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Original Research Article

# Demographic and Clinical Profile of Adult Leprosy Patients Attending a Tertiary Care Hospital: A Retrospective Study

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**Conflict of interest: Nil**

**Abstract:**

**Background:** Leprosy remains a public health concern in endemic regions despite the availability of multidrug therapy. Adult patients constitute a major proportion of the disease burden, and delayed diagnosis may result in disability.

**Aim:** To assess the demographic and clinical profile of adult leprosy patients attending a tertiary care hospital and to identify factors associated with disability.

**Methodology:** This hospital-based retrospective observational study included 86 adult leprosy patients attending at Department of Skin and VD, Bhagwan Mahavir institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India. over six months. Data were extracted from medical records, including age, gender, classification (PB/MB), Ridley–Jopling type, reaction status, and disability grading. Statistical analysis was performed using chi-square test and Student's t-test, with $p < 0.05$ considered significant.

**Results:** Most patients (65.1%) were aged 31–60 years, with male predominance (68.6%). Borderline tuberculoid (60.5%) was the most common type, and multibacillary cases predominated. Disability was observed in 20.9% patients and was significantly associated with age >45 years ($p = 0.012$), multibacillary classification ($p = 0.048$), and LL/BL types ($p < 0.001$).

**Conclusion:** Leprosy predominantly affects economically productive adults, with multibacillary forms and older age significantly associated with disability, underscoring the need for early detection and timely management.

**Keywords:** Leprosy, Demographic profile, Multibacillary, Disability, Retrospective study, Tertiary care hospital.

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## Introduction

Leprosy is a long-term granulomatous infectious disease that usually affects the skin and peripheral nerves, but the eyes, the mucosa of the upper respiratory tract and other body parts may also be involved [1]. The disease is referenced in the Bible many times as it has existed in human history since ancient times. Nevertheless, much later in 1873, the etiological agent which is Mycobacterium leprae was discovered by Gerhard Hansen, which was a major breakthrough in the scientific study of the disease [2]. Irrespective of the achievement in medical science and therapeutic interventions, leprosy still remains to be of significant public health and socioeconomic concern in some regions of the world.

The social stigma of leprosy is one of the most awful factors of this disease. Particularly in the untreated or poorly treated long-standing cases, disfiguring and mutilating complications are witnessed [3] and the reason behind this stigma is to a large extent. This can result in sensory loss, muscle weakness and deformities in the peripheral nerves that include claw hand, foot drop, trophic ulcers and facial disfigurement. All these physical disabilities tend to lead to social rejection, discrimination, and mental stress, which further exacerbate the burden of the illness on its medical consequences. Therefore, early diagnosis and prompt treatment are vital both in prevention of transmission and a better quality of life and disability reduction.

One of the greatest advances in the treatment of the leper was the establishment of multidrug therapy (MDT) by the World Health Organization in 1982. The introduction of MDT changed the course of leprosy treatment making it much shorter and avoiding the development of drug resistance, as well as preventing the disease spread [4]. This has led to the incredible reduction of the burden of leprosy with regard to the world. The number of new cases

diagnosed in 2018 all around the world has decreased to 208,619 compared to over 5 million newly diagnosed cases in 1990 underscoring the efficacy of collaborated international efforts, as well as political determination and access to standardized treatment regimens [5].

Although this has been made, leprosy is still endemic in some areas, especially in the developing countries. In 2018, South-East Asian region reported 71 percent of the global cases of new cases, and India is among the key contributors [6]. Despite the fact that India had met its goal of getting a prevalence of below one case per 10,000 population which is the national goal, new cases are still being reported every year. Recent statistics indicate that the 20152016 statistics recorded a national prevalence rate of 0.66 per 10,000 population which, according to the National Leprosy Eradication Programme (NLEP), indicate that, although the disease has been effectively eliminated as a public health problem, transmission rates remain and the disease still afflicts vulnerable populations [7].

In India, it is apparent that there are disparities in disease burden by region. Some states still report higher prevalence rates than the rest of the country. An example of the states that have portrayed a relatively high prevalence is West Bengal. It is also important to note that almost 70 percent of new cases in the state were multibacillary disease, which is characterized by an increased bacterial load and high transmission risk. Also, the reported disability rate of 3.87 percent with new cases shows that there are delays in diagnosing and initiating treatment [8]. The multibacillary cases and the presence of disabilities at the point of detection indicate that there might still be hidden cases in the community and undetected cases at the early stages in cases identification.

The demographic and clinical profile of leprosy patients can give meaningful information about the dynamics of the disease transmission, health-seeking behavior, and program efficacy. Age, gender distribution, socio-economic status, occupation, and residence in rural or urban areas could be some of the factors that could contribute to the presence and detection of the disease [9]. The colony of leprosy, which is a continuum of paucibacillary to multibacillary is a manifestation of the host immune response, and is associated with the length of treatment, the risk of reactions, and the occurrence of disability. Lepra reactions, nerve, and deformities are still significant sources of morbidity and long-term disability.

Adult patients form a huge percentage of the burden of leprosy since they form the economically productive portion of the population. Leper effects among children under this age is not limited to the personal health status of an individual, but the family and community at large in terms of loss of means of livelihood, displacement, and additional spending on health care services [10]. The demographic and clinical profile of adult leprosy patients in tertiary care facilities could be used to discover the trends in the manifestations of the disease, its severity at the time of diagnosis, and the complications. This kind of information would be imperative in enhancing early detection measures, enhanced referral, and patient management measures.

Tertiary care hospitals usually act as the referral centres to complex or advanced cases, such as those involving reactions, neuritis or deformities. Thus, information obtained in these settings may present valuable information on the more serious end of the disease spectrum. Trends, patterns of classification, disability at presentation in hospital and treatment outcomes can be evaluated by retrospective analysis of hospital records. Even though the retrospective type of study has a drawback of depending on recorded data, it is still an effective instrument that can be used to test the current healthcare delivery systems and suggest which areas need to be addressed.

In that regard, the current retrospective study was conducted to examine the demographic and clinical characteristic of adult patients with leprosy patients in a tertiary care setting. This research will help to create a more complete picture of the existing situation with leprosy in a tertiary facility through the analysis of such parameters as age and sex structure, clinical categorization, bacteriological condition, and disability level. The results can be used to determine the effectiveness of the current control strategies, the gaps in their early detection and direct intervention to control the morbidity and disability of leprosy.

## Methodology

**Study Design:** The present study was a hospital-based retrospective record-based observational study conducted to assess the demographic and clinical profile of adult leprosy patients attending a tertiary care hospital. The study design involved reviewing previously recorded patient data without any direct patient interaction.

**Study Area:** The study was conducted in the Department of Skin and VD, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

**Study Duration:** The study was carried out over a period of six months from March 2025 to August 2025.

**Sample Size:** A total of 86 adult patients diagnosed with leprosy during the study period were included in the analysis. All eligible cases meeting the inclusion criteria within the defined duration were considered.

**Study Population:** The study population comprised adult patients aged 18 years and above who were

diagnosed with leprosy and attended the leprosy clinic of the Dermatology Outpatient Department during the specified study period.

**Data Collection:** Data were collected retrospectively from hospital medical records and leprosy clinic registers. The diagnosis of leprosy had been established based on clinical signs and symptoms, and slit-skin smear examination had been performed in all cases. Skin biopsy and histopathological examination were carried out only in clinically doubtful cases to confirm the diagnosis. The demographic and clinical variables recorded included age, gender, residence (rural/urban), religion, type of case (new/relapse/defaulter), classification as Paucibacillary (PB) or Multibacillary (MB) as per National Leprosy Eradication Programme (NLEP) 2009 guidelines, Ridley-Jopling classification, site of lesions, nerve involvement, grade of disability according to the World Health Organization disability grading system (1988), and presence of lepra reactions at the time of diagnosis. The collected information was entered into a structured data sheet for analysis.

**Inclusion Criteria**

- Patients aged 18 years and above
- Confirmed diagnosis of leprosy
- Patients whose complete medical records were available during the study period

**Exclusion Criteria**

- Patients below 18 years of age
- Incomplete or missing medical records
- Patients with uncertain diagnosis

**Procedure:** After obtaining ethical clearance, medical records of eligible patients were retrieved from the leprosy clinic and medical records department. The records were carefully reviewed, and relevant demographic and clinical data were extracted and entered into a pre-designed Microsoft Excel sheet. The data were verified for completeness and accuracy before statistical analysis.

**Statistical Analysis:** The collected data were entered and analyzed using Microsoft Office Excel 2016. Continuous variables were expressed as mean and standard deviation, while categorical variables were presented as frequencies and percentages. For inferential analysis, Student's t-test was used to compare continuous variables between groups, and the Chi-square test was applied for categorical variables. A p-value of less than 0.05 was considered statistically significant. Statistical calculations were performed using Microsoft Excel and VassarStats (Website for Statistical Computation)."

**Result**

Table 1 shows the age distribution of the study subjects (n = 86). The largest proportion of patients was in the 31–45 years age group, comprising 30 patients (34.9%), followed by 46–60 years with 26 patients (30.2%). Patients aged 19–30 years accounted for 18 cases (20.9%), while those older than 60 years represented 12 cases (14.0%). Overall, the majority of patients (65.1%) were between 31 and 60 years of age, indicating that leprosy was most common among middle-aged adults in this study population.

**Table 1: Distribution of study subjects according to age (n = 86)**

| Age group (years) | Number of patients (%) |
|---|---|
| 19 – 30 | 18 (20.9) |
| 31 – 45 | 30 (34.9) |
| 46 – 60 | 26 (30.2) |
| > 60 | 12 (14.0) |
| **Total** | **86 (100)** |

Table 2 shows the distribution of different types of leprosy according to gender among 86 patients. Borderline tuberculoid (BT) was the most common type, accounting for 52 cases (60.5%), with 38 males (44.2%) and 14 females (16.3%). Borderline lepromatous (BL) constituted 17 cases (19.8%), including 9 males (10.5%) and 8 females (9.3%). Lepromatous leprosy (LL) was observed in 13 cases (15.1%), with 9 males (10.5%) and 4 females (4.7%). Tuberculoid (TT) leprosy was the least common, seen in 4 cases (4.7%), and no cases of borderline borderline (BB) were reported. Overall, males predominated across all types, comprising 59 cases (68.6%) compared to 27 females (31.4%), with BT being the most frequent clinical type.

**Table 2: Distribution of different types of leprosy according to gender (n = 86)**

| Type of Leprosy | Male n (%) | Female n (%) | Total n (%) |
|---|---|---|---|
| TT | 3 (3.5%) | 1 (1.2%) | 4 (4.7%) |
| BT | 38 (44.2%) | 14 (16.3%) | 52 (60.5%) |
| BB | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| BL | 9 (10.5%) | 8 (9.3%) | 17 (19.8%) |
| LL | 9 (10.5%) | 4 (4.7%) | 13 (15.1%) |
| **Total** | **59 (68.6%)** | **27 (31.4%)** | **86 (100%)** |

Table 3 presents the simple logistic regression analysis of factors associated with disability among 86 patients, of whom 18 had disability and 68 did not. Age >45 years was significantly associated with disability, with 13 patients (72.2%) in the disability group compared to 25 (36.8%) in the non-disability group (p = 0.012). Gender and residence showed no significant association, as males constituted 72.2% of the disability group versus 67.6% without disability (p = 0.701), and urban residence was 66.7% versus 58.8% respectively (p = 0.532). Classification was significantly associated with disability, with multibacillary (MB) cases accounting for 94.4% of those with disability compared to 79.4% without (p = 0.048). Ridley–Jopling type showed a strong association, as LL & BL types comprised 77.8% of the disability group versus 23.5% in the non-disability group (p < 0.001). Reaction status was not significantly associated with disability (p = 0.689). Overall, older age, multibacillary classification, and LL/BL type were significant factors associated with disability.

**Table 3: Simple logistic regression analysis of factors associated with disability (n = 86)**

| | Disability present (n = 18), n (%) | Disability absent (n = 68), n (%) | p value |
|---|---|---|---|
| **Age** | | | |
| ≤ 45 years | 5 (27.8) | 43 (63.2) | 0.012 |
| > 45 years | 13 (72.2) | 25 (36.8) | |
| **Gender** | | | |
| Male | 13 (72.2) | 46 (67.6) | 0.701 |
| Female | 5 (27.8) | 22 (32.4) | |
| **Residence** | | | |
| Rural | 6 (33.3) | 28 (41.2) | 0.532 |
| Urban | 12 (66.7) | 40 (58.8) | |
| **Classification** | | | |
| PB | 1 (5.6) | 14 (20.6) | 0.048 |
| MB | 17 (94.4) | 54 (79.4) | |
| **Ridley Jopling type** | | | |
| LL & BL | 14 (77.8) | 16 (23.5) | < 0.001 |
| TT & BT | 4 (22.2) | 52 (76.5) | |
| **Reaction** | | | |
| Present | 3 (16.7) | 9 (13.2) | 0.689 |
| Absent | 15 (83.3) | 59 (86.8) | |

## Discussion

In our retrospective study of 86 adult patients, most (34.9) patients were in the 31-45 years age range, then the 46-60 years (30.2) range, which represents that 65.1% of the total amount were in the economically productive age group of 31-60 years. Adil et al. (2018) [11] and Thakkar and Patel (2014) [12] also documented similar age clustering with peak incidence being reported in third and fourth decades of life as well. The same predominance was reported by Barua et al. (2016) [13] in the 30-50 years age group, which supports the finding that leprosy affects young people in the most productive ages. This may be the reason why we excluded pediatric patients, which might be minor when compared to other series conducted in hospitals (Adil et al., 2018) [11]."

Our study had an apparent male preponderance with 68.6% male and 31.4% female (male-to-female ratio of about 2.2:1). The given result is in line with previous Indian research that identified a range of ratios between 1.7:1 and 2.3:1 (Adil et al., 2018; Thakkar and Patel, 2014; Barua et al., 2016) [11-13]. Men have been found to be in a dominant role due to increased occupational exposure, movement and improved healthcare seeking behavior in men and also due to the social cultural barriers which restrict the access of women to medical services (Richardus et al., 1996) [14]. Our results are therefore in line with the existing gender trends in endemic environments.

Concerning clinical spectrum, Borderline Tuberculoid (BT) leprosy was the most common (60.5) than Borderline Lepromatous (BL) (19.8), and Lepromatous Leprosy (LL) (4.7), with Tuberculoid (TT) being only 4.7. There were no cases of Borderline Borderline (BB). The use of BT is in accordance with the studies by Bhat and Chaitra (2013) [15] and Thakkar and Patel (2014) [12], who also reported BT as the most widespread subtype in the tertiary care units. Barua et al. (2016) [13] also found higher percentage of borderline forms during the MDT period, and this can be attributed to the shift between polar and borderline presentations as reported by Ramu (2000) [16]. Nevertheless, our percentage of LL (15.1) is slightly on the higher side compared to certain previous regional surveys, which might be due to late diagnosis or bias when referred to a tertiary care hospital.

In our research, disability existed in 20.9 percent of patients at diagnosis. This is a rate similar to one of 20.1% measured by Sarkar et al. (2012) and a bit higher than 15.5% met by Ishore et al. (2019), but far lower than the range of 42.8%53.1% established in another Indian research (Thakkar and Patel, 2014; Reyila et al., 2019) [12]. The reason behind such variation can be associated with such variation in study setting, referring patterns, and inclusion criteria. Our hospital is a tertiary care center; hence, we may also get a higher rate of more complicated or advanced cases, which may affect the rate of disability. However, the comparatively moderate level of prevalence of disability in our series implies that there is some level of early diagnosis, as it is consistent with the current NLEP approaches (NLEP, 2016) [2].

The age and disability showed a statistically significant relationship ($p = 0.012$) and 72.2% of the disability cases were observed in patients who were above 45 years old. This is in line with Reyila et al. (2019) [17] and Richardus et al. (1996) [14], who reported more frequently impaired nerve functions and deformities in older people. This tendency may be explained by age-related reduction of cell-mediated immunity and longer periods of the disease without its diagnosis. However, gender did not show any significant association with disability in our study ($p = 0.701$) though males represented 72.2 of disability cases. These findings were also described by Jhuma et al. (2012) [18] and it seems that the prevalence of the former gender is more in general, but the risk of the disability when the disease is present is not necessarily a significant sex difference.

There was a significant association between disease classification and disability ($p = 0.048$) and 94.4 percent of disabled patients were in the multibacillary (MB) category. This aligns with the results of Reyila et al. (2019) [17] and Noor et al. (2010) [19] that have stated that deformity burden is greater in the case of MB. Moreover, there was one very strong association between Ridley-Jopling type and disability ($p < 0.001$), and the percentage of cases of disability with LL and BL was 77.8 in our cohort. Correlated associations of lepromatous spectrum disease with high levels of disability have been established by Richardus et al. (1996) [14] and Moura et al. (2017) [20] . It is more likely that the increased risk of deformity is due to the greater bacillary load and the more widespread nerve involvement in LL and BL forms.

The positive relationship between residence and disability was not statistically significant in our study ($p = 0.532$) although 66.7% of disability cases were in urban locations. This is unlike other studies like Mohite et al. (2013) [21] that found that rural populace had higher disability rates because of poor access to healthcare. The fact that most of the cases used in our study were centered in urban areas is probably due to the urban center nature of our institution and better accessibility of tertiary care centers.

Lastly, disability was not significantly associated with lepra reaction ($p = 0.689$) in our cohort. Although Kumar et al. (2004) [22] found that reactions especially type 1 reactions make a considerable contribution to nerve damage, the results we obtained might be a result of the timely detection and treatment of reactions in a hospital. Also, the emergence of reactions subsequent to commencement of therapy have not been incorporated into our analysis and they can have affected the identified association.

In general, the results of our study are mostly in line with the literature in India and other nations, which show that it is mostly male, the most frequent age group are the productive age, the predominance of borderline forms, and the strong correlation of the disability with the old age and multibacillary disease. These findings highlight the importance of preventing high-risk groups through early identification, as well as early onset of MDT, and close attention to monitor progress to prevent disability and limit disease burden.

## Conclusion

This retrospective study on adult leprosy patients attending a tertiary care hospital demonstrates that the disease predominantly affects individuals in the economically productive age group, with a clear male preponderance. Borderline tuberculoid was the most common clinical type, followed by borderline lepromatous and lepromatous forms, while pure borderline cases were not observed. Multibacillary cases constituted the majority of patients. Disability was significantly associated with older age, multibacillary classification, and lepromatous or borderline lepromatous types, whereas gender, residence, and lepra reaction did not show a significant association. These findings highlight the continued burden of multibacillary leprosy and the importance of early detection and timely management to prevent disability, particularly among older patients and those with advanced clinical forms.

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