e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(8); 1371-1377

Original Research Article

# Clinico-Bacteriological Spectrum of Leprosy among Clinically Suspected Patients: Insights from a Five-Year Retrospective Study

**Smita V. Mohod[1], Maria Sheikh[2], Dilip Gedam[3], Gopal Agrawal[4]**

[1]Assistant Professor, Department of Microbiology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

[2]Junior Resident 2, Department of Microbiology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

[3]Associate Professor, Department of Microbiology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

[4]Professor and HOD, Department of Microbiology, Indira Gandhi Government Medical College, Nagpur, Maharashtra, India

**Received: 01-05-2026 / Revised: 15-06-2026 / Accepted: 21-07-2026**

**Corresponding author: Dr. Smita V. Mohod**

**Conflict of interest: Nil**

**Abstract**

**Background:** Leprosy remains an important public health concern in endemic regions despite the availability of multidrug therapy. Slit-skin smear (SSS) examination is an established laboratory method for confirming the diagnosis, estimating bacillary load, and supporting disease classification. Understanding the clinic-bacteriological profile of leprosy patients is essential for strengthening disease surveillance and early case detection.

**Objective:** To evaluate the demographic profile, clinical characteristics, bacteriological index (BI) grading, and temporal trends among slit-skin smear-positive leprosy cases in a tertiary care centre.

**Methods:** A retrospective observational study was conducted using records of clinically suspected leprosy patients who underwent slit-skin smear examination from January 2020 to February 2025 at the Supervisory Urban Leprosy Unit, Nagpur, Maharashtra. Demographic details, clinical features, clinical spectrum, bacterial index (BI) grading, and year-wise distribution were extracted from laboratory records and analysed using descriptive statistics at a tertiary care teaching hospital in Nagpur.

**Results:** Among 389 clinically suspected cases, 167 (42.93%) were slit-skin smear-positive. Rural cases constituted 245 (62.98%) of the suspected cases, with a smear positivity of 42.86%, while urban cases showed a positivity of 43.06%. The highest number of smear-positive cases occurred in the 35–44-year age group. Hypopigmented patches (30%) were the most frequently documented clinical presentation, followed by numbness (27%) and nerve involvement (18%). Grade 2 disability was documented in 82 cases, with claw hand being the predominant disability (39.0%). On Ridley–Jopling classification, lepromatous leprosy was the predominant category (40.7%), followed by borderline lepromatous (26.9%) and mid-borderline disease (20.3%). A high bacteriological index of 5+ or 6+ was observed in 72 (43.1%) smear-positive cases. Year-wise analysis demonstrated an overall increase in the number of smear-positive cases during the study period

**Conclusion:** The findings indicate a persistent burden of multibacillary leprosy with significant disability and high bacillary loads. Strengthening early case detection, timely treatment, and disability prevention measures is essential to reduce transmission and improve patient outcomes.

**Keywords:** Leprosy; Slit-skin smear; Bacteriological index; Clinicodemographic profile; Multibacillary leprosy.

**DOI:** 10.25258/ijcpr.18.8.205



## Introduction

Despite substantial progress in medical care and public health interventions, leprosy remains an important public health challenge in many developing nations, particularly India [1]. The disease primarily affects the skin and peripheral nerves and can lead to permanent disabilities, including limb deformities, visual impairment, and facial disfigurement if not diagnosed and treated promptly [2]. Timely detection is therefore crucial for preventing complications, limiting transmission, and improving patient outcomes. India achieved the elimination target under the National Leprosy

Eradication Programme in 2005, defined as a prevalence of fewer than one case per 10,000 population. Nevertheless, the country continues to contribute a substantial proportion of the global leprosy burden. The South-East Asia Region of the World Health Organization (WHO) remains the most affected region, with India accounting for nearly 60% of newly detected leprosy cases worldwide in 2015 [3]. Persistent challenges such as delayed case detection, inadequate awareness, social stigma, and unequal access to healthcare services continue to sustain disease transmission and contribute to the presentation of advanced disease. In this context, laboratory investigations play a vital role in supporting clinical diagnosis and classification.

Slit-skin smear (SSS) examination remains a valuable diagnostic tool for the detection of acid-fast bacilli in leprosy. Ziehl–Neelsen (ZN) staining is routinely used to demonstrate acid-fast Mycobacteria in smear specimens. Although the sensitivity of SSS is reported to vary between 10% and 50%, its specificity approaches 100%, making it a reliable method for confirming infection when positive [4].

In addition to diagnosis, SSS provides important bacteriological parameters, including the bacteriological index (BI), morphological index (MI), and assessment of solid, fragmented, and granular (SFG) bacilli, which are useful for disease classification, monitoring treatment response, and evaluating transmission potential [5].

Analysis of demographic, clinical, and bacteriological data from suspected leprosy cases can provide valuable insights into disease patterns and trends over time. Such information is essential for strengthening surveillance activities, improving case detection strategies, and guiding public health interventions.

Therefore, the present study was conducted to assess the demographic profile, clinical characteristics, bacteriological index grading, and temporal trends among clinically suspected leprosy patients who underwent slit-skin smear examination at a tertiary care centre.

**Methodology:**

**Study design:** A retrospective observational study was conducted from January 2020 to February 2025 using records of clinically suspected leprosy patients who underwent slit-skin smear examination at the Supervisory Urban Leprosy Unit (SULU), Nagpur, Maharashtra. The collected data were analysed at a tertiary care teaching hospital, Nagpur.

**Study Population:** A total of 367 clinically suspected leprosy patients referred to SULU, Nagpur, and who underwent slit-skin smear examination during the study period were included in the study.

**Inclusion Criteria**

1. Clinically suspected leprosy patients who underwent slit-skin smear examination.
2. Complete laboratory records available during the study period.

**Exclusion Criteria:**

- Cases with missing essential demographic or laboratory information.

**Slit-skin Smear Collection and Examination:** Slit-skin smear specimens were collected from three standard sites, including both earlobes and one representative skin lesion.

In the absence of an active lesion, a site such as the elbow or knee was selected.

After cleansing the skin with an antiseptic, the area was gently pinched, and a small slit was made using a sterile scalpel.

Tissue material obtained by scraping the base of the slit was spread evenly on a clean glass slide, allowed to air-dry, stained with Ziehl–Neelsen method using the 5% H2SO4 for detection of acid-fast bacilli. The bacteriological index was graded according to the Ridley logarithmic scale.[6]

**Data Collection:** Data were extracted from medical records using a structured data collection format. Information regarding age, sex (if available), residence, clinical presentation, clinical spectrum of leprosy, slit-skin smear findings, bacteriological index grading, and year of diagnosis was recorded and analysed

**Results:**

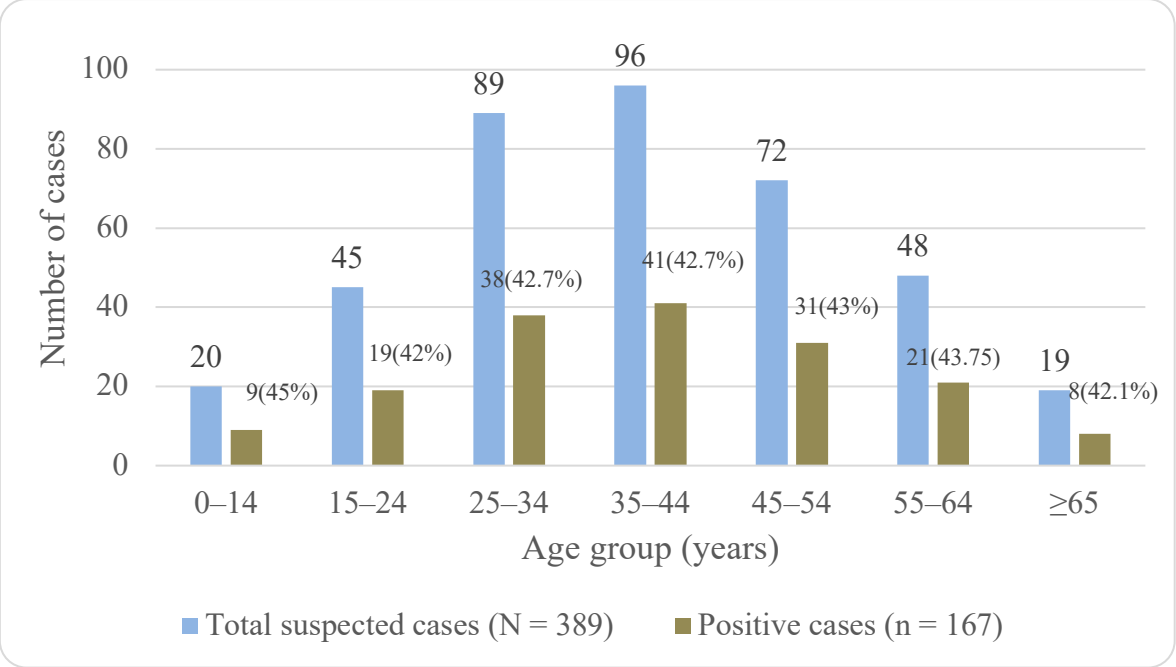


**Figure 1: Age-wise distribution of slit-skin smear-positive cases (n = 167) among clinically suspected cases (N = 389).**

389 clinically suspected cases underwent slit-skin smear examination. 167 (42.93%) cases were smear-positive. The highest number of smear-positive cases was in the 35–44-year age group (41 cases). This was followed by 25–34 years (38 cases) and 45–54 years (31 cases). Age-specific smear positivity ranged from 42.11% to 45.00%, indicating a relatively consistent positivity rate across age groups.

The highest positivity proportion was observed in 0–14 years (45.00%), followed by 55–64 years (43.75%).

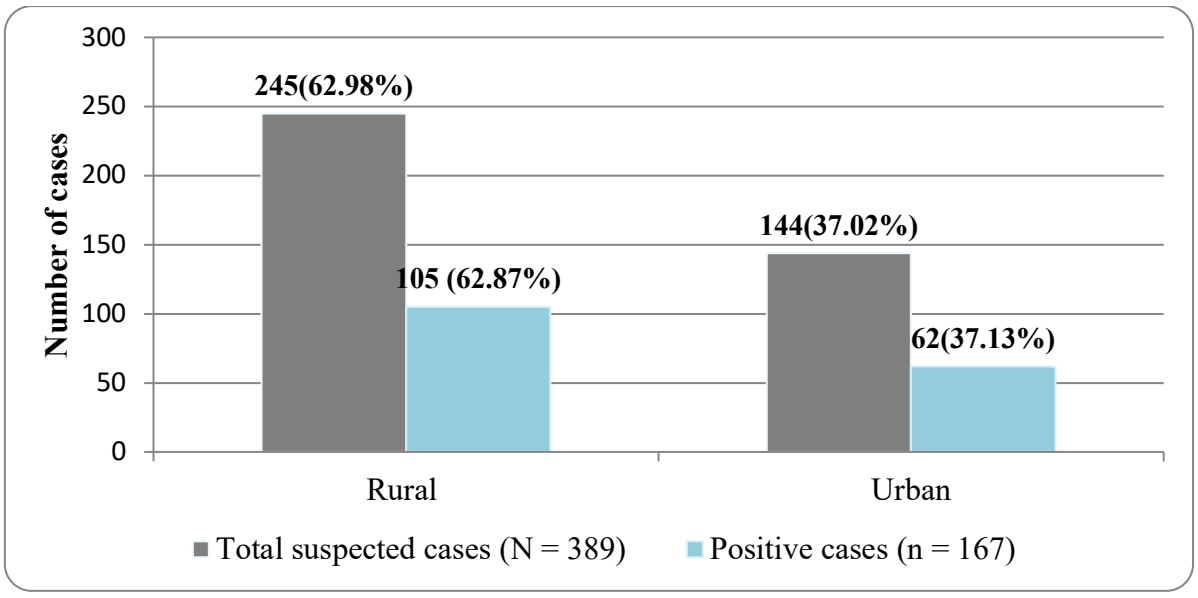


**Figure 2: Rural–urban distribution of slit-skin smear-positive cases (n = 167) among clinically suspected cases (N = 389).**

Among the 389 clinically suspected cases, 245 (62.98%) were from rural areas and 144 (37.02%) were from urban areas. Slit-skin smear positivity was observed in 105 (42.86%) of the rural suspected cases and 62 (43.06%) of the urban suspected cases. Overall, 167 of 389 clinically suspected cases (42.93%) were smear-positive. The proportion of smear-positive cases among all positive cases was comparable between rural (62.87%) and urban (37.13%) areas.

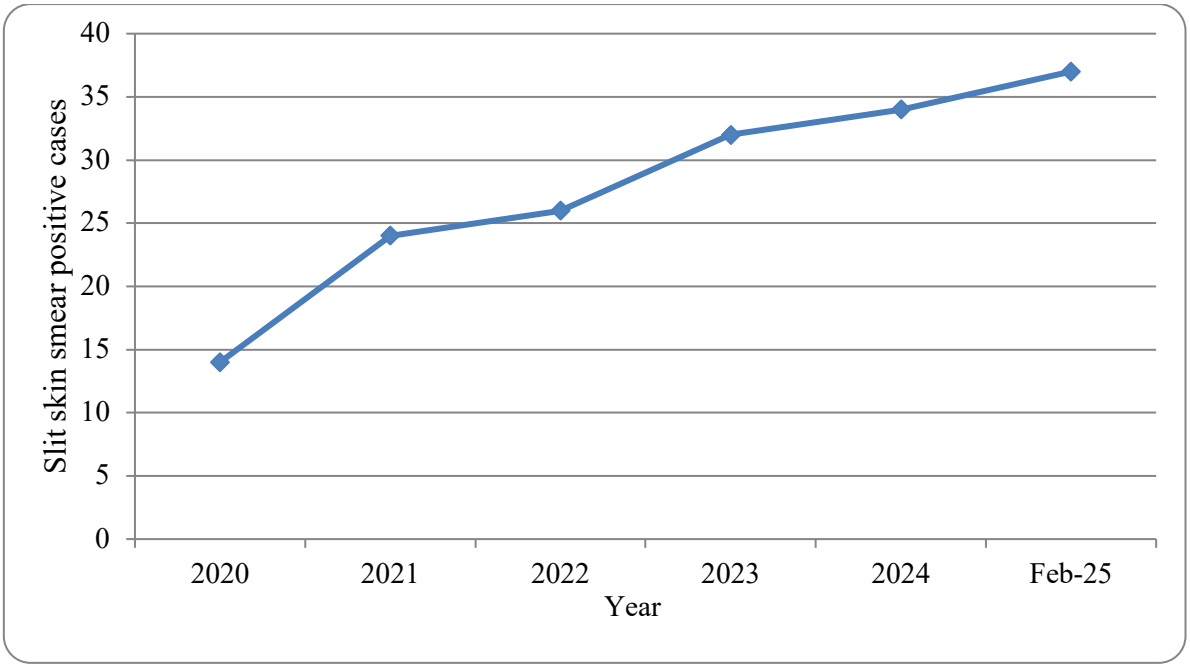


**Figure 3: Showing year wise distribution of slit skin smear positive cases ((n = 167)**

Year-wise analysis showed a progressive increase in slit-skin smear-positive cases, from 14 (8.38%) in 2020 to 37 (22.16%) in February 2025. The number of positive cases was 24 (14.37%) in 2021, 26 (15.57%) in 2022, 32 (19.16%) in 2023, and 34 (20.36%) in 2024. Overall, 167 smear-positive cases were recorded during the study period, with the highest proportion observed in February 2025 (22.16%)

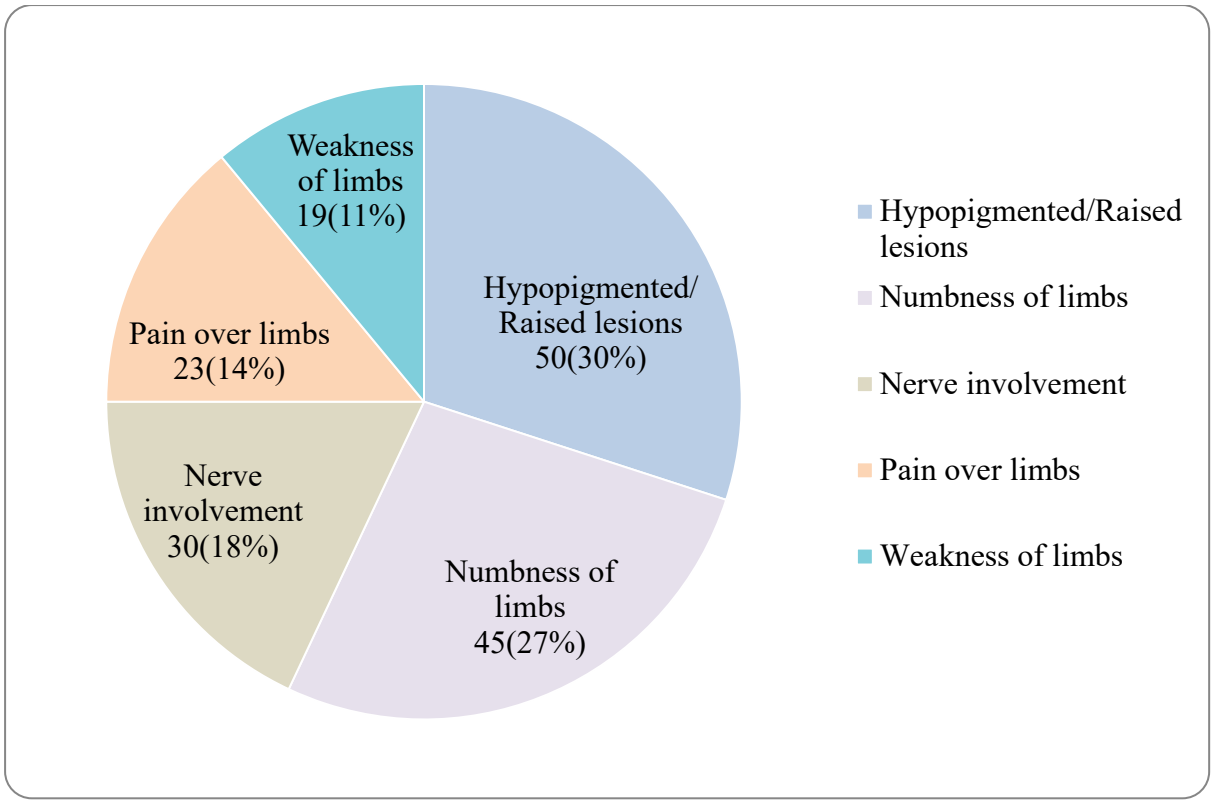


**Figure 4: Pie chart of clinical presentation in slit skin smear positive leprae cases (n = 167)**

Among the 167 slit-skin smear-positive cases, hypopigmented patches were the most common clinical presentation, observed in 50 (30%) cases. Numbness was reported in 45 (27%) cases, followed by nerve involvement in 30 (18%), pain over the limb in 23 (14%), and weakness of the limb in 19 (11%) cases.

**Table 1: Table showing grade 2 disability among slit skin smear positive cases (n = 167)**

| Grade 2 Disability | Cases | Percentage (%) |
|---|---|---|
| Claw Hand | 32 | 39.0 |
| Trophic Ulcer | 24 | 29.3 |
| Foot Drop | 15 | 18.3 |
| Resorption of Digits | 11 | 13.4 |
| **Total Grade 2 Cases** | **82** | **100** |

Among the 82 slit-skin smear-positive cases with Grade 2 disability, claw hand was the most frequently documented disability (32; 39.0%), followed by trophic ulcers (24; 29.3%), foot drop (15; 18.3%), and resorption of digits (11; 13.4%). Thus, claw hand was the predominant form of Grade 2 disability, while resorption of digits was the least frequently observed.

**Table 2: Table showing Histopathological Ridley–Jopling system among slit skin smear positive cases (n = 167)**

| Ridley–Jopling Classification | Number of Cases (n) | Percentage (%) |
|---|---|---|
| Lepromatous Leprosy (LL) | 68 | 40.7 |
| Borderline Lepromatous (BL) | 45 | 26.9 |
| Mid- Borderline (BB) | 34 | 20.3 |
| Borderline Tuberculoid (BT) | 20 | 11.9 |
| **Total** | **167** | **100** |

Among the 167 slit-skin smear-positive cases, the most common histopathological classification was lepromatous leprosy (LL) with 68 (40.7%) cases, followed by borderline lepromatous (BL) with 45 (26.9%), mid-borderline (BB) with 34 (20.3%), and borderline tuberculoid (BT) with 20 (11.9%) cases. Thus, LL was the predominant histopathological category among smear-positive cases.

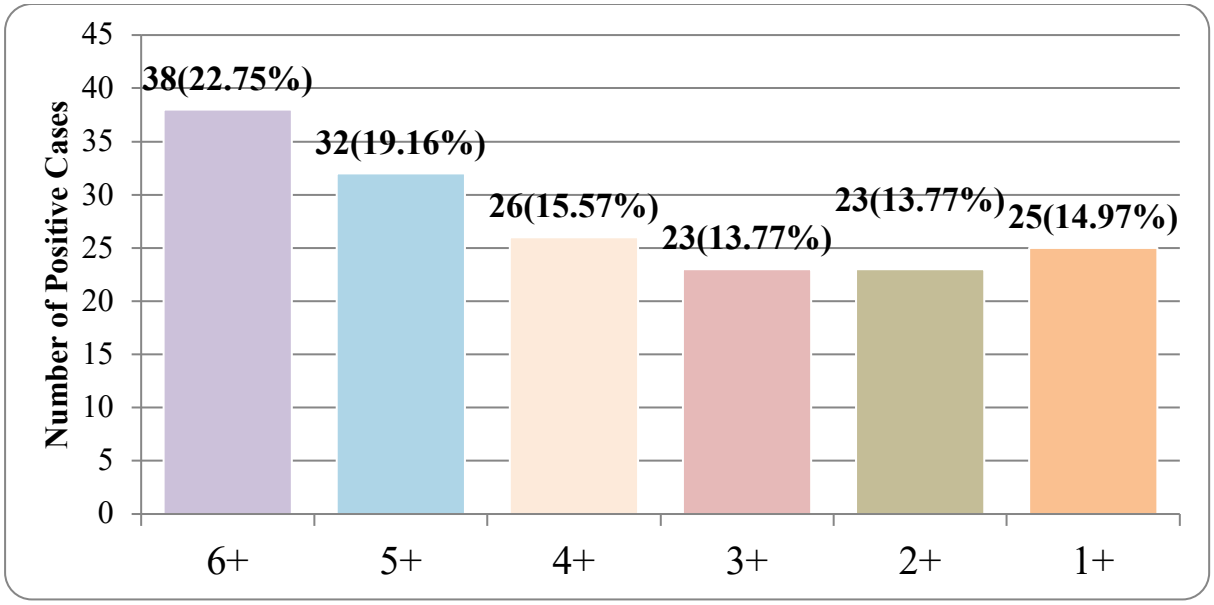


**Figure 5: Distribution of slit-skin smear-positive cases according to bacteriological index (BI) grading (n = 167)**

Among the 167 slit-skin smear-positive cases, the highest proportion had a bacteriological index (BI) of 6+ (38; 22.75%), followed by 5+ (32; 19.16%), 4+ (26; 15.57%), 1+ (25; 14.97%), and 3+ and 2+ (23; 13.77% each).

Overall, 42.91% (72/167) of smear-positive cases had a high BI of 5+ or 6+, indicating a substantial bacillary load among the smear-positive cases.

**Discussion**

The present study assessed the clinicodemographic and bacteriological characteristics of clinically suspected leprosy patients over a five-year period. Nearly half of the clinically suspected patients were confirmed by slit-skin smear examination, demonstrating the continued value of bacteriological assessment in supporting the diagnosis and classification of leprosy. Smear-positive cases were predominantly observed among adults aged 35–44 years, followed by those aged

25–34 years. A similar predominance among economically productive age groups has been reported by Sayyed et al. [7] and Chandrahas et al. [8]. The involvement of these age groups may have important socioeconomic implications because leprosy-related disease and disability can affect individuals during their productive years.

Rural residents constituted a larger proportion of smear-positive cases in the present study, consistent with observations reported by Chandrahas et al. [8] and Shetty et al. [9]. This pattern may be related to differences in access to healthcare, health-seeking practices, socioeconomic circumstances, and continued transmission in rural communities. Strengthening community-based surveillance and early case detection may facilitate timely diagnosis in such settings.

Hypopigmented skin lesions were the most frequent clinical presentation, followed by sensory impairment of the limbs. Sasidharanpillai et al. reported sensory impairment in 10.3% of patients with hypopigmented lesions [10]. These findings highlight the importance of thorough dermatological examination combined with assessment of peripheral nerve function when evaluating patients with suspicious skin lesions.

Claw hand was the most frequently recorded deformity in the present study, reflecting established peripheral nerve involvement among affected patients. A study from Tamil Nadu reported claw hand in 88% of patients [11], which was considerably higher than the 39% observed in our study. The comparatively lower frequency of resorption deformities may indicate a lower proportion of patients with advanced chronic disability in the present cohort.

Borderline tuberculoid leprosy was the predominant clinical subtype in our study, whereas pure neuritic leprosy was uncommon. In contrast, Patel et al. reported lepromatous leprosy as the predominant subtype, accounting for 35.39% of cases [12]. Although borderline tuberculoid disease is generally associated with a lower bacillary burden than lepromatous forms, the presence of high bacteriological index (BI) grades among smear-positive patients indicates that a substantial proportion of patients had considerable bacillary loads at diagnosis.

The predominance of BI 6+, followed by BI 5+, indicates a substantial bacillary burden among smear-positive patients and may reflect delayed diagnosis in some cases. Individuals with high bacillary loads have greater potential for transmission and therefore require timely initiation and completion of appropriate multidrug therapy.

The observed increase in smear-positive cases during the study period emphasizes the need for continued surveillance and strengthening of early case-detection activities. However, this temporal increase may reflect improved detection and healthcare utilization as well as ongoing transmission, and these possibilities require further evaluation.

The study has several limitations. Its retrospective design and dependence on routinely available records may have resulted in incomplete or inconsistently documented information. Furthermore, as the study was conducted at a single tertiary-care centre, the findings may not be directly generalizable to other healthcare settings or populations.

## Conclusion

This study demonstrates that leprosy continues to present with clinically significant disease and preventable morbidity. The occurrence of advanced clinical manifestations, neurological involvement, and disability emphasizes the need to shift from passive case detection towards proactive identification of early disease. Strengthening community-level surveillance, improving awareness of early warning signs, ensuring timely referral, and integrating disability prevention into routine leprosy care are essential to interrupt ongoing transmission and minimize permanent functional impairment.

**Acknowledgment:** We gratefully acknowledge the Supervisory Urban Leprosy Unit No. 3, Nagpur, Maharashtra, India, for providing the data used in this study.

## References:

1. Sengupta U. Recent laboratory advances in diagnostics and monitoring response to treatment in leprosy. Indian Dermatol Online J. 2019;10(2):106-14. doi:10.4103/idoj.IDOJ_260_18.
2. Kasl Z, Poczos P, Herzig R, Jiraskova N, Matuska M, Cesak T. Neurological disorders. In: Stepanov A, Studnicka J, editors. Ocular manifestations of systemic diseases. Cham: Springer; 2024. p. 375-446. doi:10.1007/978-3-031-58592-0_10.
3. World Health Organization. Global leprosy strategy 2016-2020: accelerating towards a leprosy-free world. New Delhi: World Health Organization, Regional Office for South-East Asia; 2016.
4. Patil AB, Singh AL, Madke B, Ghatge A, Jawade S, Singh S. Comparison of efficacy of slit skin smear and Fite Faraco stain on histopathology specimens in cases of leprosy. J Clin Diagn Res. 2020;14(3):WC01-WC04. doi:10.7860/JCDR/2020/43019.13543.
5. Khurana A. Diagnostic tests and histopathology. In: Kabir S, Ananta K, editors.

Jopling's handbook of leprosy. 6th ed. New Delhi: CBS Publishers; 2020. p. 102.
6. Ridley DS, Jopling WH. Classification of leprosy according to immunity: a five-group system. Int J Lepr Other Mycobact Dis. 1966;34(3):255-73.
7. Sayyed IP, Kale KM, Chikurdekar NV, Gade RR, Aswar NR. Clinico-epidemiological profile of new leprosy cases detected during 2020-2024 in a district of Western Maharashtra: a cross-sectional study. Int J Med Public Health. 2026;16(1):1834-40. doi:10.70034/ijmedph.2026.1.317.
8. Chandrahas Kurane S, Dani P. Clinical and sociodemographic characteristics of recently identified leprosy patients in Sangli district of Maharashtra. J Neonatal Surg. 2025;14(21S): 341-46.
9. Shetty VP, Thakar UH, D'Souza E, Ghate SD, Arora S, Doshi RP, et al. Detection of previously undetected leprosy cases in a defined rural and urban area of Maharashtra, Western India. Lepr Rev. 2009;80(1):22-33. doi:10.47276/lr.80.1.22.
10. Sasidharanpillai S, Govindan A, Dominic S, Binitha T, Nandakumar V, Devi K. Hypopigmented skin lesions with doubtful/minimal sensory impairment: a histopathology-based analysis. Indian Dermatol Online J. 2022;13(6):765-70. doi:10.4103/idoj.idoj_114_22.
11. Sane Roja Renuka, Ashok Kumar N, Kulkarni OD, Manoharan K. Distribution of deformities of hands and feet in old cases of leprosy in a tertiary care hospital in Chennai. J Res Med Dent Sci. 2022;10(5):27-31.
12. Patel K, Patel PR, Vyas J, Bhagat VM. A study of histopathological spectrum of leprosy at tertiary care hospital. Indian J Pathol Oncol. 2022;9(1):16-20. doi:10.18231/j.ijpo.2022.004.