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Clinical pattern and treatment outcome of Cutaneous Leishmaniasis in two hospitals in Bahir Dar, Ethiopia (2017-2021)

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Abstract

Introduction: Cutaneous Leishmaniasis (CL) in Ethiopia is caused by a unique species, *L. aethiopica.* In Ethiopia, there are limited studies that provide detailed clinical descriptions of CL, treatment options, and treatment outcomes.

Methodology: We conducted a descriptive study based on routinely collected data in medical files from two hospitals in Bahir Dar, Ethiopia, from 2017 to 2021. Three months following the end of therapy, we retrieved sociodemographic and clinical data, as well as data on the treatment outcome.

Result: Between March 2017 and June 2021, 94 patients were diagnosed with CL at the two hospitals. Of those, 46 (48.9%) of individuals had localized CL, 36 (38.3%) mucocutaneous leishmaniasis (MCL), and 12 (12.8%) diffuse CL. Sixty-five (69.1%) of the participants were men. The most prevalent morphologic appearances were plaque (n = 42, 46.2%), nodule (n = 38, 41.8%), infiltrative (n = 34, 36.2%), crusted (n = 32, 34%), and ulcerated (n = 24, 25.5%). Scarred, volcanic, and patchy lesions were also documented. Systemic pentavalent antimonials were the most common treatment (n = 55, 58.5%), curing 21/38 (55%) of the patients. Pentavalent antimonials were also given intralesionally to seventeen patients (18.1%), with 15/16 (94%) of them being cured. Overall, 61% (40/66) of patients with documented treatment outcomes were cured.

Conclusions: As CL in Ethiopia has a wide array of clinical presentations, clinicians should be suspicious of patients from endemic areas who present with dermatologic manifestations. Physicians can employ local treatment as a first line before resorting to systemic therapy.

Key words: LCL; DCL; MCL treatment; operational research; SORT IT; Addis Alem Hospital.

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Introduction

Leishmaniasis is a parasitic Neglected Tropical disease (NTD) caused by around 20 species of the *Leishmania* genus. It is transmitted by infected female sandflies that feed on blood [1,2]. The complex interplay between pathogenic species and host variables causes the varied clinical symptoms of leishmaniasis [3]. Clinically, there are three main types of leishmaniasis: visceral leishmaniasis (VL), cutaneous leishmaniasis (CL), and mucocutaneous leishmaniasis (MCL). Cutaneous leishmaniasis (CL) can be localized cutaneous leishmaniasis (LCL) or diffuse cutaneous leishmaniasis (DCL). The lesion in LCL affects only a few areas of the body and can leave a scar. DCL is a chronic, progressive skin disease that extends to larger parts of the body without ulceration with time [4]. MCL can cause the mucous membranes and underlying connective tissue components of the nose, mouth, and throat to be partially or completely destroyed. CL can be disfiguring and stigmatizing, particularly when there is a large lesion and/or face involvement [5,6].

Leishmaniasis is endemic in 98 countries and affects over 350 million individuals worldwide [2]. Every year, between 600,000 and 1,000,000 new cases of CL are reported worldwide [7] Ethiopia is one of the CL endemic countries with an estimated annual number of cases ranging from 20,000 to 30,000 [8].

In Ethiopia, CL is predominantly caused by a unique species of Leishmania, *L. aethiopica*. In addition, a few sporadic cases of CL due to *L. major* or *L. tropica* have been reported. In Ethiopia, there are limited thorough clinical descriptions of the various types of CL. Importantly; clinical experience in the country suggests that CL is a relatively severe,

clinically diverse, and difficult-to-treat disease. The presentation of CL is also a mimicker of other infectious, inflammatory and neoplastic diseases [9,10]. Bacterial superinfection, together with inappropriate treatment, complicates the diagnosis, delays treatment, and increases the risk of a poor treatment outcome [11]. Patients' medical records from two Northern Ethiopian hospitals revealed differences in clinical presentation, but information on the type of CL, its location, and morphologic description is still lacking [4,12]. The information on detailed clinical presentations of CL in Ethiopia would be useful for early diagnosis, advocacy for prioritizing, and domestic resource mobilization.

While Ethiopia has a national VL control program, resources for CL are limited. Outside of Ethiopia, some VL medications such as pentavalent antimonials and paromomycin have been found to be effective against CL [4]. As a result, clinicians at Ethiopian facilities with access to VL drugs frequently employ some of these drugs to treat CL cases.

However, there is a scarcity of data on how patients are managed in different facilities and the therapeutic outcomes that result. In a single-center study in the North-West of Ethiopia, short-term cure rates for injectable anti-leishmanial drugs were 19% for LCL, 31% for MCL, and 14% for DCL [12]. However, no follow-up was done after discharge, and the effectiveness of local pentavalent antimonial therapy was not evaluated in this study [4]. Only one study reported six-month treatment outcomes; however, this study used miltefosine, a drug that is hardly available in the country [13]. Furthermore, no CL clinical studies have been conducted in Ethiopia. The aim of this study was to provide a detailed clinical description of LCL, DCL, and MCL patients, as well as to report on the treatment employed and the associated treatment outcomes in two hospitals in Bahir Dar, Amhara region in Ethiopia over a four-year period. Given the country's lack of evidence-based CL treatment, such data could help define national treatment guidelines, guide drug procurement, and determine which treatments should be investigated in future clinical trials.

Methodology

Study design

A cross-sectional study using data from interviewer-administered questionnaires and routinely collected data in medical files were used.

General setting

Ethiopia is located in the horn of Africa with a population of 110 million [14]. Ethiopia is a federal state with ten regional states and two city administrations. The country has one of Africa's highest rates of NTDs [15]. NTD poses a threat to more than 75 million Ethiopians [15]. The Amhara region is one of the country's ten regions. It is divided into 15 zones and 161 districts. In 2019, the population was predicted to be 21.8 million [14].

Specific setting

Bahir Dar, the Amhara region's capital city, has two specialized and one primary government hospital. Felege Hiwot Specialized Hospital (FHSH) is located at the shore of Lake Tana, about 3 kilometers from the city center. The hospital has been functional since 1952, and dermatology services have been available since 2011. AAH (Addis Alem Hospital) is a primary hospital about 6 kilometers north of the city center. These two hospitals (FHSH and AAH) handle around 1,500 outpatients every day, with dermatology clinics at both institutions seeing an average of 60 consultations per day. The most common dermatologic conditions in these clinics are tinea capitis, seborrheic dermatitis, acne vulgaris, scabies, vitiligo, and psoriasis. These two hospitals provided healthcare to four zones in and around Bahir Dar. They include the zones of West Gojjam, East Gojjam, South Gondar, and Awi. Addis Alem Hospital offers a skin snip test as well as various leishmaniasis treatment options. FHSH offers skin snipping and biopsy services. Skin Snip and culture are also available in the regional public health research institution.

Cutaneous leishmaniasis diagnosis and treatment services

At the dermatologic clinic, residents and senior dermatologists undertake clinical evaluations of patients suspected of having CL. In addition to clinical evaluation, skin snips and tissue biopsy can be done. Skin snips are examined using microscopy (after Giemsa staining). In addition, parasite culture is practiced. CL suspects with parasites identified on microscopy (skin snip or biopsy) or culture are classified as parasitologically confirmed CL cases.

MCL is diagnosed when skin lesions and mucosal involvement are evident. LCL is diagnosed when there are one or two small lesions in a single anatomic site. DCL is diagnosed when three or more lesions or significant infiltrative skin abnormalities appear on more than one anatomic location without mucosal involvement.

According to national treatment guidelines, topical treatment is recommended for LCL cases with a

diameter of less than 5 cm and no danger of mucosal progression. The available treatment options for LCL include intralesional pentavalent antimonials and cryotherapy. The indications for systemic treatment include MCL, DCL, and complicated LCL such as multiple or large lesions, immunosuppression, LCL not suitable for topical treatment and LCL with a risk of expansion to the nearby mucous membrane. The drugs most available for systemic treatment are pentavalent antimonials and to a lesser extent paromomycin. DCL is treated with a combination of pentavalent antimonials with paromomycin. While treating physicians are generally aware of these recommendations, treatment is mostly dictated by the availability of various therapeutic options in practice.

Working definitions of LCL, MCL and DCL

Cure: Patients who have had clinical response (re-epithelialization and flattening of the lesion) and/or parasitological confirmation of recovery after three months of treatment completion.

Partial improvement: Patients who show a minor clinical response (partial re-epithelialization and some flattening), but are parasitologically negative at the end of treatment.

No improvement: Patients who do not respond clinically (re-epithelialization and flattening) and/or

Table 1. Sociodemographic characteristics, clinical features and distribution of cutaneous and mucocutaneous leishmaniasis at two hospitals in Bahir Dar, Ethiopia (2017-2021).

Variables	LCL, n (%)	MCL, n (%)	DCL, n (%)	Total, n
Age (years)				
1-15	15 (40.5)	14 (37.9)	8 (21.6)	37
16-40	25 (52.1)	19 (39.6)	4 (8.3)	48
41-60	5 (62.5)	3 (37.5)	0 (0)	8
> 60	1 (100)	0 (0)	0 (0)	1
Sex				
Male	28 (43.1)	28 (43.1)	9 (13.8)	65
Female	18 (62.1)	8 (27.6)	3 (10.3)	29
District				
Bahir Dar	4 (66.6)	1 (16.7)	1 (16.7)	6
West Gojjam	18 (50)	13 (36.1)	5 (13.9)	36
East Gojjam	10 (58.8)	6 (35.3)	1 (5.9)	17
South Gondar	4 (30.8)	8 (61.5)	1 (7.7)	13
Awi zone	10 (52.6)	6 (31.6)	3 (15.8)	19
Unknown	0 (0)	2 (66.7)	1 (33.3)	3
Morphology[a]				
Ulcerated	7 (29.2)	14 (58.3)	3 (12.5)	24
Nodular/Volcanic	18 (47.4)	13 (34.2)	7 (18.4)	38
Patchy	3 (33.3)	3 (33.3)	3 (33.4)	9
Plaque/Superinfected	21 (50)	17 (40.5)	4 (9.5)	42
Infiltrative	8 (23.5)	17 (50)	9 (26.5)	34
Scaly	4 (23.5)	11 (64.7)	2 (11.8)	17
Scarred	4 (33.3)	4 (33.3)	4 (33.4)	12
Crusted	16 (50)	14 (43.75)	2 (6.25)	32
Edema	5 (31.25)	10 (62.5)	1 (6.25)	16
Duration of lesion (months)				
< 06	7 (46.7)	8 (53.3)	0 (0)	15
06-12	29 (54.7)	16 (30.2)	8 (15.1)	53
13-18	6 (85.7)	1 (14.3)	0 (0)	7
19-24	1 (11.1)	5 (55.6)	3 (33.3)	9
> 24	3 (42.9)	3 (42.9)	1 (14.2)	7
Unknown	0 (0)	3 (100)	0 (0)	3
Site of involvement				
Head & neck	30 (49.2)	28 (45.9)	3 (4.9)	61
Trunk	0 (0)	0 (0)	0 (0)	0
Extremity	11 (78.6)	1 (7.1)	2 (14.3)	14
Buttocks/genitalia	0 (0)	0 (0)	0 (0)	0
Mixed[b]	3 (21.4)	7 (50)	4 (28.6)	14
Unknown	2 (40)	0 (0)	3 (60)	5
Total	46	36	12	94

[a] A single patient can have more than one morphologic lesion; [b] Three and more than three site involvement; LCL: Localized cutaneous leishmaniasis; MCL: Mucocutaneous leishmaniasis; DCL: Diffuse cutaneous leishmaniasis.

become parasitologically positive after treatment completion.

Default: Patients who began treatment but did not complete the entire course of treatment.

Lost to follow-up: Patients who finished the full course of treatment but did not return for follow-up after three months.

Relapse: Patients who were cured after completing the entire course of treatment but returned three months later with a typical clinical picture and were parasitologically positive.

Study population and period

We included all patients diagnosed with all types of cutaneous leishmaniasis between March 2017 and June 2021 at FHSH and between June 2019 and June 2021 at AAH.

Sources of data, data collection and analysis

The data was taken from the patient's medical records. CL cases were identified using the dermatology outpatient registry, and their medical data were collected from the chart room. The principal investigator transferred data into an Excel-database (Microsoft Excel). A senior dermatologist validated the data entry by systematically cross-checking the data entered against the patient files. The following information's were extracted: socio-demographics, clinical presentation (morphology, type, area, and extent of the lesion -s-), type of treatment given, and treatment outcomes three months after completion of treatment. There was only a descriptive analysis done. Frequencies and proportions were used to describe binary and categorical data, while medians and interquartile ranges were used to summarize continuous data.

Ethics

Ethical approval was secured from Bahir Dar University, College of Medicine and Health Sciences Internal review board, Bahir Dar, Ethiopia. Ethics approval was also obtained from the Union Ethics Advisory Group of the Center for Operational Research at the International Union against Tuberculosis and Lung Disease, Paris, France.

Results

Sociodemographic characteristic

In the two hospitals, a total of 94 patients were diagnosed with CL between March 2017 and June 2021. Of those, 46 (48.9%) had localized CL, 36 (38.3%) had mucocutaneous leishmaniasis (MCL), and 12 (12.8%) had diffuse CL. Thirty seven (39.4%) of the patients were under the age of 16. Males accounted for 65 (69.1%) of the patients. Most of the patients were from the West Gojjam zone 25 (37.9%), followed by East Gojjam zone 17 (19.3%), and Awi zone 17 (19.3%) (Table1).

Clinical presentation

The majority of patients manifested with one or more morphologic manifestation (Table 1). Only 16 of the individual cases had a single morphologic appearance. The most prevalent morphologic appearances were plaque (n = 42, 46.2%), nodule (n = 38, 41.8%), infiltrative (n = 34, 36.2%), crusted (n = 32, 34%), and ulcerated (n = 24, 25.5%). Scarred, volcanic, and patchy lesions were also documented. Plaque and nodular lesions were the most common manifestations of LCL. Plaque and infiltrative lesions were the most common findings in MCL patients. Infiltrative and nodular lesions were seen in the majority of DCL cases (Figure 1).

The median duration of illness before presentation was 8 months (IQR = 6-13). The majority of cutaneous leishmaniasis cases presented between 6 and 12 months after disease onset.

LCL commonly involved the head and neck followed by the extremities. In MCL, head and neck involvement was most common, followed by generalized involvement. In DCL, generalized involvement followed by lesions on the head and neck were most often seen.

Treatment given

Of the 94 patients, 55 cases received intramuscular antimonials and 17 cases received intralesional pentavalent antimonials. Pentavalent antimonial combined with paromomycin was given to six patients. Other treatments such as dapsone and amphotericin B were only utilized on rare occasions. Systemic treatment, mostly with parenteral antimonials, was given to 65.8% of LCL cases, 87.9% of MCL cases and 90.9% of DCL cases. Thirteen patients, eight of whom have MCL, were given a treatment extension. (Table 2).

Treatment outcomes by type of treatment

Three months after treatment, information on the treatment outcome was available for 66 of the 85 patients with documented treatment data. Overall, 60.6% (40/66) of the patients were cured, while 16.7% (11/66) showed partial improvement. The cure rate for patients treated with systemic antimonials was 55%.

Table 2. Treatment given for patient with CL in Bahir Dar, Ethiopia (2017-2021).

Variable	LCL, n (%)	MCL, n (%)	DCL, n (%)	Total, n
Total	46	36	12	94
N with data on treatment (%)	41 (100)	33 (100)	11 (100)	85
Type of initial treatment				
Systemic treatment	27 (65.8)	29 (87.9)	10 (90.9)	66
SSG/MA IM/IV	23 (56.1)	23 (69.7)	9 (81.8)	55
SSG + Paromomycin	1 (2.4)	4 (11.1)	1 (9.1)	6
Amphotericin B	0 (0)	2 (6.1)	0 (0)	2
Dapsone	3 (7.3)	0 (0)	0 (0)	3
Local treatment	15 (36.6)	4 (11.1)	1 (9.1)	20
SSG IL	13 (31.7)	4 (11.1)	0 (0)	17
Cryotherapy	1 (2.4)	0 (0)	1 (9.1)	2
Treatment extension given	3 (7.3)	8 (24.2)	2 (18.2)	13

SSG: Sodium stibogluconate; MA: Meglumine Antimoniate; LCL: Localized cutaneous leishmaniasis; MCL: Mucocutaneous leishmaniasis; DCL: Diffuse cutaneous leishmaniasis; IM: Intramuscular; IV: Intravenous; IL: Intralesional.

Figure 1. A. Diffusely infiltrated pinkish plaque lesion with brownish and whitish scale involving the right shoulder, arm and forearm; B and C (single patient); **B.** Well-demarcated plaque lesion with ulceration and hemorrhagic crust over the center with erythematous peripheral halo over the right distal forearm; **C.** Well-defined erythematous infiltrated plaque lesion with studded pustules over the chin in 9 years old female patient; **D.** Well-demarcated pinkish nodular plaque lesion with whitish crust over the left elbow area; **E.** Ulcerated plaque lesion with yellowish crust over the nasal tip with surrounding infiltration and edematous upper lip; **F.** Multiple shiny violaceous nodular lesion over the left leg and foot; **G.** Well-demarcated pinkish plaque lesion with whitish and light-brownish scale over the right cheek; H, I and J (single patient); **H.** Erythematous infiltrated plaque lesion over the nose and upper lip (left side); **I.** Diffuse edematous and infiltrated plaque lesion with central ulceration and hemorrhagic crust over the right forearm; **J.** Well-demarcated pinkish plaque lesion with whitish scale over the left posterior thigh.

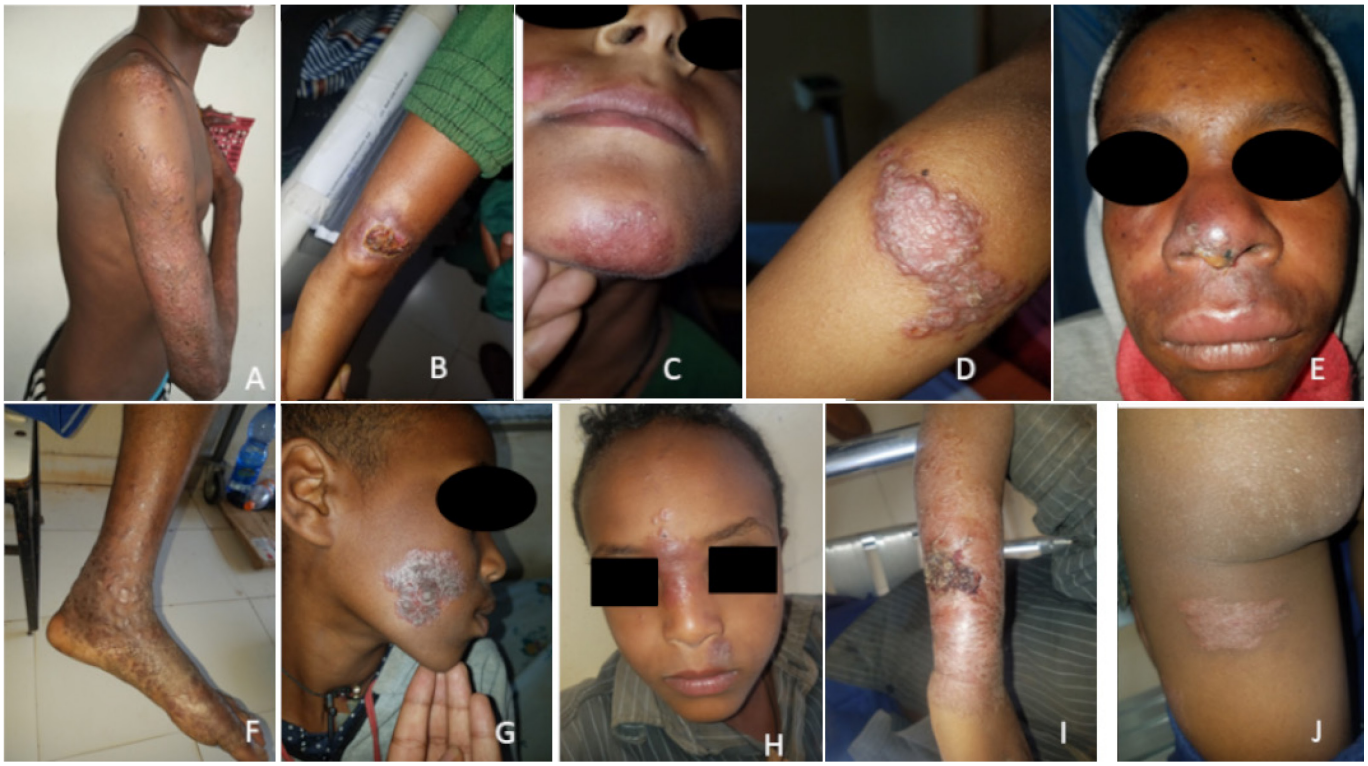


Figure 2. A. Before treatment with edematous nose and lip and crusting on tip of the nose; **B.** After treatment with SSG having clearance of the edema and the crust.

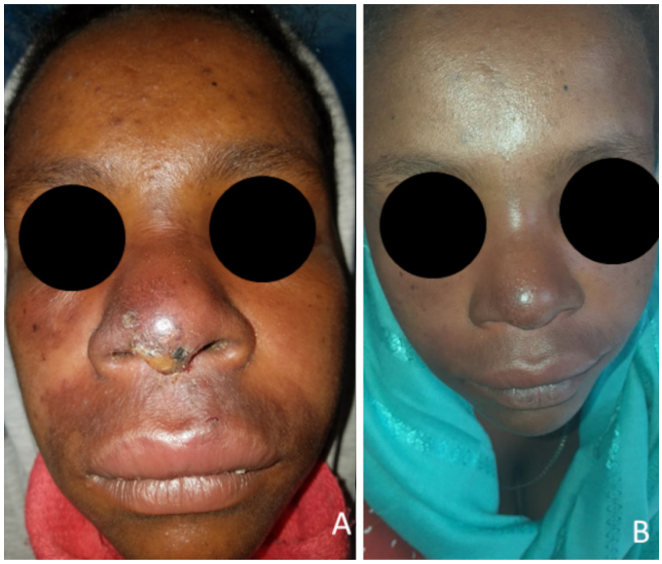
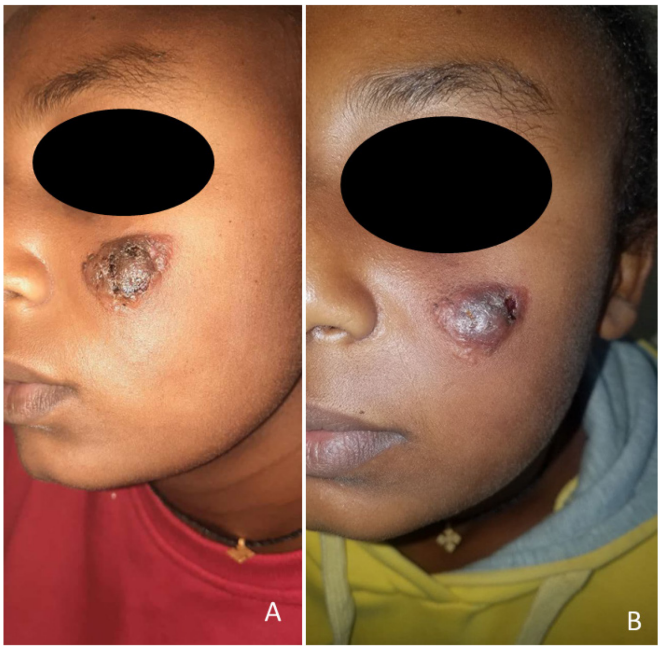


Figure 3. A. Before treatment with well-demarcated pinkish plaque lesion with brownish crust; **B.** After treatment with IL SSG having poor treatment response.



Fifteen of the 16 patients treated with intralesional antimonials (94%) were cured. There was no improvement in any of the three patients who were given dapsone. Out of 11 patients who received extended systemic therapy, only one got cured (Table 3).

Treatment outcome by type of CL

The cure rate for LCL was 69% (20/29) and 10% (3/29) showed partial improvement (Table 4). MCL had a cure rate of 55% (16/29) and a partial improvement rate of 28% (8/29). Four (50%) of the eight DCL cases were cured, three (37%) had no improvement, and one (13%) had a relapse. CL cases before and after therapy are depicted in Figures 2 and 3.

Treatment outcome by socio-demographic characteristics

The cure rate for patients aged 1 to 15 years was 58% (14/24) and 17% (4/24) had partial improvement. Patients between the ages of 16 and 40 had a cure rate of 62% (21/34) and a partial improvement rate of 18% (6/34). Patients aged 41-60 years old had a cure rate of 57% (4/7) and a partial improvement rate of 14% (1/7). Males had a cure rate of 59% (26/44) and a partial improvement rate of 21% (9/44). Females had a cure rate of 64% (14/22) and a partial improvement rate of 9% (2/22) (Table 5).

The cure rate for Bahir Dar patients was 67% (4/6) and the partial improvement rate was 17% (1/6). West Gojjam residents had a cure rate of 28% (5/18) and a partial improvement rate of 39% (7/18). Residents of East Gojjam reported an 80% (8/10) cure rate, with 10%

Table 3. Treatment outcomes of CL patients with regards to treatment given in Bahir Dar, Ethiopia (2017-2021).

Treatment given (N = 85)	Total, N	N with treatment outcomes	Cure, n (%)	Partial improvement, n (%)	No improvement, n (%)	Relapse, n (%)
Systemic treatment						
SSG/MA IM/IV	55	38 (100)	21 (55)	9 (24)	7 (18)	1 (3)
SSG+PM	6	5 (100)	1 (20)	1 (20)	3 (60)	0 (0)
Amphotericin B	2	2 (100)	1 (50)	1 (50)	0 (0)	0 (0)
Dapsone	3	3 (100)	0 (0)	0 (0)	3 (100)	0 (0)
Local treatment						
SSG IL	17	16 (100)	15 (94)	0 (0)	1 (6)	0 (0)
Cryotherapy	2	2 (100)	2 (100)	0 (0)	0 (0)	0 (0)
Treatment extension	13	11 (100)	1 (9)	4 (36)	5 (46)	1 (9)

SSG: sodium stibogluconate; MA: Meglumine Antimoniate; IV: Intravenous; IL: Intralesional; CL: cutaneous leishmaniasis; PM: paromomycin.

(1/10) demonstrating partial improvement. The cure rate for South Gondar patients was 75% (3/4) and the partial improvement rate was 25% (1/4). The cure rate for those from the Awi Zone was 90% (9/10), with 10% (1/10) indicating partial improvement.

Discussion

We describe the clinical presentation and treatment outcomes of CL patients who visited two hospitals in Bahir Dar, Ethiopia's Amhara region. LCL affected almost half of the patients, whereas MCL and DCL affected the other half. Plaque, nodule, infiltrate, and crust were the most common clinical manifestations. LCL's most common clinical manifestation was plaque, whereas MCL and DCL's most common clinical manifestation was infiltration. Only 39.4% of the patients were under the age of 15, but this age group accounted for 66.7% of DCL cases. 65.1% of LCL patients with documented treatment got systemic therapy, compared to 87.5% of MCL patients and 100% of DCL patients. From those patients with documented treatment outcome 3 months following the final therapy; 60.6% had complete cure, while 22.7% had no improvement or worsening. Only one of the 13 patients who required long-term systemic treatment has recovered completely. In comparison to males, females show a relatively higher therapeutic response (64% vs 59%).The treatment response was higher in the 16-40 years age group than in the 1- 15 years old patients, possibly because the majority of the DCL patients, known to be less responsive to treatment, were between 1-15 years old.

In contrast to textbook descriptions of old world CL, clinical manifestations in Ethiopia range from localized crusts on exposed body areas to mucosal and generalized body involvement [16,17]. In line with other studies, we also found that mucosal involvement is common in our hospital setting, with two out of every five patients presenting with MCL [4]. DCL was found in one out of every eight patients, with diffuse involvement of the face, limbs, and buttocks, clinically mimicking lepromatous leprosy. The wide array of clinical presentations can pose a challenge in differentiating CL from other dermatologic diseases with similar presentations, such as lepromatous leprosy, lupus vulgaris, cutaneous lupus erythematosus, granulomatous cheilitis, and sarcoidosis.

Both for systemic and local treatment, cure rates in our patients were higher than in other studies in the country [4]. Only 35% of LCL received localized

Table 4. Treatment outcome of patients with CL in Bahir Dar, Ethiopia (2017-2021).

Treatment response	LCL, n (%)	MCL, n (%)	DCL, n (%)	Total
Total N	46	36	12	94
Total with treatment outcomes	29 (100)	29 (100)	8 (100)	66 (100)
Cure	20 (69)	16 (55)	4 (50)	40 (61)
Partial improvement	3 (10)	8 (28)	0 (0)	11 (17)
No improvement	6 (21)	5 (17)	3 (37)	14 (21)
Relapse	0 (0)	0 (0)	1 (13)	1 (1)

LCL: Localized cutaneous leishmaniasis; MCL: Mucocutaneous leishmaniasis; DCL: Diffuse cutaneous leishmaniasis; N: Total number of patients.

Table 5. Treatment outcome of patients with CL with regard to socio-demographic characteristics in Bahir Dar, Ethiopia (2017-2021); N: Total number of patients.

Variable	N with treatment outcomes	Cure, n (%)	Partial improvement, n (%)	No improvement, n (%)	Relapse, n (%)
Age (years)					
1-15	24 (100)	14 (58)	4 (17)	5 (21)	1 (4)
16-40	34 (100)	21 (62)	6 (18)	7 (20)	0 (0)
41-60	7 (100)	4 (57)	1 (14)	2 (29)	0 (0)
> 60	1 (100)	1 (100)	0 (0)	0 (0)	0 (0)
Sex					
Male	44 (100)	26 (59)	9 (21)	8 (18)	1 (2)
Female	22 (100)	14 (64)	2 (9)	6 (27)	0 (0)
District					
Bahir Dar	6 (100)	4 (67)	1 (17)	1 (16)	0 (0)
West Gojjam	18 (100)	5 (28)	7 (39)	5 (28)	1 (5)
East Gojjam	10 (100)	8 (80)	1 (10)	1 (10)	0 (0)
South Gondar	4 (100)	3 (75)	1 (25)	0 (0)	0 (0)
Awi Zone	10 (100)	9 (90)	1 (10)	0 (0)	0 (0)
Unknown	18 (100)	11 (61)	0 (0)	7 (39)	0 (0)

therapy, which was significantly lower than expected. The Ethiopian National Guideline recommends intralesional SSG, cryotherapy, or thermotherapy for LCL treatment, although data on the efficiency of local treatment are limited. The limited use of cryotherapy in our setting is due to the difficulty in obtaining liquid nitrogen. Despite the fact that pentavalent antimonials are more readily available, only 17 patients had intralesional injections. Available studies from Ethiopia also showed that pentavalent antimonials are predominantly used systemically to treat LCL. As the response of our patients treated with intralesional pentavalent antimonials was very good, this treatment option deserves more attention in our setting. Because not all physicians are familiar with the administration process, extra training of treating physicians may be necessary. Furthermore, this treatment necessitates weekly patient visits to the hospital. Travel costs are a barrier for many who come from afar and are impoverished. As a result, some patients choose systemic pentavalent antimonials because they can be hospitalized instead of making weekly visits. However, this modality is likely to be cost effective for the health system, as it does not require hospital admission.

A fairly wide range of treatments were used, including amphotericin B and dapsone, and only a few patients received pentavalent antimonials and paromomycin in combination therapy. This is primarily due to drug availability, as both pentavalent antimonials and, in particular, paromomycin were unavailable at times during the study period. Whereas Ethiopia has a VL treatment program, it lacks a formal CL treatment program. As a result, clinicians can only employ drugs from the VL treatment program. This necessitates the establishment of a CL treatment program to ensure that drugs for CL treatments are available on a consistent basis in endemic areas.

The strength of our study is that all of the patients were examined by a dermatologist. This is also the first CL report from the treatment center in Bahir Dar. The study limitations include the small sample size and the fact that a number of patients' three-month treatment outcomes were missing. Furthermore, the lack of a control group made it difficult to generalize the treatment outcomes.

Conclusions

Our findings suggest that clinicians be aware of the several clinical presentations of CL in Ethiopia and expand their differential diagnosis list. The national guidelines recommend that local therapy for LCL should be given more focus. At the same time, we must accept that there is a scarcity of evidence regarding CL treatment in Ethiopia. Due to the lack of comparative trials, it is currently impossible to determine the best first-line treatment for the various kinds of CL. Fortunately; several trials are currently being prepared. Thermotherapy should also be included in these studies, as it appears to be useful in some situations [18,19].

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