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RATIO OF INCIDENCE OF CUTANEOUS LEISHMANIASIS AND SITE OF LESIONS IN DIFFERENT AGE GROUPS OF PATIENTS OF DISTRICT QUETTA, BALOCHISTAN, PAKISTAN

Farzad Khan Kasi[1], Haseeb Ahmed[1], Naurang Khan[2], Safdar Ali[1], Sana Ullah[3]*, Chand Kumar[1], Yasir Nazeer[2], Nabira Khan[4]

[1]**Department of General Medicine,** Bolan Medical Complex and Hospital, Quetta, Pakistan
[2]**Department of General Surgery,** Bolan Medical Complex and Hospital, Quetta, Pakistan
[3]**Department of Zoology,** University, of Balochistan (UOB), Quetta, Pakistan
[4]**Department of Psychiatry,** Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan
***Corresponding Author:** Sana Ullah. E. mail: syedsanakhan17.ss@gmail.com

Abstract

This study was carried out in the dermatology outpatient departments of several hospitals in Quetta District, including Mohtarma Shaheed Benazir Bhutto General Hospital, Sandeman Provisional Hospital, and Bolan Medical Complex Hospital. Five thousand thirty-two 5032 positive cases of cutaneous leishmaniasis were diagnosed in Quetta District between January 2023 and January 2024. The main objectives of this study were to compare the incidence of cutaneous leishmaniasis among age groups to the location of lesions of patients inside district Quetta. Samples from cutaneous leishmaniasis lesions can be obtained using various techniques, including skin scrapings, needle aspirates, and biopsies. A tiny needle is inserted into the lesion during a needle aspiration, which removes fluid or tissue fragments. The age group of 21–40 years old has the highest percentage of lesions (0.33%), while the age group under 1 year old has the lowest percentage of lesions (0.15%). The hand (825 instances), face (710 cases), and foot (533 cases) were the most affected locations among men, accounting for a total of 2819 cases (56.02% of the total). Of the 2213 cases (43.97% of the total) in females, the hand (1035 cases), face (310 cases), and foot (307 cases) were the most commonly afflicted. With 632 cases, Group A (children under 1 year old) has the fewest cases (12.55%). Group B (individuals aged 1 to 20) has 1380 instances (27.42%), whereas Group C (individuals aged 21 to 40) has 1630 cases (32.39%). Group D included 1390 instances (27.62%) of people aged 41 to 60. Cases progressively increased from January (1.33%) to March (2.04%). April (10.37%) and May (12.51%) saw a sharp spike in cases. June and July represent the highest percentage of instances (24.96% & 25.85%, respectively) in this trend of cases. Finally, our study shows that the affected body parts follow a gender-neutral distribution pattern, with the hand, face, and foot being the most typically impacted.

Keywords: *Age Groups, Body parts, Cutaneous leishmaniasis, Incidence, Quetta district*

INTRODUCTION

Cutaneous leishmaniasis is a protozoan illness transmitted through the bite of a female sand fly, and it is caused by the parasite Leishmania. These parasites are widespread in endemic regions of humans that have adequate sandfly vectors, and they are primarily detected in immunocompromised people (1). Of the several Leishmania species, about twenty are known to be capable of infecting humans. These species are responsible for three different types of clinical infections: cutaneous leishmaniasis (CL), mucocutaneous leishmaniasis (ML), and visceral leishmaniasis (VL) (2). In Pakistan, the prevalence of cutaneous leishmaniasis (CL) is on the rise. It is a significant public health issue in the nation, particularly in areas that border Afghanistan and in cities that have seen the greatest number of incoming refugees (3). A major public health concern, cutaneous leishmaniasis is a tropical illness that is common and sometimes ignored, affecting many different parts of the world. As Postigo pointed out, epidemics of both anthroponotic cutaneous leishmaniasis (anthroponotic CL) caused by Leishmania tropica (L. tropica) and zoonotic CL

caused by Leishmania major (L. major) have been reported in Pakistan. While L. major is more prevalent in the nation's rural areas, L. tropica is primarily found in metropolitan areas (4).

Cutaneous leishmaniasis is a major public health issue in the region and is common in Pakistan as well as nearby states including Afghanistan, China, Iran, and India (5). Leishmaniasis is one of the many skin illnesses that Pakistan is constantly at risk from. Regretfully, before 1935, there was no reliable documentation of leishmaniasis in Pakistan until an earthquake was detected in Quetta (6). An estimated 1.3 million people are diagnosed with cutaneous leishmaniasis each year, according to a WHO assessment. The countries with the greatest rates of cutaneous leishmaniasis in 2015 were Algeria, Brazil, Iran, Iraq, Syria, Afghanistan, Pakistan, and Colombia (7).

The World Health Organization (WHO) states that there is a wide global spread of this group of diseases. More than 1 billion people are at risk of contracting cutaneous leishmaniasis (CL), with an estimated 600,000 to 1 million new cases occurring each year worldwide. Records from the Global Health Observatory for 2021 show that 99 nations were classified as having an endemic case of leishmaniasis (8). The influence that the occurrence of cutaneous leishmaniasis has on the public's health, the individuals who are afflicted, and the places where the disease is common are what make it significant (9). The significance and importance of this study is to identifying high-risk populations, Guiding clinical practice and informing public health interventions.

Leishmaniasis is a dangerous and frequently fatal neglected tropical disease (NTD) that primarily affects the poorest of the poor. It is linked to immune system weakness, malnourishment, population displacement, and substandard housing, according to a survey (10). Over 12 million people worldwide are afflicted with cutaneous leishmaniasis (CL), a serious public health hazard that affects many different parts of the globe. According to the World Health Organization (WHO), the influx of non-immune individuals into endemic areas, population expansion, the activity of sand flies and rodents carrying the infection, and individuals who have recovered from lesions have all contributed to the maintenance of cutaneous leishmaniasis (11).

MATERIALS AND METHODS

RESEARCH AREA/ STUDY DESIGN

The study was carried out in the dermatology outpatient departments of several Quetta-area institutions, including Mohtarma Shaheed Benazir Bhutto General Hospital, Sandeman Provisional Hospital, and Bolan Medical Complex Hospital. Five thousand thirty-two 5032 positive cases of cutaneous leishmaniasis 2819 (56.02%) were male and 2213 (43.97%) were female from Quetta District between January 2023 and January 2024 were diagnosed. The parasitological confirmation of cutaneous leishmaniasis was present in all the chosen cases. As to the 2023 census, Quetta District had a total population of 2,595,492 people.

SAMPLE COLLECTION

Each participant who meets the eligibility requirements will have their diagnosis of cutaneous leishmaniasis verified by a clinical examination and laboratory analysis of skin lesion samples. Samples from cutaneous leishmaniasis lesions can be obtained using various techniques, including skin scrapings, needle aspirates, and biopsies. A tiny needle is inserted into the lesion during a needle aspiration, which removes fluid or tissue fragments. The process of skin scraping involves carefully removing cells, debris, and maybe parasites from the surface of the lesion. During a biopsy, a tiny bit of tissue from the lesion is surgically removed to examine it histopathologically. The region needs to be cleaned and, if required, sedated before beginning any surgery. Following collection, samples should be appropriately labelled, stored, and transported to the laboratory for further analysis, which may include microscopy, culture, or molecular testing for the presence of Leishmania parasites. Proper infection control measures should be followed to minimize the risk of transmission during sample collection. Samples should be collected, properly labelled, preserved, and then brought to the lab for additional testing for the presence of

Leishmania parasites by molecular testing, microscopy, or culture. To reduce the chance of transmission during sample collection, appropriate infection control procedures should be followed.

CLINICAL EXAMINATION

Examining skin lesions, which are usually characterized by nodules, ulcers, or papules, is the main goal of the physical examination. Examining lesions for size, color, texture, and discharge presence is a serious task. A skin biopsy may be necessary in certain circumstances to confirm the diagnosis by examining tissue samples under a microscope. By directly observing parasites in impression smears and skin biopsies stained with Giemsa stain, cutaneous leishmaniasis can be easily identified.

Fig. 1. Clinical examination of various affected body areas of both male and female

SCREENING OF CUTANEOUS LEISHMANIASIS

The visual examination is one component of the clinical screening; medical experts skilled in identifying CL patterns search for distinctive skin lesions such as ulcers, nodules, or plaques, frequently taking into account the lesions' location, size, and duration. Non-invasive tests (Some regions use

instruments like the Montenegro skin test (TST) or indirect immunofluorescence assay (IFA) to detect potential Leishmania exposure or antibodies), epidemiological history (Assessing travel history, potential sandfly exposure, and known CL occurrences in the area helps evaluate suspicion). These tests, however, might not be able to distinguish between an ongoing infection and prior exposure.

THE PROCEDURE OF SMEAR FOR LD BODIES TEST

A clean glass slide was labeled with patient details. A small amount of the collected sample was carefully placed in the center of the slide. The sample was evenly spread across the surface of the first slide using a second clean glass slide. A gentle circular or back-and-forth motion was employed to achieve a thin and uniform smear. The smear was left to air dry completely to facilitate fixation. Subsequently, the slide was heat-fixed by passing it over a flame multiple times.

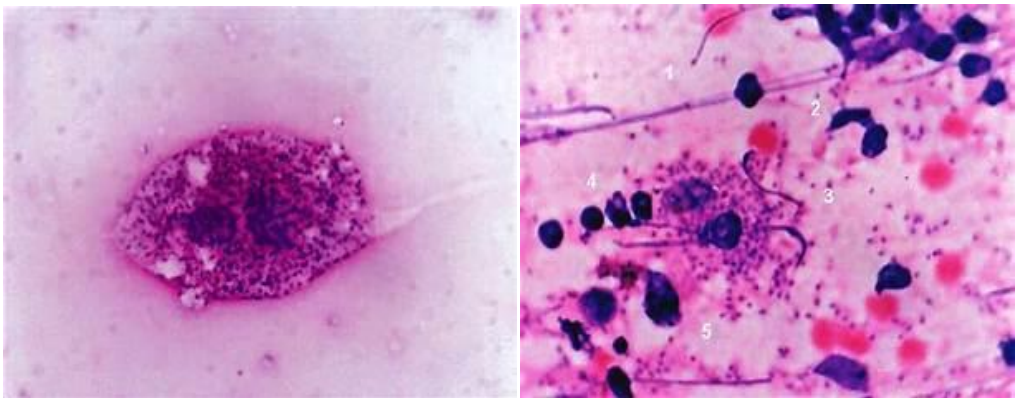

Fig. 2. Aspiration smear of cutaneous leishmaniasis using fine needles

This crucial step prevented the sample from being washed off during the subsequent staining process and ensured its adherence to the slide. Giemsa or Wright stain, commonly used for identifying LD bodies, was applied to the fixed smear. The staining procedure recommended for the chosen stain was followed, typically involving submerging the slide in the stain solution for a specified duration. Excess stain was meticulously removed by rinsing the stained slide under running tap water. The slide was then allowed to air dry completely. The stained smear was examined under oil immersion at high magnification, typically 1000x, using a light microscope. The focus was on identifying the distinctive amastigote form of LD bodies, characterized by small, ovoid to rounded shapes within host cells such as histiocytes or macrophages.

RESULTS

Out of the total 5032 number of patients diagnosed with cutaneous leishmaniasis, 2819 (56.02%) were male and 2213 (43.97%) were female. Male and female patients were separated into age groups ranging from under two years old to sixty years old. These categories are determined by the number of lesions and the body parts afflicted. The patients were divided in four age groups such as, < 1 years, 1-20 years, 21-40 years and 41-60- Years. The ethnic groups were Pashtuns, Hazaras, Balochs, Brahui and Punjabi.

Table I. Ratio of the typical number of cutaneous leishmaniasis lesions among age groups

Age groups	Positive case	Average lesions number	Lesions percentage
< 1 years	632	1	0.15
1-20 years	1380	2-5	0.25
21-40 years	1630	3-9	0.33
41-60- Years	1390	3-6	0.28

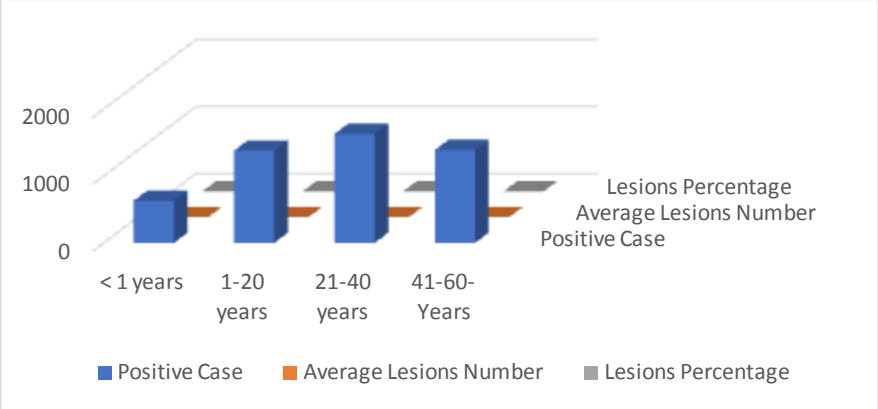

Fig. 3. Ratio of the typical number of cutaneous leishmaniasis lesions among age groups

Table I and Fig. 3 present the average number of lesions resulting from cutaneous leishmaniasis across various age groups. There were 5032 positive cases found in all. Across all age groups combined, there are 2.25 lesions on average. Of the infants under a year old, 632 had an average lesion count of 1, meaning that they constituted 0.15% of the positive cases. 1380 instances, or 0.25% of the total, were recorded in the age range of 1 to 20. The average number of lesions was between 2 and 5. A total of 1630 cases involving people in the age range of 21 to 40 years were found, with an average lesion count of 3 to 9, or 0.33%. In a similar vein, 1390 cases, averaging three to six lesions, were reported among those aged 41 to 60, representing 0.28% of the total. The age group of 21–40 years has the largest percentage of lesions (0.33%), followed by the age groups of 41–60 years (0.28%) and 1–20 years (0.25%). Lesions make up the lowest percentage (0.15%) in the age group under one-year-old.

Table II. Affected body parts of cutaneous leishmaniasis

Gender	Face	Foot	Hand	Leg	Lip	Nose	Neck	Internal Body Parts	Total	Frequency	p-value
Male	710	533	825	312	156	163	103	17	2819	56.02%	0.29
Female	310	307	1035	258	124	119	57	3	2213	43.97%	
Total	1020	840	1860	570	280	282	160	20	5032	100%	

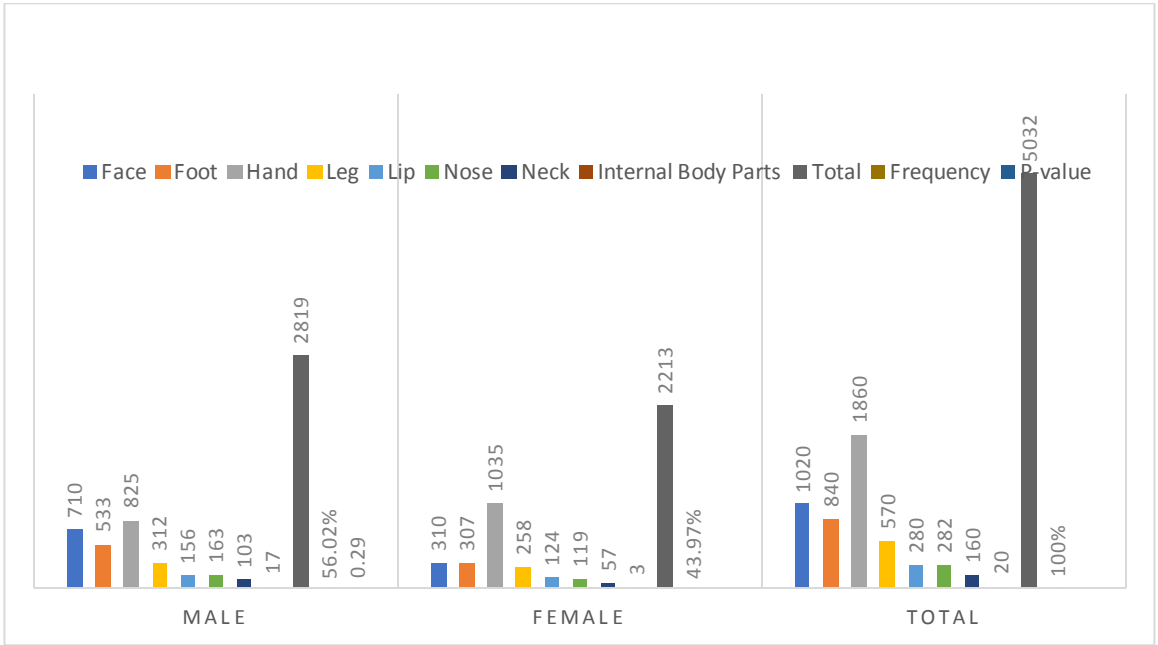

Fig. 4. Affected body parts of cutaneous leishmaniasis

The distribution of cutaneous leishmaniasis by gender about various body parts is shown in Table II and Fig. 4. The hand (825 instances), face (710 cases), and foot (533 cases) were the most affected locations

among men, accounting for a total of 2819 cases (56.02% of the total). Of the 2213 instances (43.97% of the total) in females, the hand (1035 cases), face (310 cases), and foot (307 cases) were the most commonly afflicted. The hand, face, and foot were the body parts most frequently afflicted overall, with a somewhat higher prevalence in males. A p-value of 0.29 from the statistical analysis suggested that there was no discernible gender-based variation in the distribution.

Table III. Affected individuals' age-wise presentation

S. No.	Groups	Age wise	Positive case	Percentage %	p-value
1	A	< 1	632	12.55 %	0.29
2	B	1-20	1380	27.42%	0.29
3	C	21-40	1630	32.39%	0.29
4	D	41-60	1390	27.62%	0.29

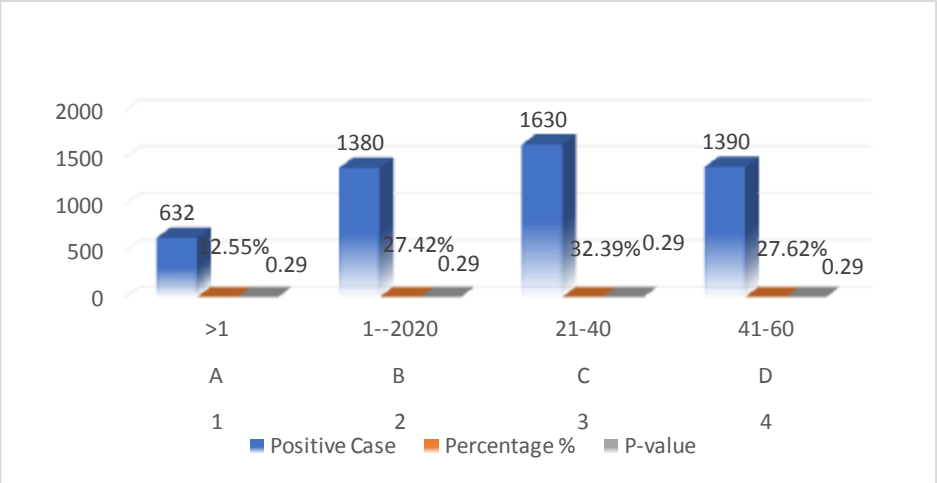

Fig. 5. Affected individuals' age-wise presentation

Cases of cutaneous leishmaniasis are categorized by age in Table III and Fig. 5. With 632 instances, Group A (children under 1 year old) has the fewest cases (12.55%). Group B (individuals aged 1 to 20) has 1380 instances (27.42%), whereas Group C (individuals aged 21 to 40) has 1630 cases (32.39%). Group D included 1390 instances (27.62%) of people aged 41 to 60. Notably, there is no discernible age-based variation in disease prevalence, as indicated by the p-value of 0.29 for all groups. Put more simply, all age groups are equally susceptible, although young people (21–40) exhibit a slightly higher occurrence.

Table IV. Site-specific distribution of cutaneous leishmaniasis

S. No.	Lesions on body parts	Frequency	Percentage
1	Face	1020	20.27 %
2	Foot	840	16.69%
3	Hand	1860	36.96%
4	Leg	570	11.32%
5	Lip	280	5.56%
6	Nose	282	5.60%
7	Neck	160	3.17%
8	Internal Body Parts	20	0.39%
	Total	5032	100%

The distribution of Cutaneous Leishmaniasis (CL) lesions throughout different body areas is shown in Table IV and Fig. 6. Of all the impacted sites, the face accounted for 1020 cases or 20.27% of all occurrences. The hand showed 1860 cases (36.96%), and the foot showed 840 cases (16.69%), in close succession. With 570 (11.32%) and 280 (5.56%) cases, respectively, the leg and lip were less impacted. There were comparatively fewer occurrences in the nose and neck, with 282 (5.60%) and 160 (3.17%) cases, respectively. Only a small percentage of instances (0.39%) affected internal body parts. With 5032 cases documented overall, a thorough picture of the distribution of CL lesions in various anatomical locations can be obtained.

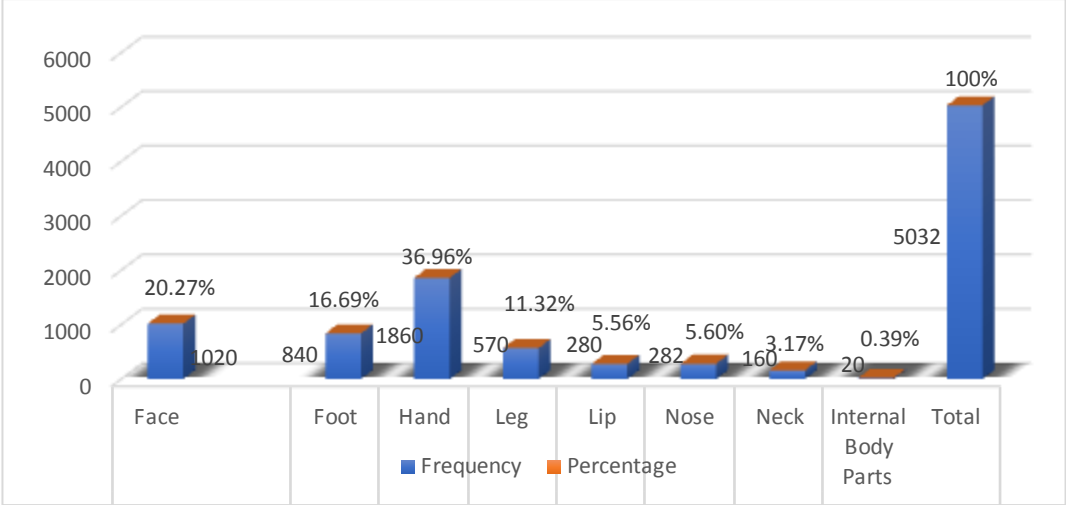

Fig. 6. Site-specific distribution of cutaneous leishmaniasis

Table V. Monthly incidence of cutaneous leishmaniasis in 2023–2024

S. No.		Months	Positive cases	Percentage of each month
1	Years 2023	January	67	1.33
2		February	87	1.72
3		March	103	2.04
4		April	522	10.37
5		May	630	12.51
6		June	1256	24.96
7		July	1301	25.85
8		August	403	8.00
9		September	198	3.93
10		October	149	2.96
11		November	131	2.60
12		December	117	2.32
13	Year 2024	January	68	1.35
Total			5032	100%

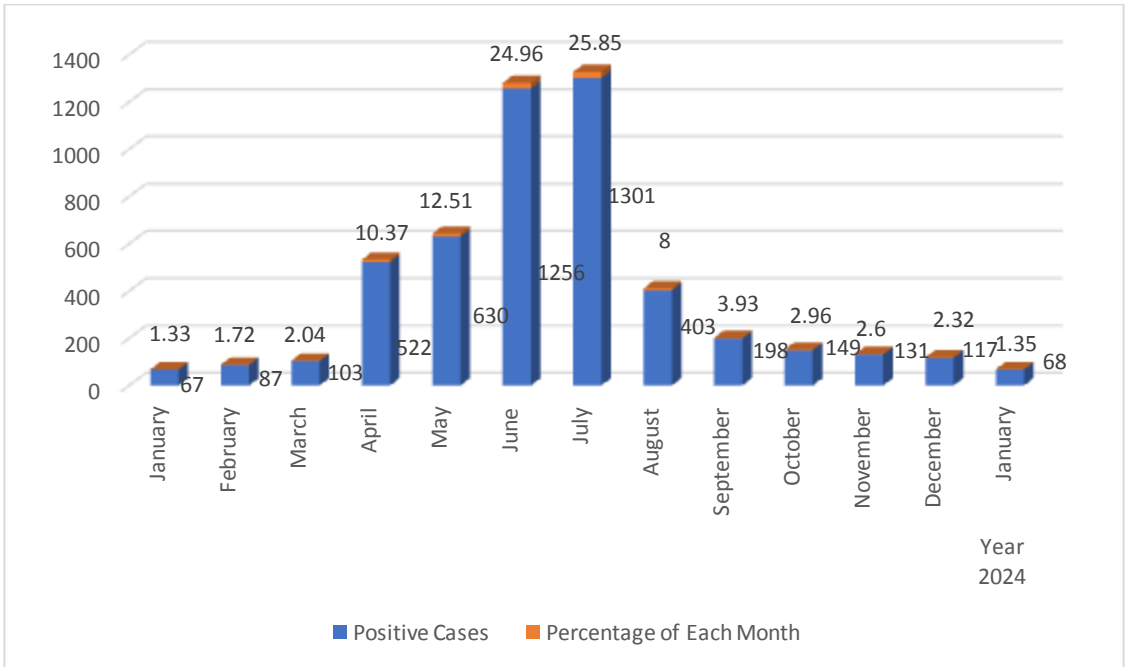

Fig. 7. Monthly incidence of cutaneous leishmaniasis in 2023–2024

A clear seasonal pattern for instances of cutaneous leishmaniasis (CL) in 2023–2024 is displayed in Table V and Fig. 7. From January (1.33%) to March (2.04%), cases progressively increase. April (10.37%) and May (12.51%) saw a sharp spike in cases. June and July see the highest percentage of instances (24.96% & 25.85%, respectively), representing over 50% of all cases. The percentage declines significantly (8.00%) in August and then gradually (3.93%), (2.96%), (2.60%), (November), and (2.32%) in September, October, and December. Interestingly, January 2024 keeps the low level (1.35%) at which it was in early 2023. According to this data, there appears to be a noticeable jump in CL cases in June and July, which may be related to an increase in sandfly activity and outdoor exposure.

The study's results demonstrate the considerable incidence of cutaneous leishmaniasis (CL) in Pakistan's Quetta District, where 5032 confirmed cases were identified in just one year. The hand, face, and foot are the most often impacted body parts, according to our data, which also shows a gender-neutral distribution pattern among affected body parts. While young individuals (ages 21 to 40) show a slightly higher prevalence, the disease appears to affect all age groups equally. In addition, the seasonal incidence pattern shows a significant rise in the summer, which is probably related to increased outdoor exposure and sandfly activity. These revelations highlight the pressing necessity for all-encompassing control strategies to lessen CL's effects in the area.

DISCUSSION

The incidence of cutaneous leishmaniasis and the location of lesions in patients of various age groups in the district of Quetta, Balochistan, Pakistan, are summarized in the current study and its findings. The age group of 21–40 years old has the largest percentage of lesions (0.33%), followed by that of 41–60 years old (0.28%) and the age group of 1–20 years old (0.25%). Lesions make up the lowest percentage (0.15%) in the age group under one-year-old. Several significant findings and their ramifications will be the main topics of discussion.

First off, over a year, the study found 5032 confirmed cases of CL, suggesting a significant disease burden in Quetta District. The significance of treating CL as a public health priority in the area is highlighted by this finding. The significant number of cases underscores the continued difficulty in effectively managing CL, despite efforts to control the condition.

Secondly, the distribution of CL in various body parts was investigated; the hand, face, and foot were the most often affected regions. This result is consistent with earlier studies that showed them to be frequent locations for CL lesions. The majority of lesions on exposed locations indicate that outdoor activities can be a major factor in the spread of CL. Consequently, treatments aimed at changing behavior, such as donning insect repellent and protective clothes, may help lower the spread of disease.

Thirdly, the analysis of the age distribution of CL patients in the study showed that young adults between the ages of 21 and 40 had a somewhat greater prevalence. All age groups were discovered to be equally vulnerable to the illness, though. This research emphasizes the value of focusing interventions on all age groups as opposed to just a few demographic groupings. It also emphasizes the necessity of early detection and treatment plans in order to avoid complications and lessen the spread of disease.

Fourthly, there was a noticeable surge in the seasonal incidence pattern of CL over the summer, specifically in June and July. This discovery aligns with the established seasonal patterns of sandflies, which serve as the primary carriers of the parasite that causes CL. Given that summertime is when instances peak, it is possible that environmental elements like humidity and temperature may have an impact on sandfly activity and breeding. Thus, to lower sandfly numbers and stop CL transmission during peak seasons, specific vector management strategies like insecticide spraying and environmental adjustments could be used.

Additionally, our research showed that the hand (825 instances), face (710 cases), and foot (533 cases) were the most affected locations among men, accounting for a total of 2819 cases (56.02% of the total). Of the 2213 instances (43.97% of the total) in females, the hand (1035 cases), face (310 cases), and foot (307 cases) were the most commonly afflicted. The hand, face, and foot were the body parts most frequently

afflicted overall, with a somewhat higher prevalence in males. Other endemic regions have also found the same gender distribution pattern, which could be explained by variations in sandfly bite exposure brought on by behavioral or occupational characteristics. The properties of the parasite species, the local ecological features of the transmission locations, the human population's exposure to the parasite in the past and present, and the vast range of human behaviors all influence the epidemiology of leishmaniasis (12).

A report states that 34 CL cases were documented in the town of Tlemcen between 2012 and 2016. The highest incidence in 2013 was 11 cases (32.35%); this can be attributed to either an outbreak that year or an improved method of disease declaration. The lower number (three instances) in 2014 could be the result of precautions taken after the 2013 peak (13).

In various areas of KP, including Karak, Hangu, and Kohat districts, there were over ten lac internally displaced people (IDPs), according to a 2013 WHO study (14). Visceral and cutaneous leishmaniasis are two of the three main forms of leishmaniasis that are endemic in Pakistan. Numerous investigators have documented endemic Zoonotic and Anthroponotic CL in different regions of the nation (15). When CL was tested in various age groups, it was discovered that younger people were more affected.

Since children are a common target demographic for leishmaniasis, the majority of research has concentrated on the treatment as well as the epidemiology and diagnostic elements of the illness, according to a report. As a result, only a small number of research have looked into age groups of children (16). As far as the authors are aware, only a very small number of research have looked into and explored the clinical spectrum of this condition in affected children, despite Iran being one of the few main endemic sources of CL infection.

In Bam, in the southern part of Iran, 117 children with leishmaniasis were the subject of a study by Talari et al. The face accounted for 47% of all lesion sites, followed by the upper (19.7%) and lower (16.3%) extremities. The age group most frequently afflicted was 6 to 8 years old. The most common clinical characteristics were erysipeloid, papulonodules, sporotrichoid impetigo, and ulcers (17).

According to a study on the prevalence and comparative analysis of cutaneous leishmaniasis (CL) carried out in Pakistan's Dargai Region, the native population had a higher prevalence of CL (61%) than refugees (39%). Although the cause of the increased infection among the people is unclear, it has been suggested that the infection is new to this location. Given that CL has been present in Afghanistan for a considerable amount of time, the immunologically local population is therefore more vulnerable to the infection than the refugees, who are assumed to have built protective immunity against the illness (18).

The 1.5% of patients who saw the BMH Dermatology Department between May 2012 and May 2018 had CL overall. This is significantly less than the prevalence found in comparable research conducted in Ethiopian health facilities, like Addis Ababa 14.2% (19). Even though CL is not very common throughout Ethiopia, certain community-based cross-sectional surveys from different regions demonstrate surprising variation, with prevalence ranging from 2.3% to 14.0% (20).

CONCLUSION

The study's results demonstrate the considerable incidence of cutaneous leishmaniasis (CL) in Pakistan's Quetta District, where 5032 confirmed cases were identified in just one year. The hand, face, and foot are the most often impacted body parts, according to our data, which also shows a gender-neutral distribution pattern among affected body parts. While young individuals (ages 21 to 40) show a slightly higher prevalence, the disease appears to affect all age groups equally. In addition, the seasonal incidence pattern shows a significant rise in the summer, which is probably related to increased outdoor exposure and sandfly activity. These revelations highlight the pressing necessity for all-encompassing control strategies to lessen CL's effects in the area. At dusk, wear long sleeves and pants and apply bug repellent containing DEET. Inform local populations on CL, how it spreads, and how to avoid it.

Limitations of the Study:

There were several limitations to the current investigation. The results may not be fully indicative of all endemic areas in Pakistan because the study was limited to a single district in Balochistan, Pakistan, and

included 5032 respondents through a convenient sampling method. Additionally, there is a chance that outpatient data may introduce sampling bias, and the study relies solely on clinical diagnosis without molecular confirmation.

Conflict of Interest:

Authors have no conflict of interest.

Acknowledgement:

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