



Tikrit Journal of Pure Science

ISSN: 1813 – 1662 (Print) --- E-ISSN: 2415 – 1726 (Online)

Journal Homepage: <http://tjps.tu.edu.iq/index.php/j>



Some of epidemiological criteria associated with cutaneous leishmaniasis in Tikrit city, Salah Al-Din province, Iraq

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DOI: <http://dx.doi.org/10.25130/tjps.26.2021.071>

ARTICLE INFO.

Article history:

-Received: 15 / 8 / 2021

-Accepted: 8 / 8 / 2021

-Available online: / / 2021

Keywords: Cutaneous leishmaniasis, epidemiology, Salah Al-Din province.

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ABSTRACT

Cutaneous leishmaniasis is endemic in Iraq and represents a real threat to public health and causes skin lesions. The current study was aimed to investigation of epidemiological aspects of cutaneous leishmaniasis infection in Tikrit city and in the districts and sub-districts around the city center. The current study was conducted for people with cutaneous leishmaniasis that attending Salah Al-Din General Hospital for treatment, during the period from 14 September to 30 December 2020. The study included 100 cases of clinically diagnosed as Cutaneous leishmaniasis and confirmed by show of *Leishmania* parasites on smears from lesions. The results showed that the majority of infections appeared in December (71.00%), males are more infected (51.00%) compared with females (49.00%). The age range was from ≤ 2 to 60 years, the majority of patients were infants in the age group ≤ 2 years (40.00%). Higher infection occurred in the districts and sub-districts around the city center (73.00%) compared with city center (27.00%). The results showed that the majority of patients had dry type lesions (67.00%), while wet ulcers were present in 33.00%. Also, the prevalence of infection was higher in face (44.23%), whereas the lower prevalence was recorder for the lower limbs (17.31%).

Introduction

Cutaneous leishmaniasis is a parasitic infection caused by a protozoan parasites belonging to Haemoflagellates from the genus *Leishmania* that obligatory parasitized within the cells of the reticuloendothelial system of the skin [1]. The diagnosis of cutaneous leishmaniasis is depends on clinical manifestations (supported by epidemiologic data) and laboratory examination [2]. About 95% of Cutaneous leishmaniasis cases happen in the Americas, the Mediterranean basin, the Middle East and Central Asia. In 2019, over 87% of new Cutaneous leishmaniasis cases occurred in 10 countries (Afghanistan, Brazil, Algeria, Colombia, Iran, Tunisia, Libya, Pakistan, Syria and Iraq). It is estimated that between 600 000 to 1 million new cases happen worldwide annually [3]. Different factors are contribute to the distribute the infection with cutaneous leishmaniasis, to the healing or progressing of infection, includes the genetic factor and immune state of host, the virulence and pathogenecity of parasite species or strains, in addition to the vector factors [4].

The prevalence of cutaneous leishmaniasis has been studied intensively in many governorates of Iraq [5, 6, 7]. In Tikrit city, the last documented study on the epidemiology of cutaneous leishmaniasis was in 2015 [8]. Therefore, the current study was conducted to explain the relationship between the infection with some epidemiological criteria, included the months of the year, gender, age, residential location of the patient, ulcer type (dry, wet), and the location of the ulcer on the patient's body.

Materials and Methods

During the period from 14 September to 30 December 2020, the current study was done. Through the current study 100 cases of cutaneous leishmaniasis were examined and diagnosed in Salah Al-Din General Hospital, Tikrit city, Salah Al-Din province, Iraq. The ages of patients ranged from ≤ 2 to 60 years, for both sex (male, female). Clinical diagnosis was made by a dermatologist at the consultative dermatological clinic of Salah Al-Din General Hospital. In addition to confirming the parasitic infection by examining the direct smear

from the skin ulcer according to the method described by Palma and Gutierrez [9]. The smears were dyed with Geimsa stain according to the method described by Adam *et al.* [10]. The epidemiological information were taken from each patients listed in questionnaire forma (date of diagnosis, gender, age, residential location of the patient, ulcer type (dry, wet) and its location on the patient's body). The number of patients with cutaneous leishmaniasis and the

prevalence of infection were evaluated according to Bush *et al.* [11].

Results

A total of 100 cases of patients are diagnosed clinically with cutaneous leishmaniasis, and by direct swabs were performed for to confirm the isolates of their skin ulcers. Amastigote phases within the phagocytic cells of the prepared direct smears stained with Giemsa were detected in the isolated samples (Fig. 1).

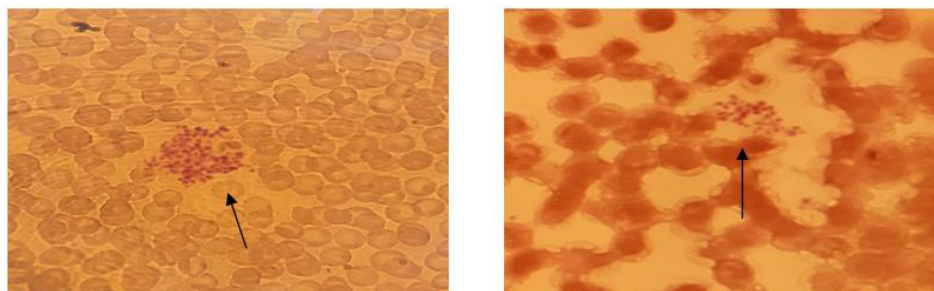


Fig. 1: Amastigote stages of cutaneous leishmaniasis parasites from positive swabs of infected ulcers, 1000x.

Distribution of cutaneous leishmaniasis according to the some months of the year (table 1) showed that December was reported higher infection (71.00%) with cutaneous leishmaniasis than the remaining months are under study. Whereas, the lowest

prevalence were recorded in October (6.00%). The current study has been carried out on 100 patient had cutaneous leishmaniasis, it was showed that the higher prevalence of infection are reported in male (51.00%) compared with female (49.00%).

Table 1: The number of patients with cutaneous leishmaniasis and the prevalence of infection according to the some months of the year

Groups Months	Males		Females		Total	
	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)**
September	6	42.86	8	57.14	14	14.00
October	3	50.00	3	50.00	6	6.00
November	3	33.33	6	66.67	9	9.00
December	39	54.93	32	45.07	71	71.00
Total	51	51.00	49	49.00	100	100

*Prevalence of infection according to the total cases within the same month.

**Prevalence of infection according to the total number of infected cases.

Age of the patients with cutaneous leishmaniasis in this study (table 2) ranged from ≤ 2 year to 60 year. The result clarified that the age group ≤ 2 had the

highest number of infection (40.00%) followed by the age group 3-10 year (22.00%), while the lowest infection (4.00%) found in 51- 60 year age group.

Table 2: The number of patients with cutaneous leishmaniasis and prevalence of infection according to age groups

Groups Age groups (year)	Males		Females		Total	
	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)**
≤ 2	20	50.00	20	50.00	40	40.00
3-10	8	36.36	14	63.64	22	22.00
11-20	6	46.15	7	53.85	13	13.00
21-30	8	72.73	3	27.27	11	11.00
31-40	4	80.00	1	20.00	5	5.00
41-50	4	80.00	1	20.00	5	5.00
51-60	1	25.00	3	75.00	4	4.00
Total	51	51.00	49	49.00	100	100

* Prevalence of infection according to all cases within the same age group.

** Prevalence of infection according to the total number of infected cases.

The results of table (3) show the prevalence of infection with cutaneous leishmaniasis in the center of Tikrit city and its districts and sub-districts. The highest cases of cutaneous leishmaniasis were concentrated in the districts and sub-districts (73.00%), while the city center was recorded the lowest cases of cutaneous leishmaniasis (27.00%).

When observing the relationship between the gender factor and geographical distribution, the highest prevalence of infection was for males (55.56%) and the lowest for females (44.44%) in Tikrit city center, while the highest prevalence of infection was for females (50.68%) and the lowest for males (49.32%) in the districts and sub-districts.

Table 3: The number of patients with cutaneous leishmaniasis and the prevalence of infection according to the area of residence

Residential areas		Tikrit city center	Districts and sub-districts
Gender of the injured			
Males	No. of infection	15	36
	Prevalence of infection (%)*	55.56	49.32
Females	No. of infection	12	37
	Prevalence of infection (%)*	44.44	50.68
Total	No. of infection	27	73
	Prevalence of infection (%)**	27.00	73.00
Total		100	

* Prevalence of infection according to the total cases within the same geographical area.

** Prevalence of infection according to the total number of infected cases.

The results of the study with regard to the type of ulcer (Fig. 2; Table 4) showed a high prevalence of dry ulcer in females (55.22%) compared to males (44.78%). While the prevalence of wet ulcers increased in males (63.64%) compared to females

(36.36%). In general, an increase in the prevalence of dry ulcers was recorded compared to the wet ulcers from the total number of infections, where the highest prevalence of total dry ulcers was 67.00%, and the lowest prevalence of wet ulcers was 33.00%.



(A)



(B)

Fig. 2: Types of cutaneous leishmaniasis ulcers (A- dry ulcer, B- wet ulcer) diagnosed from different parts of patients body.

Table 4: The number of patients with cutaneous leishmaniasis and the prevalence of infection according to the type of ulcer

Groups	Males		Females		Total	
	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)*	No. of infection	Prevalence of infection (%)**
Dry ulcer	30	44.78	37	55.22	67	67.00
Wet ulcer	21	63.64	12	36.36	33	33.00
Total	51	51.00	49	49.00	100	100

* Prevalence of infection according to all cases within the same type of ulcer.

** Prevalence of infection according to the total number of infected cases.

The results of Table (5) show the infection with Cutaneous leishmaniasis were observed in different parts of the patients body including face, upper and lower limbs. Face had the highest prevalence (46.29%, 44.23%) when compared to other sites of

infection, followed by upper limbs (27.78%, 38.46%), while lower limbs had the lowest prevalence (25.93%, 17.31%) for both males and females (respectively).

Table 5: The number of patients with cutaneous leishmaniasis and the Prevalence of infection according to the site of infection

Groups Site of ulcer	Males		Females	
	Total	Prevalence of infection (%)*	Total	Prevalence of infection (%)*
Face	25	46.29	23	44.23
Upper limbs	15	27.78	20	38.46
Lower limbs	14	25.93	9	17.31
Total	54	100	52	100

* Prevalence of infection according to the total number of cases within the same site of the body.

Discussion

The epidemiological data of cutaneous leishmaniasis cases was evaluated in present study according to the patient auditors of Salah Al-Din General Hospital in Tikrit city, where cutaneous leishmaniasis is endemic in Salah Al-Din province, specially, and in Iraq generally [5,12].

The results of the current study showed that the highest incidence of cutaneous leishmaniasis appears in December. This result agrees with many studies carried out in Iraq [13,14]. This is due to the behavior of people during the summer months in exposing the upper and lower limbs (due to the high temperature), which exposes them to the sting of the vector insect (sand fly). The results, also showed that the number of infected males is higher than females, this is due to the habits, behavior and nature of male presence outside the home for a longer period, and that the activity of the vector insect is more in open places. This result agrees with many studies carried out in Iraq [6,7,15,16], whereas it does not agree with other studies, conducted in Tikrit city [17] and in Kirkuk governorate [18] which showed that the highest infection appear in females.

Regarding the age, the present study showed that the most age group infected with cutaneous leishmaniasis were infants (≤ 2 year). Where children at these ages lack the ability to protect themselves from the stings of the vector insect as a result of their lack of awareness, in addition to the fact that children are more in contact with the ground, which makes them more close to the presence of the vector insect that is located at a limited height, as its ability to fly is weak [19]. It has been observed that the severity of the injury decreases with age, due to the different behavior and movement during sleep of children compared to adults [20], or due to the development of immunity with age as a result of previous exposure to infection that led to the acquisition of permanent immunity [21]. In regard of age group, this study agrees with the study of Ali *et al.* [7] in Iraq, while other studies indicated that the age group 5-10 are the most exposed [6, 22].

The results of the present study indicated a high prevalence of cutaneous leishmaniasis in districts and sub-districts, compared with the city center of Tikrit city. A previous study [17] in Tikrit city indicated similar results. Most of the districts and sub-districts recorded in the current study suffer from the

deterioration of the service and health conditions, the accumulation of waste, the way of living and social customs, as the population gets used to evening sessions outside the house during the summer. The residents of districts and sub-districts are also distinguished by their dwelling in open houses with the presence of animals in their homes or near them, which are the reservoir for parasites of the genus *Leishmania*, especially rodents and dogs. In addition to the presence of swamps and ponds in the districts and sub-districts that provide an environment suitable for the growth of the vector insect, where the geographical spread of cutaneous leishmaniasis depends on geographical distribution of the vector insect represented by the sand fly of the genus *Phlebotomus*, which is widely spread in places with favorable conditions for its growth and reproduction, such as agricultural and humid geographical locations or rural areas [19, 23].

In the current study, the type of infection was diagnosed based on clinical characteristics and symptoms by medical personnel. As the diagnosis of cutaneous leishmaniasis into a wet or dry type can be made based on the clinical symptoms of the lesion [24]. The results showed a higher incidence of dry ulcers compared to the rate of wet ulcers. The parasites of the type *L. tropica* represent the pathogen of the dry form of infection, while the parasites of the type *L. major* cause the wet form of infection [25]. Thus, this confirms the dominance of *L. tropica*, which is characterized by a long incubation period, which is likely to increase the emergence of infections in the cold months, and this is what was observed in the results of the current study. On the other hand, it became clear in the current study that most of the cases were of the dry type, despite the prevalence of infection in the countryside, where the wet type of infection is supposed to spread [26], this can be explained by the fact that most of the rural areas under study are non-agricultural areas, and that the rates of infection with wet ulcers appeared among people living in places close to rivers or orchards. It was also noted that the incidence of males with wet ulcers increased compared to females, as a result of the habit of people, especially males, to go to the banks of rivers in the summer in the areas under the current study.

The results of current study showed that the highest percentage of cutaneous leishmaniasis infections was in the face, followed by upper and lower limbs. It was

noted from the results of the current study shown in that most of the injuries appeared in children, and all of their injuries were in the face. This may be due to the fact that the facial skin of children is free of oily secretions, unlike the facial skin of adults, which contains oily secretions that act as sand fly repellents. As indicated by Al-Khayat *et al.* [27] most of the cutaneous leishmaniasis infections are concentrated in upper and lower limbs due to chemical attraction factors such as the carbon dioxide concentration that

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بعض المعايير الوبائية المصاحبة لداء الليشمانيات الجلدي في مدينة تكريت،

محافظة صلاح الدين، العراق

نور وليد الالوسي ، فاطمة شهاب الناصري

قسم علوم الحياة ، كلية العلوم ، جامعة تكريت ، تكريت ، العراق

الملخص

داء الليشمانيات الجلدي متوطن في العراق، ويمثل تهديدا حقيقيا للصحة العامة ويسبب آفات جلدية. هدفت الدراسة الحالية إلى تقصي الجوانب الوبائية لعدوى داء الليشمانيات الجلدي في مدينة تكريت وفي الأحياء والنواحي المحيطة بمركز المدينة ، للأشخاص المصابين بداء الليشمانيات الجلدي الوافدين إلى مستشفى صلاح الدين العام لتلقي العلاج خلال المدة من 14 أيلول ولغاية 30 كانون الأول 2020. حيث اشتملت الدراسة على 100 حالة تم تشخيصها سريريا ومن خلال إجراء مسحات من حافة الآفة. أظهرت النتائج أن غالبية الإصابات ظهرت في شهر كانون الأول (71.00%) ، وكانت نسبة الإصابة في الذكور أكثر (51.00%) مقارنة بالإناث (49.00%). شملت الدراسة الحالية الفئات العمرية من 2 إلى 60 عامًا ، وكان أغلب المصابين هم الأطفال الرضع في الفئة العمرية ≥ 2 سنة (40.00%). حدثت معظم الإصابات في الأحياء والنواحي المحيطة بوسط المدينة (73.00%). أظهرت النتائج أن غالبية المصابين بالليشمانيات الجلدية لديهم آفات من النوع الجاف (67.00%)، بينما القرح الرطبة كانت موجودة في 33.00%. فضلا عن ذلك، كان الوجه هو الجزء الأكثر تعرضاً للإصابة (44.23%)، بينما الأطراف السفلية سجلت أقل نسبة إصابة (17.31%).