

Clinicoepidemiologic profile of leprosy in geriatric population in post-elimination era: A retrospective, hospital-based, cross-sectional study from Eastern India

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ABSTRACT

Background and Aim: Geriatric populations are susceptible to leprosy infection with masked clinical signs due to lower immunity in them. Our aim was to analyze the clinicoepidemiologic profile of patients with geriatric leprosy and find out the reasons for delayed diagnosis and treatment. **Materials and Methods:** A retrospective, record-based study was conducted in a tertiary care center from May 2019 to May 2022. The clinicodemographic data of biopsy-confirmed leprosy cases aged ≥ 60 years were obtained from the leprosy clinic record. Various reasons for the delay in treatment were also recorded. Simple statistics was used for analysis. **Results:** Out of 605 leprosy cases, 50 (7.4%) cases belonged to the geriatric population. Males outnumbered females (M/F = 37/13). The mean age of the patients was 66.28 ± 6.5 years. Maximum patients belonged to 60–69 years of age. The mean duration of illness was 35.22 months (range 1–240 months). Most of the patients were illiterate (33.6%), and 56% were farmers by occupation. The ulnar nerve was the most common nerve to be thickened in 90% (45/50) cases, followed by the common peroneal nerve in 54% (27/50) cases, radical cutaneous nerve in 52% (26/50) cases, and posterior tibial nerve in 24% (12/50) cases. Borderline tuberculoid was the most common type in 44% cases, followed by lepromatous leprosy in 22%, borderline lepromatous leprosy in 18% (9/50), and pure neuritic leprosy in 14%. Type 1 and type 2 lepra reactions were found in 18% and 14% cases, respectively. Also, 38% had grade 2 disability. Common reasons for the delay in treatment were financial constraints, lack of family support, and personal superstitious beliefs. The study was limited by its retrospective nature. **Conclusion:** Geriatric leprosy needs special attention as the elderly are more prone for deformities; also, because of low immunity, there is a high chance of developing multibacillary leprosy, and therefore, they are potential sources of infection to the community.

Keywords: Clinicoepidemiologic, geriatric, leprosy, post-elimination

Introduction

Leprosy is known to mainly occur during two different periods of life – in children aged between 10 and 14 years and in young adults aged between 35 and 44 years.^[1] However, people of all ages, from early infancy to the elderly, are still susceptible to the disease (WHO 2016). With the persistence of leprosy, coupled

with India's aging population, we speculate that there may be an increase in first presentations of leprosy being detected in the elderly. When diagnosed and treated late, leprosy leads to physical disability that, when combined with the aging process and other comorbidities, can cause loss of personal autonomy to the elderly patient.^[2,3] Also, leprosy reaction episodes, the phenomena potentially responsible for the functional loss of the peripheral nerves, also result in disability that contributes to greater vulnerability and dependency in the elderly.^[4] Because of low immunity in the elderly, the bacterial load could be high, and in such a scenario, an index, untreated, elderly leprosy case can

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be a source of infection to other family members, and thereby indirectly to the community. Because the chance of disability and deformity is high in the elderly, they can contribute to increased load of various deformities. Hence, there is a need to target elderly leprosy cases, early detection of disease and treatment.

Though there have been many studies on the epidemiological profile of leprosy from several parts of India, the data regarding leprosy among geriatric population is lacking from India. No single study exists on geriatric leprosy from India. Our hospital, being in the eastern part of India, caters to patients from several leprosy-endemic areas. Hence, we intended to observe the epidemiological pattern of leprosy among geriatric population in this study.

Aim and objective

- Primary objective: To observe the clinicoepidemiologic pattern of leprosy among the elderly
- Secondary objective: To find out the factors for late presentation.

Materials and Methods

Detailed methodology

A record-based, retrospective, observational study was conducted at a tertiary care center from May 2019 to May 2022. Due to coronavirus disease (COVID) outbreak, the data of year 2020 were not available as the hospital was converted into COVID care hospital. All the diagnosed leprosy cases of age >60 years during the period given above were included in the study. Those with other comorbidities like diabetes mellitus and other neurologic disorders were excluded from the study. The diagnosis of leprosy was done based on the World Health Organization (WHO) criteria as follows: (1) patients having skin lesions in the form of hypopigmented hypoanesthetic/anesthetic patches; (2) peripheral nerves enlarged and/or tender; and (3) slit-skin smear for acid fast bacilli (AFB) positive and confirmation by histopathology. All patients were classified depending on the number of lesions, their morphology, distribution, and related nerve involvement according to the Ridley–Jopling spectrum as tuberculoid (TT), borderline TT (BT), mid-borderline (BB), borderline lepromatous (BL), and lepromatous (LL).^[3] Some patients were also classified as indeterminate or pure neuritic leprosy (PNL), when applicable. Diagnosis of Type 1 lepra reaction was made if the patient had redness, swelling, or tenderness of preexisting lesions, with or without the appearance of new lesions; presence of edema of the hands, feet, or face; or tenderness of one or more nerves, with or without nerve function impairment.^[4] Patients presenting with sudden appearance of multiple small, tender, evanescent nodules or plaques, with or without constitutional symptoms such as fever, malaise, lymphadenitis, and myalgia, were considered to have Type 2 lepra reaction.^[4] Disabilities were classified according to the standard WHO grading system.^[5]

Inclusion criterion: All newly diagnosed elderly leprosy patients of age > 60 years.

Exclusion criterion: Those with other comorbidities like diabetes mellitus and other neurologic abnormalities.

Data regarding sociodemographic details, leprosy spectrum, lepra reactions, and various deformities among the geriatric leprosy patients were collected from the leprosy register. The factors for late presentation were identified from the records wherever mentioned.

Data entry was done in Microsoft Excel sheets separately for each of the included study subjects. The qualitative data is summarized in the form of proportions, percentages, and ratios. The quantitative data is presented as mean and standard deviation.

Results

Out of 605 leprosy cases, 50 (8.3%) cases belonged to the geriatric population. Males outnumbered females (M/F = 37/13). The mean age of the patients was 66.28 ± 6.5 years. Also, 62% (31/50) of the cases were between 60 and 65 years of age, followed by 18% (9/50) of the cases in 66–70 years age group [Table 1]. The mean duration of illness was 35.22 months (range 1–240 months). Majority of the patients belonged to rural population (84%). Most of the patients were illiterates (33.6%); 26%, 22%, and 12% of the cases were having education below 10th class, up to 12th class, and above 12th class, respectively. The patients were predominantly farmers (56%) and homemakers (26% cases), and other occupations included laborer, retired service man, and shopkeeper. Also, 88% (44/50) of the cases presented as a new case and 12 (6/50) were continuing treatment. Family history of leprosy was documented in six cases.

Of the leprosy spectrum, BT leprosy was the “most common type” in 44% (22/50) cases, followed by LL in 22% (11/50), BL in 18% (9/50), and PNL 14% (7/50) cases [Figures 1–3]. Type 1 lepra reaction was found in nine (18%) cases and type 2 lepra reaction



Figure 1: Hypopigmented anesthetic patch (BT Hansen's). BT = borderline tuberculoid

in seven (14%) cases at the time of presentation [Figures 4 and 5]. Two cases had severe type 2 lepra reaction in the form of necrotic erythema nodosum leprosum (ENL).

Five cases had single nerve involved and 45 had multiple nerves involved. The ulnar nerve was the most common nerve to be thickened in 90% (45/50) of cases, followed by the common peroneal nerve in 54% (27/50) of cases, radial cutaneous nerve in 52% (26/50) of cases, posterior tibial nerve in 24% (12/50) of cases, sural nerve in 4% (2/50) of cases, great auricular nerve in 10% (5/50) of cases, supraclavicular nerve in 2% (1/50) of cases, and infraorbital nerve in 2%.

Results showed that 38% (18/50) had grade 2 disability (G2D) of hands and feet and 34 cases had grade 1 disability. Multiple deformities were found in same patients. Trophic ulcer was the most common deformity (15 cases) followed by claw hand (six cases) [Figure 6]. Claw toe deformity was found in three cases and foot drop in two patients. One case had grade 2 eye disability in the form of corneal opacity leading to severe vision impairment [Table 2].



Figure 2: Lepromatous leprosy with nodules



Figure 4: Borderline tuberculoid leprosy with downgrading type 1 reaction

All multibacillary cases were on WHO multibacillary multidrug therapy (MDT MB) regimen and paucibacillary cases were on multibacillary multidrug therapy (MB MDT) regimen for 6 months.

In 22 cases, reasons for the delay in seeking medical consultation were documented, which included lack of knowledge about the disease (11 cases), ignorance of the signs and symptoms of the disease (four cases), financial constraints (three cases), lack of family support (two cases), fear of disclosure to society and personal superstitious beliefs like the disease will heal on its own and camouflaging with tattoo (two cases).

Discussion

Leprosy is a chronic granulomatous disease caused by *Mycobacterium leprae*, an obligate intracellular parasite that affects peripheral nerves, skin, and other organs.^[5] Transmission occurs mainly via respiratory droplets from the index cases. Because of the high affinity of the lepra bacilli for the nerves, neuropathy has been the hallmark of the disease, which leads to permanent deformities and disabilities if not diagnosed and treated early. Globally, in the year 2020, 127,558 new leprosy cases were detected from 139 countries from the six WHO regions. G2Ds were found in 7198 cases out of the new cases. At the end of the year 2020, 129,389 cases were on treatment.^[6] Despite India



Figure 3: Borderline lepromatous leprosy with type 1 reaction



Figure 5: Necrotic erythema nodosum leprosum



Figure 6: (a) Claw hand deformity; (b) claw toes with trophic ulcer

Table 1: Age distribution

Age group	Number of cases
60–65 years	31
66–70 years	9
71–75 years	4
76–80 years	3
>80 years	3

Table 2: Type of deformities/disability

Deformity	Number of cases
Trophic ulcer	11
Claw hand	5
Claw toes	3
Shortening of digits	2
Foot drop	2
Corneal opacity	1

being declared as “leprosy-free” country in the year 2005, still 60% of the world’s leprosy patients are being reported from India. Bihar, Maharashtra, Uttar Pradesh, Odisha, Chhattisgarh, Madhya Pradesh, West Bengal, and Jharkhand contributed 76% of the new leprosy cases, as per the data from National Leprosy Eradication Program (NLEP). Bihar was the state with highest number of G2Ds in the year 2020–2021.^[7]

Now, the focus of various leprosy programs is on detection of child leprosy and disability detection and prevention. Although child leprosy is an indicator of disease transmission in the community, elderly leprosy can contribute to more deformities and disabilities because of compromised nerve function due to aging along with leprosy neuropathy. The WHO global leprosy strategy for 2021–2030 has the vision of zero leprosy in terms of zero infection and disease, zero disability, zero stigma and discrimination, and elimination of leprosy (defined as interruption of transmission). To achieve this goal, focus on the geriatric group is important.

Based on the data from all the states and union territories (UTs) 2020–2021, the NLEP reported that a total of 65,147 new cases of leprosy were detected, taking the annual new case detection to 4.56 per 100,000 population as against 114,451 cases in 2019–2020.^[7] According to the same data, a total of 57,672 leprosy cases are on record as of April 1, 2021. In the current study, the proportion of geriatric leprosy cases was found to be 8.3%. There is no single hospital-based

study on geriatric leprosy patients with which we can compare the proportion.

There is published data on the survey of elderly leprosy cases from the endemic region of Brazilian Amazon in which 185 elderly patients were surveyed. Out of 185 cases, 64.32% were male and 69.73% were in the 60- to 69-year-old age group (67.50 years, on average). The predominant operational classification was multibacillary, and 62.70% of the elderly presented with a dimorphic clinical form. Among the therapeutic schemes used, 69.73% of the elderly went through 12 doses of multibacillary multidrug therapy (MDT/MB) and only 9.73% went through six doses of paucibacillary multidrug therapy (MDT/MB). The occurrence of leprosy reactions in the elderly was 64.86%. Of those reactions, 37.50% presented with type 1 reactions, with a predominance of the BL and LL clinical forms. Also, 49.19% of patients already presented with some physical incapacity at the time of diagnosis. Disability grade 1 or 2 at the time of diagnosis was more prevalent in the multibacillary group (BL and LL clinical forms).^[4]

Souza *et al.*^[8] studied elderly leprosy from an endemic state in the Brazilian Northeast. Majority of the patients in their study were in the age group from 60 to 69 years (57.86%) and had elementary school education (43.54%). Males outnumbered females (52.13% and 47.87%, respectively), 66.28% cases were MB, and G2D was detected in 8.3% cases.

In another study by Matos *et al.*,^[9] 273 elderly leprosy patients were analyzed from Brazil. Out of these, 54.2% were males, 62.3% were aged between 60 and 69 years, majority had elementary school education, 90.1% belonged to urban area, 61.5% cases were multibacillary, and 28.6% had some degree of disability.

In the current study, the proportion of males was more like in the studies of Souza *et al.*^[8] and Matos *et al.*^[9] In contrast to these studies where majority of the patients had elementary education, our study had most patients in the illiterate category. Like the studies of Oliveria *et al.*,^[4] Souza *et al.*,^[8] and Matos *et al.*,^[9] majority of the patients belonged to the age group of 60–69 years in the present study. This could be because patients of this age group are relatively young and have more social contact, and thus get the infection from others.

Our study had BT leprosy as the most common type (44%), followed by LL in 22% and BL in 18%, whereas BL and LL constituted the highest case burden in the studies of Souza *et al.*^[8] and Matos *et al.*^[9]

In our study, 32% cases had lepra reaction, of which 18% had type 1 lepra reaction. In contrast, 64.86% of the elderly had lepra reaction in the study of Oliveria *et al.*, of which type 1 lepra reaction constituted 37.5%. We found two cases of severe necrotic ENL in our study.

Polyneuropathic presentation was found in 90% patients in our study, and ulnar nerve was the most common nerve involved,

followed by the common peroneal nerve, radial cutaneous nerve, and posterior tibial nerve. None of the existing studies on geriatric leprosy have reported on the pattern of nerve involvement. Our center being a tertiary care hospital, all the cases are examined meticulously by the dermatologists and documentation is done in all cases. However, in another study on leprosy patients which included all age groups, ulnar nerve was the most common type of nerve involved.^[10]

Similarly, in another study from western Maharashtra, India, the most common thickened nerve was the ulnar nerve (93.5%), followed by median nerve (44%) and radial nerve (38.4%) in upper limbs and superficial peroneal nerve (47%) in lower extremities.^[11]

Proportion of disability was high (38%) in the present study compared to the studies of Souza *et al.*^[8] and Matos *et al.*^[9] This could be due to our center being the referral institute which caters to complicated cases more. Also, the mean duration of presentation to hospital was 35.22 months, which is quite high. Delayed treatment could have resulted in more nerve damage of the patients, resulting in higher proportion of deformity.

Causes of delayed presentation to the health facility were documented only in 22 cases in our study. Though leprosy has a long incubation period, which can range from 9 months to 20 years, sometimes patients also neglect their signs and symptoms, which leads to disease progression, which is evident in our study as 45 cases had multiple nerves involved at the time of diagnosis. Among the reasons, the most common was lack of knowledge about leprosy. In post-elimination era, this is a grave issue to be taken care of by the health programs. Another interesting finding was the superstitious belief among the patients (two cases) that camouflaging with tattoo will arrest progression of the skin lesion and the disease, which indicates that people are not being educated till date regarding leprosy. We have also previously reported such cases who did tattooing to cover their disease.^[12]

Physiological aging process makes the peripheral nervous system weaker in the form of reduction in fiber myelination and decreased nervous system conduction speed, thereby compromising the pressure and tactile senses.^[13] Because of this, the diagnosis of leprosy neuropathy is most of the times difficult, in addition to elicitation of tactile sensation in the elderly. Because of low immunity, elderly are more susceptible to contact the disease and progress easily toward lepromatous pole, and thereby spread infection to the family members. Because of the combined effect of physiological decline in nerve conduction and leprosy neuropathy, chances of deformities are higher in the elderly. Being neglected by their families, dependency on others due to incapability of self-care increases the chances of worsening of deformity in them.

In the current study, though BT leprosy was the most common, 90% had multiple nerves involved at the time of presentation

and disability/deformity was found in 38% of cases, which suggests nerve involvement is very common in the elderly and hence early treatment is necessary to arrest the progression of leprosy neuropathy. Hence, it is necessary for health professionals, relatives, and caretakers to pay special attention to leprosy in elderly people, mainly in endemic areas, in the form of detailed clinical examination and investigations to make an early diagnosis and start treatment as early as possible to prevent disabilities/deformities. In addition, people should be educated regarding the disease and its course, so that the superstitious beliefs like camouflaging and tattooing the skin lesions for preventing disease progression can be avoided. Family members of the affected elderly leprosy patients need to be educated simultaneously to be attentive for disease-related complications and timely completion of treatment without default. This will help in achieving the zero leprosy strategy of WHO.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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