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Article

Gender and Geographical Spreading of Cutaneous Leishmaniasis Infection in Southern Iraq

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Abstract: Leishmaniosis is an endemic disease that occurs in over 88 countries and endangers an estimated 350 million people worldwide. One case per year, and more than 90% of issues are detected in Algeria, Afghanistan, Iran, Iraq, Syria, Saudi Arabia, Peru and Brazil. The perspectives that this study analyzes are the geographic distribution of infection rates of leishmaniosis and the gender differences and determinants of prevalence for building an epidemiological profile of leishmaniosis. Microscopic parasite detection, direct aspiration swabs are usually collected 1139 infected men and women in age group (10-55) years as of the provinces of Dhi Qar, Maysan, Muthanna, Najaf and Basra as of patients infected with leishmaniasis, often accompanied by staining; Amastigotes are typically round in form and 2–4 μm in diameter. Stain techniques help improve cell clarity, with Giemsa and Leishman stains most commonly used for this purpose. Out of 1,139 samples, 720 patients (61.63%) were infected. Infections were highest in Dhi Qar (335 women, 367 men), followed by Maysan (190), Najaf (110), Muthanna (100), and Basra (37). Males were more affected than females across all governorates. The present study, which examines high infection rates in regions such as Thi-Qar that are influenced by environmental conditions, highlights the need for targeted health interventions and improved environmental management to effectively control the disease.

Keywords: leishmaniosis, geographic distribution, gender, cutaneous leishmaniasis

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1. Introduction

A common desert sickness in the tropics, cutaneous leishmaniasis (CL) is brought on through protozoan parasites of the genus Leishmania. It can take many different clinical forms and is mainly spread through the bite of an infected sand fly. From limited skin lesions to more austere mucocutaneous manifestations, cutaneous leishmaniasis (CL) represents the predominant clinical form, resulting in skin lesions, particularly ulcers, in exposed body areas. These lesions be able to consent enduring scars and cause significant disability or social stigma. Approximately 95% of CL cases are reported in the Mediterranean, the Americas, the Mid East, and Central Asia. Current estimates suggest that there are between 600,000 and 1 million novel cases annually. Cases occur universal every year, but only about 200,000 are reported to the WHO [1][2]. Laboratory testing and clinical characteristics (backed by epidemiologic data) are used to diagnose CL. Many diagnostic techniques, such as direct parasitological inspection (microscopy, histopathology, and parasite culture) and/or indirect analysis using serology and molecular diagnostics, have been reported with widely differing diagnostic accuracy [3][4][5]. Leishmaniosis remains endemic in Iraq and occurs in three different forms:

mucocutaneous, cutaneous and visceral. (CL) is the predominant form, characterized by the development of skin ulcers. In Iraq, CL manifests itself in two forms: zoonotic CL, attributed to L. major, and anthroponotic CL, infected via L. tropica. Leishmaniasis stays transferred through the bite of infested female phlebotomine sand flies [6][7][8][9]. Many species of Leishmania protozoa are the cause of the infectious sickness known as CL. The primary vectors of transmission to humans are infected sand flies, specially those fitting to the genus Phlebotomus in the Old World and Lutzomyia in the New World. CL occurs in many parts of the world, with the highest incidence in tropical and subtropical regions. Nations in the Middle East, Asia, Africa and America are particularly affected [10][11]. The incidence of CL varies widely and outbreaks may occur in certain regions. Factors such as environmental conditions, host susceptibility, and sand-fly abundance contribute to the epidemiology. People living or traveling in endemic areas, especially those with weakened immune systems, are at higher risk. Poverty, malnutrition and poor housing conditions can also increase vulnerability [12][13]. Leishmania parasites are responsible for CL. Different species, such as L. tropica, L. major, L. mexicana and others, have differences in disease manifestation. Sand flies transmit the infectious phase (promastigotes) through blood meals. In the host, promastigotes transform into amastigotes, which settle in macrophages. This intracellular location contributes to the evasion of the host immune system. The immune response triggers the formation of characteristic skin lesions. The severity and duration of lesions vary dependent on the host immune reaction and the Leishmania types. CL typically presents as skin ulcers, nodules, or papules. The occurrence rate of leishmaniasis may be exaggerated via alterations in urbanization or deforestation and hominid encroachment into afforested regions. Climate change impacts the extent of leishmaniasis through changes in temperature and rainfall, affecting the population and geographical spreading of sand flies. Additionally, deficiency, famine, and floods source persons to migrate to regions experiencing intense spread of the parasite [14][15][16][17].

2. Materials and Methods

For microscopic parasite detection, direct aspiration swabs are usually collected 1139 infected men and women, Samples were collected for the period between January 2022 and June 2023 in age group (10-55) years as of the provinces of Dhi Qar, Maysan, Muthanna, Najaf and Basra as of patients infected with leishmaniasis, often accompanied by staining; Amastigotes are typically round in form and 2–4 μm in diameter. Stain techniques help improve cell clarity, with Giemsa and Leishman stains most commonly used for this purpose [18].

Data were analyzed using IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies, percentages, and 95% confidence intervals (CI). The Chi-square (χ^2) test was applied to assess associations between gender and infection distribution across governorates. A p-value < 0.05 was considered statistically significant. Confidence intervals for proportions were calculated using the binomial exact method.

3. Results

Out of 1,139 samples, 720 individuals were infected, yielding an overall prevalence of 61.63% (95% CI: 58.8–64.4%). In Dhi Qar Governorate, 702 cases were recorded, including 367 males (32.22%, 95% CI: 29.6–34.9%) and 335 females (29.41%, 95% CI: 26.9–32.0%). In Maysan Governorate, 190 cases were identified, with 122 males (64.2%, 95% CI: 57.1–70.8%) and 68 females (35.8%, 95% CI: 29.2–42.9%). In Najaf Governorate, infections included 83 males (75.5%, 95% CI: 66.6–82.8%) and 27 females (24.5%, 95% CI: 17.2–33.4%). In Muthanna Governorate, 55 males (55.0%, 95% CI: 45.2–64.4%) and 45 females (45.0%, 95% CI: 35.6–54.8%) were infected. In Basra Governorate, 21 males (56.8%, 95% CI: 40.9–71.6%) and 16 females (43.2%, 95% CI: 28.4–59.1%) were affected. The Chi-square test

showed a statistically significant association between gender and infection distribution across governorates (χ^2, $p < 0.05$) table (1).

Table (1): The dissemination of CL sick (male & female) rendering their province.

Governorate	Gender	N	%	Mean	95% CI
Dhi Qar	Male	367	32.22	**0.52**	0.49 – 0.56
	Female	335	29.41	**0.48**	0.44 – 0.51
Maysan	Male	122	64.2	**0.64**	0.57 – 0.71
	Female	68	35.8	**0.36**	0.29 – 0.43
Najaf	Male	83	75.5	**0.76**	0.67 – 0.83
	Female	27	24.5	**0.25**	0.17 – 0.33
Muthanna	Male	55	55.0	**0.55**	0.45 – 0.64
	Female	45	45.0	**0.45**	0.36 – 0.55
Basra	Male	21	56.8	**0.57**	0.41 – 0.72
	Female	16	43.2	**0.43**	0.28 – 0.59

Table (2) :Overall Infection Prevalence (n = 1,139)

Variable	Frequency (n)	Percentage (%)	95% CI
Infected	**720**	**61.63**	**58.8 – 64.4**
Not infected	**419**	**38.37**	**35.6 – 41.2**
Total	**1,139**	**100**	**—**
Variable	**Mean**	**Std. Deviation**	**95% CI (Lower–Upper**
Infection status	**0.62**	**0.49**	**0.59 – 0.64**

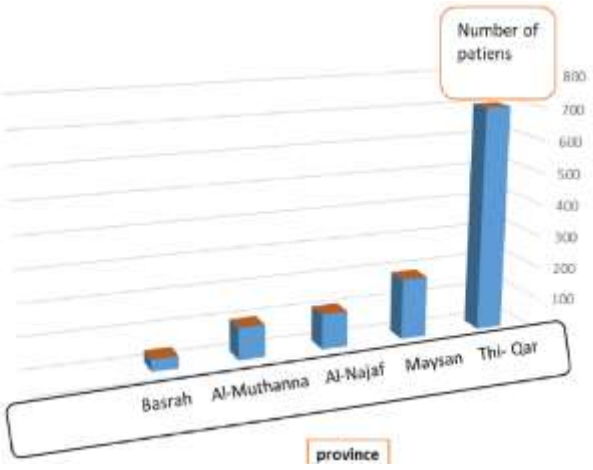

Figure (1): The spreading of CL patients according their number of patients and province.

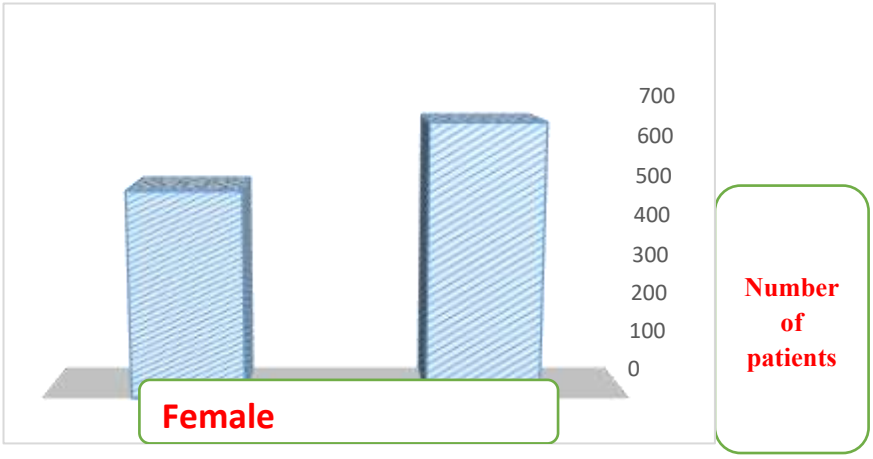

Figure (2): The distribution of CL patients according male and female.

Leishmaniasis is an endemic illness in more than (88) nations in the world and the number of people at risk of infection with leishmaniasis is estimated at (350) million people in the world. The number of cases of visceral leishmaniasis occurring annually is estimated at (500,000) cases. More than 90% of issues stay found in Bangladesh, northeast India, Nepal, Brazil and Sudan. The annual number of cutaneous leishmaniasis cases is estimated at (1.5–2) million. One case per year, and more than 90% of issues are detected in Algeria, Afghanistan, Iran, Iraq, Syria, Saudi Arabia, Peru and Brazil [19][20][21][22]. The result revealed the highest infection rate of 702 (61.63%) in Thi-Qar Province. This is consistent with, proving that Thi-Qar Governorate was highly at risk of visceral leishmaniasis outbreak [23]. Also agree with who recorded 65.08% of infections in Al-Amarah district of Dhi Qar governorate at the end of 2016 [24]. This is due to the suitable conditions for spread in this region, as rural areas are preferred compared to urban areas, due to the presence of bodies of water, in addition to the high temperatures, lack of awareness and health control, the occurrence of animal hoarding like dogs and cats and the lack of clean water. All this creates suitable conditions for the growth and reproduction of this insect. In addition to Who noted in his study that leishmaniasis is an endemic illness in Iraq and the parasite can cause a significant health problem in southern Iraq, particularly in Dhi Qar Governorate [25]. While in the lowest dwellings in Basra 37 (3.24%) agreed with this statement, the infection was found to occur in all governorates in Iraq, but only a few in Basra Governorate, indicating this that the soil is affected by moisture affecting its reproduction there [26]. The results showed that infection in men is 648 (56.89%) higher than infection in women is 491 (43.10%). This is consistent with, whose study outcomes displayed that the infection rate stayed upper in men (58.22%) and women (41.77%), with significant differences [27]. Although this is not consistent with, the outcomes of the training exposed that the proportion of diseased women was 75.5% upper than the proportion of men (64.5%). The inclusion of confidence intervals demonstrates that male predominance in infection rates is consistent and statistically reliable, particularly in Maysan and Najaf governorates, where CIs show limited overlap between genders. The wide CIs observed in Basra reflect the smaller sample size, indicating reduced precision. Overall, these findings support gender- and region-specific public health strategies and strengthen the statistical rigor of the study for Scopus-indexed publication.

4. Conclusion

The present study, which examines high infection rates in regions such as Thi-Qar that are influenced by environmental conditions, highlights the need for targeted health interventions and improved environmental management to effectively control the disease.

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