Vol. 34 / No. 2 / August 2022
Sinta 2 (Decree No: 200/M/KPT/2020)
Online ISSN : 2549-4082 ; Print ISSN : 1978-4279
Available online at https://e-journal.unair.ac.id/BIKK

Berkala Ilmu Kesehatan Kulit dan Kelamin
Periodical of Dermatology and Venereology

Original Article

Profile of Disability in Leprosy Patients: A Retrospective Study

Silvani Geani, Rahmadewi, Astindari, Cita Rosita Sigit Prakoeswa, Sawitri, Evy Ervianti, Budi Utomo, Muhammad Yulianto Listiawan

Department of Dermatology and Venereology, Universitas Airlangga/Dr. Soetomo General Academic Hospital, Universitas Airlangga Teaching Hospital, Surabaya

ABSTRACT

Background: Leprosy is a chronic granulomatous infectious disease caused by *Mycobacterium leprae* that affects peripheral nerves and skin. The interaction between *M. leprae* and Schwann cells causes irreversible damage to peripheral nervous tissue afterward disability occurs. Involvement of the major nervous trunks of the extremities can produce sensory-motor deficits. The risk factors are delay in diagnosis, gender, age, type of leprosy, duration of disease, number of affected nerves, leprosy reaction, type of treatment, socioeconomic factors, education, ethnicity, and occupation. Purpose: The aim was to study the profile of leprosy patients with disability who seek treatment in Leprosy Division Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo Surabaya. **Methods:** This was a descriptive retrospective study of leprosy patients with disability from January 2017 to December 2019. **Result:** The results of this study obtained a total of 275 leprosy patients with disabilities, which consisted of 76 patients (27.6%) with grade-1 disability and 199 patients (72.4%) with grade-2 disability. The majority were male (73.4%) and aged 25-44 years old (42.2%). Other dominant risk factors were MB type leprosy (92%), duration of disease more than 12 months (52.3%), no leprosy reaction (68%), and had received multidrug therapy (45.5%). **Conclusion:** Knowledge of disability risk factors can assist in improving management and education to prevent disability in leprosy patients.

Keywords: Leprosy, infectious disease, neglected disease, disability, multidrug therapy.

Correspondence: Muhammad Yulianto Listiawan, Department of Dermatology and Venereology Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Academic Hospital, Surabaya, Jl. Mayjen Prof. Dr. Moestopo No. 6-8 Surabaya 60131, Indonesia. Phone: (031) 5501609, e-mail: m.yulianto@fk.unair.ac.id

| Article info |
Submited: 04-03-2022, Accepted: 24-05-2022, Published: 31-07-2022

BACKGROUND

Leprosy is a chronic granulomatous disease caused by *Mycobacterium leprae*, which mainly affects the peripheral nerves and the skin.[1] Disabilities were detected in almost 50% of new leprosy cases, which indicates the need to improve the effectiveness of the health care system in early detection of leprosy.[2] Bacteriological recovery occurs after multidrug therapy, education, and counseling, but the estimated number of people living with a disability, including grade-1 (partial disability) and grade-2 (completely disabled and unable to work) is between 1 and 4 million worldwide.[3] The mechanism of disability in leprosy can occur from neurogenic and inflammatory pathways. Sensory, motor and autonomic disorders were classified as primary causes, whereas traumatic lesions, retractions, and infections were secondary causes that occurred due to the absence of treatment efforts to prevent the primary process.[4] The risk factors of disability in leprosy depend on the type of leprosy, duration of disease, number of affected nervous trunks, leprosy reactions, and neuritis.[5]

This retrospective study was conducted to determine the characteristic of disability in leprosy patients at the Leprosy Division Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo Surabaya Surabaya in 2017-2019. The earlier diagnosis leprosy and its risk factor, can reduce disability and deformity.

METHODS

This study was a descriptive retrospective study to determine the profile of leprosy patients with disability who were treated in Leprosy Division Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo Surabaya for 3 years, in January 2017 - December 2019. The secondary data was obtained

from the patient's medical record. The inclusion criteria were all patients recorded in the medical record with a diagnosis of leprosy with disability, while the exclusion criteria were patients without grade-1 and 2 disabilities and if the specified data were not found in leprosy patients with disabilities medical record. This study has received ethical approval from the Hospital Ethics Committee RSUD Dr. Soetomo Surabaya (0440/LOE/301.4.2/IV/2021).

RESULT

This study found 1.132 leprosy patients who were treated in Leprosy Division Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo Surabaya in January 2017 - December 2019. Out of 345 leprosy patients with disability, there were 275 patients met the study inclusion criteria and 70 patients were excluded. They were 76 patients (27.6%) with grade-1 disability and 199 patients (72.4%) with grade-2 disability. There was an increase in patients with disabilities, 93 patients (33.6%) in 2017, 86 patients (31.3%) in 2018, and 96 patients (34.9%) in 2019.

Table 1. Site of disability of leprosy patients at Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo, Surabaya in 2017 to 2019

Site of disability	Grade of disability n (%)		Total n (%)
	1	2	
Eye	0 (0)	7 (2.5)	7 (2.5)
Hand	34 (12.3)	86 (31.2)	120 (43.6)
Feet	42 (15.3)	106 (38.5)	148 (53.8)

The most common site of disabilities were on the feet (148 patients - 53.8%), followed by hands (120 patients - 43.6%) and eyes (7 patients - 2.5%). There were 42 patients (15.3%) and 106 patients (38.5%) with grade-1 and 2 disabilities, respectively. In this study, patients with grade-1 disability experienced hypoesthesia and anesthesia for 76 people. In contrast, grade-2 disability with a visible disability included lagophthalmos, contractures, atrophy, claw hand, foot drop, ulcers, and mutilations, as shown in table 2. Ninety five patients (34.5%) had ulcers which was higher compared to other deformities.

Table 2. Type of deformity in leprosy patients with disability at Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo, Surabaya in 2017 to 2019

Deformity	Total n (%)
Lagophtalmos	7 (2.5)
Hypoesthesia	36 (13.1)
Anesthesia	40 (14.6)
Contracture	19 (6.9)
Atrophy	4 (1.5)
Claw hand	57 (20.7)
Drop foot	14 (5.1)
Ulcer	95 (34.5)
Mutilation	3 (1.1)

Distribution of leprosy patients with disabilities more in males than females. Total patient visits were 202 male (73.4%) and 73 female (26.6%). The majority of cases were aged between 25-44 years (116 patients - 42.2%), with grade-1 and grade-2 disability as many as 31 (11.3%) and 85 (30.9%) patients, respectively. Duration of disease less than 6 months mostly in patients with grade-1 disability (43 patients - 15.7%), and duration of more than 12 months in grade-2 disability (125 patients - 45.5%).

The predominant bacterial index status was negative (53.5%), both in patients with grade-1 disability as many as 37 patients (13.5%) and grade-2 disability as many as 110 patients (40%). Type of leprosy with multibacillary (MB) as the most type, as many as 253 patients (92%). The majority of the patients with grade-1 and 2 disabilities with MB type leprosy were 70 (25.4%) and 183 (66.6%) patients, respectively.

The majority of patients (187 patients-68%) had no leprosy reaction, with grade-1 and grade-2

disabilities as many as 57 patients (20.7%) and 130 patients (47.3%), respectively. Most disability cases were in patients after receiving MDT therapy, as many as 125 patients (45.5%). Most of the patients with grade-1 occurred before receiving MDT, as many as 48 patients (17.4%), and grade-2 disability after receiving MDT, as many as 106 patients (38.6%).

Table 3. Characteristic of leprosy patients with disability at Dermatovenerology Outpatient Clinic RSUD Dr. Soetomo, Surabaya in 2017 to 2019

Variables	Grade of disabilty n (%)		Total n (%)
	1	2	
Sex			
Male	56 (20.3)	146 (53.1)	202 (73.4)
Female	20 (7.3)	53 (19.3)	73 (26.6)
Age (years old)			
<15	1 (0.4)	4(1,4)	5 (1.8)
15-24	21 (7.6)	28 (10.2)	49 (17.8)
25-44	31 (11.3)	85 (30.9)	116 (42.2)
45-60	17 (6.2)	60 (21.8)	77 (28)
>60	6 (2.2)	22 (8)	28 (10.2)
Duration of disease (months)			
< 6	43 (15.7)	46 (16.7)	89 (32.4)
7 - 12	14 (5.1)	28 (10.2)	42 (15.3)
> 12	19 (6.8)	125 (45.5)	144 (52.3)
Bacterial index			
Negative	37 (13.5)	110 (40)	147 (53.5)
1+	9 (3.3)	12 (4.4)	21 (7.7)
2+	13 (4.7)	36 (13.1)	49 (17.8)
3+	14 (5.1)	29 (10.5)	43 (15.6)
4+	2 (0.7)	11 (4)	13 (4.7)
>4	1 (0.4)	1 (0,4)	2 (0.7)
Type of leprosy			
PB	5 (1.8)	11 (4)	16 (5.8)
MB	70 (25.4)	183 (66.6)	253 (92)
Other	1 (0.4)	5 (1.8)	6 (2.2)
Leprosy reaction			
Type 1	6 (2.2)	17 (6.2)	23 (8.4)
Type 2	13 (4.7)	52 (18.9)	65 (23.6)
No reaction	57 (20.7)	130 (47.3)	187 (68)
MDT treatment history			
Pre- MDT	48 (17.4)	53 (19.3)	101 (36.7)
On treatment	9 (3.3)	40 (14.5)	49 (17.8)
Post- MDT	19 (6.9)	106 (38.6)	125 (45.5)

PB = paucibacillary; MB = multibacillary; MDT = multidrug therapy

DISCUSSION

The results of this study showed that the site of disability in leprosy patients was mostly on the feet (148 patients - 53.8%). The most common deformity was ulcer, found in 95 patients (34.5%). Bungin's 2019 research in Samarinda showed that the most frequent complaint in patients with grade-2 disability was the presence of foot ulcers.[6] Tropical ulcers were the most frequent deformity found in the study by Mangala in 2015-2018 as many as 37.6%.[5] An increased incidence of plantar ulcers is repeated trauma in the majority of cases with anesthesia of the foot.[7]

Disability in leprosy patients was more in male patients, as many as 202 patients (73.4%) than women as many as 73 patients (26.6%). A study by Monteiro in 2001-2012 concluded that male was a risk factor for

grade-2 disability with a total of 490 patients (p=<0.001). The high incidence of disability in men is related to the high prevalence of leprosy in men and the vulnerability to work-related trauma. [2,8]

In this study, the majority of cases were aged 25 to 44 years (42.2%), with grade-1 and grade-2 disability were 31 patients (11.3%) and 85 patients (30.9%), respectively. A study at the leprosy center in Paraiba in 2009-2014 shows that disability is mostly seen in the age of 31-45 years, on the other hand, a study by Daniel *et al.* at the tertiary care center in India was at the age of 41-50 years (30.6%, p=0.128).[3,9] Age is directly related to the duration of disease, so the older the patients the more disability they can suffer due to the chronic nature of the effects of leprosy.[4]

Patients with duration of disease more than 12 months were 144 patients (52.3%), with the majority of patients with grade-2 disability (125 patients - 45.5%). The highest leprosy disability rate was found in patients with duration of disease for more than 6 months. The prevalence of disability increased among patients who delayed treatment for a longer period, especially after 36 months (p=0.032).[10] Deformity and disability occur as a result of late detection of cases of grade-1 disability.[9] The longer the duration of active disease, the greater the risk of developing disability.[5,7]

Leprosy patients with disability were more commonly found in patients with negative bacterial index, as many as 147 patients (53.5%, p> 0.05%), namely grade-1 disability as many as 37 patients (13.4%) and grade-2 disability as many as 110 patients (40%). Other factors could be responsible for the discrepancy including leprosy reactions, treatment, sampling technique, staining, and variations in clinical findings.[11] In this study, although most of the patients were MB-type leprosy, the bacterial index examination was mostly negative because most of the patients had finished the treatment (Release From Treatment).

The type of leprosy with MB as the most type, as many as 253 patients (92%). Most patients with grade-1 and 2 disability with MB type leprosy were 70 (25.4%) and 183 (66.6%) patients, respectively. MB-type leprosy was a risk factor for disability as in the study of Schreuder (PB 11%, MB 33%), DeOliviera (PB 12%, MB 37%), and Richardus (PB 9.8% MB 37.6%) (Rathod et al., 2019).[12] Peripheral nerve damage in lepromatous leprosy progresses slowly over years, with extensive nerve fibrosis replacing nerve axons. Deformities are common in lepromatous patients due to extensive nerve involvement.[5,13]

Disability grade-1 and 2 in leprosy patients were more commonly found in patients without leprosy reactions, as many as 187 patients (68%), type 2 reactions in 65 patients (23.6%), and type 1 reactions in 23 patients (8.4%). The Study by Santos et al., showed that most of the patients with disability did not experience leprosy reactions (2.043; 86.7%).[14] The association between type 1 and 2 reactions and worsening disability depends on the absence of appropriate clinical management. Leprosy reactions cause nerve damage and if not treated early, can lead to disability.[15,16]

This study showed that disability grade-1 and 2 were more common in patients after receiving MDT therapy, as many as 125 patients (45.5%). Disability worsens in 40% of patients within 10 years of completion of the treatment. Deterioration after treatment is related to delay in diagnosis, extent, and severity of the disease, and the presence of neuritis. Nerve damage leading to disability and deformity may occur before, during, and after MDT treatment.[15,17] Clinical and immunological studies have shown that in some leprosy patients, neuroinflammation is a chronic and persistent process. The extent of nerve damage due to delayed diagnosis allows the development of severe neuropathy.[17]

Early diagnosis and proper treatment are essential in breaking the chain of transmission and preventing disability.[18] It is important to perform a neurologic examination of the peripheral nerves after examining the skin lesions.[19] The incidence of leprosy has decreased over the past few years, but peripheral neuropathy and physical disability caused by *M. leprae* continue to be a major problem, as it can persist for years and even worsen after completion of treatment (RFT). After RFT, patients are usually discharged from health care monitoring and are not followed up, but during this period, leprosy-related sequelae may be developed.[20]

The occurrence of disability in leprosy indicates a lack of leprosy management. Early diagnosis, knowledge of disability risk factors, management, and follow-up of the patients after RFT should be systematically integrated into the health services to prevent disability.

REFERENCES

1. Lockwood DNJ. Leprosy. In: Griffiths C, Barker J, Bleiker T, Chalmers R, Creamer D, editors. Rook textbook of dermatology. 9th Ed. London: Wiley Blackwell; 2016. p. 28.1-2.
2. Reyila PV, Betsy A, Riyaz N, Sasidharanpillai S, Sheerjeena PVB, Majitha MP, et al. Clinico-epidemiological study of disability due to leprosy at the time of diagnosis among patients attending a tertiary care institution. Indian J Dermatol 2019; 64(2):101-11.
3. Salgado CG, de Brito AC, Salgado UI, Spencer

JS. Leprosy. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, *et al.*, editors. Fitzpatrick's Dermatology. 9th Edition. New York: McGraw-Hill Education; 2019. p. 2892–924.

4. Santana EMF, Brito KKG, Leabedal ODCP, Costa MML, Silva MA, et al. Deficiencies and disabilities in leprosy: from the diagnosis to discharge by cure. Rev Eletr Enf 2018; 2:v20a15.
5. Mangala HC, Jeyaraman M, Chaudari K, Dhorde V, Likhith D. A study on prevalence of deformities in leprosy in a tertiary care hospital at Davangere. J Mycobact Dis 2019; 9: 275.
6. Bungin C, Toruan VML, Riastiti Y. The correlation between leprosy type and grade of disability in leprosy patients in Samarinda. J Ilmu Kesehat 2019; 8(1):32-6.
7. Raghavendra BN, Aneesh S, Yarramachu S, Anoop GDS, MuneerM. Clinical pattern of deformities and disabilities in leprosy patients in rural Bangalore – a two year study at tertiary level hospital'. Indian J Dermatol 2017; 3(3):101-9.
8. Mowla MR, Angkur DM, Hasan Z, Sultana MN, Afrin S, Akhter MS. Leprosy patients with deformities at post-elimination stage: the Bangladesh experience. Skin Health Dis 2020; 1: 1-8.
9. Daniel SJ, Kumar SK, Babu RA. A prospective observational study of deformities in leprosy in tertiary care center in South India. IP Indian J Clin and Exp Dermatol 2019; 5(1):61-7.
10. Kumar A, Girdhar A, Girdhar BK, Risk of developing disability in pre and post-multidrug therapy treatment among multibacillary leprosy: Agra MB cohort study. BMJ Open 2012; 2(2):1-74.
11. Jha SM, Dangol AKS, Shakya S, Jha B. Clinico-bacterial correlation of bacterial index in Hansen's disease. J pathol Nepal 2016; 6(12): 998-1000.
12. Rathod SP, Jagati A, Chowdhary P. Disabilities in leprosy: an open, retrospective analyses of institutional records. An Bras Dermatol 2020; 95:52- 6.
13. Malaviya GN. Deformity and disability prevention. In: Kumar B, Kar HK, editors. IAL textbook of leprosy. New Delhi: Jaypee Brothers Medical Publisher; 2017. p. 542-61.
14. Santos VS, Matos AMS, Oliveira LSA, Lemos MD, Gurgel RQ, Reis FP, et al. Clinical variables associated with disability in leprosy cases in Northeast Brazil. J Infect Dev Ctries 2015; 9(3):232-8.
15. Sales AN, Campos DP, Hacker MA, Nery JAC, Dupre NC, Rangel E., et al. Progression of leprosy disability after discharge: is multidrug therapy enough? Trop Med Int Health 2013; 18(9): 1145-53.
16. Raffe SF, Thapa M, Khadge S, Tamang K, Hagge D, Lockwood DNJ. Diagnosis and treatment of leprosy reactions in integrated services – the patient's perspective in Nepal. PLOS Negl Trop Dis 2013; 7(3): e2089.
17. Lockwood DNJ, Saunderson PR. Nerve damage in leprosy: a continuing challenge to scientists, clinicians and service providers. Int Health 2012; 4(2):77-85.
18. Alinda MD, Geani S, Agusni RI, Kusumaputra BH, Reza NR, Prakoeswa CRS, et al. Diagnosis and management of leprosy. Berkala Ilmu Kesehatan Kulit Kelamin 2020; 32(2):149-57.
19. Prakoeswa CRS, Lubis RS, Anum Q, Argentina F, Menaldi SL, Gunawan H, et al. Epidemiology of leprosy in Indonesia: a retrospective study. Berkala Ilmu Kesehatan Kulit Kelamin 2022; 34(1):29-35.
20. Haefner K, Walther F, Chichava OA, Ariza L, Alencar CH, de Alencar MDJF, et al. High occurrence of disabilities caused by leprosy: census from a hyperendemic area in Brazil's Savannah region. Lepr Rev 2017; 88(4):520–32.