EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS OF CUTANEOUS LEISHMANIASIS AT DISTRICT MOHMAND

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ABSTRACT

OBJECTIVES

This study aims to determine Cutaneous Leishmaniasis's epidemiological and clinical characteristics (CL) in the Mohmand district.

METHODOLOGY

This descriptive cross-sectional study was conducted at District Headquarters (DHQ) Ghallanai, District Mohmand, involving 360 patients with cutaneous Leishmaniasis. Individuals with coinfections or other skin diseases were intentionally excluded. Data, including gender, age, socio-economic status, size, site, and number of lesions, were recorded. CL was compared among age groups, gender, and socio-economic status using the chi-square test.

RESULTS

The mean age was 10.72 ± 5.94 years, with 137 (38.06%) females and 223 (61.94%) males. Most patients suffering from CL had a low socio-economic status (n=175, 48.61%), followed by the middle (n=126, 35%). A minority reported a habit of sleeping on the ground (n=43, 11.94%). About 53 (14.72%) had multiple lesions. The location of lesions varied, with 66 (18.33%) on the arm, 229 (63.61%) on the head, neck, and face, and 65 (18.06%) on the leg. The association of the number of lesions (p=0.61), size of the lesion (p=0.47), and location of the lesion (p=0.27) was not statistically significant. Multiple lesions of CL were more common in the low socio-economic group (n=30, 56.6%) than in the middle (n=10, 18.8%) and high-class (n=13, 24.6%) groups, and the results were statistically significant (p=0.019). Most lesions were on the head, neck, and face, with the highest percentage in the low socio-economic group (66.86%). The rate of lesions on the leg was highest in the middle socio-economic group (19.84%), followed by the low (12.57%) and high (30.51%) groups. The differences in location were statistically significant (p=0.032).

CONCLUSION

Cutaneous Leishmaniasis (CL) disproportionately affects children, particularly males and those with lower socio-economic status. We observed a notable link between lesion characteristics and socio-economic status.

KEYWORDS: *Cutaneous Leishmaniasis, Epidemiology, Clinical Feature, Socio-Economic Status*

INTRODUCTION

Leishmaniasis, caused by various Leishmania species transmitted through infected sandfly bites, presents in forms like Cutaneous Leishmaniasis (CL) and Visceral Leishmaniasis.[1] With over 20 Leishmania species capable of causing the disease, it affects 98 countries and around 350 million people globally, classifying it among the seven most neglected tropical diseases.[2,3] Cutaneous Leishmaniasis, the most prevalent form, accounts for 0.7 to 1.2 million reported cases annually.[4] Urgent efforts are needed to understand, prevent, and treat this widespread and impactful global health concern.[5] The modification of sandfly habitat and distribution, leading to the resurgence of cutaneous Leishmaniasis, is attributed to human activities such as wars, deforestation, and agricultural practices.[6] Climatic factors, encompassing rainfall, global warming, humidity, and ambient temperature, further influence the spread of the disease by impacting sandfly vectors, hosts, and various Leishmania species. Conditions like poor sanitation, uncovered water containers, wall cracks, and dwellings made of grass provide conducive environments for sandfly breeding.[7] Moreover, clustering people in confined spaces and migration influenced by socio-economic factors can attract sandflies and contribute to additional risk factors for cutaneous Leishmaniasis.[8] Cutaneous Leishmaniasis (CL) represents Pakistan's substantial public health challenge. The prevalence of CL extends across the

entire country, yet a noteworthy concentration of reported cases is consistently observed in the Khyber Pakhtunkhwa (KP) province.[9] This province shares a border with Afghanistan, and the heightened incidence of CL in this region is notably associated with districts hosting a significant population of refugees.[10] The complex interplay of factors, including regional geography, human mobility, and the presence of refugee populations, contributes to the heightened burden of CL in the KP province.[11] The proximity to Afghanistan likely plays a role in the transmission dynamics of the disease, with cross-border movements potentially facilitating the spread of the infection.[11] A previous study in Iran reported the distribution of cutaneous leishmaniasis lesions, with the hand being the predominant site (62.75%, 2,312 lesions), followed by the face and neck (24.8%, 915 lesions). Lesions on the body constitute a smaller proportion (2.7%, 98 cases), while the foot is also noteworthy, representing 22.7% of the distribution with 837 recorded lesions.[12] This study on the epidemiological and clinical characteristics of Cutaneous Leishmaniasis (CL) in the Mohmand district is crucial for several reasons. Firstly, the region-specific variations in CL epidemiology, influenced by environmental factors and human behaviors, warrant a focused investigation. Understanding the public health impact of CL in the Mohmand agency is essential for effective planning and resource allocation. This study aimed to determine Cutaneous Leishmaniasis's epidemiological and clinical characteristics in the Mohmand, Khyber Pakhtunkhwa district.

METHODOLOGY

This descriptive cross-sectional study was conducted in DHQ Ghallanai District Mohmand, involving 360 patients with cutaneous Leishmaniasis. The data collection spanned from August 20, 2023, to September 30, 2023, utilizing a consecutive sampling technique. Ethical approval (approval number 2809/MS) was secured from the medical superintendent. The sample size was determined using the World Health Organization calculator, considering a 5% margin of error, a 95% confidence level, and a 62% prevalence of cutaneous Leishmaniasis on the hands based on prior study.[12] The study confirmed patients with cutaneous Leishmaniasis based on clinical features and smear analysis across all age groups, genders, and Pakistani nationals (based on NIC) who presented at DHQ Ghallanai in District Mohmand. To ensure the specificity of the study, individuals with coinfections or those afflicted with other skin diseases were deliberately excluded from participation. This exclusion criterion aimed to maintain the focus on individuals solely affected by Leishmaniasis, contributing to a more precise and targeted investigation of this particular health condition within the identified population. Patients enrolled in the study underwent comprehensive clinical evaluations conducted by a specialized dermatologist. The examination specifically addressed affected tissues, scrutinizing the size, site, appearance, and number of skin lesions. Beyond the physical assessment, a thorough collection of sociodemographic information took place, encompassing factors such as the patient's residence, the presence of animals in or around the house, and a detailed history of recent visits to endemic areas within the last 1-3 months before the manifestation of skin lesions. This detailed approach aimed to fully understand the patient's clinical condition and relevant contextual factors that might contribute to cutaneous Leishmaniasis. Cutaneous Leishmaniasis was confirmed through Giemsa stain. Following the disinfection of the skin with 70% alcohol, disposable surgical blades or needles were employed to collect skin specimens from the border of the ulcer, which were then spread across two separate slides. Prepared slides, air-dried and fixed with methanol, were stained using Giemsa stain and examined under a microscope for the presence of amastigotes, following Saab et al.'s method (2015).[13] The diagnostic criteria for Cutaneous Leishmaniasis (CL) and Mucocutaneous Leishmaniasis (MCL) relied on identifying amastigotes within the smear. Data analysis was performed through R software using the get summary and tidyverse packages. Mean and standard deviation were calculated for continuous data, such as age. In contrast, frequencies and percentages were calculated for qualitative data, including gender, socio-economic status, sleeping habits on the ground, travel history to infected areas, and outcome variables (number of lesions, lesion size, and location of lesions). The outcome variables were compared among age groups, gender, and socio-economic status using the chi-square/Fisher exact test. The level of significance was set at $p \leq 0.05$.

RESULTS

The results showed various aspects of Cutaneous Leishmaniasis, including demographics, epidemiology, and clinical characteristics. The results showed that most patients belonged to a low socio-economic status and exhibited a single lesion. No significant difference was observed between males and females for the lesions' number, size, and location. However, multiple lesions were more common in the low socio-economic group.

Table 1: Age and Gender Distribution of the Study

Characteristic	n = 360
Age(years), mean ±SD	10.72 ± 5.94
Gender, n (%)	
Female	137 (38.06)
Male	223 (61.94)
Age group (year), n (%)	
above 15	38 (10.56)
upto 15	322 (89.44)

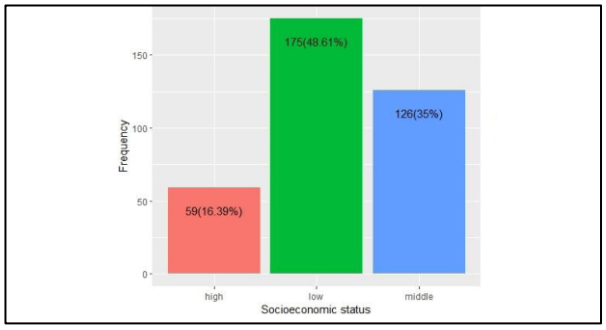

Figure 1: Socio-Economic Level of Participants

Table 2: Epidemiological and clinical aspects of Cutaneous Leishmaniasis

Variable	Characteristic	N (%)
Sleeping Habits on the Ground	No	317 (88.06)
	Yes	43 (11.94)
Travel history to infected areas	No	335 (93.06)
	Yes	25 (06.94)
Number of lesions	Multiple	53 (14.72)
	Single	307 (85.28)
Lesion Size (cm)	01	202 (56.11)
	02	65 (18.06)
	03	44 (12.22)
	04	20 (5.56)
	more than 4	29 (8.06)
Location of lesions	Arm	66 (18.33)
	Head, neck & Face	229 (63.61)
	Leg	65 (18.06)

Table 3: Association of Leishmaniasis Features by Gender

Leishmaniasis features	Characteristics	female, N = 137	male, N = 223	p-value*
Number of Lesions	Multiple	18 (13.14)	35 (15.70)	0.61
	Single	119 (86.86)	188 (84.30)	
Lesion Size (cm)	01	82 (59.85)	120 (53.81)	0.47
	02	23 (16.79)	42 (18.83)	
	03	12 (8.76)	32 (14.35)	
	04	07 (5.11)	13 (5.83)	
	more than 4	13 (9.49)	16 (7.17)	
Location of Lesions	Arm	23 (16.79)	43 (19.28)	0.27
	Head, neck & Face	94 (68.61)	135 (60.54)	
	Leg	20 (14.60)	45 (20.18)	

*Chi-squared test

Table 4: Comparison of Leishmaniasis Features by Age Group

Leishmaniasis Features	Characteristic	above 15, N = 38	up to 15, N = 322	p-Value*
Number of Lesions	Multiple	07 (18.42)	46 (14.29)	0.66
	Single	31 (81.58)	276 (85.71)	
Lesion Size	01	27 (71.05)	175 (54.35)	0.17
	02	07 (18.42)	58 (18.01)	
	03	01 (2.63)	43 (13.35)	
	04	02 (5.26)	18 (5.59)	
	more than 4	01 (2.63)	28 (8.70)	
Location of Lesions	Arm	04 (10.53)	62 (19.25)	0.33
	Head, neck & Face	25 (65.79)	204 (63.35)	
	Leg	09 (23.68)	56 (17.39)	

Table 5: Comparison of Leishmaniasis Features by Socio-Economic Group

Leishmaniasis	Characteristic	high, N = 59	low, N = 175	middle, N = 126	p-value*
Number of Lesions	Multiple	13 (24.6)	30 (56.6)	10 (18.8)	0.019
	Single	46 (14.9)	145 (47.23)	116 (37.8)	
Lesion Size	01	36 (61.02)	93 (53.14)	73 (57.94)	0.7
	02	12 (20.34)	29 (16.57)	24 (19.05)	
	03	05 (8.47)	26 (14.86)	13 (10.32)	
	04	03 (5.08)	09 (5.14)	08 (6.35)	
	More than 4	03 (5.08)	18 (10.29)	08 (6.35)	
location of lesions	Arm	10 (16.95)	36 (20.57)	20 (15.87)	0.032
	Head, neck & Face	31 (52.54)	117 (66.86)	81 (64.29)	
	Leg	18 (30.51)	22 (12.57)	25 (19.84)	

*Chi-square test

DISCUSSION

This study aimed to provide an epidemiological and clinical presentation of cutaneous Leishmaniasis (CL) in the Mohmand district over the past year. CL remains a public health problem. Our main findings show that most participants were young, male, and of low socio-economic status. Our study showed that males were predominantly more affected. Similarly, another study conducted in Baluchistan also reported that males are affected by CL.[14] A previous research study noted that both sexes were susceptible to a specific disease. However, an intriguing observation was made-the incidence of the disease was more prevalent in males, constituting 58% of the reported cases. This trend was not isolated, as similar findings were documented in other investigations conducted in different regions of Iran, specifically in Kermanshah and Fars Province.[14,15] The higher incidence of the disease in males was proposed to be influenced by a combination of factors. These factors encompassed various aspects such as

clothing practices, occupational engagements, travel patterns to regions with a high disease prevalence, limited access to health education, environmental conditions, and factors related to the presence and behavior of disease vectors.[15,16] The study also delved into the distribution of the disease across different occupational groups, revealing a noteworthy finding. Housewives exhibited the highest disease frequency, comprising 27.2% of the cases. This outcome was consistent with results from studies conducted in Qom Province and various urban and rural provinces in Iran. The heightened contamination among housewives was proposed to be associated with their economic activities, particularly those related to carpet weaving. Many housewives engage in the craft of knitting handmade carpets, often carried out in dimly lit basements or rooms. This specific environment provides conducive conditions for sandflies, the vectors responsible for transmitting the disease, to sustain their bloodsucking activities throughout the day. This insight into the occupational and environmental factors contributing to the disease's prevalence sheds light on the multifaceted nature of its epidemiology.[17] Our study showed that most of the participants affected by CL were children. Cutaneous Leishmaniasis predominantly affects children under ten years old, but adolescents and young individuals are also affected in areas with lower prevalence.[18] Previous study results indicate infections in older age groups, suggesting the spread of the disease to newly affected areas. Clinical symptoms associated with Leishmania parasites vary globally, with manifestations such as nodular, ulcerative, satellite lesions, lymphadenitis, and sporotrichosis, highlighting the diverse clinical presentations of CL.[12] In this study, the predominant observation was that most cases of Cutaneous Leishmaniasis (CL) displayed localized symptoms, with lesions primarily appearing on exposed body parts like the hands, nose, ears, and cheeks. This aligns with similar findings from studies conducted in Ethiopia and Turkey, where a notable percentage of lesions were also identified on the face.[19,20] The rationale behind the facial prevalence is linked to the challenge of effectively covering the face, leaving it vulnerable to sand fly bites during the crucial nighttime period, which is pivotal for the spread of the parasite.[21] Our results indicate a higher prevalence of multiple Cutaneous Leishmaniasis (CL) lesions among participants with a lower socio-economic status. This may be attributed to financial constraints, potentially hindering timely access to treatment.[14]

LIMITATIONS

The study acknowledges a significant limitation due to its short duration, complicating international comparisons in understanding Cutaneous Leishmaniasis (CL) epidemiology. To address this, the authors strongly recommend future research to extend its temporal scope for a more comprehensive view, enabling the capture of nuanced patterns. Additionally, the suggestion is made to enhance analytical depth by exploring associations with various socio-economic factors such as educational levels, human behavior, protein-energy malnutrition, population dynamics, and the introduction of nonimmune individuals. This approach is anticipated to unravel the intricate influences, contributing valuable insights for a more holistic understanding of CL epidemiology.

CONCLUSIONS

Our study concludes that Cutaneous Leishmaniasis (CL) is more prevalent among children, with a higher impact on males and individuals of lower socio-economic status. A significant association was identified between the location, number of lesions, and socio-economic status. However, lesion size, number, and location did not show any significant association with the age and gender of the participants.

CONFLICT OF INTEREST: None

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