Dermatology Section

Looking into Array of Clinical Presentations of Patients with Leprosy and their Clinico-epidemiological Profile: A Retrospective Study

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ABSTRACT

Introduction: The prevalence of leprosy in India has decreased to <1 per 10,000 population by 2016 after the introduction of Multidrug Therapy (MDT) in 1982; still wide variations in Prevalence Rates (PR) continue to exist across the states and regions in the country.

Aim: To determine the current clinical profile of leprosy and study various presenting features of patients with leprosy at a tertiary care hospital in Northern India.

Materials and Methods: A retrospective study, based on seven years data, was conducted on patients diagnosed and registered in the leprosy clinic of a tertiary care hospital in Northern India, from January 2013 to December 2019. Data regarding their demographic details, presenting complaints, clinical features, associated complications and treatment administered was analysed and was entered into Microsoft Excel and presented as tables.

Results: A total of 181 patients of leprosy were registered over a period of seven years. There were 133 males and 48 females with male to female ratio of 2.77:1. Of the total patients registered, 3.86% were children (≤14 years) and 97.8% patients were immigrants from the adjoining states. The most common clinical type was Multibacillary (MB) leprosy in 88.95% patients whereas most frequent morphological type was Borderline Tuberculoid (BT) leprosy (72.93%). Thirty-three (18.23%) patients presented with leprosy reaction (Type 1 reaction in 16.6% and Type 2 reaction in 1.66%). World Health Organisation (WHO) grade 2 deformities (G2D) were diagnosed in 3 (1.66%) patients, with claw hand being the most common deformity (1.10%). Anaesthetic to hypoaesthetic patches were the most common presenting feature (64.1%).

Conclusion: Despite statistical elimination, MB disease and leprosy reactions are commonly seen as presenting manifestations. It highlights the need for high quality leprosy services including good referral system for an active case detection. Varied clinical presentations of leprosy should be contemplated while examining patients that can assist in an early and better case detection that will prevent delay in therapy and associated deformities and also decrease the transmission of disease in the community.

INTRODUCTION

Leprosy is caused by *Mycobacterium leprae*, a slow growing mycobacterium, manifesting as damage to the skin and peripheral nerves [1]. It is a Neglected Tropical Disease (NTD) that still occurs in more than 120 countries and more than 2,00,000 new cases are reported every year [2]. Compared to other infectious diseases, it causes more physical deformity. Leprosy has a wide distribution in the world, but most prevalent in the tropical and subtropical regions [1]. India has achieved great success in eliminating the disease as a public health problem with the national PR being 0.66/10,000 in 2016 [2]. Despite the above success, India contributes to 60% of new cases globally each year. It is among the 22 "global priority countries" that contribute 95% of world numbers of leprosy [2]. Even in states/Union Territories (UT) that have achieved elimination, a few districts and blocks continue to have a prevalence >1/10,000 [2].

The objective of eliminating leprosy at the subnational level is still unfinished in many countries. The challenges faced include a continued delay in detecting new patients and limited impact on transmission of leprosy [2]. To assess the current situation of leprosy and to overcome the possible loopholes in the running program, data from referral clinics is an essential prerequisite that can help to ascertain the factors leading to high prevalence of leprosy at the subnational level and contribute to further strengthen the running National programmes of leprosy.

The aim of present study was to analyse the profile and magnitude of leprosy patients presenting to tertiary care referral centre and also study various clinical presenting features of patients with leprosy (both typical and atypical), knowledge of which can help in early case detection and treatment of disease and identify missed cases in the community by healthcare workers.

MATERIALS AND METHODS

A retrospective data analysis of all leprosy cases registered at the Leprosy Clinic of Dermatology Department of a tertiary care centre of North India was carried out from January 2013 till December 2019. Approval from Institutional Ethical Committee was obtained (vide memo number EC/NEW/.INST/2020/997/9419-20).

Inclusion criteria: All the patients registered at the Leprosy clinic during this time period were included in the study.

Exclusion critera: Patients with incomplete information in the case records were not included in the study.

Case detection was based on voluntary reporting and referral from lower centers and other specialities. The data was analysed according to age, sex, residence, history of contact, presenting features, type of leprosy, leprosy reactions and deformities.

All patients (181) were classified as per Ridley Jopling (RJ) classification [3] and as per the criteria laid down under National Leprosy Eradication Programme (NLEP) and treated accordingly. As per WHO classification [4], the disease was classified as MB if there

were six or more lesions and/or more than one nerve involvement and Paucibacillary (PB) if lesions were less than six in number and/or if only one or no nerve involvement. The diagnosis was confirmed on the basis of slit skin smear and skin biopsy or nerve biopsy in case of pure neuritic leprosy.

STATISTICAL ANALYSIS
Data was entered into Microsoft Excel and presented as tables.

RESULTS
A total of 181 new cases of leprosy were registered during the study period of seven years. The year-wise distribution of leprosy patients is shown in [Table/Fig-1]. Out of 181 patients, 133 were males and 48 were females with male to female ratio of 2.77:1. MB leprosy was the most common clinical type of leprosy encountered in 88.9% patients (n=161). A majority of the patients (44.19%) were in the middle age group (31-50 years) and only 7 (3.86%) were children [Table/Fig-2].

| Year | Total No. of patients (n) | Gender | | Clinical type | | Type 1 reaction n (%) | Type 2 reaction n (%) | G2D n (%) |
		M n (%)	F n (%)	MB n (%)	PB n (%)			
2013	30	21 (70.00)	9 (30.00)	19 (63.38)	11 (36.67)	5 (16.67)	1 (3.33)	2 (6.67)
2014	32	20 (62.50)	12 (37.50)	28 (87.50)	4 (12.50)	6 (18.75)	0	1 (3.13)
2015	22	18 (81.82)	4 (18.18)	20 (90.91)	2 (9.09)	3 (13.64)	0	0
2016	26	21 (80.77)	5 (19.23)	24 (92.31)	2 (7.69)	4 (15.38)	2 (7.69)	0
2017	18	14 (77.78)	4 (22.22)	18 (100.0)	0	3 (16.67)	0	0
2018	26	20 (76.92)	6 (23.07)	25 (96.15)	1 (3.85)	4 (15.38)	0	0
2019	27	19 (70.37)	8 (29.63)	27 (100.0)	0	5 (18.5)	0	0
Total	181	133 (73.4)	48 (26.5)	161 (88.9)	20 (11)	30 (16.6)	3 (1.66)	3 (1.66)

[Table/Fig-1]: Year-wise distribution of newly registered leprosy patients.
*MB: Multibacillary leprosy; PB: Paucibacillary leprosy; G2D: Grade 2 deformity

Year	Upto 14 years n (%)	15-30 years n (%)	31-50 years n (%)	>50 years n (%)
2013	2 (6.67)	12 (40.00)	13 (43.33)	3 (10.00)
2014	1 (3.12)	9 (28.12)	16 (50.00)	6 (18.75)
2015	0	9 (40.90)	8 (36.36)	5 (22.73)
2016	0	14 (53.85)	11 (42.35)	1 (3.85)
2017	0	8 (44.44)	9 (50.00)	1 (5.55)
2018	3 (11.54)	9 (34.61)	12 (46.15)	2 (7.69)
2019	1 (3.7)	10 (34.04)	11 (40.74)	5 (18.51)
Total	7 (3.86)	71 (39.23)	80 (44.19)	23 (12.7)

[Table/Fig-2]: Age-wise distribution of newly registered leprosy patients.

The majority of patients were immigrants (97.79%, n=177), mainly from Uttar Pradesh (56.35%, n=102) and only 4 (2.2%) patients were natives of the state (Haryana) [Table/Fig-3]. Only 2 patients (1.1%) had history of contact with a leprosy patient within the household. The MB leprosy was the most common clinical type of leprosy encountered in 88.9% patients (n=161). Different morphological types seen are shown in [Table/Fig-4].

State	n (%)
Uttar Pradesh	102 (56.35)
Bihar	62 (37.25)
Haryana	4 (2.2)
Nepal	6 (3.31)
Punjab	4 (2.2)
Jharkhand	1 (0.55)
Madhya Pradesh	1 (0.55)
Tamil Nadu	1 (0.55)
Total	181

[Table/Fig-3]: Demographic profile of the patients included in the present study.

Year	TT n (%)	BT n (%)	BB n (%)	BL n (%)	LL n (%)	Pure neuritic n (%)	Histoid leprosy n (%)
2013	6 (20.00)	19 (63.33)	0	3 (10.00)	0	2 (66.70)	0
2014	3 (9.37)	25 (78.12)	0	2 (6.25)	0	2 (6.25)	0
2015	2 (9.09)	14 (63.64)	0	2 (9.09)	1 (4.54)	3 (13.64)	0
2016	2 (7.69)	17 (65.38)	1 (3.84)	2 (7.69)	2 (7.69)	2 (7.69)	0
2017	0	14 (77.78)	2 (11.11)	2 (11.11)	0	0	0
2018	2 (7.69)	20 (76.92)	0	2 (7.69)	2 (7.69)	0	0
2019	2 (7.41)	21 (77.78)	0	1 (3.85)	2 (7.41)	0	1 (3.7)
Total	17 (9.2)	130 (71.8)	3 (1.66)	14 (7.7)	7 (3.86)	9 (4.97)	1 (0.55)

[Table/Fig-4]: Ridley Jopling (RJ) and special types of cases.
*TT: Tuberculoid leprosy; BT: Borderline tuberculoid leprosy; BB: Borderline leprosy; BL: Borderline lepromatous leprosy; LL: Lepromatous leprosy

The BT was the most frequent morphologic type seen in 71.8% (n=130) followed by Tuberculoid (TT) in 9.39% (n=17). Additionally, special types of leprosy such as pure neuritic leprosy was recorded in 4.97% (n=9) patients and histoid leprosy in 0.55% (n=1) patients.

Biopsy records were available for all cases and BT leprosy was the most common histological diagnosis. Findings of histopathological examination corroborated with clinical diagnosis in 142 (78.4%) patients [Table/Fig-5].

Type of leprosy	Clinical diagnosis (n)	Histopathological diagnosis corroborated with clinical diagnosis n (%)
TT	17	11 (64.7)
BT	130	104 (80)
BB	3	1 (33.3)
BL	14	12 (85.7%)
LL	7	5 (71.4%)
Pure neuritic	9	8 (88.8%)
Histoid leprosy	1	1 (100%)
Total	181	142 (78.4%)

[Table/Fig-5]: Corroboration of clinical diagnosis with histopathological examination.

Though the most common presenting clinical features of patients with leprosy were anaesthetic to hypoaesthetic patches in 64.1% (n=116) and erythematous plaques in 9.94% (n=18), various other uncommon presenting features with which patients either reported voluntarily or were referred from other medical specialities, were also recorded [Table/Fig-6]. On clinical examination, thickened peripheral nerve enlargement was recorded in 84.53% (n=153) patients. The ulnar nerve was the most commonly thickened nerve seen in 115 (75%) patients followed by common peroneal nerves in 93 (61%) patients.

Presenting features	n (%)
Anaesthetic to hypoaesthetic patches	116 (64.1)
Erythematous plaques	18 (9.94)
Glove and stocking anaesthesia/paraesthesias	5 (2.76)
Epistaxis	2 (1.1)
Trophic ulcer over feet	3 (1.65)
Trophic ulcer over hands	1 (0.55)
Asymptomatic granulomatous lesion on face with ulceration	2 (1.1)
Multiple asymptomatic nodular lesions present diffusely (histoid leprosy)	1 (0.55)
Fever, oedema of hands and/or feet with skin lesions (T1R)	30 (16.57)
Painful, evanescent raised lesions with/without ulceration (T2R)	3 (1.66)

[Table/Fig-6]: Presenting features of leprosy patients.
*T1R: Type 1 leprosy reaction; T2R: Type 2 leprosy reaction

Out of 30 patients presenting in Type 1 reaction, 23 (76.6%) patients had BT leprosy, 6 (20%) patients had BL and 1 (3.3%) patient had BB leprosy. All the patients presenting with Type 2 reaction had LL leprosy.

The overall incidence of various deformities of the hands, feet, or eyes {WHO Grade 2 deformity (G2D)} was 1.66% (n=3) detected at the time of diagnosis. Claw hand was the most common G2D seen in 1.10% (n=2), followed by trophic ulcers in 0.55% (n=1).

DISCUSSION

Leprosy is a mycobacterial infection caused by *M. leprae*, affecting the skin, peripheral nervous system, and certain other tissues. Till 2018, the PR of leprosy was calculated per 10,000, however, as per WHO Global leprosy (Hansen disease) update 2019 [5], the new case detection rate is being calculated per 1,00,000 and the rate of Grade 2 disability (G2D) per million population. The number of cases on treatment at the end of 2019 (point prevalence) recorded was 1,77,175, with a corresponding PR of 22.7 per million population. India contributed 79,898 cases to this point prevalence (45.1%) [5]. Though, statistically India has eliminated leprosy (PR <1/10,000), still some regions continue to have a PR of >1/10,000 [2]. Leprosy cases are not uniformly distributed in the country but tend to cluster in certain areas. There is a need for wider awareness about the signs and symptoms of leprosy and reactions among general healthcare staff as well as in the community to promote self-reporting, early diagnosis and timely management of the disease and its complications in an integrated setting. The study was conducted to analyse the profile and magnitude of leprosy patients presenting to our tertiary care referral centre and study various presenting clinical features.

After reduction of PR of leprosy to <1 per 10,000 population, in April 2016 [2] WHO launched a five-year global leprosy strategy which set three main targets at global level to be achieved by 2020: i) a reduction to zero cases of G2D child cases; ii) reduction in rate of new G2D cases to <1 case per million population; and iii) zero countries with laws that allow discrimination against leprosy. We are still to achieve zero child with G2D and G2D cases <1 per million population [6]. To achieve this, early diagnosis and prompt treatment of all new cases of leprosy with MDT remain the key strategies for leprosy control in India. The social stigma associated with leprosy is a barrier in self-reporting and a resultant delay in treatment. The MDT has brought down the PR of disease in India from 25.1 in 1991 to 0.66 per 10,000 population in 2016. It is seen that though number of cases has decreased but disease burden is far more as reported by Singal A and Sonthalia S, and Prasad PV and Kaviarasan PK, in various part of India especially in states of Chhattisgarh and UT Dadra and Nagar Haveli [7,8].

In this study, the total number of new cases recorded over a period of seven years were 181. Majority of the patients belonged to the middle age group (31-50 years), in contrast to the finding reported by Ardeshna KP et al., and Jindal N et al., where maximum patients were in age group of (15-30 years) [6,9]. The higher male to female ratio (2.77:1) in the series is because mostly male labourers migrate to Punjab (the study region) in search of employment for earning livelihood. Such demographic effects on disease prevalence have been reported by other authors as well [10,11]. Out of 181 patients registered, only 4 (2.2%) patients were natives of Punjab and rest 177 (97.7%) patients were immigrants mainly from the states of Uttar Pradesh (56.35%) and Bihar (34.25%) that have highly endemic districts of leprosy [2] and these patients had history of visiting their native places often.

Childhood cases indirectly indicate ongoing transmission in the community and are therefore, monitored closely. The percentage of childhood leprosy in the study was 3.86%, which is lower than that reported by Tiwary PK et al., and Grover C et al., [12,13]. It is also lower than national value of 6.87% and global value of 7.41% [5]. This data indicates that the study region shows a better trend for childhood leprosy and though leprosy continues to be transmitted in the community, it is less in the study state as compared to national and global trends.

A 1.1% rate of household contact in the present series is lower than that reported by Jindal N et al., (9.2%) and contributes as an important factor for transmission of leprosy [9]. Further, the risk is higher if contact has the MB form of the disease. Thus, it is important to take detailed contact history and screen family members whenever possible.

Though the most frequent morphologic type in the study was BT (71.8%), which is similar to the observations made by Tiwary PK et al., Mahajan VK et al., and Singh AL et al., majority of patients had MB leprosy [12,14,15]. It is important to detect features suggestive of MB involvement early and treat accordingly. The percentage of MB cases (88.95.%) in the study was significantly higher than national value of 54.27% and global value of 64.33%. The high proportion of MB cases in the study could be a sign of existence of undiagnosed leprosy for a long time in the community that can either be due to stigma attached to the disease that causes patients to hide their lesions or inability of health services to diagnose an early case of leprosy as has also been observed by Adil M et al., [16].

A higher rate (78.4%) of clinico-histopathological concordance was found in the patients as compared to 52% reported by Sehgal VN and 60.6% by Kumar B et al., [17,18]. As proposed by Nadkarni NS and Rege VL, a proper selection of optimum lesion for biopsy might have been responsible for the high rate observed in this series that serves as an important tool in diagnosing patients presenting with atypical features of leprosy [19].

Thirty three (18.23%) patients presented with leprosy reaction. About 16.4% of patients presented with T1R, which was lower than reported by Kumar B et al., (30.9%) [18]. Most of other epidemiological studies showed a lower percentage of T1R [9,15]. Most of T1R were seen in BT leprosy (65.9%) which was a consistent finding present in other studies as well [15,20]. T2R was seen in 1.66% patients, which is lower as compared to that reported by Jindal N et al., (17.2%) [9]. Both the type of reactions carry the risk of causing nerve damage and disability, hence, timely detection and medical intervention is needed.

The present study showed a lower incidence of WHO grade 2 deformity at presentation (1.66%) as compared to national value of 2.42% and global value of 5.35% [5]. This could be due to low rate of occurrence of T1R in the series, which significantly decreases the risk of deformities. It is important to have an early detection of reactions. A careful and detailed neurological examination in patients with T1R would also further reduce deformities.

Though, most cases of leprosy are still being diagnosed by typical presenting features such as hypopigmented, anaesthetic to hypoaesthetic patches and thickened nerves; cases with predominant neurological manifestations and atypical presentations such as trophic ulcers hands/feet or asymptomatic granulomatous plaques and nodules can also be present as was seen in this study. It has also been noted in some other studies from India by Tayshetye PU et al., Noordeen SK and Kumar B et al., [21-23]. Therefore, a high degree of suspicion should be kept to diagnose these cases as an early diagnosis and treatment can prevent future deformities in these patients and help to decrease the spread of disease. Also, the transmission of this knowledge to primary healthcare level can increase the percentage of detection of cases and coordination with healthcare services can help in early diagnosis of disease. There is need to conduct population-based studies for better understanding of the situation in community and for better management of patients.

Limitation(s)

Since the study was conducted in a tertiary care hospital, it may not be representative of the situation on the field. But it is reflective of the current tends of leprosy in the region.

CONCLUSION(S)

The experience from this tertiary care referral centre suggests that though great strides have been made in elimination of leprosy, we still have a long way to go. The high rate of MB disease or patients presenting with reactions is a cause for concern. Its time when we need to consolidate the achievement made and intensify on the aberrations discovered. Various atypical presenting features of leprosy should also be considered while examining the cases as this will help in early case detection and treatment, interruption of transmission of the disease in the community and achievement of elimination status at district and sub-district level sooner.

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