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Original Article

Clinico-epidemiological profile of adult leprosy patients from a referral hospital in Eastern India: A retrospective study

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Abstract

Background The prevalence of leprosy has drastically reduced globally after the introduction of multidrug therapy. However, it continues to be a major public health challenge in India. The present study was conducted to evaluate the clinical and epidemiological profile of adult leprosy patients attending a tertiary care hospital in eastern India over a period of six months.

Methods A retrospective record-based study was carried out to collect clinical and demographic data of patients over 18 years of age attending the leprosy clinic of a tertiary care institution in Kolkata, West Bengal, India, from 1st January 2019 to 30th June 2019. The data collected were tabulated and analyzed using appropriate statistical methods.

Results 132 adult leprosy patients attended the clinic during the study period. Most of them were between 31-45 years of age, with a predominance of male patients (68.2%) and patients from an urban background (62.9%). A high prevalence (87.1%) of multibacillary leprosy was noted and the commonest type was borderline tuberculoid (66.7%). Prevalence of borderline lepromatous and lepromatous leprosy showed a rising trend above 45 years of age. 22% patients presented with disabilities, with significant predilection for older age groups, multibacillary disease and towards the lepromatous spectrum (P = 0.0042, 0.0424 and < 0.0001 respectively). Lepra reactions were noted in 13.6% patients at presentation.

Conclusion Our findings highlight the need for implementation of sustained effective measures for early diagnosis and treatment of leprosy in order to prevent disabilities, while improving awareness to ensure appropriate health seeking behavior.

Key words
Adult leprosy, paucibacillary, multibacillary, disability, lepra reaction.

Introduction

Leprosy is a chronic granulomatous infection affecting the skin, peripheral nerves and various other organs. Although the disease has been known to mankind since biblical times, its causative agent, *Mycobacterium leprae*, was identified much later in 1873 by Gerhard Hansen. The social stigma associated with leprosy is mainly due to its mutilating nature leading to deformities in untreated long-standing disease.

The introduction of multidrug therapy (MDT) by the World Health Organization (WHO) since 1982 has led to a significant reduction in the incidence and prevalence of the disease worldwide. Compared to more than five million new cases of leprosy diagnosed in 1990, only

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208,619 new cases were detected in the year 2018.[1] The South-east Asian region accounted for 71% of these cases, with India being one of the major contributors, in spite of having reached the elimination target of prevalence less than one per 10,000 cases in December 2005. In 2015-2016 the National Leprosy Eradication Programme (NLEP) reported a nationwide prevalence rate of 0.66 per 10,000 population.[2] West Bengal was among the states showing a prevalence higher than the national average, with multibacillary disease in almost 70% new cases and a disability rate of 3.87% among new cases.

With this perspective, we carried out a retrospective study to find out the demographic and clinical profile of leprosy among adult patients attending a tertiary care hospital in Kolkata.

Methods

The present study was a retrospective record-based observational study conducted in the leprosy clinic of the dermatology outpatient department of a tertiary care institution in Kolkata, West Bengal, India. The medical records of all patients above 18 years of age, who visited the clinic during a six-month period from 1st January 2019 to 30th June 2019, were retrieved. The patients had been diagnosed on the basis of clinical signs and symptoms and slit skin smear had been done in all cases. Skin histopathology had been done to confirm the diagnosis only in doubtful cases.

Records of the patients were analyzed and the following clinical and demographic variables were noted: age, gender, residence (rural/ urban), religion, new/ relapse/ defaulter case, paucibacillary (PB)/ multibacillary (MB) disease as per criteria laid down under NLEP guidelines 2009,[3] Ridley Jopling classification, site and grade of disability according to WHO disability grading system 1988[4] and presence of lepra reactions at the time of diagnosis.

The data collected were tabulated and analyzed using Microsoft Office Excel 2016. Descriptive statistical tools like mean and standard deviation were used for continuous data, while frequencies and percentages were used for categorical data. For inferential statistics, t-tests and Chi-square tests were used in intergroup comparisons of continuous and categorical variables respectively. P-value of less than 0.05 was considered statistically significant. All calculations were performed using Microsoft Excel and VassarStats: Website for Statistical Computation.

Results

A total of 132 patients above 18 years of age attended the leprosy clinic during the study period. Of these patients, 90 (68.2%) were males and 42 (31.8%) were females, with a male to female ratio of 2.1:1. The mean age of the patients was 42.99±13.32 years. **Table 1** shows the distribution of patients according to age. Maximum number of patients (46) were in the age group of 31-45 years, constituting 34.8% of all cases. Only 14 patients (10.6%) were above 60 years of age.

49 patients (37.1%) were from a rural background as compared to 83 patients (62.9%) from urban areas. 64 (77.1%) of the urban cases were males as compared to 26 (53.1%) of the rural patients ($P = 0.0075$).

Table 1 Distribution of study subjects according to age.

Age group (years)	*Number of patients (%)*
19 - 30	28 (21.2)
31 - 45	46 (34.8)
46 - 60	44 (33.3)
> 60	14 (10.6)
Total	132 (100)

Table 2 Distribution of different types of leprosy according to gender.

Type of Leprosy	*Male n (%)*	*Female n (%)*	*Total n (%)*
TT	4 (3.0%)	2 (1.5%)	6 (4.5%)
BT	64 (48.5%)	24 (18.2%)	88 (66.7%)
BB	0 (0.0%)	0 (0.0%)	0 (0.0%)
BL	10 (7.6%)	15 (11.4%)	25 (18.9%)
LL	12 (9.1%)	1 (0.8%)	13 (9.8%)
Total	90 (68.2%)	42 (31.8%)	132 (100%)

Majority of the patients, that is, 115 patients (87.1%) were Hindu, 16 (12.1%) were Muslim while one patient belonged to the Sikh community.

All 132 cases were new patients and no cases of relapse or defaulters had been recorded during the study period.

17 patients (12.9%) were diagnosed as PB cases as compared to 115 patients (87.1%) with MB leprosy. The mean age of PB patients was slightly lower than that of MB patients (40.76±12.42 vs. 43.32±13.47 years; *P*=0.4617). 80 males had MB leprosy accounting for 88.9% of all males, as compared to 35 females with MB disease accounting for 83.3% of the female patients.

Table 2 shows the distribution of patients according to the Ridley Jopling classification. Borderline tuberculoid (BT) leprosy was the commonest type accounting for 88 patients (66.7%), followed by borderline lepromatous (BL) leprosy accounting for 25 patients (18.9%). 13 patients (9.8%) had lepromatous (LL) leprosy, while 6 (4.5%) had tuberculoid (TT) leprosy. Mid-borderline (BB) type was not seen in any of the patients. All the types, except BL leprosy, were more common in males than females. The mean age of patients was found to increase from the tuberculoid towards the lepromatous spectrum with the mean ages of TT, BT, BL and LL patients being 31.67±8.64, 41.05±12.14, 48.72±15.12 and 50.38±12.65 years respectively. The age-specific prevalence of TT and BT leprosy were found to decrease with age, with the maximum cases being below 45 years of age. On the other hand, the prevalence of BL and LL leprosy were found to rise progressively above 45 years of age (**Figure 1**).

Of the 132 patients, a total of 29 patients (22%) presented with disabilities, including 13 patients (9.8%) with Grade 1 and 16 (12.1%) with Grade 2 disability. Feet were the most common sites involved, accounting for 10 patients (7.6%). **Table 3** shows the simple logistic regression analysis of various factors associated with disability. Urban patients presented with

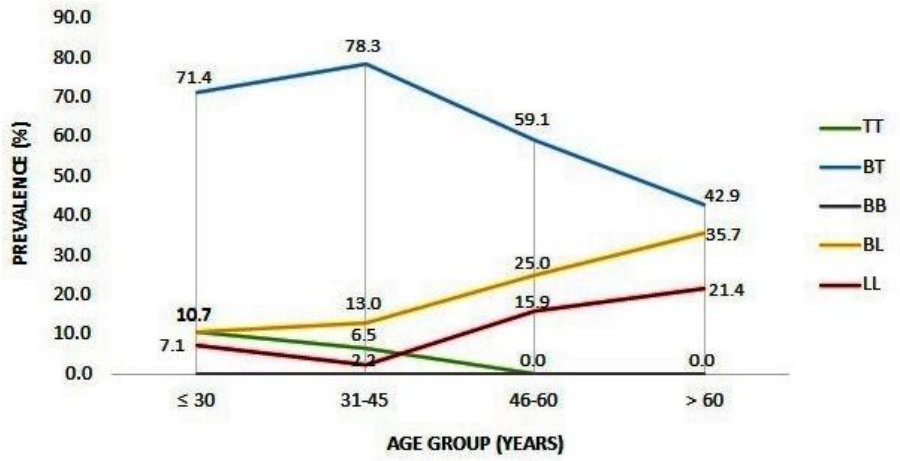

Figure 1 Line chart showing age-specific prevalence of different types of leprosy.

Table 3 Simple logistic regression analysis of factors associated with disability.

	Disability present (n = 29), n (%)	*Disability absent (n = 103), n (%)*	*p value*
Age			
≤ 45 years	9 (31.0)	65 (63.1)	0.0042
> 45 years	20 (69.0)	38 (36.9)	
Gender			
Male	20 (69.0)	70 (68.0)	0.8875
Female	9 (31.0)	33 (32.0)	
Residence			
Rural	7 (24.1)	42 (40.8)	0.1552
Urban	22 (75.9)	61 (59.2)	
Classification			
PB	0 (0.0)	17 (16.5)	0.0424
MB	29 (100)	86 (83.5)	
Ridley Jopling type			
LL & BL	25 (86.2)	13 (12.6)	< 0.0001
TT & BT	4 (13.8)	90 (87.4)	
Reaction			
Present	4 (13.8)	14 (13.6)	0.7773
Absent	25 (86.2)	89 (86.4)	

disabilities more often (26.5%) than rural patients (14.3%). Disabilities were seen in a significantly higher proportion of patients above 45 years of age, with MB disease and in the BL and LL spectrum combined (*P*=0.0042, 0.0424 and <0.0001 respectively).

18 patients (13.6%) presented with lepra reaction at the time of diagnosis. Of them, 13 (9.8%) were in Type 1, while 5 (3.8%) were in Type 2 reaction. Reactions were seen more commonly in MB patients as compared to PB, although statistically insignificant (14.8% vs. 5.9%; *P* = 0.5376). 12 of the 13 patients with Type 1 reaction had BT leprosy, while Type 2 reaction was predominantly seen in the LL (3 patients) and BL (2 patients) spectra.

Discussion

Although the advent of MDT has resulted in a significant reduction in the prevalence of leprosy, it continues to be a major public health problem, especially in developing countries like India. The epidemiological profile of the disease varies greatly in different parts of our country as is evident from a comparison between studies from various regions.

In the current study, 132 adult leprosy cases were registered in our institution during the study period, with a male to female ratio of 2.1:1. Studies on slightly larger sample size have reported comparable ratios ranging from 1.7:1 to 2.3:1.[5-7] The male preponderance may be attributed to increased exposure among males due to greater mobility and increased accessibility to health care compared to females in most developing countries including ours.[8,9]

We observed a maximum number of patients in the age group of 31-45 years, which was also comparable to previous studies.[5,6] However, the mean age of patients in our study was comparatively higher than that recorded by others.[6,10] This was most likely due to the exclusion of pediatric patients in our study.

A study from Uttar Pradesh reported a higher prevalence of patients from rural areas, whereas in our study urban cases were more common.[6] This can be attributed to the location of our hospital in a metropolitan city leading to a predominantly urban catchment area. However,

we cannot rule out the possibility of inappropriate health seeking behavior owing to a lack of awareness among rural patients.

The higher proportion of MB patients as compared to other studies[10-12] may be indicative of the inability of health services to diagnose the disease at an early stage. Also, the social stigma attached to leprosy often deters patients from seeking treatment early as they tend to hide their lesions. Some studies have reported a higher percentage of MB disease among rural patients, which has been attributed to the lack of accessibility of the rural population to healthcare facilities.[6,13] However, in our patients the prevalence of MB leprosy among rural and urban patients were almost similar (12.2% vs 13.3%), suggesting less disparity in healthcare access between rural and urban areas in this region.

BT leprosy was found to be the commonest type in our study subjects. This was in accordance with most other Indian studies in recent years.[5,7,14,15] The low percentage of polar forms corroborates the observation that borderline cases have become more common in the MDT era as compared to polar types which were more prevalent in the dapsone era.[8,16] An important finding in our study was a declining trend of TT and BT leprosy in contrast to a rising trend of BL and LL leprosy above 45 years of age. Another study from our state had previously reported similar findings with the prevalence of BL and LL cases rising from 15.8% in patients below 50 years of age to 47.6% in those above 50 years.[5] The increased susceptibility of elderly patients to the lepromatous spectrum may be explained by the decrease in cell-mediated immunity with age along with appearance of various co-morbidities that lead to further immunosuppression.

The disability rate in newly diagnosed patients in our study was 22%. This was much lower than disability rates ranging from 42.8% to 53.14% reported by previous studies from various parts of India.[7,14,17] However, studies from our state by Ishore *et al.* and Sarkar *et al.* reported comparatively lower disability rates of 15.5% and 20.1% respectively.[10,18] Also, a predominance of Grade 2 over Grade 1 disabilities in our study was in contrast to previous study findings.[7,10,18] This observation may be because ours being a tertiary referral center, we receive a large number of complicated cases including those with advanced visible deformities that often require surgical intervention. On the other hand, patients presenting with anesthesia of distal extremities without any visible deformity are usually managed adequately at the primary or secondary level. Hence, the predominance of patients presenting with Grade 2 disability at a referral center does not necessarily indicate delayed diagnosis or treatment.

Another significant finding in our study was the occurrence of disabilities predominantly in older age groups, MB patients and those having disease towards the lepromatous spectrum. These findings have been corroborated by several previous studies from India as well as other endemic countries.[14,18-21]

The data relating to lepra reactions in newly diagnosed patients in our study were mostly comparable to previous reports.[5,6,14,22] A higher proportion of type 1 compared to type 2 reaction observed in our study, may be attributed to the higher prevalence of borderline cases. It should also be noted that in our study patients who developed reactions during or after treatment were not taken into account.

The present study was conducted as a retrospective analysis of medical records of leprosy patients. Therefore, the data available

were limited and non-expandable. Another major limitation of this study is that it was conducted at a tertiary referral center in an urban area, where a large number of cases are referred from peripheral health facilities. A high proportion of these referred patients have severe complications requiring special intervention. Thus, our study findings may differ to some extent from the true picture of the epidemiology of leprosy in the general population.

Conclusion

In spite of India being in the "elimination era", our study shows a high proportion of MB cases and newly diagnosed patients with Grade 2 disability. This highlights the importance of continuing effective measures such as information education and communication activities to spread awareness and remove stigma associated with leprosy. Improvement of facilities for early case detection and treatment at the field level can go a long way in preventing disease progression and development of deformities. Newer strategies should be devised to target susceptible subgroups of the population in order to achieve complete eradication of this disease from our society.

References

1. Global leprosy update, 2018: moving towards a leprosy-free world. *Wkly Epidemiol Rec*. 2019;**94**:389-412.
2. NLEP Annual Report 2015‑2016. Central Leprosy Division, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, Nirman Bhavan, New Delhi.
3. Training manual for medical officers: NLEP. Chapter 7. Classification and management of leprosy. Directorate of Health Services, Ministry of Health and Family Welfare, Nirman Bhavan, New Delhi.
4. World Health Organization. World Health Organization Expert Committee on Leprosy. 6th Report. Technical Report Series 768. Geneva: World Health Organization; 1988.
5. Barua JK, Anurag D, Barik G, Ghoshal L, Shukla DK, Banerjee G. A Clinico-Epidemiological Study of Leprosy in an Urban Leprosy Centre of West Bengal. *IOSR J Dent Med Sci*. 2016;**15(8)**:12-5.
6. Adil M, Amin SS, Mohtashim M, Mushtaq S, Alam M, Priya A. Clinico-epidemiological study of leprosy from a North Indian tertiary care hospital. *Int J Res Dermatol* 2018;**4**:518-21.
7. Thakkar S, Patel SV. Clinical profile of leprosy patients: A prospective study. *Indian J Dermatol*. 2014;**59**:158-62.
8. Norman G, Bhushanam JDRS, Samuel P. Trends in leprosy over fifty years in Gudiyatham Taluk, Vellore, Tamilnadu. *Indian J Lepr*. 2006;**78**:105-11.
9. Richardus JS, Meima A, Croft RP, Habbema JD. Case detection, gender and disability in leprosy in Bangladesh: a trend analysis. *Lepr Rev*. 1999;**70**:160-73.
10. Ishore K, Das DK, Banerjee S. Disability in New Leprosy Cases - Magnitude, Pattern and Associated Factors: A Cross Sectional Study in a Subdivision of Darjeeling District, West Bengal. *Indian J Lepr*. 2019; **91**:207-15.
11. Arora M, Katoch K, Natrajan M, Kamal R, Yadav VS. Changing profile of disease of leprosy patients diagnosed in a tertiary care centre during years 1995-2000. *Indian J Lepr*. 2008;**80**:257-65.
12. Mahajan VK, Sharma NL, Rana P, Sood N. Trends in detection of new leprosy cases at two centers in Himachal Pradesh, India: a ten year study. *Indian J Lepr*. 2003;**75**;17-24.
13. Mohite RV, Mohite VR, Durgawale PM. Differential trend of leprosy in rural and urban area of Western Maharashtra. *Indian J Lepr* 2013;**85**:11-8.
14. Reyila VP, Betsy A, Riyaz N, Sasidharanpillai S, Sherjeena PV, Majitha MP *et al*. Clinico-epidemiological study of disability due to leprosy at the time of diagnosis among patients attending a tertiary care institution. *Indian J Dermatol*. 2019;**64**:106-11.
15. Bhat RM, Chaitra P. Profile of new leprosy cases attending a South Indian referral hospital in 2011-2012. *ISRN Trop Med*. 2013;**2013**:4.

16. Ramu G. Clinical leprosy through the last seventy-five years. *Indian J Lepr*. 2000; **72**:199-214.
17. Patel NR, Modi KR. A cross-sectional study of deformities in patients of leprosy at a tertiary care center of Western India. *Indian J Lepr*. 2016;**88**:209-15.
18. Sarkar J, Dasgupta A, Dutt D. Disability among new leprosy patients, an issue of concern: An institution based study in an endemic district for leprosy in the state of West Bengal, India. *Indian J Dermatol Venereol Leprol*. 2012;**78**:328-34.
19. Richardus JH, Finlay KM, Croft RP, Smith WC. Nerve function impairment in leprosy at diagnosis and at completion of MDT: A retrospective cohort study of 786 patients in Bangladesh. *Lepr Rev*. 1996;**67**:297‑305.
20. Moura SH, Grossi MA, Lehman LF, Salgado SP, Almeida CA, Lyon DT, *et al*. Epidemiology and assessment of the physical disabilities and psychosocial disorders in new leprosy patients admitted to a referral hospital in Belo Horizonte, Minas Gerais, Brazil. *Lepr Rev*. 2017;**88**:244-57.
21. Noor SM, Paracha MM, Ali Z, Rauf A. Frequency of disabilities in newly diagnosed patients of leprosy presenting to Lady Reading Hospital, Peshawar. *Ann Pak Inst Med Sci*. 2010;**6**:210-3.
22. Kumar B, Dogra S, Kaur I. Epidemiological characteristics of leprosy reaction:15 years experience from North India. *Int J Lepr Other Mycobact Dis*. 2004;**72**:125-33.