ORIGINAL ARTICLE

Current Status of Leprosy in the Rural Area of North Gresik, Indonesia After Eliminated Status Achieved: "Is Leprosy Truly Eliminated?"

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ABSTRACT

Introduction: This study aims to provide the current situation of leprosy prevalence and clinical findings in one of the endemic regions of North Gresik City that has already achieved elimination status. Leprosy remains a public health problem in some developing countries, including Indonesia. Indonesia, with two other big countries, India and Brazil, contributed 74% of all the new leprosy cases detected. Even though Indonesia achieved the elimination target from WHO in 2018, the endemic pockets are still scattered, and new cases remain detected each year. **Methods:** This study is a one-decade retrospective analysis descriptive record based on newly diagnosed cases of leprosy from 2010 until 2020. We use total data sampling of all newly diagnosed leprosy cases and analyze using SPSS. **Result:** This study found that newly diagnosed cases of leprosy are still discovered each year. 15.7% of newly diagnosed cases were children. MB type was dominated type in this study. MB types are statistically significant in male subjects (35.5%) diagnosed more than one year after the symptoms appear. 40.7% were found with deformity when first diagnosed. **Conclusion:** This study reports a high rate of contracting leprosy disease in children, with 15.7% of cases. It indicates that disease transmission remains high in the community and might be out of control. The new cases diagnosed dominated with MB type, and 40.7% had deformity when first diagnosed. There was a delayed diagnosis reported that could be caused by ineffective surveillance for early diagnosing new cases.
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INTRODUCTION

Leprosy, also known as Hansen's disease, is a chronic granulomatous infectious disease that is a neglected tropical disease (NTD) or lower-profile infectious disease (1–5). Hansen's disease is caused by a bacteria called *Mycobacterium leprae*; this disease is a worldwide issue that affects many parts of the world where the disease is endemic (6–8). Leprosy is related to severe physical, social, and psychological impacts (2,8–10). *M. Leprae* mainly affects the peripheral nervous system, skin, eyes, mucous membranes, bones, and testes (8). Early disease recognition and treatment will improve clinical output and prevent permanent disability (3,6,11,12).

The global situation over the last four decades has significantly changed after the introduction of multidrug therapy in 1982 (13). Despite significant improvement in leprosy condition due to treatment using WHO recommendation, multidrug therapy (MDT), this disease remains a significant public health problem in many parts of the world, including Indonesia (2,8,14,15). The prevalence of leprosy in Indonesia during 2020 was 41.5 per 1000.000 population (16). Indonesia is one of three countries with the highest number of new cases detected after Brazil and India. Three of these countries account for 74% of all new cases detected (3,17). There remain endemic sheading areas of leprosy in Indonesia. The highest leprosy number is in Java, Sulawesi, Maluku, and Papua (3). East Java region is one of the sheading areas with a higher prevalence than the national average number (1). Based on Kementrian Kesehatan Republik Indonesia's record, east java was the highest province of detected leprosy new cases (18). Nevertheless, in 2017, East Java province already achieved leprosy elimination status (19).

Endemic pockets still exist in Indonesia, including one of region in the North of Gresik City (20). Even though

Gresik City already fulfilled the leprosy elimination target in 2017, new cases are still detected yearly. In the last decade, this ancient disease's prevalence remains being discovered yearly in the North of Gresik City. The reason for this phenomenon is yet to be explained. This study aims to provide demographic data and clinical profiles of leprosy patients that attend a primary health care facility in the north of Gresik City. The concern of this study was also to provide the current status of leprosy after elimination status was achieved in one area in a highly endemic province. Focusing on a high endemic region will give a more realistic representation of the actual leprosy status in a country (12).

MATERIALS AND METHODS

This study is an analytic descriptive cross-sectional study carried out from January 2011 until December 2020 in the Primary Health Care Service in the North of Gresik, Indonesia. This study was held in one of district in North of Gresik City, which consists of seven villages. This study was held in one of district in North of Gresik City because it is one of the endemic pockets in Gresik City, even though Gresik City already achieved elimination status in 2017(20). A total data sampling of all newly diagnosed leprosy cases was used in this study. Fifty-one newly diagnosed leprosy cases were enrolled.

Data was collected using the medical record of the leprosy cases at the department of *Pencegahan dan Pemberantasan Penyakit Menular* (P2PM) and analyzed using SPSS ver. 23. Comparison of the categoric variable was analyzed using the chi-square test or fisher's exact test if the data is not fulfilled the chi-square test recruitment. A p-value less than 0.05 was considered significant.

A detailed history was collected using medical records of the leprosy cases such as demographic data (age, sex, residential area), history of using MDT for leprosy, history of contact with leprosy cases, duration of diagnostic delayed, deformity, deformity type when first admission, and sequel of deformity. Patients were diagnosed clinically using WHO criteria based on the number of skin lesions and peripheral nerve abnormalities such as nerve enlargement and sensory-motoric disorders. The indefinite cases will undergo a Slit Skin Smear (SSS) test with modified Ziel Neelsen (ZN) staining. In our place, we did not use the SSS test for routine diagnostic tests because of limited facilities. All newly diagnosed leprosy is divided into two significant categories, paucibacillary (PB) and multibacillary (MB), based on WHO guidelines, especially the number of skin lesions (11,21). This study was approved by the relevant office and district health office, Gresik No. 445/24.1/437.52.13/2022.

RESULTS

In this study, a total of all 51 leprosy cases were enrolled. We used all patients diagnosed with leprosy that attended a referral center of primary health care facility in the North of Gresik City, Indonesia, from 2011 to 2020. The total population is 48,955 lives, with 11,116 children ranging from 0 – 14 years old. The prevalence rate of leprosy in our study is 0.001.

The most common group age is distributed in the group of 17-40 years old with 58.8%, followed by group aged 40-60 years old and 0-16 years old, respectively 21.6% and 15.7% (Table I). Most of these study groups are male, with 39 cases (76.5%) and 12 cases (23.5%) female. The ratio of male and female subjects was 3.25:1. Most of the subjects attended the primary health care facility one year after the symptoms appeared (35.5%), and even 17.6% of subjects sought treatment more than three years after the symptoms appeared. The most common symptoms were hypopigmented or reddish skin with a loss of sure sensation. Other patients came with wounds in their extremities or leprosy reaction that had been going on for months until years.

This study used WHO classification to divide the subject, 76.5% was a multibacillary (MB) type, and 23% was a paucibacillary (PB) type. There was a positive history of contact with leprosy patients, such as close contact skin to skin and exposure to a patient's oral droplets in 21.6% of cases. 54.5% of patients with a history of contact

Table I: Demographic profile of leprosy patient

Characteristic	n (%)
Age	
Age mean	30.69 ± 14.923
0-16 years	8 (15.7%)
17-40 years	30 (58.8%)
40-60 years	11 (21.6%)
>60 years	2 (3.9%)
Sex	
Ratio male: Female	3.25 : 1
Male	39 (76.5%)
Female	12 (23.5%)
Classification of Leprosy, WHO	
PB	12 (23%)
MB	39 (76.5%)
History of Contact	11 (21.6%)
Duration Before Diagnosed	
<6 months	9 (17.6%)
6-12 months	3 (5.9%)
>1 year	18 (35.5%)
>2 years	4 (7.8%)
>3 years	9 (17.6%)
Deformities	
None	29 (56.9%)
Grade 1 Deformity	15 (29.4%)
Grade 2 Deformity	7 (13.7%)

became MB type, and 45.5% became PB type. There was a significantly different between the classification of leprosy and the duration of delayed diagnosis. MB type had a longer duration of a delayed diagnosis, ≥ 1 year (80.6%) rather than PB type (19.4%) (Table II). Even if it was not statistically different, the MB type tends to have more deformity when first diagnosed as leprosy (86.4%) and a sequel of deformity after treatment (72.7%). Whereas PB type, only 13.6% had deformity during the first visit, and 27.3% had a sequel of deformity. 91.7% of MB type need to use steroids during treatment, while only 8.3% of PB (8.3%) need steroids. Table III shows the association between delayed treatment and grade 2 deformity. No significant association was found.

DISCUSSION

Leprosy is one of the ancient diseases. WHO considers leprosy a neglected tropical disease (NTD) because it presents a significant burden among the poorest and often unheard communities. Although the prevalence has decreased worldwide since the WHO recommendation of using MDT, some regions remain leprosy endemic, including Indonesia(5,22). The WHO's most recent global update on leprosy stated that new cases still arise, although the prevalence has significantly decreased. It indicates there remained continued transmission of leprosy in society(23). Indonesia is one of the three big countries with the most numerous cases of leprosy (24,25).

Table II: Association Between WHO Classification and Clinical Finding

	PB	MB	*P-Value*
Age[1]			
0-16 years	5 (62.5%)	3 (37.5%)	0.646
17-40 years	23 (76.7%)	7 (23.3%)	
40-60 years	9 (81.8%)	2 (18.2%)	
>60 years	2 (100%)	0 (0%)	
Sex[2]			
Woman	12 (100%)	0 (0%)	0.000*
Man	0 (0%)	39 (100%)	
Status of Leprosy[2]			
New Cases	11 (91.7%)	35 (89.7%)	0.665
Relapse	1 (8.3%%)	4 (10.3%)	
Contact history[1]	5 (41.7%)	6 (15.4%)	0.053
Duration before seeking for treatment[1]			
< 1 year	6 (50%)	6 (19.4%)	0.044*
≥ 1 year	6 (50%)	25 (80.6%)	
Deformity at the time of diagnosis[2]	3 (25%)	19 (48.7%)	0.131
Grade 2 Deformity[2]	2 (15.4%)	5 (13.2%)	0.581
Sequel of deformity[2]	3 (25%)	8 (22.2%)	0.563
Steroid need[2]	1 (8.3%)	11 (28.9%)	0.141
Compliance			
Good	5 (41.7%)	24 (63.2%)	0.189
Bad	7 (58.3%)	14 (36.8%)	

*p<0.05, indicates a significant value. [1]Chi-Square, [2]Fisher Exact Test

Table III: Association of delayed treatment and grade 2 deformity

		Grade 2 Deformity		*P-Value*
		Yes	No	
Delayed Symptoms[2]	< 1 year	0 (0%)	12 (100%)	0.165
	≥1 year	7 (20.6%)	27 (79.4%)	
Total		7	39	46

*p<0.05, indicates a significant value. [1]Chi-Square, [2]Fisher Exact Test

Nevertheless, in 2000, Indonesia had achieved elimination status with the incidence of leprosy at 0.8 per 100,000 population, but new cases of leprosy are still reported(25). Leprosy is highly endemic in Indonesia, with 11,173 new cases reported in 2020. Leprosy elimination programs have not been entirely successful(2,16). East Java is one of the provinces with the most prevalent cases besides Banten, West Kalimantan, and South Kalimantan(25).

In the last decade, the trend of newly diagnosed leprosy cases has increased in one of a district in the North of Gresik city. Event leprosy is one of the oldest diseases, but there is still limited knowledge about how leprosy is transmitted. Contamination usually happens after prolonged contact with the nasal and oral secretion of MB type, lepromatous leprosy (LL) type, or an untreated leper patient. MB type is 4-11 times more infectious than PB type. The transmission chains of leprosy are not fully understood. It is believed that leprosy is not a disease that exclusively happens to humankind, but there is also a relationship between animals and the environment as the reservoir of leprosy (22). Many works of literature reported the possibility of transmission in different ways, such as through damaged or undamaged skin, vertical transmission from mother to child via blood or breast milk, and blood transfusion. There was also so much evidence supporting that there was a reservoir other than humans. The reservoir that had been reported were nine-banded armadillo in America, female chimpanzees from Africa, red squirrels in the British Isles, insects, amoeba, soil, and water(22,26). Bacillus can survive for 46 days in a moist environment and 60 days in water(26,27).

This study only focused on the referral center of a primary health care facility in one of a district in the north of Gresik City. A total of 51 subjects were treated from 2011 until 2020. It is believed that the exact number of leprosy reported is lower than the exact cases. Difficulty in diagnosing leprosy can be one of the reasons for the delayed diagnosis and treatment. In our study, we found that most cases were diagnosed after one year after the first symptoms appeared. Stigmatized toward people affected by leprosy and families remains high in the North of Gresik City. People affected by leprosy in often have problems finding jobs, live discriminated against the society, or even get divorced by their spouses. Another reason for delayed diagnosis was that there had been reported atypical forms of the disease and the

emergence of newer forms. These reasons could lead to delayed or underdiagnosed leprosy (24).

Most of our subjects were afflicted by man and MB type (76.5%). All the male subjects contract MB type of leprosy. This finding correlates with another study held in Papua and North Maluku, Indonesia(28). Many other studies claim MB type is a predominant class in their findings(4,29,30). MB type correlates with more extensive diseases with a higher risk of developing deformity or disability and leprosy reaction(30). It is also implicated in our finding that MB type tended to develop deformity and reaction even not statistically different.

The proportion of PB cases has significantly altered during this past decade. Changing case definition and overclassifying MB patients became one of the reasons there was shifting in leprosy cases towards MB type. After many countries had declared their elimination status towards leprosy, the less experienced medical staff was responsible for leprosy diagnosis and treatment. In this case, there might be underdiagnosis in PB cases that is inconspicuous(11,31). Late diagnosis could be another reason why MB cases are increasing(4). The health worker in charge of diagnosing leprosy in this study refer to the number of skin lesions to classify leprosy and only used slit skin smear tests to confirm the diagnosis when there was a doubt in diagnosing leprosy. Knowing that many under-detected cases will remain a threat to accomplishing elimination status(12). A form of leprosy called pure neuritic leprosy has no typical dermatological features and is only limited to peripheral nerves. The case prevalence of this form is estimated for about 4-8% of all leprosy cases. Diagnosing this form required a more excellent diagnostic acuity using physical examination and suitable equipment(32). Therefore there might be many pure neuritic leprosy that remains undetected, becomes the source of infection, and cause disability due to limited facilities in our primary health care.

The increased prevalence of MB cases also indicates the advanced case of leprosy and, indirectly, the extent of infection(23). MB type contains more bacteria than the PB type. MB type is more contagious and becomes the source of infection than the PB type(23). In our study, 60.9% of subjects had more than one year of diagnostic delays. People affected by leprosy that did not receive MDT treatment will risk other people to get contracting leprosy. This finding correlates with a previous study held in India. It has an essential manifestation that leprosy detection camps since the disease remain unnoticed owing to its asymptomatic nature(33). Late diagnosis will lead to various complications and disabilities.

This more extensive disease type was significantly associated with males (33). In our study, 100% of MB type during the past decade suffered by man. Male preponderance was found in this study. This might be due to involved environmental and sociocultural factors such as greater mobility in males will give greater exposure and contact with outdoor activities (4,15).

58.8% of our subject was at their formative stage, 17-40 years old. This finding correlates with many studies that study the epidemiology of leprosy (29). This could be explained by the fact that in this stage, people will have a broad association that is more prone to contracting the disease. Many studies have also claimed that many leprosy cases occur at productive age (23,28,29). The prevalence of childhood leprosy in our study is 8 (15.7%). The prevalence of newly detected leprosy cases in children is one of the indicators of disease prevalence in the general population and is associated with active transmission sources (15).

Deformities were observed in 40.7% of the cases. Leprosy is close to social stigma because of its deformity and disability by an affected person(5,34). The most important thing to prevent this deformity and disability is an early diagnosis and treatment(29). Health workers must do active surveillance to detect leprosy cases as soon as possible. This study founds that MB type is more prevalent with deformity rather than PB type event not significantly different. A high number of deformities suggest a delay in the diagnosis, this could be seen as a measure of the effectiveness of public health programs as early detection of leprosy through active case finding and health promotion. MB type and impairment at diagnosis was the leading risk factor for neurological worsening after MDT treatment(30).

Some of the problems of leprosy in Indonesia are early diagnosis, development of more effective treatment, deformity, and stigmatization(5). Early diagnostic and prompt treatment remains the primary way to cut the transmission chain and prevent disability in leprosy (11,29). Targeting to reduce deformity hopefully will decrease the stigma achieved by people affected by leprosy. Stigmatization is a severe problem faced by people affected by leprosy. It can cause delayed diagnosis and hinder the leprosy prevention effort(5,34). Providing comprehensive training for the health care staff in charge for diagnosing leprosy is needed to increase early detection of leprosy in the primary health care facility. Further research is needed to explore the current stigma related to leprosy to seek what causes delayed diagnosis of leprosy.

CONCLUSION

Our finding was that there was a significant number of epidemical indicators, such as deformity grade 2 13.7%, leprosy cases in children 15.7%, and MB-type cases 76.5%. Deformities found during the first contact with a health care provider might be caused by delayed diagnosis. A high prevalence of leprosy cases in children indicated there was still an active transmission in the

general population. The commitment of all health care services and related institutions is needed to reduce the incidence of leprosy, and early detection or active case surveillance is needed to be improved.

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