Diagnosis and epidemiologic overview of the spectrum of skin diseases in Central, Northeast, and Southern Ethiopia

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Abstract

This study analyzed data from hospitals located in three regions of Ethiopia: Addis Ababa, Northeastern Ethiopia, and Southern Ethiopia. The research aims to investigate the prevalence and contributing factors associated with skin diseases in these regions. Skin disorders represent a significant health concern in these areas, though their epidemiology differs markedly from that observed in Western countries. We collected data from 6,449 patients, considering factors like education, income, cultural habits, and access to healthcare. Patients in Southern Ethiopia generally had higher Body Mass Indexes (BMI) and incomes and were closer to dermatology centers. The findings indicate that infectious diseases and pruritic dermatoses are the most prevalent skin conditions in all regions. The study highlights the significant impact of socio-economic status on skin health, with higher education correlating with a lower incidence of infectious diseases and sebaceous gland disorders. Overcrowding was associated with a higher occurrence of infectious diseases, emphasizing the importance of hygiene and sanitary conditions. Additionally, the distance from a patient's residence to the hospital influenced the duration of the disease, stressing the need for better accessibility to healthcare services. In conclusion, this research offers important insights into the spectrum of skin diseases in Ethiopia, emphasizing the role of socio-economic factors and the critical need for improved healthcare access and education.

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Key words: hygienic-sanitary; socioeconomic; eczemas; prurigo; infections; observational.

Contributions: PM, AGK conceived the study; TT, EAB, LW, FG, MT, FD, and SB contributed to study implementation; SR carried out the analysis and interpretation of epidemiologic data; PCP and AM critically revised the manuscript for intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

Conflict of interest: the authors have no conflict of interest to declare.

Ethics approval and consent to participate: the study trial was approved by the local Ethics Committee (Protocol Number 4364).

Consent for publication: not applicable.

Availability of data and materials: data supporting the findings of this study are available from the corresponding author upon reasonable request.

Received: 11 August 2024.
Accepted: 5 November 2024.

Licensee PAGEPress, Italy
Dermatology Reports 2025; 17:10114
doi:10.4081/dr.2024.10114

Introduction

Skin disease is very common in both developing and developed countries. Nevertheless, the epidemiology of dermatological disorders in the emergent nations results in very different patterns from those of Western countries. Skin disease patterns proved to be influenced by the level of education, income, belief systems, as well as cultural habits and customs.[1] The high prevalence of dermatological diseases among the inhabitants of developing countries can be attributed to innumerable factors, including poor hygienic-sanitary conditions, overcrowding, greater exposure to UVA and UVB radiations, low education status, and a reduced possibility of accessing medical care.[1] It is well known that skin diseases in Africa, and in the developing world in general, are mainly a result of common conditions related to preventable infections and infestations and are readily treatable, with a limited number of common infections accounting for the majority of the burden of skin disease.[2] However, recent studies highlight a changing trend in the prevalence of skin diseases, such as acne, eczemas, and dyschromias.[1] Data on skin diseases in Ethiopia are scarce, particularly systematic data collected from various regions of the country. These data could reveal disparities related to socio-economic conditions, infrastructure, and access to healthcare. Additionally, these data are substantial in terms of numerical volume, offering valuable insights into the epidemiology of skin diseases in a developing country. The main purpose of our research was, therefore, to identify the skin diseases that most often affect

people living in different areas of Ethiopia. We also collected data regarding living and socioeconomic conditions. The secondary aim of our study was to search for a statistically significant correlation between these factors and the dermatological disorders we diagnosed. The exact knowledge of the spectrum of dermatological diseases in these geographical areas is the first step in developing adequate prevention methods and better managing the limited therapeutic sources.

Materials and Methods

We performed an observational study from 15 August 2022 to 30 May 2023, collecting data from 2,629 patients who were admitted to hospitals in Addis Ababa and Northeast Ethiopia (Saint Paul Millennium Hospital and Boru Meda Hospital) and 3,820 patients evaluated in four Southern Ethiopia hospitals (Wolaita Sodo University Comprehensive Specialized Hospital (WSUCSH), Wolaita Sodo; Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital (NEMMCSH), Hossana; Dr. Bogalech Gebre Memorial General Hospital, Durame; Arbaminch General Hospital, Arbaminch). For each patient visited in these six hospitals, we performed a complete clinical evaluation of dermatosis and anamnesis and formulated a diagnosis based on the clinical features, using histopathologic examination when needed. We also collected personal data like sex, age, Body Mass Index (BMI), and information concerning previous medical history (comorbidities, previous treatments), hygienic-sanitary conditions (number of showers taken in a month, use of emollients, number of cohabitants), socio-economic status, evaluated as monthly income, education level, and occupation. We also asked questions regarding their house (urban or rural residence, source of drinking water, and use of insect protection) and, finally, questions about the distance between their residence and the hospital.

Referring to the clinical study of Monari *et al.*,[3] conducted in the Tigray region, we used the same groups to categorize the diagnoses. We added an additional category for connective tissue disorders. Dermatological diseases were categorized into i) infectious diseases (impetigo, tuberculosis, erisipela, favus, herpes zoster, varicella, warts, head lice, tinea corporis, tinea capitis, tinea manuum, tinea faciei, pitiriasi versicolor, candida, scabies, pediculosis, and kerion celsi); ii) erythematous and pruritic inflammatory dermatoses (prurito sine materia, eczema, lichen simplex, lichen planus, lichen sclerosus, psoriasis, photo-induced and photo-aggravated dermatitis, and urticaria); iii) diseases of the sebaceous gland (acne, rosacea, suppurative hidradenitis, and folliculitis); iv) pigment disorders (melasma and vitiligo); v) annexial diseases (alopecia areata and nail disorders); vi) miscellaneous diseases (scars, moles, ulcers, keloids, cutaneous tumors); and vii) connective tissue disorders (lupus, rheumatoid arthritis, mixed connective tissue disease).

Table 1. Epidemiologic data collected in Addis Ababa/Boru Meda and Southern Ethiopia.

	Addis Ababa and Boru Meda	Southern Ethiopia
Number of patients	2629	3820
Gender (%)	Males (42.5) Females (57.5)	Males (46.8) Females (53.2)
Residence (%)	Urban (69.5) Rural (34.5)	Urban (69.7) Rural (30.3)
Average age (years)	24.6	24.9
Average BMI	20.1	21.6
Previous visits (%)	Yes (49.1) No (50.9)	Yes (77.7) No (22.3)
Comorbidities (%)	Yes (92.4) No (7.6)	Yes (6.0) No (94.0)
Average number of household	4.4	6.5
Avarage number of showers in a month	7.7	9.0
Source of drinking water (%)	Piped water (92.3) Spring water (5.9) Dug well (1.8)	Piped water (0.8) Spring water (9.2) Dug well (90)
Emollient use (%)	Users (63.6) Non-users (36.4)	Users (54.5) Non-users (45.5)
Use of insect protection (%)	Yes (20.4) No (79.6)	Yes (54.3) No (45.7)
Education level (%)	Primary school (20.5) Secondary school (20.7) College (20.1) No data/not applicable (38.7)	Primary school (22) Secondary school (20.6) College (34.2) No data/not applicable (23.2)
Employment status (%)	Employed (80.1) Unemployed (6) Not applicable (13.9)	Employed (94.6) Unemployed (3.3) Not applicable (2.1)
Average monthly income (Birr)	5211.9	5901.5
Distance to hospital (Km)	46.4	22.9
Duration of complaint (days)	700.2	190.1

Statistical analysis

The database was formatted through the Microsoft-Excel software ver. 365 and later imported to the IBM-SPSS software ver. 27.0.1 (IBM SPSS Inc. Chicago, Illinois); the use of the Stata software ver. 17.0 (Stata Corporation, College Station, Texas) was also considered.

The normality of the distributions was assessed using the Kolmogorov-Smirnov test.

Continuous variables were presented as means ± standard deviation (SD) (in case of a normal distribution) or medians and min/max (in case of a skewed distribution) and compared with the use of Mann-Whitney and Kruskal-Wallis tests; the Spearman's rank correlation test was used to determine correlations among variables. Categorical variables were presented as frequencies or percentages and compared with the use of the chi-square test and Fisher's exact test, as appropriate; associations of the crosstabs were verified using standardized adjusted residuals. A two-sided alpha level of 0.05 was used for all tests.

Results

We visited a total of 6,449 newly diagnosed patients: 2,629 in Addis Ababa and in the northeastern region of Ethiopia, and 3,820 in Southern Ethiopia. Of which, 2,903 were males, and 3,546 were females. 69.6% of patients declared to live in an urban area, while 30.4% in a rural area (meaning an area with lower population density and limited infrastructure). The average age was 24.8 years (precisely, 24.6 in Addis Ababa/Boru Meda and 24.9 in Sodo, Southern Ethiopia), and the average BMI was 21.0 (20.1 in Addis Ababa/Boru Meda and 21.6 in Sodo, Southern Ethiopia).

Evaluating the medical history of our patients, 93.2% declared non-comorbidities, and only 6.8% reported a diagnosis of systemic disease. In particular, hypertension and respiratory virus infections were the most frequent (each representing 1.6% of the total), followed by asthma (1.2%), diabetes mellitus (1.2%), and others (1.2%). The 66.0% had already been visited for health problems and, among these patients, 35.3% had been previously treated by a dermatologist, 34.4% by a general practitioner, 19.3% by health officer, 2.2% addressed to a nurse, 6.1% was cured by a traditional healer, and 2.6% by a non-dermatologist medical doctor.

Concerning the hygienic-sanitary conditions, we found that each patient shared the house with an average of 5.6 people. The average number of showers taken per month was 8.5, mainly taken in a bathroom (68.2%), while the remaining 31.8% declared to take showers outside. The main source of drinking water for members of the patient's household was piped water (90.9%), followed by water from spring (7.9%) and dug wells (1.2%). 58.2% of patients reported using emollients, while 41.8% don't.

We also investigated the use of insect protection, which was confirmed by only 40.5% of patients.

Considering data about education level, out of 5,350 patients who could answer our questions being adults, we found that 14.9% didn't declare the instruction level, 25.8% attended primary school, 25% got a secondary school education, and 34.3% attended college or university.

Only 4.8% of our patients were unemployed; for 6.9%, the question was not applicable due to age or a medical condition that prevented work. The rest of them had a job (88.3%). Among the employed, the most common occupation was government employee (19.4%), followed by private sector employee (12.7%), farmer (10.4%), housewife (9.8%), merchant (7.4%), driver (1.6%), other occupations (1.2%), and 0.1% did not provide a response. The average monthly income was 5620.4 Birr.

The average distance from the patient's residence to the hospital was 32.5 km, differing considerably between patients visited in Addis Ababa (46.4 km) and those evaluated in Sodo (22.9 km). Examining data about the duration of the complaint, we found that the average duration was 398.1 days, ranging from a mean of 700.2 days in Addis Ababa and Boru Meda to a mean of 190.1 days in Southern Ethiopia. Epidemiologic data of the two geographic areas separately (Addis Ababa and Southern Ethiopia) are fully reported

Table 2. Number of patients (%) affected by pathology. Pathologies falling within diagnosis groups are fully described in the article text.

Group 1	29.6
Group 2	38.0
Group 3	8.2
Group 4	10.2
Group 5	1.1
Group 6	6.8
Group 7	1.5
No diagnosis	1.5
Two concomitant diagnosis	3.1
Southern Ethiopia diagnosis groups	**Patients (%)**
Group 1	23.5
Group 2	38.8
Group 3	9.2
Group 4	8.4
Group 5	1.4
Group 6	17.7
Group 7	0.3
No diagnosis	0.0
Two concomitant diagnosis	0.7

in Table 1. Regarding the diagnoses, the biggest group of patients suffered from erythematous and pruritic inflammatory dermatoses (35.8%); the second most represented diagnosis was infectious disease, accounting for 26% of the total. Group six, miscellaneous, was the third cause of complaint (13.3%). In this group, the principal clinical entities were found to be keloids and moles. However, four melanoma and nine non-melanoma skin cancers were diagnosed. Group four, pigment disorder, accounted for 9.1%, while group three, diseases of the sebaceous gland, accounted for 8.8%. Group five and seven, representing annexial diseases and connective tissue disorders, were the least numerous, accounting for 1.3% and 0.8%, respectively. Additionally, 39 patients were not diagnosed, while 111 subjects were diagnosed with two different dermatological disorders.

Most of the patients were diagnosed clinically. However, 51/2,629 (1.9%) in Addis Ababa/Boru Meda and 87/3,820 (2.3%) in Southern Ethiopia were diagnosed by a skin biopsy. Overall, 138/6,449 (2.1%) of patients required histological examination. Data concerning the prevalence of diagnosis groups in the two geographic areas (Addis Ababa/Boru Meda and Southern Ethiopia) are reported in Table 2.

Discussion

This study describes skin disease patterns in three different areas of Ethiopia. We collected a large sample of the population, representative by gender and age, of the geographical areas considered. Most consultations were in adults (67.4%), with a female preponderance (55.1%).

Patients visited in southern hospitals of Sodo, Durame, Hossana, and Arbaminch (3,820 patients), compared to the ones evaluated in Addis Ababa and Northeast Ethiopia (2,629 patients), resulted in having a slightly higher BMI (20.1 *vs.* 21.6), a monthly income of 5212 Birr (*vs.* 5901.5 Birr), a dermatology center closer to their residence (22.9 *vs.* 46.4 Km) and a lower duration of the complaint (190.1 *vs.* 700.2 days). In addition, the prevalence of infectious disease results in slightly lower rates in Southern Ethiopia compared to Addis Ababa (24.2% *vs.* 30.2%), and so the prevalence of pruritic dermatosis (38.8% *vs.* 40.8%). Diagnoses of pigment disorders (12.2% *vs.* 7.1%) and diseases of the sebaceous gland (13.4% *vs.* 5.7%) were more frequent in the four Southern Ethiopian hospitals than in Addis Ababa. This increasing percentage of dermatoses, like acne, folliculitis, melasma, and dyschromia, has already been reported in other geographic areas in Africa, like South Africa.[1]

Nevertheless, eczemas, prurigo, and infections generally represent the main dermatological problems in our study in both areas considered. In the study by Monari *et al.*,[3] these entities were similarly the most represented in the Tigray region: pruritic dermatosis constituted 47.8% of the total, and infectious diseases 21.2%. Similarly, the study by Kelbore *et al.*[4] reported eczema, bacterial, and fungal skin infections to be the first three causes of disease among children attending a dermatologic clinic in the Wolaita Sodo area.

It is widely known from the literature that infectious diseases are a main concern among dermatological disorders in Ethiopia.[5] In our study, they constituted about a quarter of all dermatological diseases (26%). Our data showed that subjects who received a diagnosis of infectious disease had a higher average number of cohabitants (6.6 compared to the average value of 5.6). This data corroborates the impact of overcrowding on the incidence of infectious diseases in these geographical areas. We also observed a statistically significant correlation between the use of insect protection and the incidence of infectious diseases: the incidence of infectious diseases was significantly lower in subjects who used repellents (p=0.001). Furthermore, we evaluated the association between the education level (defined as primary, secondary school, or college degree) and the diagnosis received: it emerged that for patients with a diagnosis of infectious diseases and diseases of the sebaceous glands, as the level of education increases, the incidence of the disease decreases by up to half (p=0.01). This evidence confirms that socio-economic status can have serious implications on the patients' health as well, mainly influencing the possibility of accessing medical care and medications,[3] but also probably determining a greater or lesser awareness about health issues.

We have also highlighted a positive correlation between the distance from the patient's residence to the hospital and the duration of complaint, with an increase in the duration of the disease as the distance from the reference service increases (p=0.001). Obviously, this reflects the difficulty of patients in accessing healthcare services and the profound impact of this problem on the timeliness of diagnosis.

Conclusions

In this observational study, we documented the spectrum of skin diseases seen in Addis Ababa, in Northeast Ethiopia, and in the Wolaita Sodo area, Southern Ethiopia. The most frequent diagnosis was represented by erythematous and pruritic inflammatory dermatoses (35.8%), followed by infectious disease, accounting for 26% of the total.

Our study has underlined the influence of socioeconomic conditions and education level on skin diseases in Ethiopia. The use of sources for this purpose would lead to a strong reduction in the incidence of several pathological conditions. Great progress still needs to be made in this direction.

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