

The Ethiopian SORT IT Course

Looking for NTDs in the skin; an entry door for offering patient centered holistic care

Seid Getahun Abdela¹, Ermias Diro², Feleke Tilahun Zewdu³, Fentaw Tadese Berhe¹, Wendimagegn Enbiale Yeshaneh⁴, Koku Sisay Tamirat², Hannock Tweya⁵, Collins Timire⁵, Johan van Griensven⁶

¹ Wollo University, Dessie, Ethiopia

² University of Gondar, Gondar, Ethiopia

³ Boru Meda Hospital, Dessie, Ethiopia

⁴ Bahir Dar University, Bahirdar, Ethiopia

⁵ International Union Against Tuberculosis and Lung Disease (The Union), Paris, France

⁶ Institute of Tropical Medicine, Antwerp, Belgium

Abstract

Introduction: The majority of neglected tropical diseases (NTDs) have established primary skin manifestations or associated clinical feature. Skin NTDs often result in physical impairment and disfigurement, which can lead to disability. Skin diseases have been proposed as an entry point for integrated NTDs control. However, the magnitude and overlap of skin NTDs is poorly understood.

Methodology: An institution-based cross-sectional study was done using medical records of dermatology patients between July 2017 and June 2018 in a dermatology service in Northeast Ethiopia. A total of 661 patient records were selected using simple random sampling.

Results: A total of 656 complete records were included in analysis. Skin NTDs constituted 17.2% (n = 113) of the overall of skin diseases. Of skin NTDs, cutaneous leishmaniasis (n = 40; 35.4%), leprosy (n = 38; 33.6%), and scabies (n = 31; 27.4%) were the most common. Additionally, there were four cases of mycetoma. Of the non NTDs, poverty-related infections such as superficial fungal (n = 118; 21.1%) and bacterial (n = 33; 5.2%) infections were also frequent. *Tinea capitis* was the most common superficial fungal infections. Impetigo and cellulitis were the predominant bacterial infections.

Conclusions: Skin NTDs and other poverty related skin infections were common at the dermatology service. Dermatological services could act as a good entry point for integrated management of skin NTDs. Future studies should assess how different preventive strategies like contact tracing, early diagnosis and mass drug administration can be integrated.

Key words: Skin NTD; cutaneous leishmaniasis; leprosy.

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Introduction

Neglected tropical diseases (NTDs) are a group of diseases that are prevalent in many of developing countries where poverty is rampant. According to the World Health Organization (WHO), more than a billion people mostly in developing countries are infected with one or more of the NTDs. Initially, the 2020 roadmap of WHO focused on 20 NTDs until the WHO Technical Advisory Group for NTDs added mycetoma, scabies and snakebite to the NTDs list in 2017 [1].

However, one undervalued dimension of the NTD grouping is that many of the diseases affect the skin, either as the primary manifestation or as an associated clinical feature [2]. Eighteen of the twenty NTDs have established skin manifestations [3]. The Ethiopian Ministry of Health has identified nine diseases as

priority NTDs for control or elimination in its multi-year national NTD Master Plan for control and/or elimination. Among the nine, six of them directly involve the skin onchocerciasis, dracunculiasis, lymphatic filariasis, podoconiosis, cutaneous leishmaniasis (CL) and scabies [4].

Skin NTDs often result in physical impairment and disfigurement, which can lead to disabilities such as permanent nerve damage and limb deformity in leprosy, disfiguring and stigmatizing scars in CL, severe itching in onchocerciasis and advanced lymphoedema and hydrocele in lymphatic filariasis. In addition to stigmatization, skin NTDs result in discrimination and psychological distress [5].

For many years, vertical disease control programs have been implemented to deal with priority diseases.

However, vertical disease programs are resource intensive, and resources are not maximized when fragmented. Therefore, increasingly, there has been a move to integrate these programs into general health services. In line with that, the WHO Department of Control of NTDs currently promotes intervention-based approaches rather than disease-specific approaches [6].

Skin manifestations have been proposed as an entry point for integrated NTD early diagnosis and control. It eases the integration of control activities, from diagnostic processes to community mass drug administration. As a first step towards integrated skin NTD programs, research on the type and relative contribution of skin NTDs among patients seeking care for dermatologic complaints has been called for [3]. Additionally, there are other skin diseases that are not formally recognized by WHO as NTDs that contribute a huge disease burden in impoverished populations. These include fungal and bacterial skin infections [7].

Ethiopia potentially has several hotspots for skin NTDs. These hotspots includes some areas of the Eastern Amhara region, where leprosy, CL and scabies are highly prevalent. The referral center of skin problems for this area is the Boru Meda hospital. The aim of this study was to describe the type and proportion of skin NTDs, bacterial and fungal infection among patients attending the Boru Meda hospital dermatology clinic, Eastern Amhara Region in Ethiopia.

Methodology

Study Design

A cross-sectional study using routine data recorded in medical files.

General setting

Ethiopia, officially the Federal Democratic Republic of Ethiopia, is a country in the Horn of Africa. With a population size of 110 million, Ethiopia is the most populous landlocked country in the world and the second-most populous nation on the African continent [8]. According to the World Fact book, only 57% of the country has improved access to clean drinking water, while 42% still struggle to find clean water. Only 28% of the population has access to improved sanitation services, while 72% struggle to maintain sanitation. This likely contributes greatly to the very high burden of transmittable diseases in many parts of the country area. Ethiopia has the third highest number of NTD cases in Africa, with 16 of the 22 NTDs in WHO list present in the country [9].

Study site

Boru Meda Hospital is one of the oldest hospitals in Ethiopia, established in 1954. It is located in the center of the country, 410km from Addis Ababa, the capital city. The hospital was initially established by missionaries mainly for treating leprosy and its complications. Later, the hospital expanded its services. Currently, the dermatology clinic has three offices, staffed with two dermatologists and two health officers with dermatology training. In each outpatient clinic, up to 60 patients with a variety of skin diseases are seen daily. The hospital also has a dermatology ward with 40 beds.

Study population and period

The study population consisted of patients who visited the dermatology clinic between July 2017 and June 2018.

Sample size determination and Sampling

The sample size was calculated in Open Epi, using the formula for the estimation of a proportion in a descriptive study. The sample size was determined using single population proportion formula considering expected proportion of skin NTDs of 50% as no previous similar studies were found. Besides, precision was taken at 4% and 95% confidence level. The resulting sample size was 601. The final sample size was found to be 661 considering 10% contingency to account for missing data or patient records. A total of 23,000 patient records were found and simple random sampling technique was employed. We made a list with all visits using Microsoft Office Excel software, assign a random number and total of 661 patients records were selected using simple random sampling.

Data collection and analysis

The health management information system registry was used to list the chart numbers. The randomly selected chart numbers were retrieved. Data were collected by the first author using a structured data extraction tool, containing questions on the type of skin disease like cutaneous leishmaniasis, leprosy, scabies, dermatitis, fungal, bacterial, viral, pigmentary, papulosquamous and pilosebaceous skin conditions. Besides, socio-demographic data such as age and sex of patient were included. The diagnosis was done by trained dermatologists using the national guidelines clinically complemented with laboratory tests for some diseases like leprosy and CL. Epi Data software version 4.4.2 (EpiData Association, Odense, Denmark) was used for data storage and analysis. Descriptive analysis

Table 1. Demographic characteristics of dermatologic patients at Boru Meda Hospital, Amhara, Ethiopia between July 2017 and June 2018 (n=656).

Variable	n (%)
Sex	
Male	309 (47.1)
Female	347 (52.9)
Age (years)	
< 15	171 (26.1)
15-24	176 (26.8)
25-44	198 (30.2)
45-64	85 (12.9)
≥ 65	26 (3.9)

entailed the calculation of absolute and relative frequencies.

Ethical approval

Permission to conduct the study was obtained from the Boru Meda Hospital management, Dessie, Ethiopia. Local ethics approval was received from Amhara, Public Health institute, Bahir Dar, Ethiopia. The study was also approved by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France. As this was a retrospective study without patient identifiers, the issue of informed patient consent did not apply.

Results

Demographic characteristics and skin disease type

A total of 661 patient records were reviewed and 656 complete records were included in the analysis. Five patient records were excluded for missing key data on the dependent variable. More than half 347 (52.9%) were female; 171 (26.1%) were aged less than 15 years (Table 1). One hundred thirteen (17.2%) of patients presented with skin NTDs, 559 (83.4%) patients were diagnosed with non-NTD skin diseases (Table 2). Sixteen patients had both NTDs and non-NTD skin diseases.

Table 2. Type of skin diseases among patients receiving health services at Boru Meda Hospital, Amhara, Ethiopia between July 2017 and June 2018.

Type of skin diseases	n (%)
Skin NTDs (n = 656)	
Yes	113 (17.2)
No	543 (82.8)
Type of skin NTDs (n = 113)	
Cutaneous leishmaniasis	40 (35.4)
Leprosy	38 (33.6)
Scabies	31 (27.4)
Mycetoma	4 (3.5)
Only Non NTD skin diseases (n = 656)	
Yes	559 (85.2)
No	97 (14.8)
Category of non NTDs diseases *(n = 559)	
Dermatitis	220 (39.4)
Fungal	118 (21.1)
Bacterial	29 (5.2)
Viral	10 (1.8)
Pigmentary	82 (14.7)
Papulosquamous	41 (7.3)
Pilosebaceous	63 (11.3)
Others non NTDs	37 (6.6)

NTD: neglected tropical diseases. *More than one skin disease is possible

Neglected tropical skin diseases

CL(n = 40; 35.4%), leprosy(n = 38; 33.6%), scabies (n = 31; 27.4%) and mycetoma (n = 4; 3.5%) were the four NTDs identified (Table 2). More than two third of the common skin NTDs (CL, leprosy, scabies) patients were males (n = 76; 69.7%). Among a total of 30 children aged less than 15 years old, there were 18 cases with CL, three with leprosy and nine with scabies (Table 3).

Non-neglected tropical skin diseases

Amongst the 559 patients with non-NTDs, dermatitis (n = 220; 39.4%) was the most common skin problem, mainly consisting of atopic dermatitis (n = 68; 30.9%) and other type of eczematous dermatitis (n = 114; 51.8%). Fungal skin infections (n = 118; 21.1%) were also common, predominantly *Tinea capitis* (n = 65; 55.1%) and onychomycosis (n = 15; 12.7%). In

Table 3. Type skin NTDs by sex and age of patients among patients receiving health services at Boru Meda Hospital, Amhara, Ethiopia between July 2017 and June 2018.

Characteristics	Cutaneous Leishmaniasis	Leprosy	Scabies
	n (%)	n (%)	n (%)
Sex			
Male	27 (67.5)	30 (78.9)	19 (61.3)
Female	13 (32.5)	8 (21.1)	12 (38.7)
Age (years)			
< 15	18 (45.0)	3 (7.9)	9 (29.0)
≥ 15	22 (55.0)	35 (92.1)	22 (71.0)

NTD: neglected tropical diseases.

addition, 29 (5.2%) patients were diagnosed with bacterial skin infections, including 19 cases of impetigo and 10 cases of cellulitis (Table 2 and Table 4).

Discussion

Skin NTDs constituted 17.2% of the overall proportion of skin diseases in the Boru Meda hospital. CL was the most common NTD, followed by leprosy, scabies and mycetoma. Similarly, a meta-analysis report indicated that there is still a higher prevalence of Leishmaniasis in the country [10]. The proportion of CL and leprosy is higher than reported by a study done in Finote Selam District hospital, Northwest Ethiopia while the scabies proportion was similar [11]. This difference could be explained by the nature of our study site, Boru Meda hospital, which is historically known for diagnosis and treatment of leprosy and other skin diseases like cutaneous leishmaniasis.

Other poverty-related infections such as superficial fungal (21.1%) and bacterial (5.2%) infections were also frequent. This finding is not congruent with a study done in Finote Selam District hospital, Northwest Ethiopia [11]. This might be related to similarity in socio-demographic characteristics of participants.

Our findings showed the high proportion of skin NTDs in the study area. As skin conditions are an important reason to attend health facilities, enhanced systematic screening for skin NTDs can complement efforts of the current vertical programs. For instance, contact tracing for new leprosy cases provides opportunities for a wider screening for skin conditions including skin NTDs [12,13]. Mass drug administration within scabies programs could equally be used for awareness raising on and screening for other skin NTDs. Several skin NTDs also lead to stigma and psychosocial suffering. Enhancing efforts to address this across the different diseases would be useful.

To maximize this potential would require increasing capacity at the community and decentralized level. This would require training of health extension workers and primary health care workers on the screening and management of the different conditions. WHO has developed a manual to aid training of front-line health workers in recognition of the signs and symptoms of NTDs [14]. Before taking this forward, the WHO policy of skin NTDs should be endorsed by the Ministry of health, and the WHO guidelines adapted to the Ethiopian context.

Some other NTDs such as lymphatic filariasis and podoconiosis which are present in Ethiopia were not detected in our study. While it could well be that these

are rare in the study area, it could as well relate to health seeking behaviour or missed diagnosis.

We also observed a high proportion of other infectious poverty-related diseases such as fungal and bacterial infections. While morbidity due to superficial fungal infections might be limited, *streptococcal* infections can lead to long-term cardiac and renal complications in children. As these can also be addressed by improved hygienic conditions such as recommended for scabies, it should be considered to add these to the list of NTDs.

Table 4. Specific types of skin non-NTDs among patients receiving health services at Boru Meda Hospital, Amhara, Ethiopia between July 2017 and June 2018.

Specific types of skin non NTDs	n (%)
Type of Dermatitis (n = 220)	
Atopic dermatitis	68 (30.9)
Contact dermatitis	36 (16.4)
Follicular keratinization	2 (0.9)
Others	114 (51.8)
Type of Fungal infection (n = 118)	
<i>Tina capitis</i>	65 (55.1)
Onychomycosis	15 (12.7)
<i>Tinea faciei</i>	11 (9.3)
<i>Pityriasis Versicolor</i>	10 (8.5)
<i>Tinea corporis</i>	7 (5.9)
<i>Tinea manuum</i>	7 (5.9)
Vulvovaginal candidiasis	2 (1.7)
<i>Tinea incognito</i>	1 (0.9)
Type of Bacterial (n = 29)	
Impetigo	19 (65.5)
Cellulitis	10 (34.5)
Type of Viral (n = 10)	
Wart	7 (70)
Hypersimplex	1 (10)
<i>Moluscum contagiosum</i>	2 (20)
Type of Pigmentary (n = 82)	
Vitiligo	53 (64.6)
Melasma	24 (29.3)
Melanocytic nevi	2 (2.4)
Others	3 (3.7)
Type of Papulosquamous (n = 81)	
Psoriasis	31 (75.6)
Lichen planus	9 (22.0)
Others	1 (2.4)
Type of Pilosebaceous (n = 63)	
<i>Acne vulgaris</i>	56 (88.9)
Rosacea	7 (11.1)
Other type of Non NTDs (n = 37)	
Diffuse <i>lupus erythematosus</i>	8 (21.6)
Urticaria	14 (37.8)
Keloid	14 (37.8)
Sexually transmitted disease	1 (2.7)

NTDs: neglected tropical disease.

There were four cases of “mycetoma”. Based on available data, it was not possible to define whether this was related to actinomycetomas – a bacterial infection – or eumycetomas – a fungal infection, which is integrated as a skin NTD. Irrespective of the cause, further studies are required to determine whether any of these is common in the study area, as both can cause significant morbidity and can be challenging to treat [15].

The strengths of the study include the fact that data were gathered by trained dermatology professionals. Following the recent launch of WHO policy regarding skin care as an innovative strategy towards improved NTD control, this study is one of the first studies in East-Africa addressing this. There are several limitations. The study was hospital based and, as such, is not generalizable to the community. Likewise, with the diagnosis mostly being clinical, there may have been some element of subjectivity. Moreover, since the study used secondary data source all relevant variables related to the study were not recorded.

Conclusions

Our study showed a high proportion of skin NTDs at a specialized dermatology clinic, with three of them relatively common. While our data are not representative for the general population, they indicate that integrated management of skin NTDs should be considered and different preventive strategies like contact tracing, early diagnosis and mass drug administration can be done in integrated way. The dermatology community is best placed to tackle this problem.

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References

1. World Health Organization (2017) Neglected tropical diseases program. Available: <http://www.who.int/neglected-diseases/en/>. Accessed: 18 July 2017.
2. Engelman D, Fuller LC, Solomon AW, McCarthy JS, Hay RJ, Lammie PJ, Steer AC (2016) Opportunities for integrated control of neglected tropical diseases that affect the skin. *Trends Parasitol* 32: 843-854.
3. Chandler D, Fuller L (2018) The skin - A common pathway for integrating diagnosis and management of NTDs. *Trop Med Infect Dis* 3: 101.
4. WHO Regional Office for Africa (2016) Second Edition of National Neglected Tropical Diseases Master Plan for Ethiopia Available: <https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html>. Accessed: 15 April 2020.
5. Weiss M (2008) Stigma and the social burden of neglected tropical diseases, *PLoS Negl Trop Dis* 2: e237
6. Mitjà O, Marks M, Bertran L, Kollie K, Argaw D, Fahal AH, Fitzpatrick C, Fuller LC, Izquierdo BG, Hay R, Ishii N (2017) Integrated control and management of neglected tropical skin diseases. *PLoS Negl Trop Dis* 11: e0005136.
7. Yotsu RR, Kouadio K, Vagamon B, N'guessan K, Akpa AJ, Yao A, Aké J, Abbet RA, Agbor BT, Bedimo R, Ishii N (2018) Skin disease prevalence study in schoolchildren in rural Côte d'Ivoire: Implications for integration of neglected skin diseases (skin NTDs). *PLoS Negl Trop Dis* 17: e0006489.
8. United Nations Department of Economic and Social Affairs (2017) World population prospects: The 2017 Revision Available: <https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html>. Accessed: 02 October 2018.
9. Deribe Meribo K, Gebre T, Hailu A, Ali A, Aseffa A, Davey G. (2012) The burden of neglected tropical diseases in Ethiopia, and opportunities for integrated control and elimination. *Parasite Vector* 5: 240.
10. Ayalew Assefa (2018) Leishmaniasis in Ethiopia: A systematic review and meta-analysis of prevalence in animals and humans. *Heliyon* 4 e00723.
11. Sintayehu W (2017) Pattern of skin disease among clients attending dermatologic clinic at Finote Selam hospital, West Gojjam zone, Amhara Region, Ethiopia.. *Am J Health Res* 5: 178-182.
12. Hofstraat K, van Brakel WH (2016) Social stigma towards neglected tropical diseases: a systematic review. *Int Health* 8 Suppl 1: 53–70.
13. Smith WC, Aerts A (2014) Role of contact tracing and prevention strategies in the interruption of leprosy transmission. *Lepr Rev* 85: 2-17.

14. World health organization (2018) Recognizing neglected tropical diseases through changes on the skin. Available: https://www.who.int/neglected_diseases/resources/9789241513531/en/ Accessed 15 Apr. 2020.
15. Taha H, Fahal A, van de Sande W (2015) Mycetoma: epidemiology, treatment challenges, and progress. *Res Rep Trop Med* 6: 31-36

Corresponding author

Seid Getahun (MD)
Assistant Professor of Internal Medicine.
Wollo University, Dessie, Ethiopia.
PO Box: 1145
Tel: +2510912325013
Fax: 033-311-52-32
Email: seidgech014@gmail.com

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