

Trends of Leprosy Over a Period of Four Years (2016-2019) at a Tertiary Care Hospital in Uttarakhand (India) and Comparison with Last Lustrum (2011-2015)

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Leprosy ceased to be a public health problem in India in December 2005 when the prevalence rate fell below one per 10,000 population at national level. However there still remain pockets of high endemicity with many hidden cases. These cases land up in complications including deformities and severe reactions and thus present to tertiary care centers. This study has been undertaken to analyze the pattern of leprosy over a period of four years (Jan 2016- Dec 2019) at a tertiary care center in capital city of Uttarakhand and to compare it with the previously reported pattern of last lustrum (Jan 2011 - Dec 2015). This retrospective, observational study included all leprosy patients registered in Department of Dermatology at Himalayan Institute of Medical Sciences, Dehradun over last four years were included. Data was extracted from the leprosy case registration forms and was analyzed for age, gender, domicile, type of leprosy, presence of reaction and grade of disability. A total of 206 new cases were registered in last four years. Forty percent of these were migrants. Highest number of patients was in age group 15-29 years. Childhood leprosy cases constituted 1.9% of total cases. Half of the patients were in borderline tuberculoid spectrum and 94.6% had multibacillary leprosy. Grade 2 disability was seen in 10.7% patients. Number of new leprosy cases presenting to our tertiary care center has remained steady. However, there is a significant increase in proportion of multibacillary cases from 86.3% in 2011- 2015 to 94.7% in 2016- 2019. This indicates that the drive to identify active cases in community needs to be accelerated.

Keywords : Leprosy, New Cases, Disability, Reactions, Multibacillary

Introduction

India has come a long way in eliminating leprosy with a noteworthy decline in prevalence rate (PR)

from 57.8 in 1983 to 0.66 in 2016. Leprosy ceased to be a public health problem in December 2005 in India when the PR fell below one; but since then

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the annual new case detection rate (ANCDR), cases with grade 2 disability and childhood leprosy cases have remained stable (NLEP 2016-17). World Health Organization (WHO) global leprosy update, 2018 states that 120334 new cases were detected from India in 2018; which amounts to 57.8% of the total new cases detected globally. Further 57.6% of all childhood leprosy cases and 32.3% of new cases with grade 2 disabilities belonged to India (WHO 2016). There appears to be pockets of high endemicity in the country with many hidden cases in community. There is low voluntary reporting due to the social stigma attached and also lack of awareness. Thus with active case search the statistics soar high as happened with Orissa, Chandigarh, Delhi and Lakshadweep where PR of less than one was reported in 2011-2012 but subsequently in 2014-15 it increased again (Rao and Suneetha 2018). Similar trends can be expected in other states as well. Uttarakhand being a state of difficult terrain is especially prone to this. Though the PR has remained stable for Uttarakhand (0.25, 2016-17) and all the thirteen districts report an ANCDR of less than 10/100000 populations; still one needs to be vigilant and must follow trends of leprosy in the region to detect any variation that might need amendments in the health care policies (NLEP 2016-17). Implementation of WHO Global Leprosy strategy 2016-2020 with the aim of accelerating towards a leprosy free world emphasizes on reducing stigma, promoting inclusiveness to reinforce better and earlier diagnosis. Focus also is on strengthening referral system, systematic tracing of household contacts and monitoring drug resistance. State of Uttarakhand is actively involved in implementing National directives with the aim to improve leprosy situation. This study was planned at our tertiary care center attached to the district leprosy unit, receiving substantial referrals for leprosy cases from Uttarakhand as

well as Punjab and Uttar Pradesh being one of the oldest institutes in the region. Thus this study was intended to assess the pattern of leprosy in terms of the type, demographic profile of patients and cases with disability, indirectly representing the effect of interventions done at state level. These patterns were compared with those of last five years (2011-2015) to assess any appreciable change. Though this information may not represent the situation at community level, this is likely to be useful to plan appropriate research cum intervention relevant to public health. Objectives of this study were to determine the pattern of leprosy over a period of four years (Jan 2016- Dec 2019) at a tertiary care center in Uttarakhand and to compare this with the previously reported pattern of last lustrum (Jan 2011 - Dec 2015).

Methodology

This was a retrospective, observational study. All leprosy patients registered in Department of Dermatology at Himalayan Institute of Medical Sciences, Dehradun were included in the study. Patients report voluntarily to the department and no active search to detect new cases was made.

Data was extracted from the leprosy case registration forms maintained diligently in the department and was analyzed for age, gender, domicile, type of leprosy, presence of reaction and grade of disability. Type of leprosy was categorized according to Ridley Jopling classification (1966) and Indian Association of Leprologists classification (1982) into Tuberculoid (TT), Borderline Tuberculoid (BT), mid-borderline (BB), Borderline Lepromatous (BL), Lepromatous (LL), Indeterminate (IL), Pure Neuritic (PNH) and Histoid Hansens (HH) (Ridley and Jopling 1966, IAL 1982). On the basis of WHO classification type of leprosy was also categorized as pauci-bacillary (PB) and multi-bacillary (MB) leprosy (WHO

2012). Reactions were classified as type 1 and type 2. Type 1 reaction was defined as presence of redness and edema of pre-existing lesions, with or without development of new lesions, swelling of hands and feet, nerve tenderness with or without associated nerve function impairment. Type 2 reaction was defined as development of crops of tender, erythematous nodules or plaques with or without systemic features including fever, malaise, joint pains and lymphadenitis. Disabilities of hands and feet and eyes were graded as 0, 1 and 2 according to WHO (Brandsma and van Brakel 2003).

The data was collected and entered in MS excel 2011. Statistical analysis was performed using SPSS software version 22. Descriptive statistics were calculated for quantitative variables. Frequency along with percentage was calculated for qualitative and categorical variables. Further data was analyzed for the change in trends comparing it with the previous lustrum (2011-2015) reported by Rawat et al (2017) from the same institute.

Results

A total of 206 new leprosy cases were registered in the past four years (2016-2019). Number of

new patients attending the Dermatology outpatient department (OPD) increased from 21840 in 2016 to 24960 in 2019. Number of new leprosy cases per 10000 new OPD attendees were 23.8, 18.3, 22.6 and 23.2 in year 2016, 2017, 2018 and 2019 respectively. Year wise gender distribution is depicted in Table 1.

Demographics:

Mean age at presentation of new cases registered from 2016 to 2019 was 37.80 ± 16.69 years. Male to female ratio was 2.7:1. Maximum number of patients were in age group 15 - 29 years and children below 14 years constituted 1.9% of the total new cases (Table 1). 59.7% patients were residents of Uttarakhand while rest were migrants. Highest number of migrants were from Uttar Pradesh (36.4%) and those from Bijnor district of Uttar Pradesh constituted 20.3% of the total new cases. Rest were from Punjab (0.97%), Delhi (0.48%), Assam (0.48%), Bihar (0.048%), Rajasthan (0.048%), Maharashtra (0.048%) and Odisha (0.048%). Comparison of disease characteristics among migrants and indigenous population revealed a higher proportion of migrants with childhood leprosy and those presenting with reactions (Table 2).

Table 1 : Gender and age-wise distribution of patients

Year	2016	2017	2018	2019	Total
No. of cases (per 10000 new OPD attendees)	52 (23.80)	43 (18.32)	53 (22.65)	58 (23.24)	206 (22.01)
Males (%)	37 (71.1%)	32 (74.4%)	36 (68%)	46 (79.3%)	151 (73.3%)
Females (%)	15 (28.9%)	11 (25.6%)	17 (32%)	12 (20.7%)	55 (26.7%)
Age (years) wise distribution					
<15 (%)	0 (0%)	0 (0%)	3 (5.6%)	1 (1.7%)	4 (1.9%)
15-29 (%)	19 (36.5%)	15 (34.9%)	22 (41.5%)	20 (34.5%)	76 (36.9%)
30-44 (%)	13 (25.0%)	13 (30.2%)	12 (22.6%)	11 (18.9%)	49 (23.8%)
45-59 (%)	12 (23.0%)	5 (11.6%)	11 (20.8%)	18 (31.1%)	46 (22.3%)
≥ 60 (%)	8 (15.5%)	10 (23.3%)	5 (9.4%)	8 (13.8%)	31 (15.0%)

Table 2 : Comparison of disease characteristics between migrants and indigenous patients

Disease characteristics	Indigenous	Migrants
Number of cases	123	83
MB (%)	118 (95.9%)	77 (92.7%)
G2D (%)	14 (11.4%)	8 (9.6%)
Childhood leprosy (%)	1 (0.8%)	3 (3.6%)
Type 1 reaction (%)	12 (9.7%)	10 (12.1%)
Type 2 reaction (%)	34 (27.6%)	27 (32.5%)

Table 3 : Year wise distribution of patients according to Ridley Jopling and Indian Association of Leprologists classification (n=206)

Year	2016	2017	2018	2019	Total		
	TT	BT	BB	BL	LL	PNH	HH
2016	0	24	6	7	13	2	0
2017	0	19	2	5	13	3	1
2018	1	31	1	7	7	3	3
2019	3	28	2	11	11	2	1
Total (%)	4 (1.9%)	102 (49.5%)	11 (5.3%)	30 (14.6%)	44 (21.3%)	10 (4.8%)	5 (2.4%)

TT=Tuberculoid, BT=Borderline Tuberculoid, BB=mid borderline, BL=Borderline Lepromatous, LL=lepromatous, PNH=pure neuritic Hansens, HH=histioid Hansens.

Table 4 : Year wise distribution of number of cases depending on type of leprosy, type of reactions and grade of disability.

	2016	2017	2018	2019	Total (n=206)
PB leprosy	2	0	7	2	11 (5.3%)
MB leprosy	50	43	46	56	195 (94.7%)
Type 1 reactions	8	6	4	4	22 (10.7%)
Type 2 reactions	17	18	9	17	61 (29.6%)
Grade 1 disability	17	11	7	11	46 (22.3%)
Grade 2 disability	9	5	6	2	22 (10.7%)

PB=Paucibacillary, MB=Multibacillary

Clinical spectrum of disease:

According to Ridley Jopling classification most common type noted was BT constituting 102 (49.5%) cases followed by LL (21.3%), BL (14.5%),

BB (5.3%) and TT (1.9%). Ten (4.8%) patients were of Pure Neuritic Hansens and five (2.4%) of Histioid Hansens. Year wise distribution of cases on the basis of Ridley Jopling classification and Indian

Table 5 : Comparison of number of new cases, proportion of multibacillary (MB) cases, number of grade 2 disability (G2D) and childhood leprosy cases over last nine years.

Parameters	2011	2012	2013	2014	2015	2016	2017	2018	2019
No. of new cases (per 10000 new OPD attendees)	62 (56.77)	58 (46.47)	40 (25.64)	43 (22.90)	35 (17.20)	52 23.80)	43 (18.32)	53 (22.65)	58 (23.24)
No. of MB cases (%)	54 (87.0%)	51 (87.9%)	30 (75.0%)	36 (83.7%)	24 (68.6%)	50 (96.1%)	43 (100%)	46 (86.8%)	56 (96.5%)
No. of G2D cases (%)	5 (8.0%)	3 (5.1%)	5 (12.5%)	6 (13.9%)	2 (5.7%)	9 (17.3%)	5 (11.6%)	6 (11.3%)	2 (3.4%)
No. of Childhood leprosy cases (%)	1 (1.6%)	0 (0%)	2 (5.0%)	1 (2.3%)	1 (2.8%)	0 (0%)	0 (0%)	3 (5.6%)	1 (1.7%)

Table 6 : Indian studies from tertiary care centers representing trends of leprosy in different geographical regions.

S.No	Study	Region	Time period	No of cases	% of MB cases	% of G2D	% of childhood cases
1.	Jain et al 2014	Bhopal, Madhya Pradesh	2004-2013	304	56.9	7.9	8.2
2.	Relhan et al 2016	Delhi	2005-2016	1487	66.7	19	7.59
3.	Chhabra et al 2015	Delhi	2007-2012	849	86.9	37.9	9.3
4.	Muthuvel et al 2016	Mumbai	2008-2015	578	47	9	10
5.	Thyvalappil et al 2019	Kannur, Kerala	2008-2017	133	57.9	9.3	14.3
6.	Dimri et al 2016	Srinagar, Uttarakhand	2009-2014	129	50.3	-	6.9
7.	Tegta et al 2019	Shimla, Himachal Pradesh	2010-2017	221	85.5	34.8	2.3
8.	Bhat & Chaitra 2013	Mangalore, Karnataka	2011-2012	46	54.35	12.3	15.2
9.	Mathew & Sobhanakumari 2017	Kerala	2012-2016	68	66.0	29.0	4.0
10.	Rao & Moodalgiri 2015	Bagalkot, Karnataka	2013-2014	45	24.4	-	15.5
11.	Arif et al 2019	Aligarh, Uttar Pradesh	2015-2016	220	73.2	1.8	0.9
12.	Kulkarni 2016	Maharashtra	2015	111	63.9	8.1	8.1
13.	Gupta et al 2019	Patna, Bihar	2016-2017	464	80.17	20.6	5.6

14.	Kilikdar et al 2018	Akola, Maharashtra	2016-2018	102	58.62	38.5	0.0
15.	Yadav et al 2019	Haldwani, Uttarakhand	2016-2018	62	-	24.2	3.2
16.	Adil et al 2019	Aligarh, Uttar Pradesh	2017-2018	225	70.2	-	14.2

MB=Multibacillary, G2D=Grade 2 disability

Association of Leprologists classification is depicted in Table 3. Multibacillary cases constituted 94.6% (195) of new cases and paucibacillary constituted 5.4% (11) cases. Type 1 reaction was seen at the time of initial presentation in 22 (10.6%) patients and type 2 in 61 (29.6%) patients. Twenty-two (10.7%) patients had grade 2 disability (G2D) at the time of initial presentation and 46 (22.3%) had grade 1 disability. Year wise distribution of type of leprosy according to WHO classification, type of reactions and disabilities has been summarized in Table 4.

Patients were given WHO multi drug therapy for 12 months and 6 months for multi-bacillary and pauci-bacillary cases respectively. Reactions were managed depending on severity with steroids or anti-inflammatory drugs. Appropriate home care, ulcer care and physiotherapy were administered for disabilities with plastic surgery referral wherever required.

Discussion

India is one of the 23 global priority countries of WHO and contributes to the highest percentage of new cases (57.8%) of leprosy detected globally. Approximately one third of the global new cases with G2D and more than half of the childhood leprosy cases belong to India. Thus with the current global leprosy strategy 2016-2020; aiming to achieve zero new grade 2 disability cases per million population, India has a long way ahead (WHO 2016).

NLEP data for 2016-2017 reports a prevalence rate of 0.25 for Uttarakhand, which is less than that of India collectively (0.66). A total of 375 (PB: 136, MB: 239) new cases were detected in 2016-2017 with an annual new case detection rate of 3.34. All the thirteen districts of Uttarakhand have an annual new case detection rate less than 10 per 100000 population and grade 2 disability rate less than 1 per million population. But still 63.73% cases are multibacillary with 5.87% childhood leprosy cases (NLEP 2016-17). These are markers of delay in diagnosis and disease transmission in community respectively. Thus we need to work effectively to bring these further down.

In the last four years (2016-2019); our tertiary care center had 206 new cases. A large fraction of these were from surrounding districts especially from Uttar Pradesh. Uttarakhand being a relatively new state offers better job opportunities attracting people from adjoining states. 59.7% patients in our study had domicile of Uttarakhand and rest were migrants. In the previous study (2011-2015) 65.5% patients were from Uttar Pradesh and 34.5% were indigenous to Uttarakhand. In the present study (2016-2019) 40.3% patients belonged to nearby districts. This decline could be due to nationwide improvement in availability of healthcare facilities and introduction of state health benefit schemes motivating patients to enroll for treatment in their own states. Migrant population in the present study contributed to 75% of the childhood leprosy

cases and also the number of patients presenting in reactions were higher, that can represent delay in seeking medical advice by migrant workers. However, the proportion of multibacillary cases and those with grade 2 disability were slightly higher in indigenous population.

Analysis of trends of leprosy at our tertiary care institute over last nine years suggests that the number of new leprosy cases have remained stable. There has been a significant increase in the new patients attending the dermatology OPD from 10920 in 2011 to 24960 in 2019. To annul this effect number of new cases per 10000 new OPD attendees was assessed and was found to be unwavering (Table 5). There has been a decrease in the male to female ratio from 3.7:1 in 2011-2015 to 2.7:1 in 2016-2019 suggesting improvement in approach of healthcare services to women. The number of cases in children has remained constant (2.1% in 2011-2015 and 1.9% in 2016-2019). Highest numbers of patients in the present as well as previous study were in the age group of 15 - 45 years. The fraction of multibacillary cases is on the rise increasing to 94.7% in 2016-2019 from 86.3% in 2011-2015. G2D cases and childhood leprosy cases show a variable trend, which is difficult to infer considering their small number. The limitation of our study is the inability to epidemiologically correlate these findings, as over the last nine years there might have been change in the population to which our tertiary care center caters. Still noteworthy increase in proportion of multibacillary cases must be taken earnestly and drive to identify active cases in community needs to be commenced. Identification of patients with G2D further goes against achieving the new goal of zero G2D cases set by WHO. A large proportion of patients had grade 1 deformity (22.3%); these cases might progress to develop G2D if not treated timely and appropriately. More than one

third of patients had reactions at the time of initial presentation, these account for significant morbidity and loss of wages. Most important intervention to decrease disability as well as reactions is early diagnosis and treatment.

Indian studies done at tertiary care centers from different geographic areas reveal variable findings (Table 6). Most of them reflect high proportion of multibacillary cases ranging from 24.4% to 86.9% (Adil et al 2018, Arif et al 2019, Bhat and Chaitra 2013, Chhabra et al 2013, Dimri et al 2016, Jain et al 2014, Gupta et al 2019, Kilikdar et al 2018, Kulkarni 2016, Mathew and Sobhanakumari 2017, Muthuvel et al 2016, Rao and Moodalgiri 2015, Rawat et al 2017, Relhan et al 2016, Tegta et al 2019, Thyvalappil et al 2019). Except for one study of Rao & Moodalgiri (2015), MB proportion was more than 50% in all of them. Some had MB proportion between 80-87% (Chhabra et al 2015, Tegta et al 2019, Gupta et al 2019). A further high proportion of 94.7% in the current study warrants investigation to ascertain the lacunae at the community level paving way for future studies to help design better operational policies. State figures for MB cases for the year 2016-2017 are 63.73%, a higher proportion seen in the current study could be due to serious patients with advanced disease being referred to the tertiary care center, some coming for complications - reactions, disabilities of their own. Fraction of patients with G2D in reported studies varies from 8.1% to 37.9% and childhood leprosy cases from zero to 15.5%. In the present study 10.7% patients had G2D at initial presentation and 1.94% were children less than 15 years. While the child proportion is lower than national average of 8.7% (NLEP 2016-17), disabilities are higher than national average of 3.87% in 2016-17. In any case, public health importance can be determined only after well planned community level studies.

Since the introduction of MDT in 1982; India has achieved substantially in terms of a steep decrease in prevalence rate from 57.8 per 10,000 in 1983 to 0.65 in 2017. Still at the global level we continue to account for more than half of the new cases. Reasons behind these needs to be understood and addressed. There are pockets of high endemicity in country with many hidden cases in community. Leprosy trends over years from different regions need to be reported. The patients reaching the tertiary care center, as new cases are the one left undetected at primary level; this unveils important lacunae in the existing health care policies. These patients wander undiagnosed increasing their chance of developing G2D and also serve as potential source of disease transmission. Data from tertiary care centers needs to be compiled and reported to identify any hot spots undetected in community and also to predict resurgence of leprosy in areas otherwise reporting low prevalence.

Further there might be need to strengthen leprosy specific services again to achieve better results. Emphasis should be on generating community awareness to decrease social stigma that will improve voluntary reporting. Migrant population needs special attention in Uttarakhand and also other states based on actual data. Community based research should be encouraged to know the actual status of leprosy in different regions of country.

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