DOI: 10.7860/JCDR/2023/62454.18053

Original Article

Dermatology Section

Epidemiological and Clinical Pattern of Leprosy in a Tertiary Care Centre in Bareilly, Uttar Pradesh, India- A Retrospective Study

NAVEEN NETAJI RAO

ABSTRACT

Introduction: Leprosy also known as Hansen's Disease (HD), is a chronic infectious granulomatous disease caused by *Mycobacterium leprae*. It affects the skin and peripheral nerves. It is characterised by the formation of nodules or macules that enlarge and spread with loss of sensation due to nerve involvement which can progress to paralysis and eventually lead to deformities.

Aim: To describe the clinical and epidemiological pattern of leprosy patients in a tertiary care hospital in Bareilly, Uttar Pradesh, India.

Materials and Methods: This retrospective study was conducted at a tertiary level, Military Hospital in Bareilly, Uttar Pradesh, India, from June 2022 to August 2022. Medical records of 263 Leprosy patients, who were diagnosed as HD clinically and histopathologically were part of the study. All their data pertaining to the history, onset, time of detection, clinical features in the form, type and number of patches, presence of peripheral nerve thickenings, investigations which included skin slit smear for Acid Fast Bacilli (AFB) (Lepra) and histo-pathological examination, duration of drug therapy, reactions encountered and the disabilities were collected. The data was compiled in Microsoft (MS) Excel format anfd analysed.

Results: A total of 263 case records of leprosy patients (225 males (85.55%) and 38 females (14.45%), mean age of 35.36±13.79 years) were analysed. Majority of the cases were Borderline Tuberculoid (BT) Hansen's 113 (42.96%). Average time taken by the patients before reporting to the Leprosy centre from onset of symptoms was 18 months. The most common clinical manifestation was multiple light coloured numb patches in 169 patients. A total of 245 patients had peripheral nerve thickening with Ulnar nerve 205 (77.95%) being the most commonly affected nerve. A total of 98 patients had Type-1 reaction and 13 had Type-2 reaction. The Grade-2 disability was seen in 22 cases with claw hand deformity being the commonest 10 (45.45%).

Conclusion: In present study, majority patients were male with the most common clinical manifestation being multiple numb patches all over the body. The most common type of leprosy which presented was BT HD.

Keywords: Disability, Hansen's disease, Multidrug therapy, *Mycobacterium leprae*, Neuropathy

INTRODUCTION

Leprosy is a chronic communicable granulomatous disease caused by *Mycobacterium leprae*. It predominantly affects the skin and the peripheral nervous system and less commonly the mucosal surfaces of the upper respiratory tract and the eyes. It is transmitted by droplet spread which is facilitated by close contact. Although, it is the oldest disease known to mankind, it continues to remain a public health concern even to date [1]. It is caused by *M Leprae* which was discovered by Gerhard Armaeur Hansen in the year 1873 [2]. With the outreach programme instituted by the Government of India, the National Leprosy Eradication Programme (NLEP) was able to bring down the prevalence from 57.8/10,000 population in1983 to less than 1/10,000 population by 2005, thereby re-kindling hopes that leprosy can be totally eradicated [3].

As per the latest figures released by NLEP, the new case detection rate stands at 10 per 10000 contacts. The annual case detection rate of leprosy is 4.56 per 10,000 population in India with a prevalence rate of 0.4 per 10,000 population. Of the new cases detected during 2020-2021, 58.1% were multibacillary, 39% were women, 5.8% were children less than 14 years of age, and 2.41% had visible deformities [4].

As per the figures released by World Health Organisation (WHO), India tops the list of countries with highest number of leprosy cases in the world. As on 2021, leprosy cases in India were 75,394 that accounts for 53.64% of the world's leprosy cases. The world's total leprosy cases were estimated at 140,546 in 2021 [5]. To curb and control this public health issue, the present WHO strategy of "Towards Zero Leprosy-Global Leprosy (Hansen's Disease) Strategy 2021-2030" harps on the following four components, firstly to implement integrated, country-owned zero leprosy roadmaps in all endemic countries, secondly to scale up leprosy prevention alongside integrated active case detection, thirdly to manage leprosy and its complications and prevent new disability and fourthly to combat stigma and ensure human rights are respected [6].

Since, India has the highest case load of leprosy cases in the world; it is pertinent to say that the onus lies with healthcare providers to ensure timely and proper implementation of the NLEP [6]. Uttar Pradesh has a prevalence of 0.43/10000 population, 45.61% are MB cases and 1.02% Grade-2 deformity cases [7]. For any health programme to be effective, it is necessary to know the trend of the disease in the past few years. Hence, present study was conducted to provide an insight into the clinical and epidemiological pattern of leprosy patients at this tertiary level care hospital in Bareilly, Uttar Pradesh, Northern India.

MATERIALS AND METHODS

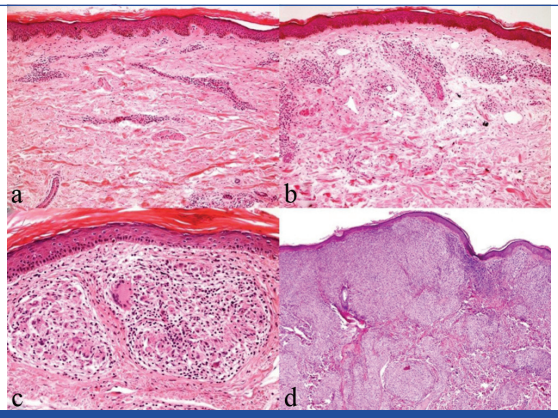
A retrospective study was conducted in a tertiary level, Military Hospital, Bareilly, Uttar Pradesh, India. Prior to the study, Institutional Ethical Clearance was taken from the hospital (02/Jun 2022/ Research dated 01 Jun 2022). The case records of all leprosy patients, who were managed at this centre from 2001 to 2020 were studied retrospectively and data was analysed from June 2022 to August 2022.

Inclusion criteria: All cases of Leprosy, who presented in the Department within the study duration and who fulfilled the WHO definition of Leprosy were included in the study [8].

Exclusion criteria: Leprosy cases who were registered but were lost to follow-up were excluded from the study.

Study Procedure

Data collection: All their data pertaining to the clinical features in the form, type and number of patches, presence of peripheral nerve thickenings, investigations which included skin slit smear for AFB (Lepra) and histo-pathological examination [Table/Fig-1], duration of drug therapy, reactions encountered and the disabilities which they suffered either at the onset, during and post-drug therapy were collected.



[Table/Fig-1]: Histopathology pictures of various types of Leprosy (H&E staining, 10X).
a- Borderline Tuberculoid, b- Borderline Lepromatous
c- Tuberculoid Leprosy, d- Lepromatous Leprosy

Leprosy reactions are categorised into two types of reaction:

Type-1 reaction (Reversal Reaction or RR): result from the activation of cell immunity, expressed as inflammation of skin and nerve trunk, leading to sensory and motor alterations.

Type-2 reaction (Erythema Nodosum Leprosum or ENL): acute inflammatory reactions with systemic involvement, entailing the activation of pro-inflammatory cytokines. In general, this type of reaction affects other organs also, in addition to skin, and co-exists with systemic symptoms [9].

Disability in leprosy is defined by the WHO grading system:

- Grade-0- absence of disability (no anaesthesia) and no visible damage or deformity on eyes, hands, or feet;
- Grade-1- loss of protective sensibility on eyes, hands, and feet;
- Grade-2- presence of deformities or visible damage to the eyes, hands, or feet [10].

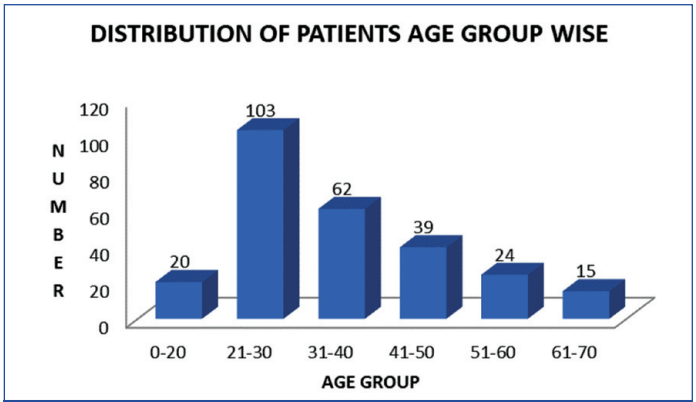
STATISTICAL ANALYSIS

The data was compiled in Microsoft (MS) Excel format and analysed. In this study for each parameter, descriptive data were presented as frequency and percentage.

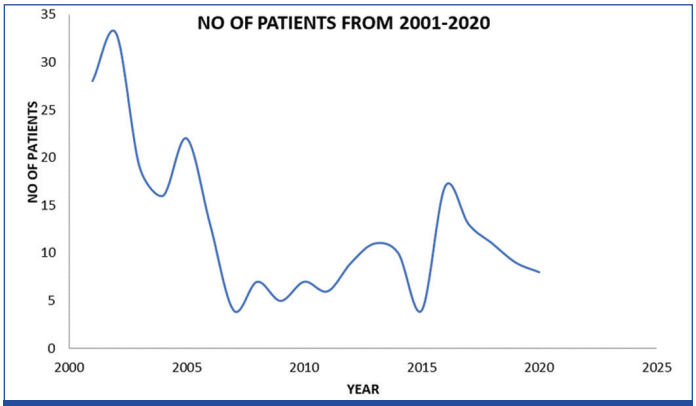
RESULTS

In present study, out of 263 case records of leprosy patients, 225 were males and 38 females with male:female ratio of 5.92. The age group of the study population ranged from 10 years to 68 years however maximum number of cases were aged between 21-30 years with a mean age of 35.36±13.79 years [Table/Fig-2]. Year wise distribution of the leprosy patients treated from 2001 to 2020 depicted that maximum 33 patients presented in the year 2002 and minimum four patients reported in the years 2007 and 2015, respectively. From years 2007-2012, number of patients who reported to this center was less than 10 [Table/Fig-3].

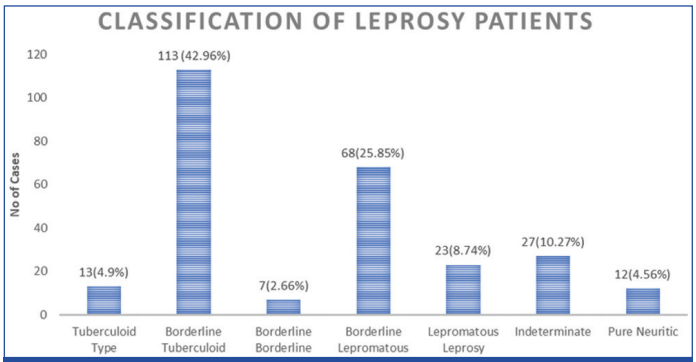
The most common type of Leprosy seen was borderline tuberculoid (n=113), followed by borderline lepromatous (n=68), lepromatous leprosy (n=23), indeterminate type (n=27), tuberculoid type (n=13), pure neuritic type (n=12) and last was borderline borderline type (n=7) [Table/Fig-4]. There were 153 paucibacillary cases and 108 multibacillary cases as per the case definition of WHO 1998. Of these cases only 148 were smear positive.



[Table/Fig-2]: Age-wise distribution of all study participants (N=263).

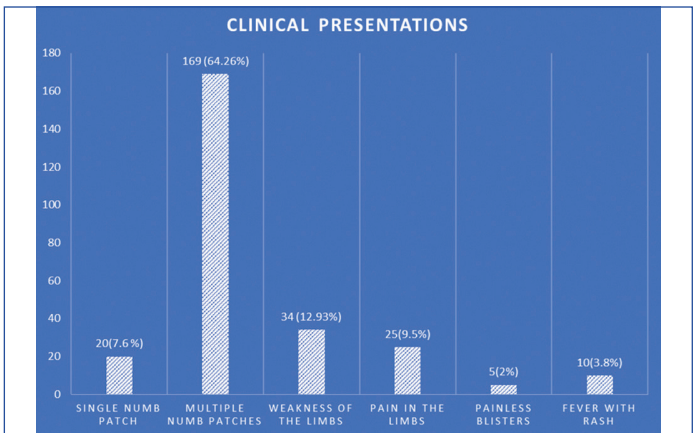


[Table/Fig-3]: Year wise distribution of leprosy cases over 20 year.



[Table/Fig-4]: Distribution of all study participants according to classification; N=263.

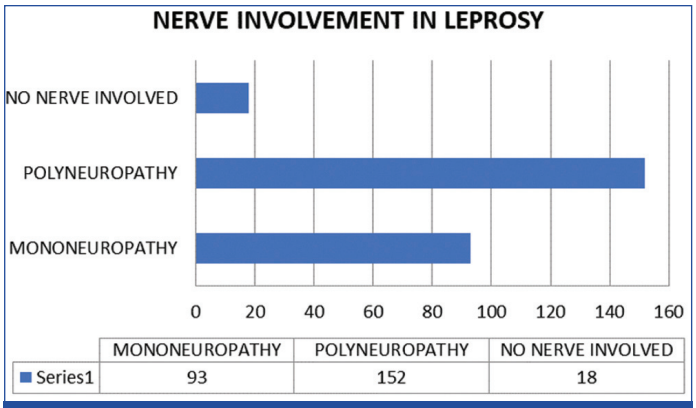
Most common clinical presentation was multiple hypo-aesthetic patches, with majority of them having 1-5 patches (n=136), single hypo-aesthetic patch was found in 20 cases. Other presentations were weakness of the limbs (n=34), shooting pain down the limbs (n=25), painless blisters (n=5) and fever with rash (n=10) [Table/Fig-5].



[Table/Fig-5]: Bar Chart depicting clinical presentations of all study participants (N=263 participants).

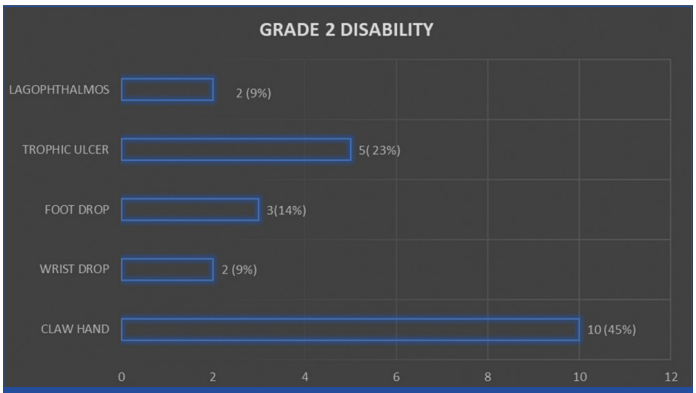
Peripheral nerve thickening was found in 245 cases. Mononeuropathy was found in 93 cases, multiple nerve enlargement was found in

152 cases. There was no peripheral nerve thickening documented in 18 cases [Table/Fig-6]. The most common nerve involved was ulnar nerve (n=205) followed by common peroneal nerve (n=151). Lepra reaction was found in 98 cases. 85 cases had the most common Type-1, 13 had Type-2 reaction. A total of 98 cases of reaction were managed with tapering doses of oral steroids. Thalidomide was needed in only eight cases.



[Table/Fig-6]: Bar chart depicting nerve involvement in leprosy patients (N= 263).

Grade-2 disability was seen in 22 cases. The most common disability seen was claw hand (n=10), followed by trophic ulcer (n=5), wrist drop (n=2), foot drop (n=3) and lagophthalmos (n=2) [Table/Fig-7].



[Table/Fig-7]: Grade-2 Disability seen in Leprosy patients in the present study (N=22); Grade-2 Disability: presence of deformities or visible damage to the eyes, hands, or feet.

Of the total 263 cases, 247 cases were managed with multidrug therapy as prescribed by WHO. Sixteen cases were managed with modified (MDT), as four cases had dapsone hypersensitivity syndrome, six cases developed anaemia and four cases developed drug induced hepatitis. The average duration of drug therapy received was 20.8±10.15 months.

DISCUSSION

Although Leprosy remains the leading cause of infection of peripheral neuropathy and deformity in our country. Widespread implementation of the NLEP monitored MDT has been successful in reducing the number of cases in the country but there are still pockets of endemicity in our country where prevalence is more than one per 10000 population [3]. The present focus of the NLEP is to reduce the incidence of newer deformities caused by Hansen's disease and in turn reduce the stigma associated with the disease which is caused by the visible deformity.

The mean age in presents study was 35.36±13.79 years. Majority of the patients belonged to the 21-30 age group (n=103). Males outnumbered females, 225 vs 38 in the ratio of 5.92. This corroborated with the study conducted by Liu YY et al., at Sichuan, China where a total of 2900 new leprosy cases were detected from 2000 to 2015, of whom 2075 (71.6%) were male and 825 (28.4%) were female with a gender ratio of 2.5 [11]. This was also consistent with the study conducted by Ramos JM et al., at south-eastern Ethiopia where males constituted 64.5% of cases and Dimri D et al., where males were in majority 62.8% [12,13].

The number of Paucibacillary (PB) cases was 153 (58.7%) which is more than Multibacillary (MB) 110 (41.8%). This is similar to the national average reported and studies conducted by Tiwary PK et al., [14]. Contact family history was positive in only 12 cases (4.56%). This is lesser than the few studies conducted. In one study, conducted by Nair SP the prevalence of leprosy in families was 5.44%. BT was the most common type of leprosy and prevalence of conjugal leprosy was 1.78%, with majority of the partners having the lepromatous type. Of the affected children [15], a study conducted in China by Shen J et al., showed prevalence rates ranging from 14.1% to 22% [16], while Deps PD et al., in Brazilian population showed a prevalence rate of 18.2% [17].

Amongst the spectrum, BT leprosy was the commonest with 113 cases (42.96 %), followed by BL leprosy with 68 cases (25.85%). This was consistent with the studies conducted at various other centres, Sirisha NL et al., Semwal S et al., [18,19]. In study of Semwal S et al., a total of 116 cases were clinically diagnosed as HD with a clinico-histological correlation in 73 cases [19]. The most common histological subtype of HD was borderline tuberculoid (BT) (40/116). Few centres have reported BL or LL as the most common spectrum reported; in a study conducted at Brazil by Zanella LF et al., BL was the most common spectrum which was 61.84% (N=4, 610) of all the leprosy cases in a retrospective study from 2001-2015 [20].

Twelve PNL cases were reported in the present study, which is 4.5% of the total cases. This is consistent with the study conducted by Kumar B et al., Of the total 1542 leprosy patients seen from 1993-2003 at PGIMER Chandigarh, 65 (4.2%) had PNL [21]. The number of PB cases was 153 (58.7%) which is more than MB 110 (41.8%). This is not in concordance with other recent studies where MB cases were more in number. The present national figure stands at more than 50% [22]. The number of new PB cases was more due to the robust screening, referral and reporting system existing in the hospital.

Nerve thickening is seen in 245 cases. Eighteen cases did not have any peripheral nerve thickening, majority of them were Indeterminate leprosy (n=27). Mononeuropathy was seen in 93 cases (35.36%). This was in consonance with most of the studies published till now. Ulnar nerve was the most common nerve to be thickened followed by common peroneal nerve. This is similar to the other studies conducted by Rathod SP et al., where ulnar nerve was commonly involved in 83.5%, followed by anterior tibial nerve (76%) and lateral popliteal nerve (53%) [23]. Lepra reactions were seen in 98 (37.26%) cases during the course of therapy. Type-1 reaction was seen in 85 patients (32.31%). Type-1 reaction was most common in those with BT Hansen's (n=70, 71.42%). Various studies done in India and abroad showed a prevalence ranging from 15% to 35%. Similarly, Chhabra N et al., in their studies showed the 33.9% had Type-1 reaction and 65.9% had Type-2 reaction [24].

Thirteen cases had Type-2 reaction (4.94%) predominantly in those with BL Hansen's. Five of them had recurrent ENL while on therapy and continued to have these reactions even after completion of the MDT. These finding are in contrast to study conducted by Pocaterra L et al., who reported that Type-2 reaction was seen in 50% of LL patients and 5-10% of BL patients [25]. Most of the cases (26.23%) presented with reaction during their initial presentation, about 24.71% in Type-1 reaction and 3.8% in Type-2 reaction. A 5.7% developed Type-1 reaction within six months of onset of therapy, remaining reaction cases were seen after six months of therapy.

Steroids were the mainstay of therapy for the treatment of Type-1 reaction. It was given over a period of 4-6 months, which was similar to the schedule of Walker SL and Lockwood DN [26]. The mean duration of therapy for Type-1 reaction was 8.41 months. For

majority of patients with Type-2 reaction, oral steroids were given albeit for a longer duration corresponding to their natural history of the illness. The average duration of therapy was 10.95 months.

Grade-2 disabilities was seen in 22 cases, the most common disability noted was claw hand deformity (n=10), followed by trophic ulcers (n=5), wrist drop (n=2), foot drop (n=3) and lagophthalmos (n=2). In the present study, 10 cases of deformity were present at the time of presentation five of them had ulnar claw hand deformity, two with foot drop and three with trophic ulcers. The fact that they presented with deformity shows the delay in diagnoses and could be because of ineffective public health programme at some level. A great emphasis on meticulous clinical assessment of all the peripheral nerves involved at the time of diagnoses will act as a proxy indicator of present and future disabilities [27]. Early diagnoses and treatment remain the mainstay of preventing the deformities.

Limitation(s)

The study was record based. So, it might not be reflective of the real time national figures as most of the cases are transferred from many peripheral centers. Larger population-based studies will be of greater significance to plan preventive measures.

CONCLUSION(S)

In present study, the most common type of leprosy seen was Borderline Tuberculoid and most common clinical presentation was multiple hypo-aesthetic patches. In view of robust reporting system most of the cases detected are PB cases with less deformities. This has been possible due to the increased awareness in the community brought about by the effective implementation of the NLEP throughout the country. A proper and timely referral of the new cases detected to the nearest Leprosy centers; will help in close monitoring of the case and ensure contact tracing and prompt treatment of both the cases and contacts at an early stage.

REFERENCES

[1] Khubchandani J. State of the globe: Many challenges of the multifaceted leprosy. Journal of Global Infectious Diseases. 2011;3(4):315.
[2] Polycarpou A, Walker SL, Lockwood DN. New findings in the pathogenesis of leprosy and implications for the management of leprosy. Current Opinion in Infectious Diseases. 2013;26(5):413-19.
[3] Pandey A. Current perspectives on leprosy as a public health challenge in India. Res Rep Trop Med. 2015;6:43-48. https://doi.org/10.2147/RRTM.S54783.
[4] Karotia D, Kishore J, Kumar A. Epidemiological determinants of leprosy in a high endemic district of India: A community based case control study. Indian J Lepr. 2022;94:69-80.https://www.ijl.org.in/published-articles/02042022164035/7_D_Karotia_et_al_69-80.pdf.
[5] World Health Organization. Global leprosy (Hansen disease) update, 2021: Moving towards interruption of transmission-Situation 2021: Weekly Epidemiological Record. 2022;97(36):429-50.
[6] World Health Organization. Towards zero leprosy. Global leprosy (Hansen's Disease) strategy 2021-30.
[7] 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. https://dghs.gov.in/WriteReadData/userfiles/file/NLEP_Final_Annual_Report_2015-16.PDF.
[8] World Health Organization. Guidelines for the diagnoses, treatment and prevention of leprosy, 2018. https://apps.who.int/iris/bitstream/handle/10665/274127/9789290226383-eng.pdf.
[9] Nery JA, Bernardes Filho F, Quintanilha J, Machado AM, Oliveira SDS S, Sales AM. Understanding the Type-1 reactional state for early diagnosis and treatment: A way to avoid disability in leprosy. An Bras Dermatol. 2013;88(5):787-92. Doi: 10.1590/abd1806-4841.20132004. PMID: 24173185; PMCID: PMC3798356.
[10] Brandsma JW, Van Brakel WH. WHO disability grading: Operational definitions. Lepr Rev. 2003;74(4):366-73. PMID: 14750582.
[11] Liu YY, Yu MW, Ning Y, Wang H. A study on gender differences in newly detected leprosy cases in Sichuan, China, 2000-2015. International Journal of Dermatology. 2018;57(12):1492-99.
[12] Ramos JM, Martínez-Martín M, Reyes F, Lemma D, Belinchón I, Gutiérrez F. Gender differential on characteristics and outcome of leprosy patients admitted to a long-term care rural hospital in South-Eastern Ethiopia. International Journal for Equity in Health. 2012;11(1):01-07.
[13] Dimri D, Gupta A, Singh AK. Leprosy continues to occur in hilly areas of North India. Dermatology Research and Practice. 2016;2016:7153876.
[14] Tiwary PK, Kar HK, Sharma PK, Gautam RK, Arora TC, Naik H, et al. Epidemiological trends of leprosy in an urban leprosy centre of Delhi: A retrospective study of 16 years. Indian Journal of Leprosy. 2011;83(4):201-08.
[15] Nair SP. Leprosy in families: Clinicoepidemiological profile from a tertiary care centre. Indian Dermatology Online Journal. 2017;8(5):328.
[16] Shen J, Wang Y, Zhou M, Li W. Analysis on value of household contact survey in case detection of leprosy at a low endemic situation in China. Indian J Dermatol Venereol Leprol. 2009;75:152-55.
[17] Deps PD, Guides BV, Filho JB, Andreatta MK, Marcari RL, Rodriges LC. Characteristics of known leprosy contact in a high endemic area in Bazil. Lepr Rev. 2006;77:34-40.
[18] Sirisha NL, Kumar MP, Sowjanya S. Prevalence of skin diseases in a dermatology outpatient clinic in RIMS, Kadapa, a cross-sectional, retrospective study. Journal of Evolution of Medical and Dental Sciences. 2015;4(57):9903-10.
[19] Semwal S, Joshi D, Goel G, Asati D, Kapoor N. Clinico-histological correlation in Hansen's disease: Three-year experience at a newly established tertiary care center in central India. Indian Journal of Dermatology. 2018;63(6):465.
[20] Zanella LF, Sousa IB, Barbosa MD, Faccenda O, Simionatto S, Marchioro SB. High detection rate of new cases of multibacillary leprosy in Mato Grosso do Sul, Brazil: An observational study from 2001-2015. Revista do Instituto de Medicina Tropical de São Paulo. 2018;60:e67.
[21] Kumar B, Kaur I, Dogra S, Kumaran MS. Pure neuritic leprosy in India: An appraisal. International Journal of Leprosy and other Mycobacterial Diseases. 2004;72(3):284-90.
[22] World Health Organization. Global Leprosy Strategy 2016-2020: Accelerating towards a leprosy-free world-Operational manual.
[23] Rathod SP, Jagati A, Chowdhary P. Disabilities in leprosy: An open, retrospective analyses of institutional records. Anais Brasileiros de Dermatologia. 2020;95:52-56.
[24] Chhabra N, Grover C, Singal A, Bhattacharya SN, Kaur R. Leprosy scenario at a tertiary level hospital in Delhi: A 5-year retrospective study. Indian Journal of Dermatology. 2015;60(1):55.
[25] Pocaterra L, Jain S, Reddy R, Muzaffarullah S, Torres O, Suneetha S, et al. Clinical course of erythema nodosum leprosum: An 11-year cohort study in Hyderabad, India. The American Journal of Tropical Medicine and Hygiene. 2006;74(5):868-79.
[26] Walker SL, Lockwood DN. Leprosy Type-1 (reversal) reactions and their management. Leprosy Review. 2008;79(4):372-86.
[27] Moschioni C, Antunes CM, Grossi MA, Lambertucci JR. Risk factors for physical disability at diagnosis of 19,283 new cases of leprosy. Revista da Sociedade Brasileira de Medicina Tropical. 2010;43:19-22.

PARTICULARS OF CONTRIBUTORS:
1. Consultant Dermatologist, Department of Dermatology, Military Hospital, Bareilly, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Naveen Netaji Rao,
Consultant Dermatologist, Department of Dermatology, Military Hospital, Bareilly, Uttar Pradesh, India.
E-mail: drnaveenrao77@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Dec 23, 2022
- Manual Googling: Apr 05, 2023
- iThenticate Software: Apr 12, 2023 (14%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Dec 23, 2022**
Date of Peer Review: **Feb 13, 2023**
Date of Acceptance: **Apr 17, 2023**
Date of Publishing: **Jun 01, 2023**