasis in Iraq varies from 2.3/100,000 to 45.5/100,000 (WHO 2003). There had been two peaks of CL. occurred during last thirty years ,the first in 1992,the infection rate reached 8779 infected person (Korzeniewski.,2008) the epidemic lasted for six years, during which 8000-9000 new cases were reported every year, followed by a gradual decrease in the endemicity of the disease which reached lowest peak in 2002. After that, there was again a gradual increase in the incidence from 2003 to2013, reporting 1000-3000 cases per year(Al-Obaidi., 2016). The second peak happened in 2015 where the reported cases reached4000 patient.(WHO 2021).The military operations, emigration, emigrant camps with low sanitary and health level in addition to low standard of living which affect the herd immunity my the main factors the late outbreak. The highest percent of cutaneous leishmaniasis in Iraq is in winter with the peak incidence in February whereas the lowest percent were in July in summer(Al-Obaidi *et al.*,2016). Seasonal variation may depend on sand fly activity where the sand fly season in Iraq is from April through November and peaks in September–October(Stoops *et al.,* 2013) No sand flies could be collected in the middle of July and August (Amin *et al.,* 2013, cdc 2016). Five provinces of Iraq are considered as foci of leishmaniasis Mosul, Baghdad, Kerbala, Muthanna and Misan (Hezari *et al.*,2014). Leishmaniasis also was reported from the eastern provinces of Diyala Wasit, Missan, and Basrah(Majeed*et al.*,2013] .The high reported cases were observed in the South and East , while lowest cases were observed in the North of country (Ferro *et al.*, 2015). This study aimed to reveal the distribution of leishmaniasis in Babil Governorate considering sex, age , distribution of ulcer on the body, inhabitant of patients and nature of the ulcer for the period from September 2022 to April 2023.

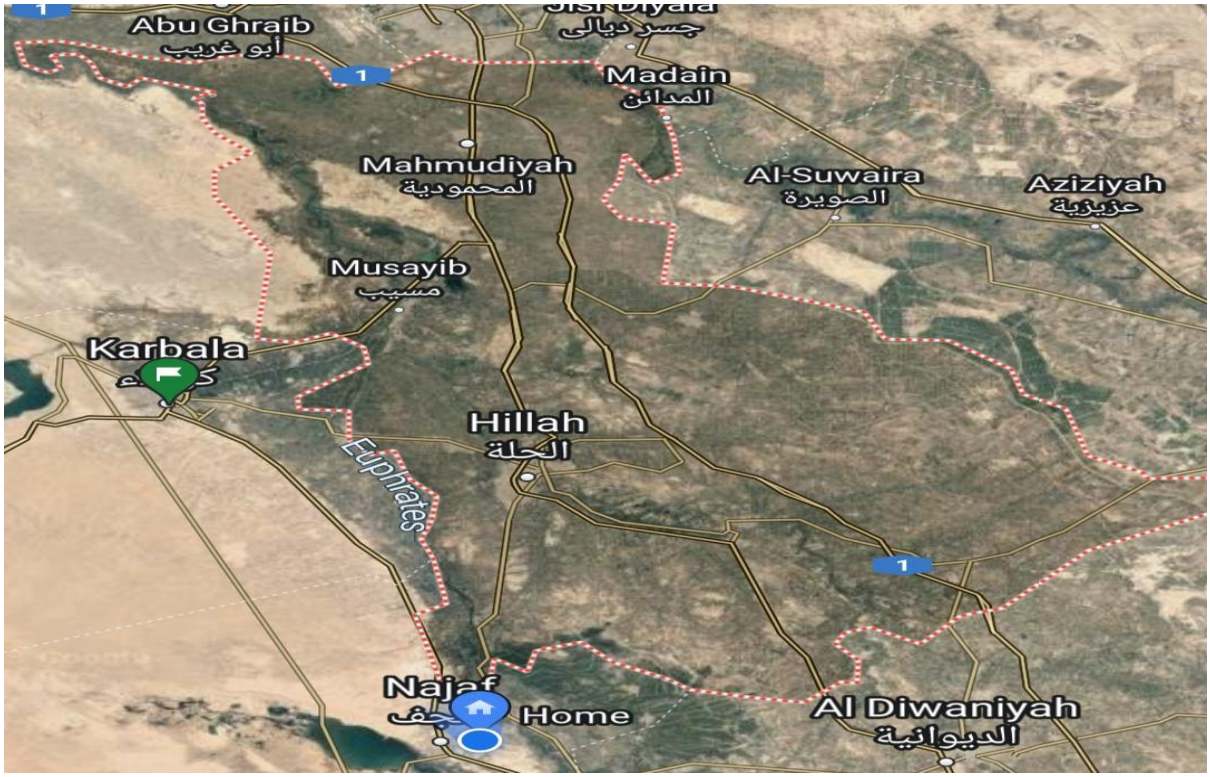

Figure (1) Babil Governorate Map (https://earth.google.com/web/search/Babil/@32.655906)

Location of study:

Babil Governorate is located in the central part of Iraq within the alluvial plain between two latitudes (45º 12¯ 19ⁿ) (43º 58¯ 24ⁿ) north and between linear length (33º 4¯ 30ⁿ) (32º 6 18ⁿ) East, it is One of the governorates of the Middle Euphrates, it is bordered to the north by Baghdad Governorate, to the east by Wasit Governorate, and to the south To the west is Najaf Governorate, to the south is Qadisiyah Governorate, and to the west are Anbar and Karbala Governorates extend longitudinally From the triangle vertex to the north From north to south, at a distance of (120 km), the province of Babil Shakka is close west and its base is at the southeast. The area of the governorate is (5307 square km). The governorate consists of (16) An administrative unit distributed in four districts (Hilla

District, Al-Mahaweel District, Al-Musayyib District, Al-Hashimiyya District) Followed by (12 districts). Map (1).

The cmatlie:

A desert climate prevails, characterized by low rainfall and high temperatures in summer, which reach 50 m. A warm climate prevails in winter . total population; 2065042 million .Sex ratio (male to female at birth) ;105%. proportion of the rural population to urban population is 52 to 48.(Al-Ma‹mouri.,2022)

Specimen collection;

The present study was performed during the period from 1/9/2022 to 1/4l2023. ,118 patients visited Al-Sadeq teaching hospital, Musaib general hospital, Alexandria general hospital, Al-Kifel general hospital and some private clinics in the governorate were studied. The lesion was diagnosed by dermatology Specialist. Questionnaire form used included age ,sex , residence, lesion type, lesion site, lesion duration, lesion diameter, and lesion number.

Diagnostic methods:

The parasite diagnosis was made by a dermatology Specialist Clinically and by histological examination and culture as follows :

Skin smears were done for CL patients, the skin lesion area was cleaned with 70 % alcohol, and then 0.1-0.2 ml of Normal saline solution was injected subcutaneously . The injected solution was re-aspirated without taking the needle out of the skin. Part of this aspirate was directly used to prepare a direct smear, stained with Geimsa stain examined by microscope on power x 100 magnification for amastigote. The other part of the aspirate was cultured on di-phasic *NNN* media . The culture was microscopically examined for the presence of the promastigote stage after 7–10 days.

Ethic statements

All subjects were told that participation in the study was voluntary and that the collected data would only be used for scientific research. Some uncompleted questionnaires were neglected.

Statistical analysis

All data were represented as numbers and percentages. Statical analysis was done by using chi-square test with P value ≤ 0.05.

Table (1) Number and ratio of infected patients according to sex

Sex	The number	Percentage
Male	66	57.89
Female	48	42.11

Total	114	100%
Chi- square	2.8421	
SD	Non significant	

Table (2) Distribution of cutaneous Leishmania according to age and sex

Age category	The number		Percentage		Total Number	Chi-square	SD
	Male	Female	Male	Female			
1-14	29	16	64.44	35.56	45	3.7556	P≤0.05
15-24	18	7	72.0	28.0	25	4.8400	P≤0.05
25-34	5	14	26.32	73.68	19	4.2632	P≤0.05
35-44	13	6	68.42	31.58	19	2.5789	N.S
45 and above	1	5	16.67	83.33	6	2.6667	N.S

Table (3) Distribution of cutaneous leishmaniasis based on age

Age Category (year)	The number	Percentage
1-14	45	39.47
15-24	25	21.93
25-34	19	16.67
35-44	19	16.67
45and above	6	5.26
Total	114	100%
Chi – square	35.4737	
SD	P<0.0001	

Table (4) Distribution of cutaneous leishmaniasis based on ulcer distribution on body

Body distribution	The number	Percentage
Face	18	15.79
Upper limps	42	36.84
Lower limps	51	44.74
Chest	3	2.63
Total	114	100%
Chi-square	50.8421	
SD	P<0.0001	

Table (5) Distribution of cutaneous leishmaniasis based on inhabitant

Geographical distribution	The number	Percentage
Rural	86	75.43
Urban	28	24.57
Total	114	100%
Chi – square	15.6	
SD	P<0.05	

Table (6) The rate of ulcers based on its origin

Ulcer origin	No.	rate
Zoonotic Origin	**94**	**82.45**
anthroponotic Origin	**20**	**17.54**
T P < 0.05	**7.3 Sign Zoonotic**	

Table (7) The rate of Cutaneous Leishmaniasis based on number of ulcers

The number	Number of patients	The rate
Multiple	**68**	**59.64%**
Single	**46**	**40.35%**
T P < 0.05		
Chi-square 4.2		

Results and Discussion:

Cutaneous Leishmaniasis were detected in some Babil Governorate hospitals and private clinics ,results are shown in table (1) ;114 patients diagnosed and confirmed clinically and laboratory. Males rate was 57.89% the total number of male was 66. Female rate was 42.11% the total number of female was 48.The rates is in agreement with Al-Obaidi *et al* (2016) in his survey study of cutaneous leishmaniasis in Iraq from 2008- 2015 the rates were 50.8% for male , 49.2 for female respectively, . AlSamarai (2009) gave a 57% for female that goes along with Al-Obaidi (2000) for his study in Tikrit Governorate and Sharifi *et al*(1998) in Iran. Ayman *et al* (2015) stated in his study in libya that female were more affected than male by 1.351 to 1. Jaffar and Abbas (2004) gave proximal results with 1.1 to 1 to the female favor in i Saudi Arabia in his retrospective study from 1956-2002.

In table (2) results showed significant difference between male and female, in 1-14 age category and 15-24 age category the rates were 64.44% and 72% respectively for male and 35.56% ,28% for female. The interesting difference was in 25-34 category was in favor of female group in rate 73.68% for female and 26.32% for male. AlSamarai (2009) gave proximal results in favor of female in above 15 years group and attributed that to the fact that most workers in farms are female within this age group. There was no significant level for age group 35-44 and age group >45. , The table (3) shows a significant difference in age category 1-15 with 39.47% rate ,also the age category 15-25 showed a significant difference with 21.93% . p was 0.0001.This give 1-15 category the highest infection rate then 15-25 years category This rate goes along with the general results in Iraq given by

Al-Obaidi *et al* (2015) in his survey, the sum rates of age group 1-15 was 61.3.% ,while AlSamarai (2009) in his study in Alhaweja district the result of 1-15 category was 43% which is the highest rate within his study age groups. Al-Nassiri and Al-Alousy (2011) in their study in Salah Eldin Governorate also gave this category the highest rates with 75% to the age group below 20 years. Jaffar and Abbas(2004) also gave higher rates to this category with 76%. In contrast to these results Ayman *et al* (2015) in Libya gave the adolescents and children 30.7%. All above results gets along with our study that children below 15 years are the most exposed group for infection.

The table (4) shows the distribution of ulcers on the body . The highest rate was on feet with 44,47% then the feet with 42%. Face had 15.79% while the lowest rate was the chest with 2.63% The increase in the rates of infection of the hands and feet is attributed to the fact that they are exposed to the infection of the insect that carries the parasite, especially during the period of activity of the parasite at night. (Ataya *et al*., 2001) (Uzun *et al*., 1999). Al-Mousawy (2015) and Al-jawabreh *et al*(2003) stated that the face was the highest part exposed to infection . Results in table (5) show the rates of infection with the cutaneous leishmaniasis parasite according to the location of residence during the current study period. The obtained results show that the infection rates increased in rural agricultural areas (75.43%), while the urban area infection rate was (24.57%). The current results correspond to what was shown by Wesam (2012). Hamzavi *et al*(2001). The high rates in agricultural may be attributed to the vertebrate hosts storing the disease, which increases the chance of infection with the parasite throughout the year due to the presence of continuous cultivation in summer and winter, while this percentage decreases in urban areas, where it is noted that the activity of the insect increased during the summer period and the study was conducted during the period of gradual decrease in temperature (Kassiri *et al*., 2011).

The results in table (6) show that the percentage of wet ulcers of animal origin was 82,45%, a high percentage compared to dry ulcers of human origin, which constituted 17.55% of the total parasitic infections with cutaneous leishmaniasis. This clearly indicates that the main cause of this infection is L. major, which attacks the skin after a short incubation period that extends from one week to two months, compared to *L*. tropica, which needs a longer incubation period (Alam *et al*., 2011). These results indicate the presence of large numbers of storage animals in the study area (dogs, rodents), especially because the area is of an agricultural nature, which encourages the availability of large numbers of insects that transmit the disease: the sand fly (Shujan., 2017)., The results in the table (7) showed in the current research the percentage of people infected with more than one ulcer was the highest (59.65%) compared to those infected with one ulcer (40.35%). The results in the case study are similar to what was found by (Al-Nassiri and Al-Alousy, 2011), which is attributed to the development of a new strain of the parasite in Salah Al-Din Governorate due to the large numbers of displaced people, so that the Leishmania parasites spread quickly in any new area they enter and develop into new strains with virulence (Krier., 2003). Multiple lesions indicate the continuation of successive and repeated bites of sand flies, and despite what was indicated by (A l-Qadhi *et al*., 2015) that the immune response of those infected with more than one ulcer was higher and better than those infected with one ulcer, the logical explanation is due to the optimal conditions that allow the occurrence of infection such as the nature of the area exposed to the bite, the availability of sand flies and even the weakness of the immune response.

Conclusion;

Age group1-14 years is the most group prone to infection with 39.47%, male more than female with 57.89%, female within group age 25-34 is more prone to infection than male, rural area more than urban area with 75.43%. Arm and legs are the most parts of the body prone to infection. Multiple ulcers are more prevalent than single ulcer with 59.64 and the wet ulcers of zoonotic origin are more prevalent than dry Anthroponotic ulcers.

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