



THE CORRELATION BETWEEN LEPROSY TYPES AND REACTIONS WITH DISABILITY OF LEPROSY PATIENTS IN UNIVERSITAS MATARAM HOSPITAL

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Abstract

The purpose of this study is to analyze the correlation between leprosy types and reactions with the disability occurrence of leprosy patients in the outpatient clinic of Universitas Mataram (UNRAM) Hospital. This study was an analytical observational study with a retrospective approach and cross-sectional design. Medical records of leprosy patients were utilized to gather the information from January 2021-April 2023. The Fisher-exact test was used to analyze the data. There were 25 patients included in the study. There were 15 male patients (60%) while women were 10 patients (40%). In the majority, there were 12 patients (48%) around 25-45 years old. Based on occupation, fourteen patients (56%) were unemployed followed by 9 employed patients (36%). Furthermore, there were 24 patients (96%) who suffered from multibacillary leprosy. Twenty patients (80%) had type 1 reactions while the other 5 patients (20%) had type 2 reactions. Among leprosy patients, there were 17 disabled patients due to leprosy in this study. There was no association between leprosy types and disability occurrence (p-value 1.0). The correlation between leprosy reactions and disability was not significant either in UNRAM Hospital (p-value 0.28). There was no association between leprosy types and reactions to disability of leprosy patients in UNRAM Hospital.

Keywords: *Leprosy; leprosy types; leprosy reactions; disability.*

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INTRODUCTION

Leprosy is an ancient yet infectious disease that still causes stigma worldwide (1). The pathogen of this disease is *Mycobacterium leprae*, an acid-fast, intracellular obligate bacteria, thus, it needs the host cell to develop and replicate (2). It is a chronic granulomatous disease and spread through droplets or close contact with infected patients (3). The bacteria have a strong affinity towards Schwann cells and induce the host's immune response causing the cardinal symptoms of the disease (2). Leprosy, known as Hansen's disease, could cause serious morbidity because of its destructive properties toward infected individuals (3). World Health Organization (WHO) also declares this disease as a neglected disease (4). Globally, in the past ten years, leprosy cases had been declining ever since because WHO eagerly enforces specific programs in order to lower the incidence of leprosy in every country. Nevertheless, leprosy is still causing problems in several regions, such as Southeast Asia. In 2019, there were 202.256 leprosy cases reported from 118 different countries. Southeast Asia contributed almost 70% of cases compared to other regions. Furthermore, Indonesia, along with India and Brazil, still contributes a large number of leprosy cases worldwide (5). According to an epidemiological study in Indonesia, Jakarta had the highest number of leprosy cases (16% of cases) while Semarang had the lowest cases (2.2%) (6). Meanwhile, in West Nusa Tenggara, leprosy cases reached 1.7 per population in 2022 (7).

Leprosy is diagnosed based on clinical symptoms and laboratory results of a skin-slit smear. According to those, WHO categorizes leprosy into 2 types: paucibacillary (PB) and multibacillary (MB) types. Patients with loss of sensation within skin lesions, nerve tenderness, and positive slit-skin smear results are defined as multibacillary patients (3). Furthermore, leprosy patients might suffer from episodes of inflammation during the disease or treatment, known as reactions. There are two types of reactions: Type 1 reaction, known as reversal reaction, and type 2 reaction, known as erythema nodosum leprosum. Those reactions occur depending on

an individual's immune response. Leprosy reaction could lead to the progression of disability because it causes nerve damage (1,8). There are 3 degrees of disability caused by leprosy depending on its severity (9). The prevalence of disability in leprosy patients is still high in several countries including Indonesia. The high number of disability is thought to be the result of delay in diagnosis and problems in treatment-seeking awareness. Disability among leprosy patients causes restriction of daily activities, causing stigma (10). Several studies already analyzed many factors associated with disability including leprosy types and reactions. However, the result was still controversial. There is still a lack of research evaluating the relationship between leprosy types and reactions to disability in Mataram. Thus, since disability could cause great morbidity to the patients, this study aims to discover the association between leprosy types and leprosy reactions toward disability of leprosy patients in UNRAM hospital.

METHODS

This study is an analytical observational study with a retrospective approach, and it utilizes a cross-sectional design. The target population of this study was leprosy patients coming into the dermatology-venerology outpatient clinic at UNRAM hospital, Mataram from January 2021st until April 2023rd. Secondary data were utilized in this research which was the medical record of the patients collected using the total sampling method. There were 25 patients eligible for this study. The patients were around 18-74 years old without any disability from other disease complications nor had a history of default in medication. The characteristic of the samples was presented as total number and percentage. Fisher exact test was utilized in order to analyze the association between leprosy types and reactions with the occurrence of disability in leprosy patients. The result will yield the p-value as < 0.05 being statistically significant with 95% confidential interval. The study has been approved by the ethical committee of Medical Faculty of Mataram University No: 260/UN18.F8/ETIK/2023.

Table 1. Sociodemographic distribution of Leprosy Patients at Outpatient Clinic Universitas Mataram Hospital

Patients Characteristic	Total Leprosy Patients	
	n	(%)
Gender		
Male	15	(60%)
Female	10	(40%)
Age		
<25 years old	4	(16%)
25-45 years old	12	(48%)
>45 years old	9	(36%)
Occupation		
Unemployed	9	(36%)
Students	2	(8%)
Employees	14	(56%)
Leprosy Type		
PB	1	(4%)
MB	24	(96%)
Leprosy Reaction		
Type 1 Reaction	20	(80%)
Type 2 Reaction	5	(20%)
Disability Status		
No disability	8	(32%)
Disabled	17	(68%)

PB = Paucibacillary; MB = Multibacillary

RESULT

The distribution of leprosy patients in UNRAM Hospital was described in Table 1. There were 25 patients included in the study. Most of the leprosy patients in UNRAM Hospital were men. There were 15 male patients (60%) while women were 10 patients (40%). Leprosy was common among patients around 25-45 years old. There were 12 patients around that age. Based on patients' occupations, fourteen patients (56%) were unemployed followed by 9 employed patients (36%). Multibacillary leprosy was more prevalent compared to paucibacillary leprosy. There were 24 patients (96%) who suffered from multibacillary leprosy. Furthermore, twenty patients (80%) had type 1 reactions while the other 5 patients (20%) had type 2 reactions. Among leprosy patients, there were

17 disabled patients due to leprosy in this study.

In Table 2, we would like to determine the association between leprosy types and the occurrence of disability for leprosy patients in UNRAM hospitals. There were 16 multibacillary (66.7%) and only one paucibacillary leprosy patient (100%) had disability. The result showed there was no association between leprosy types and disability occurrence in leprosy patients (p-value 1.0).

Table 2. Correlation between Leprosy Types and Disability of Leprosy Patients in UNRAM Hospital

Variable	Leprosy Types		p-value (95% CI)
	PB n(%)	MB n(%)	
No disability	0 (0%)	8 (33.3%)	1.0 (0.02)
Disability	1 (100%)	16 (66.7%)	- 17.64

PB = Paucibacillary; MB = Multibacillary

Next, we analyzed the association between leprosy reactions and disability occurrence in leprosy patients. There were 15 disabled patients with type 1 reaction and 2 disabled patients with type 2 reaction. However, there was no association between leprosy reactions and disability occurrence in leprosy patients at UNRAM Hospitals either (p-value 0.28) as shown in Table 3.

Table 3. Correlation between Leprosy Reaction and Disability of Leprosy Patients in UNRAM Hospital

Variable	Leprosy Reaction		p-value (95% CI)
	T1R n(%)	T2R n(%)	
No disability	5 (25%)	3 (60%)	0.28
Disability	15 (75%)	2 (40%)	(0.03– 1.73)

T1R = Type Reaction; T2R = Type 2 Reaction

DISCUSSION

Leprosy infection was more common among men compared to women. This fact correlated with a study in Indonesia which

showed around 67% of leprosy cases were common among male patients (11). In Sichuan, China, the ratio between men and women with leprosy was 2.5(12). Besides, men were also more vulnerable to having a physical disability due to leprosy. This case suggested that the awareness and disclination of the disease among men had been taken into account (13). Men were also associated with multibacillary leprosy, and multibacillary cases were reported to be more prevalent in several countries (14,15). Moreover, age also increased the risk factor of leprosy infection. The risk was higher in patients around 40 years old (IQR 25-55) (16). Another factor for the increased risk of leprosy was educational background. Low educational background was associated with the risk of leprosy infection (p-value < 0.05) (17).

This study showed multibacillary patients were more prevalent compared to paucibacillary patients. However, the incidence of disability was not significantly related to leprosy types (p-value > 0.05). A study from Surabaya with 275 leprosy patients sample reported that leprosy type was not correlated with disability (p-value 0.639) (18). However, a study from Lokpaikat, South Kalimantan, in 2015 reported the correlation between leprosy types and the degree of disability (p-value 0.021). The study included 36 multibacillary patients and 6 paucibacillary patients. Besides, this study also proved that leprosy type was significantly related to the occurrence of 2nd degree of disability (p-value 0.006) (19). Furthermore, the bacterial index was also presented to be correlated with the degree of disability. There was a positive correlation between leprosy types and types of disability. A higher bacterial index will increase the risk of developing hand and feet disability (p-value <0.05) (11). The bacterial index is known to be positive in multibacillary patients while negative in paucibacillary patients. Borderline and lepromatous leprosy have higher risk factors for developing deformities than tuberculoid (13). The types of leprosy occur depending on the response of the immune system. In multibacillary leprosy, the humoral immune response is more predominant and responsible for the clinical symptoms of MB patients. The involvement of T helper 2 cells, regulatory T cells, and

increased Interleukin 4 and 10 production exhibit macrophage granuloma with few lymphocytes which are inadequate for eliminating the acid-fast bacilli (2,13). Since the bacteria mostly infect the Schwann cells, the high bacilli load will impact the severity of nerve damage and, therefore, disability for the patients (3).

Type 1 reaction, known as reversal reaction, was more common for the occurrence of disability in UNRAM hospitals. However, there was no association between the types of reaction with the disability (p-value > 0.05). A study from Surabaya showed that disability occurred more in patients with type 2 reactions, yet, there was no correlation between the type of leprosy reaction and grade 1 & 2 disability in the study (p-value 0.1) (18). Likewise, a cross-sectional study reported no association between having a disability and the event of reactions, the result was not statistically correlated either (p-value 0.64) (20). Nonetheless, several studies reported otherwise and showed a significant correlation, regardless of what type the reactions were. A significant result was reported from a meta-analysis study that 7997 participants (82.5%) had disability without ongoing reactions while 1694 patients (17.5%) with reactions had disability. Having leprosy reactions would be more likely to increase the risk of morbidity by 2.43 times. The study showed significant results (p-value <0.05) (13). The occurrence of type 1, type 2, or mixed reactions will lead to grade 1 disability compared to patients without reactions (p-value < 0.05). The reactions could also worsen the physical disability of the patients (OR 3.3, p-value < 0.05) (21). In Indonesia, a study from Mojokerto showed 68.6% of patients with a reaction history are more likely to suffer from grade 2 disability (p-value < 0.05) (22). Leprosy reactions occur due to sudden and severe immune responses toward the acid-fast bacilli. Due to hypersensitivity, cellular-mediated immune responses are enhanced in type 1 reaction, meanwhile, immune complexes in type 2 reaction attract granulocytes and activate the complements as well as the cytokines. Thus, both reactions could damage the peripheral nervous system and become a major factor in

leprosy-related neurological problems (13)(13).

There are several shortcomings in this study because the study was held in only one referral hospital, thus, the total sample was limited. Moreover, sampling bias could also happen in this study because most of the patients coming into the hospital had suffered from more advanced stages of the disease. Therefore, the samples did not represent the community. Regardless, this study could be a benchmark for leprosy studies in Mataram which could lead to more studies in this field.

CONCLUSION

Leprosy cases in Mataram are still a burden for society. The great morbidity caused by leprosy has led to social stigma within the community. Restriction of physical activity due to disability is one of the complications of the disease. Multibacillary leprosy and type 1 leprosy reactions were more prevalent and common with disability in this study. However, there was no correlation between the two factors with the occurrence of disability in patients in UNRAM Hospital. Therefore, larger samples and more information are required for future research to reflect the community in order to prevent bias and get more representative results.

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