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## Original article

# Determination of infection rate of cutaneous leishmaniasis among patients attending dermatology hospitals in Khartoum

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**Background:** Cutaneous leishmaniasis (CL) is an endemic disease in Sudanese patients presented to Dermatology hospital in Khartoum. **Objectives:** The present study is intended to extrapolate data on the occurrence of CL among patients attending the Dermatology Hospital in Khartoum. **Methods:** This was observational cross sectional laboratory based study. Clinical examination of people attending Dermatology Hospital in Khartoum during 2020-2022 revealed various dermal infections. Samples included all patients attended during the period of study. Among such patients those presented with cutaneous lesions were selected and asked for participation. Then investigations for confirmed CL were performed. **Results:** The study showed that except for few cases 5 (8%) most of the clinically examined cases were positive for (CL) caused by *Leishmania major*, the most affected age group was (28-40) years. Comparison of infection rate among soldiers and non soldiers, it was higher in soldiers (60%) than non soldiers (40%). The results indicated that age and occupation may have impact in the prevalence of the disease. These are considered as new findings regarding Sudanese patients. **Conclusion:** On the basis of positivity, patients coming from Darfour had more rates of CL than other states, this can be attributed to several factors such as fly abundance and inadequate vector control.

## Introduction

Leishmaniasis is vector-borne parasitic disease caused by, *Leishmania* species [1]. They are endemic in many tropical and subtropical regions in at least 88 countries of the world. The annually estimated incidence of the infection is 1.0 -1.5 million cases of cutaneous leishmaniasis (CL) which is the most common form and 500,000 cases of the visceral form [2]. The agents of CL in eastern Africa are principally *L.tropica, L.major, and L.aethiopica*, with different clinical outcomes. **Zijlstra and el-Hassan** [3] reported that CL in Sudan is caused by *L.major* and the strain was zymodeme LON-1, *L.tropica* is known to occur in neighboring countries such as Egypt, Kenya and Ethiopia [4,5].

In Sudan, the first cases of CL were reported by Thompson and Balfour in 1910. Since then many reports documented the occurrence of disease in Blue Nile and Darfur provinces. *Phlebotomus papatasi* is considered the principle vector of CL in Sudan [6].

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The present study is intended to extrapolate data on the occurrence of CL among patients attending the Dermatology Hospital in Khartoum

**Materials and Methods**

This was observational cross sectional laboratory based study. Clinical examination of people attending Dermatology Hospital in Khartoum during 2020-2022 revealed various dermal infections. Samples included all patients attended during the period of study. Among such patients, those presented with cutaneous lesions were selected and asked for participation. Then investigations for confirmed CL were performed. A structured questionnaire was applied for each patient.

Most of the patients were soldiers, sixty male patients were grouped into 3 groups namely group A (12-27 years), group B (28-40 years) and group C (>40 years). Information regarding their homeland, age, occupation was obtained from those who were willing to participate. Lesions and the adjacent normal looking skin around them were cleaned and disinfected. Skin biopsies of 4mm diameter were taken aseptically from the border of ulcers using disposable scalpel blade. The blade was turned 90 degrees and scraped along the cut edge of the incision to remove and picked up small pieces, used for smearing. Smears were prepared by rolling biopsy on glass microscopic slide. After smears were dried completely, they were fixed with absolute methanol allowed to dry again and then stained with Giemsa stain and examined under microscope using 100 x magnifications [7].

**Statistical analysis**

Analysis was done by statistical package for social sciences(SPSS), Wilcxon signed- rank test was done.

**Results**

From the affordable patients attended hospitals during the period of study ,out of 65 patients examined at Dermatology clinics in Khartoum, 60(92%) were found to be positive by microscopic examination of stained skin smears **(Table1)** which also showed that 5(8%) were false positive. The causative agent was shown to be *L.major*. Positivity was determined by the presence of intracytoplasmic red to purple nuclei and kinetoplasts with light blue cytoplasm **(Figure 1)**.

When the positive cases were arranged according to age, the infection rates in the 3 groups were 21(35%) in group A, (28-40) in group B was 36 (60.7%) and (>41) was 3(5%) in group C **(Table 2)**.

Out of 60 positive patients the frequency of cutaneous infections in soldiers and non soldiers showed rates of 60% and 40%, respectively **(Table 3)**.

The residences of the patients were as follows 21,16,4 and 19 from Darfur, Khartoum, Kordofan and other states, their rates were 35%, 26.6%, 6.6% and 31.6%, respectively **(Table 4)**.

**Figure 1.** Amastigote of *Leishmania t.major*.

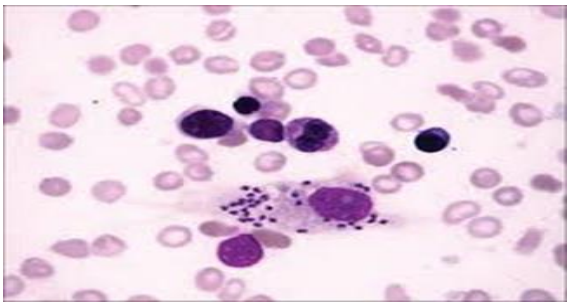

**Table 1.** Positivity of cutaneous leishmaniasis in examined patients at Khartoum dermatology hospital.

| Total number examined | No of positive cases (%) | No of negative cases(%) |
|---|---|---|
| 65 | 60 (92%) | 5(8%) |

**Table 2.** Frequency of cutaneous leishmaniasis in the examined patients according to the age.

| Group | Age group(years) | Frequency | % |
|---|---|---|---|
| A | 12-27 | 21 | 35% |
| B | 28-40 | 36 | 60% |
| C | >40 | 3 | 5% |
| | Total | 60 | 100% |

**Table 3.** The frequency of patients with cutaneous leishmaniasis according to occupation.

| Soldiers | Non soldier |
|---|---|
| 36(60%) | 24(40%) |

**Table 4.** Frequency of cutaneous leishmaniasis patients according to the residence.

| Area | Patients | % |
|---|---|---|
| Darfour | 21 | 35% |
| Khartoum | 16 | 26.6 |
| Kordofan | 4 | 6.6% |
| States | 19 | 31.6 |

## Discussion

Tentative diagnosis of CL relies on clinical presentation, history of living or visiting CL endemic areas and is confirmed by demonstration of *Leishmania* amastigotes in aspirates from lesions using invasive sampling technique and requiring microscopic expertise. Montenegro skin test (MST) is occasionally used in CL diagnosis ( e.g in epidemiological survey and vaccines studies ) because of its simplicity and its high sensitivity and specificity.

The first epidemic started in 1976 in the Shendi-Atbara area, about 170 km from the capital, Khartoum [8]. The second epidemic started in 1985 in Khartoum, apparently originating on Tuti, an island of some 20 000 inhabitants at the junction of the White and Blue Nile rivers in Khartoum province. From September 1986 to March 1987, almost 10 000 cases reported to hospitals in Khartoum province [9]. In 1985 cases were reported in a number of small villages on the White Nile River south of Khartoum.

The present study revealed that re-examination of CL patients showed that not all the smears were positive as 5(8%) were negative. This may be due to specimens taking or microscopic examination. The results obtained were found to be in agreement with those reported by **ELamin et al.** [10]. The results obtained indicated that the highest frequency of CL was shown by group B patient, whose ages ranged between (28-40) years. This is in agreement with the study done by **Weigle et al.** [11].

Such individuals have more outdoor activities so; they could be more exposed to sand flies transmission. Comparison between the infection in soldiers and non-soldiers showed higher rate in soldiers. In soldiers as their tasks and duties expose them to fly challenges and harsh environmental condition.

On the basis of positivity, patients coming from Darfour had more rates of CL than others states. This can be attributed to fly abundance as a result of inadequate vector control. This is in agreement with the study done by **El-Safi et al.** [9] who showed seasonal incidence was observed in Southern Darfour. This is further supported by WHO [12] reports which indicated sustained increase of incidence. As there is no similar published work in Sudan, it seems reasonable to conclude that the obtained data represents preliminary study.

**Zijlstra and el-Hassan** mentioned that CL in Sudan is caused by *Leishmania major*, zymodeme LON-1. The disease is endemic in many parts of the country. The vector is *Phlebotomus papatasi* and the animal reservoir is probably the Nile rat Arvicanthis niloticus [13].

Active surveillance is required to understand the extent of CL in Sudan, as well as training to standardize surveillance, diagnosis, reporting, and quality control. Point-of-care rapid diagnosis would be valuable. Genotyping and phenotyping are required to monitor the emergence of pathogenic strains, drug resistance, outbreaks, and changes in severity [14].

## Conclusion

On the basis of positivity patients coming from Darfour had more rates of CL than others states, this can be attributed to several factors such as fly abundance and inadequate vector control. Further studies with more larger samples are highly recommended.

## Conflict of interest

We declare that we have no conflict of interest.

**Financial disclosures**: nothing to declare.

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