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Clinico-Epidemiological Study of Leprosy Cases at a Tertiary Care Hospital

[1]Gayatri Gund, Department of Dermatology, Venereology, and Leprosy (DVL), Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahilyanagar

[1]Mithila Gadekar, Department of Dermatology, Venereology, and Leprosy (DVL), Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahilyanagar

[2]Prajakta Gaikward, Department of General Medicine, Venereology, and Leprosy (DVL), Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahilyanagar

Corresponding Author: Gayatri Gund, Department of Dermatology, Venereology, and Leprosy (DVL), Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahilyanagar

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Abstract

Introduction: Current statistics show that leprosy continues to be a public health problem in India despite free treatment and continuous efforts of the government.[3] India and Brazil account for the maximum burden of disease

Aim and Objective: To determine sociodemographic and clinical characteristics of newly diagnosed adults and children (less than 15 years) with leprosy and their trends over 10 years at a tertiary care center

Methodology: Case records of leprosy patients treated at a tertiary care hospital over 10 years from 2012 to 2021 were studied retrospectively

Results: Most of the patients were in the age group of 41-60 years and more than 60 years age group. Most of the patients were males. Characteristics facies was present in 187 (20.6%) patients and it was absent in 719 (79.4%) patients. In most of the patients, characteristic facies was absent. Mucosa was not involved in 698 (77%) patients. In 45 (5%) patients, no sites were involved. In 592 (65.3%) patients, <=3 sites were involved, in 267 (29.5%) patients, 4 to 6 sites were involved and in 2 (0.2%) patients, 7 to 10 sites were involved. Nerve abscess was present in only 11 (1.2%) patients, while it was absent in 895 (98.8%) patients. Neuritis was present in 327 (36.1%) patients, while it was absent in 579 (63.9%) patients., slit skin smear was found to be positive in 636 (70.2%) patients, while it was negative in 270 (29.8%) patients. BT, BL and LL were the most common types of leprosy seen in our study. MB-MDT was given in 680 (75.1%) patients; PB-MDT in 224 (24.7%) patients and PB-MBT in 2 (0.2%) patients in 193 (21.3%) patients, there was a positive family history of leprosy; while in 713 (78.7%) patients, there was no family history of leprosy, 185 (20.4%) patients had Type 1 and 119 (13.1%) patients had Type 2 reactions, while in 602 (66.4%) patients, there were no reactions. Deformity was absent in 236 (26%) patients. In 62 (6.8%) patients, there was Grade 0 deformity; in 338 (37.3%) patient, there was Grade 1 deformity; and in 270

(29.8%) patients, there was Grade 2 deformity. whereas Side effects of drugs was seen in only 59 (6.5%) patients. 49 (5.4%) patients were seen in 2010; 69 (7.6%) patients were seen in 2011; 74 (8.2%) patients were seen in 2012; 80 (8.8%) patients were seen in 2013; 89 (9.8%) patients were seen in 2014; 99 (10.9%) patients were seen in 2015 patients; 93 (10.3%) patients were seen in 2016; 108 (11.9%) patients were seen in 2017; 124 (13.7%) patients were seen in 2018 and 121 (11.4%) patients were seen in 2019. In most of the patients 1 and 2 nerves were involved Ulnar, peroneal and radial nerve were more commonly involved in these patients

Conclusion: There Is A Increasing Trend In Leprosy In Last 10 Years in Our Study

Limitation: This Is A Reterospective Study is its limitation

Keywords: Deformity, Mycobacterium Leprae, Sociodemographic

Introduction

Leprosy, also recognized as Hansen's disease, is a chronic granulomatous infectious disease caused by Mycobacterium leprae. It is an ancient disease in India with its early description in 'Sushruta Samhita' written in 600 BC. [1] Mycobacterium leprae is an acid-fast, gram positive bacilli having special affinity for Schwann cell of nerve. It was first discovered by Norwegian physician Gerhard Henrik Armaeur Hansen in 1873. This obligate intracellular parasite has a life span of 6 months and generation time of 12-14 days.[2]

Current statistics show that leprosy continues to be a public health problem in India despite free treatment and continuous efforts of the government.[3] India and Brazil account for the maximum burden of disease.[4][5] National Leprosy Eradication Programme (NLEP) in India is working toward the goal of leprosy eradication. However, despite the deployment of well thought out strategies, there are the pockets of high prevalence in India. India achieved a prevalence rate of <1/10,000 population at the national level on January 1, 2006, yet there are pockets of high prevalence in a few states. Previous studies in the state of Maharashtra have concluded an ineffective outreach leaving disease hotspots across the region. Reasons implicated for such inconsistency are a high migration rate and a dense tribal population devoid of effective health-care infrastructure.[3]

M. leprae is a straight or slightly curved rod shaped bacillus, with rounded ends, measuring 1.8-5 microns in length and 0.2-0.5 microns in diameter. In smears, it is red stained with fuchsin using the Ziehl Neelsen stain and because of its high lipid content, it does not get discoloured when washed with alcohol and acid, thus being acid-fast bacilli. When Gram staining is used, M. leprae is gram-invisible, appearing as negatively stained images, called ghosts, or as bead like Gram positive bacilli.[5] The main route of transmission is the nasal mucosa. Less commonly, it can occur by skin erosions.[6] Other transmission routes, such as blood, vertical transmission, breast milk, and insect bites are also possible. Three cardinal signs have remained the basis for the basis of clinical diagnosis of leprosy.[6] Other transmission routes, such as blood, vertical transmission, breast milk, and insect bites are also possible. Three cardinal signs have remained the basis for the basis of clinical diagnosis of leprosy.[7]

The classification system of Ridley and Jopling uses the concept of spectral leprosy based on clinical, immunological and histopathological criteria.[8] The borderline form is divided into borderline tuberculoid (BT), borderline lepromatous (BL) and mid-borderline (BB) forms. Leprosy reactions result from changes in the immune balance between the host and M. leprae.

Patients with a strong cell-mediated immune reaction had few lesions with low or undetectable mycobacteria and were classified as having tuberculoid forms, whereas patients anergic to M. leprae had multiple lesions with higher loads of mycobacteria and were classified as having lepromatous forms[9]. Where an affected person falls within the classification model depends on their immune response[10]. Tuberculoid forms show little evidence of M. leprae-specific antibodies but a vigorous T helper (Th)1 cytokine response, whereas lepromatous forms show a Th2 cytokine response with markedly high antibody titers but T-cell hypo-response (anergy)[11].

Lepromin Test

The lepromin test is an intradermal injection of the lepromin antigen (inactivated M. leprae extracted from lepromas) into the flexor surface of the forearm, and the delayed-type hypersensitivity (DTH) reaction is read at two time points. On inspection, there is an early (Fernandez) reaction and the other for a late (Mitsuda) reaction. Fernandez reaction was performed for 24 or 48 h. The Mitsuda reaction was read at 21 days and indicated resistance to Bacillus. A nodule measuring >5 mm indicates positivity[12]. While patients with TT/BT evoke a strong DTH skin reaction, those with BL/LL fail to develop any skin reaction to lepromin[13]. A previous study showed that there was no difference in the mean reaction size between household contacts and noncontact testing with two soluble antigens of M. leprae, indicating that these antigens are not useful for the diagnosis of leprosy[13]. However, lepromin tests (lepromin H and lepromin A) are useful for confirming disease classification and prognosis[12]. Lepromin antigen tends to prime the immune response and is not specific for leprosy. Earlier skin test antigens for leprosy (lepromin A, Rees antigen, and Convit antigen) have been used for nearly 40 years and have been proven safe when used in humans[14]\. Recently, two new skin test antigens, Mycobacterium leprae soluble antigens (MLSA) devoid of glycolipids, particularly lipoarabinomannan (LAM), called MLSA-LAM, and MLCwA (M. leprae cell wall-associated antigens), derived from M. leprae grown in armadillos, were produced. A clinical trial[12] showed that both antigens at low doses had a sensitivity of 20% and 25% in BT/TT leprosy patients, but specificity was 100% and 95%; at the high dose of both antigens, sensitivity was 10% and 15%, specificity was 70% and 60%, and BL/LL leprosy patients were anergic to the leprosy antigens[15].

Overall, early skin test antigens (lepromin A) for leprosy are safe when used in humans. Lepromin tests have poor accuracy for diagnosing leprosy in children. Lepromin tests have several shortcomings, including inconsistent readings due to soft rather than hard DTH reactions in some individuals, variation in potency between batches due to quality control issues, and lack of adequate sensitivity and specificity [12]. These tests are still useful for confirming classification and prognostic purposes.

Table 1: Distribution of patients according to age (N=906)

Age	Number (No.)	Percentage (%)
<=20 years	134	14.8
21-40 years	92	10.2
41-60 years	449	49.6

>60 years	231	25.5
Total	906	100.0

The above table shows the distribution of patients according to age.

134 (14.8%) patients were in the age group of <=20 years; 92 (10.2%) in the age group of 21-40 years; 449 (49.6%) in the age group of 41-60 years; and 231 (25.5%) in the age group of more than 60 years.

Most of the patients were in the age group of 41-60 years and more than 60 years age group.

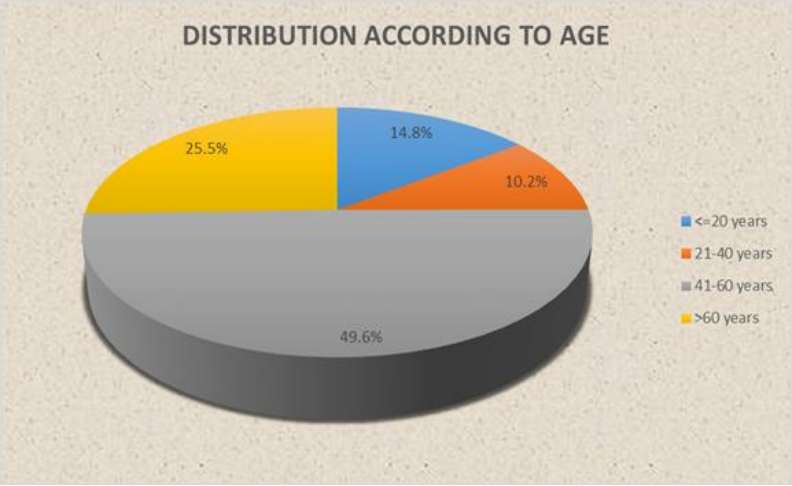


Figure 1: The pie diagram shows the distribution according to age

Table 2: Distribution of patients according to sex (N=906)

Sex	Number (No.)	Percentage (%)
Female	353	39.0
Male	553	61.0
Total	906	100.0

The above table shows the distribution of patients according to sex.

There were 353 (39%) females and 553 (61%) were males. The male: female ratio was 1.56:1.

Most of the patients were males.

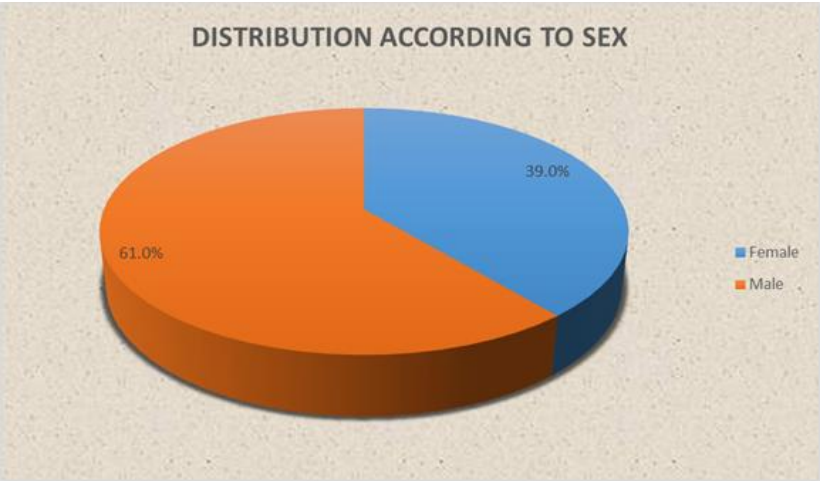


Figure 1 : The pie diagram shows the distribution according to sex

Table 3: Distribution of patients according to characteristic facies (N=906)

Characteristic facies	Number (No.)	Percentage (%)
Present	187	20.6
Absent	719	79.4
Total	906	100.0

The above table shows the distribution of patients according to characteristic facies. Characteristics facies was present in 187 (20.6%) patients and it was absent in 719 (79.4%) patients. In most of the patients, characteristic facies was absent.

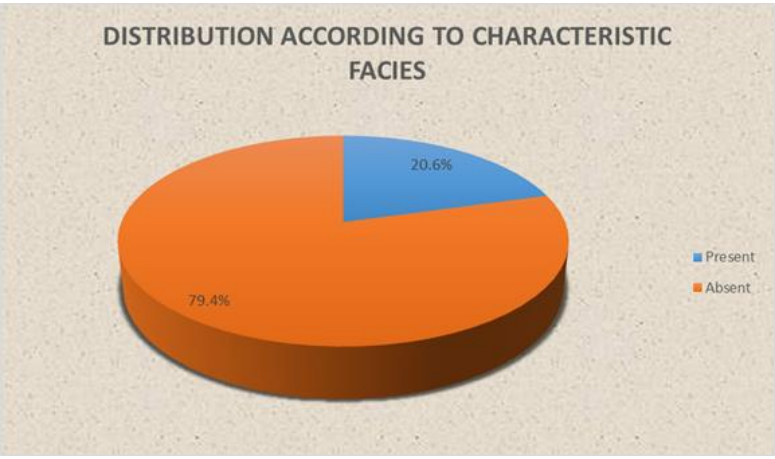


Figure 2 : The pie diagram shows the distribution according to characteristic facies

Table 4: Distribution of patients according to mucosal involvement (N=906)

Mucosal Involvement	Number (No.)	Percentage (%)
No involvement	698	77.0
Nose	153	16.9
Eye	107	11.8
Face	1	0.1

The above table shows the distribution of patients according to mucosal involvement.

Mucosa was not involved in 698 (77%) patients. Nose involvement was seen in 153 (16.9%) patients, eye involvement was seen in 107 (11.8%) patients and face involvement was seen in 1 (0.1%) patient. In most of the patients, mucosal involvement of nose and eye were seen.

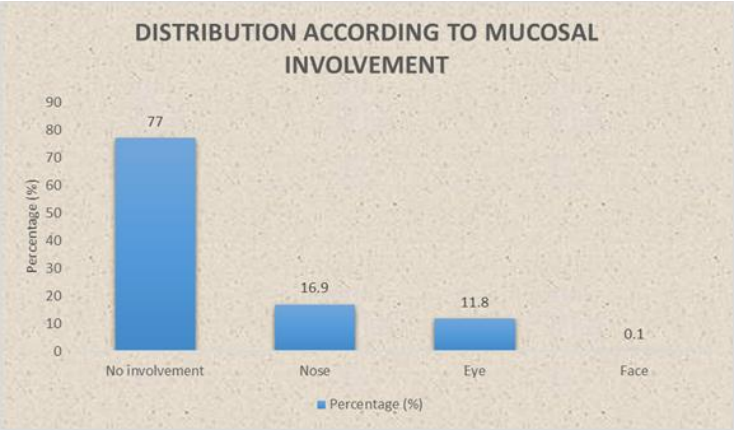


Figure 3 : The bar diagram shows the distribution according to mucosal involvement

Table 5: Distribution of patients according to number of sites involved (N=906)

Number of sites involved	Number (No.)	Percentage (%)
No involvement	45	5.0
<=3 sites	592	65.3
4-6 sites	267	29.5
7-10 sites	2	0.2
Total	906	100.0

The above table shows the distribution of patients according to number of sites involved.

In 45 (5%) patients, no sites were involved. In 592 (65.3%) patients, <=3 sites were involved, in 267 (29.5%) patients, 4 to 6 sites were involved and in 2 (0.2%) patients, 7 to 10 sites were involved.

In most of the patients <=3 sites were involved.

Figure 4: The bar diagram shows the distribution according to number of sites involved

Table 6: Distribution of patients according to nerve abscess (N=906)

Nerve abscess	Number (No.)	Percentage (%)
Absent	895	98.8
Present	11	1.2
Total	906	100.0

The above table shows the distribution of patients according to nerve abscess.

Nerve abscess was present in only 11 (1.2%) patients, while it was absent in 895 (98.8%) patients.

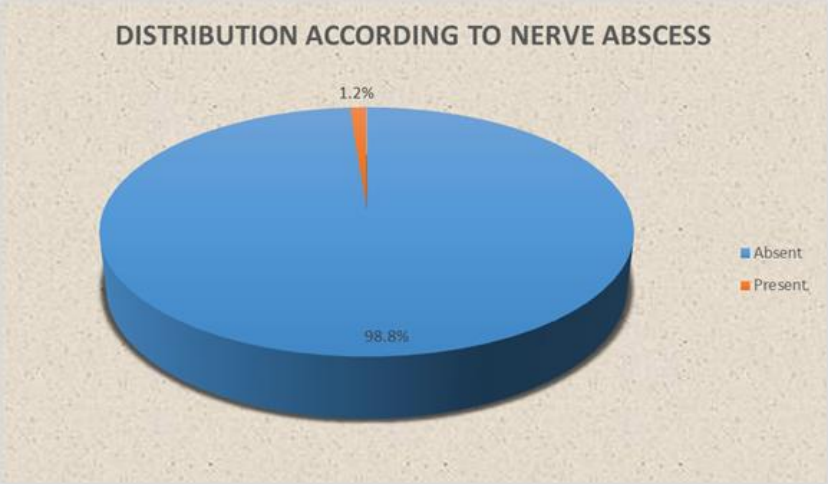


Figure 5 : The pie diagram shows the distribution according to nerve abscess

Table 7: Distribution of patients according to neuritis (N=906)

Neuritis	Number (No.)	Percentage (%)
Absent	579	63.9
Present	327	36.1
Total	736	100.0

The above table shows the distribution of patients according to neuritis.

Neuritis was present in 327 (36.1%) patients, while it was absent in 579 (63.9%) patients.

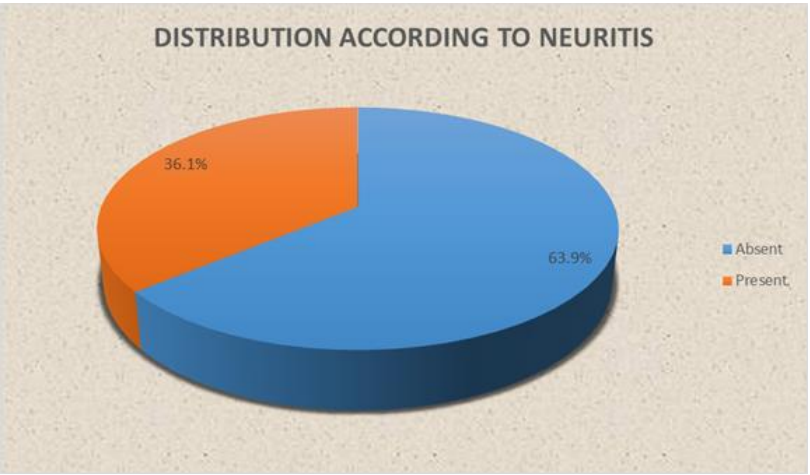


Figure 6 : The pie diagram shows the distribution according to neuritis

Table 8: Distribution of patients according to slit skin smear (N=906)

Slit skin smear	Number (No.)	Percentage (%)
1-3 numbers	216	23.8
4-6 numbers	419	46.2
>6 numbers	1	0.1

Negative	270	29.8
Total	906	100.0

The above table shows the distribution of patients according to slit skin smear.

In 216 (23.8%) patients, 1 to 3 slit skin smears were taken; in 419 (46.2%) patients, 4 to 6 numbers of slit skin smears were taken and in 1 (0.1%) patient, more than 6 slit skin smears were taken to confirm the diagnosis of leprosy.

In our study, slit skin smear was found to be positive in 636 (70.2%) patients, while it was negative in 270 (29.8%) patients.

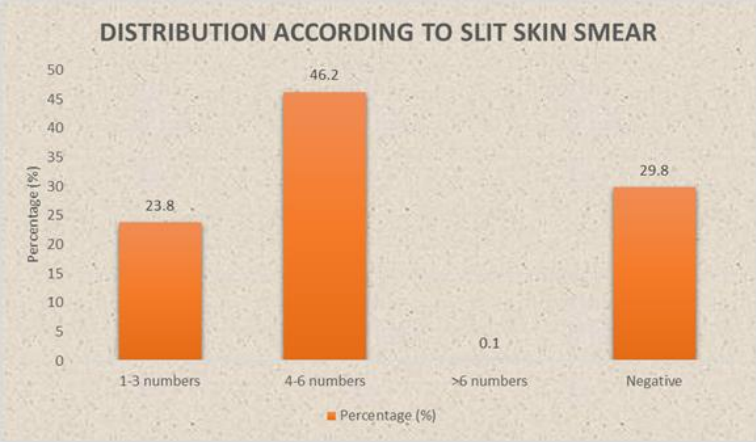


Figure 7: The bar diagram shows the distribution according to slit skin smear

Table 9: Distribution of patients according to type of leprosy (N=906)

Type of leprosy	Number (No.)	Percentage (%)
BT Hansen's	305	33.7
BL Hansen's	227	25.1
LL Hansen's	197	21.7
BB Hansen's	68	7.5
Pure Neuritic Hansen's	46	5.1
Histoid Hansen's	21	2.3
Indeterminate Hansen's	16	1.8
ENL	13	1.4
TT Hansen's	13	1.4
Total	906	100.0

The above table shows the distribution of patients according to type of leprosy.

BT Hansen's was seen in 305 (33.7%) patients; BL Hansen's in 227 (25.1%) patients; LL Hansen's in 197 (21.7%) patients; BB Hansen's in 68 (7.5%) patients; Pure Neuritic Hansen in 46 (5.1%) patients; Histoid Hansen's in 21 (2.3%) patients; Indeterminate Hansen's in 16 (1.8%) patients; ENL in 13 (1.4%) patients; and TT Hansen's in 13 (1.4%) patients.

BT, BL and LL were the most common types of leprosy seen in our study.

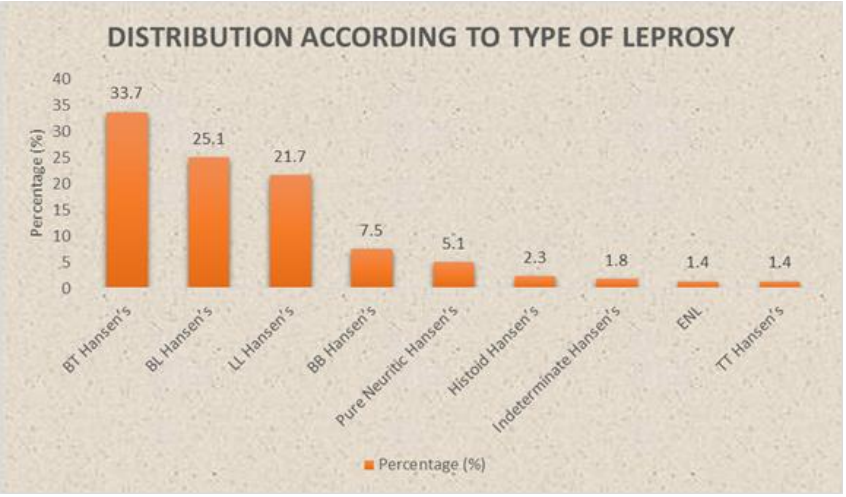


Figure 8: The bar diagram shows the distribution according to type of leprosy

Table 10: Distribution of patients according to treatment taken (N=906)

Treatment taken	Number (No.)	Percentage (%)
MB-MDT	680	75.1
PB-MDT	224	24.7
PB-MBT	2	0.2
Total	906	100.0

The above table shows the distribution of patients according to treatment taken.

MB-MDT was given in 680 (75.1%) patients; PB-MDT in 224 (24.7%) patients and PB-MBT in 2 (0.2%) patients.

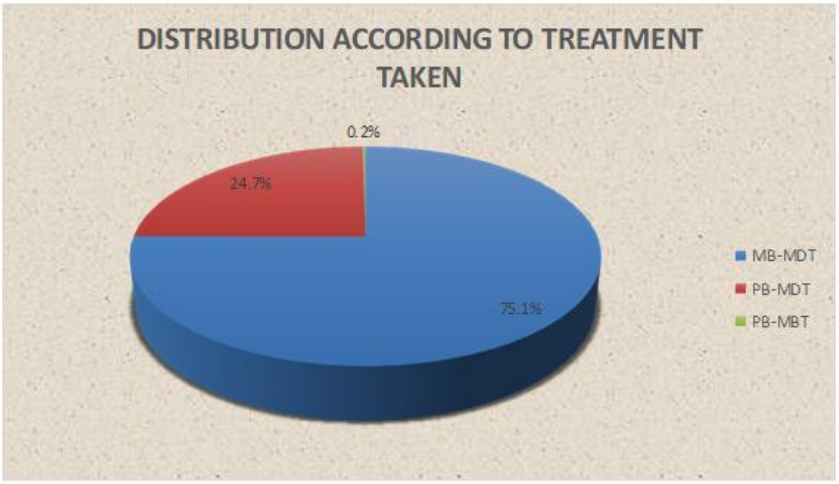


Figure 9 : The pie diagram shows the distribution according to treatment taken

Table 11: Distribution of patients according to family history of leprosy (N=906)

Family history of leprosy	Number (No.)	Percentage (%)
Absent	713	78.7
Present	193	21.3
Total	906	100.0

The above table shows the distribution of patients according to family history of leprosy.

In 193 (21.3%) patients, there was a positive family history of leprosy; while in 713 (78.7%) patients, there was no family history of leprosy.

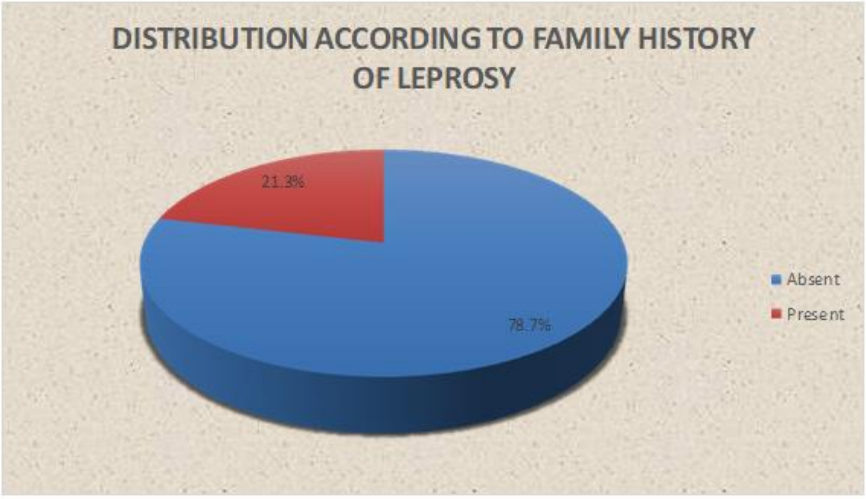


Figure 11: The pie diagram shows the distribution according to family history of leprosy

Table 12: Distribution of patients according to reaction (N=906)

Reaction	Number (No.)	Percentage (%)
No reactions	602	66.4
Type 1	185	20.4
Type 2	119	13.1
Total	906	100.0

The above table shows the distribution of patients according to reaction.

185 (20.4%) patients had Type 1 and 119 (13.1%) patients had Type 2 reactions, while in 602 (66.4%) patients, there were no reactions.

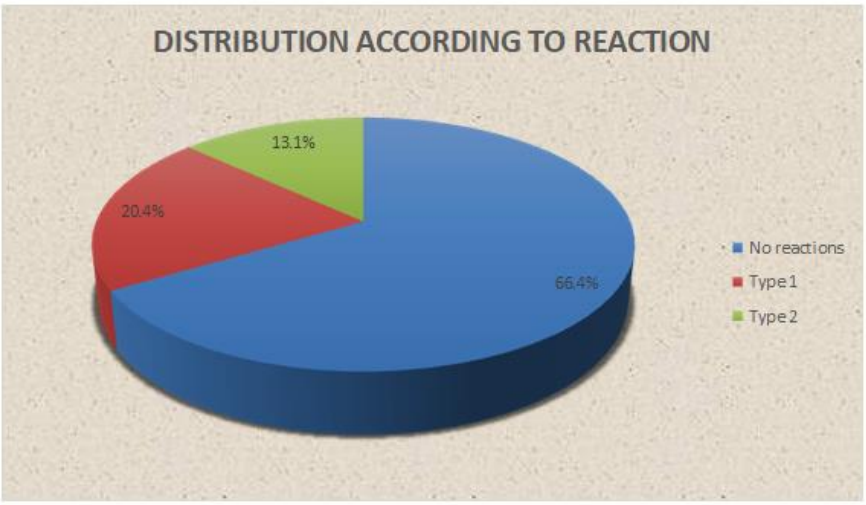


Figure 12: The pie diagram shows the distribution according to reaction

Table 13: Distribution of patients according to deformity (N=906)

Deformity	Number (No.)	Percentage (%)
Absent	236	26.0
Grade 0	62	6.8
Grade 1	338	37.3
Grade 2	270	29.8
Total	906	100.0

The above table shows the distribution of patients according to deformity.

Deformity was absent in 236 (26%) patients. In 62 (6.8%) patients, there was Grade 0 deformity; in 338 (37.3%) patient, there was Grade 1 deformity; and in 270 (29.8%) patients, there was Grade 2 deformity.

Overall deformity due to leprosy were seen in 670 (73.9%) patients.

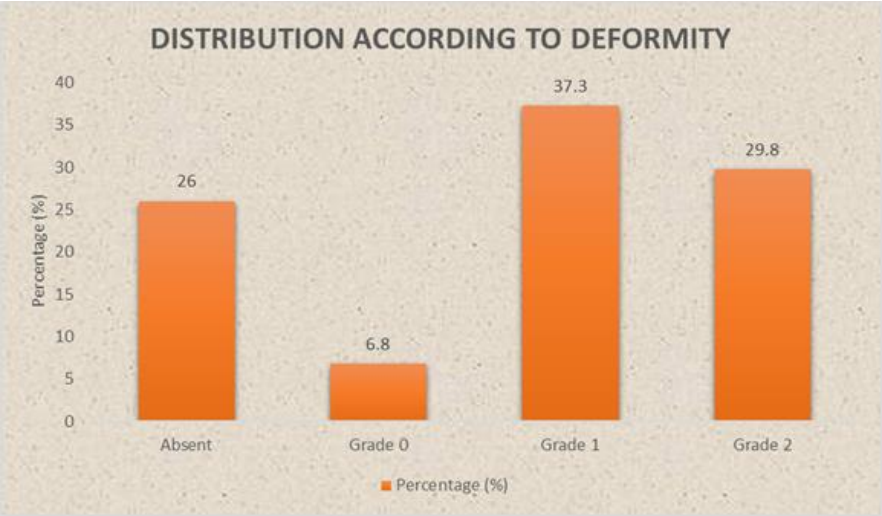


Figure 13: The bar diagram shows the distribution according to deformity

Table 14: Distribution of patients according to relapse (N=906)

Relapse	Number (No.)	Percentage (%)
Absent	861	95.0
Present	45	5.0
Total	906	100.0

The above table shows the distribution of patients according to relapse.

Relapse of the disease was seen in 45 (5%) patients.

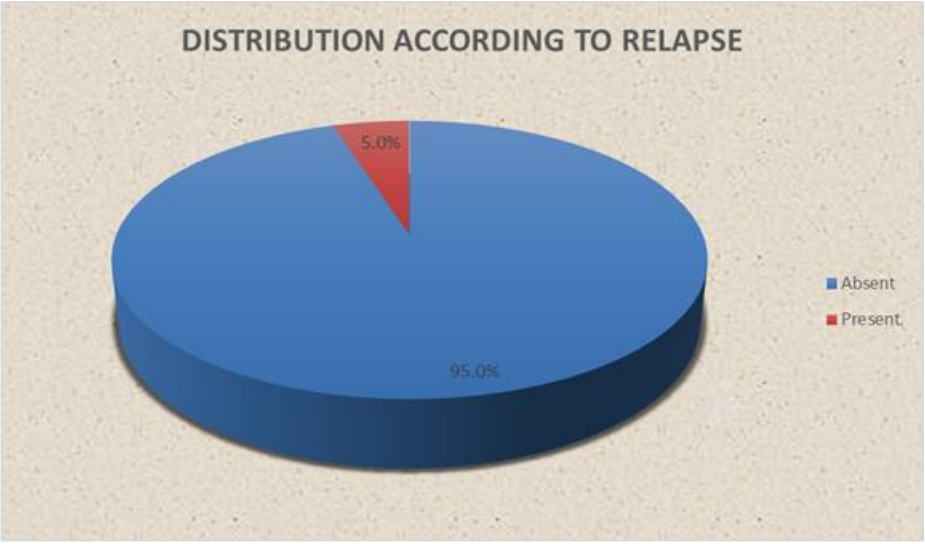


Figure 14: The pie diagram shows the distribution according to relapse

Table 15: Distribution of patients according to side effects of drugs (N=906)

Side effects of drugs	Number (No.)	Percentage (%)
Absent	847	93.5
Present	59	6.5
Total	906	100.0

The above table shows the distribution of patients according to side effects of drugs.

Side effects of drugs was seen in only 59 (6.5%) patients.

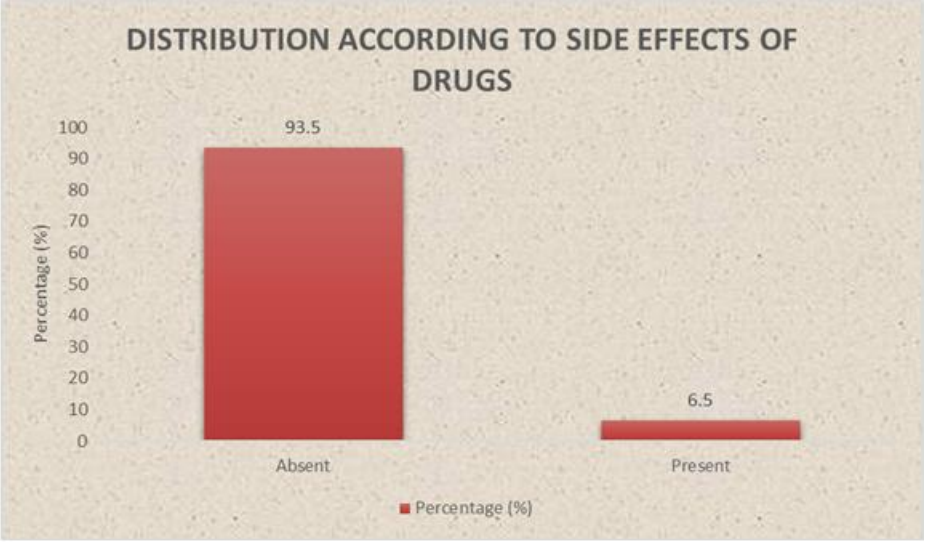


Figure 15: The bar diagram shows the distribution according to side effects of drugs

Table 16: Distribution of patients according to number of patients seen in the last 10 years (N=906)

Number of patients seen in the last 10 years	Number (No.)	Percentage (%)
2010	49	5.4
2011	69	7.6

2012	74	8.2
2013	80	8.8
2014	89	9.8
2015	99	10.9
2016	93	10.3
2017	108	11.9
2018	124	13.7
2019	121	13.4
Total	906	100.0

The above table shows the distribution of patients according to number of patients seen in the last 10 years.

49 (5.4%) patients were seen in 2010; 69 (7.6%) patients were seen in 2011; 74 (8.2%) patients were seen in 2012; 80 (8.8%) patients were seen in 2013; 89 (9.8%) patients were seen in 2014; 99 (10.9%) patients were seen in 2015 patients; 93 (10.3%) patients were seen in 2016; 108 (11.9%) patients were seen in 2017; 124 (13.7%) patients were seen in 2018 and 121 (11.4%) patients were seen in 2019.

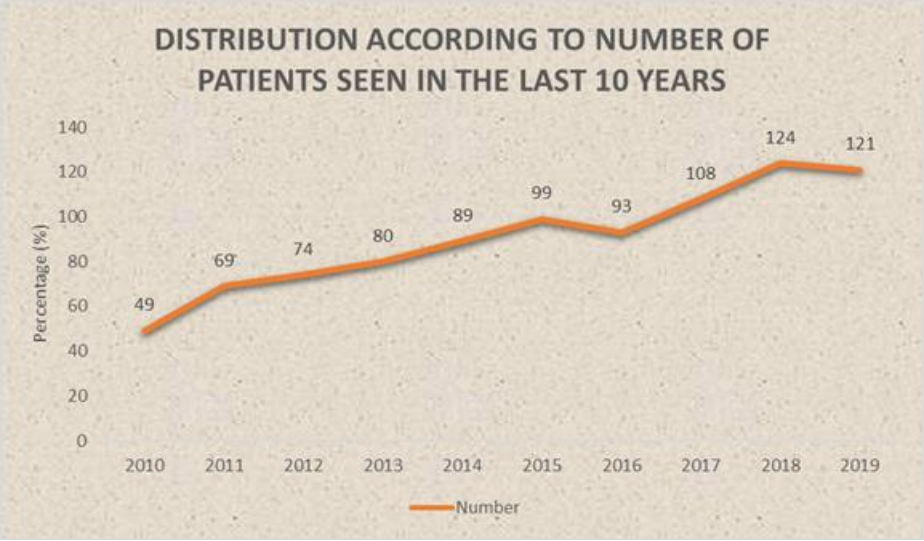


Figure 16: The line diagram shows the distribution according to number of patients seen in the last 10 years

Table 17: Distribution of patients according to number of nerves involved

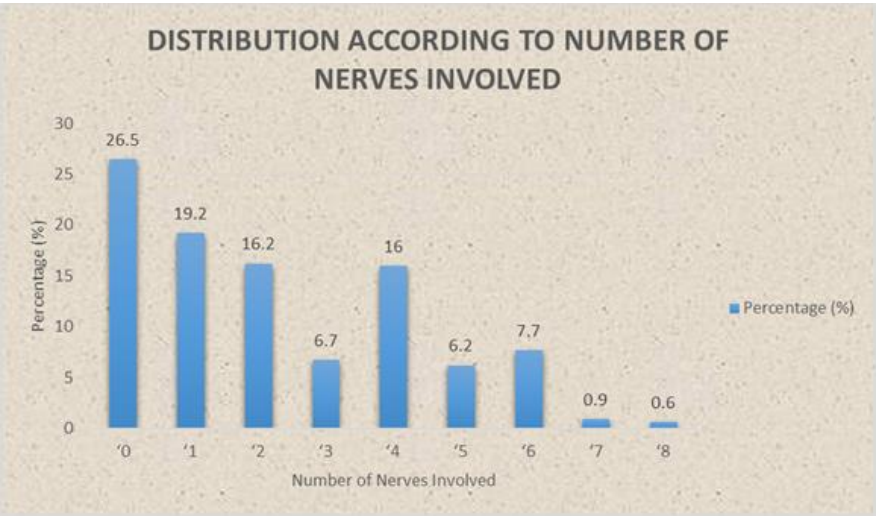
Number of Nerves Involved	Number (No.)	Percentage (%)
‘0	240	26.5
‘1	174	19.2
‘2	147	16.2
‘3	61	6.7
‘4	145	16.0
‘5	56	6.2
‘6	70	7.7

‘7	8	0.9
‘8	5	0.6
Total	906	100.0

The above table shows the distribution of patients according to number of nerves involved.

In 240 (26.5%) patients, none of the nerves were involved; in 174 (19.2%) patients 1 nerve was involved; in 147 (16.2%) patients 2 nerves were involved; in 61 (6.7%) patients 3 nerves were involved; in 145 (16%) patients 4 nerves were involved; in 56 (6.2%) patients 5 nerves were involved; in 70 (7.7%) patients 6 nerves were involved; in 8 (0.9%) patients 7 nerves were involved; and in 5 (0.6%) patients 8 nerves were involved.

In most of the patients 1 and 2 nerves were involved.



Figur17: Bar diagram shows the distribution of patients according to number of nerves involved

Table 18: Distribution of patients according to the nerves involved

Nerves Involved	Number (No.)	Percentage (%)
Ulnar nerve	511	56.4
Peroneal nerve	265	29.2
Radial nerve	227	25.1
Posterior tibial nerve	109	12.0
Median nerve	44	4.9
Sural nerve	14	1.5
Auricle nerve	7	0.8

The above table shows the distribution of patients according to nerves involved.

Ulnar nerve involvement was seen in 511 (56.4%) patients; peroneal nerve involvement was seen in 265 (29.2%) patients; radial nerve involvement was seen in 227 (25.1%) patients; posterior tibial nerve involvement was seen in 109 (12%) patients; median nerve involvement was seen in 44 (4.9%) patients; sural nerve involvement was seen in 14 (1.5%) patients; and auricle nerve involvement was seen in 7 (0.8%) patients.

Ulnar, peroneal and radial nerve were more commonly involved in these patients.

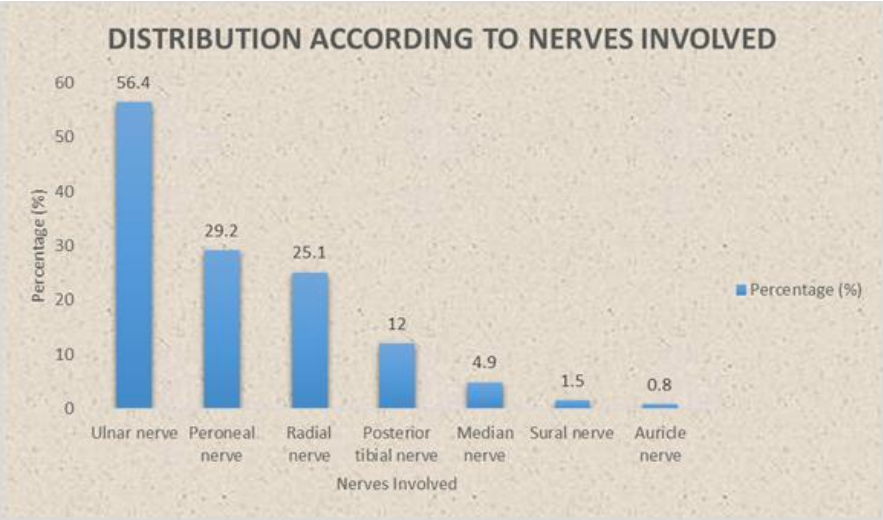


Figure 18: Bar diagram shows the distribution of patients according to nerves involved

Discussion

AGE

Our study shows 134 (14.8%) patients were in the age group of <=20 years; 92 (10.2%) in the age group of 21-40 years; 449 (49.6%) in the age group of 41-60 years; and 231 (25.5%) in the age group of more than 60 years. Most of the patients were in the age group of 41-60 years and more than 60 years age group. Study by mushtaq et al [18] 34 % patient of age group 15-29 and 32 .4 % patient in age group of 30-44

Sex

In our study There were 353 (39%) females and 553 (61%) were males. The male: female ratio was 1.56:1. Most of the patients were males. However study by Vengarakath Puthiyapura Reyila et al[16] male to female ration was 3:1 which is higher then our study but both studies shows higher number of males

Distribution of patients according to mucosal involvement

In our study Mucosa was not involved in 698 (77%) patients. Nose involvement was seen in 153 (16.9%) patients, eye involvement was seen in 107 (11.8%) patients and face involvement was seen in 1 (0.1%) patient. However study by Vengarakath Puthiyapura Reyila et al[16] 76 patients, 39 patients (51.3%) had no disability involving eyes, hands or feet which is similar to our results

Distribution of patients according to type of leprosy

In our study BT Hansen's was seen in 305 (33.7%) patients; BL Hansen's in 227 (25.1%) patients; LL Hansen's in 197 (21.7%) patients; BB Hansen's in 68 (7.5%) patients; Pure Neuritic Hansen in 46 (5.1%) patients; Histoid Hansen's in 21 (2.3%) patients; Indeterminate Hansen's in 16 (1.8%) patients; ENL in 13 (1.4%) patients; and TT Hansen's in 13 (1.4%) patients.BT, BL and LL were the most common types of leprosy seen in our study. However, study by Nisha et al [17] majority of the patients had borderline tuberculoid (39%), followed by borderline lepromatous (18%), tuberculoid (15%), lepromatous (12%) and histoid (6%). have any reactions. 15% had Type 1 while 16% had Type 2 reactions. 10 BT, 11 BL and 8 LL patients had reactions. which is similar to our study

Distribution of patients according to deformity

In our study Deformity was absent in 236 (26%) patients. In 62 (6.8%) patients, there was Grade 0 deformity; in 338 (37.3%) patient, there was Grade 1 deformity; and in 270 (29.8%) patients, there was Grade

2 deformity. Overall deformity due to leprosy were seen in 670 (73.9%) patients study by Vengarakath Puthiyapura Reyila et al[16] shows Of these 76 patients, 39 patients (51.3%) had no disability involving eyes, hands or feet Grade 1 disability was observed in 13 patients (17.1%) and Grade 2 in 24 patients (31.6%).which is similar to our study

Distribution of patients according to reaction

185 (20.4%) patients had Type 1 and 119 (13.1%) patients had Type 2 reactions, while in 602 (66.4%) patients, there were no reactions however study by Vengarakath Puthiyapura Reyila et al[16]. Shows of the 76 patients with newly diagnosed leprosy, 11 presented with lepra reaction. Ten were Type 1 and one was Type 2 lepra reaction. Which is not similar to our study may be due lower sample size in their study

Neuritis

Distribution of patients according to number of patients seen in the last 10 years

In our study 49 (5.4%) patients were seen in 2010; 69 (7.6%) patients were seen in 2011; 74 (8.2%) patients were seen in 2012; 80 (8.8%) patients were seen in 2013; 89 (9.8%) patients were seen in 2014; 99 (10.9%) patients were seen in 2015 patients; 93 (10.3%) patients were seen in 2016; 108 (11.9%) patients were seen in 2017; 124 (13.7%) patients were seen in 2018 and 121 (11.4%) patients were seen in 2019 which shows increasing trend which is contradictory to the study by Mushtaq et al[18] which shows A decreasing trend of leprosy cases was observed during 2005–2014, although this was not statistically significant. Whereas the mean case detection of leprosy based on voluntary reporting was 84.60 ± 22.37 during the first 5 years (2005–2009), it reduced to 69.00 ± 8.34 during the last 5 years (2010–2014).

Limitation: This is a reterospective study with duration of 10 years

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