Original Research Article

A Hospital Based Cross Sectional Study to Detect Deformities/Disabilities in Patients with Leprosy

Bhagyashree Kanakareddi[1], Prabhakar M Sangolli[2], Adarsh Gowda[3*]

[1]Assistant Professor, Department of Dermatology, Gadag Institute of Medical Sciences, Gadag, Karnataka, India
[2]Associate Professor, Department of Dermatology, East Point College of Medical Sciences and Research Centre, Bengaluru, Karnataka, India
[3]Professor and HOD, Department of Dermatology, East Point College of Medical Sciences and Research Centre, Bengaluru, Karnataka, India

Received: 06-11-2021 / Revised: 18-12-2021 / Accepted: 10-01-2022

Abstract

Background: Leprosy is a common infectious disease causing as much social problem as a medical one. It leads to variety of disabilities resulting from nerve damage, immunological reactions and bacillary infiltration. Among communicable diseases, it remains a leading cause of peripheral neuropathy and disability worldwide. Disabilities and deformities are of major concern as it triggers social, economic and psychosocial problems of leprosy patients. Early identification can lead to prevention of progression of the deformities and also help in providing rehabilitation in advanced cases. **Objectives**: To detect deformities and disabilities in leprosy patients and grading them according to WHO deformity and disability grading system (2007). Method It was a hospital-based, cross sectional study. One hundred and forty-six patients with leprosy attending the Dermatology, Venereology and Leprosy out- patient department of a tertiary care hospital were included in the study. Detailed history was taken and all patients were examined for all kinds of deformities of hands, feet and face. Slit skin smear and biopsy was done in all new cases. **Results**: Among the 146 patients enrolled in the study, 85 were male and 61 were female, 10 were children, with a mean age of 38.1(±15.6) years. The mean duration of disease was 2.6 (±4.1) years. A statistically significant ($p < 0.001$) number of patients with deformity presented to hospital by 2 years of onset. Proportion of deformities was greater in males, in farmers and in people belonging to lower socio-economic status ($p=0.008$). Multibacillary patients had higher rate of deformities of hands and feet and a statistically significant ($p=0.006$) number of MB patients had grade 2 ocular deformity (WHO 2007). **Conclusion:** Various deformities can be detected by clinical examination and simple tests. Early identification of disease and deformities can help in educating the patients about leprosy and thus prevention of progression to adverse sequelae.

Keywords: Leprosy, Deformity, Multibacillary, Disability.

Introduction

Deformities are the loss or abnormality of psychological, physiological or anatomical structure or function.6 It may be either visible impairments or consequences of invisible impairments.6 Disability is the inability to perform certain activities, which were normally possible, but become difficult or impossible to carry out because of deformities[1].

The deformities due to leprosy result in extensive loss of man power and economic loss to the society. Leprosy remains a public health problem in fifty-five countries but thirteen countries account for 94% of total registered cases.8 India, Brazil and Indonesia report more than 10,000 new patients annually. Globally about 21,3899 new cases were detected with Grade 2 deformity corresponding to 6.6% of the total number of newly diagnosed patients and to a rate of 2.5 cases per million (WHO 2015)[2,3].

Leprosy is known to cause various deformities. The incidence of deformity is higher in males than in females and more in multibacillary than in paucibacillary leprosy. Deformities: These are the loss or abnormality of psychological, physiological or anatomical structure or function. It may be either visible impairments or consequences of invisible impairments. Primary impairment: Changes in the structures and functions of the body tissues directly due to disease process like damage to the nerve, e.g., anaesthesia to the area supplied by the nerve. Secondary impairment: Changes in the structure and function of the body parts due to neglect, excessive use, carelessness and improper care of body parts with primary impairment; e.g., weak/paralysed parts, leading to joint stiffness or formation of contractures. Handicap: These are the disadvantages that limit or prevent the patients from fulfilling their normal role in society (e.g., unemployment, economic and physical dependence)[1].

Damage to the components of the peripheral nerves is followed by anaesthesia, dryness of skin and muscle paralysis. These three factors precede deformity of hands and feet in patients with leprosy. These predispose the affected limbs to misuse, ulceration and scar formation. Secondary infection ensues and create a vicious cycle of events which causes loss of deep tissue and results in severe deformity. A further cause of damage in lepromatous patients is due to direct invasion of tissues by M. Leprae[4,5].

However, the variables like study location, study population, study period, inclusion criteria etc. are widely different in these studies; hence it is not possible to estimate the accurate epidemiology of leprosy-related deformities and disabilities in the country from these studies. The present study has been planned to assess the burden of deformities and disabilities in patients suffering from leprosy in northern Karnataka .

Objectives of study

To detect deformities and disabilities in leprosy patients and grading them according to WHO deformity and disability grading system (2007).

*Correspondence
Dr. Adarsh Gowda
Professor and HOD, Department of Dermatology, East Point College of Medical Sciences and Research Centre, Bengaluru, Karnataka, India
E-mail: adarhgowda@hotmail.com

Materials and methods

Source of Data

A hospital-based, cross sectional study to detect deformities/disabilities in patients with leprosy was conducted in the department of Dermatology Venereology and Leprosy of B.L.D.E.U's Shri. B.M. Patil Medical College Hospital and Research Centre, Vijayapur, Karnataka. One hundred and forty six cases were included in the study. The study duration was from November 2014 to September 2016.

Method of Collection of Data

Inclusion Criteria

All leprosy patients irrespective of age, gender and treatment status were included in the study.

Method

Detailed history of the patient was taken in respect to duration of disease and deformity, history of contact, episodes of reactions if any, and treatment. Each patient was subjected to complete cutaneous examination and palpation of peripheral nerves.

Presence or absence of deformities were recorded. All patients underwent following steps of clinical examination:

- Detailed inspection of hands, feet, face and eyes for lesions and any visible deformity.
- Examination of peripheral nerves.
- Sensory tests done on hands and feet:

1) Temperature test with hot and cold water
2) Pin prick test
3) Cotton wool test
4) Semmes Weinstein monofilament test (SWMT)

Tests for muscle power:

1) Hands: ¬ Pen test (Abductor pollicis, median nerve) ¬ Card test (Interossei and lumbricals, ulnar nerve) ¬ Book test (Deep branch of ulnar nerve) ¬ Extension of wrist against resistance (wrist extensors, radial nerve) ¬ Beak test (Triple nerve test).

2) Feet: ¬ Extension of great toe against resistance (Anterior tibial nerve) ¬ Dorsi-flexion and plantar-flexion of ankle against resistance (Common peroneal nerve) ¬ Inversion and eversion of foot (Posterior tibial nerve) ¬ Adduction and abduction of toes against resistance (Medial and lateral branches of tibial nerve)

3) Examination of face and eyes: - Inspected for any visible deformity. - Tested for corneal sensation. - Tested for visual acuity.

Type of deformity was noted down from head to toe and grading of deformity was done according to WHO classification of disability measurement proposed in the year 2007.

Investigations

Slit skin smear and biopsy were carried out in all newly diagnosed cases and in already diagnosed and treated cases whenever indicated to confirm the diagnosis

Statistical Analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of N, mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square ($\chi 2$) test was employed to determine the significance of differences between groups for categorical data. The difference of the proportion of analysis variables was tested with the z-test. If the p-value was < 0.05, then the results were considered to be significant. Data were analyzed using SPSS software v.24.0.

Results

The age of the patients enrolled in the study ranged from 8 to 84 years. The mean age (± SD) of the study population was 38.1 (±15.6) years. Most Prevalent clinical type was borderline tuberculoid leprosy in 54 (37%) patients, followed by lepromatous leprosy in 49 (33.6%), borderline lepromatous in 22 (15.1%), pure neural in 6 (4.1%), tuberculoid and histoid types in 5 (3.4%) patients Male Female 45 each, mid-borderline in 3 (2.1%) and indeterminate in 2 (1.4%) patients.

Distribution of specific deformities of limbs

In the hands, shortening of fingers was seen in 13 (8.9%) patients, banana fingers were seen in 10 (6.8%) patients, reaction hand in 2 (1.4%) patients and swan neck deformity in 1 (0.7%) patient. In the feet, fixed foot deformity was present in 10 (6.8%) patients, tarsal disorganization was seen in 2 (1.4%) patients.

Distribution of anaesthetic deformities of limbs

In the hands, majority of the patients had xerosis (n=113, 77.4%), followed by trophic ulcer (n=20, 13.7%). Cracks (n=13, 8.9%), fissures (n=2, 1.4%), and other (n=10, 6.8%) deformities were also noted. In the feet, most of the patients had xerosis (n=115, 78.8%). Cracks (n=44, 30.1%) and fissures (n=10, 6.8%) were also noted. Trophic ulcer was present in 26 (17.8%) patients.

Distribution of visible paralytic deformities of limbs

In the hands, claw hand was the commonest deformity seen in 24 (16.5%) patients, flattening of thenar and hypothenar eminences in 24 (16.4%) patients, guttering in 18 (12.3%) patients. Wartberg's sign was present in 7 (4.8%) patients, ape thumb in 3 (2.1%), wrist drop and Benediction's sign in 1 (0.7%) patient each. In the feet, claw toes was seen in 18 (12.3%) patients, guttering in 15 (10.3%), fanning of toes in 11 (7.5%), collapse of arch in 6 (4.1%), foot drop in 2 (2.7%) patients.

Distribution of deformities in face

Among 146 patients, 28 (19.2%) patients had madarosis and nodularity of face was seen in 23 (15.8%) patients, collapse of nose in 8 (5.5%), mega lobules and premature senility in 12 (8.2%) patients each. In the eyes, corneal sensation was lost in 3 (2.1%) patients, visible redness in 4 (2.7%), visual impairment in 6(4.1%).

Distribution based on sensory testing in upper and lower limbs

Out of 146 patients, 2 (1.3%) patients had loss of temperature sensation alone in the hands and 3 (2%) patients in the feet. Loss of temperature and cotton wool sensation in the hands was seen in 19 (13%) patients and 17 (11.6%) patients in feet. Sixty three (43.1%) patients had loss of temperature, cotton wool, pin-prick sensation along with impaired sensations as tested by Semmes-Weinsten monofilaments (SWMF) in the hands and, 68 (46.5%) patients in the feet.

Distribution based on ability to perform motor tests of upper and lower limbs

Out of 146 patients, 50 (34.2%) patients were unable to perform card test, 31 (21.2%) the beak test, 25 (17.1%) the book test, 17 (11.6%) the pen test, and 10 (6.8%) were unable to perform extension of wrist against resistance. In the lower limbs, 34 (23.3%) patients were not able to perform adduction and abduction of toes, 31 (21.1%) were not able to perform flexion and extension of toes against resistance, 10 (6.8%) were not able to perform flexion and extension of ankle against resistance.

Distribution of grade of deformity (hands and feet):

The distribution of deformities of hands, feet and eyes have been shown in tables

It is observed that majority of the patients with deformity of hands and feet belonged to lower socio-economic status. The association of deformity and socio-economic status was statistically significant ($p=0.008$). The association of disease duration with presence of deformities was statistically non- significant ($p=0.082$). However, there was variability in this association. Patients with disease duration of < 1 year had lesser deformities (grade 1: n=6, 15.4%; grade 2: n=12, 30.8%). The number of deformities was maximum in patients with disease duration of 1-2 years, followed by 3-5 years. Patients with disease duration of >5 years had least occurrence of deformities.

A statistically significant (p<0.001) number of patients with deformity presented to hospital by 2 years of onset

It is observed that association of type 1 reaction was statistically significant (p<0.001) with both grade 1 and grade 2 deformities, whereas this association was not statistically significant for type 2 reaction (p>0.05). Patients with BT, tuberculoid, BB, pure neural and histoid leprosy were statistically significantly associated with grade 2 deformity (p<0.001). In patients with BL, grade 1 deformity was more common, and this association was statistically significant (p<0.001). In LL patients grade 2 deformities were more as compared to grade 1, but this association was not statistically significant (p>0.05).

It is observed that there was no significant association of deformities of hands and feet with treatment status (p=0.16). Similarly, association of deformities of hands and feet with MB or PB disease was not statistically significant (p=0.178).

Table 1: Percentage distribution of specific deformities of limbs

Specific deformity	No. of patients	Percentage (%)
UPPER LIMB		
Banana Fingers	10	6.8
Reaction hand	2	1.4
Shortening of fingers	13	8.9
Swan neck deformity	1	0.7
LOWER LIMB		
Fixed deformity of toe and feet (Fig C)	10	6.8
Tarsal Disorganization	2	1.4

Table 2: Percentage distribution of anaesthetic deformities of limbs

Anaesthetic deformity	No. of patients	Percentage (%)
UPPER LIMB		
Xerosis	113	77.4
Cracks	13	8.9
Fissures	2	1.4
Trophic ulcer	20	13.7
Others	10	6.8
LOWER LIMB		
Xerosis	115	78.8
Cracks	44	30.1
Fissures	10	6.8
Trophic ulcer	26	17.8
Others	17	11.6

Table 3: Percentage distribution of visible paralytic deformities of limbs

Visible paralytic deformity	No. of patients	Percentage (%)
UPPER LIMB		
Claw Hand (ulnar)	22	15.1
Claw Hand (median)	1	0.7
Claw Hand (complete)	1	0.7
Wrist drop	1	0.7
Gutttering	18	12.3
Ape thumb	3	2.1
Wartberg's sign	7	4.8
Benediction's sign	1	0.7
Others	24	16.4
LOWER LIMB		
Claw toes	18	12.3
Fanning of toes	11	7.5
Foot drop	2	1.4
Guttering	15	10.3
Collapse of arch	6	4.12
Others	4	2.7

Table 4: Percentage distribution of deformities of face

FACE	No. of patients	Percentage (%)
Madarosis	28	19.2
Collapse of nose	8	5.5
Nodularity	23	15.8
Others	24	16.4

Table 5: Percentage distribution of grade of deformity (hands and feet)

Grade of deformity	No. of patients	Percentage (%)
0	49	33.6
1	36	24.7

2	61	41.8
Total	146	100

Table 6: Percentage distribution of grade of deformity (eyes)

Grade of deformity	No. of patients	Percentage (%)
0	132	90.4
2	14	9.6
Total	146	100

Table 7: Level of significance of grade of deformity (hands and feet) with selected parameters

Parameters	Grade 0		Grade 1		Grade 2		p value
Gender	**n**	**%**	**n**	**%**	**n**	**%**	
Male	24	28.2	23	27.1	38	44.7	0.111
Female	25	41.0	13	21.3	23	37.7	
Age group							
5-15	3	60.0	0	0.0	2	40.0	0.611
16-25	13	39.4	7	21.2	13	39.4	
26-40	16	31.4	15	29.4	20	39.2	
41-60	14	33.3	9	21.4	19	45.2	
61-75	2	14.3	5	35.7	7	50.0	
>75	1	100.0	0	0.0	0	0.0	
Occupation							
Daily wage worker	2	25.0	1	12.5	5	62.5	0.401
Driver	3	42.9	1	14.3	3	42.9	
Farmer	11	25.6	13	30.2	19	44.2	
Housewife	10	38.5	5	19.2	11	42.3	
Labourer	3	20.0	3	20.0	9	60.0	
Others	12	42.9	8	28.6	8	28.6	
Student	6	50.0	1	8.3	5	41.7	
Teacher	2	28.6	4	57.1	1	14.3	
S-E status							
Lower	12	37.5	6	18.8	14	43.8	0.008*
Upper Lower	15	22.1	19	27.9	34	50.0	
Lower Middle	12	42.9	7	25.0	9	32.1	
Upper Middle	10	55.6	4	22.2	4	22.2	
Duration of deformity in years							
<1	47	52.2	17	18.9	26	28.9	<0.001*
1-2	1	3.6	10	35.7	17	60.7	
>2	1	3.6	9	32.1	18	64.3	
Duration of disease in years							
<1	21	53.8	6	15.4	12	30.8	0.082
1-2	13	23.2	17	30.4	26	46.4	
3-5	11	30.6	8	22.2	17	47.2	
>5	4	26.7	5	33.3	6	40.0	

*significant at p<0.05

Table 8: Level of significance of grade of deformity (hands and feet) with types of disease and reaction

Parameters		Grade 1		Grade 2		p value
		n	**%**	**n**	**%**	
Reaction	**Type 1**	10	63	6	38	<0.001*
	Type 2	14	52	13	48	>0.05
Types of disease	**Tuberculoid**	0	0	1	100	<0.001*
	BT	10	29	25	71	<0.001*
	BB	0	0	2	100	<0.001*
	BL	8	62	5	38	<0.001*
	LL	16	42	22	58	>0.05
	Pure neural	0	0	4	100	<0.001*
	Histoid	1	33	2	67	<0.001*

*significant atp<0.05

Table 9: Level of significance of grade of deformity (hands and feet) with treatment status

Parameters	Grade 0		Grade 1		Grade 2		p value
Treatment	**n**	**%**	**n**	**%**	**n**	**%**	
New case	28	43.1	12	18.5	25	38.5	0.160
Treated cases	9	22.0	11	26.8	21	51.2	
Relapse	2	66.7	1	33.3	0	0.0	
Under treatment	10	27.0	12	32.4	15	40.5	

MB/PB							
PB	7	53.8	1	7.7	5	38.5	0.178
MB	42	31.6	35	26.3	56	42.1	
Total	49	33.6	36	24.7	61	41.8	

*significant at p<0.05

Discussion

More than 91% of the patients belonged to MB group and 9% belonged to PB group. Higher incidence of deformities of hands, feet and eyes was seen in MB cases, and association of ocular deformities with MB disease was statistically significant (p=0.006). Kumar et al[6], have reported overall disability rate of 7.9% in their study subjects and among these MB patients had significantly higher disability rate than PB patients (17% vs. 3.8%). Chavan et al[7], recorded more disability among MB patients **(**60%) as compared to PB patients (19%). In the study by Jain et al[8], majority of the patients belonged to MB group while 131 (43%) were in the PB group. Disability rate was more in MB leprosy patients (11.6%) than in PB (6.9%). Similarly, Sarkar et al[9], noted that MB patients had significantly higher disability (31.6%) than PB patients (10%). So our study results are similar to the published Indian literature.

Majority of the MB cases in our study had BT disease with more than five skin lesions and more than two peripheral nerve involvement. It ascertains the well- known fact that BT leprosy is the commonest spectrum of the disease.

The association of disease duration with presence of deformities was statistically non-significant (p=0.082). However, there was variability in this association. Patients with disease duration of < 1 year had lesser deformities (grade 1:16.7%; grade 2:19.7%). The number of deformities was maximum among patients with disease.

In this study proportion of BT cases and lepromatous leprosy cases were higher compared to other forms of leprosy and there was statistically significant association of BT cases with grade 2 deformity (p<0.001). In LL patients grade 2 deformities were more as compared to grade 1, but this association was not statistically significant (p>0.05). Grade 2 ocular deformity was higher in patients with type 2 reaction, and in patients with BT and LL disease. In a study by Kumar et al,[6] majority were BT cases (n=131) of which grade 2 deformity was present in 3.8%.

Among 146 patients, 63 had lepra reactions out of which type 1 reaction was present in 22 (15.1%) patients. Association of type 1 reaction was statistically significant (p<0.001) with both grade 1 and grade 2 deformities. In a study by Kar et al[10], reactions were present in 55(20%) children of which 11 had deformities.

In this study, the proportion of cases with anaesthesia (grade I deformity) is 24.7%. Inflammation and destruction of peripheral nerves following invasion by M. leprae are unique features of leprosy. Peripheral neuritis due to leprosy causes sensory loss or motor paralysis or both. The sensory loss may be confined to skin lesions, or it may confine to sensory distribution of affected nerve and their branches. In borderline tuberculoid leprosy, damage to peripheral trunk nerve is very much widespread, also frequently severe. In lepromatous leprosy especially in long standing cases there is glove and stocking distribution of anaesthesia.

Apart from xerosis and cracks which were observed in majority of the patients, trophic ulcer was the next common visible deformity in order. Chavan et al[7], noted trophic ulcer as the most common type of grade 2 deformity which was significantly higher in females than males. In a study by Jain et al[8], planter ulcer was present in 7 (35%) patients. This was followed by ulcers in hands and loss of tissue in the form of resorption of toes in one patient. Sukumar et al[11], in their study noted ulcers and scars/ cracks in hands in 17 patients each, and plantar ulcers in 6 patients. In this study proportion of claw hand and guttering was higher as compared to other visible deformities. In a study by Kumar et al[6], ulnar palsy/ claw hand alone or in combination with foot drop were the commonest paralytic deformities. In a study by Jain et al[8], among the patients with grade 2 deformities, most common type observed was claw hand. Sukumar et al[11], noted claw hand in 18 patients in their study. Paralytic deformities of hand occur because of destruction of motor fibres in the major nerve trunks supplying the intrinsic and extrinsic muscles of hand. In leprosy the ulnar nerve is damaged most often hence ulnar claw hand is the most common deformity. In the present study, claw toes was seen in 18, guttering in 15, fanning of toes in 11 and collapse of arch of the foot in 6 patients. In the lower limb the posterior tibial nerve and common peroneal nerves were affected commonly.

In this study 2 patients had foot drop. In the studies by Jain et al[8], and Sukumar et al[11], foot drop was seen in 1 patient each.

Specific deformities are a result of direct infiltration of the tissues by M. leprae. Commonest specific deformities seen in hands were, shortening of fingers in 13 patients, and banana fingers in 10 patients. In the feet, fixed foot deformity was present in 10 patients. Among 146 patients, 28 had madarosis, 23 had nodularity of face, and collapse of nose was present in 8. Higher number of multibacillary cases in this study might have contributed to increased number of specific deformities. In the eyes, corneal sensation was lost in 3, redness was seen in 4, and visual impairment was present in 6 patients. In a study by Jain et al[8], eye involvement was present in 2 patients; lagophthalmos and chorioretinitis in 1 patient each. In another study by Sarkar et al[9], 7 patients had loss of corneal sensation (grade 1), and 3 patients each had lagophthalmos and severe visual impairment (acuity of vision <6/60, i.e., grade 2). Singh et al[12], noted ocular disability in 119 patients out of which 38 had grade 1 deformity and 81 had grade 2 deformity of eyes. In a study by Kumar et al[6], even though 57 patients had facial lesions, none had lagophthalmos. In the present study, 10 patients were children of which, 7 were male and 3 were female. Five each belonged to the age group of 6 to 15 years and 16 to 18 years. Majority were students. Commonest clinical type was BT leprosy. Nine were MB, one was PB case. Three children had history of intrafamilial contacts with parents. Four children had grade 2 deformity and 1 had grade 1 deformity of hands and feet in a study by Kar et al[10], out of 275 patients, 163 were boys and 112 were girls. Thirteen affected children were below the age of 4 years, 71 were between 5- 9 years, and 191 were between 10-15 years. Majority of the deformities detected were among the children in the age group of 10-15 years. Of them, 238 were PB and 37 were MB cases. Out of 238 PB patients 20, and among 37 MB cases 9 had deformities. Grade 2 deformity of hands and feet was seen in 29 children affected with leprosy. However, in a study by Kumar et al[6] none of the children (<15 years) had any deformity.

In a retrospective study conducted in this institution (2013-2014) it was noted that, of a total of 309 leprosy cases examined, newly diagnosed childhood cases were 19.7%. Borderline tuberculoid leprosy was the commonest presentation in children. Twenty-four were PB and 37 were MB cases. Household contacts were identified in 18·2% and 8·19% children had visible deformity. Deformities were recorded in 5·82%, and 1·79% had WHO Grade 2 deformity of hands and feet. Anjum et al[13] noted that out of 257 newly detected cases, 26 were children, indicating continuing transmission of leprosy in that region. Familial and non-familial close contacts play an important role in the epidemiology of childhood leprosy. The type of disease in the contact and proximity to the child i.e. household or neighbourhood are important determining factors in the disease transmission.

In this study among the 97 patients with deformities, 36 were advised care of hands and feet, 25 were advised physiotherapy. Twenty-six patients were treated for trophic ulcers of foot with paring and wound care; POP cast immobilization was done in 3 patients. Splints were advised for 1 patient with claw hand (Fig U) and 2 patients with foot drop (Fig T). Fistulectomy, debridement, disarticulation, was done when indicated in selected cases. This emphasizes that in significant

number of patients, the development of secondary impairments can be prevented. No doubt surgery plays a major role in presence of motor dysfunction and altered appearance, but it can be performed only in suitable cases. However, it does not influence sensory loss and therefore patients should be instructed about thorough care of hands, feet duration of 1-2 years, followed by 3-5 years. A statistically significant ($p<0.001$) number of patients with deformity presented to hospital by 2 years of onset. In a study by Kumar et al[6], paralytic deformities were rare in whom duration of disease was less than a year but increased considerably from 3.9% at 1-3 years to 25% when diagnosed late, i.e >8 years.

In our study 24.7% patients had grade 1 deformity and 41.8% had grade 2 deformity of hands and feet. Sixty-one (41.8%) patients had grade 2 deformity of eyes. In a study by Kumar et al[6], the overall disability rate was 7.9% and out of 58 patients with grade 2 deformities of hands and feet, 45 (77%) had paralytic deformities. Chavan et al[7], recorded grade 2 disability in 13 (12.39%) patients and the disability rate for hands and feet was 38.10 %. Eye disability was not found in any of the patients by these authors. Jain et al[8] noted higher prevalence of grade 2 deformity than grade 1. Nine patients (3 %) had grade 1 and 20 patients (6.6%) had grade 2 deformity. In a study by Sukumar et al[11], out of 259 patients 22 (8.5 %) had grade 1 and 30 (11.6%) had grade 2 deformities of hands and feet. Sarkar et al[9], had detected 49 (20.1%) patients with disabilities among 244 newly diagnosed cases. Among these 28 (11.5%) had grade 1 and 21 (8.6%) had grade 2 disability. Both grade 1 (n=9, 39.1%) and grade 2 (n=5, 21.8%) disability were more among pure neural leprosy patients. BT patients with more than five skin lesions also had more disability than patients with ≤5 lesions.

Conclusion

Leprosy is known to cause a plethora of deformities. Detailed history and examination of the patient at presentation is of utmost importance especially when there is sensory loss. Neglecting anaesthetic limbs can lead to progression of deformity leading to untoward consequences.

This study led to recognition of various deformities in the patients ranging from mild impairment of sensory functions to gross mutilation of hands, feet and face.

Early detection of anaesthesia in the extremities can help in educating the patients regarding the care of limbs and also to identify risk factors. Both treated and newly diagnosed cases of leprosy were included in this study which led to tracing the close contacts especially children and educating the patients about the disease.

This study helped in assessing the burden of leprosy-related deformities and disabilities in this region.

References

1. Shah A, Shah N. Deformities of face, hands and feet, and their management. In: Kar HK, Kumar B, editors. IAL Textbook of Leprosy, 2nd edn. New Delhi: Jaypee Publishers; 2016.p.-517-540.
2. Malaviya GN. Deformity and disability prevention. In: Kar HK, Kumar B, editors. IAL Textbook of Leprosy, 2nd edn. New Delhi: Jaypee Publishers; 2016.p.- 541-561.
3. Van B, Anderson WH. Impairment and disability in leprosy; in search of missing link. Indian J Lep 1987; 69: 361-372.
4. Jopling WH, McDougall AC. The disease. In: Jopling WH, McDougall AC, editors. Handbook of leprosy. 5th edn. New Delhi: CBS Publishers and Distributers Pvt. Ltd; 1996.p.-10-53.
5. Shepard CC. Temperature optimum of M. leprae in mice. J Bacteriol 1965; 90: 1271-1275.
6. Kumar A, Girdhar A, Girdhar BK. Nerve thickening in leprosy patients and risk of Paralytic deformities: a field based study in Agra, India. Lepr Rev 2004;75:135-142.
7. Chavan LB, Patel P. Epidemiology of disability in incident leprosy patients at supervisory urban leprosy unit of Nagpur city. Natl J Community Med 2011; 2:119-12
8. Jain S, Mishra MK. Retrospective study of epidemiological trends of leprosy in an urban leprosy centre of Madhya Pradesh. Natl J Community Med 2014;5:114-117.
9. Sarkar J, Dasgupta A, Dutt D. Disability among new leprosy patients, an issue of concern: an institution-based study in an endemic district for leprosy in the state of West Bengal, India. Indian J Dermatol Venereol Leprol 2012; 78: 328- 334.
10. Kar BR, Job CK. Visible deformity in childhood leprosy – A 10 year study. Int J Lepr Other Mycobact Dis 2005;73: 243-8.
11. Sukumar MG, Shivaraj SM, Dayananda M. Proportion, pattern and need assessment of deformities among registered leprosy affected individuals in Chamrajnagar district. Indian J Community Med 2010; 35: 347-9.
12. Singh L, Malhotra R, Bundela RK. Ocular Disability - WHO Grade 2 in persons affected with leprosy. Indian J Lepr 2014; 86: 1-6.
13. Anjum V, Vijaykumaran P. Presence of an index case in household of newly registered leprosy patients: experience from a leprosy referral centre in South India. Lepr Rev 2015;86:383-6.

Conflict of Interest: Nil Source of support: Nil