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Original Research Article

Relationship between history of household contact and rate of leprosy in Central Jakarta area in 2017

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ABSTRACT

Background: Leprosy is a disease whose mode of transmission is not known with certainty. It is based solely on the classic notion that it is transmitted through prolonged and close direct contact between the skin and inhalation because *Mycobacterium leprae* can live several days in a droplet. The objectives of this research are to find out whether or not there is a relationship between household contact and leprosy and to find out how the relationship between household contact and leprosy.
Methods: This is an observational descriptive research that applies a case control design. The samples were taken using a simple random sampling method that obtained 34 people.
Results: The research results obtained a p-value of 0.003 which is smaller than the value of α=(5%). It shows that there is a significant relationship between the history of household contact and leprosy in the Central Jakarta area in 2017.
Conclusions: The relationship that occurs between the history of household contact and leprosy shows a negative correlation that a person who has a history of household contact with a person affected by leprosy does not all suffer from leprosy. Meanwhile, there are many people who do not have a history of household contact who suffer from leprosy.

Keywords: Leprosy, Household contact, Case control

INTRODUCTION

Leprosy is caused by *Mycobacterium leprae* (*M. leprae*) and is a chronic disease that attacks humans. The highest prevalence of this disease is found in Central Africa, Southeast Asia and South America.[1] In 1991, the World Health Assembly launched the elimination of leprosy by reducing the prevalence of leprosy below 1 per 10,000 population. In Indonesia, it is known as the Elimination of Leprosy in 2000 (EKT 2000). The number of cases registered worldwide at the beginning of 2009 was 213,036 patients from 121 countries. In addition, the number of new cases in 2008 was 248,007. At the beginning of 2009, the number of leprosy cases in Indonesia affected 21,538 people with new cases in 2008 of 17,441 people. The 2008 prevalence rate per 10,000 population was 0.76.[2]

In 1999, the prevalence of leprosy in Indonesia decreased from six to three per 10,000 population. In 2003, the number of leprosy patients was recorded at 18,312 patients consisting of 2,814 Pausi Basiler (PB) and 15,498 Multi Basiler (MB) with a prevalence rate of 0.86 per 10,000 population. The case occurred in 10 provinces covering East Java, West Java, Central Java, South Sulawesi, Papua, Nangroe Aceh Darussalam, Special Capital Region of Jakarta, North Sulawesi, North Maluku, and East Nusa Tenggara. In 2004, it decreased to

16,549 patients, while in 2005 it increased to 19,695 patients.[3]

In 2012, the World Health Organization (WHO) reported that the global prevalence of leprosy was 232,857 cases, in 2013 it became 215,656 cases, and in early 2014 there was a decrease to 180,618 cases. Although the prevalence shows a decrease every year, it is still categorized high.[4]

In 2016, several countries reported new cases of leprosy, 33 countries reported no cases, 59 countries reported between 100 and 999 cases, 10 countries reported between 1000-9999 cases, and 3 countries (Brazil, India, Indonesia) reported >10,000 cases (WHO, 2017).

The transmission method of this disease is not known with certainty. It is only based on the classic assumption that it is transmitted through direct contact between prolonged and close skin and inhalation because *M. leprae* can live for several days in a droplet.[2] Factors related to leprosy include BCG (Bacillus Calmette Guerin) vaccination status, contact history, duration of contact, personal hygiene, age, education, socioeconomic status, occupancy density, and gender.[5] Household contact with leprosy patients is at risk for infection with *M. leprae* which then develops into leprosy. In addition, it can act as carriers of leprosy transmission sources.[6]

Based on the previous research findings, the risk of someone who has a history of household contact for leprosy is 15,127 times greater than someone who has no history of household contact and that is significant.[4]

The objective of this research consists of twofold, namely general objective and specific objective. The general objective of this search is to know the history of household contact and the rate of leprosy. Besides, the specific objective of this research is to know whether there is a relation between history of household contact and leprosy or not and to know how the relation between history of household contact and leprosy.

METHODS

The researchers conducted was a quantitative research. It is a research that requires quantitative data that are relevant to the variables formulated in the research problem and can be analyzed statistically. In certain studies, the analysis is needed to prove whether or not the previously formulated hypotheses are accepted. The conceptual framework was given in Figure 1.

Formulation of research hypotheses

H_0: There is no relationship between household contact and leprosy.

H_1: There is relationship between household contact and leprosy.

Research design

This is an observational descriptive research that applies a case control design. The research data were obtained from Community Health Centers and Hospitals throughout Central Jakarta that showed data related to patients infected with leprosy. The research scheme can be seen in Figure 2.

After the research data were obtained, to see a significant relationship between the history of household contact and leprosy, Chi Square correlation analysis was used. However, if the data acquisition does not meet the requirements for testing with Chi Square then it is carried out through Exact Fisher.

Sample and population

The research population was individuals infected with leprosy in the central Jakarta area in 2017 as a case group and individuals who has not infected leprosy and live at central jakarta with case as a control group. The time of the research sampling was carried out in October 2017 to December 2017. The research was conducted at the Public Health Centers and Hospitals registered in Central Jakarta.

The samples taken in this research came from Community Health Centers and Hospitals throughout Central Jakarta.

Inclusion criteria

Individuals infected with leprosy, currently undergoing treatment, ages 13-65 years, male and female as inclusion criteria of case group and Individuals has not infected with leprosy, ages 13-65 years, male and female as inclusion criteria of control group.

Exclusion criteria

Individuals are not willing to take part in research, do not settle in Central Jakarta, are not present when the research takes place, live alone.

The determination of the sample was carried out through a simple random sampling method by considering the inclusion and exclusion criteria that have been set in which 17 people are assigned to each group (cases and controls). Thus, the total sample in this study was 34 people. It processed quantitative primary data obtained directly from respondents through a questionnaire instrument that aims to determine the level of knowledge and education of the society with the level of leprosy in the Central Jakarta area in 2017. This research data consists of primary data which includes filling out questionnaires to obtain identity and history and secondary data from medical record from Community Public Health Centers and Hospital registered in Central Jakarta.

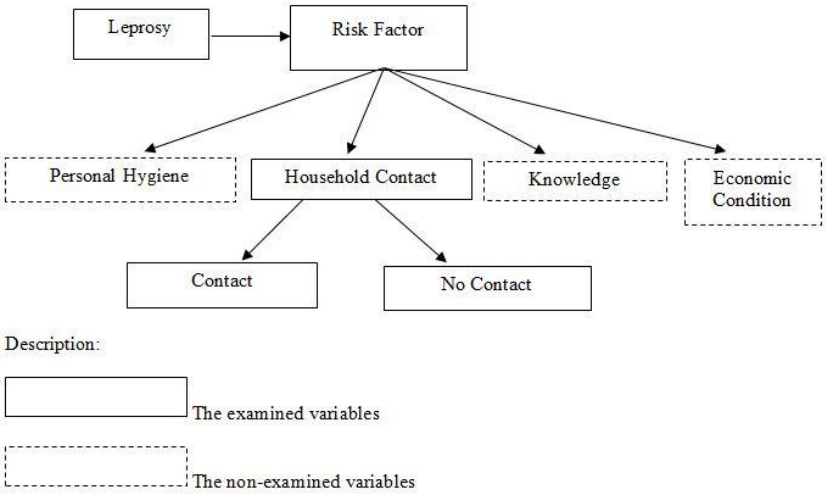

Figure 1: Conceptual framework.

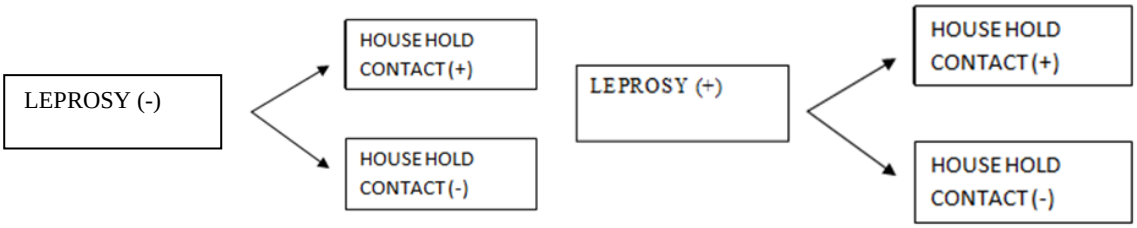

Figure 2: Cross sectional research scheme.

This research data consists of primary data which includes filling out questionnaires to obtain identity and history and secondary data from medical record from Community Public Health Centers and Hospital registered in Central Jakarta.

Data analysis

Data measurement was carried out in 2 ways: 1) the variable of leprosy patient was obtained through questionnaire and 2) the other variable, history of household contact, was obtained through questionnaire. The data that has been collected through filling out the questionnaire was then processed through a cleaning process to ensure its completeness and accuracy. Then, it continued with the input process into the computer with a coding system. Presentation and analysis of research data was carried out by computer using the help of Microsoft Office Excel 2010 for descriptive analysis and SPSS 17 for Windows for correlational analysis. To find out the relationship between the history of household contact and leprosy, it will be analysed by using correlational analysis. Hypotheses that will be tested on correlational analysis are:

H_0: There is no relation between history of household contact and leprosy

H_1: There is a relation between history of household contact and leprosy

The analysis used to determine the significance of the relationship between the two variables is the chi square analysis.[7]

$$\chi^2 = \sum \frac{\left(n_{ij}\hat{\mu}_{ij}\right)^2}{\hat{\mu}_{ij}}$$

In this case:

$$\hat{\mu}_{ij} = \frac{n_{i+}xn_{+j}}{n}, i, j = 1,2$$

The hypothesis (H_0) will be rejected if 2 is greater than α; (i-1) (j-1) 2 or the hypothesis (H_0) will be rejected if the significance of chi square is less than α.

However, chi square analysis has a requirement that the value of ij (expected value) for each cell in the cross tabulation is greater than 5.[7] If there is one cell in a cross tabulation that is less than 5 then the correlation analysis is performed using the Fisher's Exact test. Fisher's Exact Analysis is defined as Norušis):[7]

$$p = \frac{\binom{n_{1+}}{n_{11}}\binom{n_{2+}}{n_{+1}-n_{11}}}{\binom{n}{n_{+1}}}$$

Hypothesis (H_0) will be rejected if it obtains a p-value smaller than α. In this case, the p-value is obtained by adding up the probability of the data appearing and the chance of the more extreme possibility of appearing or can also use the Fisher table.

RESULTS

Respondent characteristic

Respondent characteristic is an analysis needed to find out information about the background of the respondent. It aims to provide an overview of the research object based on variables obtained from the group of subjects under research. The following is a descriptive respondent from the results of research that has been processed.

Respondent characteristic by gender

Based on Table 1, respondents in the group of male case are 12 respondents (35%) and those who are female are 5 respondents (15%). Meanwhile, in the control group, respondents who are male are 11 respondents (32%) and those who are female are 6 respondents (18%).

Table 1: Gender of respondents.

Gender	Case	Control	Total
	N (%)	N (%)	N (%)
Male	12 (35)	11 (32)	23 (68)
Female	5 (15)	6 (18)	11 (32)
Total	17 (50)	17 (50)	34 (100)

Respondent characteristic by age

Based on Table 2, respondents in the case group who are less or equal to 20 years are 6 respondents (18%), aged 21 to 40 years are 6 respondents (18%), who have ages 41 to 60 years are 2 respondents (6%), and over 60 years old are 3 respondents (9%). Meanwhile, in the control group, respondents aged less than or equal to 20 years are 8 respondents (24%), aged 21 to 40 years are 7 respondents (21%), aged 41 to 60 years are 1 respondent (3%) and over 60 years old are 1 respondent (3%).

Table 2: Age of respondents.

Age (years)	Case	Control	Total
	N (%)	N (%)	N (%)
≤20	6 (18)	8 (34)	14 (41)
21-40	6 (18)	7 (21)	13 (38)
41-60	2 (6)	1 (3)	3 (9)
>60	3 (9)	1 (3)	4 (12)
Total	17 (50)	17 (50)	34 (100)

Respondent characteristic by educational background

Based on Table 3, respondents in the case group who have never taken education are 1 respondent (3%), who have an educational background elementary school are 6 respondents (18%), who have a junior high school educational background are 2 respondents (6%), and those who have senior high school educational background are 8 respondents (24%). Meanwhile, in the control group, who have elementary school educational background are 2 respondents (6%), who have junior high school educational background are 4 respondents (12%), who have senior high school educational background are 8 respondents (24%), and those who have university educational background are 3 respondents (9%).

Table 3: Educational background of respondents.

Educational background	Case	Control	Total
	N (%)	N (%)	N (%)
Not going to school	1 (3)	0 (0)	1 (3)
Elementary school	6 (18)	2 (6)	8 (24)
Junior high school	2 (6)	4 (12)	6 (18)
Senior high school	8 (24)	8 (24)	16 (47)
University	0 (0)	3 (9)	3 (9)
Total	17 (50)	17 (50)	34 (100)

Respondent characteristic by occupation

Based on Table 4, respondents in the case group that have occupation as housewife are 4 respondents (12%), who have occupation as entrepreneurs are 2 respondents (6%), who have occupation as private employees are 3 respondents (9%), who have occupation as students are 3 respondents (9%), and those who have no jobs are 5 respondents (15%). Meanwhile, in the control group, those who have occupation as housewife are 5 respondents (15%), those who have occupation as entrepreneurs are 2 respondents (6%), who have occupation as private employee are 3 respondents (9%), who have occupation as students are 6 respondents (18%), and those who do not have a job are 1 respondent (3%).

Table 4: Current occupation of respondents.

Occupation	Case	Control	Total
	N (%)	N (%)	N (%)
Housewife	4 (12)	5 (15)	9 (26)
Entrepreneur	2 (6)	2 (6)	4 (12)
Private employee	3 (9)	3 (9)	6 (18)
Student	3 (9)	6 (18)	9 (26)
Unemployed	5 (15)	1 (3)	6 (18)
Total	17 (50)	17 (50)	34 (100)

Respondent characteristic by ethnicity

Based on the Table 5, in the case group, respondents who come from the Betawi ethnicity are 13 respondents

(38%), who come from the Malay ethnicity are 2 respondents (6%), who comes from the Sundanese ethnicity is 1 respondent (3%), and those who comes from the Minang ethnicity is 1 respondent (3%). Meanwhile, in the control group, respondents who come from the Betawi ethnicity are 9 respondents (26%), who come from the Sundanese ethnicity are 3 respondents (9%), who comes from the Javanese ethnicity is 1 respondent (3%), who come from Minang ethnicity are 3 respondents (9%), and those who comes from Arab ethnicity is 1 respondent (3%).

Table 5: Ethnicity of respondents.

Ethnicity	Case	Control	Total
	N (%)	N (%)	N (%)
Betawi	13 (38)	9 (26)	22 (65)
Malay	2 (6)	0 (0)	2 (6)
Sundanese	1 (3)	3 (9)	4 (12)
Javanese	0 (0)	1 (3)	1 (3)
Minang	1 (3)	3 (9)	4 (12)
Arab	0 (0)	1 (3)	1 (3)
Total	17 (50)	17 (50)	34 (100)

Variable description

History of household contact variable

Based on the results of questionnaire and interview with 34 respondents, the frequency for history of household contact variable is presented as in Table 6. The total sample of 34 respondents, the frequency of respondents who have a history of household contact with leprosy patient are 8 respondents (24%). Meanwhile, respondents who have no history of household contact with leprosy patient are 26 respondents (76%).

Table 6: Frequency distribution for history of household contact variable.

History	Frequency	%
Contact	8	24
No contact	26	76
Total	34	100

Leprosy patient variable

The total sample of 34 respondents, the frequency of leprosy sufferers and those who are not leprosy sufferers are the same; i.e., each is 17 respondents (50%). This is because determining the relationship between the history of household contact with leprosy sufferers was carried out using case control Table 7.

Table 7: Frequency distribution of leprosy patient.

Leprosy	Frequency	%
Yes	17	50
No	17	50
Total	34	100

Relationship history of household contact and leprosy

The analysis used to determine the relationship between the history of household contact and leprosy is Fisher's Exact correlation. In this research, the significance of the correlation of each calculation between the independent variable and the dependent variable was tested. The following is the inferential statistical calculation hypothesis to see the correlation between the history of household contact and leprosy in the Central Jakarta area in 2017:

H_0: $\rho=0$ (There is no relationship between history of household contact and leprosy).

H_1: $\rho\neq0$ (There is relationship between history of household contact and leprosy).

$\alpha=0.05$.

Based on research data, it was obtained a cross tabulation between the history of household contact and leprosy as presented in Table 8.

Table 8: Cross tabulation of history of household contact and leprosy.

History	Leprosy		Total
	Yes	No	
Contact	0	8	26
No contact	17	9	8
Total	17	17	34

Source: Processed data, 2017.

Table 8 shows that there are 17 respondents who have leprosy (cases) all of whom have never had a history of household contact with lepers. It was found from the results of history and anti-PGL-1. Meanwhile, there are 17 respondents who do not suffer from leprosy (control) of which there are 8 respondents who have history of household contact and 9 respondents who have no history of household contact. In addition, the anti PGL-1 results are negative in all control respondents.

The test results on the relationship between the history of household contact and leprosy can be seen in Table 9.

Table 9: Correlation of history of household contact and leprosy.

	Value	exact sig (2-sided)
Fisher's exact test	-	0.003
No. of valid cases	34	-

Test criteria will accept H_1 if p value $<\alpha$ and accept H_0 if p value $>\alpha$. Based on Fisher's Exact Correlation statistical test from the above table, the p value is $0.003<\alpha=0.05$ then H_1 is accepted. It means that there is a significant relationship between the history of household contact and leprosy in the Central Jakarta area in 2017.

DISCUSSION

Variable description

Based on questionnaire and interview conducted with 34 respondents, in this case, in the leprosy patient variable, 17 respondents are leprosy patients (case) and 17 respondents are not leprosy patients (control). Meanwhile, in the history of household contact variable, 8 respondents have history of household contact with leprosy patients while 26 other respondents do not have history of household contact with leprosy patients.

Analysis of relationship between history of household contact and leprosy

To analyze the relationship between the history of household contact and leprosy, Fisher's Exact correlation was used. This research tested the null hypothesis that there is no relationship between the history of household contact and leprosy (with alpha 5%).

Based on Fisher's Exact correlation statistical test, it obtained a p value of 0.003. These results indicate that the p value <alpha which reject H_0 and accept H1. It means that there is a significant relationship between the history of household contact and leprosy in the Central Jakarta area in 2017.

A significant relationship between household contact and leprosy shows that a person who has a history of household contact with leprosy sufferers does not all suffer from leprosy. Meanwhile, there are more people who have no history of household contact suffer from leprosy. Although the theory of Montoya et al, states that the risk factors for leprosy occurrences include a history of contact with lepers, however, there are more lepers who are people who do not have history of household contact.[6] It shows a negative correlation in the relationship history of household contact and the number of leprosy patient in the Central Jakarta area in 2017.

According to the research conducted by Ratnawati entitled with the factors related to risks of leprosy (morbus hansen), the factors are such as: house sanitation condition consisting of wall, floor, and toilet.[8] Besides, the education and the history of contact influence the occurrence of leprosy. The research done previously by Ratnawati is in line with this research that the history of household contact is the cause of leprosy transmission let along supported by less hygiene house sanitation condition. This research is also supported by the research done by Kora entitled with Risk Factor of Leprosy in Community of Saumlaki in Western Southeast Maluku in 2010-2011 in which its research result reveals that the influencing factors are such as gender, education, occupation, household contact, residence density.[9] The similar research but not supporting this research is done by Sugireng who make an analysis on the relation between history of leprosy sufferer household contact and infection status using microscopic check on acid-proof bacillus in Community Health Center of Benu-Benua. The research result of Sugireng concludes that there is no relation of the history of household contact but further research is needed.[10]

CONCLUSION

Based on the results of the discussion that has been described regarding the relationship between the history of household contact and leprosy in the Central Jakarta area in 2017, the following conclusions can be drawn i.e., based on Fisher's Exact correlation statistical test, it obtained a p value of 0.003 which is smaller than the α=5% value. It shows that there is a significant relationship between the history of household contact and leprosy in the Central Jakarta area in 2017. The relationship between the history of household contact and leprosy shows a negative correlation that someone who has a history of household contact with leprosy sufferers does not all suffer from leprosy. Meanwhile, there are more people who have no history of household contact suffer from leprosy.

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