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CLINICAL PATTERN OF LEPROSY AND THEIR ASSOCIATED DEFORMITIES AND DISABILITIES- A 10 YEAR STUDY AT A TERTIARY CARE CENTRE'

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Abstract
Background: Leprosy or Hansen's disease is a chronic granulomatous infectious disease caused by Mycobacterium leprae which primarily affects the peripheral nervous system, the skin, mucosa of the upper respiratory tract and eyes, apart from certain other tissues. The crippling deformities resulting from leprosy deeply affect the quality of life of the patients and result in extensive loss of manpower and economic loss to the society.
Aim: The present study is undertaken to describe the clinical pattern of the disease and the prevalence of deformities in leprosy patients.
Method and materials: We aimed to study the clinical pattern of leprosy and the deformities registered for a period of last 10 years.
Results: In our study, out of the 228 patients, 103 patients (45.1 %) had deformities. The most common deformity was grade 1(64 patients) which is sensory impairment.
Conclusion: In our study, we encountered significant number of deformities which emphasize the importance of routine assessment of Nerve Function Impairment of all leprosy patients.

Keywords: leprosy, deformities, Nerve Function Impairment

INTRODUCTION: Leprosy or Hansen's disease is a chronic granulomatous infectious disease caused by Mycobacterium leprae which primarily affects the peripheral nervous system, the skin, mucosa of the upper respiratory tract and eyes, apart from certain other tissues.[1, 2] According to William Jopling and D.S. Ridley classified leprosy into tuberculoid, borderline tuberculoid, mid-borderline, borderline lepromatous, and lepromatous leprosy.[3]

In 1998, for treatment purpose, WHO classified leprosy on the basis of number of skin lesions, into paucibacillary (PB) and multibacillary (MB) leprosy . Nerve damage in leprosy is associated with

physical disability and deformity and is considered to be the most dreaded complication. This disablement is a progressive series of events which has three recognised stages:

Impairment: changes or abnormalities in body parts and functions as a consequence of the disease. [4]Impairments may be: 1. Primary- Directly due to disease. Eg: face disfigurement, eye changes, loss of sensation, motor paralysis in hands, feet & eyes. 2. Secondary- As a consequence of neglect, excessive use, careless or improper care of parts with primary impairment.

Disability (activity limitation): inability to do certain activities, which are normally possible.

Handicap (participation restriction): Chronic disabled persons face many disadvantages that limit or prevent them from fulfilling their normal role in society, making leprosy one of the major cause of morbidity. [5]

Deformity: Deformity is defined as any loss or abnormality of psychological, physiological or anatomical structure or function.

Types of deformities:[6]Depending on their causation, deformities in leprosy patients are described as-
1. **Specific deformities** – arise from local infiltration with Mycobacterium leprae.
2. **Paralytic deformities** – result from damage to motor nerves.
3**. Anaesthetic deformities** – occur as a late sequela of neglected injuries in parts rendered insensitive.

The factors responsible for India contributing to the increase in the number of cases are- Delay in diagnosis of new cases, Irregular treatment and Early release of treatment. The present study is undertaken to note the clinical patterns of leprosy and the deformities registered over last 10 years (2011-2021) as well as to spread awareness about the importance of timely diagnosis of leprosy, to educate and motivate the patients for rehabilitation.

MATERIAL AND METHODS: This was a retrospective descriptive record-based study with patients of Hansen's disease, who attended the Dermatology OPD, Jaipur, Rajasthan. The study included data of last 10 years between January 2011 and December 2021.

Inclusion criteria: 1. All patients who were clinically and histopathologically diagnosed with leprosy, irrespective of treatment status. 2. Patients who were diagnosed for the first time, who are on active treatment and those who were RFT but in the surveillance period.

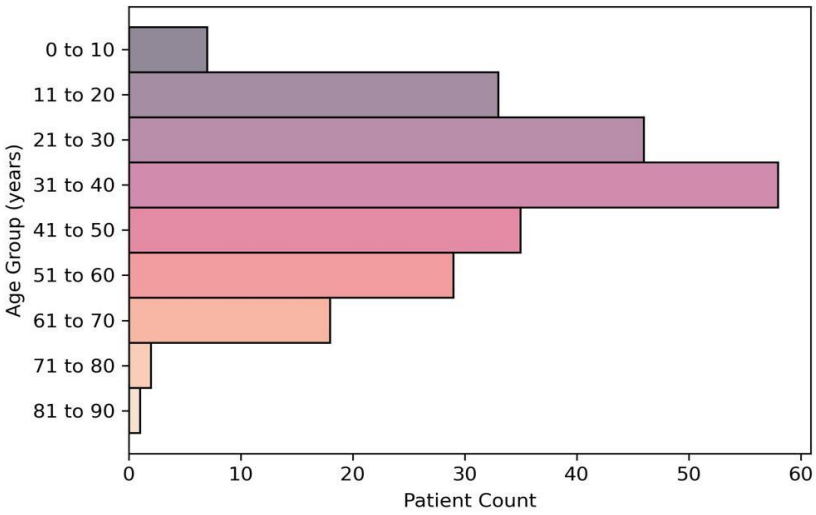
Exclusion criteria: 1. Patients with disabilities of some other known cause.
Due consent was taken from all the registered patients after being informed about the aim of the study. A Case Proforma was prepared for each patient which was used to record the complaints, history, clinical features and results of clinical examination and investigations. The following details were recorded in each patient's file – 1.Sociodemographic variables, detailed history, general health and examination, peripheral nerves, eyes, oral and nasal mucosa examination. 2. Face, hands and feet were examined for any Visible Deformities. 3. Nerve function assessment for sensory and motor loss. 4. Slit skin smear findings. 5. Skin biopsy findings. A printed proforma was used for all the documentation. WHO Disability Grading system (Brandsma & van Brakel et al 2003) was used –

Hands and Feet: Grade '0' - No anaesthesia, no visible deformity or damage. Grade'1'- Anaesthesia present, but no visible deformity or damage. Grade '2'- Visible deformity or damage present.

Eyes: Grade '0'- No eye problem due to leprosy, no evidence of visual loss. Grade '1'- Eye problem due to leprosy present, but vision not severely affected. Grade '2'- Severe visual impairment (vision worse than 6/60: Inability to count fingers at 6 meters distance), also includes lagophthalmos, irido-cyclitis and corneal opacities. Data was analysed using a master chart.

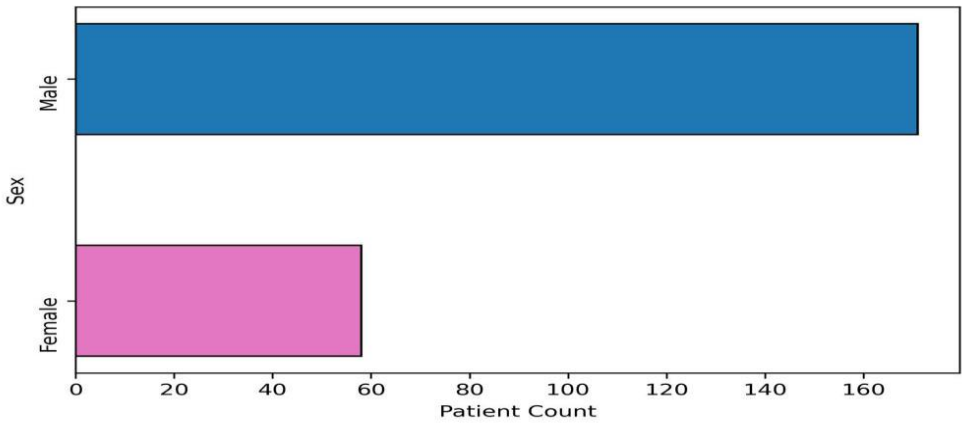
RESULTS: 228 patients of Hansen's disease who presented to Dermatology OPD, Jaipur, Rajasthan were studied.

Age distribution: The age of the patients ranged from 8 to 85 years. The majority were in the 31-40 years group followed by 21-30 years age group. (graph1)



Graph 1: Age distribution

Sex distribution: Out of the 228 patients, 170 were males (74.56%) and 58 were females (25.44%). Male to female ratio was 2.9: 1. (graph2)



Graph 2: Sex distribution

Socio-economic status: 135 out of 228 patients (59.2%) belonged to lower class, 89 patients (39.03%) belonged to middle class and 4 patients (1.77%) belonged to upper class. (Table 1)

Presenting complaints: Presenting complaints of 228 cases showed that 172 (75.4%) presented with skin lesions, 15 patients (6.5 %) came with sensory or motor impairment without any skin lesions,

while 14 patients (6.1%) presented with symptoms of reactions and its complications and 27 patients came with other complaints (Table 2).

Table 1: Socio-economic status

Socio-Economic Status		
Occupation	**Patients**	**Percentage**
Lower class	135	59.2%
Middle class	89	39.03%
Upper class	4	1.77%

Table 2: Presenting complaints

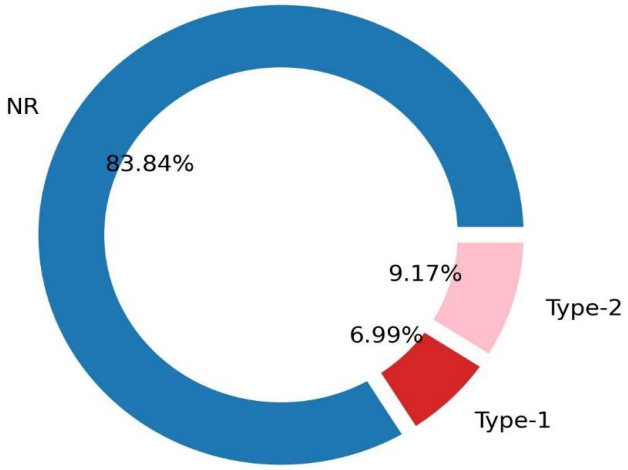
Presenting Complaints		
Presenting Complaints	**Patients**	**Percentage**
Skin Lesions	172	75.4%
Sensory or motor impairment (without skin lesions)	15	6.5%
Reactions	14	6.1%
Others	27	12%

Number of skin lesions: Most of the study group had less than or equal to 5 skin lesions which constituted 77.2% (176 patients) and rest 52 patients (22.8%) had more than 5 skin lesions (table 3).[
Reactions: In our study, 16.16% (36) patients presented in reaction. Out of 228 patients, 9.17% (21) patients presented with Erythema nodosum leprosum, 6.99% (15) [fig1] patients presented with type 1 reaction [fig2]. (Graph 3)

Table 3: Number of skin lesions

Number of Skin Lesions		
No. of skin lesions	**Patients**	**Percentage**
>5	52	22.8%
≤5	176	77.2%

Graph 3: Reactions



Nerve involvement: 112 patients had multiple nerve thickening (49.1%) and single nerve was thickened in 74 patients (32.5%). In 42 patients there was no nerve thickening (18.4%) (Table 4)
AFB Smear: Out of the 228 cases only 31 were smear positive (13.6%) and 197 cases (86.4%) were smear negative (Table 5).

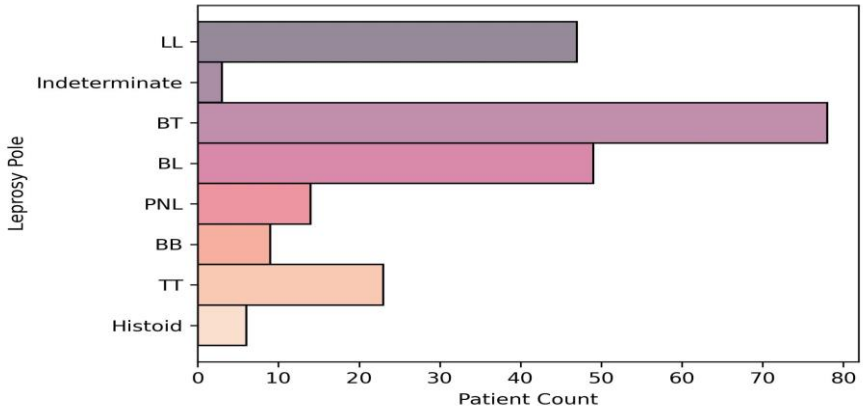
Table 4: Nerve involvement

Nerve Involvement		
Number of nerves	**Patients**	**Percentage**
No-Nerve	42	18.4%
Single	74	32.5%
Multiple	112	49.1%

Table 5: AFB Smear

AFB Smear		
AFB	**Patients**	**Percentage**
Positive	31	13.6%
Negative	197	86.4%

Spectrum of leprosy: Of the 228 cases, proportion of BT cases were 77 (33.77%), which was higher compared to other forms of leprosy. PNL were 15 (6.5%), BL were 48 (21.05%), LL were 47 (20.61%), BB were 9 (3.95%) and TT were 23 (10.09%) and indeterminate were 3(1.32%). There were 6 (2.63%) cases with histoid leprosy. (Graph 4)



Graph 4: Spectrum of leprosy

WHO Classification: Most of the cases (189) belonged to MB (82.9%) and 39(17.1%) cases belonged to PB (Table 6).

Disability grade: Out of the 228 patients, 103 patients (45.1 %) had deformities. Among these patients, 61 patients (28%) had grade 1 deformity and 42 (15.7%) had grade 2 deformity. (Table 7)

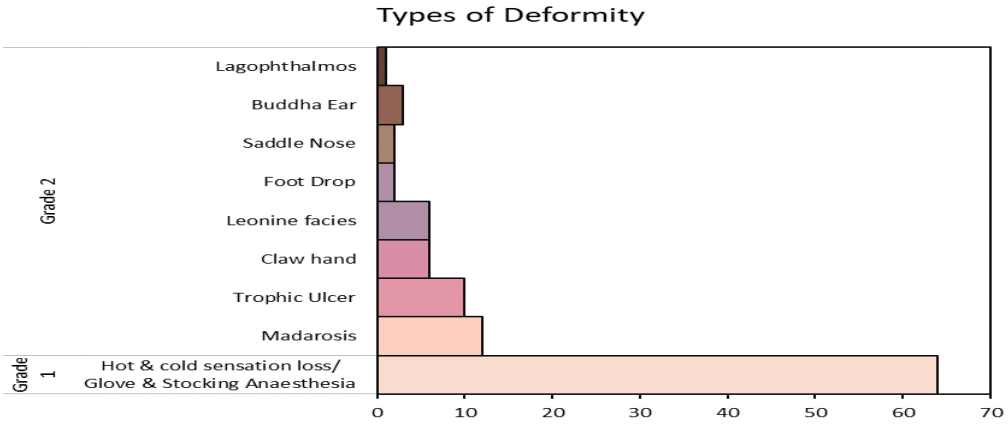
Table 6: WHO Classification

WHO Classification		
WHO Classification	**Patients**	**Percentage**
PB	39	17.1%
MB	189	82.9%

Table 7: Disability grade

Disability Grade		
Disability Grade	**Patients**	**Percentage**
No deformity	125	54.8%
Grade 1	61	26.8%
Grade 2	42	18.4%

Type of deformity: In our study, patients presented with a variety of deformities. Out of the 228 patients, 103 patients (45.1 %) had deformities. The most common deformity was grade 1(64 patients) which is sensory impairment. Among grade 2 deformity (36 patients), majority of the patients presented with madarosis (12), followed by trophic ulcers (10), claw hand (6) [fig 3], buddha ear (3), foot drop (2), saddle nose (2) [fig 4] and lagophthalmos (1) [fig 5]. Most deformities were seen in patients of BT, LL and those with reactions. (Graph 5)'



Graph 5: Type of deformity


Fig. 1


Fig. 2


Fig. 3

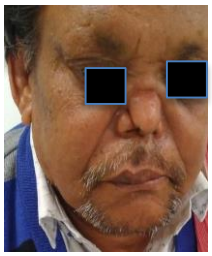


Fig. 4


Fig. 5

DISCUSSION: Age Distribution: In our study, the age of the patients varied from 8 to 85 years and maximum number of patients belonged to the age group of 31-40 years followed by 21-30 years. This was in concordance to a few other studies. [7-9] In our study, 12 patients (5.26%) out of 228 belonged to the paediatric age group (0-16 years), indicating an active transmission of the disease as leprosy detection in children below 15 years old is a strong indicator of recent transmission by active sources of infection. [10]

Sex Distribution: In a hospital based retrospective study conducted by Peters ES between 1988 to 1997, reported 66% males and 33% females with a ratio of 2:1. [11]
In the present study, 170 were males (74.56%) and 58 were females (25.44%). Male to female ratio was 2.9: 1. This increased incidence among males could be due to increased chances of exposure to men.

Socioeconomic status: Results show leprosy is more prevalent among people belonging to low socioeconomic strata, could be due to crowded and unhygienic conditions in both rural and urban areas. [12]

Clinical presentation: Majority of the patients presented with skin lesions, mostly presenting with >5 erythematous skin lesions, forming the maximum number in the borderline group. 15 patients in our study presented with only neurotic complaints (pure neuritic leprosy).
36 patients (16.16%) presented in reaction out of which 21 (9.1%) patients presented with painful nodules (Erythema nodosum leprosum) & 15 patients (7%) presented with type 1 reaction. Comparable results were seen in study by Salodkar and Kalla. [20] And also in study by Thakkar and Patel. [13] In our study, 186 patients had nerve involvement (74 – single nerve & 112- multiple nerves). The higher number of patients presenting in reaction in our study may be attributed to delay in diagnosis, more patients with nerve involvement in our study, lack of awareness about the symptoms of reactions in leprosy.

Spectrum of leprosy: Of the 228 cases, proportion of BT cases were 77 (33.77%), which is higher compared to other forms of leprosy. BL were 48 (21.05%), LL were 47 (20.61%), BB were 9 (3.95%). Pure Neuritic Leprosy was 5 (2.2%), and TT were 23 (10.09%) and indeterminate were 3 (1.32%). Just as in our study, several studies by Thakkar et al, Sharma et al, Shenoi et al, Nadkarni et al and Moorthy et al observed that maximum cases occur in the borderline group. [13-17] An epidemiological study in leprosy conducted by Anil Kumar reported 30.5% patients belonged to BT spectrum. PNL was the second most common type in this study i.e., 26%. [10] Incidence of PNL in a study by Anil Kumar was 20%. In most Indian studies PNL occurs with a higher frequency in South India where it constitutes up to 18%. This is in contrast to our study, where the PNL cases were much lesser, i.e., 5. This states the regional difference of the clinical profile of leprosy patients between Western and Southern part of India.

Deformity: In a study conducted by Schipper [18], 19% had grade-1 deformity and 21% had grade-2 deformity.in the present study. This is in contrast to our study, where Grade 1 defo-were more (28%) than grade 2 deformities (15.7%).

Type of deformity: Anaesthesia (Grade 1 deformity): In this study, the proportion of cases presenting with lesional hot and cold sensation loss or glove and stocking anaesthesia, was 26.7% (61 patients) and 59.2% of the cases with deformities.
The reason for this is increased proportion of BT and PNL cases, where involvement of nerves is early with extensive destruction. In LL cases, glove and stocking anaesthesia is a late presentation.
In a study by Raghvendra, Aneesha et al [19], the proportion of cases with anaesthesia (Grade 1 deformity) was 24%.

Trophic ulcers: In a pilot project conducted on leprosy by Jagannathan, 25% patients had trophic ulcers of the foot. A study conducted by Sow SO, 11% had trophic ulcers of foot. In our study 4.3 % patients had plantar ulcers. [20]

Madarosis- In our study, 12 out of 103 (5.2%) patients presenting with deformities, presented to us with loss of eyebrows. This is attributed to the increased cases of LL in our study. Raghvendra, Aneesha et al in their study on leprosy deformities [21], the reported that only 2% of patients had madarosis.
Claw hand: A study by Sow SO reported 33% had claw hand deformity.[22] In the present study, 6 patients (2%) of the total and 5.8 % of the patients with deformities had partial claw hand.

Foot drop: A pilot project done by Jagannathan; foot drop was observed in 7.76% of the patients. In a study conducted by Sow SO 113, 11% had foot drop. [23]
In the present study, only one patient (0.9 % of the deformities) had foot drop. In the lower limb the common peroneal nerve in the popliteal region and the posterior tibial nerve lower down in the leg are affected very often. About 2% of leprosy patients develop foot drop because of damage to common peroneal nerve in the popliteal region. [24]
In our study, 6 patients had leonine facies (2.6%), 3 patients had buddha ears (1 %), 2 patients had saddle nose deformity (0.8%) and only 1 patient had lagophthalmos (0.4%). This is similar to the findings in the study by Raghvendra, Aneesha et al, where 2% had madarosis and 2% had leonine facies.

CONCLUSION: Aim of our study was to educate these patients for basic self-care measures like not to walk barefoot, protection from injuries, daily inspection of hands & feet for any ulcers, physiotherapy, eye care, change in occupation, etc.
Patients should also be made aware of the symptoms of reactions like sudden redness, pain and swelling in the lesions, joint pains etc, so as to avoid any worsening of their clinical condition.

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