ORIGINAL ARTICLE

Epidemiological characterization of leprosy patients presenting to a tertiary care hospital from Uttar Pradesh

Animesh Panda[1], Peetam Singh[2], Rijul Ranjan[3], Anita Pandey[4]

[1,2,4]Department of Microbiology, Subharti Medical College, Swami Vivekanand Subharti University, Meerut

[3]Department of Community Medicine, Subharti Medical College, Swami Vivekanand Subharti University, Meerut

CORRESPONDING AUTHOR

Dr Rijul Ranjan, Associate Professor, Department of Community Medicine, Subharti Medical College, Swami Vivekanand Subharti University, Meerut Uttar Pradesh 250005

Email: rrrijulranjan26@gmail.com

CITATION

Panda A, Singh P, Ranjan R, Pandey A. Epidemiological characterization of leprosy patients presenting to a tertiary care hospital from Uttar Pradesh. Indian J Comm Health. 2026;38(1):107-110. https://doi.org/10.47203/IJCH.2026.v38i01.021

ARTICLE CYCLE

Received: 13/02/2026; Accepted: 27/02/2026; Published: 28/02/2026

ABSTRACT

Background: Leprosy is a disease of public health importance and social stigma to the patients, which may result in debilitating deformities and complications. The diagnosis and microbiological characterization of leprosy is important to initiate appropriate antileprotic treatment. **Methods:** The clinical and epidemiological data from the patients was collected based on history and examination findings from the patients suspected of leprosy. The slit skin smears were subjected to microscopy and calculate bacteriological index and morphological index. The data generated in this study was subjected to statistical analysis by using statistical package for social sciences (SPSS) software version 27.0. **Result:** Out of all slit skin smears collected from 210 patients suspected of leprosy, 78 (37.14%) found positive for the presence of acid-fast bacilli. There was predominance of leprosy cases among males as compared to females. The majority of the leprosy cases were between 21-40 years of age. The majority of the patients were having a bacteriological index of <4. **Conclusion:** Leprosy is still prevalent in India in spite of ongoing National Leprosy Eradication Program. The community evidently indicate the grave nature of the problem of untreated and undetected leprosy cases leading to active transmission of the disease.

KEYWORDS

Bacteriological Index, Leprosy, Morphological Index, Mycobacterium Leprae

INTRODUCTION

Leprosy, also known as Hansen's disease, is a chronic granulomatous neglected tropical disease of public health importance targeting the nerves and skin, leading to loss of sensation on the skin, with or without dermatological lesions, correlated with long term consequences, such as deformities or disability. (1,2)

The diagnosis of leprosy can be made by finding at least one of the following cardinal signs:

A. Hypo pigmented or reddish skin patch
B. Enlarged or thickened peripheral nerves with loss of sensation
C. Detection of acid-fast bacilli (AFB) in a slit skin smear (SSS) from the lesions. (1)

Classification divided leprosy into two distinct entities comprising pauci-bacillary (PB) leprosy and multi-bacillary (MB) leprosy. The PB leprosy is characterized by the presence of one to five skin lesions, without the presence of AFB on SSS microscopy. Similarly, the MB leprosy is characterized by either more than five skin lesions or with nerve involvement or with the demonstrated bacilli in SSS.(3)

The reported cases are not representing the actual burden of the disease due to lack of studies. This study was planned to observe the epidemiological profile and microbiological characterization of suspected leprosy cases presented to a tertiary care hospital from Uttar Pradesh.

MATERIAL & METHODS

This study was conducted for a period of six years from January 2018 to December 2023 on suspected leprosy patients presenting to a tertiary care hospital from Uttar Pradesh. All type of socio-demographic characteristics of the patients along with the clinical history and examination finding were recorded. The clinical and epidemiological data from the patients was collected based on history and examination findings. The slit skin smears were collected from the patients suspected of leprosy. The slit skin smears were subjected to microscopy after performing acid fast staining to observe acid fast bacilli and calculate bacteriological index and morphological index. All patients were diagnosed based on detailed history and clinical examination followed by SSS. This study was approved by the institutional ethical committee.

Sample Collection and processing:

The SSS from all the patients suspected of leprosy, before commencement of multidrug therapy (MDT) were collected following appropriate sample collection

guidelines. Three or more SSS were taken including one from the lesion and two or more additional ones from the earlobes, eyebrow and/or other sites. The SSS were processed following standard operative procedure guidelines of modified Ziehl Neelsen (ZN) staining for Mycobacterium leprae.

The ZN-stained smears were examined for the presence of viable lepra bacilli against blue background characterized by uniformly and intensely stained bacilli in red. They were designated as solid stained (S) bacilli. On the other hand, the dead leprea bacilli were characterized as irregularly stained and described as fragmented (F) or granular (G). The total number of bacilli were measured using Ridley's logarithmic scale and BI was calculated. The MI was calculated by the percentage of solid stained bacilli. Based on the number of skin lesions and smear positivity, the cases were categorised as PB or MB for therapeutic purpose.

Statistical Analysis: The data generated in this study was subjected to statistical analysis by using statistical package for social sciences (SPSS) software version 27.0.

RESULTS

Table 1: Gender wise distribution of patients

Gender	Total No. of patients	No. of SSS positive	%	No. of SSS negative	%
Male	144	55	38.20	89	61.80
Female	66	23	34.85	43	65.15
Total	210	78	37.14	132	62.86

A total of 210 clinically suspected leprosy cases included in the study, were subjected to the SSS during the study period. The SSS samples collected from a total of 210 suspected leprosy cases, 78 (37.14%) found positive for AFB out of which males were 144 (38.20%) and females were 66 (34.85%). The SSS samples collected from a total of 210 suspected leprosy cases, 132 (62.86%) found negative for AFB out of which males were 89 (61.80%) and females were 43 (65.15%). There was predominance of male cases as compared to females.

Table 2: Age wise distribution of patients

Age in years	Total No. of patients	No. of SSS positive	%
≤ 20	16	5	31.25
21 – 40	88	40	45.45
≥41	106	33	31.13
Total	210	78	37.14

The age-wise distribution of patients in relation to skin smear positivity (SSS positive) shows notable variation across different age groups. Among patients aged 20 years or younger, there were 16 cases in total, with 5 testing SSS positive, accounting for 31.25%. In the 21–40 age group, out of 88 patients, 40 were SSS positive, representing the highest positivity rate at 45.45%. For those aged 41 years and above, 106 patients were recorded, with 33 testing positive, making up 31.13%. Overall, out of 210 total patients, 78 were SSS positive, resulting in an overall positivity rate of 37.14%. This data indicates that the highest proportion of SSS positive cases occurred in the 21–40 age group.

Table 3: Gender wise distribution of bacteriological index (BI) in SSS (n=78)

Bacteriological index (BI)	Total no. of SSS positive	Male	%	Female	%
≤ 2	35	25	71.43	10	28.57
2.1-4	35	25	71.43	10	28.57
≥4.1	8	5	62.50	3	37.50
Total	78	55	70.51	23	29.49

The distribution of Bacteriological Index (BI) among skin smear positive (SSS positive) cases shows varying trends across different BI ranges and gender. Out of a total of 78 SSS positive cases, 55 were male (70.51%) and 23 were female (29.49%). In the BI range of ≤2, there were 35 cases, with 25 males (71.43%) and 10 females (28.57%). The same distribution was observed in the BI range of 2.1–4, also comprising 35 cases with 25 males (71.43%) and 10 females (28.57%). In the highest BI range (≥4.1), there were 8 cases, of which 5 were male (62.50%) and 3 were female (37.50%). Overall, the data indicates a higher proportion of males across all BI categories, with the majority of cases falling within the ≤4 range.

Table 4: Distribution of PB and MB cases according to demographic profile of patients

Variable	Total No. of Cases	No. of PB cases	%	No. of MB cases	%
Male	144	15	10.42	55	38.19
Female	66	10	15.15	23	34.85
≤ 20	16	3	18.75	5	31.25
21-40	88	9	10.23	40	45.45
≥41	106	13	12.26	33	31.13

The data presents the distribution of cases based on gender and age. Among males, there were a total of 144 cases, out of which 15 were classified as PB (10.42%) and 55 as MB (38.19%). In comparison, females accounted for 66 cases, with 10 being PB cases (15.15%) and 23 being MB cases (34.85%).

When analyzed by age groups, individuals aged 20 years or younger had 16 total cases, with 3 PB cases (18.75%) and 5 MB cases (31.25%). The 21–40 age group reported 88 cases, including 9 PB cases (10.23%) and 40 MB cases (45.45%). In the age group of 41 years and above, there were 106 cases in total, of which 13 were PB (12.26%) and 33 were MB (31.13%). This data highlights that the highest percentage of PB cases was found in the youngest age group (≤20), while the highest proportion of MB cases occurred in the 21–40 age group.

Table 5: Socio-Economic characteristics of the leprosy cases

Gender	Total no. of positive	Lower Class	%	Lower Middle Class	%	Middle Class	%
Male	70	37	52.86	27	38.57	6	8.57
Female	33	18	54.55	12	36.36	3	9.09
Total	103	55	53.4	39	37.86	9	8.74

The gender-wise distribution of total positive cases based on socio-economic class reveals that out of 70 male cases, 37 (52.86%) belonged to the lower class, 27 (38.57%) to the lower middle class, and 6 (8.57%) to the middle class. Among the 33 female cases, 18 (54.55%) were from the lower class, 12 (36.36%) from the lower middle class, and 3 (9.09%) from the middle class. Overall, out of the total 103 positive cases, 55 (53.4%) were from the lower class, 39 (37.86%) from the lower middle class, and 9 (8.74%) from the middle class. This indicates that a majority of the positive cases were concentrated in the lower socio-economic class across both genders.

DISCUSSION

Leprosy is an ancient and chronic granulomatous infectious disease, predominantly affecting the skin and peripheral nerves. As per the WHO, leprosy is categorized mainly into two groups, PB and MB, but the widely-accepted classification was Ridley-Jopling classification.

To eliminate leprosy, the centrally sponsored health scheme, National Leprosy Eradication Program (NLEP) has been started. The major objective of NLEP was to reduce the disease burden, prevention of disability and to improve awareness among the communities about leprosy and curability. The prevalence of leprosy has come down from 0.69 per 10,000 populations in 2014-15 to 0.45 in 2021-22 as per statistics given by the WHO. The government of India has launched National Strategic Plan (NSP) and road map for leprosy 2023-27 on 30th January 2023 to achieve zero transmission of leprosy by 2027.

The present study mainly concentrates on finding AFB in SSS from leprosy patients. We analysed different type of skin samples and lesions for different clinically suspected leprosy patients.

In this study, we analysed SSS from a total of 210 clinically suspected cases of leprosy. We observed 37.14% AFB positive while 62.86% AFB negative SSS. A predominance of males over females was observed among patients with AFB positive SSS. The male preponderance was in concordance with other studies on leprosy as well.[21,23] The predominance of male can be attributed to more outdoor activities leading to higher chances of contracting the infection. In our study, 21-40 years of age group was most commonly affected comprising 45.45% followed by ≤ 20 and ≥ 41years of age groups due to again more outdoor activities, illiteracy and ignorance about the disease, which may lead to higher chances of leprosy transmission.

The BI plays an important role in Ridley's logarithmic scale which signifies the bacillary load. As per different hypotheses, BI is higher in nerves due to higher bacillary load as compared to skin. As skin specimens are usually taken from the most convenient lesions which may not always be the site with the highest density of bacilli, resulting in lower BI. The BI range of 2.1-4 (44.87%) was the predominant BI category in our study. The majority of the cases were of MB leprosy as compared to PB leprosy comprising 78 (37.14%) and 11.90% respectively.

With respect to socio-economic characteristics of leprosy cases, the leprosy patients were predominantly belonging to lower class comprising 53.40% followed by lower middle class (37.86%) and middle class (8.74%) because the lower class were socio economically very weak. So, the poor hygiene and the poor living conditions including overcrowding are major factors determining the transmission of leprosy in lower class. The lack of awareness about leprosy and other infectious diseases may be another reason behind higher burden of leprosy in lower socioeconomic groups, in spite of all the initiatives taken by the NLEP.

CONCLUSION

This study highlights the ongoing burden of leprosy in Uttar Pradesh, with a significant proportion of patients presenting with advanced disease and Grade 2 disabilities, indicating delayed diagnosis and inadequate awareness. Despite the ongoing efforts under the National Leprosy Elimination Program (NLEP), leprosy remains prevalent in India, reflecting the persistent challenge of undetected and untreated cases that contribute to continued transmission within the community.

The findings underscore the grave nature of the problem and the urgent need for strengthened efforts at all levels. Active awareness among both the community and healthcare workers is critical to improving early case detection and reducing disability. Enhanced surveillance, prompt diagnosis, complete and timely treatment, along with education on personal and community hygiene, are essential pillars in controlling transmission. By reinforcing these strategies, India can move closer to achieving the goal of leprosy elimination in the near future.

RECOMMENDATION

Since this study was conducted in a hospital-based setting, there is a need for larger, community-based epidemiological studies to accurately assess the true burden, distribution, and transmission patterns of leprosy in various regions of Uttar Pradesh. Early Detection and Diagnosis have strengthened early case detection strategies through active surveillance and regular screening, particularly in high-risk and underserved areas. This will help reduce the delay in diagnosis and minimize the risk of disability. Intensify awareness campaigns to educate communities about early signs and symptoms of leprosy, modes of transmission, and the importance of seeking timely medical care. Reducing stigma is essential for improving case reporting and treatment adherence. Promote research focused on local risk factors, socio-demographic influences, and emerging concerns like drug resistance, which can inform more effective and targeted interventions. Rehabilitation and Disability Prevention ensure that patients with nerve damage or disabilities receive timely physiotherapy, footwear, and rehabilitative support to improve quality of life and prevent worsening of disabilities.

LIMITATION OF THE STUDY

This study was entirely hospital-based and conducted at a single healthcare facility that primarily serves a limited and localized population. As a result, the data collected and the observations made are confined to the specific demographic and geographic characteristics of the patients who sought care at this institution.

Consequently, the study may not accurately reflect the true prevalence or overall burden of leprosy within the broader community or region. The patterns, trends, and outcomes observed in this setting might differ significantly from those in other populations due to variations in access to healthcare, socioeconomic conditions, and environmental factors. Therefore, the findings of this study should be interpreted with caution and cannot be generalized or applied to the entire population. Broader, community-based, and multi-centric studies would be necessary to gain a more comprehensive and representative understanding of leprosy's actual impact at the population level.

RELEVANCE OF THE STUDY

Disability and Social impact, 2. Clinical and Diagnostic Insights and 3. Monitoring Post-Elimination Trends

AUTHORS CONTRIBUTION

All authors have contributed equally.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

ACKNOWLEDGEMENT

This article represents the outcome of original research and interpretation. Every effort has been made to ensure the authenticity and novelty of the content. Any resemblance to existing works is purely coincidental and unintentional.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process. Nil

REFERENCES

1. Demsiss W, Henten SV, Takarinda KC, Kamau EM, Abdela SG. Slit-skin smear for the classification of leprosy; are we wasting time and resource? J Infect Dev Ctries. 2022;16(8.1):3S-7S.
2. VK Mahajan. Slit-skin smear in leprosy: lest we forget it ! Indian J Lepr. 2013,85:177-183.
3. Teng VC, Esti PK. Skin microbiome dysbiosis in leprosy cases. Int J Res Dermatol. 2021;7(5):741-747.
4. Suma N, Md. Siddique Ahmed K, Lubna S, Mariya S, Humera Qudsia FA, Tiyyagura S. Incidence and Clinical Profile of Leprosy in a Tertiary Care Hospital in Hyderabad, Telangana.ijcmr.2018.5.10.7
5. Ponnighaus JM, Lienhardt C, Lucas S, Fine PEM, Sterne JAC. Comparison of bacillary indexes in slit-skin smears, skin and nerve biopsies; a study from Malawi. Int J Lepr. 1997;65(2):211-6.
6. Chen KH, Lin CY, Su SB, Chen KT. Leprosy: A Review of Epidemiology, Clinical Diagnosis, and Management. J Trop Med. 2022;2022:8652062.
7. Sivaji AR, Scaria TK. Atypical ear lesion as initial presentation in Hansen disease. Int J Res Med Sci. 2023;11:3852-4.
8. World Health Organization (WHO) (2020) Classification of leprosy. Available at: https://www.who.int/lep/classification/en/. Accessed 9 March 2020.
9. World Health Organization (WHO) (2019) Weekly epidemiological record, 2019, vol. 94, 35/36.
10. Bhushan P, Sardana K, Koranne RV, Choudhary M, Manjul P. Diagnosing multibacillary leprosy: a comparative evaluation of diagnostic accuracy of slit-skin smear, bacterial index of granuloma and WHO operational classification. Indian J Dermatol Venereol Leprol. 2008;74:322-6.
11. Job CK, Ponnaiya J (2010). Laboratory diagnosis. In: Kar H, Kumar B; IAL Textbook of Leprosy. 1st edition. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi (India). pp 177-80.
12. Weyrich LS, Dixit S, Farrer AG, Cooper AJ, Cooper AJ. The skin microbiome: Associations between altered microbial communities and disease. Australas J Dermatol. 2015;56(4):268-74.
13. Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AH et al. Fitzpatrick's Dermatology. 9th ed. McGrawHill. 2019;2.
14. Bhat RM, Chaitra P. Profile of new leprosy cases attending a South Indian referral hospital in 2011-2012. ISRN Tropical Medicine. 2013;2013:579024.
15. National Leprosy Eradication Programme. NLEP annual report 2016 – 2017. Available at: http://nlep.nic.in/pdf/Annual%20report_%202016-17_rev.pdf Accessed 30 March 2024.
16. Rawat SDS, Jain E, Bhardwaj N. Current leprosy scenario at a tertiary care hospital in Uttarakhand. International Journal of Contemporary Medical Research. 2017;4(1):97-99.
17. Chaptini C, Marshman G. Leprosy: a review on elimination, reducing the disease burden, and future research. Lepr Rev. 2015;86:307-15.
18. Report of the third meeting of the WHO technical advisory group on the elimination of Leprosy. WHO/ CDS/CPE/CEE/2002; Geneva: WHO; 2002.
19. Chhabra N, Grover C, Singal A, Bhattacharya SN, Kaur R. Leprosy scenario at a tertiary level hospital in Delhi: A 5-year retrospective study. Indian J Dermatol. 2015;60:55- 9.
20. Tiwary PK, Kar HK, Sharma PK, Gautam RK, Arora TC, Naik H, et al. Epidemiological trends of leprosy in an urban leprosy Centre of Delhi. A retrospective study of 16 years. Indian J Lepr. 2011;83:201-8.
21. Ghosh S, Chaudhuri S. Chronicles of Gerhard Henrik Armauer Hansen's life and work. Indian Journal of Dermatology. 2015;60(3):219-21.
22. Mohanty P, Naaz F, Bansal AK, Kumar D, Gupta UD. Challenges beyond elimination in leprosy. Int J Mycobacteriol. 2017;6(3):222-8. https://doi.org/10.4103/ijmy.ijmy_70_17
23. WHO. Supporting leprosy elimination in India, 2022. Available at: https://www.who.int/india/news/ 02022 supporting-leprosy-. Accessed on 22 August 2023.
24. Palaniappan V, Kaliaperumal K. Cauliflower Ear in Lepromatous Leprosy. Am J Trop Med Hyg. 2021;105(6):1444-5. https://doi.org/10.4269/ajtmh.21-0661
25. Paudel V , Chudal D. Isolated Leprosy of Bilateral Ear Lobes, A Rare Presentation of Leprosy. Kathmandu Univ Med J. 2021;19(74):268-70. https://doi.org/10.3126/kumj.v19i2.49693
26. Kannan R, Kumar P, Vijayan BS, Priya YB. Lucio Leprosy in Neglected Cases of Hansen's Disease: A Series of Three Cases. Journal of Clinical and Diagnostic Research. 2023;17(7):1-5. https://doi.org/10.7860/jcdr/2023/62221.18139