

Epidemiology of Leprosy in Indonesia: a Retrospective Study

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ABSTRACT

Background: According to WHO data, the number of new cases of leprosy has decreased in 2019. However, Indonesia continues to provide a significant number of cases. According to statistics, India, Brazil, and Indonesia account for 79 percent of all instances. **Purpose:** This study aims to describe the profile of leprosy patients, and involves all Dermatology and Venereology Academic Hospitals in Indonesia. **Methods:** This study was a retrospective study of 2461 patients from Dermatology and Venereology Outpatient Clinic at 13 Academic Hospitals in Indonesia between January 2018 and December 2020. **Result:** Subjects in this study were dominated by males (66.8%) and aged > 14 years (95.3%). The most common type of leprosy was multibacillary (MB) (86.2%), and erythema nodosum leprosum (ENL) was the most leprosy reaction (20.3%). Majority of the subjects experienced disability in the hands (26.6%), in grade 1. **Conclusion:** Leprosy cases in Indonesia are mostly experienced by adult males. The most common type of leprosy is MB, with ENL being the most common leprosy reaction. Grade 1 disability is the most prevalent, therefore proper education is necessary to keep patients from progressing to grade 2 disability.

Keywords: leprosy, epidemiology, leprosy, infectious disease, human and disease, tropical disease, infectious disease.

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BACKGROUND

Leprosy is an ancient chronic infection caused by *Mycobacterium leprae* (*M. leprae*). This infection affects mainly mucous cutaneous tissues and peripheral nerves, which manifest as a loss of a sensation in the skin and development of deformities and disabilities during the progression of the disease. *M. leprae* has an affinity for keratinocytes, macrophages, and histiocytes in the skin. Meanwhile, in peripheral nerves, *M. leprae* is found in Schwann cells.^{1,2}

According to WHO, leprosy is classified as paucibacillary (PB) or multibacillary (MB). PB leprosy is a milder type of the disease, defined by hypopigmented, pale, and reddish lesions with the presence of 1 to 5 skin lesions. Meanwhile, MB leprosy is characterized with the presence of > 5 skin lesions and can also have nodules, plaques, and diffuse skin infiltration.^{3,4}

Since the WHO recommendation in 1981 to use multidrug therapy (MDT) in the treatment of leprosy, this disease has progressed well. According to WHO data from 2019, there were 202,256 new cases detected in 118 countries in 2019. However, Indonesia is still contributing quite a lot of cases. Data shows that 79% of cases come from India, Brazil, and Indonesia.^{2,5} There is no recent data regarding the profile of leprosy patients in Indonesia. Therefore, this study aims to describe the profile of leprosy patients and involve all Dermatology and Venereology Academic Hospitals in Indonesia.

METHODS

This study was a retrospective study of patients from the Dermatology and Venereology Outpatient Clinic at 13 Academic Hospitals in Indonesia between January 2018 and December 2020. The data was obtained from medical records. This study used a total sampling method of sampling. Inclusion criteria for this study were all patients with a leprosy diagnosis and had complete medical records, which consisted of medical records number, identity, date of examination, history taking, physical examination, and therapy. Exclusion criteria were medical records with incomplete variable data. The ethical clearance has been obtained from the Ethical Committee of Dr. Soetomo General Academic General Hospital Surabaya, Indonesia (No. 0261/KEPK/IX/2021)

RESULT

A total of 2461 subjects were involved in this study, with Jakarta as the city with the highest number of leprosy patients, which was 396 subjects (16.1%), while Semarang had the lowest number, which was 54 subjects (2.2%). The majority of the subjects were >14 years old (95.3%), and only 4.7% were <14 years old. As many as 1643 subjects were males (66.8%), and the rest were females (33.2%). Surakarta was the city with the highest distribution of male subjects, which was 267 subjects, while the highest number of female subjects was in Jakarta, which was 138 subjects. The complete distribution of number of subjects and gender is shown in Figure 1

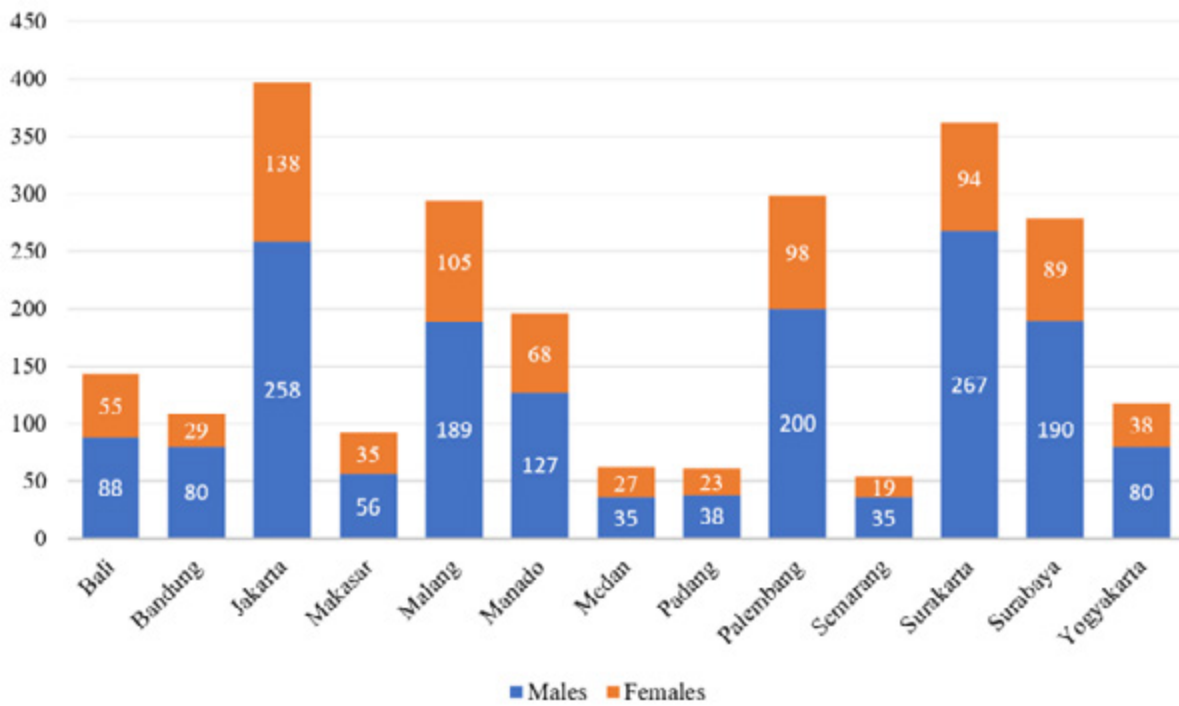


Figure 1. Gender distribution and the number of subjects.

The most common type of leprosy in this study was multibacillary (MB) (86.2%), followed by paucibacillary (PB) (11.1%), indeterminate (0.7%),

lucio (0.6%), histoid (0.2%) and subclinical (0.2%) (Figure 2).

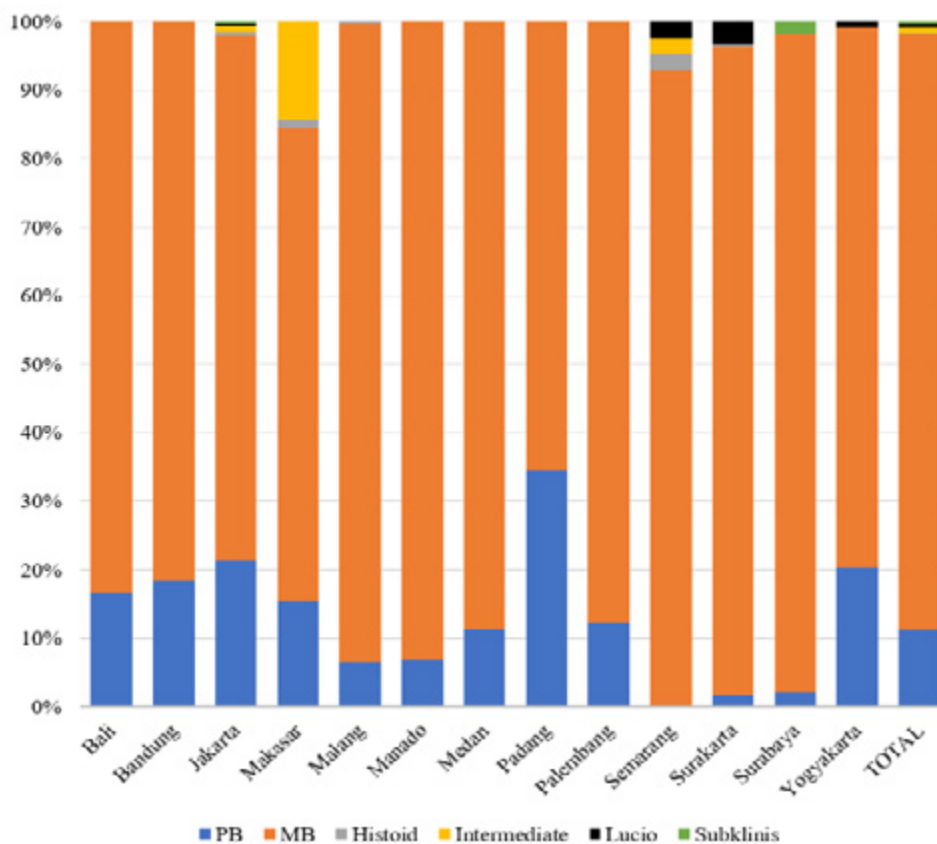


Figure 2. Leprosy type.

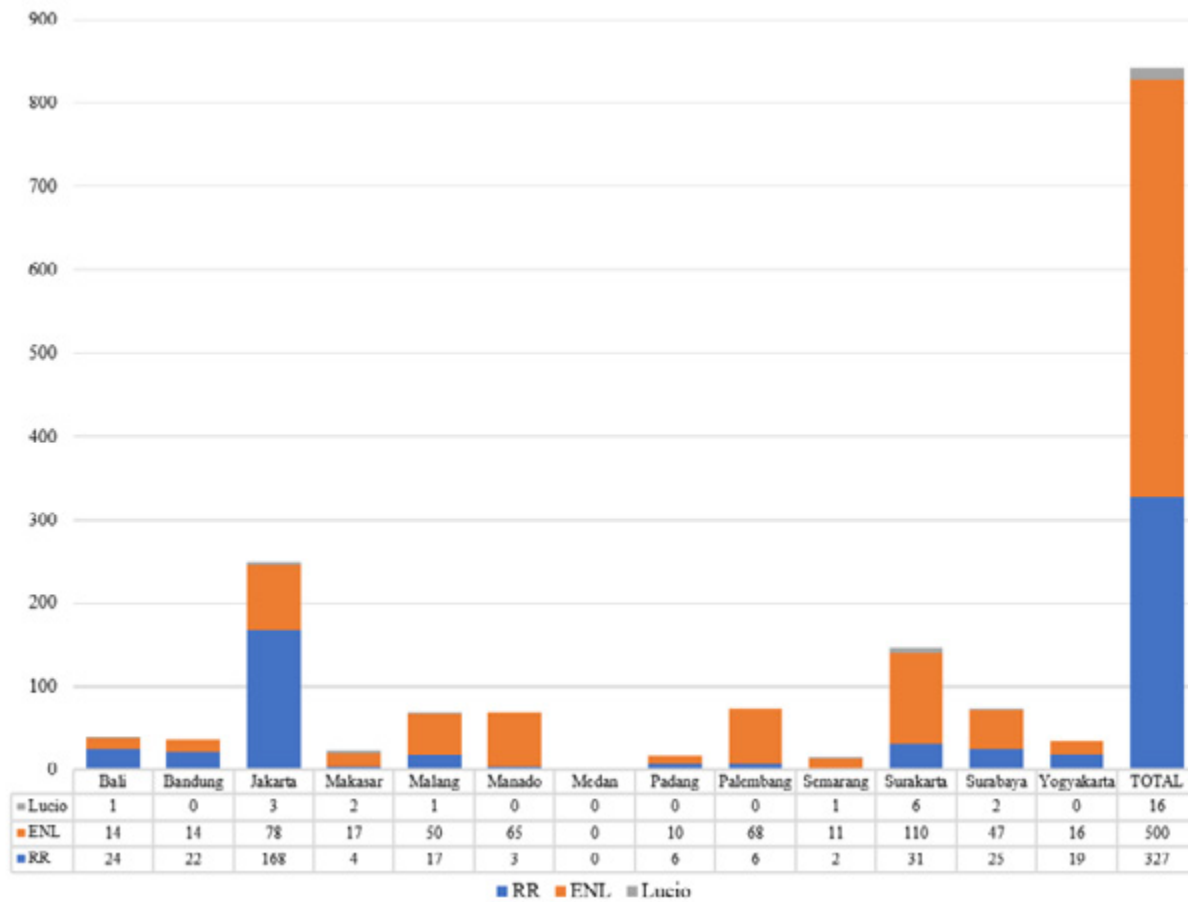


Figure 3. Leprosy reactions.

Figure 3 shows the distribution of leprosy reactions that occur in subjects. The most common leprosy reactions in this study were erythema nodosum leprosum (ENL) (20.3%), followed by reversal reaction (RR) (13.3%) and Lucio (0.7%).

The data showed that 39.2% of patients had their bacterial index (BI) checked, and 26.6% had their morphological index (MI) checked. (Figure 4).

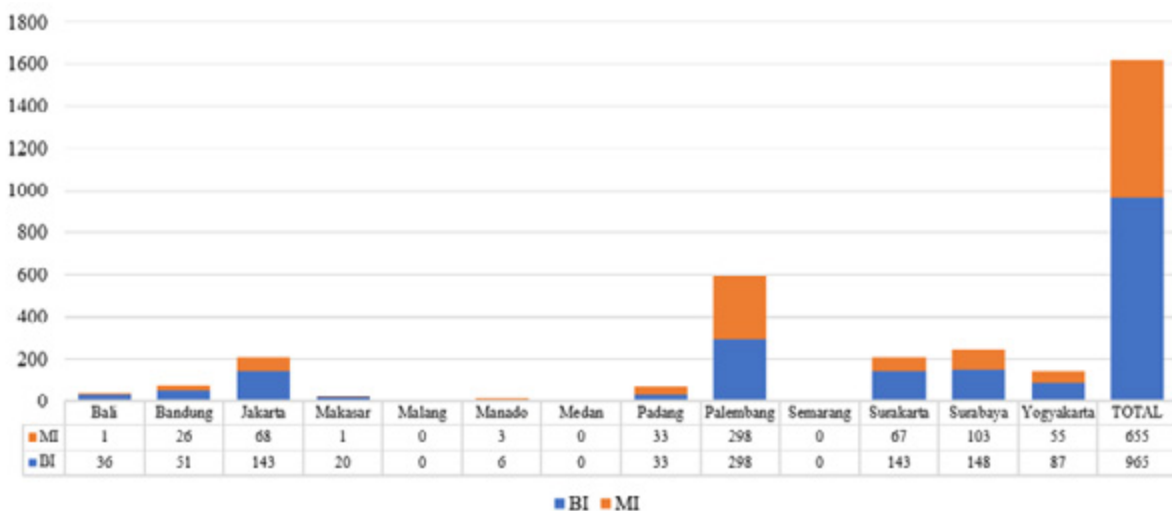


Figure 4. Bacillary examination.

This study showed that the most common disability experienced by subjects was in the hands (26.6%), followed by feet (22.9%), and eyes (2.5%). Of the three

types of disability, the majority of the subjects had grade 1 disability. Palembang and Manado were the cities with the highest incidence of hand disabilities.

For the legs, the subjects from Palembang were the most likely to have leg disability. As for eye disability, subjects from Manado were the most affected. The severity of hand, leg, and eye disability is summarized in Table 1.

Table 1. Grade of hands, feet, and eyes disability

City	Grade of disability								
	Hands			Feet			Eyes		
	0	1	2	0	1	2	0	1	2
Bali	143 100.00%	0 0.00%	0 0.00%	143 100.00%	0 0.00%	0 0.00%	143 100.00%	0 0.00%	0 0.00%
Bandung	98 89.90%	0 0.00%	11 10.10%	101 92.70%	6 5.50%	2 1.80%	108 99.10%	0 0.00%	1 0.90%
Jakarta	368 92.90%	1 0.30%	27 6.80%	359 90.70%	1 0.30%	36 9.10%	393 99.20%	0 0.00%	3 0.80%
Makasar	87 95.60%	4 4.40%	0 0.00%	88 96.70%	3 3.30%	0 0.00%	90 98.90%	1 1.10%	0 0.00%
Malang	287 97.60%	0 0.00%	7 2.40%	271 92.20%	6 2.00%	17 5.80%	292 99.30%	0 0.00%	2 0.70%
Manado	34 17.40%	141 72.30%	20 10.30%	125 64.10%	64 32.80%	6 3.10%	170 87.20%	25 12.80%	0 0.00%
Medan	62 100.00%	0 0.00%	0 0.00%	62 100.00%	0 0.00%	0 0.00%	62 100.00%	0 0.00%	0 0.00%
Padang	56 91.80%	3 4.90%	2 3.30%	59 96.70%	2 3.30%	0 0.00%	61 100.00%	0 0.00%	0 0.00%
Palembang	36 12.10%	257 86.20%	5 1.70%	30 10.10%	267 89.60%	1 0.30%	298 100.00%	0 0.00%	0 0.00%
Semarang	46 85.20%	8 14.80%	0 0.00%	47 87.00%	5 9.30%	2 3.70%	49 90.70%	5 9.30%	0 0.00%
Surakarta	279 77.30%	46 12.70%	36 10.00%	312 86.40%	18 5.00%	31 8.60%	347 96.10%	14 3.90%	0 0.00%
Surabaya	214 76.70%	42 15.10%	23 8.20%	220 78.90%	49 17.60%	10 3.60%	268 96.10%	7 2.50%	4 1.40%
Yogyakarta	96 81.40%	12 10.20%	10 8.50%	81 68.60%	22 18.60%	15 12.70%	117 99.20%	0 0.00%	1 0.80%
TOTAL	1806 73.40%	514 20.90%	141 5.70%	1898 77.10%	443 18.00%	120 4.90%	2398 97.40%	52 2.10%	11 0.40%

The majority of the subjects received MDT MB therapy (70.6%), but there were still 2.1% of the subjects who didn't get therapy (Table 2).

Table 2. Leprosy therapy

Leprosy Therapy	n (%)
No therapy	51 (2.1%)
MDT PB	251 (10.2%)
MDT MB	1738 (70.6%)
Non MDT	421 (17.1%)

MDT = Multidrug Therapy; PB = pausibasiler; MB = multibasiler

DISCUSSION

The subjects in this study were dominated by males, with a male-to-female ratio of 2:1. This is in line with previous research which stated that in most countries in Asia, leprosy affects more males than females. The average male-to-female ratio globally is also 2:1. This could be related to many factors, including the differences in behavior and lifestyle (males are more active outside, so they are more susceptible to infection, whereas females are more accustomed to taking care of themselves and maintaining health), males' decreased concern for their own health and the difficulty accessing public health services.⁶⁻⁸

The majority of subjects in this study were over the age of 14. However, there were also children under the age of 14. Case detection in children is an indicator of recent infection transmission in the community. Furthermore, children's leprosy cases also indicate exposure to the bacillus, the operational vulnerability of primary care surveillance, and a lack of active case search action.^{5,9}

The findings of this study revealed that the MB form of leprosy was the most prevalent in Indonesia (86.2%). This is consistent with a study conducted by Liu in 2015 in China, which found that 84.1% of leprosy patients were of the MB type, while the remainder were of the PB type. There are several classifications of leprosy. Ridley-Jopling classified leprosy into 5 categories: Tuberculoid (TT), Borderline Tuberculoid (BT), Borderline-borderline Mid-borderline (BB), Borderline-Lepromatous (BL), and Lepromatous (LL). But according to the WHO, leprosy is divided into two types to facilitate its treatment, which are PB and MB (TT and BT are included in the PB, while BB, BL, and LL are included in the MB). PB is defined as the presence of 1-5 skin lesions and/or one impaired nerve, whereas MB is described as the presence of > 5 skin lesions or impaired nerves.⁴

In addition to these types, there are others, namely indeterminate (I), histoid, lucio, and subclinical. Intermediate is a type of early stage leprosy whose symptoms are not clearly visible and can differentiate into tuberculoid, lepromatous, borderline or even cured forms. Usually, there are only hypopigmented lesions and little nerve disturbance. Intermediate symptoms, which are not clear, cause leprosy sufferers to be unaware of their condition, so that very few patients with intermediate leprosy have their condition checked by a doctor.¹⁰ Histoid leprosy is a rare form of leprosy with a higher load of bacilli than lepromatous leprosy. It is characterized by rafts of bacilli (globi), diffuse glossy nodules and papules, and varying degrees of skin infiltration. Lucio leprosy is also a rare type of leprosy with infiltration as main skin manifestation.¹ Meanwhile, subclinical leprosy is a patient with positive *M. leprae*, but have no symptoms at all.

Several subjects also experienced leprosy reactions. The majority of leprosy reactions that the individuals in this study encountered were type 2 reactions, or ENL (20.3%). This is in contrast with a study conducted by Suchonwanit et al. in 2015, which stated that RR reactions were more common. However, these findings are consistent with research conducted by Scollard that ENL is more than RR. ENL reactions were reported to be common in the pre-MDT era. Variations in the frequency of occurrence of ENL can occur due to various factors, such as the subjects

involved in the study, patients in the field, patient reports to the hospital, duration of MDT use, and quality control of the leprosy program.¹¹

The leprosy reaction is an immunological phenomenon that can occur before, during, or after complete treatment with MDT. There are two common types of leprosy reactions: type I reactions (RR) and type 2 reactions (ENL). These two forms of leprosy reactions develop independently, but can also occur in the same patient at different times. RR usually occurs in BT, BB, BL, and LL types of leprosy, while ENL generally occurs in LL leprosy types only. Along with these two leprosy reactions, there is one extremely severe leprosy reaction referred to as the Lucio Phenomenon.^{1,12}

Parameters of bacillus examination through smear can be divided into 2: MI and BI. Ziehl-Neelsen staining was used for this examination. MI indicates the viability of the bacteria through the percentage of intact bacilli. Viable/intact bacilli will be red and may be found before treatment or in cases of relapse. Meanwhile, BI shows the load of the bacilli on a 0-6+ scale. The results of the smear examination will be positive in the MB group, while the PB group tends to be negative. Therefore, the results of this smear examination can also be used as a reference to distinguish between MB and PB.¹³

The data in this study indicated that many subjects had hand and foot deformities. This is consistent with Bungin's research in 2020, which found that hand and foot deformities were the most prevalent, while eye deformities were found in only two people. And the majority of subjects had deformities at grade 1. This is also in line with research by Rathod (2019). Disabilities in leprosy patients can be divided into grades 0, 1, and 2. Grade 0 indicates normal sensation with no visible impairments; Grade 1 indicates impaired sensation with no visible impairments; Grade 2 indicates visible impairments/deformity (Eye = lagophthalmos, ectropion, trichiasis, corneal opacity, and visual impairment ; hands = ulcerations, resorption, claw hand, fallen hand ; feet = trophic, resorption, claw foot, drop foot, ankle contracture).^{14,15}

Grade 1 assessment is really important. Because patients must have passed through the Grade 1 stage prior to entering Grade 2. As a result, when examining any leprosy case, it is important to conduct a thorough neurological examination of peripheral nerves following the examination of skin lesions. If the proper education about self-care is given to the patients, such as not walking barefoot, daily inspection of hands/feet, eye care, and changing occupations; no visible deformity will occur.¹⁵

The majority of patients were treated with MDT MB (70.6%). This is in accordance with data from this study, which showed that the majority of cases in this study were of the MB type. However, 2.1% of subjects received no therapy. This must be followed up immediately because if the patient is not treated promptly, the patient can fall into a worse condition and decrease their quality of life.

Leprosy cases in Indonesia are mostly experienced by adult males. The most common type of leprosy is MB, with ENL being the most common leprosy reaction. Grade 1 disability is the most prevalent, therefore proper education is necessary to keep patients from progressing to grade 2 disability

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