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Epidemiology and Clinical Patterns of Leprosy: A Retrospective Study at Dr. M. Djamil General Hospital, Padang, Indonesia

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Abstract

Background: Indonesia ranks third globally in the number of leprosy cases, following Brazil and India. Despite this, leprosy remains a neglected disease. Monitoring its epidemiology through retrospective studies is essential to inform effective disease control programs.
Methods: This retrospective descriptive study reviewed medical records of leprosy patients who visited Dr. M. Djamil General Hospital, Padang, between 2021 and mid-2024. Data were extracted from patients' electronic medical records.
Results: A total of 92 patients were confirmed with leprosy during the study period. The incidence increased from 13 patients in 2021 to 22 in 2022, and 40 in 2023, with 17 additional cases identified by mid-2024. Of these, 70 (76.1%) were multibacillary cases and 22 (23.9%) were paucibacillary cases. Male patients predominated, with a mean age of 35 years (range: 7–79 years). Leprosy reactions occurred in 44 patients (47.8%), consisting of 20 (45.5%) reversal reactions and 24 (54.5%) erythema nodosum leprosum (ENL). Most cases originated from Pesisir Selatan Regency and Pariaman City, both recognized as high-endemic areas in West Sumatra Province.
Conclusion: The incidence of leprosy is rising annually, with multibacillary cases predominating. Male patients are more frequently affected, and nearly half experience leprosy reactions, with ENL more common than reversal reactions. Strengthened disease control strategies are urgently needed to detect and reduce new cases in endemic regions. Study limitations include reliance on retrospective medical record data and a single tertiary hospital setting.

Keywords: *leprosy, multibacillary, erythema nodosum leprosum, reversal reaction, neglected tropical disease*

Introduction

Leprosy is a long-lasting, often overlooked infectious condition caused by Mycobacterium leprae, which can result in changes to the skin and nerves. Each year, the number of leprosy cases continues to increase, with the World Health Organization (WHO) announcing a total of 182,815 cases around the globe by the year 2023. The five nations with the greatest number of leprosy cases are India, Brazil, Indonesia, the Republic of Congo, and Bangladesh.[1] From a clinical standpoint, the disease is defined by a combination of three main symptoms: skin lesions that are either lighter or reddened and paired with loss of sensation, thickening of the peripheral nerves, and the detection of acid-fast bacilli in skin samples or biopsies. Mycobacterium leprae mainly affects Schwann cells in peripheral nerves, leading to nerve injury and the onset of disabilities.[2] Furthermore, the stigma surrounding this condition within the community causes leprosy patients to face significant psychological and social challenges. The stigma associated with this condition in the community leaves leprosy patients facing significant mental and social challenges. Stigma cause discrimination, embarrassment and low quality of life.[3]

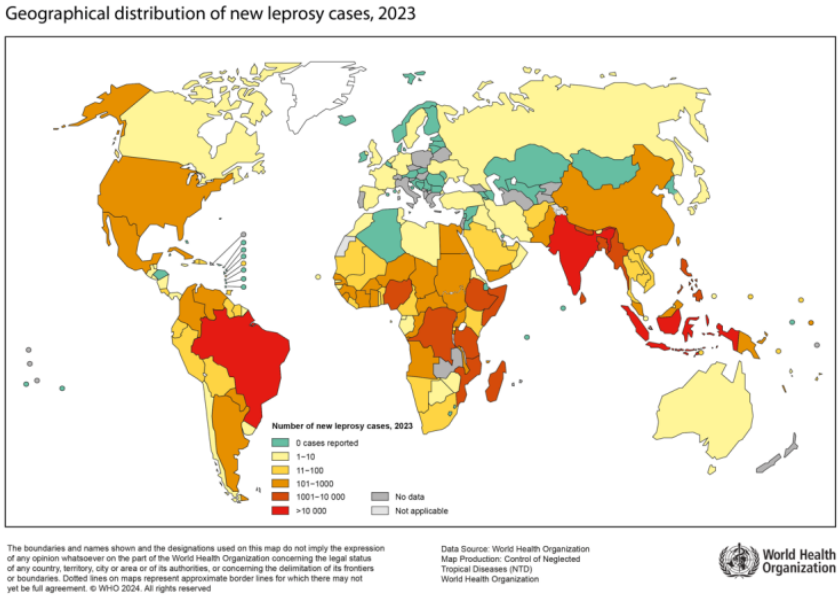

Figure 1. Geographical distribution of new leprosy cases in 2023 from World Health Organization, Indonesia were rate as (red) with more than 10.000 total cases. [6]

A two-year retrospective multicenter study conducted in Indonesia from 2018 to 2020 documented 2,461 new leprosy cases in the country. [4] According to WHO data, Indonesia recorded a total of 14,376 leprosy cases in 2023, an increase from 12,441 cases in the previous year. The number of leprosy cases in Indonesia post-COVID 19 has shown a decline compared to the pre-COVID-19 period.1 While further epidemiological data is required to better understand this trend, ongoing annual studies on leprosy in endemic regions remain essential.[5] Epidemiological data on new leprosy cases is crucial for achieving the World Health Organization goal of zero leprosy by 2030. Accurate and up-to-date data enables health authorities to monitor cases especially in high endemic area. Additionally, the WHO has called for urgent action to address gaps in leprosy service, which disrupted by COVID-19 pandemic during late 2019- May 2023, and to accelerate efforts towards zero leprosy. [6] Dr. M. Djamil General Hospital, located in the endemic area of Padang City, West Sumatra Province, is a tertiary referral hospital equipped with disability prevention exams conducted by dermatologists and comprehensive histopathology and immunohistochemistry facilities. Therefore this study was conducted to present the data of number of new leprosy cases during Covid-19 pandemic and after Covid-19 pandemic in tertiary hospital in West Sumatera Province.

Methods

This retrospective descriptive research sought to examine the occurrence of leprosy by evaluating patient records at Dr. M. Djamil General Hospital located in Padang, West Sumatra, Indonesia, from January 2021 to June 2024. The research was authorized by the Ethics Committee for Health Assessment at Dr. M. Djamil General Hospital (Approval No. DP. 04. 03/D. XVI. 10. 1/13/2025).

The study subjects were patients diagnosed with leprosy by dermatologists and confirmed through clinical examination, biopsy, and immunohistochemistry. The inclusion criteria were all patients who attended the Dermatology and Venereology Clinic of Dr. M. Djamil General Hospital with complete medical records and confirmed histopathological examination results for leprosy classification. Patients with incomplete data were excluded. A total sampling technique was applied to include all leprosy cases that met the criteria.

The study analyzed demographic variables such as medical record number, age, sex (male, female), educational attainment (from no schooling to university level), occupation (private sector, entrepreneur, civil servant, student, housewife/unemployed, laborer/farmer, and others), marital status (single, married, divorced), and geographic origin (within or outside West Sumatra). Clinical characteristics included leprosy classifications according to WHO criteria (borderline lepromatous, borderline tuberculoid, lepromatous, tuberculoid, and

borderline borderline) and Ridley–Jopling classification (multibacillary and paucibacillary), as well as bacteriological index status. Instances of leprosy reactions were classified into Type 1 (Reversal Reaction, RR) and Type 2 (Erythema Nodosum Leprosum, ENL) to aid in the prompt identification of reaction-related symptoms and to avert paralysis or long-term disabilities.[4,5,7,8]

Patients with incomplete data in their medical records were excluded. Demographic and clinical data were summarized using descriptive statistics, which included measures of central tendency (mean, median, and mode) and frequency distribution tables. Unique codes were used to collect data in order to protect patient confidentiality. Patients were free to decline or resign from the study at any time without experiencing any repercussions because participation was entirely voluntary.

Results

A number of 92 patient records diagnosed with leprosy were found between January 2021 and June 2024. Fluctuations in the number of leprosy patients were observed each year, with the highest increase in 2023 at the end of the COVID-19 pandemic (Figure 2).

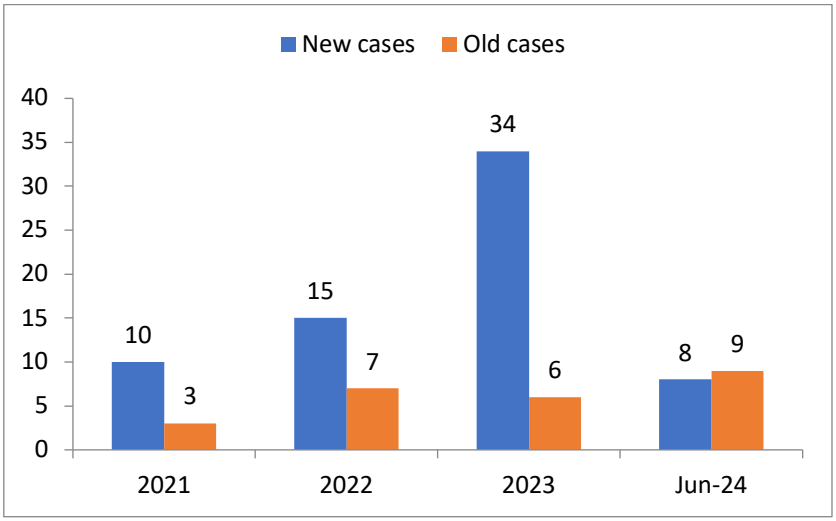

Figure 2. Number of patient visits and leprosy incidence at Dr. M. Djamil General Hospital Padang

In the study, participants' ages ranged from 7 to 79 years, with an average age of 35 years. Out of the whole group, 50 (54. 3%) were males, while 42 (45. 7%) were females. A large number of the patients lived in country regions, especially in Pariaman City and Pesisir Selatan Regency, known for being areas of high disease prevalence in West Sumatra Province. The majority of patients were housewives or unemployed (31.5%), followed by entrepreneurs (19.6%), students (15.2%), laborers or farmers (13%), private sector workers (9.8%), civil servants (5.4%), and other professions (5.4%).

Regarding educational background, the highest number of patients had completed high school (40 patients), followed by those who had not completed elementary school or had no formal education (16 patients). Thirteen patients each had completed junior high school and elementary school, while 10 patients held a university degree. In terms of marital status, 42 (45.7%) patients were unmarried, 49 (53.3%) were married, and 1 (1.1%) was divorced.

Table 1. Patients profile.

Variable	Value
Age (years), median (min-max)	35 (7-79)
Sex, f(%)	
Male	50 (54.3)
Female	42 (45.7)
Educational background, f(%)	
No school	17 (17.4)
Elementary school	13 (14.1)
Junior high school	13 (14.1)
Senior high school	40 (43.5)
University	10 (10.9)
Occupation, f(%)	
Private sector	9 (9.8)
Entrepreneur	18 (19.6)
Civil servant	5 (5.4)
Student	14 (15.2)
Housewife or unemployed	29 (31.5)
Labourer or farmer	12 (13)
Other	5 (5.4)
Marital status, f(%)	
Single	42 (45.7)
Married	49 (53.3)
Divorced	1 (1.1)

The residential neighborhoods of leprosy patients who visited the dermatology and venereology clinic at Dr. M. Djamil General Hospital in Padang between 2021 and mid-2024 are described here. The results showed that Pesisir Selatan Regency had the highest number of leprosy patients (23.91%), Pesisir Selatan is the district located south of the of the capital province of Padang city, second place followed by Pariaman City (22.82%) and Padang City (21.73%). In addition to areas in West Sumatra, there were also patients residing in Jambi, North Sumatra, and Riau, comprising 8.69%, as illustrated in Figure 2 and Figure 3.

Figure 2. Map of West Sumatera Province in Indonesia (marked with orange area), city and regency with the highest number of leprosy cases in west sumatera (red star)

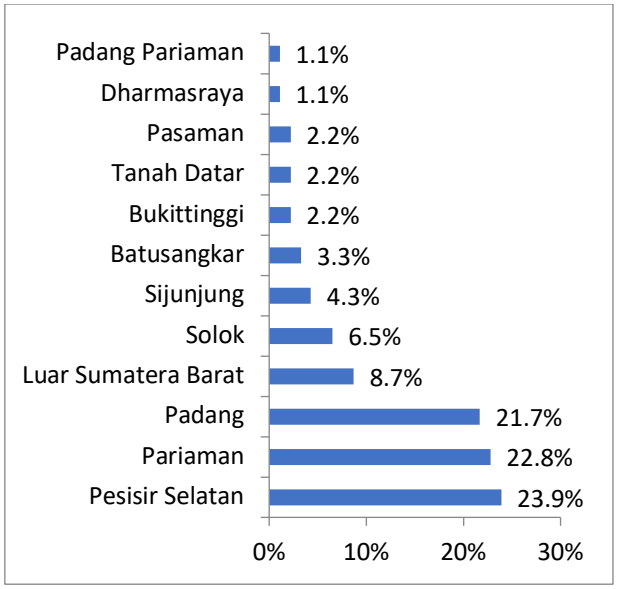

Figure 3. Distribution of residential areas of leprosy patients during the period of January 2021 to June 2024.

The most prevalent leprosy classification was borderline lepromatous (BL), followed by borderline tuberculoid (BT), lepromatous leprosy (LL), tuberculoid (TT), and borderline borderline (BB).

All cases were evaluated by a dermatologist through comprehensive clinical examination, skin slit smear, histopathological analysis, polymerase chain reaction (PCR), and immunohistochemistry. The distribution of cases was as follows: 35 cases (38%), 21 cases (22.8%), 16 cases (17.4%), 11 cases (12%), and 9 cases (9.8%). The prevalence of clinical forms based on the Ridley-Jopling classification is presented in Table 2. Of the 92 patients,

70 (76.08%) were treated with the multibacillary (MB) regimen, while 22 patients (23.92%) received the paucibacillary (PB) regimen. Additionally, 47 patients (51.08%) exhibited a positive bacteriological index (BI).

Table 2. illustrating the clinical classification characteristics of leprosy.

Variable	Value
Clinical form of leprosy, f (%)	
TT	11 (12)
BT	21 (22.8)
BB	9 (9.8)
LL	16 (17.4)
BL	35 (38)
Bacillary index, f (%)	
Positive	47 (51.08)
Negative	45 (48.91)
Treatment regimen, f (%)	
PB	22 (23.92)
MB	70 (76.08)

This study documented 44 cases (33%) of leprosy reactions. Among these, 20 cases were identified as type 1 reactions (45.45%), and 24 cases as type 2 reactions (54.54%). The borderline lepromatous (BL) form was the most common clinical type in both type 1 and type 2 reactions, observed in 9 and 12 patients, respectively. This was followed by the borderline tuberculoid (BT) form in type 1 reactions and the lepromatous leprosy (LL) form in type 2 reactions, each seen in 7 patients, as illustrated in Figure 4.

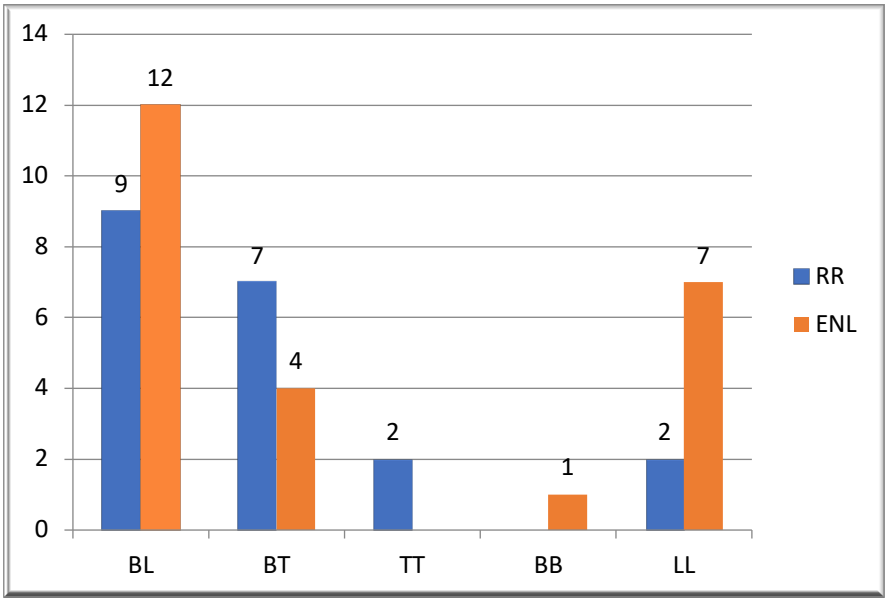

Figure 4. Data of leprosy reactions at the Dermatology and Venereology outpatient clinic of Dr. M. Djamil General Hospital Padang based on the leprosy classification according to Ridley-Jopling.

The distribution of leprosy types also varied, with a higher prevalence of men in the multibacillary (MB) subtype compared to women (Table 3). A yearly increase in male patients attending the Dermatology and Venereology Clinic was observed. In 2021, there were 7 male and 6 female patients; in 2022, 12 male and 10 female patients; and in 2023, 23 male and 17 female patients were recorded. From 2021 until mid-2024, a total of 22 male and 14 female patients were diagnosed with the borderline lepromatous (BL) type, while 10 male and 11 female patients presented with the borderline tuberculoid (BT) subtype.

Table 3. Distribution of leprosy types by gender of leprosy patients at Dr. M. Djamil General Hospital Padang from January 2021 to June 2024

Sex / Leprosy types	Year								Value		Value
	2021		2022		2023		2024				
	M	F	M	F	M	F	M	F	M	F	
TT	2	1	2	0	3	2	0	0	7	3	10
BT	1	3	3	0	4	6	2	2	10	11	21
BB	0	0	1	4	1	0	2	0	4	4	8
BL	4	1	6	4	9	5	3	4	22	14	36
LL	0	1	0	1	5	4	1	3	6	9	15
Inderminate	0	0	0	1	1	0	0	0	1	1	2
Value	7	6	12	10	23	17	8	9	50	42	92

Discussions

In this study, leprosy was more prevalent in men than in women, consistent with other studies reporting a male-to-female ratio of approximately 2:1.[7] In Madagascar, 56.5% of leprosy patients were male, supporting the hypothesis that genetic and environmental factors contribute to higher susceptibility among men.[7] Male patients may also be at greater risk of infection due to occupational exposure, increased outdoor activity, overcrowded living conditions, and lower health-seeking behavior compared to women.[4]

The average age of patients was 35 years, which aligns with findings that leprosy is most commonly diagnosed in individuals aged 20–30 years.[6] This can be explained by the long incubation period of *Mycobacterium leprae*, which may extend from several weeks to more than 20 years.[7,8] Therefore, adults diagnosed with leprosy may have acquired the infection during childhood or adolescence. In this study, 8.7% of patients were children under 17 years, a figure similar to findings in Madagascar (6.2%), India (9%), and Palembang, Indonesia (7.58%).[7-10]

Children are particularly susceptible to transmission, especially through close household contact with infected family members. The World Health Organization (WHO) reported that in 2020, children accounted for 7.4% of global cases and 11.5% of cases in Indonesia.[11] Studies indicate that children in households with leprosy are nine times more likely to contract the disease than those without such contact, while the risk is four times higher when exposure occurs outside the household.[11] Household overcrowding is a key factor contributing to pediatric leprosy incidence.[12]

Most patients in this study resided in rural areas, with Pesisir Selatan Regency and Pariaman City identified as the highest endemic regions in West Sumatra. This finding reflects the limited access to preventive measures and early detection programs in rural areas. Cultural practices among the Minangkabau community, in which multiple generations live in the same household, may also increase transmission risk. The Indonesian national leprosy program has also identified rural residency as a strong determinant of infection risk.[10,13]

Environmental conditions contribute significantly to leprosy transmission. A systematic review reported that substandard housing, such as wooden or soil-based floors that retain humidity, non-concrete walls, inadequate lighting, and poor ventilation, increases the risk of infection.[12] These factors are prevalent in rural West Sumatra and may explain the persistence of leprosy in these regions.

The majority of patients in this study were housewives or unemployed (31.5%), followed by entrepreneurs (19.6%), students (15.2%), and farmers or laborers (13%). Housewives are at increased risk due to close and prolonged household contact with family members suffering from leprosy, combined with limited knowledge of disease prevention. Entrepreneurs may face heightened risk due to frequent mobility and exposure to crowded markets. Students, particularly school-age children, are also vulnerable due to prolonged contact with peers. A Brazilian study involving 236 students found a 15% prevalence of *M. leprae* detected by nasal swab PCR, highlighting the potential role of schools in transmission.[15]

Multibacillary (MB) leprosy accounted for 76.08% of cases, higher than paucibacillary (PB) cases, consistent with previous studies reporting MB dominance.[16] In this study, 33% of patients experienced leprosy reactions, similar to findings in Madagascar (33%) and Indonesia (34.3%).[7,16]

Leprosy reactions represent acute inflammatory processes that may occur before or after treatment and are associated with nerve damage and disability.[17] ENL reactions were more frequent (54.54%) than reversal reactions (45.45%), which is consistent with previous Indonesian studies reporting ENL as the most common reaction.[5,18,19] The BL subtype was the most frequently associated with both RR and ENL, followed by BT in RR and LL in ENL, consistent with findings from Madagascar, Indonesia, and India.[7,17]

MB leprosy has been strongly linked to male sex, lower educational attainment, and clinical characteristics such as multiple skin lesions and disability grades I or II.[20] MB cases are more infectious and therefore contribute more significantly to community transmission.[21]

Despite ongoing national and global efforts, leprosy elimination remains challenging. Indonesia failed to achieve its 2019 provincial elimination target, and as of 2022, seven provinces and 113 districts had not yet achieved elimination.[22] The national leprosy program focuses on four strategies: health promotion, surveillance, chemoprophylaxis, and case management. Strengthening early detection, health education, and integrated management of leprosy reactions will be crucial to reducing transmission and preventing disability.

This study has limitations, including its retrospective design, reliance on medical record data, and sampling restricted to one tertiary hospital. These factors may limit generalizability. Nevertheless, the study provides valuable insights into local epidemiological trends and underscores the need for improved early detection and interventional strategies in endemic areas.

Conclusions

This retrospective study, conducted from January 2021 to June 2024 at Dr. M. Djamil General Hospital Padang, demonstrated an annual increase in leprosy incidence, with the peak observed in 2023. Multibacillary cases predominated and were more frequent in men. More than half of the patients developed leprosy reactions, with Type 2 (erythema nodosum leprosum, ENL) being more common than Type 1 (reversal reaction, RR). Effective management of these reactions is essential to prevent disability, highlighting the importance of early detection and comprehensive care.

This study provides epidemiological surveillance insights into leprosy trends in West Sumatra and emphasizes the need for improved early detection programs, enhanced strategies for managing leprosy reactions, and strengthened resource allocation for leprosy control in endemic areas. However, limitations include reliance on secondary medical record data, potential bias from incomplete documentation, and its single-centre design. Future research with larger populations, longer follow-up, and multicentre approaches across Indonesia is recommended to generate more robust evidence.

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Declarations of competing interest

No potential competing interest was reported by the authors.

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