Characteristics, clinical manifestations and management of leprosy in KwaZulu-Natal, South Africa: A 20-year retrospective study

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Background. Although leprosy, a neglected tropical disease, has been eliminated (<1 case per 10 000 population) in South Africa (SA) since 1926, according to the World Health Organization, new cases continue to be reported. The management of leprosy poses several challenges, including patient adherence, education and insufficient training of healthcare practitioners.
Objectives. To describe the biographical profile, clinical manifestations and treatment outcomes in patients with leprosy in KwaZulu-Natal Province.
Methods. This retrospective study aimed to analyse the clinical data of leprosy patients in SA from 2002 to 2022. Data collected included patient demographics, comorbidities, cutaneous and neurological manifestations of leprosy, complications, treatment and adverse reactions. Descriptive statistics were used to summarise the data.
Results. The study analysed the clinical data of 194 leprosy patients from 2002 to 2022. The majority of patients were male and middle aged, with a disproportionate representation of black South Africans. Regarding socioeconomic status, 80% were unemployed and 40% were social grant recipients. Most cases were clustered in urban centres and diagnosed at secondary care facilities, with 15% being HIV positive. The majority of patients (90%) were classified as having multibacillary leprosy. Common symptoms included upper respiratory tract involvement, hair loss and painful nerves, with the face and limbs being most frequently affected. Cutaneous morphology predominantly included plaques and hypopigmented patches, while neurological signs included ulnar nerve tenderness, muscle weakness and sensory deficits. Debilitating neurological complications were found in one-fifth of patients. Despite initiation of multidrug therapy in most patients, a significant proportion (27.3%) did not complete the full course of treatment, and treatment reactions were noted in 33.5% of patients.
Conclusion. These findings emphasise the urgent need for enhanced patient and healthcare worker education, particularly in primary healthcare settings, to improve adherence to treatment, advocate for prophylactic measures and prevent new cases. Achieving leprosy-free status in SA requires the collaboration of many role-players to address these challenges and improve healthcare practices.

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Leprosy, also known as Hansen's disease, is a chronic infection caused by *Mycobacterium leprae* and *Mycobacterium lepromatosis*.[1] It has been historically associated with ancient biblical references and has been recognised as a neglected tropical disease (NTD) by the World Health Organization (WHO).[2,3] Notably, leprosy stands as a significant infectious cause of disability in the developing world.[4] The disease is primarily transmitted through droplet spread and typically manifests cutaneous and peripheral neurological signs.[2] Systemic involvement may extend to various body parts, including the eyes, respiratory mucosa, skeletal system, testes and liver.[1,5] Without proper treatment, leprosy can lead to permanent disability and disfigurement.[1]

In 1998, the WHO introduced a classification system, based on the number of cutaneous lesions, allowing more efficient disease management and prognosis in the field.[5,6] This classification divides leprosy into three categories: paucibacillary (characterised by a single lesion); paucibacillary leprosy (involving two to five lesions) and multibacillary leprosy (involving more than five lesions).[5] Furthermore, the Ridley and Jopling classification system delineates the spectrum of cutaneous manifestations ranging from lepromatous leprosy at the immunosuppressed end to tuberculoid leprosy at the immunocompetent pole.[5]

Clinically, lepromatous leprosy presents with multiple erythematous to hyperpigmented nodular and infiltrative plaques known as lepromas that are symmetrically distributed, predominantly on the face and trunk.[5] In contrast, tuberculoid leprosy is characterised by solitary, annular, hypopigmented and erythematous asymmetrically distributed patches and plaques, often found on the extremities.[5] Lesions may demonstrate loss of sensation or anhidrosis.[5] Indeterminate leprosy is marked by one or more hypopigmented macules, initially neither infiltrated or erythematous.[7]

Patients with lepromatous leprosy may present with leonine facies whereby cushion-like infiltrations are found in the centrofacial distribution and madarosis, which manifests as loss of eyebrows.[7] Destruction of the nasal septum may cause a saddle nose deformity.[7]

Neurological manifestations such as peripheral neuropathies, paresthaesia and hypoesthaesia are common in leprosy patients.[5,7] Peripheral nerves may become enlarged and tender, and those frequently affected are the greater auricular, radial, ulnar, median, posterior tibial and common peroneal nerves.[5] The treatment of leprosy follows the WHO (Table 1) and National Hansen's Disease Program guidelines (Table 2).

Leprosy reactional states are acute immunological phenomena that are divided into type 1 reactions, involving cell-mediated immunity, and type 2 reactional states (erythema nodosum leprosum) associated with immune complex formation.[5,8-12] The Lucio phenomenon is a rare, distinct leprosy reaction characterised by thrombotic reactions, leading to bullae and systemic symptoms.[13]

Notably, despite the prevalence of HIV in sub-Saharan Africa,[14] studies have disproved a direct link between HIV infection and leprosy.[4,14-16] However, leprosy can manifest as an immune reconstitution disease in HIV-positive patients,[4,15,16] typically presenting in paucibacillary leprosy with a type 1 reaction.[16]

Leprosy diagnosis relies on clinical assessment, histology, Fite-Faraco stained slit skin smears, or the lepromin skin test.[5]

According to the WHO, the most recent worldwide prevalence of leprosy was 22.9 cases per million, with a significant burden in Africa.[1,2]

In South Africa (SA), leprosy's distribution is heterogenous, with historical concentrations in specific regions.[19,20] Although declared eliminated by the WHO in 1926, new cases continue to be diagnosed.[4,19,21] It is a notifiable disease and the prevalence in SA is 0.013 per 10 000 population.[19,21] A study in Johannesburg found male predominance, a high percentage of multibacillary cases and challenges with treatment completion.[12]

Protection against leprosy infection can be divided into immunoprophylactic and post-exposure prophylactic measures.[22] One important immunoprophylactic measure is the bacillus Calmette-Guérin (BCG) vaccination.[22] Initially intended to protect against *Mycobacterium bovis*, the BCG vaccine has been shown to provide some protection against leprosy infection, and has been included in the WHO guidelines for diagnosis, treatment and prevention of leprosy.[17,22,23] Post-exposure prophylaxis with single-dose rifampicin has been shown to be a safe and cost-effective option in preventing leprosy transmission in close contacts.[22,24,25]

Stigma remains a significant challenge in leprosy management, arising from religious, cultural and misconceived beliefs, as well as the association of disability with the disease.[26] This stigma can adversely affect patient outcomes and add to the psychological burden.[26]

Barriers to global elimination include delayed detection due to stigma, limited healthcare worker capacity and expertise, restricted healthcare access, and inadequate surveillance and health information systems.[2,4] Additionally, health and socioeconomic emergencies can divert attention from NTDs such as leprosy.[4] Concerns exist about the loss of leprosy-specific skills among healthcare workers in SA due to the low prevalence of the disease and the lack of attention to leprosy in undergraduate medical curricula.[20,27]

Addressing research gaps is pivotal in the global effort to eliminate leprosy, emphasising the need for ongoing research interest and investment in this field, as identified by the WHO.[2]

Methods

A retrospective chart review encompassing 20 years, from January 2002 to January 2022, was conducted to investigate leprosy cases in KwaZulu-Natal Province, SA. A total of 194 patients, including both paediatric and adult individuals, were included in the study. Patient records were sourced from The Leprosy Mission (TLM) of SA.

Objectives

The principal aim of this study was to comprehensively elucidate the clinical characteristics, treatment outcomes and associated challenges in managing leprosy in KwaZulu-Natal over a two-decade span. This was achieved through the meticulous collection and analysis of data encompassing patient demographics, coexisting medical conditions, clinical presentations of leprosy, treatment modalities and the subsequent follow-up plan.

Setting

The study was conducted in collaboration with TLM, a non-governmental organisation actively involved in healthcare

Table 1. Recommended leprosy treatment regimen from the World Health Organization[17]

Diagnosis	Population	Medication	Dose	Duration
Paucibacillary leprosy	Adults	Rifampicin	600 mg/month	6 months
		Clofazimine	300 mg/month and 50 mg/day	
		Dapsone	100 mg/day	
	Children	Rifampicin	450 mg/month (10 - 14 years old) or 10mg/kg month (<10 years old)	6 months
		Clofazimine	150 mg/month and 50 mg alternate days (10 - 14 years old) or 50 mg twice weekly (<10 years old)	
		Dapsone	50 mg/day (10 - 14 years old) or 2 mg/kg/day (<10 years old)	
Multibacillary leprosy	Adults	Rifampicin	600 mg/month	
		Clofazimine	300 mg/month and 50 mg/day	12 months
		Dapsone	100 mg/day	
	Children	Rifampicin	450 mg/month (10 - 14 years old) or 10 mg/kg month (<10 years old)	12 months
		Clofazimine	150 mg/month and 50 mg alternate days (10 - 14 years old) or 50 mg twice weekly (<10 years old)	
		Dapsone	50 mg/day (10 - 14 years old) or 2 mg/kg/day (<10 years old)	

worker training, patient home visits and counselling services throughout KwaZulu-Natal. The organisation also operates an outpatient leprosy clinic with the KwaZulu-Natal provincial health department. These services are available at Prince Mshiyeni Memorial Hospital (PMMH) in Durban, Harry Gwala Regional Hospital (HGRH) and Grey's Hospital in Pietermaritzburg and Manguzi Hospital in northern KwaZulu-Natal. KwaZulu-Natal, the second largest province, is characterised by a predominately black African population (87.6%) and a diverse socioeconomic landscape encompassing urban centres, rural villages and agricultural areas.[28] Data were collected from outpatient files obtained from TLM's offices in Durban. These files are carried by TLM staff to their outpatient clinics at the previously mentioned hospitals and then stored at TLM's Durban office.

Data collection

Owning to the relative rarity of leprosy, a convenience sampling approach was used to select patient records without randomisation. Each file was assigned a unique identifier to avoid duplicate information. Data compilation was executed using Excel (Microsoft, USA) spreadsheets. The diagnosis of leprosy was established collaboratively by medical practitioners and TLM field workers. Histology results were assessed by pathologists affiliated with the SA National Health Laboratory Service and Lancet Laboratories.

Variables

The variables in our study are listed in Table 3.

Statistical analysis

To determine the required sample size, a minimum of 194 cases was necessary to estimate the demographic and clinical characteristics of leprosy patients in KwaZulu-Natal to within a precision of ~10%, a confidence level of 95% and an assumed baseline estimate of 50%. Descriptive statistical methods were employed to summarise the data. Categorical data were presented as frequencies and percentages, while numerical data were expressed as means. The statistical software Stata version 17 (StataCorp, USA) was employed for sample size estimation and data analysis.

Ethical considerations

Stringent ethical protocols were adhered to throughout the study. All patient data were anonymised to safeguard privacy. Gatekeeper permission was duly obtained from TLM, PMMH, HGRH and Manguzi and Grey's hospitals. Ethical approval and permission for data analysis and subsequent publication were obtained from the Bioethics Research Committee of the University of KwaZulu-Natal (ref. no. BREC/00003825/2022) as well as the KwaZulu-Natal National Health Research Committee (ref. no. KZ_202207_011).

Results

Patient demographics

Age and gender

The study encompassed a review of 194 patient files. Age at diagnosis exhibited a wide range, from 7 years old to 87 years old, with 12 (6%) patients falling into the paediatric category (<12 years of age) and 21 (11%) individuals classified as geriatric patients (≥65 years old). Household leprosy contacts were reported in 7 (58%) paediatric patients and 61 (34%) adults. A gender distribution analysis revealed a female-to-male ratio of 1:1.2.

Racial identity and nationality

Regarding racial identity, 190 patients identified as black African, three as mixed race, and one as Indian. Fifteen (8%) patients were foreign nationals, representing Ethiopia, India, Lesotho, Tanzania, Malawi and Mozambique, while 179 (92%) were SA citizens.

Place of residence and employment status

The majority of patients resided in specific districts, with 44 (23%) residing in the eThekwini district, 27 (14%) in the uMgungundlovu district and 15 (8%) in the uMhlabuyanlingana district. Employment status data indicated that 146 out of 182 adults (80%) were unemployed, and 81 (40%) participants relied on social grants for income.

Comorbid conditions

Regarding HIV status, 132 (68%) patients tested negative for HIV, while 29 (15%) were HIV positive, and the HIV status of 33 (17%) remained unknown. Medical comorbidities other than HIV, including tuberculosis, hypertension, diabetes, asthma, thyroid disease, epilepsy and hepatitis collectively affected 23 (12%) patients.

Diagnosis and onset of presentation

The diagnosis of leprosy predominantly occurred at secondary level of care facilities, accounting for 114 (59%) patients. This was followed by primary care facilities, with 60 (31%) patients, while tertiary centres accounted for 17 (9%) patients. Histological confirmation was noted in 171 (88%) patients, while only 2 (1%) patients underwent split skin smears, and 21 (11%) received a clinical diagnosis. Most patients were newly diagnosed leprosy

Table 2. Recommended treatment regimen from the National Hansen's Disease Program and the United States Health Resources and Services Administration data extracted from the National Hansen's Disease Program[18]

Diagnosis	Population	Medication	Dose	Duration
Paucibacillary leprosy	Adults	Rifampicin	600 mg/day	12 months
		Dapsone	100 mg/day	
	Children	Rifampicin	10 - 20 mg/kg/day (>600 mg)	12 months
		Dapsone	1 mg/kg/day	
Multibacillary leprosy	Adults	Rifampicin	600 mg/day	24 months
		Clofazimine	50 mg/day	
		Dapsone	100 mg/day	
	Children	Rifampicin	10 - 20 mg/kg/day (>600 mg)	24 months
		Clofazimine	1 mg/kg/day	
		Dapsone	1 mg/kg/day	

Table 3. List of variables

Variable	Category	Description
Demographics	Age	In years
	Gender	Male or female
	Racial identity	Black, coloured or Indian
	Nationality	Country of citizenship
	Place of residence	Province, municipal district and town
	Employment status	Employed, unemployed, scholar or pensioner
	Contact history	Household and community contacts
Clinical characteristics	Comorbid conditions	HIV, tuberculosis, hypertension, diabetes, asthma, thyroid disease, epilepsy, hepatitis
	Level of care at which diagnosis was made	Tertiary, secondary or primary level of care
	Method of diagnosis	Clinical, histological or via split skin smear
	History of relapse	Subsequent diagnosis of leprosy after having completed a course of treatment
	Time interval between symptoms onset and presentation	In months
	Classification of leprosy	World Health Organization (multibacillary and paucibacillary) and Ridley and Jopling (tuberculoid, borderline tuberculoid, borderline borderline, borderline lepromatous and lepromatous leprosy)
Symptoms and clinical manifestations	Upper respiratory tract	Nasal congestion, epistaxis, and hoarseness of voice
	Cutaneous	Anhidrosis, hair loss, painful nodules
	Neurological	Pruritus, nerve pain, warmth and flushing and subjective muscle weakness
	Site of cutaneous lesions	Face, arms, legs, back, trunk and buttocks
	Morphology of cutaneous lesions	Infiltrative plaques, patches, nodules, ulcers and papules
	Lesional colour	Skin-coloured, erythematous, hyperpigmented and hypopigmented
	Other morphological features	Well-defined plaque edges, symmetry of lesions, central clearance and presence of satellite lesions
	Site of peripheral nerve tenderness	Ulnar, peroneal, posterior tibial, radial, median and facial nerve
	Other neurological signs	Muscle power deficits and sensory deficits
Complications	Neurological	Clawing of the hands, autoamputation of fingers and hammer toes
	Cutaneous/musculoskeletal	Leonine facies, collapsed nasal bridge
	Ophthalmic	Conjuctivitis, lagophthalmos, visual loss and loss of corneal sensation
Treatment and treatment reactions	Drug therapy	Multidrug therapy, dapsone
	Completion of treatment	Completed treatment or treatment incomplete (default, loss to follow-up, demise)
	Duration of treatment	In months
	Treatment reactions	Type 1 or type 2

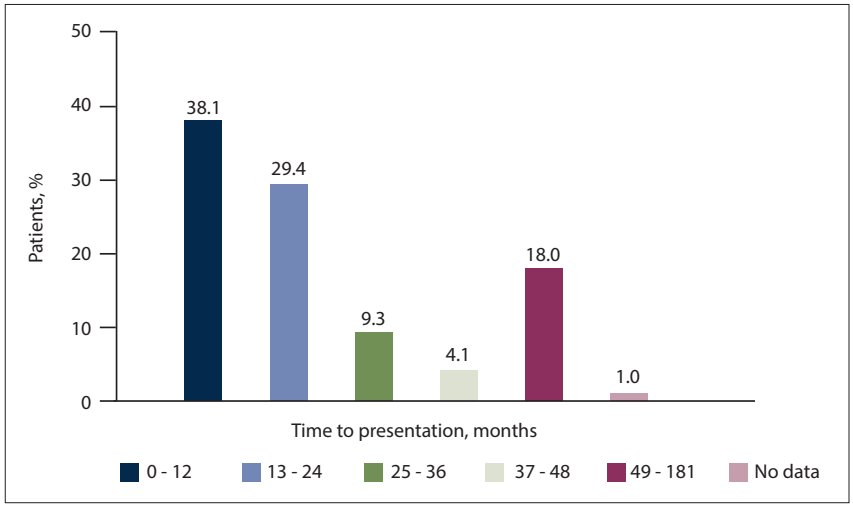

Fig. 1. Time from symptoms to presentation.

cases, with a relapse noted in 17 patients (9%). Notably, 71 (36.6%) had a positive household contact. The time interval between symptom onset and initial healthcare facility presentation varied, with nearly a fifth (48) of the patients seeking medical attention 49 months after symptom onset (Fig. 1).

Leprosy classification

The WHO classification of leprosy cases revealed that multibacillary leprosy accounted for 173 (89%) cases, while paucibacillary leprosy accounted for 21 (11%). Further classification based on the Ridley and Jopling system (Fig. 2) demonstrated that 116 (60%) patients had lepromatous leprosy.

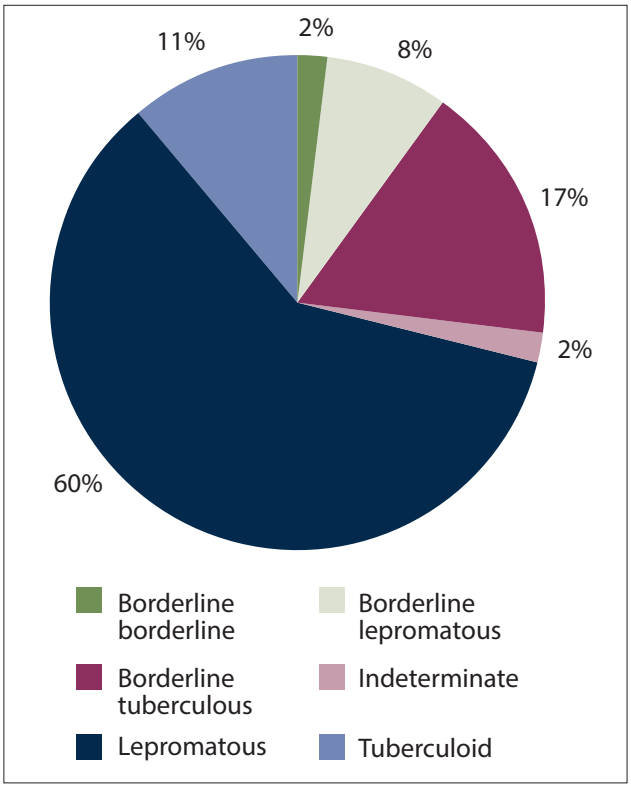

Fig. 2. Ridley and Jopling classification of leprosy.

Symptoms and clinical manifestations

The most frequently reported upper respiratory tract symptoms were nasal congestion, while cutaneous and neurological symptoms often included hair loss and nerve pain, respectively. Specific signs and symptoms are detailed in Table 4.

Cutaneous lesions were commonly observed on the face, arms and legs, with the buttocks being the least involved (Fig. 3).

Madarosis was present in 81 (42%) patients. Cutaneous lesions typically exhibited an erythematous rather than hypopigmented appearance (Table 5).

Neurological signs were characterised by nerve tenderness and enlargement, with the ulnar nerve being the most commonly implicated (Fig. 4).

Muscle power deficits were noted in 32 (17%) patients, while sensory deficits were evident in 103 (53%). Complications such as clawing of the hands and various cutaneous, musculoskeletal and ophthalmic issues were documented (Table 6).

Treatment and treatment reactions

All patients received multidrug therapy (MDT), except for one who underwent dapsone monotherapy. Eleven patients were currently on treatment. Of the 183 patients no longer on treatment, 50 (27%) had not completed the course: 27 defaulted (15%), 4 died (2%), 6 relocated (3%) and 13 were lost to follow-up (7%). Most patients underwent treatment for a duration of 13 - 24 months. Among the 11 patients currently on treatment, 1 patient on dapsone monotherapy had been on treatment for 372 months. Treatment reactions were observed in 65 (34%) patients, with type 2 reactions accounting for 38 (59%) patients and type 1 reactions comprising the remaining 27 (41%). No data were available regarding re- challenge of therapy after reactions.

Preventive measures

No data were available regarding preventive measures such as immunisation with the BCG vaccine and the use of post-exposure prophylaxis in contacts.

Discussion

Patient demographics

Age and gender

This study offers insights into the comprehensive characteristics, clinical presentations and management strategies employed for leprosy cases in KwaZulu-Natal over 20 years. Notably, a male predominance was observed, consistent with global and local research findings.[12,29] The average age at diagnosis, ~37.8 years old, placed patients in the middle age group, a trend corroborated by prior studies.[30] Although there were limited paediatric and geriatric cases, an intriguing observation was that nearly 60% of paediatric patients had household contacts.

Ethnicity and nationality

The study revealed a disproportionate burden of leprosy among black South Africans, particularly in comparison with other population groups within KwaZulu-Natal. Conversely, <8% of the patients were foreign nationals, a notable contrast to a recent study conducted in Gauteng Province, where more than half of the patient cohort consisted of foreign nationals.[12] This discrepancy may be attributed to Gauteng's status as an economic hub in SA, attracting more migrant workers.[31]

Place of residence and employment status

Our study highlighted the geographical clustering of leprosy cases in the eThekwini and uMgungundlovu municipal areas, possibly due to enhanced healthcare accessibility in these metropolitan regions and the presence of outpatient clinics, operated by TLM in collaboration with dermatologists, contributing to improved diagnostic accuracy. We found that 80% of patients with leprosy were unemployed. This suggested link between lower socioeconomic status and risk of leprosy infection has also been observed in other studies.[32]

Comorbid conditions

HIV co-infection

Considering the high prevalence of HIV in KwaZulu-Natal, with recent studies reporting rates as high as 27%,[33,34] the identification of 15% of leprosy patients as HIV positive and 17% with an unknown HIV status underscores the imperative for prioritising HIV testing among individuals presenting with leprosy. This finding aligns with similar observations in other SA studies.[12]

Other comorbidities

Medical comorbidities other than HIV, such as tuberculosis, hypertension, diabetes, asthma, thyroid disease, epilepsy and hepatitis, were present in ~12% of the patient population, with a noteworthy proportion (almost 11%) of geriatric patients.

Diagnosis and presentation

The study highlighted that most diagnoses occur at secondary-level care facilities, indicating a potential deficiency in leprosy-specific expertise at the primary level. This observation aligns with a study by Ukpe,[20] which underscored primary healthcare

workers' limited knowledge and practical involvement in leprosy management and diagnosis. Most patients were newly diagnosed cases of leprosy, with a relapse rate of 9%, a trend consistent with findings from a local study.[12] We are unable to comment as to whether relapse was due to re-infection, treatment-resistant or recalcitrant leprosy. Notably, many patients presented to healthcare facilities more than a year after experiencing the initial leprosy symptoms, possibly indicating inadequate healthcare access or patient education regarding leprosy.

Leprosy classification

Almost 90% of patients were diagnosed with multibacillary leprosy, with 60% of the cohort exhibiting lepromatous leprosy, surpassing the proportions reported in a study by Nkehli *et al*.[12] This discrepancy may be attributed to KwaZulu-Natal's larger rural population, potentially leading to delayed presentations to healthcare services.

Symptoms and clinical manifestations

Common symptoms included upper respiratory tract symptoms, hair loss and nerve pain. The predilection of lesions on exposed sites such as the face, limbs and trunk was noted, consistent with findings in other studies.[35]

Complications

Neurological complications were evident in over one-fifth of patients, with clawing of the hands being the most frequent complication. This contrasts with a study conducted in the USA, where one-third of the cohort exhibited neurological complications.[36] Other severe features such as digital autoamputation, leonine facies and collapsed nasal bridges were also noted in some patients. Ocular complications were relatively infrequent, predominantly comprising conjunctivitis and lagophthalmosis, findings echoing those of a similar study in Cameroon.[37]

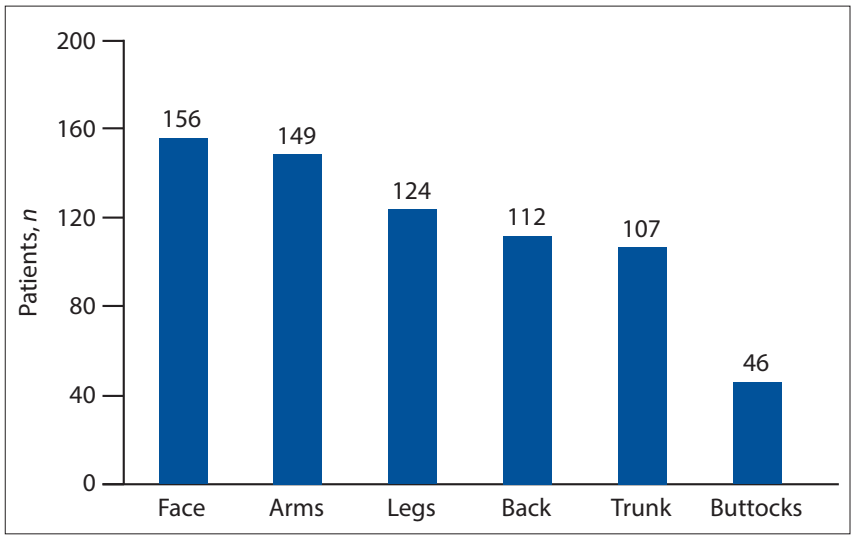

Fig. 3. Site of skin lesions.

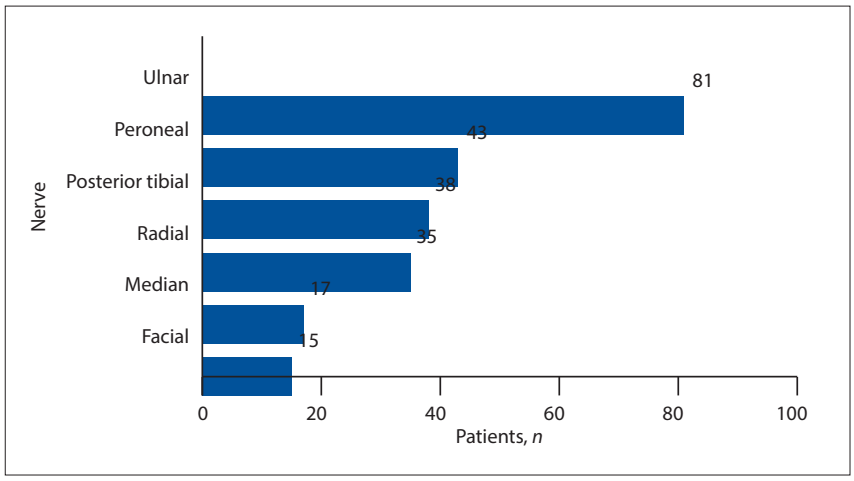

Fig. 4. Nerve tenderness/enlargement.

Treatment and treatment reactions

The vast majority of patients (99.5%) received MDT, with only one patient refusing MDT, and opting for dapsone monotherapy, a concerning development with potential implications for public health. Treatment adherence remained a significant concern, with 27% failing to complete their treatment, contributing to a substantial public health challenge, as these individuals may serve as potential sources of transmission within the community.

Treatment reactions were observed in approximately one-third of patients, with type 2 reactions comprising the majority (59%). These findings resonate with those of a similar local study. However, the causative factors contributing to these reactions were not extensively elucidated.[12] Possible reasons for defaulting treatment may include limited access to healthcare services, socioeconomic challenges, non-compliance due to treatment reactions and side-effects, stigma and the impact of COVID-19 restrictions.[11,38-40] Recent studies involving patients with pulmonary tuberculosis in our setting showed higher rates of completion of treatment in patients who participated in directly observed therapy short course (DOTS).[41,42] Similar results were noted in patients with leprosy globally.[43,44] This could serve as a cost-effective and simple solution to prevent loss to follow-up.

Implications

In conclusion, this study's findings shed light on the multifaceted aspects of leprosy within KwaZulu-Natal, emphasising the need for targeted strategies to improve diagnosis, treatment adherence and overall management of this ancient and stigmatised disease in the region.

Study limitations

Our study is subject to several limitations that warrant consideration. Firstly, the possibility of reporter, recall and selection bias cannot be entirely ruled out as data were collected by a sole researcher and relied upon reported information.

Secondly, the patient files contained gaps in critical data, including HIV status and the extent of involvement of the greater auricular nerve. Files lacked data regarding

Table 4. Symptoms experienced by patients

Sign/symptom	Patients, %	Patients, *n*
Upper respiratory tract		
Nasal congestion	65	126
Epistaxis	44	85
Hoarseness of voice	43	83
Cutaneous		
Hair loss	53	103
Painful nodules	36	69
Anhidrosis	22	42
Pruritus	20	39
Neurological		
Nerve pain	36	69
Warmth and flushing	19	37
Subjective muscle weakness	19	37

Table 5. Morphology of skin lesions

Feature	Patients, %	Patients, *n*
Morphology		
Infiltrative plaques	67	126
Patches	63	122
Nodules	40	78
Ulcers	20	39
Papules	9	17
Colour		
Hypopigmented	63	122
Erythematous	38	73
Other features		
Well-defined plaque edges	64	124
Symmetry of lesions	40	78
Central clearance	21	41
Satellite lesions	20	39

Table 6. Complications of leprosy in our cohort

Complication	Patients, %	Patients, *n*
Neurological		
Clawing of hands	21	41
Autoamputation of fingers	13	25
Hammer toes	2	3
Cutaneous/musculoskeletal		
Leonine faces	6	12
Collapsed nasal bridge	3	5
Ophthalmic		
Conjunctivitis	7	13
Lagophthalmos	4	8
Visual loss	3	6
Loss of corneal sensation	2	4

BCG vaccination, and we were unable to ascertain whether post-exposure prophylaxis was offered to contacts. Other gaps in data included documentation of re-challenging treatment after treatment reactions and the cause of relapse. Additionally, given the extensive data collection period, spanning over 20 years, the influence of potential confounding factors such as patient demographics and changes in healthcare practices during this time period could not be entirely excluded.

Thirdly, the retrospective nature of our study, which entailed review of patient records, introduces inherent limitations regarding the quality and completeness of the available data.

Lastly, it is important to acknowledge that our study was limited to a single province in SA, and consequently, the generalisability of our findings to other regions within the country may be limited.

Recommendations

Based on the findings of our study, we propose several recommendations to enhance the management and control of leprosy:

- **Use of TLM's medical assessment form:** We strongly recommend the adoption of TLM's medical background and physical assessment form for all patients with leprosy. This user-friendly tool offers a comprehensive reporting template that equips clinicians with essential patient biographical information, facilitating contact tracing. Moreover, it provides convenient checklists and diagrams outlining comorbidities, clinical manifestations, treatment and follow-up plans. In light of our study, we suggest the incorporation of the following elements into this assessment form: inclusion of HIV voluntary testing and counselling with a corresponding follow-up plan for patients with unknown HIV status, integration of CD4 and viral load parameters and inclusion of an assessment of the greater auricular nerve in the neurological evaluation.
- **Enhancement of health information systems:** We postulate that issues related to health information systems in SA contribute to the burden of leprosy-related complications. To address this, we recommend the implementation of electronic health records to improve patient data tracking, management and continuity of care. Additionally, concerted efforts should be made to strengthen health systems by providing equitable access to healthcare services and improving existing infrastructure.
- **Capacity building for healthcare workers:** Our study revealed a deficiency in leprosy-specific skills among healthcare workers in our setting. To rectify this, we recommend a significant paradigm shift in public health interventions, health professions academic curricula and continuous medical education in SA. These programmes should focus on equipping healthcare workers with the necessary leprosy-specific skills, particularly those in primary care. This capacity-building effort aims to facilitate timely diagnosis and treatment, ultimately reducing disease-related morbidity.
- **Healthcare worker and patient education:** A substantial portion of our study population experienced potentially preventable, debilitating neurological complications and alarming rates of delayed presentation and treatment default. We advocate for comprehensive healthcare worker and patient education initiatives as strategies to mitigate disease morbidity. Furthermore, community engagement and public education on leprosy are crucial. Every opportunity should be seized to counsel and educate patients who have already been diagnosed with leprosy regarding treatment compliance and the importance of timely intervention.
- **Contact tracing and prophylaxis:** More effort and resources should be directed toward prevention of leprosy transmission in the community. The BCG vaccination has been part of the infant vaccination schedule in SA for many years, and healthcare workers

should take every opportunity to reinforce the importance of ensuring children's vaccinations are up to date. Household contact tracing and the use of post-exposure prophylaxis should be prioritised in the homes of leprosy patients.

- E**xploration of Further Research**: Future research avenues could include exploring patient perspectives on leprosy, investigating health system factors, assessing long-term treatment outcomes and evaluating the impact of community engagement and public education initiatives. Further research regarding cost-effective solutions, such as the use of DOTS to prevent loss to follow-up, is recommended. These studies would contribute valuable insights to the ongoing efforts to combat leprosy.

By implementing these recommendations, we aim to improve the diagnosis, treatment and overall management of leprosy, ultimately reducing its impact on affected individuals and communities.

Conclusion

In conclusion, our study underscores a stark reality: despite being eliminated in SA according to the WHO, leprosy persists, with new cases emerging in KwaZulu-Natal. The misconception that leprosy is an ancient, biblical ailment has fostered a dangerous complacency among healthcare practitioners and the general public. Our findings highlight the fact that leprosy remains a tangible threat to public health, disproportionately affecting the most vulnerable members of our society.

We advocate for a diligent and unwavering commitment to combat this ongoing challenge. We must empower healthcare workers with the requisite skills, educate patients about the disease and its management and actively engage communities. We hope to achieve a leprosy-free status only through the collective involvement of all stakeholders and the cultivation of a collaborative spirit.

The journey toward eradicating leprosy demands vigilance, dedication and a unified effort. Let us stand together in this endeavour, reaffirming our commitment to a future where leprosy no longer threatens our communities' wellbeing.

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