

Research Article

The Effect of Determining Events of Leprosy Reaction Based on Biological and Psychological Reactions on Leprosy Patients at Naob Hospital TTU Regency

Yustina Muti^{1*}, Pius Weraman², Christina O Lada³¹Master Program in Public Health, Nusa Cendana University, NTT Indonesia^{2,3}Nusa Cendana University, NTT Indonesia**Article History**

Received: 19.12.2020

Accepted: 05.01.2021

Published: 14.01.2021

Journal homepage:<https://www.easpublisher.com>**Quick Response Code**

Abstract: Introduction: Leprosy is a chronic disease that attacks the peripheral nerves, skin and other body tissues. A leprosy reaction is an acute episode in which leprosy occurs as a result of sudden changes in the immune system. Leprosy reactions can occur before, during, and after treatment. In type I leprosy reactions, it is very important to recognize and treat appropriately, otherwise there can be rapid and extensive nerve damage while in mild type II reactions, it can disappear immediately but severe type II reactions can persist for years. **Aim:** The purpose of this study was to determine and analyze the influence of the determinant factors of leprosy reactions based on Biological, and Psychological reactions in leprosy patients at Naob Hospital, TTU Regency. **Material and Methods:** This type of research is analytic survey research with cross sectional design. The population in this study was people with leprosy who experienced reactions of leprosy types I and II with a total of 65 people with leprosy. This study uses a total sampling technique, namely sampling in which the number of samples is the same as the population which is 65 people. The data analysis included univariate and bivariate with chi-square test and multivariate with logistic regression test. **Results:** The results showed that there was a relationship between biological reactions (Type of Leprosy, Duration of Illness and Disability), and there was a significant relationship between psychological reactions (Stress) with the incidence of leprosy reactions in the patients at Naob Hospital, TTU Regency with $p\text{-value} < \alpha$ (0.05). Simultaneously, the independent variable (Type of Leprosy, Duration of Illness, Disability and Stress) had an effect of 55% on the dependent variable (Leprosy Reaction) in leprosy patients at Naob Hospital, TTU Regency. The most influential independent variable is duration of illness.

Keywords: Leprosy Reaction, Biological, Psychological.

Copyright © 2021 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Leprosy reaction is an acute episode in a history of leprosy as a result of sudden changes in the immune system. Leprosy reactions can occur before, during, and after treatment. There are 2 types of leprosy reactions, namely type I reactions (Reversal Reaction) and type II reactions (Erythema Nodum Leprosi). Each type of leprosy has a risk of a leprosy reaction. In type I leprosy reactions, it is very important to recognize and treat appropriately, otherwise there can be rapid and extensive nerve damage while in mild type II reactions, it can disappear immediately but severe type II reactions can persist for years [1].

Leprosy is a disease with the highest prevalence in Southeast Asia, and Indonesia itself is in the third rank of the largest contributor of leprosy cases in the world after India and Brazil. The World Health Organization (WHO) recorded that from 2017 to 2018

the prevalence of leprosy was 0.7 / 10,000 population and 0.2 / 10,000 population, with 15,910 new patients and 208,619 cases. In 2017, WHO stated that the number of new cases of leprosy in Indonesia was 14,397 cases with a Case Detection Rate (CDR) of 5.43 / 100,000 population with a total number of leprosy cases of 19,033 (prevalence rate 0.72 / 10,000 population) [2].

Data from the Indonesian Ministry of Health in 2018, in the Province of East Nusa Tenggara (NTT) in 2017, there were 405 new cases with a CDR of 7.6 / 100,000 population, with a prevalence rate of 0.8 / 10,000 population. Leprosy sufferers were recorded, the multi-bacillary type (MB) was more than the Paucibacillary (PB) type of leprosy which was only 34 cases, where there were more male patients with 266 patients compared to female patients with 139 patients [3].

Naob Leprosy Hospital is one of the Technical Implementation Units (UPK) in North Central Timor Regency which serves leprosy patients. The number of leprosy patients and leprosy reactions at Naob Leprosy Hospital for the last 2 years are as follows: In 2018, out of 45 leprosy sufferers, 8 people (17.7%) had leprosy reactions, 3 of whom had disabilities; In 2019 there were 35 leprosy sufferers, 7 of whom had leprosy reactions and disabilities; Meanwhile, in 2020 (the condition in February), there were 19 leprosy sufferers, 5 of whom experienced leprosy reactions without disabilities [4]. The results of preliminary observations made on leprosy sufferers at Naob Hospital, TTU Regency, showed that in 2019 the total number of people affected by leprosy was 35 people with 25 men and 10 women. Also, based on the data, there were 3 people who died due to complications and there were 25 people with level I disabilities and 7 people with level II disabilities. Based on the data obtained, the researchers are interested in conducting research on the Influence of Determinant Factors on the

Incidence of Leprosy Reactions Based on Biological and Psychological Reactions on Leprosy Patients at Naob Hospital, TTU Regency.

METHODS

This type of research is an analytic survey research with a cross sectional design. The population in the study was leprosy sufferers who experienced reactions of leprosy types I and II in leprosy patients in the Naob Leprosy Hospital, North Central Timor Regency, both inpatients and outpatients with a total of 65 people with leprosy. The sample in this study amounted to 65 people. The data collection technique used a questionnaire and the research period was September-October 2020. Data analysis included univariate, bivariate with chi square test, and multivariate with logistic regression test. The sampling technique in this study is the total sampling technique. Presentation of data in this study in the form of tables and narrative.

RESULTS

Table-1: The Influence of Determinant Factors of Leprosy Reaction Incidence

| Variable | Leprosy Reaction | | | | Total | | p-value |
|----------------------------|------------------|-------------|-----------|-------------|-----------|------------|---------|
| | Not Severe | | Severe | | n | % | |
| | n | % | n | % | | | |
| Type of Leprosy | | | | | | | |
| MType | 21 | 51,2 | 20 | 48,8 | 41 | 63,1 | 0,012 |
| PType | 4 | 16,7 | 20 | 83,3 | 24 | 36,9 | |
| Duration of Illness | | | | | | | |
| New | 16 | 59,3 | 11 | 40,7 | 27 | 41,5 | 0,008 |
| Long Time | 9 | 23,7 | 29 | 76,3 | 38 | 58,5 | |
| Total | 25 | 38,5 | 40 | 61,5 | 65 | 100 | |
| Disabilities | | | | | | | |
| Mild | 18 | 58,1 | 13 | 41,9 | 31 | 47,7 | 0,004 |
| Severe | 7 | 20,6 | 27 | 79,4 | 44 | 52,3 | |
| Total | 25 | 38,5 | 40 | 61,5 | 65 | 100 | |
| Stress | | | | | | | |
| Mild | 15 | 60,0 | 10 | 40,0 | 25 | 38,5 | 0,010 |
| Severe | 10 | 25,0 | 30 | 75,0 | 40 | 61,5 | |
| Total | 25 | 38,5 | 40 | 61,5 | 65 | 100 | |

Based on table 1 above, the results of the Bivariate analysis (Chi-Square) statistical test between the variables of the type of leprosy and leprosy reactions obtained a value of p-value = 0.012, which means that there was a significant relationship between the type of leprosy and the leprosy reaction. The results of the Bivariate (Chi-Square) statistical test between the length of illness and the leprosy reaction showed that the value of p-value = 0.008, which means that there was a significant relationship between duration of illness and leprosy reactions. The results of the Bivariate (Chi-Square) statistical test between the variable disability and leprosy reactions obtained p-value = 0.004, which means that there was a significant relationship between disability and leprosy reactions and the results of the Bivariate (Chi-Square) analysis

between the stress variable and the leprosy reactions obtained p-value = 0.010, which means that there was a significant relationship between stress and the leprosy reaction.

The analysis used a multivariate logistic regression method to see the effect of several independent variables on one dependent variable being tested at the same time. The variables that were continued using multivariate were type of leprosy, duration of illness, disability, and stress. This analysis takes the independent variable which has a p-value <0.05 in the bivariate analysis. Table 1 showed that all variables had a p-value < 0.05, meaning that this variable could be continued in a multivariate analysis.

Table-2: Multivariate Logistic Regression Step 1

| | B | S.E | Wald | Df | Sig | Exp (B) | 95% CI for EXP (B) | |
|----------------------------|-------|------|-------|----|------|---------|--------------------|--------|
| | | | | | | | Lower | Uper |
| Type of Leprosy | 2.098 | .885 | 5.619 | 1 | .018 | 8.146 | 1.438 | 46.151 |
| Duration of Illness | 2.333 | .785 | 8.825 | 1 | .003 | 10.304 | 2.211 | 48.011 |
| Disability | 2.108 | .748 | 7.935 | 1 | .005 | 8.228 | 1.899 | 35.656 |
| Stress | 1.551 | .759 | 4.171 | 1 | .041 | 4.715 | 1.064 | 20.881 |

Furthermore, the final modeling of the step 1 multivariate analysis shows that all variables can be

included in the final modeling of the next multivariate analysis.

Table-3: Final Modeling of Multivariate Analysis

| | B | S.E | Wald | Df | Sig | Exp (B) | 95% CI for EXP (B) | |
|----------------------------|-------|------|-------|----|------|---------|--------------------|--------|
| | | | | | | | Lower | Uper |
| Type of Leprosy | 2.098 | .885 | 5.619 | 1 | .018 | 8.146 | 1.438 | 46.151 |
| Duration of Illness | 2.333 | .785 | 8.825 | 1 | .003 | 10.304 | 2.211 | 48.011 |
| Disability | 2.108 | .748 | 7.935 | 1 | .005 | 8.228 | 1.899 | 35.656 |
| Stress | 1.551 | .759 | 4.171 | 1 | .041 | 4.715 | 1.064 | 20.881 |

The final result of the multivariate analysis modeling, showed that it was still significantly related when the analysis was carried out jointly for the variables of type of leprosy, duration of illness, disability, and stress with the order of the strength of the relationship from the largest to the smallest are duration of illness (OR = 10.304), disability (OR = 8.228), type of leprosy (OR = 8.146), and stress (OR = 4.715). Of the four determinant factors, the most dominant factor that directly affected the leprosy reaction was the length of illness variable because this factor had the largest odds ratio (OR), which was 10.304.

DISCUSSION

Factor Analysis of the Type of Leprosy with Leprosy Reactions

There are two types of leprosy, namely Paucibacillary (PB) and Multibacillary (MB). The occurrence of disability is more frequent in the MB type than in PB. Ogbeiwi states that there is a relationship between the type of leprosy and the level of disability. The difference in the level of disability in the types of MB and PB leprosy is due to the fact that treatment for the MB type of leprosy is longer than that of the PB type [5].

The results of the bivariate test showed that there was a relationship between the variable type of leprosy and the incidence of leprosy reactions in leprosy patients at Naob Hospital, TTU Regency. This shows that the type of leprosy is one of the factors that influence the incidence of leprosy reactions. According to researchers, this is because in general MB leprosy has more severe symptoms. Multibacillary type leprosy is a condition that is more severe leprosy infection where there is low cellular immunity with a high

number of bacteria. Leprosy reactions can occur in both types of leprosy, MB and PB. However, type II reactions can only occur in MB leprosy. In this study, subjects with type MB have a higher tendency to experience reaction leprosy. The same thing is also expressed by several research results in the world. The leprosy reaction is a hypersensitivity reaction, so it is strongly influenced by the immune response and a person's immune status. A study shows an increase in the activity of helper T cells in a group of people who experience leprosy reactions, where these cells play an important role in autoimmune processes and inflammatory reactions.

This research is in contrast to research conducted by Oktovian which states that there is no relationship between the type of leprosy and the incidence of leprosy reactions. The results showed that of the 18 respondents with PB type, there were 1 respondent who experienced leprosy reactions and from 72 respondents, there were 17 respondents who experienced the type of MB and experienced leprosy reactions with a value of p-value = 0.160 [6].

Analysis of the Duration of Illness with Leprosy Reactions

Long suffering from leprosy clients who suffer from leprosy until it is found by health workers and undergoing treatment is caused by several factors, including the client does not understand the early signs of leprosy in the form of numb skin spots, they are embarrassed because the client is already disabled, and the client does not know that there are drugs available free of charge at the Health Center [7].

The bivariate test results showed that there was a relationship between the length of illness and the incidence of leprosy reactions in leprosy patients at Naob Hospital, TTU Regency. This shows that the duration of illness is one of the factors that influence the incidence of leprosy reactions. According to researchers, as stated by Prawoto, this is because the longer you suffer from illness, the more *Mycobacterium leprae* dies or breaks down and becomes antigen which triggers a leprosy reaction. Type II or ENL reactions can occur if people with leprosy have not received treatment for a long time so that many antigens from leprosy germs trigger an immune response. Thus, the opportunity for disability to occur is greater [8].

This study is in line with research conducted by Prawoto which states that there is a relationship between duration of illness and the incidence of leprosy reactions. The results showed that the proportion of respondents with leprosy disease duration of more than 1 year, in the case group was 81.1%, which was higher than the control group (60.4%). While respondents with a duration of illness less than 1 year in the case group were 18.9%, which was lower than the control group (39.6%), with a p-value of $0.033 < 0.05$ [8].

Analysis of Disability Factors with Leprosy Reactions

Disability is a term that has a broad meaning, covering any damage, which is a limitation of activities that affect a person [2]. Leprosy disability is a disability that occurs in leprosy due to impaired nerve function in the eyes, hands or feet.

The results of the bivariate test showed that there was a relationship between the disability variable and the incidence of leprosy reactions in leprosy patients at Naob Hospital, TTU Regency. This shows that disability is one of the factors that influence the incidence of leprosy reactions. According to researchers, this is because disability and leprosy reactions are closely related to one another. Leprosy reactions that are not diagnosed, treated, and treated adequately will cause disability. The occurrence of defects in leprosy patients is caused by damage to peripheral nerve function either by germs or due to nerve inflammation (neuritis) during a leprosy reaction. Leprosy reactions can last several weeks to several months and can result in permanent disability. Prevention, discovery, and management of neurological dysfunction are top priorities in the eradication of leprosy.

This research is in line with research conducted by Firdaus which states that there is a relationship between disability and the incidence of leprosy reactions. The results showed that most of the respondents who experienced disabilities had experienced leprosy reactions (68.60%) with p-value = $0.01 < 0.05$ [9].

Stress Factor Analysis with Leprosy Reaction

Psychological stress can affect the body's balance which is called homeostasis. Homeostasis is a relatively constant state in the body's internal environment maintained naturally by the body's physiological adaptation mechanisms [10].

The bivariate test results indicate that there was a relationship between stress variables and the incidence of leprosy reactions in leprosy patients at Naob Hospital, TTU Regency. This shows that stress is one of the factors that influence the incidence of leprosy reactions. According to researchers, this is because stress can lead to decreased immunity so that it can trigger a leprosy reaction. Most of the respondents showed characteristics of stress such as feeling dry in the mouth, chills, panic, and heart palpitations without any physical activity. As with several theories put forward, leprosy patients who experience emotional stress will tend to require heavy adaptations as well. In a state of stress, the body will experience general disorders that can trigger a leprosy reaction.

This study is in line with research conducted by Prawoto which states that there is a relationship between duration of illness and the incidence of leprosy reactions. The results showed that the proportion of respondents who experienced stress in the case group was 47.2%, which was higher than the control group (15.1%). While respondents who did not experience stress in the case group were 52.8%, which was lower than the control group (84.9%) with a p-value of $0.01 < 0.05$ [8].

CONCLUSION AND SUGGESTION

There is a significant influence between the type of leprosy reaction, duration of illness, disability, and stress with the incidence of leprosy reactions in leprosy patients at Naob Hospital, TTU Regency and the variable duration of illness as a biological reaction has the most dominant influence on the incidence of leprosy reactions in leprosy patients at the hospital. In other words, leprosy sufferers who have a long history of illness have a 10,304 times higher risk of experiencing a reaction compared to new lepers.

The suggestion for government agencies is that all government agencies, especially health agencies, are expected to further improve counseling and provide information to leprosy sufferers regarding their health conditions. For other researchers, it is expected to conduct research to assess the condition of leprosy sufferers with a qualitative descriptive approach with the in-depth interview method so that it can produce an appropriate method to change the stigma or risk factors that develop in the community.

REFERENCES

1. Kementerian Kesehatan Republik Indonesia. (2012). Pedoman Nasional Program Pengendalian Penyakit Kusta.
2. World Health Organization. (2017). Epidemiological Report 2017: Global Leprosy Situation.
3. Kementerian Kesehatan Republik Indonesia. (2018). Hapuskan Stigma dan Diskriminasi terhadap Kusta. *InfoDatin Pus Data dan Inf Kementerian Kesehat RI*. Published online.
4. RS, Kusta, Naob. (2019). *Rekam Medik RS Kusta Naob*. Published online 2019.
5. Ogbeiwi, O.I. (2005). Progress towards the elimination of leprosy in Nigeria: A review of the role of policy implementation and operational factors. *Lepr Rev*. Published online.
6. Oktavian, A., Arisanti, Y., Tanjung, R., Mirino, Y. (2018). Faktor Risiko Potensial Reaksi Kusta Pada Etnis Asli di Dua Daerah Endemis Kusta-Papua. *Bul Penelit Kesehat*. Published online.
7. Susanto, N. (2006). Faktor-Faktor Yang Berhubungan Dengan Tingkat Kecacatan Penderita Kusta (Kajian Di Kabupaten Sukoharjo). Published online.
8. Prawoto. (2008). Faktor-faktor yang berpengaruh terhadap terjadinya reaksi kusta (studi di wilayah kerja Puskesmas Kabupaten Brebes). *J Epidemiol*. Published online.
9. Firdaus, F. (2019). Risiko keterlambatan berobat dan reaksi kusta dengan cacat tingkat 2. *J Berk Epidemiol*. Published online.
10. Cohen, S., Kamarck, T., Mermelstein, R. (2007). A global measure of perceived stress. *J Health Soc Behav*. Published online.

Cite this article:

Yustina Muti *et al* (2021). The Effect of Determining Events of Leprosy Reaction Based on Biological and Psychological Reactions on Leprosy Patients at Naob Hospital TTU Regency. *EAS J Parasitol Infect Dis*, 3(1), 1-5.