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# Epidemiological and Diagnostic Study of Cutaneous Leishmaniasis at Kut City

**Ali H. Abd Altaj, Abdulsada A. Rahi**
Wasit University / College of Science /Iraq, aht.47.2@gmail.com

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**Abstract:** This study is an epidemiological and diagnostic study of cutaneous leishmaniasis (CL), in Kut city, Iraq, during November, 2024- April, 2025 . Sixty nine suspicious cases were analyzed using Giemsa-stained skin smears whereby, 36 cases (52.2 %) of them were positive. The results showed that the group that was mostly affected was children that aged (1 - 10) years old, and it could be either because of behavioral or immunological reasons. Even though higher infection rate among the girls was observed, the sex-difference was not always statistically significant and this fact proves that further research on sex-related susceptibility should be done. Residency wise, the cases were slightly higher in the rural than the urban setting indicating that the environmental and socioeconomic settings could have a contribution in the spreading of the disease. Regarding the type of lesion, the wet and dry forms of CL were found to have the same rate of infection among the confirmed cases. The findings support the significance of reinforcement in health education and awareness particularly in children and rural setting to manage and cut down CL burden in endemic regions.

**Keywords:** Cutaneous leishmaniasis, Microscope, Giemsa stain,Human , Skin

## Introduction

Leishmaniasis is a parasitic skin infection that is caused by the intracellular protozoan parasites of the genus *Leishmania*. The transmission of the infection in humans occurs majorly as a result of the bites of infected female sandflies of the genus *Phlebotomus and Lutzomyia* (Miranda *et al*., 2021).

Nearly 20 species in the genus *Leishmania* have been established as the cause of CL. These species are categorized based on two ecological groups; Old world and new world leishmaniasis. *Leishmania tropica*, *L. major* and *L. aethiopica* are the most commonly known etiological agents of CL in the Old World (Asia, Africa, and Europe) but in the New World (Central and South America) *L. mexicana*, *L. braziliensis*, *L. guyanensis* and *L. panamensis* have been found to cause the disease. (Al-Rashed *et al*., 2022; Shita *et al*., 2022). L. tropica and L. major are most prevalent together with endemic areas such as Iraq. The majority of cases of zoonotic cutaneous leishmaniasis are caused by *L. major* whereas *L. tropica* causes anthroponotic cutaneous leishmaniasis (Dabirzadeh *et al*., 2024).

Lesions of CL are generally ulcerative in nature and occur on exposed parts of the skin which may lead to permanent scarring, and high morbidity. The infection also has the potential of spreading to the mucosal tissues and in these cases, MCL may develop which will leave the patient disabled partially or totally by making the mucous membranes of the nose, mouth, and throat partly or completely destroyed (Miranda *et al*., 2021).

Then, cutaneous leishmaniasis, mucocutaneous leishmaniasis and visceral leishmaniasis in humans are the main types, in the sense that all of them affect different tissues and organs. (Piyasiri *et al*., 2023).

The infection is route primarily transmitted by the bite of female infected subfamily Psychodidae family Phlebotominae or generally known as sandflies (Gow *et al*., 2022).

Cutaneous leishmaniasis is changing and is impacted by its environment, socioeconomic and political forces. Migration patterns, urbanization, deforestation and climate change are some of the factors that have led to the emergence and re-emergence in new localities In certain regions, a combination of *Leishmania* species and overlapping transmission cycles go hand in hand to compound the control efforts (Mohammadpour *et al*., 2019).

CL is geographically wide-spread and most cases are happening in tropics and sub tropics. According to WHO, most cases of CL are in ten countries, including Afghanistan, Algeria, Brazil, Colombia, Iran, Peru, Syria, Iraq, Sudan and Costa Rica (Dabirzadeh *et al*., 2024).

Conventional techniques used in CL diagnosis are clinical observation, microscopy and parasite cultures in vitro. Although these are cost-effective, they tend to have low sensitivity particularly where cases are chronic or atypical (Gow *et al*., 2022).

## Materials and Methods

### Patients and study area:

This study was done at Al-Zahra a and Al-Karamah Teaching Hospital dermatology clinics in the city Al Kut during the months of November 2024 to April 2025. There were 69 suspected CL individuals of cutaneous leishmaniasis (CL) involved. The patients showed skin lesions located on the most of the exposed parts of the body, mainly on the face and limbs. The diagnosis at first was performed upon clinical examination done by a specialized dermatologist and all the cases were then confirmed to be CL upon clinical symptoms and the subsequent presence of *Leishmania* parasites via direct Giemsa stained smear examination.

**Parasitological examination:**

The cutaneous lesion samples were taken by fine needle aspiration as the steps below:

1. The skin around the lesion was disinfected.
2. The sterile syringe of 1ml contained 0.2 ml of sterile normal saline was injected intradermal through intact skin in to the active red border of the lesion.
3. Aspirate the injected fluid as the needle draw back till the bloody stained fluid aspirate.
4. Small amount of aspirated fluid was taken and smeared on a clean glass microscope slide then left it to dry, then fixed using 100% absolute methanol for 30 seconds and left it to dry again.
5. Stained with Geimsa stain for 20 minutes, then rinse with tap water and dry the slide, then examined it under oil immersion lens of the light microscope (Olympus CH2 , Japan).
6. 6-Amastigote was diagnosed as round or spherical shape with distinctive kinetoplast. In this case it was declared positive .when no amastigote was seen after 15 minute of inspection, the smears were declared negative (Al-Jassani 2020)as shown in figure 1.

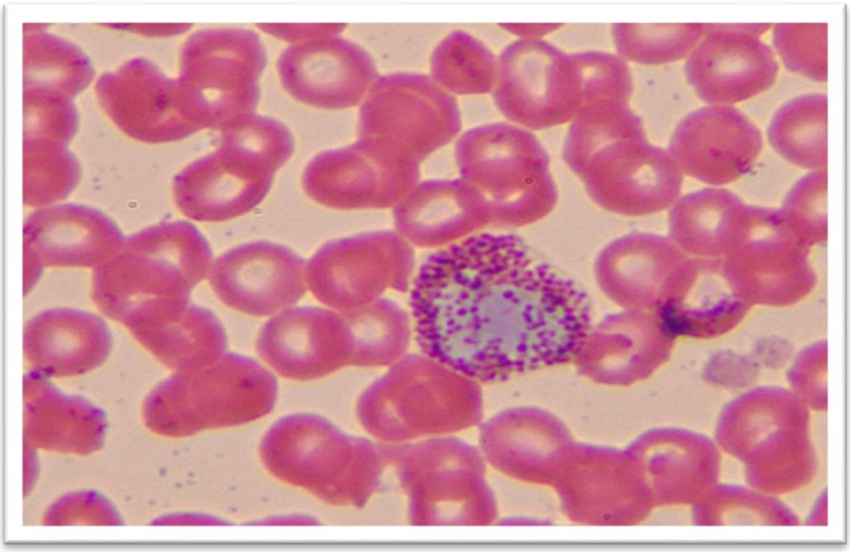

**Figure (1) the amastigote form of *Leihmania* spp.**

**Results**

**Detection of *cutaneous leishmaniasis* by microscopic examination**

The present study enrolled 69 samples (from suspected patients with *cutaneous leishmaniasis*) to surveillance *Leishmania* infection by using microscopic examination and the results was show as in figure (2). The present results show 36 (52.2%) of patients have positive results of microscopic examination and 33 (47.8%) was negative results.

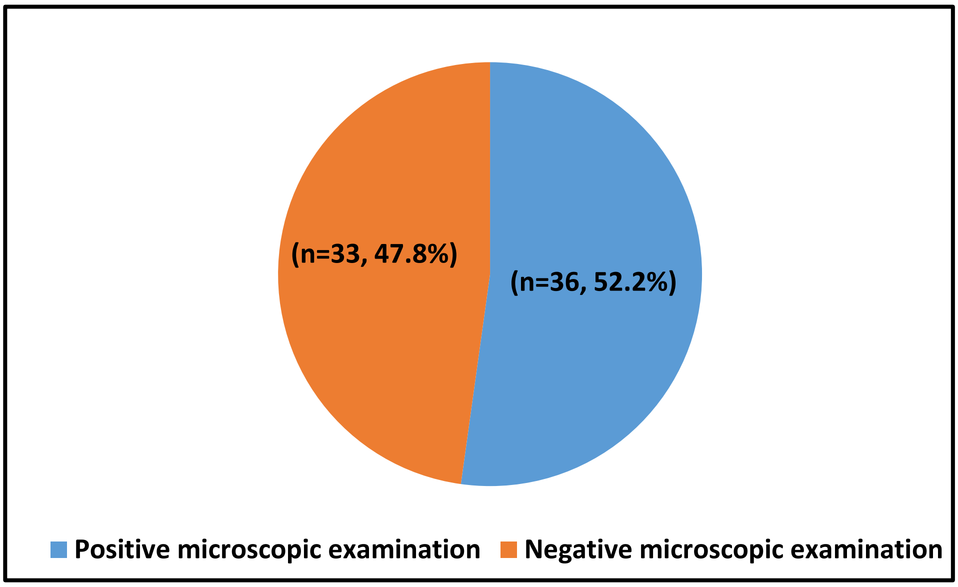


**Figure (2): The frequency percentage of positive and negative results by microscopic examination**

**Frequency distribution of patient according to age groups**

With regard to the microscopic examination, the frequency distribution of cutaneous leishmaniasis positive patients by age group included 19 (52.8%) cases between 1-10 years age group, 7 (19.4%) cases in the 11-20 years age group, 6 (16.7%) cases in the 21-30 years age group, and 4 (11.1%) cases in more than 30 year age group, and the difference was significant at (P= 0.002). The results of present study indicate that the most positive cases with cutaneous leishmaniasis occur in children in the age group between 1-10 years by the ratio of 19 (52.8%) as shown in table 1.

**Table (1): Distribution of cutaneous leishmaniasis infection between the age groups by microscopic examination**

| Test | Age groups | Examined number | Positive number | Percentage |
|---|---|---|---|---|
| Microscopic examination | 1-10 years, *n* (%) | 40 | 19 | **52.8%** |
| | 11-20 years, *n* (%) | 13 | 7 | **19.4%** |
| | 21-30 years, *n* (%) | 10 | 6 | **16.7%** |
| | > 30 years, *n* (%) | 6 | 4 | **11.1%** |
| | Total | 69 | 36 | **100.0%** |
| | P value | **0.002*** | | |
| | $X^2$ | **15.333** | | |

¥: Chi-square test; *: significant at $P \leq 0.05$.

**Distribution of the patients according to sex**

The frequency distribution of positive cutaneous leishmaniasis infections according to sex was shown in table (2). The frequency distribution of cutaneous leishmaniasis positive patients by sex included 8 (22.2%) cases was male and 28 (77.8%) cases was female, and the difference was significant at (P= 0.196). The results of present study indicate that the most positive cases with cutaneous leishmaniasis occur in female group by the ratio of 28 (77.8%) as shown in table2.

**Table (2): Distribution of cutaneous leishmaniasis infection between male and female by microscopic examination**

| Test | Sex | Examined number | Positive number | Percentage |
|---|---|---|---|---|
| Microscopic examination | Male, *n* (%) | 20 | 8 | 22.2% |
| | Female , *n* (%) | 49 | 28 | 77.8% |
| | Total | 69 | 36 | 100.0% |
| | P value | 0.001* | | |
| | $X^2$ | 11.111 | | |

¥: Chi-square test; *: significant at $P \leq 0.05$.

**Distribution of the patients according to residency**

The frequency distribution of positive cutaneous leishmaniasis infections according to residency was shown in table (3). The frequency distribution of cutaneous leishmaniasis positive patients by residency included 16 (44.4%) cases from urban area and 20 (55.6%) cases from rural area, and the difference was non-significant at (P= 0.505).

**Table (3): Distribution of cutaneous leishmaniasis infection between urban and rural area by microscopic examination**

| Test | Residency | Examined number | Positive number | Percentage |
|---|---|---|---|---|
| Microscopic examination | Urban, *n* (%) | 29 | 16 | 44.4% |
| | Rural, *n* (%) | 40 | 20 | 55.6% |
| | Total | 69 | 36 | 100.0% |
| | P value | 0.505 | | |
| | $X^2$ | 0.444 | | |

¥: Chi-square test; NS: non-significant at $P > 0.05$.

**Distribution of the patients according to lesion type**

The frequency distribution of positive cutaneous leishmaniasis infections according to lesion type was shown in table (4). The present results show equal rate of patients with cutaneous leishmaniasis infection between dry and wet lesion type, and the difference was non-significant.

**Table (4): Distribution of cutaneous leishmaniasis infection according to lesion type by microscopic examination**

| Test | lesion type | Examined number | Positive number | Percentage |
|---|---|---|---|---|
| Microscopic examination | Dry, *n* (%) | 37 | 18 | 50.0% |
| | Wet, *n* (%) | 32 | 18 | 50.0% |
| | Total | 69 | 36 | 100.0% |
| | P value | NS | | |
| | $X^2$ | ……. | | |

¥: Chi-square test; NS: non-significant at $P > 0.05$.

**Discussion**

The results of this research report the epidemiological situation of cutaneous leishmaniasis (CL) in Kut City, which can be a good example of endemic regions in Iraq. The proportion of clinically-suspected cases with a direct microscopic examination of 52.2 % positivity rate proves the utility of the field diagnostic method regardless of the limitations. These results are consistent with the findings of Nadri et al. (2020) in central Morocco, where 51% of cases were confirmed microscopically, supporting the effectiveness of this method in acute clinical presentations.

The results showed that 1 to 10 years old children comprised the largest percentage of positive cases – a similar pattern is mostly typical in field based studies of CL in Iraq and the region at large. According to the study of Akhoundi et al. (2016) in Iran, the same age group represented the largest number of infections, and that is due to the following reasons: low health awareness in the child population, daily outdoor exposure during the hours of the most intense activity of sand flies.Even though a higher percentage of the positive cases were made by the female population (77.8%), this fact was not found to be statistically significant. Several other studies have observed gender differences in the infection rates related to activities on a daily basis (Marlet et al., 2020) in West Africa. Both sexes can be at risk in work places and females would most likely be at risk at home in the vicinity of sand fly breeding grounds. These differences indicate some impact of social, environmental, and cultural variables in the dynamics of transmission.

Although the difference was not pronounced the study also demonstrated that there are some higher infection rates in the rural areas (55.6 %) compared to urban areas and this finding is supported by the local and international literature also. Places like rural environments tend to offer the best surroundings required to breed sand flies which include the near contact to livestock, inadequate sanitary systems, and minimal health insurance. Guerra et al. (2019) in Brazil recorded the same issue with the number of cases increasing in rural areas and suggested that the control programs be centered in high-risk areas.

There was propensity with respect to equal sharing of the wet plus dry lesions (50 %). This differs with the conventional belief that *Leishmania tropica* may cause dry lesions whereas *Leishmania major* may cause wet ones. This clinical similarity highlights the need to better diagnostic methods, i.e. PCR, in order to be certain of the offending species. This is corroborated by the finding of Espirito-Santo et al. (2020) who found that in congruent geographical locations, there were situations in which mixed infections took place.

Although Giemsa-stained direct microscopy is a quick, viable diagnostics test, it has a low sensitivity in a chronic case or a situation where the parasite load is low. It is because of this reason that most of the current researches suggest incorporation of microscopy with other advanced techniques like molecular diagnostics. According to the study conducted by Valero et al. (2021), microscopy had a sensitivity of less than 60 percent compared to PCR, which supports the importance of enabling the integration of the diagnosis to enhance precision and case detection.

## Conclusion

This study highlights the ongoing public health burden of cutaneous leishmaniasis in Iraq, particularly among younger age groups and rural communities. While microscopy remains a key tool in field diagnostics, sole reliance on it may lead to underdiagnosis. Thus, the adoption of integrated diagnostic strategies—alongside expanded health education and environmental control efforts—is strongly recommended, especially in rural endemic regions.

## Reference

1. **Akhoundi, M., Kuhls, K., Cannet, A., Votýpka, J., Marty, P., Delaunay, P., & Sereno, D. (2016).** A historical overview of the classification, evolution, and dispersion of *Leishmania* parasites and sandflies. *PLoS Neglected Tropical Diseases, 10*(3), e0004349.

2. **Al-Jassani, S. E. J. (2020).** *Molecular and epidemiological study of cutaneous leishmaniasis in Wasit province, Iraq*

3. **Al-Rashed AS, Al Jindan R, Al Jaroodi S, Al Mohanna A, Abdelhady A, El-Badry AA.** Genotypic and phylogenic analyses of cutaneous leishmaniasis in Al Ahsa, Eastern Saudi Arabia during the coronavirus disease 2019 pandemic: First cases of Leishmania tropica with the predominance of Leishmania major. Sci Rep. 2022 Jun 24;12(1):10753.

4. **Dabirzadeh M, Rahim S, Beheshtizadeh M, Azizi H, Fooladi B.** Species Identification and Genotyping of Cutaneous Leishmaniasis in Clinical Samples Based on ITS1-PCR-Sequencing in Southeast Iran. Iran J Public Health. 2024 Nov;53(11):2582-2594.
5. **Espirito-Santo, R. C., Silva, J. G., Moreira, M. D. D., Gomes, C. M., de Oliveira, E., Porrozzi, R., & Cupolillo, E. (2020).** Clinical and epidemiological features of cutaneous leishmaniasis in Brazil: Species overlap and lesion diversity. *Parasites & Vectors, 13*(1), 279.
6. **Gow I, Smith NC, Stark D, Ellis J.** Laboratory diagnostics for human Leishmania infections: a polymerase chain reaction-focussed review of detection and identification methods. Parasit Vectors. 2022 Nov 5;15(1):412.
7. **Guerra, J. A. O., Barbosa, M. G., Loureiro, A. C., Coelho, L. I. A. R. C., & Rosa, G. G. (2019).** Epidemiology of cutaneous leishmaniasis in rural Brazil: Incidence and associated factors. *PLOS ONE, 14*(10), e0222763.
8. **Marlet, M., Sangaré, I., Yapi, A., Koné, M., Kassi, K. F., & Guindo, A. (2020).** Cutaneous leishmaniasis in West Africa: Epidemiology and gender aspects. *Tropical Medicine & International Health, 25*(2), 236–245.
9. **Miranda ADC, González KA, Samudio F, Pineda VJ, Calzada JE, Capitan-Barrios Z, Jiménez A, Castillo J, Mendoza Y, Suárez JA, Ortiz B, Méndez J, Pascale JM, Grögl M, Sosa N, Saldaña A.** Molecular Identification of Parasites Causing Cutaneous Leishmaniasis in Panama. Am J Trop Med Hyg. 2021 Jan 11;104(4):1326-1334.
10. **Mohammadpour I, Hatam GR, Handjani F, Bozorg-Ghalati F, PourKamal D, Motazedian MH.** Leishmania cytochrome b gene sequence polymorphisms in southern Iran: relationships with different cutaneous clinical manifestations. BMC Infect Dis. 2019 Jan 29;19(1):98.
11. **Nadri, S., Rhalem, S., Malki, Z., Fellah, H., Sahibi, H., & Guessous-Idrissi, N. (2020).** Epidemiology of cutaneous leishmaniasis in central Morocco: A retrospective study. *BMC Infectious Diseases, 20*(1), 213.
12. **Piyasiri SB, Dewasurendra R, Samaranayake N, Karunaweera N.** Diagnostic Tools for Cutaneous Leishmaniasis Caused by *Leishmania donovani*: A Narrative Review. Diagnostics (Basel). 2023 Sep 18;13(18):2989.
13. **Shita EY, Semegn EN, Wubetu GY, Abitew AM, Andualem BG, Alemneh MG.** Prevalence of Leishmania RNA virus in Leishmania parasites in patients with tegumentary leishmaniasis: A systematic review and meta-analysis. PLoS Negl Trop Dis. 2022 Jun 8;16(6):e0010427.
14. **Valero, N. N., Rodríguez-López, C., Ruiz-Postigo, J. A., & Alvar, J. (2021).** Improved molecular diagnostics for *Leishmania* species detection in endemic regions. *Infectious Diseases of Poverty, 10*(1), 65.