

The Profile of Leprosy Patients in Aceh: Retrospective Study

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ABSTRACT

Backgrounds: Morbus Hansen or leprosy is a chronic granulomatous infectious disease caused by the obligate intracellular *Mycobacterium leprae* bacillus. Leprosy can cause loss of sensation in the skin with or without lesions and body dysfunction during the course of the disease. In Aceh, there were 337 new cases of leprosy in 2019 and this was the highest case in Sumatra. **Purpose:** To analyze the profile of leprosy patients in the Department of Dermatology and Venereology of RSUDZA Banda Aceh. **Methods:** Observational descriptive study with retrospective design, using medical record of leprosy patients who visited Dermatology and Venereology Outpatient Clinic RSUDZA Banda Aceh for the period of January 2017 – December 2021. **Result:** A total of 183 leprosy patients were obtained from the study. Most cases occurred in male patients (68.3%), the majority was in the 18-40 year age group (60.1%), most patients live outside of Banda Aceh (71%). The most frequently reported type of leprosy was the multibacillary type (71.6%). Leprosy patients without disability were 35.5%, the majority did not experience a leprosy reaction (71%), the most common morphology of the lesion was erythematous (29.5%), and the highest proportion of the bacteriological and morphological index was negative (46.4% and 50.8% respectively). **Conclusion:** The diagnosis of leprosy was based on clinical, bacteriological, and histopathological features. Early diagnosis, patient access to treatment, early initiation of treatment and adherence to therapy would reduce the disease transmission thus would decrease the prevalence of leprosy in Aceh.

Keywords: Leprosy, *Mycobacterium leprae*, infection disease.

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BACKGROUND

Morbus Hansen or leprosy is a chronic disease that caused by an acid-fast bacteria known as *Mycobacterium leprae* (*M. leprae*).^{1,2} *M. leprae* was first discovered by Gerhard Armauer Hansen in 1874 as the first pathogenic bacteria identified in humans.³ *M. leprae* was identified from skeletal remains in India dating back to 2000 BC.⁴ Although leprosy is a very long-known disease, it is still endemic in several parts of the world.³

In 2005, World Health Organization (WHO) had reported that leprosy had been eliminated as a public health problem worldwide, but sadly this is not the case.⁵ There were approximately 200,000 new cases being reported in 2017.² Previously, in 2012, WHO had set the goal of “stopping global transmission of leprosy by 2020”, but there are still many hurdles that have to be overcome before reaching the goal. According to WHO in 2018, there were 208,613 new cases of

leprosy in 152 countries around the world. As a matter of fact, three countries reported more than 10,000 new cases of leprosy in the same year, including India (120,334), Brazil (28,660), and Indonesia (17,017). These three countries accounted for about 81% of new cases detected worldwide.⁶ In Aceh, there were 337 new cases of leprosy in 2019 and this was the highest case in Sumatra.⁷ Leprosy usually occurs in developing countries because of the limited ability to provide adequate services in the fields of health, education, socio-economics, and community welfare.¹

Leprosy is a disease that predominantly attacks the skin and peripheral nerves; it can even cause neuropathy and have long-term consequences in the form of deformity and disability.⁸ Even today, leprosy is considered a stigmatized disease. Despite the reduction in prevalence in the last few decades, transmission still occurs and is still a major health problem in the community.² For some stigmatized

individuals, the psychosocial consequences of their health condition are more difficult to bear than the physical consequences. Likewise, for people with leprosy, the stigma and the lack of knowledge about leprosy have become an obstacle in case finding and adherence to treatment, resulting in a reduction in treatment effectiveness and disease control. In an attempt to hide the disease and prevent discrimination, leprosy patients often delay seeking treatment even until they are already permanently disabled. When leprosy patients delay seeking treatment, disease transmission becomes prolonged, thus hampering the treatment and prevention of the disease. False local beliefs such as the belief that all leprosy patients end up with disability, leprosy can't be cured, or results in death, or something implying that people affected by leprosy have made mistakes, contribute to stigma.⁹ As a result, social stigma affects patient adherence to treatment and motivation to heal, thereby increasing the prevalence of leprosy in the community.¹⁰

The transmission of leprosy is not fully understood yet, though it has been suspected that droplet inhalation of the causative agents containing *M. leprae* is responsible. However, transmission from direct contact can not be excluded. Nearly 95% of patients exposed to *M. leprae* do not develop the disease. This is presumably because of the role of host immunity in the development and control of the disease.⁸

Diagnosis of leprosy is based on the cardinal signs and clinical manifestations. Leprosy is diagnosed by finding at least one of these 3 cardinal signs, namely: (1) numb skin lesions, (2) thickening or enlargement of peripheral nerves with impaired nerve function, and (3) the presence of acid fast bacilli (AFB). Therefore, most leprosy diagnosis do not require large pieces of technical equipment, but rather require patient cooperation and professional skills and experience when dealing with various atypical clinical manifestations. Some patients may exhibit atypical symptoms and the clinical manifestations of leprosy that vary with other diseases, as well as the chronic course of the disease, are factors that often lead to late diagnosis and misdiagnosis. Other diseases that may have similar skin lesions to leprosy are granuloma annulare, scleroderma, syphilis, lupus erythematosus, etc. On the other hand, a false positive diagnosis can result in inadequate treatment, emotional and physical harm, and increased health care costs.¹¹ Multidrug therapy (MDT) with Rifampicin, Clofazimine, and Dapsone, was introduced in the 1980s and has been shown to be very effective.¹² The basic intervention in controlling leprosy is by using MDT, but it seems that this is not enough to reduce the number of new cases

and achieve WHO target in reducing new cases of leprosy.¹³ Other than that, early detection along with regular and accurate treatment is needed to reduce new cases of this disease.¹⁰ Leprosy patients require routine MDT for 6 or 12 months, depending on the type of leprosy. However, patient adherence to the MDT regimen constitutes a challenge because a long duration of treatment can lead to residual sources of infection, incomplete healing, persistent infection, irreversible transmission to new susceptible individuals, resistance, disability, and even deformity.¹⁴

METHODS

This study was an observational descriptive study with retrospective design using data from medical records. The sample for this study were all leprosy patients in the Department of Dermatology and Venereology of RSUDZA Banda Aceh for the period of January 2017 – December 2021.

RESULT

The characteristics of the leprosy patients in this study are presented in Table 1.

Table 1. Characteristics of leprosy patient

Characteristics	Frequency (n)	Percentage (%)
Sex		
Male	125	68.3
Female	58	31.7
Age (years)		
<12	3	1.6
12-17	11	6
18-40	110	60.1
41-65	49	26.8
>65	10	5.5
Place of Residence		
Banda Aceh	53	29
Outside of Banda Aceh	130	71
Total	183	100

Based on Table 1, by gender shows that most of the leprosy patients in the Dermatology and Venereology Outpatient Clinic of RSUDZA for the period of 2017-2021 are 125 males (68.3%) followed by females, as many as 58 people (31.7%). Based on age, the majority of leprosy patients aged between 18 and 40 years were 110 respondents (60.1%) and live outside of Banda Aceh (71%) followed by patients from Banda Aceh (29%).

Based on Table 2, there were more patients with MB type leprosy than PB type; 131 cases (71.6%) of

MB type leprosy and 52 cases (28.4%) of PB type leprosy.

Table 2. Distribution of leprosy types

Type	Frequency (n)	Percentage (%)
Paucibacillary (PB)	52	28.4
Multibacillary (MB)	131	71.6
Total	183	100

Table 3. Distribution of leprosy disability

Leprosy disability	Frequency (n)	Percentage (%)
Without disability	65	35.5
Disability grade 1	1	0.5
Disability grade 2	2	1.1
No data	115	62.8
Total	183	100

Based on Table 3, it is known that as many as 65 (35.5%) patients do not have any disabilities, but there was 115 (62.8%) patients who had incomplete data regarding the level of disability.

Table 4. Distribution of leprosy reaction

Leprosy reaction	Frequency (n)	Percentage (%)
Without reaction	130	71
Reaction type 1	11	6
Reaction type 2	42	23
Total	183	100

Based on Table 4, this study shows that the majority of respondents do not experience leprosy reaction, namely 130 people (71%).

Table 5. Distribution of leprosy lesion morphology

Lesion morphology	Frequency (n)	Percentage (%)
Erythematous	54	29.5
Hypopigmentation	27	14.8
Hyperpigmentation	29	15.8
Xerosis	2	1.1
Ulcer	8	4.4
Others	4	2.2
No data	59	32.2
Total	183	100

Based on Table 5, this study states that the highest proportion of the lesion morphology found was erythematous, which was 29.5%. After erythematous, the next high prevalence lesion morphology was hypopigmentation (14.8%), followed by

hyperpigmentation (14.6%), xerosis (1.1%), ulcers (4.4%), and others (2.2%). The number of patients with incomplete data regarding lesion morphology was 32.2%.

Table 6. Distribution of leprosy AFB result

AFB	Frequency (n)	Percentage (%)
Bacteriological index		
0	85	46.4
<1	30	16.4
1 – 2	8	4.4
>3	1	0.5
No data	59	32.2
Morphological index		
0%	93	50.8
10-30 %	7	3.8
>30 %	24	13.1
No data	59	32.2
Total	183	100

AFB: Acid fast bacilli

Based on Table 6, the highest proportions for the bacteriological and morphological indexes are negative, 46.4% and 50.8%, respectively.

DISCUSSION

Based on Table 1, leprosy patients at RSUDZA Dermatology and Venereology Outpatient Clinic in 2017-2021 consisted of 125 males (68.3%) and 58 females (31.7%). The results showed that male patients suffering from leprosy were larger in number than female patients. This is in line with the research of Safira et al. (2020) which states that patients with multi-bacillary leprosy are more frequently found in male than female. This is due to differences in the activities of men, which are more varied, than women in general. In addition, men are more susceptible to being exposed to infections and risk factors because of a lifestyle that includes different ways of dressing and making more contact with other people.¹⁵ This is also in line with the research of Kurniawan et al. (2018), where it was found that the 2014-2015 leprosy cases in Blora regency, there were more frequent in males, as many as 137 cases (67%). 70,9% of multi-bacillary type respondents were male. Meanwhile, the paucibacillary type respondents were dominated by female, by as much as 61.5%.¹⁶

Based on age, the majority of leprosy patients were aged between 18 and 40 years, consisting of 110 respondents (60.1%). The result of this study is in line with the study of Safira, et al. (2020) in Semarang which showed that the majority of leprosy patients with the multibacillary type were aged between 20-40 years old.¹⁵ This is also in line with a study done by Yunita

et al. (2018) in Pidie, in which the age of the majority of leprosy patients were mostly young adults, grouped from the age of 20-40 years old.¹⁷ This is presumably due to people in the age group of 20-40 years old being the group in society that interacts the most frequently with other people. This makes the previously mentioned age group at a high risk of having contact with people infected with leprosy.¹⁵ The result of this study is also supported by data from minister of health regulations number 11 in the year of 2019 concerning Leprosy Management which showed that the majority of leprosy occur in young and productive age group.¹⁸

Based on the characteristics of residence (Table 1), it showed that the distribution of leprosy patients who underwent treatment at RSUDZA Banda Aceh mostly came from outside of Banda Aceh (71%), followed by patients from Banda Aceh (29%). However, this does not state that leprosy cases originating from Banda Aceh was low because the category of patients outside Banda Aceh is an accumulation of several districts/cities in Aceh province. If the data from Aceh province health profile, 2019 is taken into consideration, it can be found that Banda Aceh was one of the areas with the most leprosy cases in Aceh province, where there were 44 new cases in 2019 and most were found in Pidie, with 70 new cases. If we refer to the latest 2019 leprosy data, around 54.3% of leprosy patients receive treatment at the RSUDZA Banda Aceh.⁷ However, this requires comprehensive data collection and further research in order to obtain more detailed and more accurate data.

Based on Table 2, it shows that the number of respondents diagnosed with MB type leprosy was larger, namely 131 (71.6%), while 52 (28.4%) respondents were diagnosed with PB type leprosy. These results are in line with the meta-analysis by Gaschignard et al. (2016). In that study it was found that 407 (56%) respondents were diagnosed with MB type leprosy.¹⁹ This was attributed to the stronger virulence of *M. leprae* in endemic areas. Indonesia is one of the countries with the most leprosy cases besides India and Brazil. In addition, endemic areas are also associated with the large population's exposure to *M. leprae*. The study also stated that leprosy patients who had received the Bacillus Calmette-Guérin (BCG) vaccine were more likely to be diagnosed with the PB type than MB.^{19,20}

Based on Table 3, the highest proportion leprosy patients based on the level of disability was patients without disabilities, namely 65 (35.5%) people. From a total of 183 (100%) patients, there were 115 (62.8%) patients who had incomplete data regarding the level of disability. The result of the study is in line with data

from Aceh province health profile 2019, which the highest proportion of disabilities in new leprosy cases was grade 0 leprosy disability as many as 312 (92.6%) out of a total of 337 (100%) people recorded in every regency in Aceh province in 2019. These data showed that the percentage of grade 1 and 2 disability was very small.⁷ In leprosy, the complication that must be prevented is the occurrence of disability because it will affect patient's quality of life. There are 3 types of disabilities that are assessed, namely: without disability, grade 1 disability, and grade 2 disability. Grade 1 disability occur when a sensibility examination is carried out; sensory nerve disorder is found in the hands and feet, but is not accompanied by anatomical abnormalities. Grade 2 disability is marked by the presence of anatomical abnormalities in the extremities in the form of claw hands and accompanied by lagophthalmus.^{21,22}

Based on Table 4, the result show that the majority of respondents did not experience a leprosy reaction, namely 130 (71%) subjects. The result of this study is in line with a research conducted by Harahap in 2019 which stated that 51.9% of leprosy patients who had been treated at RSUP Haji Adam Malik from 2015-2018 mostly did not experience leprosy reaction.²³ This result is also similar with a research conducted by Linoora in 2017 which found that 59.3% of leprosy patients who had been treated at RSUD Dr. Soetomo Surabaya from March-May 2016 mostly did not experience leprosy reaction.²⁴ Leprosy reactions only occur in 30-50% of patients. Apart from eliminating leprosy, another goal mentioned by WHO was to reduce the level of disability or sequelae, especially in leprosy reactions. A leprosy reaction is an acute inflammatory episode resulting from an exacerbation of the host immune response, which may occur during disease progression, during treatment or even after treatment.²⁵ Currently, no laboratory biomarkers are available to predict the onset of leprosy reactions. Early diagnosis of this reaction is not always easy and is based solely on the clinical characteristics of the patient. In clinical practice, the diagnosis is based on the patient's clinical manifestations and response to treatment. The host inflammatory response plays a very important role in the development of leprosy reactions. However, none of the biomarkers can differentiate patients with leprosy reactions or predict disease evolution associated with complications.²⁶

The highest proportion of leprosy lesion morphology (Table 5) found was erythematous, namely 54 (29.5%) cases, hypopigmentation in 27 (14.8%) cases, hyperpigmentation in 29 (14.6%) cases,

ulcer in 8 (4%) cases, xerosis in 2 (1.1%) cases, and others (2.2%). The number of patients whose lesion morphology was not recorded is 59 (32.2%) cases. The result of this study is in line with a literature which stated that erythematous lesions indicated that the patient was experiencing a leprosy reaction.²⁷ In addition to reactions, several types of leprosy also have clinical features in the form of anesthetic erythematous lesions.²⁸ This is what makes the number of erythematous lesions morphology larger compared to other morphologies.

Based on Table 6, the highest proportion for the bacteriological index was 0 (46.4%), the highest morphological index was 0 (50.8%). Bacteriological index (BI) is a semi-quantitative measure of the density of AFB in smear preparations. The use of BI is not only to help in determining the type of leprosy, but also to assess treatment outcomes. Morphological index (MI) is the percentage of intact (solid) leprosy bacilli to all AFB.²⁹ From this study, it was found that the MB type showed negative smear results. It can be concluded that it often occurred a discrepancy between the AFB examination and the clinical events. This can be caused by an inexperienced analyst, staining coloring factor, or reading error. This is in line with a literature which stated that this bacteriological examination was subjective and could produce false positives or false negatives due to the presence of dyes, saprophytic AFB, fibers in the color, scratches on object glass, and poor reading skills.²⁹

The limitation of this study is the data collection using medical records, which not all patients have complete data. In conclusion, there were 183 patients diagnosed with leprosy during 2017 – 2021 in RSUDZA Banda Aceh. The age distribution was between 18-40 years (60.1%), a range of productive age. The dominant sex was male (68.3%) and the most place of residence was outside of Banda Aceh (71%). The MB type was the most common type of leprosy (71.6%), in patients who did not experience disability (35.5%), and in patients who did not experience a leprosy reaction (71%). The highest proportion of lesion morphology found was erythematous (29.5%), and negative bacteriological and morphological indexes were 46.4% and 50.8%, respectively.

REFERENCES

1. Prakoeswa FRS, Ilhami AZ, Luthfia R, Putri AS, Soebono H, Husada D, et al. Correlation analysis between household hygiene and sanitation and nutritional status and female leprosy in Gresik regency. *Dermatology Research and Practice* 2020; 1–7.
2. Sadhu S, Mitra DK. Emerging concepts of adaptive immunity in leprosy. *Front Immunol*; 2018; 9 : 604.
3. Acebrón-García-de-Eulate M, Blundell TL, Vedithi SC. Strategies for drug target identification in *Mycobacterium leprae*. *Drug Discovery Today* 2021; 26(7): 1569–73.
4. Mungroo MR, Khan NA, Siddiqui R. *Mycobacterium leprae*: pathogenesis, diagnosis, and treatment options. *Microbial Pathogenesis* 2020; 149 : 104-475.
5. Alemu Belachew W, Naafs B. Leprosy : diagnosis, treatment and follow-up. *J Eur Acad Dermatol Venereol* 2019; 33(7): 1205–13.
6. Sousa PP de, Sousa ALM de, Turchi MD. Reviewing the therapeutic management of leprosy in primary care: demand case series referred to a university hospital in the midwest region of Brazil. *Anais Brasileiros de Dermatologia* 2021; 96(3): 301–8.
7. Dinas Kesehatan Aceh.. *Profil Kesehatan Aceh* 2019. Dinkes Aceh 2020.
8. World Health Organization. *Guidelines for the diagnosis, treatment and prevention of leprosy*. New Delhi 2014.
9. Van't Noordende AT, Lisam S, Ruthindartri P, Sadiq A, Singh V, Arifin M, et al. Leprosy perceptions and knowledge in endemic districts in India and Indonesia: differences and commonalities. *PloS Negl Trop Dis* 2021; 15(1): 9031.
10. Susanti IA, Mahardita NGP, Alfianto R, Sujana IMIWC, Siswoyo, Susanto T. Social stigma, adherence to medication and motivation for healing: a cross-sectional study of leprosy patients at Jember public health center, Indonesia. *Journal of Taibah University Medical Sciences* 2018; 13(1): 97–102.
11. Neves KVRN, Nobre ML, Machado LMG, Steinmann P, Ignotti E. Misdiagnosis of leprosy in Brazil in the period 2003 - 2017: spatial pattern and associated factors. *Acta Tropica* 2021; 215: 105791.
12. Ortuño-Gutiérrez N, Mzembaba A, Ramboarina S, Andriamira R, Baco A, Braet S, et al. Exploring clustering of leprosy in the Comoros and Madagascar: a geospatial analysis. *International Journal of Infectious Diseases* 2021; 108: 96–101.
13. Richardus R, Alam K, Kundu K, Chandra Roy J, Zafar T, Chowdhury AS, et al. Effectiveness of single-dose rifampicin after BCG vaccination to prevent leprosy in close contacts of patients with newly diagnosed leprosy: a cluster randomized

- controlled trial. *International Journal of Infectious Diseases* 2019; 88: 65–72.
14. Rachmani E, Lin M-C, Hsu CY, Jumanto J, Iqbal U, Shidik GF, et al. The implementation of an integrated e-leprosy framework in a leprosy control program at primary health care centers in Indonesia. *International Journal of Medical Informatics* 2020; 140:104155.
 15. Safira NF, Widodo A, Wibowo AD, Budiastuti A. Faktor risiko penderita kusta tipe multibasiler di RSUD Tugurejo Semarang. *Diponegoro Medical Journal* 2020; 9(2):201–7.
 16. Kurniawan J, Radiono S, Kusnanto H. Analisis spasial kejadian penyakit kusta di kabupaten Blora provinsi Jawa Tengah. *BKM Journal of Community Medicine and Public Health* 2018; 34(1):6.
 17. Yunita N, Rahim TA, Irwan S. Analisis kerugian ekonomi dan karakteristik penderita kusta di Kabupaten Pidie. *Jurnal Kesehatan Masyarakat Aceh* 2018; 4(2).
 18. Kemenkes. Peraturan menteri kesehatan republik Indonesia Nomor 11 Tahun 2019 tentang penanggulangan kusta. Kemenkes RI 2019.
 19. Gaschignard J, Grant AV, Thuc NV, Orlova M, Cobat A, Huong NT, et al. Pauci and multibacillary leprosy: two distinct, genetically neglected diseases. *PloS Negl Trop Dis* 2016; 10(5):4345.
 20. World Health Organization. Global leprosy update, 2015: time for action, accountability and inclusion. *Wkly Epidemiol Rec* 2015; 91(35):405–20.
 21. Noviasuti AR, Soleha TU. Morbus hansen tipe multibasiler (mid borderline) dengan reaksi kusta reversal dan kecacatan tingkat I. *J Medula Unila* 2017; 7(2):30–6.
 22. Andini F, Warganegara E, Effendi A, Adyananto. Morbus hansen tipe multibasiler dengan reaksi kusta tipe 1 dan kecacatan tingkat 2. *J Medula Unila* 2016; 6(1):44–9.
 23. Harahap ATM. Prevalensi pasien kusta dengan reaksi dan tanpa reaksi pada tahun 2015-2018 di RSUP Haji Adam Malik Medan : Sumatera Utara 2019.
 24. Lynoora ER, Agusni I, Hidayati AN. Kadar malondialdehyde (MDA) pada pasien kusta reaksi dan tanpa Reaksi. *Media Dermato-Venerreologica Indonesia* 2017; 44:33–40.
 25. Morato-Conceicao YT, Alves-Junior ER, Arruda TA, Lopes JC, Fontes CJF. Serum uric acid levels during leprosy reaction episodes. *PeerJ* 2016; 4:1799.
 26. Gomes LT, Morato-Conceição YT, Gambati AVM, Maciel-Pereira CM, Fontes CJF. Diagnostic value of neutrophil-to-lymphocyte ratio in patients with leprosy reactions. *Heliyon* 2020; 6(2):3369.
 27. Eichelmann K, González González SE, Salas-Alanis JC, Ocampo-Candiani J. Leprosy. An update: definition, pathogenesis, classification, diagnosis, and treatment. *Actas Dermo-Sifiliográficas (English Edition)* 2013; 104(7):554–63.
 28. Bhat RM, Prakash C. Leprosy: an overview of pathophysiology. *Interdisciplinary Perspectives on Infectious Diseases* 2012; 1–6.
 29. Gayatri L, Listiawan MY, Agusni I. Reverse transcription polymerase chain reaction (RT-PCR) untuk mendeteksi viabilitas mycobacterium leprae pada pasien kusta tipe multibasiler pascapengobatan MDT-WHO. *Berkala Ilmu Kesehatan Kulit dan Kelamin* 2014; 6(2):116–21.