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## Original Article

# Epidemiological and Evaluative Study of the Prevalence of Cutaneous Leishmaniasis in Najaf Governorate, Iraq

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### Abstract

**Background:** The developing world encounter rising Leishmaniasis. Therefore, it remains a substantial public health burden in Iraq. A revised dataset on its prevalence and distribution are essential. We aimed to evaluate the epidemiological status of cutaneous leishmaniasis in Najaf Governorate and evaluate the therapeutic effectiveness of included drugs.

**Methods:** The investigation was conducted in several hospitals in Najaf City, Iraq from March 2023 to May 2025. Samples were collected from 275 suspected patients. Of these, 157 were confirmed to be infected with the disease (103 males and 54 females). Their ages ranged from 3 to 48 years.

**Results:** Males constituted most of the total infections, accounting for 65.6% of cases, whereas females represented only 34.4%. Regarding distribution, Rural areas recorded the highest proportion of cases (71.34%), while urban areas comprised the remaining percentage (28.66%). Regarding monthly variation, January, February, March, and November represented the peak period, comprising 50.3% of the confirmed cases. Concerning lesion localization, facial lesions were the most common, representing 38.22% of the total cases.

**Conclusion:** Cutaneous leishmaniasis is found among individuals in the surveyed hospitals, suggesting a significant health issue. Further research is necessary to determine the diseases spread across Iraq and to guide control measures.



## Introduction

**L**eishmaniasis is a complex group of parasitic diseases that constitute a significant health burden worldwide. These diseases are caused by various species of *Leishmania* parasites, which are transmitted to humans through the bite of infected female sandflies. Clinical manifestations vary widely among individuals, ranging from localized skin lesions to visceral leishmaniasis (VL), which can be fatal if not treated promptly (1).

Cutaneous leishmaniasis (CL) is one of the types of leishmaniasis. There are two terms for this disease: New World cutaneous leishmaniasis (WDL) and Old World cutaneous leishmaniasis (2). The incubation period for the various types of leishmaniasis typically ranges from two weeks to several months (3). In Iraq, serious cases of leishmaniasis have been found in suburban areas (4). CL lesions are either solitary or multiple, and the infection usually spreads via the lymphatic system, causing lymph node enlargement (5). Atypical forms, such as verrucous lesions, are more common in the New World (6). CL lesions can resolve spontaneously within months, leaving behind a scar. However, in some cases, they become chronic or widespread. Chronic and recurrent forms occur in *L. tropica* and are characterized by the formation of papules around the ulcers after the healing process (7). The lesions contain large numbers of parasites, which in turn cause significant changes, particularly in the facial area, resulting in an appearance like that of lepromatous leprosy (8).

T lymphocytes produce soluble factors called lymphokines. A relationship has been observed between resistance to leishmaniasis in mice and Th lymphocytes (9). Killer lymphocytes have an important role in protection against infection with leishmaniasis due to their ability to produce IFN- $\gamma$  (10). Antibodies play a minor role in determining the course of cutaneous leishmaniasis (11).

Antimony sulfate (SSG) (Sodium Stibogluconate) was, for a long time, the only im-

portant antileishmanial agent, but its efficacy gradually diminished (12). Around the same time, the highly effective amphotericin B (AMB) was introduced, and its safer liposomal formulation continues to achieve very high cure rates (13).

SSG sodium is the only drug to date that has detected both TF (treatment failure) and DR (drug resistance) in immunocompetent patients, allowing analysis of the relationship between the two conditions (14). DR strains of *L. donovani* and *L. braziliensis* have been increasingly reported and represent a significant clinical concern (15,16).

The study was designed to assess the prevalence of the cutaneous leishmaniasis in Najaf City, evaluate the therapeutic effectiveness of included drugs, and highlight their clinical significance in disease management.

## Materials and Methods

### Sample Collection

The investigation was conducted in several hospitals in Najaf City from March 2023 to May 2025. Samples were collected from 275 suspected patients. Of these, 157 were confirmed to be infected with the disease (103 males and 54 females). Their ages ranged from 3 to 48 years. The participating hospitals were Al-Sadr Teaching Hospital, Al-Hakim General Hospital, Al-Zahraa Teaching Hospital for Women and Children, Al-Haidariya Hospital, Al-Manathira Hospital and Al-Sajjad Hospital, in addition to other private dermatology clinics.

### Sample Examination Method

Leishmaniasis was diagnosed by direct microscopic examination of clinical specimens, in addition to the clinical characteristics of the nodule or lesion (17-19). Clinical material was carefully collected from the affected site using a sterile scalpel or fine needle following disinfection with 70% ethanol (20). A thin smear

was prepared on a clean glass slide, air-dried, and fixed with absolute methanol for a short duration (21). The smears were stained with Giemsa for 10–30 minutes, rinsed with distilled water, and allowed to dry. *Observation was carried out at high magnification under oil immersion to identify the stage of Leishmania, supporting the clinical diagnosis (22,23).*

**Medications Taken**

Information on the medications used by leishmaniasis patients with was collected from several dermatologists. The types of drugs for each patient were recorded. The most important and commonly used medications were as follows: sodium gluconate, aminocyclines (paromomycin), amphotericin B, and liposo-

mal amphotericin B. The focus was on these medications, and none of the others.

**Statistical analysis**

Data were analyzed in terms of numbers and percentages using SPSS 28.0 (IBM Corp., Armonk, NY, USA) to determine the statistically significant differences between the percentages.

**Results**

The distribution of leishmaniasis patients according to sex showed a higher percentage among males (65.6%) compared to females (34.4%), indicating that males were affected approximately twice as often as females (Table 1).

**Table 1:** Distribution of cutaneous leishmaniasis cases among infected individuals by age and sex

Age group (yr)	Males	Females	Total
5-10	34	28	62
10-15	32	16	48
15-20	7	5	12
20-25	21	8	29
25-30	8	9	17
30-35	7	5	12
35-40	6	8	14
40-45	3	3	6
45-48	4	5	9
<b>Total</b>	103	54	157
<b>Percentage</b>	65.6	34.4	100

A significant variation was observed in the distribution of leishmaniasis cases between urban and rural areas. Rural areas accounted for 71.34% of the total cases, whereas urban

areas accounted for 28.66% (Table 2). This variation indicates that rural areas are the focus of cutaneous leishmaniasis in this study.

**Table 2:** Distribution of cutaneous leishmaniasis cases by residence and sex of infected individuals

Variable	Urban regions	Rural regions	Total
<b>Male</b>	35	68	103
<b>Female</b>	10	44	54
<b>Total</b>	45	112	157
<b>Percentage</b>	28.66	71.34	100

The monthly distribution of cutaneous leishmaniasis revealed that males consistently

outnumbered females across most months, in proportion to the overall incidence rate. From

November to March, an overall increasing trend in case numbers was observed, except for December. A noticeable rise in incidence was recorded in January (11.5%), February

(14%), March (12.1%), and November (12.7%), and together these months accounted for more than half of the total diagnosed cases (50.3%) (Table 3).

**Table 3:** Distribution of cases of cutaneous leishmaniasis by months

Month	Male	Female	Total	%
January	12	6	18	11.5
February	15	7	22	14
March	13	6	19	12.1
April	10	4	14	8.9
May	8	3	11	7
June	7	3	10	6.4
July	5	2	7	4.5
August	4	1	5	3.2
September	6	2	8	5.1
October	9	4	13	8.3
November	12	8	20	12.7
December	2	8	10	6.4
<b>Total</b>	<b>103</b>	<b>54</b>	<b>157</b>	<b>100%</b>

Wet lesions were the most common type of cutaneous leishmaniasis among the examined cases, representing 79.62% of the total infections. In contrast, dry lesions constituted a much smaller percentage (20.38%) (Table 4).

**Table 4:** Distribution of cutaneous leishmaniasis cases among infected males and females based on the type of ulcer.

Type of lesion	male	female	Total	%
<b>Wet lesion</b>	80	45	125	79.62
<b>Dry lesion</b>	23	9	32	20.38
<b>Total</b>	<b>103</b>	<b>54</b>	<b>157</b>	<b>100</b>

The face was the most affected body part by cutaneous leishmaniasis in this study, representing 38.22% of the total lesions. This was followed by the lower extremities, which accounted for 28.66%, and following these, the upper extremities were affected in 22.29% of cases. The least affected part was the trunk.

representing 10.83% of the total infections. The predominance of lesions on the face and extremities (upper and lower) was expected in cutaneous leishmaniasis (Table 5).

**Table 5:** Relative distribution of cutaneous leishmaniasis infection according to lesion site in patients

Site of lesion	Male	Female	Total	%
<b>Face</b>	40	20	60	38.22
<b>Upper extremities</b>	25	10	35	22.295
<b>Lower extremities</b>	30	15	45	28.66
<b>Trunk</b>	8	9	17	10.83
<b>Total</b>	<b>103</b>	<b>54</b>	<b>157</b>	<b>100</b>

The outcomes indicated that the efficacy of medications for leishmaniasis differed across patients, and was influenced by several factors, such as the type of *leishmania*, the severity of the infection, and the patient's tolerance to the drug (Table 6).

**Table 6:** The effect of treatment with sodium gluconate, aminocyclines (paromomycin), amphotericin B, and liposomal amphotericin B, the most used, on patients with cutaneous leishmaniasis in Najaf Governorate, Iraq (24, 25).

Therapeutic agent	Proposed mechanism of action	Expected/observed results	Advantages	Disadvantages
<b>Sodium Stibogluconate - SSG</b>	It inhibits key enzymes in the glycolytic pathway in the <i>Leishmania</i> parasite, causing energy depletion and parasite death.	Highly effective in treating cutaneous leishmaniasis.	Commonly used and effective treatment for many years.	Intravenous or intramuscular injection, long-term dosing regimen, no side effects.
<b>Aminocyclines (Paromomycin)</b>	Paromomycin acts as an antibiotic, believed to accumulate within lysosomes and affect mitochondrial function and protein synthesis in <i>Leishmania</i> .	It is effective topically in treating cutaneous leishmaniasis, especially uncomplicated leishmaniasis.	Topical application (cream or ointment) reduces systemic side effects.	It may be less effective in complicated lesions and cause local skin irritation.
<b>Amphotericin B</b>	It is considered an antifungal agent that works by creating pores or channels in the cell membrane. This causes the leakage of ions and molecules from the cell, disrupting its functions and leading to parasite death.	Highly effective, especially in cases of cutaneous leishmaniasis, and results in rapid clinical recovery.	Effective in cases of resistance to SSG.	Intravenous injection. Has severe systemic side effects and is expensive.
<b>Liposomal Amphotericin B</b>	Same mechanism of action as amphotericin B, but the drug is encapsulated within lipid particles.	Very effective, especially in cases of visceral leishmaniasis, and results in rapid clinical recovery.	Less renal toxicity and generally has fewer severe side effects.	Very expensive.

## Discussion

This study revealed that the men were more affected than women. This finding is consistent with previous study (26), which reported a prevalence among men, likely related to their exposure to vectors from occupational

activities. However, it contrasts with other studies (27-30), possibly because females visit healthcare centers earlier than males, and due to environmental conditions and differences in sample size.

Another finding is that children and adolescents represented the largest proportion of

infections. This reflects children's behavior, such as outdoor play, and lack of awareness of safety precautions, which increase their vulnerability to sandfly bites compared to others (31).

In general, the infection was more frequent in rural regions than in urban regions, attributed to the fact that rural environments are often characterized by dense vegetation, moist soil, and the presence of ruins or houses with traditional infrastructure (such as mud walls or cracks) that provide shelter for the sand-fly vector. In contrast to our findings, a study reported that the prevalence of cutaneous leishmaniasis was higher in urban regions compared to rural areas (32). Some other studies also indicated the role of the nature and climate of rural areas in the spread of the disease compared to the city (33,34).

The incidence was higher in warmer and/or wetter months, while it was lower in the winter and spring months. This might result from the incubation period of the disease, as clinical manifestations often appear weeks to months after the peak of sand fly activity, which usually happens in late summer and early fall (35). Several studies have shown that environmental factors, such as temperature, rainfall, and humidity, are associated with the incidence of cutaneous leishmaniasis (36). However, climatic and environmental factors are not the only factors that contribute to the spread of infection, and other additional factors must be studied (37).

Various studies have shown a significant relationship between cutaneous leishmaniasis and the vegetation cover index, as rainfall, humidity, wind, and other factors can increase the number of infections after rainy seasons (38,39). Humidity plays an important role in the growth and activity of sand flies, which transmit the disease. Nighttime humidity levels affect fly activity and, consequently, the incidence of leishmaniasis (40).

In Iran, humidity levels ranging from 27% to 30% have been recorded in areas with a significant prevalence of leishmaniasis in the city of

Isfahan (41). Several environmental and climatic factors influence the incidence and spread of the disease in different regions of the world. In Colombia and Brazil, annual rainfall is a significant risk factor for the disease (42). Furthermore, vegetation index values in Iran and Turkey were associated with leishmaniasis incidence (43).

The findings suggested that wet lesion was a common form of cutaneous leishmaniasis, especially in areas where certain *Leishmania* species were endemic, causing severe inflammatory reactions and the formation of open ulcers. The predominance of wet lesions is due to an excessive inflammatory response and cell-mediated immunity, which are important factors in the development of wet lesions. Some *Leishmania* species (such as *L. major*) are also known to cause wet lesions frequently. These findings are consistent with a study (44).

Table 5 demonstrates that the predominance of lesions on the face and extremities (upper and lower) was expected in cutaneous leishmaniasis. The sand fly (*Phlebotomus* species) typically bites exposed parts of the body at night and dawn. This result aligns with previous studies (26). Table 6 demonstrates that SSG was a traditional and effective treatment for many years, achieving rapid clinical and histological recover (45). Aminocyclines (such as paromomycin) showed good topical efficacy in the treatment of cutaneous leishmaniasis, especially in uncomplicated lesions. However, its efficacy may be less in complicated cases or against some resistant species of the parasite (46).

Liposomal amphotericin B showed very high efficacy, especially in cases of visceral and cutaneous leishmaniasis. It is characterized by better tolerated by patients than the conventional formulation, with less renal toxicity (47). Therefore, in this study, we examined the effectiveness of these medications and their potential side effects on patients. Studies of more effective treatments must be expanded to re-

duce damage and improve patients' chances of survival for as long as possible.

## Conclusion

This study demonstrates leishmaniasis (CL) has been an important health issue in Najaf province. Males represent a significantly higher rate of total infections than females. The most affected age group is 5-10 years. Further research is necessary to determine the diseases spread across Iraq and to guide control measures.

## Ethical Considerations

This study was conducted in accordance with the ethical guidelines of the Iraqi Ministry of Health. Verbal informed consent was obtained from all adult participants and from parents or legal guardians of minors prior to sample collection. Participant confidentiality and privacy were strictly maintained through data anonymization.

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## Conflict of Interests

The authors declare no conflict of interest.

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