

## Original Research Article

# Study of clinico-epidemiological profile of leprosy patients at tertiary care centre of South Gujarat region

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## ABSTRACT

**Background:** Leprosy is a chronic feared illness caused by *Mycobacterium leprae*. It was eliminated as a public health problem in India in 2005. But still, India contributes more than 60% of all new cases of leprosy.

**Methods:** A retrospective analysis of 307 patients attending the leprosy clinic of the dermatology out patient department, SMIMER, was done for a period of five years from January 2014 to December 2018. The data was analysed for clinical and epidemiological characteristics of the patients.

**Results:** A total of 307 patients visited the leprosy clinic during the study period. More than half patients (60.3%) were between 21-40 years age group. There were 213 males and 94 females with male female ratio of 2.3:1. 72.3% (222) patients were suffering from multibacillary leprosy and 27.7% (85) had paucibacillary disease. Borderline tuberculoid leprosy was the most common type found in 83 patients (27.1%). 16 cases (5.2%) of childhood leprosy (less than 14 years of age) were noted. A total of 214 patients (69.7%) were migrants.

**Conclusions:** Despite of decline at global and national level, leprosy cases show gradual increase. The high proportion of total cases, MB cases, and grade 2 disability cases are warning signs. Continued efforts are required to manage and prevent the disease.

**Keywords:** Leprosy, Epidemiology, SMIMER

## INTRODUCTION

Leprosy is a chronic disease caused by *Mycobacterium leprae*, infectious in some cases, and affecting the peripheral nervous system, the skin, and certain other tissues. It has been a feared illness since antiquity, due to the havoc it wreaks upon the body. Leprosy has a wide distribution in the world, but most prevalent in the tropical and subtropical regions. Humans who are the most likely source of infection for other humans, or for susceptible animals, are those who harbour *M. leprae* in the upper respiratory tract, especially in the nose, and these probably constitute about 20% of all leprosy suffers. Danger is from undiagnosed case. Bad housing conditions and inadequate food are important factors in

the spread of leprosy for domestic overcrowding particularly at night, provides the ideal conditions for infection whether by droplets or by skin contact and under-nourishment reduces cell-mediated immunity. Campaigns to control leprosy in endemic regions should take these factors into account. Leprosy preferentially infects cooler parts of the body, particularly the fingers, toes, eyes, nose and testes. The response of the immune system to the infection often leads to an intense inflammation, and in the involved nerve, it causes severe damage, leading to peripheral neuropathy. Leprosy is not often a direct killer. Instead, due to the predilection of the infective agent for skin and peripheral nerves, the serious but fortunately not very common consequences of leprosy are deformity and disability. This has significant

social and economic impact on both the patient and their community. Therefore, early detection and prompt treatment of the disease prevents stigma and discrimination.

Introduction of multidrug therapy (MDT) to leprosy programmes in the mid 1980's resulted in significant reduction in prevalence of the disease, from 5.4 million cases to a few thousand cases per year at present. With the help of national leprosy eradication programme (NLEP) India had achieved elimination targets in 2005, the criteria being less than 1 case per 10000 population. However, majority of leprosy burden in the world still comes from south east Asian region (SEAR) particularly from India; around 60% of the new leprosy cases detected globally in 2015 were from India (WHO 2015). According to NLEP progress report and WHO global leprosy update, a total of 88166 leprosy cases are on record as on 1 April 2017 giving a prevalence of 0.65 per 10,000 population, as against to 0.66 on 1 April 2016 and 0.69 on 1 April 2015 showing a decreasing trend of leprosy cases in India (NLEP 2015-16, WHO 2016).<sup>1</sup>

## METHODS

After taking Institutional ethical committee permission retrospective record-based study was conducted in the leprosy clinic of department of dermatology, venereology and leprosy of Surat Municipal Institute of Medical Education and Research, Surat, Gujarat, India. Records of patients visiting the leprosy clinic for duration of 5 years from January 2014 to December 2018 were retrieved. The study included all the cases of leprosy with completely filled standardized pre-designed proformas during that study period. Incompletely filled proformas were excluded from the study. Records of the patients were analysed for the parameters like age, sex, region, number of patients from different states within country, extent of skin and nerve involvement, bacillary load [multibacillary (MB) and paucibacillary (PB) cases], type of lepra reaction, patients presenting and grade of disability as per WHO criteria (Brandsma and van Brakel 2003) etc. Patients were classified into clinical spectrum as per classification of Ridley-Jopling (1966) and Indian Association of Leprologists (IAL 1982). The data so collected was tabulated and analysed statistically.

## RESULTS

Retrospective analysis was done. A total of 307 patients attended the leprosy clinic in tertiary health care centre of South-Gujarat during January 2014 to December 2018. Out of them, there were 213 males and 94 females with male to female ratio of 2.3:1. Out of total 307, majority of patients (185-that is 60.3%) belonged to age group of 21-40 years with age range of 6 to 81 years (Table 1). Mean age was 32.19 years.

Out of 307 patients, majority of patients (214 that is 69.7%) were migrants from other Indian states and Nepal,

while 93 (30.3%) patients were from Gujarat state. From 214 (69.7%) migrant patients, highest migrants were from Uttar Pradesh 87 (28.3%) followed by Bihar (17%), Maharashtra (14.3%), Jharkhand (2.6%), Odisha (2.6%), Madhya Pradesh (1.6%), Nepal (1.30%), Rajasthan (1%), and West Bengal (1%) (Figure 1, shows state wise distribution of migrants).

Patients presented with different clinical types of leprosy, among which the most common type was Borderline tuberculoid leprosy (83 patients-27.1%), followed by tuberculoid leprosy 75 (24.7%), Lepromatous leprosy 75 (24.7%), pure neuritic leprosy 33 (10.8%), Borderline lepromatous leprosy 32 (10.7%), Indeterminate leprosy 4 (1.3%), histoid leprosy 3 (1%), and mid borderline leprosy (2 patients 0.7%) (Figure 2).

Majority patients were having multibacillary type of leprosy (222 cases 72.3%) as compared to paucibacillary type (85 cases 27.7%) with the ratio of 2.6:1 (MB: PB) (Table 2).

There were total 16 childhood leprosy cases (less than 14 years of age). Among them, most common type was Tuberculoid leprosy which was 7 in number, followed by Borderline tuberculoid leprosy which was 4 in number (Table 3).

It was observed that there was steady increase in number of leprosy patients every year from 2014 to 2018 (except for year 2016).

Total number of patients suffering from lepra reaction was 31 (10.1%) out of which type 2 reaction was seen in 23 (7.5%) patients while type-1 was noted in 8 (2.6%) patients. Among 23 patients of type 2 reaction, most of the patients (22) were of lepromatous leprosy while 1 patient was of borderline lepromatous leprosy. Type 1 reaction was seen in 4 patients of borderline tuberculoid leprosy and 4 patients of borderline lepromatous leprosy (Figure 3).

**Table 1: Distribution of patients in different age groups.**

Age group (in years)	Number of patients	Percentage
1-10	8	2.60
11-20	51	16.60
21-30	107	34.90
31-40	78	25.40
41-50	32	10.40
51-60	20	6.50
61-70	6	2
71-80	4	1.30
81-90	1	0.30
<b>Total</b>	<b>307</b>	<b>100</b>

At the time of presentation, 156 (50.8%) patients out of 307 patients were presented with sensory deformity while 74 (24.1%) patients were presented with motor deformity (Figure 4). Only 15 (almost 5%) patients-all of lepromatous leprosy were having different types of eye deformity (Table 4).

Nerve thickening was present in 146 (44.6%) patients in whom ulnar nerve was most commonly involved followed by lateral popliteal, radial cutaneous, and posterior tibial nerves. Neuritis was noticed in 102 (33.2%) patients out of which 3 patients presented with type 1 reaction and 8 patients presented with type 2 reaction.

**Table 2: Distribution of patients according to MB/PB leprosy.**

Year	PB cases	MB cases	Total cases
2014	20	37	57
2015	16	46	62
2016	9	30	39
2017	17	54	71
2018	23	55	78
<b>Total cases</b>	85	222	307

**Table 3: Year wise detail of child leprosy cases.**

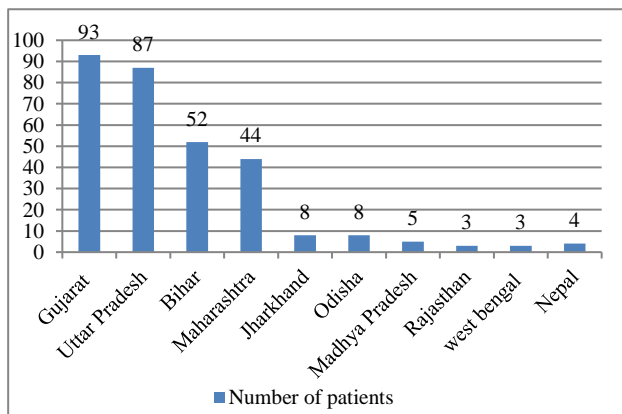
Year	Tuberculoid leprosy	Borderline leprosy	Lepromatous leprosy	Indeterminate leprosy	Total
2014	1	-	1	-	2
2015	1	-	-	-	1
2016	1	1	-	1	3
2017	2	1	-	-	3
2018	2	2	1	2	7
<b>Total</b>	7	4	2	3	16

**Table 4: Different eye deformities in leprosy patients.**

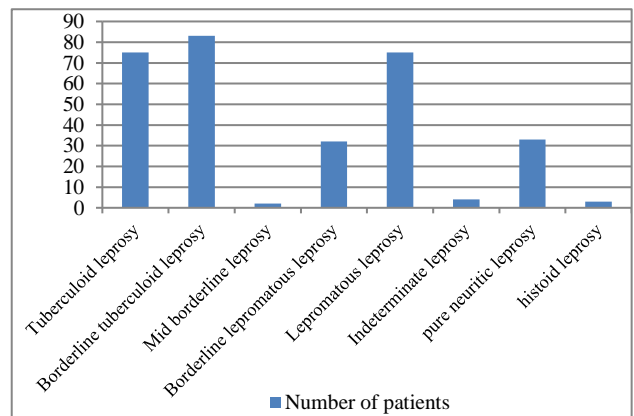
Type of eye deformity	Number of patients	Percentage
Lagophthalmos	6	1.9
Conjunctivitis	4	1.3
Decreased corneal sensation	3	0.9
Iridocyclitis	2	0.9
<b>Total</b>	15	5

**Table 5: Various parameters in leprosy in India.**

Parameters	2013-14	2014-15	2015-16	2016-17	2017-18
Cases	126913	125785	127334	135485	126164
ANCDR/100000	9.98	9.73	9.71	10.17	9.27
PR/10000	0.68	0.69	0.66	0.66	0.67
Child cases	12043	11365	11389	11792	No data
Child case rate	0.95/100000	0.88/100000	8.94%	8.7%	No data

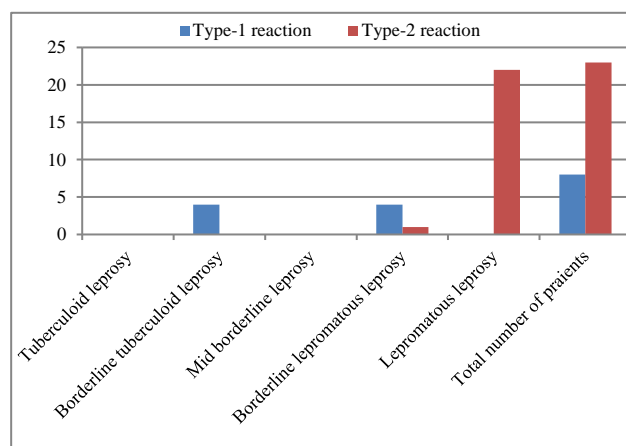


**Figure 1: State wise distribution of migrant leprosy patients.**

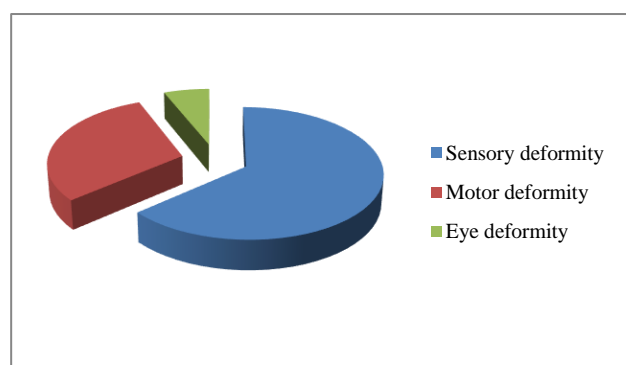


**Figure 2: Distribution of patients according to type of leprosy.**

Out of 307 patients, total 116 (37.8%) patients had positive slit skin smear stained with Ziehl-Neelsen technique. 24 (7.8%) patients were defaulters out of which 8 were of lepromatous leprosy, 7 of tuberculoid leprosy, 6 of borderline tuberculoid leprosy, 3 of pure neuritic leprosy.



**Figure 3: Detail of lepra reactions in leprosy cases.**



**Figure 4: Distribution of patients according to type of deformities.**

## DISCUSSION

Leprosy is a mycobacterial infection caused by *M. leprae*, affecting the skin, peripheral nervous system, and certain other tissues. Due to that the common and severe consequence of leprosy is loss of sensations followed by deformities and disability which have significant social and economic impact on both patient and community. Introduction of sulfones in the treatment of leprosy in 1943 marked the beginning of a new era which was the era of case finding and domiciliary treatment. Subsequently with availability of multidrug therapy (MDT) as a cure of leprosy, NLEP was launched in 1983-84 with a vision of "Leprosy Free India". The programme achieved an appreciable milestone in December 2005 when India attained an elimination target of less than 1 case per 10000 population. Leprosy has since been a curable and controllable disease (Jindal et al 2009). Still

according to WHO global leprosy update, India contributed to 60% of the total number of cases in the year 2015 (WHO 2015). India had 127334 new cases of leprosy according to the NLEP report of 2015-16 with a prevalence of 0.66 per 10000 population and annual new case detection rate of 9.71 per 100,000 population (NLEP Progress report for the year 2015-16).

The global leprosy strategy 2016-2020: 'accelerating towards a leprosy-free world' was released in April 2016. The strategy is based on the principles of initiating action, ensuring accountability and promoting inclusion. It is built around 3 pillars: to strengthen government ownership, coordination and partnership; to stop leprosy and its complications; and to stop discrimination and promote inclusion (WHO, global leprosy update 2015).<sup>1</sup>

The implementation of MDT programme by itself has helped in improving case management in such a way that a substantial reduction in prevalence has been achieved in all leprosy endemic countries/states. Despite of noticeable decrease in prevalence rate (PR), the annual new case detection rate (ANCDR) has not declined so steeply. So overall reduction in leprosy cases are there in post MDT era. Situation of leprosy 2014 to 2018 has been mentioned in Table 5.

The latest update from the WHO titled 'global leprosy update, 2016: accelerating reduction of disease burden:' states that- although there has been a significant reduction in prevalence of the disease worldwide since the mid-1980s to elimination levels, new cases continue to arise indicating continued transmission.<sup>2</sup> The global prevalence at the end of 2016 was 171,948 with a registered prevalence rate of 0.23 per 10,000 population, a decrease from that in 2015.

In Gujarat, in 2017-18, census population was 68,274,359, new cases were 6894, ANCDR was 10.10 per 100000 population, and prevalence rate was 0.64 per 10000. On 31<sup>st</sup> March 2018, there were 4400 cases in Gujarat.

Retrospective analysis was done of 307 patients who attended the leprosy clinic in tertiary health care centre of South-Gujarat during January 2014 to December 2018. Among total number of 307 patients 213 (68.38%) were male and 94 (30.61%) were female with ratio of Male: Female 2.3:1. In Kurup et al study, out of total 265 patients, 163 (61.7%) were male and 102 (38.4%) were female.<sup>3</sup> Miguel et al also noted male preponderance.<sup>4</sup> In their study, total number of leprosy patients was 110 including 74 (67.27%) male and 36 (32.73%) female.<sup>3,4</sup>

In our study most common age group was 21-40 years with 185 (60.3%) patients. While in Geetharani et al study, 44.8% patients were in age group of 21-40 years.<sup>5</sup> In Adil et al study, 47.1% patients were among age group of 21-40 years.<sup>6</sup> Jindal et al noted 47.8% patients in age group of 20-40 years.<sup>7</sup>

Out of 307 patients, majority of patients (69.7%) were migrants from other Indian states and Nepal while 93 (30.3%) patients were from Gujarat state. From 214 (69.7%) migrant patients, highest migrants were from Uttar Pradesh 87 (28.3%) followed in descending order by Bihar (17%), Maharashtra (14.3%), Jharkhand (2.6%), Odisha (2.6%), Madhya Pradesh (1.6%), Nepal (1.30%), Rajasthan (1%), West Bengal (1%).

In Tegta et al study majority of patients (80.1%) were natives of Himachal Pradesh while 44 patients (19.9%) were migrants from other Indian states or immigrants from Nepal. 23 out of 44 patients belonged to Nepal and 12 patients were from Bihar, 8 from Uttar Pradesh while 1 from Jharkhand.<sup>8</sup> 28.2% migrant patients were there in the study done by Jindal et al.<sup>7</sup>

Status of MB case globally is 61% and at national level it is 51.27%. This is an indication that even today there are some inaccessible population harbouring undiagnosed leprosy patients for a long time. High number of MB cases might also be due to the fact that less severe cases might have been managed at peripheral health centre while most of the severe cases with reactions and disabilities might have presented to our tertiary care centre.

In our study MB cases are 222 (72.31%) and PB cases are 85 (27.68%). Adil et al also noted 73.4% of MB cases and 26.6% of PB cases.<sup>6</sup> Similar findings were also recorded in study done by Kurup et al also, in which MB cases were 192 (71.9%) and PB cases are 71 (26.6%).<sup>3</sup> 80.5% of MB cases were reported by Tiwary et al.<sup>9</sup>

Most common type of leprosy found in our study was Borderline tuberculoid leprosy with 83 patients (27.1%), followed by lepromatous leprosy (24.7%) and tuberculoid leprosy (24.7%), Pure neuritic leprosy 33 (10.8%), Borderline lepromatous leprosy 32 (10.7%), indeterminate leprosy 4 (1.3%), histoid leprosy 3 (1%) and mid borderline leprosy with 2 patients (0.7%).

BT was to be the most common spectrum followed by BB in other studies also (Tiwary et al 2011, Mahajan et al 2003, Singh et al 2009).<sup>9,10,11</sup>

Numbers of patients suffering from lepra reactions were 31 (10.1%) in which type 2 reaction was seen in 23 (7.5%) patients while type-1 was seen in 8 (2.6%) patients in present study.

Out of 23 patients of type 2 reaction, majority patients were having lepromatous leprosy (22 patients). While in 8 patients of type 1 reaction, half (4) were having borderline tuberculoid leprosy and another half (4) were having borderline lepromatous type of leprosy.

Similar findings of lepra reactions were noted in the study done by Adil et al, 12.9% patients (29) were having lepra reactions among which 3.1% (7) were of type 1 and

9.8% (22) patients were of type 2 lepra reactions respectively.

In Tegta et al study, lepromatous leprosy (32.1%) and borderline lepromatous (31.2%) were common types of leprosy.<sup>8</sup> Total number of patients suffering from lepra reactions were 82 (37%) in number in which type 2 reaction was seen in 46 (20.8%) while type 1 reaction in 36 (16.3%) patients. Among type 1 reaction patients, borderline tuberculoid type of leprosy was most common and in type 2 reaction, borderline lepromatous type of leprosy was most common.<sup>8</sup>

Jindal et al also noted that borderline tuberculoid leprosy was more common in type 1 reaction and lepromatous leprosy was common in type 2 reaction patients.<sup>7</sup>

18% patients of lepra reactions were recorded in study done by Agrawal et al.<sup>12</sup> Histoid leprosy was reported in 1% (3 patients) only. Similar proportion was reported by Kaur et al (1.8%) (2009).<sup>13</sup>

The proportion of new child cases globally is 8.8% (WHO, global leprosy update 2015).<sup>9</sup> In our study, childhood leprosy cases ( $\leq 14$  years of age) were found in 5.2% (16) patients. The proportion is lower than reported by Chhabra et al (2015) (9.3%).<sup>14</sup> Singal et al (2011) also noted somewhat higher proportion of leprosy cases in children (9.6%).<sup>15</sup>

In present study eye deformity was noted in total 15 patients (almost 5%) which was comparable with the study done by Jindal et al who noted eye deformities in 5.5% patients.<sup>7</sup> Tegta et al noted eye deformity in 8.6% of patients.<sup>8</sup> In our study most common eye deformity was lagophthalmos and in Tegta et al study conjunctivitis was most common. In both studies corneal ulcer and blindness were rare manifestations with 0 and 1 number respectively.<sup>8</sup>

In our study total 230 (74.91%) patients were having sensory and/or motor deformity, while in Tegta et al study total 175 (79.2%) patients were having deformity.<sup>18</sup> In our study grade 1 and grade 2 deformity patients are 156 (50.8%) and 74 (24.1%) respectively. Tegta et al reported 79 (35.7%) patients of grade 1 and 77 (34.8%) patients of grade 2 deformities respectively.<sup>8</sup> Chhabra et al also reported similar number of patients of grade 2 deformity.<sup>14</sup>

The proportion of new G2D cases indicates delay in the detection of leprosy cases. In 2015, 14059 new G2D cases were reported globally (proportion being 6.7%). This corresponds to a detection rate of 2.1 per million populations (WHO, global leprosy update 2015). In NLEP 2015-16, 5851 patients presented with G2D indicating the grade II disability rate of 4.46/million population.



Higher grade II disabilities indicate the need to improve the access to quality services so that patients are diagnosed and treated early and disabilities are prevented.

Nerve thickening was found in 44.6% (146) patients and neuritis in 33.2% patients in our study. Ulnar nerve was the most common to be involved. Similar finding of predominant ulnar nerve involvement was noted by the study done by Tegta et al, Patil et al and Lasry et al.<sup>8,16,17</sup>

## CONCLUSION

In spite of decline in leprosy cases globally and at national level, there is steady increase noted in our study. Gujarat, a low endemic area for leprosy, is too getting its share of migrant leprosy as is evident from the data from our study. Large number of migrant populations from high endemic areas especially Uttar Pradesh, Bihar, and Maharashtra travelling to Gujarat for seeking employment opportunities may be the reason for this. The rate of MB case (72.31%) as well as a proportion of patients presenting with grade II disability (24.1%) is also a matter of concern. The most important factor that could have significant impact on prevalence is the coverage of the entire population with adequate MDT service. This shows the need to increase the awareness in community as well as health care workers so that cases report early, are diagnosed early and are managed appropriately on time so that chances of disabilities can be reduced. Our study has some limitations as it was conducted in a tertiary care hospital, and was done by retrospective data analysis based on departmental records. So, it cannot be the representative of the situation on the field. Still, it gives a general picture about the current trends of leprosy in the region. But there is requirement to carry out population-based studies for better understanding of the situation in community and for better management of patients.

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## REFERENCES

- Global leprosy strategy 2016-2020: Accelerating towards a leprosy-free world. New Delhi, World Health Organization, Regional Office for South-East Asia, 2016.
- Weekly Epidemiological Record No. 35. 2017;92:501-20.
- Kurup R, Haynes U, Mentore G. A Study on Trends and Patterns of Leprosy in Guyana during a Ten period, 2007-2016. Indian J Lepr. 2018;90:207-16.
- Miguel C, Gonzalez R. Clinical Profile of Leprosy Cases Registered in a Hospital in Paraguay, 2013 to 2015. Indian J Lepr. 2018;90:249-51.
- Geetharani G, Pavithra G, Sathesh P. Clinico-Epidemiological Study of Untreated Multibacillary Leprosy Patients Visiting a Tertiary Care Hospital in Madurai. Indian J Lepr. 2018;90:197-206.
- 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.
- Jindal N, Shanker V, Tegta GR, Gupta M, Verma GK. Clinico-epidemiological trends of leprosy in Himachal Pradesh: a five-year study. Indian J Lepr. 2009;81:173-9.
- Tegta GR, Verma GK, Verma K. A Clinico-epidemiological Scenerio of Leprosy at a Tertiary Care Centre in Sub-Himalayan Region: A Seven Year Retrospective Study. Indian J Lepr. 2019;91:7-16.
- Tiwary PK, Kar HK, Sharma PK. Epidemiological trends of leprosy in an urban leprosy centre of Delhi: A retrospective study of 16 years. Indian J Lepr. 2011;83:201-8.
- Mahajan VK, Sharma NL, Rana P. Trends in detection of new leprosy cases at two centres in Himachal Pradesh, India: a ten-year study. Indian J Lepr. 2003;75:17-24.
- Singh AL, Vagha SJ, Agarwal A. Current scenario of leprosy at tertiary care level hospital of rural central India. Indian J Dermatol Venerol Leprol. 2009;75:520-2.
- Agrawal S, Bhuptani N. Clinico-histopathological Concordance in Leprosy patients-A study of 200 Cases. Indian J Lepr. 2018;90:147-53.
- Kaur I, Dogra S, De D, Saikia UN. Histoid leprosy: a retrospective study of 40 cases from India. Br J Dermatol. 2009;160:305-10.
- Chhabra N, Grover C, Singal A. Scenario at a Tertiary Level Hospital in Delhi: A 5-year Retrospective Study. Indian J Dermatol. 2015;60:55-9.
- Singal A, Sonthalia S, Pandhi D. Childhood leprosy in a tertiary-care hospital in Delhi, India: a reappraisal in the post-elimination era. Lepr Rev. 2011;82:259-69.
- Patil AA, Sherkhane MS. Clinico-epidemiological study of Hansen's disease patients attending a tertiary care centre in South India. Int J Community Med Public Health. 2016;3:3092-5.
- Lasry LE, Hietaharju A, Pai V, Ganapati R, Andrew S, Rice C, et al. Neuropathic Pain and Psychological Morbidity in Patients with Treated Leprosy: A Cross-Sectional Prevalence Study in Mumbai. PLOS Neglected Trop Dis. 2011;5(3):981.

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