

The relationship between Body Mass Index and leprosy type

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Abstract

Background Leprosy, sometimes referred to as Hansen's disease, is a chronic granulomatous infection caused by bacteria that predominantly impacts the peripheral nerves but may additionally harm the eyes, muscles, bones, skin, the mucous membrane of the mouth, upper respiratory tract, reticuloendothelial system, eyeballs, and the testicles. The factors that predispose to illness development must be recognized. Poverty, under nutrition, food scarcity, insufficient food supply, and a lack of food diversity are the most obvious risk factors.

Objective To determine the relationship between body mass index (BMI) and leprosy type.

Methods This is an analytical cross-sectional study design involving 30 subjects with leprosy. Clinical examination and history-taking were carried out and the BMI was taken into account.

Results It was discovered that this study's leprosy subjects were more likely to be male, with 20 male subjects (66.6%) and 10 female subjects (33.3%). 11 patients (36.6%) of the study group's participants were beyond the age of 47. The correlation between the BMI value and the type of leprosy has a positive direction of 0.123 with very low relationship criteria and there's no relationship between body mass index and leprosy type ($p=0.069$).

Conclusion No association between body mass index and leprosy type.

Key words

Leprosy; Multibacillary; Paucibacillary; Body Mass Index.

Introduction

Leprosy, sometimes referred to as Hansen's disease, is a chronic granulomatous infection caused by bacteria that predominantly impacts the peripheral nerves but may additionally harm the eyes, muscles, bones, skin, the mucous membrane of the mouth, upper respiratory tract, reticuloendothelial system, eyeballs, and the testicles.¹ Leprosy can be attributed to a bacteria

called *Mycobacterium leprae*, sometimes referred to as Hansen's germ. The Norwegian physician Gerhard Henrik Armauer Hansen made the discovery in 1873.^{1,2}

From 2012 to mid-2013, there was an increase in both leprosy prevalence and the detection of new leprosy cases globally. In Indonesia, the number of new cases diagnosed appears to have decreased significantly from 2011 to 2012, with 22,390 cases in 2011 and 18,994 cases in 2012. According to this research, the majority of cases (82.6%) are multibacillary leprosy (MB).²

The "towards zero leprosy" goal of the WHO Global Leprosy Strategy 2021–2030 is to

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achieve a leprosy-free world.³ The focus is on controlling transmission of disease through early identification along with efficient treatment. Nutritional status plays an important role in controlling immunological response to different infections, including *Mycobacterium leprae*. Undernutrition has been identified as an important risk factor for developing leprosy. Furthermore, it may influence therapy response. In order to detect specific nutritional deficits in index cases and vulnerable individuals, the nutritional status of patients diagnosed with leprosy as well as their families should be evaluated as part of the initial assessment. The fact that different investigations employ diverse approaches as indicators of nutritional status has become the largest obstacle in evaluating the current literature in this context. BMI, or body mass index, has become among the most frequently employed measurement.⁴

Methods

A descriptive study with a cross-sectional method corresponding to 30 leprosy patients. The variables in the study were as follows: independent variable (leprosy patients) and dependent variable (body mass index). Each subject had signed the informed consent. The body mass index (BMI) was used to determine nutritional status. For nutritional classification of patients based on BMI, WHO guidelines were utilized, with values of 18.5, 18.5-24.9, and >25.0 designated as underweight, normal weight, and overweight, respectively.

The Health Research Ethics Committee, Faculty of Medicine, Sumatera Utara University, has granted the ethical authorization. Clinical examination and history-taking were carried out and the BMI was taken into account.

Result

It was discovered that this study's leprosy

participants were more likely to be male, with 20 male patients (66.6%) and 10 female individuals (33.3%). The study also demonstrated that the study group's average age was >47 years old, amounting to 11 subjects (36.6%) with leprosy and the lowest age group was 28–32 and 43–47 years old, about 3 subjects (10%) (**Table 1**).

In this study, these were the values of body mass index in leprosy subjects. The average (mean) height was 1.6130m with the highest value being 1.85m and the lowest being 1.44m (SD 0.109). The average (mean) weight was 57.1 kg with highest weight was 90 kg with the lowest being 30 kg (SD 13.70). Furthermore, the average (mean) BMI was 21.85, the highest BMI was 33.12 with the lowest value 14.47 (SD 4.477).

Based on **Table 2**, it shows that 3 respondents who had BMI with below normal weight suffered from multibacillary (MB) type leprosy and 4 respondents had paucibacillary (PB) type of leprosy. Furthermore, 9 respondents who had BMI with normal weight suffered from MB type leprosy and 8 had PB type of leprosy. 2 respondents who had BMI with excess body weight suffered from MB type leprosy and 2 had PB type of leprosy.

None of the respondents who had BMI with

Table 1 Distribution of research subjects by gender and age.

Variable	n	%
Gender		
Male	20	66.6
Female	10	33.3
Total	30	100
Age (years)		
18 – 27	5	16.6
28 – 32	3	10
33 – 37	4	13.3
38 – 42	4	13.3
43 – 47	3	10
> 47	11	36.6
Total	30	100

Table 2 Body mass index in leprosy subjects.

Body mass index	Multibacillary	Paucibacillary	Total	r^a	p^b
Under weight	3	4	7	0.123	0.069
Normal weight	9	8	17		
Over weight	2	2	4		
Obesity	0	2	2		
Total	14	16	30		

a) Pearson test. b) Spearman test.

obese weight suffered from MB type leprosy and 2 had PB type of leprosy. Based on this explanation, the majority of respondents who had BMI with normal weight were lepers with a total of 17 respondents with 9 respondents having MB and 8 respondents having PB. Spearman's correlation test, was used to determine whether there was a correlation between BMI and the kind of leprosy. According to the findings of the correlation test, there is a positive 0.123 association between the BMI value and the type of leprosy, with extremely weak relationship requirements. So there's no observed relationship between body mass index and leprosy type ($p=0.069$).

Discussion

It was discovered that this study's leprosy participants were more likely to be male, with 20 male patients (66.6%) and 10 female individuals (33.3%). According to the literature, leprosy is more common in males than in women, especially as they are more likely to seek treatment and are more prone to lepromatous leprosy.⁵ This finding is similar to Miranzi's (2010) study in Brazil, where 55.4% of 455 leprosy cases were male.⁶ Several pieces of evidence suggested a link between the region with the highest gender ratio of diagnosed and treated leprosy cases. Males are more likely to be registered as leprosy patients in Asian locations than females, whereas females are more likely to be registered as leprosy patients in African regions.⁷

This study showed that 11 participants (36.6%) were over the age of 47 in the study group. Leprosy can affect people of all ages, with the most cases occurring between the ages of 10 and 20 and 30 and 60. Leprosy in adults living in endemic areas is frequently a reinfection or superinfection of a previously infected but asymptomatic individual who experiences a declining immune response as they age. Verkevisser's study in Brazil discovered that 31.4% of leprosy patients were between the ages of 34 and 49. This is significant because people in this age group are economically productive and hence have a higher risk of transmission.⁷

Based on **Table 2**, the majority of respondents who had BMI with normal weight were lepers with a total of 17 respondents with 9 respondents having MB and 8 respondents having PB. Based on the results of the correlation test, the correlation between the BMI value and the type of leprosy has a positive direction of 0.123 with very low relationship criteria. So every time there is an increase in the type of leprosy, it has a very low relationship with the type of BMI of the respondent and there's no relationship between body mass index and leprosy type ($p=0.069$). Brazilian researchers also discovered similar conclusions: the majority of patients had normal BMIs, with only a tiny proportion of them being obese.⁸ Another study from the same region found that 60% of leprosy patients were obese.⁹ There was no correlation between reactional states and BMI in either of these investigations. In the

reported study, BMI did not connect with the existence of reaction and abnormalities or multibacillary illness ($p>0.05$). A similar study involving female patients from Indonesia found no link between poor nutrition and leprosy ($p=0.008$, $OR=0.422$).¹⁰ In contrast, there was no connection between the quantity of skin lesions and bacillary load in a previous study at India which revealed that under nutrition (BMI 18.5) to be much more prevalent in leprosy patients than in controls.¹¹

Conclusion

There's no association between body mass index and leprosy type. Thus, leprosy and undernutrition may be associated in numerous manners, and whether undernutrition is a cause or an effect of leprosy remains undetermined. To answer this question, standardized case-control and cohort studies are required. However, it seems prudent to assess the nutritional condition of new/under-treatment/discharged patients in order to take corrective action.

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