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Original Article

Epidemiological Status of Cutaneous Leishmaniasis in Different Colonies of District Dera Ismail Khan, Khyber Pakhtunkhwa Province

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Abstract

This study aimed to assess the occurrence of leishmaniosis in certain colonies of District Dear Ismail Khan in the KP province of Pakistan. The diagnosis of cutaneous leishmaniasis may be quickly and readily confirmed by directly examining an impression smear taken from the lesion. The smear was stained using either Giemsa or Wright stain. The amastigote type of the parasite is readily identifiable both within and outside active lesions. The diagnosis of visceral leishmaniasis was confirmed by detecting the presence of the leishmania parasite in a Giemsa smear, together with the consideration of demographic information and physical indicators exhibited by the patients. 205 cases were collected from OPD of the dermatology unit of DHQ Hospital Dear Ismail Khan. Data was collected from Dec 2023 to May 2024. For 06 months period, 205 positive cases were identified. In this study, all cases were of cutaneous leishmaniasis. The commonly affected age group was 16-30 years (44.3%) and more males were among this group. The presence of CL infection poses a significant health risk to the local people of District Dear Ismail Khan. The findings of this study might assist health authorities in promptly addressing this little ailment. In addition, the healthcare department should organize seminars and awareness efforts for the local population.

Keywords: Epidemiological Status, Cutaneous Leishmaniasis, Prevention, Outpatient Department, Quantitative Analyses.

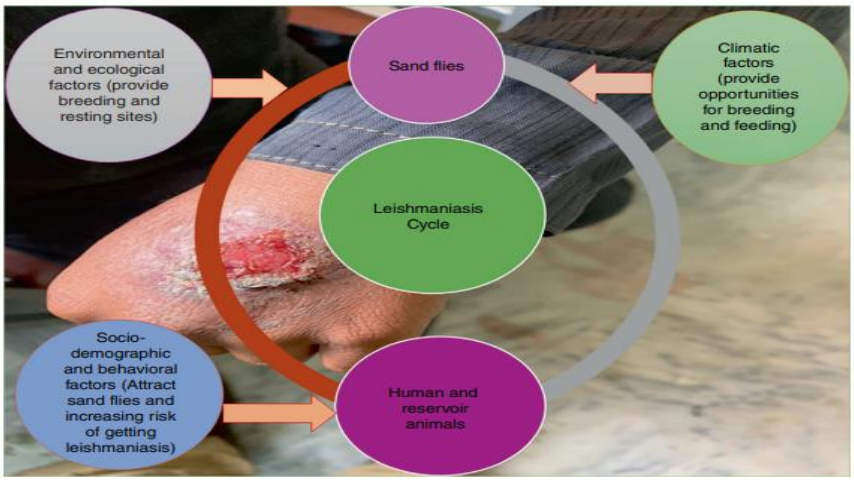
Introduction

The ability of cutaneous leishmaniasis (CL) to imitate nearly every kind of dermatosis has earned it the nickname "the great imitator." Misdiagnosis, leading to improper treatment and morbidities, can occasionally occur due to these similarities. When parasitic elements interact with the host immune response, atypical forms emerge. The normal course of CL can be altered by secondary infections or improper treatment, leading to cases that are both unusual and difficult to diagnose. If you have a persistent, painless skin abnormality resembling erysipelas, dermatitis, verruca, herpes zoster, paronychia, or sporotrichosis, it is advisable to investigate the possibility of atypical leishmaniasis. Alternate diagnoses may need to consider less prevalent conditions such as sarcoidosis, deep mycosis, basal and squamous cell carcinoma, cutaneous lymphoma, or lesions that resemble lymphomas (Gurel, 2020). Leishmania tropical and Leishmania major are the causative agents of Cutaneous Leishmaniasis (CL), which is a prevalent illness in Khyber Pakhtunkhwa, Pakistan. The world's ninth most frequent skin illness is this form of leishmaniasis. Sandfly vectors are a significant source of parasites in endemic parts of the world, which mostly affect those with impaired immune systems. In areas where leishmania is prevalent, such as the Mediterranean, Asia, Africa, the Middle East, and Europe, over twenty distinct species can cause infections. Human infections by the three species include visceral leishmaniasis (VL), also referred to as kala-azar, cutaneous leishmaniasis (CL), and mucocutaneous leishmaniasis (MCL). Humans can contract the leishmanial (promastigotes) parasites from female sandflies of the species. Phlebotomus, according to the study. The sand fly injects promastigotes contained in its saliva into the victim after sucking blood from it (Afsheen, Riaz, & Khan, 2021).

Leishmaniasis is an often-disregarded vector-borne parasitic disease caused by more than 20 species of the Leishmania genus and can manifest a broad range of symptoms. Among the risk factors, include inadequate housing, migration, hunger, and poverty. The incidence of this phenomenon is increasing in several areas throughout the globe, such as Syria, Turkey, and Jordan, because of the refugee crisis and the migration resulting from armed conflict. Imported leishmaniasis is becoming an increasingly serious disease, and one reason why is the rise in international travel. Approximately 600,000 to 1 million new instances of cutaneous leishmaniasis (CL) arise year worldwide, rendering it the predominant manifestation of the illness. Since CL can cause long-term psychological repercussions, stigmatization, permanent scar formation, and a lower quality of life, it is a disorder that should be recognized and treated even when it is not lethal (Gurel, Tekin, & Uzun, 2020). The species of Leishmania can cause either of three main clinical symptoms: The characteristic of localized cutaneous leishmaniasis (CL) is cutaneous ulcers that are sometimes associated with satellite lesions and/or nodular lymphangitis. Both visceral leishmaniasis (VL) and mucocutaneous leishmaniasis (MCL) affect internal organs including the liver, spleen, and bone marrow, as well as underlying connective tissues like cartilage structures and CL illness. However, less commonly, VL can be deadly much as MCL can. American tegumentary leishmaniasis (ATL) is a fourth disease caused by species of New World Leishmania. It mainly manifests as MCL and CL, but it also includes very rare variants including diffuse and disseminated CL. However, less commonly, VL can be deadly much as MCL can. American tegumentary leishmaniasis (ATL) is a fourth disease caused by species of New World Leishmania. It mainly manifests as MCL and CL, but it also includes very rare variants including diffuse and disseminated CL (de Vries & Schallig, 2022). The primary focus of this study was to investigate the current epidemiology, diagnosis, and management of Cutaneous Leishmaniosis (CL) in the KP region of Pakistan, as there is less knowledge on the occurrence of CL and the efficiency of its treatments in this area. (Iqbal *et al*., 2022). Presently available World Health Organization (WHO) studies state that leishmaniasis are native to every continent save Oceania. They are native to the Mediterranean basin, the tropics and subtropics. According to the World Health Organization (WHO), there are 12 million cases of this class of neglected diseases and 20,000–40,000 deaths in 98 countries per year (Sabzevari, Teshnizi, Shokri, Bahrami, & Kouhestani, 2021). Though congenital, transfusion, and human-to-human transmission via contaminated needles have also been documented, anthroponotic or zoonotic transmission by phlebotomine sandflies is the primary mode of transmission for Leishmania species. Depending on the parasite type, vector genus, and geographic area, dogs, rodents, or humans are often the main vectors of transmission. Around 90 different species of sandflies are known to transmit disease in the Old World and the New World, respectively. Here in the Old World and there in the New. Approximately twenty distinct kinds of Leishmania parasites infect humans; these parasites are transmitted by phlebotomine sandflies, which are most active at night and first thing in the morning (Gurel *et al.*, 2020).

Figure 1

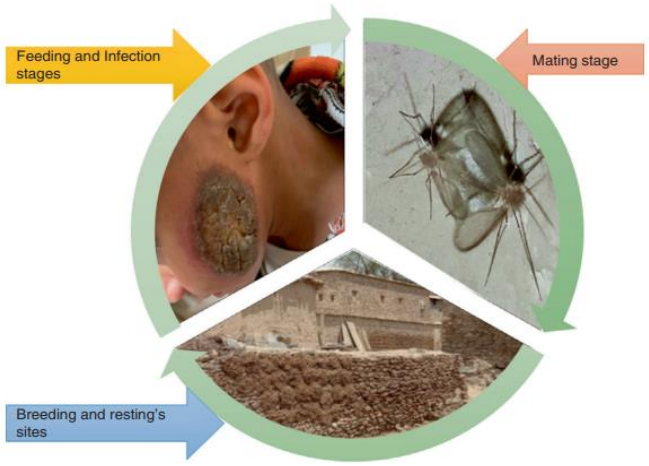
Flow Chart of Risk Factors Associated with Cutaneous Leishmaniasis.



When a female sand fly bites an infected patient, it suckers up the leishmanial amastigote form from the blood. Massive division results in the promastigote form, which is made up of an enormous number of flagellates. Without infecting the salivary glands, it advances to the anterior portion of the alimentary canal. Human first-line cells, the macrophages, pick up (phagocytose) the promastigotes that the sand fly inoculates. Upon entering macrophages, promastigote cells shed their flagella and undergo a metamorphosis into amastigote cells, which proliferate by binary fission. Notorious amastigote forms physically kill infected macrophages by rapidly replicating. After killing a macrophage, the liberated amastigotes infect nearby healthy macrophages, and the cycle repeats at full speed until all human immunocompetent cells have been eliminated, at which point an immunosuppressed condition develops. Parasites' final destinations are unclear since they are dependent on both the parasite and the host (Mumtaz, Munir, Asghar, & Naheed, 2016).

Figure 2

Breeding and feeding life cycle of Sand Fly



WHO (2017) reported the most affected countries with Cutaneous Leishmaniasis including Pakistan, Afghanistan, Albania, Kuwait, Lebanon, Algeria, Argentina, Azerbaijan, Belize, Mali, Brazil, Bulgaria, Cameroon, Tunisia, China, Colombia, Egypt, Ethiopia, Spain, Malta, Sri Lanka, France, Georgia, Guatemala, India, Jordan, Kazakhstan, Kenya, Libya, Mexico, Morocco, Namibia, Niger, Nigeria, Oman, Peru, Portugal, Saudi Arabia, Senegal, Croatia Slovenia, Sudan, Tajikistan, Syrian Arab Republic, Taiwan Republic of China, Greece, Thailand, Iran, Iraq, Turkmenistan, Turkey, Costa Rica, United State of America, and Yemen (Ihsanullah *et al*., 2021). Nearly eighty percent of cutaneous leishmaniasis cases were reported from countries in the Eastern Mediterranean, such as Afghanistan, Iran, Saudi Arabia, and Pakistan. Infected female sand flies (Diptera Psychodidae) bite humans, transferring the Leishmania species that cause the sickness (Organization, 2023). Visceral leishmaniasis is rare in the northern regions of Pakistan (Gilgit Baltistan province, Malakand, Hazara divisions, Azad Jammu and Kashmir), however cutaneous leishmaniasis is widespread and endemic across Pakistan with regularly recorded outbreaks. Because of the widespread assumption that native Pakistanis are carriers of cutaneous leishmaniasis, the illness has migrated from regions of Pakistan where it is endemic to others where it is not. In this nation, cutaneous leishmaniasis can be caused by Leishmania tropical, Leishmania major, or, very rarely, Leishmania infantum (Khan *et al*., 2022)

First recorded in Pakistan, it occurred in 1960. It was originally mostly found in the northern mountainous area, but it has already spread across the nation, affecting nearly all of it. It is now endemic in Baluchistan, Multan, and interior Sindh. Pakistan has classic types of sickness as well as some uncommon presentations such as chancriform, palmoplantar, acute paronychial, zosteriform, erypsipeloid, and annular forms. The sand fly vector of species Phlebotomus and Lutzomyia determines the geographic spread of cutaneous leishmaniasis. Sandflies are nocturnal, wet creatures. Following their feeding on the diseased animals, they get leishmania, which stays with them and makes them a vector for the disease. It can thereafter spread the parasite to humans and other animals. Sandflies are not like mosquitoes. It is a little (2-3 mm) quiet flier that may readily get through mosquito nets. They are busier and more productive in the evening and at night. This illness mostly manifests as zoonosis in many other species that are more common in rural and forest areas. Skin test for leishmania shows an earlier, asymptomatic illness. About 9% of the healthy residents of the endemic regions have it positive. More frequently occurring in Pakistan and India is simple cutaneous leishmaniasis brought on by L. tropical. A relatively typical host for the parasite is man. (Mumtaz *et al*., 2016). Cases of cutaneous leishmaniasis have increased in Pakistan's northwest province of Khyber Pakhtunkhwa and are common in regions along the Pakistan-Afghanistan border, particularly in the region's amalgamated tribal districts. Aside from having, the longest northwest border with Afghanistan a country known for its cutaneous leishmaniasis. Epidemic in Khyber Pakhtunkhwa also happens to be home to some of the region's most important trading posts and a major entry point for Afghan refugees, who established refugee camps in different parts of the province. As a result of the disease's expansion from endemic to non-endemic locations, national and international health authorities are facing a serious challenge (Khan *et al.*, 2022).

Materials and Methods

This study was carried out at the Pathology Laboratory of DHQ Hospital, Dear Ismail Khan, Pakistan, to document the prevalence of cutaneous leishmaniasis and associated treatments in the district of Dear Ismail Khan, Pakistan. The study received ethical approval from the Institute of Skin Disease, Dear Ismail Khan (ISD Dear Ismail Khan). We conducted clinical investigations on 205 patients who were suspected and who were seen regularly at the ISD Dear Ismail Khan with active lesions. The following details were gathered from every individual: name, father's name, age, profession, sex, location of the lesion, number of lesions, date of initial symptom, residence, ethnic background, medical history, previous diagnosis by microscopic examination and/or biopsy, relatives afflicted by the condition, and so on. We used a pre-designed Proforma to enter the data. The patient was interviewed face-to-face to collect data on several factors. Images of the growth were captured using a digital camera on a mobile device.

Biopsy Samples

Clinical indications of skin infection were used to obtain samples of skin lesions. We used 100% ethanol to disinfect and sterilize skin lesions before collecting them. Between the thumb and fingers, the lesions were pierced. One side

of the slide contains skin-scrap samples collected from the lesion's pierced boundary using a sterile blood lancet. The examination slide had a heavy smear applied to one side, which was then fixed in 100% methanol for half an hour. A serial number was permanently imprinted into the slides.

Blood Samples

A small amount of peripheral blood was carefully transferred to the test tube using a syringe. After blood samples were collected, they were spun at 3000 rpm for half an hour. The Buffy coat was applied to the research slides in a thin layer using a pipette and then fixed in 100% methanol for half an hour. The slides were given a quick washing with water to remove any excess stain before histology and then let to air dry.

Staining and Diagnosis by Microscopy

Identifying cutaneous leishmaniasis is as simple as looking for the parasite in Giemsa-stained skin biopsies or impression smears (Pereira *et al.*, 2023). Following a duration of 30 minutes within a container specifically designed for staining, desiccated and delicate slides that had been previously treated to preserve their integrity, and which contained blood and skin lesions from individuals afflicted with the parasite, were fully submerged in a solution of Giemsa stain that had been prepared for immediate use. Following staining, the slides were allowed to air dry before being gently rinsed with water and then air dried once more. To identify the protozoan parasite, namely the Leishman Donovan bodies, the slides were examined using a microscope with an oil immersion objective set at a magnification of 10 x 100. One positive instance was identified when Leishman-Donovan (LD) corpses were found in the smear.

Results and Findings

During Six Months period, 205 cases were identified. These Patients were residents of different Colonies of Tehsil Dera Ismail Khan like Chakan, Marhaba Colony, Kutti, Muneez Abad, Zafar Abad Colony, Mochi Wanda, Gara Hayat, Qurashi Morr, Muryali.

Colonies Wise Distribution of CL Prevalence

The 205 individuals (Active CL lesions) were recorded from 10 Colonies of district Dera Ismail Khan via questionnaire. The highest prevalence was in Naiwala (17%), followed by Gara Hayat (12.1%), Chakan (11.2%), and Muneez Abad with 10.7% (Figure 1).

Table 1
Colonies-wise Distribution of Cutaneous Leishmania Prevalence

Area	Number affected	Male	Female
Chakan	23	18	05
Marhaba Colony	14	10	04
Kutti	20	13	07
Muneez Abad	22	16	06
Zafar Abad	10	06	04
Mochi Wanda	15	10	05
Naiwala	35	25	10
Gara Hayat	25	22	03
Qureshi Morr	20	16	04
Muryali	21	18	03

Figure 3
Colonies-wise Distribution of CL Prevalence

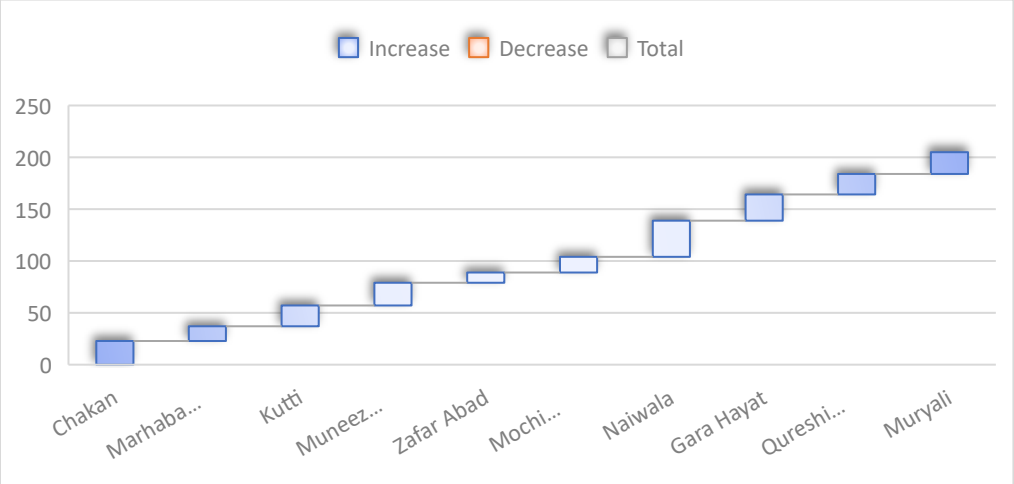


Table 2
Distribution by Age Group

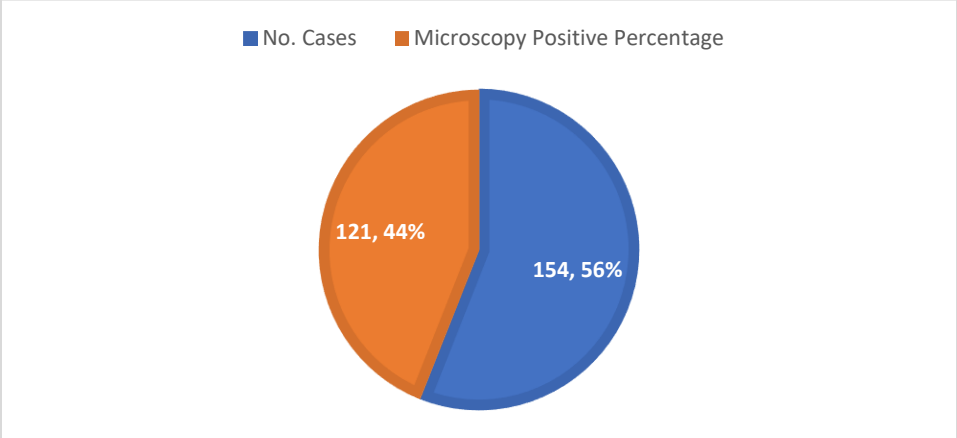
Age group in years	Frequency and %age
0-5	07(3.4%)
6-15	26(12.6%)
16-30	91(44.3%)
31-45	56(27.3%)
46-55	15(7.3%)
56	10(4.8%)

The research was carried out from January to June 2024 to ascertain the frequency of cutaneous leishmaniosis among 205 inhabitants of the D.I. Khan district. In the study, 205 individuals were examined. Out of them, 151 individuals (73%) were diagnosed with cutaneous leishmaniasis. Among the affected individuals, 121 were males (80%) and 30 were females (20%). The age range of the individuals spanned from birth to 70 years, with zero representing the period from the first day of life to one year.

Table 3
Gender-Wise Frequency of Cutaneous Leishmaniosis

Gender-wise frequency of cutaneous leishmaniosis		
Gender	No. Cases	Microscopy Positive Percentage
Male	154	121
Female	51	30

Figure 4
Gender-Wise Frequency of Cutaneous Leishmaniasis



Discussion

According to published literature, CL is broadly spread in infection-free areas of Pakistan and constantly scattered in various regions of the country (Hossain *et al.*, 2017). It is recommended that infection-free regions with nearby CL endemic regions are at huge risk (Jamal *et al*., 2013). Concerning this district, Malakand is at a high-risk area for CL owing to sharing borders with endemic regions like Upper and Lower Dir. Therefore, a current study was aimed to determine the status of CL in different villages in the district of Malakand KPK, province. We observed the highest incidence of active lesions in different parts of the body (Table 3 & Figure 2) in the native population of the study area. Similarly, the native shared their accommodation with migrants (IDPs) of the hilly areas who visited with their cattle, which may promote vector-borne parasitic diseases. In 2013, WHO published a report and claimed that more than 1 million IDPs are settled in different districts of KP province (Organization, 2013). Amongst the 3 main forms of leishmaniasis, cutaneous leishmaniasis, and visceral leishmaniasis are more prominent in Pakistan (Abdullah *et al*., 2021). Leishmaniasis is prevalent in several regions worldwide, particularly in tropical nations. Asian communities predominantly consist of residents from economically disadvantaged areas with below-average living conditions. These people seem to be more prone to vector-borne illnesses. According to Durrani, leishmaniasis is a major health problem in China, Afghanistan, Iran, India, and Pakistan (Durrani, Durrani, Kamal, & Mehmood, 2011). The present investigation was conducted throughout the winter season. In the past, there have been reports of a high incidence rate during the winter season (Amin, Al-Mohammed, Kaliyadan, & Mohammed, 2013). However, separate research documented its elevated occurrence throughout the summer season. The variance seen in various research may be attributed to the local climate and its impact on the activity of the host vector. Furthermore, the insect is known to be more active in damp conditions and to seek out areas with an adequate supply of moisture (Iqbal *et al.*, 2022).

Conclusions

It is concluded from existing epidemiological data that the local population of District Dera Ismail Khan has a health-threatening problem from CL infection. To make a diagnosis of an atypical CL lesion, it is necessary to evaluate the patient's geographical location, medical history, and the lesion's natural progression. The present study can be beneficial for the district of DIKhan's disease control cell to identify specific regions and take appropriate action for its management. The age range of 16 to 30 should be shielded to reduce the infection rate. To slow the disease's course and contain its spread, the most suitable diagnostic approach should be used to identify CL if it is being considered. Since there is currently no vaccine to prevent leishmaniasis, prevention strategies rely on maintaining good personal

cleanliness, protecting oneself from sand fly bites, and controlling reservoirs and vectors. Controlling leishmaniasis is still a challenging endeavor; eliminating the illness is an even more formidable one.

Recommendations, Limitations, and Future Directions

Since the adult flies are most abundant on their breeding grounds between the final week of August and December, we recommend spraying with various non-conventional insecticides to reduce its vector currently. Data was collected from a sample of a relatively small city of Dera Ismail Khan, where if resources allow, studies could include more cities to generalize the results and get a better comprehension of the problem understudy for the development of strategies, prevention measures, and policy guidelines.

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Declaration of Interest

The authors declare that there is no clash of interest.

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