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Original Research Article

Clinico-Epidemiological Profile of Leprosy Cases in Post-Elimination, Post Covid Era at a Tertiary Care Center

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Abstract

Background: Leprosy continues to be a public health problem despite elimination from India in December 2005 with around 60% cases being reported from India globally. The covid pandemic has additionally disrupted case detection and treatment leading to under-reporting. The current study aims to get insights into the clinical and epidemiological profile of leprosy in post covid era at a tertiary care center.

Methods: A retrospective observational study of all patients visiting leprosy clinic of dermatology department of NSCB Medical College, Jabalpur, MP over 1-year period from May 2022 to April 2023. Data regarding clinical and epidemiological characteristics were collected from patients' records and tabulated and analyzed using appropriate statistical methods.

Results: A total of 119 patients visited the leprosy clinic during the study period. Maximum patients belonged to age group 20-40 years (49.6%). There were 81 males and 38 females with male female ratio of 2.1:1. Most common clinical type of leprosy was lepromatous leprosy (LL) (40.3%) followed by borderline tuberculoid (BT) (26.9%). Nerves were involved in all patients with ulnar nerve being the most common (71.4%). Lepra reactions were noted in 13.6%, grade-2 disability 50.4%, deformity -ulcer 37% of cases. PCR test for detecting M. leprae DNA was positive in 91.6% cases.

Conclusion: Our findings highlight the need for increasing leprosy case detection and early treatment through community based approaches as there in increased burden of lepromatous cases and disability patients post the covid pandemic phase due to compromised case reporting during lockdown. Also molecular diagnosis like PCR should be widely utilized for leprosy.

Keywords: leprosy, clinical profile, disability, lepra reaction.

Introduction

Leprosy also called Hansen's disease, is a chronic granulomatous disorder primarily affecting peripheral nerves, skin and other tissues.[1] The causative organism Mycobacterium leprae is a slow multiplying bacillus with weak pathogenicity, that could be possible reason for leprosy being still prevalent. The resulting nerve damage and deformities is an important cause of disability and social stigma alongside economic consequences both for patient and society at large. Before COVID-19, around 200,000 people were diagnosed with leprosy each year, this number has reduced by 30% because of disruptions caused by the pandemic to leprosy programmes.[2]

India has highest leprosy burden in the world contributing 58% of the new cases followed by Brazil. In 2020-21, 65164 new cases were detected while 114451 new cases year 2019 -20.[3] Even though leprosy has been eliminated globally in 2000[4] and in India in 2005, the decline in new cases is gradual and Covid-19 further disrupted the detection and reporting of leprosy cases leading to delayed treatment and possible rise in deformities and defaulters.

WHO released the 'Towards zero leprosy: global leprosy (Hansen's disease) strategy 2021–2030' aligned to the neglected tropical diseases road map 2021–2030 which calls for a vision of zero leprosy: zero infection and disease, zero disability, zero stigma and discrimination and the elimination of leprosy (defined as interruption of transmission) as its goal.[4]

The current study is undertaken with the aim to get insights into the clinical and epidemiological profile of leprosy in post covid era at a tertiary care center.

Materials and methods

A retrospective observational study of all patients visiting leprosy clinic of dermatology department of NSCB Medical College, Jabalpur, MP over 1-year

period from May 2022 to April 2023 was carried out using data retrieved from patient's records.

The data included information on socio-demographic profile, occupation, urban/rural, clinical findings that included cutaneous lesions, nerve findings (enlarged/thick, abscess), deformities, type of leprosy, reactions), SSS (slit skin smear), histopathology report and PCR (polymerase chain reaction).

The diagnosis was made based on clinical findings and investigations reports. Patients were classified according to Ridley and Jopling classification[5] and deformities were graded as per WHO criteria.[6]

The data thus collected were entered in prestructured proforma and analysed using Statistical Package for Social Sciences version 23.

Results

A total of 119 patients were included in the present study with age ranging from 18 to 78 years (mean 40.88 ± 13.97 years). Males outnumbered females with a ratio of 2.1:1. Majority of patients were in age group 20-40 years (n=59, 49.6%) followed by 40 patients (33.6%) in 41-60 years and 13 (10.9%) patients in 61-80 years [Table 1]. Family history was positive in 8 (6.7%) cases. Rural population was higher (54.6%) compared to urban population (45.4%).

Occupation wise labourers comprised majority (n=39,32.8%) followed by housewives 27(22.6%), farmers 24 (20.2%). [Table 1]

Table 1: Socio-demographic details of patients

Age	**Frequency**	**%**
<20	7	5.90%
20-30	21	17.60%
31-40	38	31.90%
41-50	29	24.40%
51-60	11	9.20%
61-70	10	8.40%
71-80	3	2.50%
mean age	40.88±13.97 years	
Gender		
Male	81	68.10%
Female	38	31.90%
Residence		
Urban	54	45.40%
Rural	65	54.60%
Occupation		
Business	6	5%
Farmer	24	20.20%
Labourer	39	32.80%
Housewife	27	22.60%
employed	10	8.40%
Student	10	8.40%
Prisoner	1	0.80%
Retired	2	1.70%

The most common clinical type of leprosy was lepromatous leprosy (LL) 48 (40.3%) followed by borderline tuberculoid (BT) 32 (26.9%), borderline lepromatous (BL) 24 (20.2%), borderline borderline (BB) 12 (10.1%) and least cases were of tuberculoid leprosy (TT) 3 (2.5%) [Table 2].

Table 2: Distribution of patients according to clinical subtype as per Ridley-Jopling classification

Clinical diagnosis	**N**	**%**
TT	3	2.50%
BT	32	26.90%
BB	12	10.10%
BL	24	20.20%
LL	48	40.30%
Total	119	100%

Slit skin smear was positive in 78 (65.5%) cases. All cases of LL and BL while 5 and 1 case of BB and BT respectively were SSS positive. Nerve was involved in all cases among which ulnar nerve was the most commonly affected in 85 (71.4%) followed by common peroneal nerve 65 (54.6%), median nerve,

sural nerve, radial nerve, greater auricular and posterior tibial nerve in decreasing frequency of involvement [Table 3]. Eighteen cases of neuritis were seen, 3 and 15 of which were manifestations of type 1 and type 2 lepra reaction respectively and two cases of nerve abscess.

Table 3: Pattern of nerve involvement

Nerve	N	%
Ulnar	85	71.40%
Common peroneal	65	54.60%
Median	33	27.70%
Radial	28	23.50%
Sural	29	24.30%
Posterior tibial	12	10.08%
Greater auricular	27	22.70%

Table 4: Reaction and disability grading

Reaction	N	%
Type 1	12	10.10%
Type 2	41	34.50%
total	53	44.50%
disability grading		
Grade 0	21	17.60%
Grade 1	38	31.90%
Grade 2	60	50.40%

Table 5: SSS and PCR tests results

SSS	N	%
Positive	78	65.50%
Negative	41	34.50%
PCR		
Positive	109	91.60%
Negative	10	8.40%
Total	119	100%

Table 6: Grade 2 disability among the study population

Type of Grade 2 disability	N	%
clawing	25	21%
ulcer	44	37%
foot drop	4	3.40%
digit resorption	1	0.80%
ear infiltration	4	3.40%
leonine facies	20	16.80%
lagophthalmos	2	1.70%
madarosis	18	15.12%
saddle nose	5	4.20%

Fifty-three (44.5%) cases presented with reaction of which 12 (10.1%) and 41 (34.5%) cases were of type 1 and type 2 reaction respectively. As per the WHO disability grading, grade 2 disability (G2D) was seen in 60 (50.4%) cases while 38 (31.9%) had grade 1 disability(G1D) [Table 4].

Most common deformity was ulcer present in 44 (37%) followed by clawing of hands 25 (21%), leonine facies 20 (16.8%) [Table 6]. Sensory loss/hyposthesia was present among 91 (76.5%) cases while rest 28 (23.5%) had sensations intact.

PCR test for detecting M.leprae DNA was positive in 109 (91.6%) cases [Table 5].

Discussion

Leprosy continues to pose a public health challenge despite introduction of MDT in the mid 1980's as a promising cure. The affliction of peripheral nerves, skin and mucosae resulting in sensory loss, disabilities and deformities have major consequences for patient and community on both social and economic front. The National Leprosy Eradication Programme achieved elimination target

(criteria <1 case/10,000 population) in India in 2005 yet majority of leprosy burden globally continues to be reported from India.[7]

The new case detection rate, an important statistical indicator of leprosy control has not declined significantly.[8] The present study of 119 patients over one year period revealed male female ratio of 2.1:1. This is in accordance with previous studies showing male preponderance.[9,10,11,12,13] which is attributable to increased mobility and accessibility to heath care among males and increased social stigma and fear among females limiting their turn up at medical facility. However equal incidence in both genders was observed by Suri et al.[14] Maximum patients belonged to age group 20-40 years (49.6%) in our study similar to previous studies.[11,12,15,16,18] This subset of age group is the most productive and susceptible on account of increased mobility and opportunity for contact with the population harboring cases. Leprosy in young population pinpoints the endemic nature of this disease.[12]

In the current study leprosy was most common among the labourers (32.8%), followed equally by farmers and housewives. This is in concordance to studies by Kumar et al, Gupta et al and Giridhar et al.[12,19,20] Factors like low socio-economic status, over-crowding, malnutrition, poor hygiene that commonly are associated with leprosy explains this increased incidence among labourers and farmers. Rural population was majorly affected in our study (54.6%), a finding similar to Adil et al and Kumar et al[11,19].

Poor health facilities in rural set-up and huge drainage of patients from adjoining rural areas can be reasons for this predominance. However in another study by Doshi et al from western Indian state, Maharashtra, urban population showed greater prevalence and new case detection rate of leprosy.[21] Barua et al also had predominance of urban population in their study of leprosy patients attributable to metropolitan location of their study center with urban catchment area.[22]

Family history was positive in 6.7% cases in present study, an observation concordant with Kumar et al.[19] Mahajan et al elicited positive family history in 2.43%.[16] The most common clinical type of leprosy in present study was lepromatous leprosy (40.3%). This observation is in concordance with Jindal et al where maximum patients (33.12%) were of lepromatous leprosy followed by BT (28.22%).[17] Also Bishnoi et al had a similar finding of majority cases of LL (30.7%) followed by BT (27.8%), BL (19%).[23] Tegta et al also reported maximum cases of lepromatous leprosy (32.1%) followed closely by Borderline lepromatous (31.2%).[24] However in previous other studies borderline leprosy outnumbered the polar groups. Borderline tuberculoid was most common clinical subtype in a multitude of studies[8,12-15,18-20,22,25-27] while borderline leprosy constituted the maximum proportion in studies by Adil et al, Mahajan et al and Arif et al.[11,16,28] Since the introduction of MDT, borderline spectrum has more often been reported than the polar forms which were seen more in the dapsone era.[28] The maximum proportion of lepromatous leprosy is an alarming situation here which possibly could be due to disruption in health care facilities during Covid pandemic phase as a result of lockdown and limited mobility. The use of systemic steroids for Covid treatment and immune suppression due to Covid per se could have further added to the problem resulting in decreased CMI (cell mediated immunity) and increased cases of LL. How Covid infection and vaccine affected the immune mechanisms which could have implications in leprosy infection and progression remains to be extrapolated through further studies. Lockdown and restricted mobility during pandemic led to decreased case detection, missed cases, delayed and non-treatment, defaulters, all of which possibly resulted in increased LL cases.

All cases in current study showed nerve involvement. Ulnar was the most common affected nerve (71.4%) followed by common peroneal (54.6%) which is in agreement with previous studies. [12,15,16,19,23-25,27,29] The likelihood of detecting one or more enlarged nerves can vary from in as few as 20% of patients to as many as 96% as observed by a study done in the department of Clinical Neurology, University of Oxford, UK.[30] Reactions were seen in 44.5% of cases with type 2 reaction being more common (34.5%) than type 1 (10.1%).

Tegta et al observed lepra reactions in 82 (37%) cases in which type 2 reaction was seen in 46 (20.8%) while type 1 reaction in 36 (16.3%) patients. Patel et al, Agrawal et al reported much lower cases of reactions among 10.21% and 18% respectively. [15,31]

Increased frequency of reactions in our study could be due to majority of lepromatous cases which have poor CMI and cases reporting late in course of disease. Increased frequency of type 2 reactions than type 1 has been documented in earlier studies.[11,12,15-17,19].

Grade 2 disability (G2D) were higher(50.4%) than grade 1 disability (31.9%) in our study similar to earlier studies.[12,16,22,24,25,27,29,32,33] However Jindal et al reported higher proportion of type 1 disability.[17] One of the targets of the Global Leprosy Strategy (2016– 2020) is to bring down new leprosy cases with G2D to <1 case per million population.[7]

G2D is indicative of awareness level about leprosy symptomatology, health seeking behaviour and the capacity of the health system to manage leprosy at an early stage, before the disabilities set in. The high rate of G2D in current study indicates delayed diagnosis and presentation to health facility and delayed/irregular treatment due to covid restrictions. This highlights the urgent need to up the leprosy case finding and contact tracing in society and at community level and MDT administration to all diagnosed cases to bring down leprosy transmission and disability rates. In current study slit skin smear was positive for acid fast bacilli in 65.5% cases. SSS positivity has been reported as 88.89%, 54.01% and 60% in previous studies.[13,16,19] This stresses the utility of SSS in leprosy diagnosis and treatment monitoring by observing shift in bacteriological index values. PCR test detected mycobacterial DNA in skin biopsy samples in 91.6% cases. This high positivity rate could be due to increased number of lepromatous cases in our study. PCR proved to be an important additional diagnostic laboratory test in our study. Researchers have employed various PCR methods for molecular diagnosis of M. leprae from SSS, skin biopsy, blood and urine samples. Conventional PCR targeting a single gene has been found to be the most commonly reported method.[34]

Our study was conducted at a tertiary care centre which may not be representative of the community level ground reality as most cases report late in advanced stage and also referred from other centers. Larger population-based studies are required to assess leprosy status and inform policy makers and stakeholders of control programs. It was a cross-sectional study that did not follow patients longitudinally so reactions and deformities might be under reported.

Conclusion

The leprosy case detection and management has been hugely disrupted under NLEP during Covid-19 pandemic phase during 2020 and 2021 which has resulted in increased number of lepromatous leprosy and grade 2 disability cases in post covid post elimination era. Factors such as social stigma, illiteracy, lack of awareness, difficulty in MDT procurement, fear of hospital and health facility visits among masses during covid, compromised programmatic activities of NLEP across various strata of community have all contributed in delayed diagnosis of leprosy resulting in more multibacillary cases, reactionary episodes and deformities and disabilities.

Effective and vigorous implementation of awareness about the disease, self-reporting among community members, combating stigma through educational activities, widespread facilities for investigation, unhindered provision of therapy and rehabilitative care are the need of the hour to effectively achieve the target of zero leprosy: zero infection and disease, zero disability, zero stigma and discrimination and the elimination of leprosy as envisioned by the WHO.

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