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Research Article

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Demographic Incidence of Cutaneous Leishmaniasis in Patients of Wasit Province, Iraq

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Abstract

Background: *Leishmaniasis is a chronic disease caused by flagellate protozoa of the genus Leishmania, which remains uncontrolled and neglected transmissible disease in many countries including Iraq.*

Aim: *Estimating the incidence rate and association of cutaneous leishmaniasis (CL) to different demographic risk factors including season, geographic area, gender, age, and distribution of lesions on different body's regions.*

Materials and methods: *Totally, 224 individuals who diagnosed as patients with CL were attended to the governmental hospitals in Wasit province (Iraq) during the year of 2023, and subjected for this questionnaire to collect the required data.*

Results: *The findings of demographic risk factors were showed a significant variation ($P<0.05$) in their values. Concerning season, significant highest levels of CL ($P<0.0357$) was recorded in February 29.91% and January 24.11%, while the lowest values were seen in December (0%), September (1.97%), June (2.23%), April (3.13%), August (3.57%), July (4.02%), October (4.91%), and November (6.25%) in comparison to March (14.73%). Significantly ($P<0.0185$), the higher rate for incidence of leishmaniasis was seen in Al-Aziziyah (46.43%); whereas, the lower rates were observed in An Numaniyah (2.68%), Al-Hai (5.8%) and Al-Suwaira (759%) in comparison with Kut (37.5%) district. For gender of study patients, males were showed a significant increase ($P<0.0442$) in incidence rate of leishmaniasis (58.93%) when compared to females (41.07%). Regarding age, significant increases ($P<0.0422$) in incidence rate of leishmaniasis was reported in patients aged ≤ 20 years (57.14%) and lowest in patients aged ≥ 40 years (31.25%); while in patients of 21-39 years old, it was 11.61%. Distribution of lesions on the body of study patients showed that the incidence of disease was increased significantly ($P<0.0278$) in legs and abdomen (38.39%) and arms (32.59%); and reduced significantly in all the body (0.45%), back (0.45%), chest (0.89% (2/224)), abdomen (1.34%), and neck (3.13%) when compared to face (22.77%). According to type of lesion, the dry lesions (97.32%) were increased significantly ($P<0.0122$) when compared to wet lesions (2.68%).*

Conclusion: *This might represent the first recent retrospective study for analysis of documented cases of CL in Wasit province (Iraq). This study concludes that the CL disease is sex, age, seasonal and geographical dependent and it is with continuously increasing in Iraq. To further contain CL incidence and morbidity, there is a need for more intensified preventive research programs into improved vector control, vaccines, and diagnostics.*

Keywords: Leishmania tropica, CL, Sandfly, Epidemiological survey, Parasitic disease, Skin infection, Risk factor

Introduction

Leishmaniasis is a vector-borne infection caused by the protozoan parasite of the genus *Leishmania* that belongs to Trypanosomatida Order of Kinetoplastea Class under Euglenozoa Phylum; and transmits by the vectors are female sandflies (*Phlebotomus and Lutzomyia*) [1,2]. The World Health Organization (WHO) has designated leishmaniasis a neglected tropical disease (NTD); thus, emphasizing its considerable impact not only on health, but on societies at large with a high economic burden [3,4]. Leishmaniasis is endemic in almost 100 countries and the estimated total risk population is approximately 350 million people [5]. Each year, an estimated 2 million new cases occur and the overall prevalence is 12 million cases; however, the incidence numbers are probably underestimated in most countries since cases are not recognized and reporting is not mandatory [6,7].

Depending on the *Leishmania* species, the disease can cause three main clinical manifestations: (1) localized cutaneous leishmaniasis (CL) characterized by cutaneous ulcers, sometimes accompanied by satellite lesions and/ or nodular lymphangitis; (2) muco-cutaneous leishmaniasis (MCL) involving mucosa, and underlying connective tissues such as cartilage structures in combination with CL disease; and (3) visceral leishmaniasis (VL) affecting internal organs, like liver, spleen, and bone marrow. VL can be lethal, just like MCL, albeit the latter less frequently [8,9]. With 600,000 to 1 million new cases annually worldwide, CL is the most prevalent clinical leishmanial manifestation. Moreover, only eight countries contribute to 90% of cases: Afghanistan, Algeria, Brazil, Iran, Pakistan, Peru, Saudi Arabia, and Syria [10]. Conflicts, such as in Syria recently, caused CL outbreaks due to healthcare disruption, and potential human to human transmission due to massive overcrowding [11]. Outbreaks occurred not only in the actual war zones, but also among refugees sheltered in safe countries such as Turkey, Jordan, and Lebanon [12]. Based on the European world view, *Leishmania* parasites are divided into two dominant groups: (1) Old World species found in the Mediterranean basin, the Middle East, the horn of Africa and the Indian subcontinent such as *L. (L.) major, L. infantum, and L. (L.) tropica;* and (2) the New World species that consists of species found in Middle and South America such as *L. (L.) amazonensis, L. (L.) chagasi, L. mexicana L, L. (Viannia.) naiffi, L. (V.) braziliensis,* and *L. (V.) guyanensis* [12]. Old World species predominantly cause self-limiting ulcers, whereas New World species can be severely destructive and even cause death, mostly in relation to MCL disease. Not all *Leishmania* species are susceptible to the currently available array of therapeutic options [13-15]. Therefore, species determination is a key for the clinical outcome of patients with CL or MCL caused by an unknown species [9]. Based on the successful molecular Leishmania species determination, novel parasite species-driven disease manifestations have been unveiled in different regions of the world [16]. In Wasit province (Iraq), no recent studies were carried out to determine the incidence rate of leishmaniasis; hence, the current study aims to estimate the prevalence of disease and its association with the different demographic risk factors.

Materials and Methods

Study population

The retrospective study included analysis of the reported cases of CL. The study was used the available surveillance database for the disease from the Wasit Health Department, Ministry of Health (Wasit, Iraq). Totally, 224 patients were included in this study, who diagnosed as clinically infected with leishmaniasis by the specialist physicians in the governmental hospitals in Wasit province (Iraq) based on clinical signs and using the traditional method that include microscopic examination of stained skin smears with Giemsa stain and culturing of the suspected lesions in the NNN (Novy, MacNeal, Nicolle) medium [17]. The study data were obtained from the patients during the year of 2023 using special questionnaire to document the required data.

Statistical analysis

All recorded data were documented, categorized and tabled using the Microsoft Office Excel (*version 2013*). Statistical analysis was done in the GrphPad Prism Software (*version 6.0.1*) by the One-Way ANOVA and t-test at a level probability (P) of □0.05 [18].

Results

The findings of demographic risk factors were showed a significant variation (P<0.05) in their values. Concerning season, significant highest levels of CL (P<0.0357) was recorded in February (29.91% (67/224)) and January (24.11% (54/224)), while the lowest values were seen in December (0% (0/224)), September (1.97% (4/224)), June (2.23% (5/224)), April (3.13% (7/224)), August (3.57% (8/224)), July (4.02% (9/224)), October (4.91% (11/224)), and November (6.25% (14/224)) in comparison to March (14.73% (33/224)), (Figure 1).

Significantly (P<0.0185), the higher rate for incidence of leishmaniasis was seen in Al-Aziziyah (46.43% (104/224)); whereas, the lower rates were observed in An Numaniyah (2.68% (6/224)), Al-Hai (5.8% (13/224)) and Al-Suwaira (759% (17/224)) in comparison with Kut (37.5% (84/224)) district (Figure 2).

For gender of study patients, males were showed a significant increase (P<0.0442) in incidence rate of leishmaniasis (58.93% (132/224)) when compared to females (41.07% (92/224)), (Figure 3).

Regarding age, significant increases (P<0.0422) in incidence rate of leishmaniasis was reported in patients aged ≤ 20 years (57.14% (128/224)) and lowest in patients aged ≥ 40 years (31.25% (70/224)); while in patients of 21-39 years old, it was 11.61% (26/224), (Figure 4).

Distribution of lesions on the body of study patients showed that the incidence of disease was increased significantly (P<0.0278) in legs and abdomen (38.39% (86/224)) and arms (32.59% (73/224)); and reduced significantly in all the body (0.45% (1/224)), back (0.45% (1/224)), chest (0.89% (2/224)), abdomen (1.34% (3/224)), and neck (3.13% (7/224)) when compared to face (22.77% (51.224)), (Figure 5).

According to type of lesion, the dry lesions (97.32% (218/224)) were increased significantly (P<0.0122) when compared to wet lesions (2.68% (6/224)), (Figure 6).

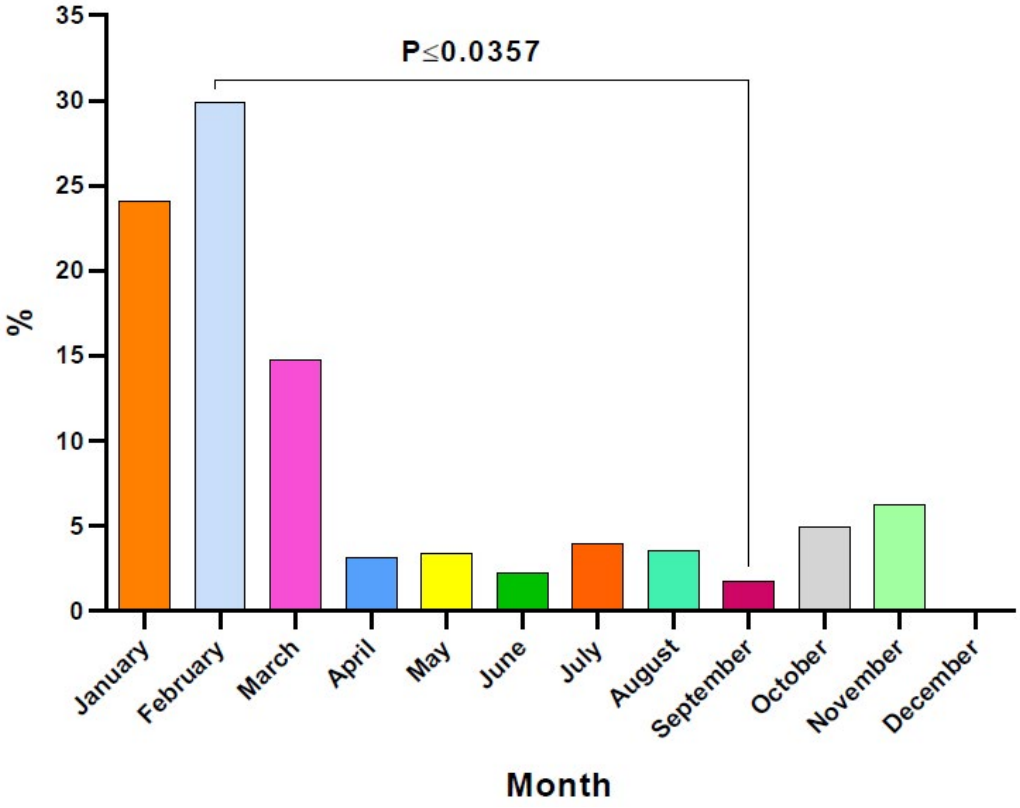

Figure 1: Association of leishmaniasis to season.

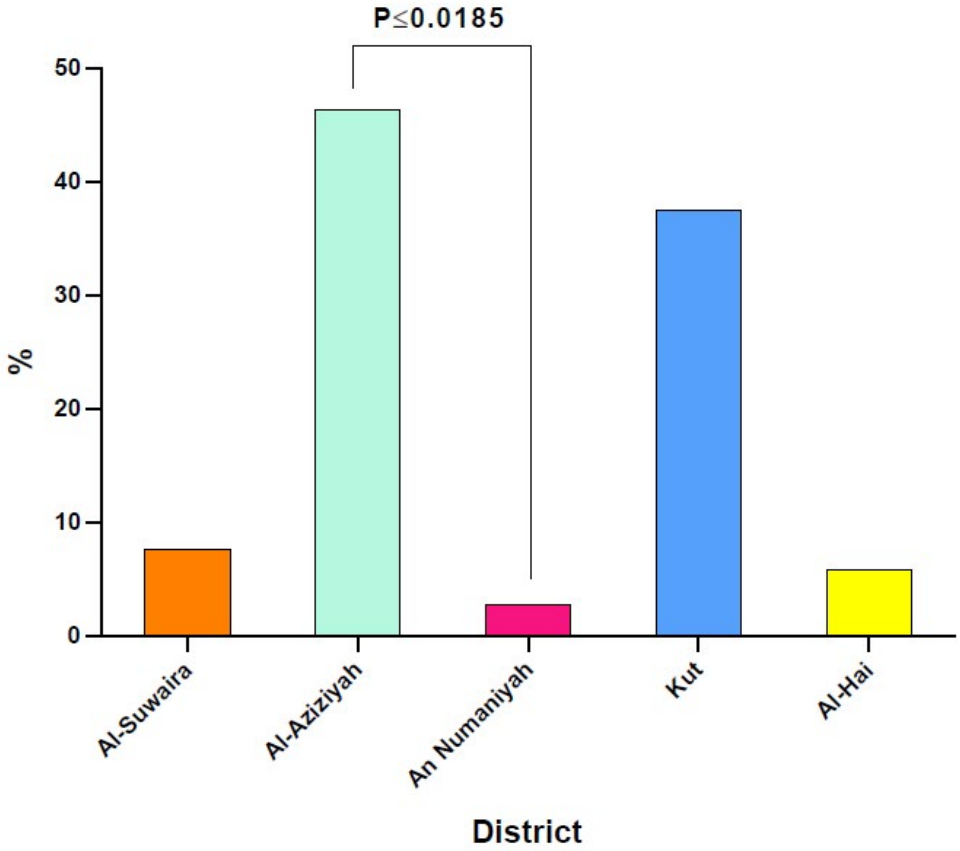

Figure 2: Association of leishmaniasis to geographic areas.

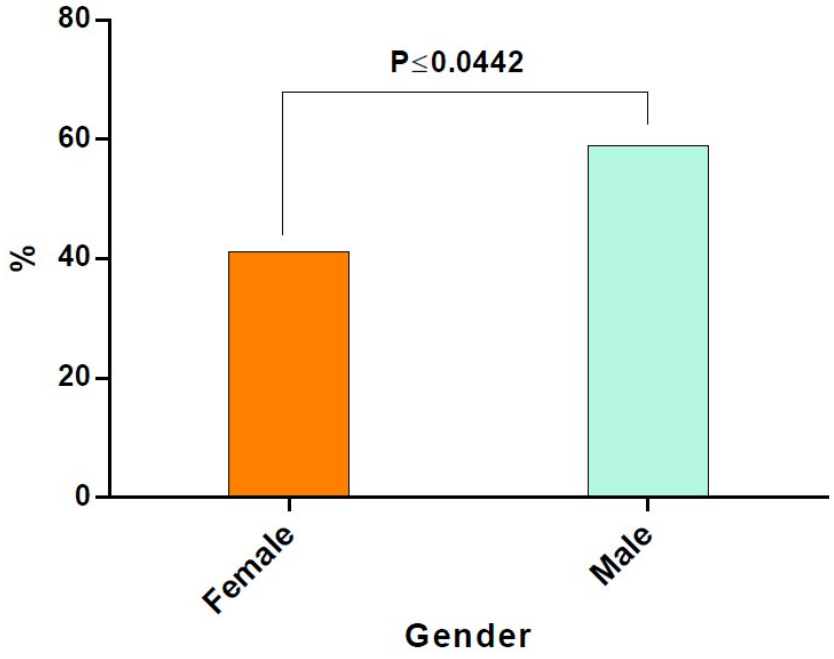

Figure 3: Association of leishmaniasis to gender.

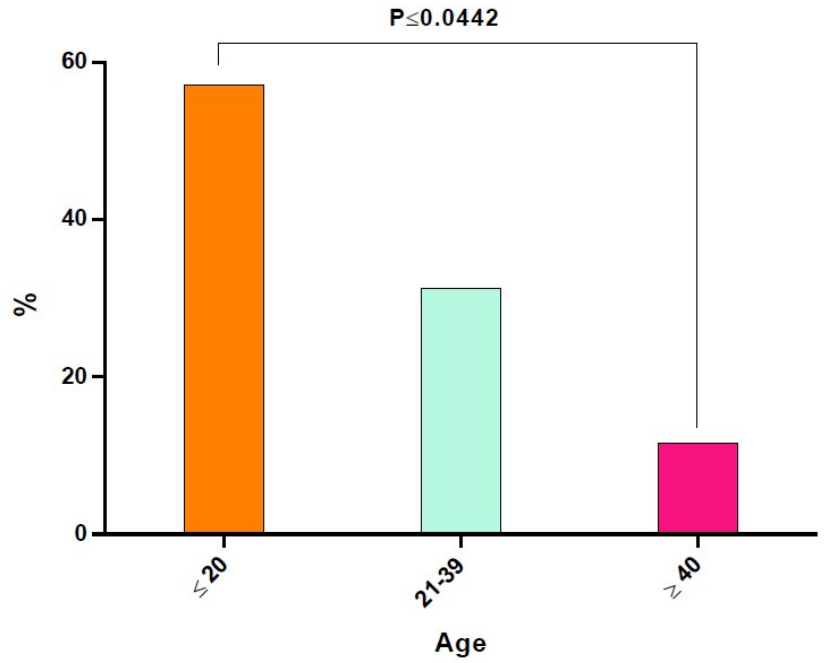

Figure 4: Association of leishmaniasis to age.

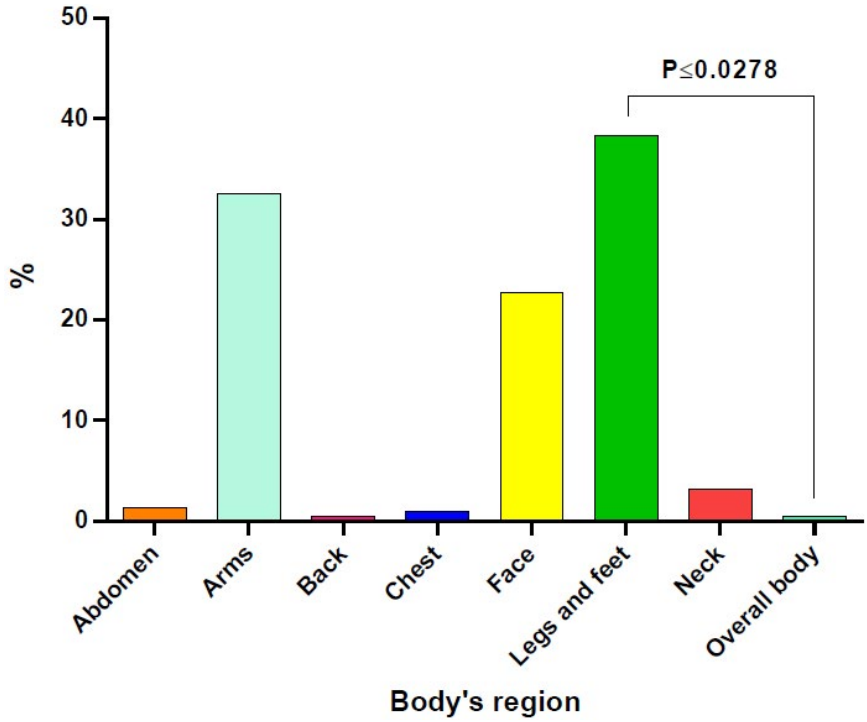

Figure 5: Distribution of leishmaniasis lesion on the patients' organs.

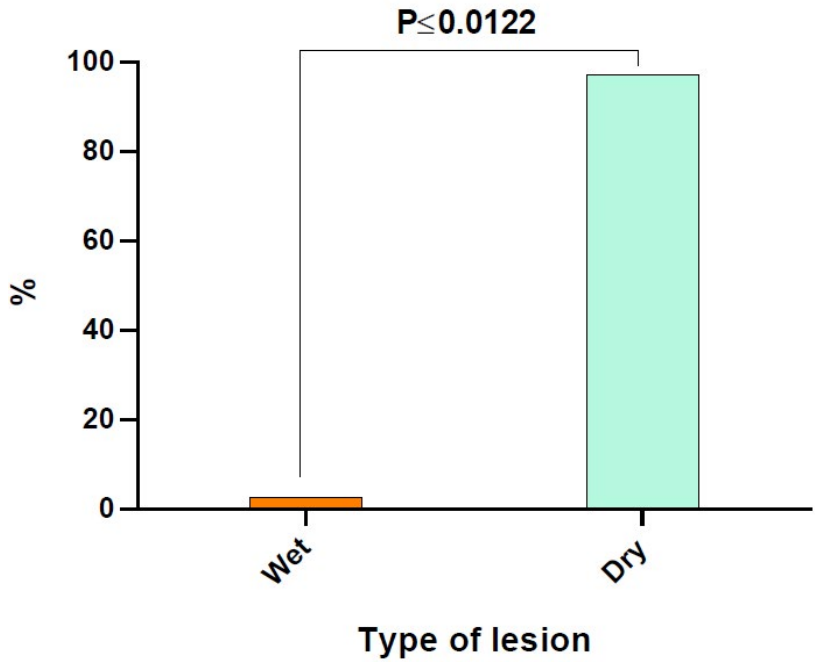

Figure 6: Association between leishmaniasis incidence and type of lesion.

Discussion

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 [19]. It seems that the majority of CL cases reported in Iraq are caused by L. tropica [20]. Another study found that the cause of CL in Iraq is L. major in percent more than L. tropica [21]. Also, it is an important health problem, as a secondary bacterial infection [22].

Regarding seasonal incidence of CL, our fining were similar with the results of Al-Obaidi et al. [17] who reported 29.4% in February, 21.1% in January, 14.2% in March, 3.9% in April, 2.12% in May, 1.24% in June, 0.7% in July, 0.9% in August, 2.33% in September, 3.06% in October, 4.7% in November and 15.8% in December.

This variation in seasonal peak could be due to the existence of various dominant reservoir species in each study area as well as to the activity of the sand flies. The differences in monthly distribution of CL patients might also be related to the development of female insects and their requirement of blood during their life cycle for the maturation and development of eggs, especially in spring season. The lapse of time between when the patient was bitten and the appearance of skin lesions might be related to the long incubation period of leishmaniasis (two to four months).

In one Iraqi study, Al-Obaidi et al. [17] revealed that the highest infection case of CL for the period (2008-2015) was observed in the middle and West of the Iraq but the high reported cases were observed in the South and East of the state. While lowest cases were observed in the North of country, the finding 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). Rashid et al. [23] detected that the distribution of positive cases of CL by residence in CL population in Pakistan was 26.97% in urban and 73.03% in rural areas.

The prevalence of CL in our study was more in males than females. These findings were similar with that reported by Jamal et al. [24] as 70.59% in males and 29.41% in females, Ullah et al. [25] as there is 58.20% positive males and 41.80% positive females, Al-Obaidi et al. [17] as 50.8% in males 49.2% in females, and Rashid et al. [23] as there is 64.20% and 35.80% positive males and females, respectively. However, no study with higher prevalence of CL in females could be found.

This study recorded the incidence of CL in younger individuals of □20 years was more than in older individuals of 21-39 years and □40 years. Also, Rahim et al. [26] reported 85% positive cases in age group up to 20 years, 12.5% cases in age group 21-40 years and 2.5% case in age group above 40 years; Jamal et al. [24] showed 47.06% positive cases in age group up to 20 years, 32.35% cases in age group 21-40 years and 20.59% in age group ≥40 years. Al-Obaidi et al. [17] recorded that the high incidence of CL infection was 34.6% in age group of 5-14 years when compared to other age group; >1 year (4.3%), 1-4 years (23.6%) and □45 years (11.1%). Rashid et al. [23] found that the distribution of positive cases of CL by age groups 60.62% of 19 years, 24.11% of 20-39 years and 15.27% of ≥40 years. Contrary to our findings, no study could be isolated. In one experimental study, Müller et al. [27] showed that younger BALB/c mice develop clearly exacerbated disease as compared to older mice, as demonstrated by more pronounced lesions, pathology and higher parasite burdens at the site of parasite inoculation. This aggravation of disease correlates with a higher arginase activity expressed at the site of infection. This is due to altered macrophage effector functions, as macrophage derived from younger mice has an increased capacity to express arginase.

Our finding showed that significant incidence of leishmaniasis was upper (arms) and lower (legs and feet) limbs when compared to other body organs; however, AlSamarai and AlObaidi [28] noted that lesions were distributed as following: 57% in upper limbs, 25% in face, 15% in lower limbs, 2% in scalp and 1% in ear. The clinical manifestations of the different types of CL have been classified in various ways. In order to distinguish between the different types, most authors have divided CL into two major forms ("wet" and "dry") without considering the pathogenesis [29]. In practice, "wet" and "dry" lesions often coexist in the same epidemiologic foci, and may even coexist in the same patient. Some confusion has arisen with the different terms used by parasitologists and dermatologists. Presently, there is a practical need to reanalyze the classification of CL. Therefore, in this review, we present a summarized analysis of existing morphologic types and provide a new classification for epidemiologic and clinical purposes [30]. In contrast to our study that recorded the prevalence of dry lesions when compared to wet lesion, AlSamarai and AlObaidi [28] reported significant higher prevalence of wet lesions of leishmaniasis (63.5%) than the dry lesions (36.5%).

Conclusion

This might represent the first recent retrospective study for analysis of documented cases of CL in Wasit province (Iraq). This study concludes that the CL disease is sex, age, seasonal and geographical dependent and it is with continuously increasing in Iraq. To further contain CL incidence and morbidity, there is a need for more intensified preventive research programs into improved vector control, vaccines, and diagnostics

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