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The Epidemiology and Risk Factor of Lymphatic Filariasis Strains of *Wuchereria bancrofti* in Indonesia

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ABSTRACT

Lymphatic filariasis is a debilitating disease caused by the filarial worm *Wuchereria bancrofti*. It is earmarked for elimination by the year 2020 through the Global Program for the Elimination of LF (GPELF). Lymphatic Filariasis (LF) is a disease transmitted by the filarial worm *Wuchereria bancrofti*. The swell makes people becoming unproductive in their lives, so that the researcher is engaged to know the cause of filariasis. The purpose of this research was to know the age, the breeding spot of mosquito, occupation, health service and habit of wearing closed outfit properly are the risk factors on lymphatic filariasis strains of *Wuchereria bancrofti*. This type of research was the *observasional* research by using *Case Control Study* design. This research was executed in North Mamuju regency on April 1st - 30th July, 2017. Total sample that would be analyzed in this study was 82 samples. The data analysis functioned univariate, bivariate and multivariate analysis system. Age is the risk factor on the case of filariasis Σ 0.232 while the non-risk factor is, the breeding spot of mosquito with Σ 0.657, health service with Σ 1.129 and habit of wearing full closed outfit is Σ 0.266. Job is the risk factor of mosquito with Σ 8.032 because of all respondents having jobs that contaminated with the vector of mosquito. The conclusion of this research outcomes that outdoor job having 8.032 times much bigger risk of suffering lymphatic filariasis in North Mamuju Regency, Indonesia. This research suggests people to apply mosquito repellent when sleeping to avoid mosquito bites.

Keywords: Lymphatic filariasis, Epidemiology, Risk factor

INTRODUCTION

The geographic strains of parasites are important in disease pathogenicity as observed with the forest and savanna strains of *Onchocerca volvulus*⁽¹⁾. Thus, an understanding of the way in which genotype varies with geography, may provide useful tools in discerning epidemiological patterns and thus designing strategies to prevent disease. Lymphatic Filariasis (LF) is a disease transmitted by the filarial worm *Wuchereria bancrofti*. It is earmarked for elimination by the year 2020, and since the year 2000 there have been yearly mass treatment of endemic communities with Ivermectin and Albendazole. Mass Drug Administration (MDA) coverage for LF increased from three million people treated in 12 countries in 2000, to nearly 950 million in 53 countries in 2011^{(2),(3)}. In order to prevent failures of the massive control programs that have been embarked upon, an understanding of how genetic variations within *W. bancrofti* affect the epidemiology of LF is required in different settings.

LF is a mosquito-borne parasitic infection of neglected people in Africa, Asia, the Pacific, and the Americas. It is caused by three parasites (*Wuchereria bancrofti*, *Brugia malayi*, and *B. timori*) that are transmitted by different mosquitoes, including *Anopheles*, *Aedes*, *Culex*, and *Mansonia* species⁽⁴⁾. The Global Program to Eliminate Lymphatic Filariasis (GPELF) is a rapidly expanding public health initiative that coordinated the administration of treatments to over 539 million people in 53 of 73 endemic countries in 2011⁽⁵⁾.

WHO explains that more than 556 million people worldwide are treated for lymphatic filariasis by 2015, compared with 538 million in 2014. WHO conducted a transmission assessment survey, the national program can now determine whether to stop filariasis events. Survey results in 2015 revise the population at risk of developing lymphatic filariasis in many areas where intervention occurs several times, the number of global people in need of care is reduced from 1.4 billion in 2011 to 946 million by 2015^{(6),(7)}.

Results of mapping of endemic areas in Indonesia were obtained as many as 241 districts are endemic areas of non-endemic lymphatic filariasis as much as 273 districts from a total of 514 districts Indonesia. This indicates that almost half of Indonesia's population live in endemic areas so that the risk of contracting filariasis⁽⁸⁾.

Studies on LF in West Sulawesi have shown differences in disease prevalence and multiplicity of symptoms in two geographically distinct regions: the Northern Mamuju of the country exhibit higher prevalence compared to the Southern Mamuju⁽⁹⁾. Patients lymphatic filariasis with new cases on the gender of men as many as 11 patients while in women 3 patients. The total number of filariasis cases in West Sulawesi Province in male gender were 37 patients and 22 women, the total was 59 cases of filariasis.

Patients lymphatic filariasis strains of *Wuchereria bancrofti* with new cases in Funju Village on male gender as many as 3 patients and women 1 patient, Parabu Village on female gender 1 patient, Pasangkayu District on male gender 1 patient and 1 female patient, Tikke Raya District on male gender as many as 4 patient and woman 2 patient, Pedongga village on male gender counted 2 patient, Random Village on male gender 18 patient and female 5 patient, and Village Bambaira on male gender 1 patients and women 3 patients. The total number of cases in the male sex of 29 patients and 13 women, so the number of cases patients who still exist as many as 42 patients⁽⁹⁾.

The purpose of this research was to know the epidemiology and risk factor of lymphatic filariasis strains of *Wuchereria bancrofti* in North Mamuju Indonesia based on age, mosquito breeding place, occupation, health service, and habit of using closed clothes perfectly.

METHODS

The research design used was observational study by case control study. Population and samples of study were all patients lymphatic filariasis strains of *Wuchereria Bancrofti* in North Mamuju Indonesia on April 1st - 30 th July, 2017 as many as 82 people. The study used total sampling technique ini wich all population were the samples. Data were obtained through interview to respondents by using questionnaire and direct interview.

Data were then analyzed by using contingency correction coefficient to independent variables (age of work, place of development lymphatic filariasis, occupation, health service, and habit of wearing full closed) and dependent variable (lymphatic filariasis), and proceed to the anlysis by using logistic regression and odds ratio.

RESULTS

Based on Table 1, there were five variables that had significant relation with lymphatic filariasis strains of *Wuchereria bancrofti* (p-value < 0.005), there were age of work, place of development lymphatic filariasis, occupation, health service, and habit of wearing full closed. Selection of the variables used multivariate analysis by using multiple logistic regression method Backward Likelihood Ratio.

Table 1. Relation between Independent and Dependent Variables

Variable	LF Status				OR	CI
	LF		Non LF			
	Frequency	Percentage	Frequency	Percentage		
Age of work						
• Productive	35	83.3	38	90.5	0.526	0.142-1.954
• Non productive	7	16.7	4	9.5		
Place of development						
• There is place	30	71.4	31	73.8	0.887	0.340-2.316
• Non there is place	12	28.6	11	26.2		
Occupation						
• Inside the house	28	66.7	10	23.8	6.400	2.458-16.664
• Outside the house	14	3.3	32	76.2		
Health service						
• Non support	29	69	28	66.7	1.115	0.446-2.788
• Support	13	30.1	14	33.3		
Habit of wearing full closed						
• Non wearing	33	78.6	38	90.5	0.386	0.109-1.370
• Wearing	9	21.4	4	9.5		

Table 2. Result of candidate selection

Variable	Score	df	p-value
Age of work	4.232	1	0.053
Place of development LF	5.657	1	1.319
Occupation	9.115	1	0.000
Health service	6.129	1	0.838
Habit of wearing full closed	8.266	1	0.089

Table 3. Modeling Stage

Variable	B	SE	Exp (B)	CI 95%
Age of work	-1.164	-1.164	0.312	0.053-1.020
Place of development LF	-1.197	-1.197	0.585	0.389-4.475
Occupation	1.102	0.897	4.684	2.824-22.841
Health service	-1.183	-1.183	0.526	0.352-3.627
Habit of wearing full closed	0.266	0.371	0.089	0.057-1.227

Analys to get multivariate model. Flowing multivariate model first. Result of analysis showed variable which had a very strong relation was variable occupation (Exp (B) = 4.684).

DISCUSSION

Based on results of study, the significant relation between occupation and LF strains of *Wuchereria bancrofti* in endemic zone ($p=0.000$). Age productive in work so have the opportunity to get a mosquito bite even though it is not as big as dengn non-productive age. The age of productive workforce is a risk factor because all respondents who have a productive working age every day do outdoor activities that have a greater chance of getting a vector bite. The age of non-productive labor does not affect the community in North Mamuju District (OR=0.526), because many have non productive age (>65 years) but still work in the garden and even their garden is on the mountain, so they have to climb up to the garden or where they work.

The case responders who had swollen legs for decades were not only actively working but they had six wives and children from each of the wives of the respondents. This proves that the age and incidence of filariasis does not affect the patient for the move. Productive age of work is 15-65 years, while the non-productive age of work is <15 years and > 65 years⁽⁹⁾.

This result is not in accordance with research Dhia Afra et al. about factors related to filariasis incidence in Padang Pariaman District 2010-2013 shows that there is a relationship between age with filariasis incidence with p value = 0,013. The mosquito breeding site affects the vector density level. A home environment with a high vector density has an opportunity to get a bite from filariasis mosquitoes. The community around the house there is a malaria mosquito breeding place more protective 0.887 times compared with people who do not have mosquito breeding place. The mosquito breeding place around the community residence such as open drinking water reservoir, well inside the house is not closed and has a hole in the floor near the well so that the water is collected, the location of some villages reside in the mountains that have forest around the house⁽¹⁰⁾.

The remote village of North Mamuju District has no water reservoirs at home because the villagers use the mountain springs that flow in the public washers they have made for the villagers, waste water flowing into the sewer to the river. Additional breeding sites are called non-landfills, such as animal bins, flower vases, ant traps and others, whereas natural landfills such as tree holes, stone pits, leaf bleach, coconut shell, shell, base of the tree bananas, bamboo pieces, and others^{(11),(12)}.

The results of this study are in line with the research of Candriana Yanuarini (2015), on factors related to filariasis occurrence at Community Health Centers Tirto 1 Pekalongan District indicate that the presence of vector resting place and vector breeding is related to filariasis occurrence and is a protective factor or factor that can reduce the risk of filariasis⁽¹³⁾.

People who work outdoors have a more frequent chance of being contaminated by vectors compared to people working in the home, it can be seen in this study found results that work outdoors 6.400 times more risky than those working indoors, making it more often contaminated by vectors. Communities in the Northern Mamuju District work as farmers, so they have a greater chance of being bitten by filariasis mosquitoes because their place of work is a breeding ground for mosquitoes, so farmers are more often bitten by vectors than house wives who stay home more often, but they can not in ensuring that house wives are free from mosquito bites, as many of the respondents who own the house do not fit the criteria of proper shelter, so vectors can get in and out of the house easily.

Working outdoors does not mean 100% have a chance of getting a vector bite because when the mosquito activity does not bite man, but when someone is resting work, because his work is outdoors when the worker is resting outdoors too, that's when mosquitoes have chance to bite man. Work performed during the hours of mosquitoes seeking blood can be at risk for filariasis, it is known that work at night has something to do with filariasis. Incidence of filariasis in males is higher than filariasis incidence in women because men are generally more likely to be in contact with vectors due to work^{(11),(12)}.

The results of this study are in line with the research of Dhia, Afra, et al. on risk factors of lymphatic filariasis occurrence in Padang Pariaman District showing that there is a relation between work (p value = 0.071, OR = 3,800, 95% CI = 0,938-15,398). The availability of health services is a supporting factor so that treatment and filariasis drug administration can be implemented maximally⁽¹⁰⁾.

The limitations possessed by communities in North Mamuju District are remote villages and have difficult access to reach Community Health Centers, limited human resources in Helpers of Public Health Centers,

availability of medicines and health facilities more complete than the pustu located in the village. There is one sub-district that has enormous potential as a nest of transmission on lymphatic filariasis strains of *Wuchereria bancrofti*, namely Random Sub-district, in addition to poor performance of lymphatic filariasis Prevention Officer, the stigma of people in some remote villages who do not want to take medicines from officers is another risk factor for filariasis.

North Mamuju District only carry out Finger Blood every two years working with Research and Development. This is done because the officers have limited operational costs in implementing the program, so the SDJ is not implemented thoroughly/not in total population in each area of peripheral blood is taken. Most of the population whose bleeding is not taken can not be said to be negative lymphatic filariasis strains of *Wuchereria bancrofti*. Remote villages with great potential for lymphatic filariasis incidents are not specifically monitored by prevention and control of lymphatic filariasis officers in the working area of Random Community Health Centers, the personal data of the patient is not owned by prevention and control of lymphatic filariasis officers in the last two years. A necessary control is to use GIS can be used as a detailed analysis of the incidence and prevalence of lymphatic filariasis⁽¹⁴⁾.

Health services are an important part in improving health status. Through this health system the goals of health development can be achieved more effectively, efficiently, and on target. The success of the health care system depends on the existing components, both funds, supporting facilities, and human resources available in this case nurses, doctors, radiologists, physiotherapists, nutritionists and other health teams⁽¹⁵⁾.

This result is in accordance with Santoso et al's research, about filariasis risk factor in Muaro Jambi regency shows that the determinant of risk factor of filariasis occurrence in Muaro Jambi District of unfavorable health service (travel time to health facility) Probability of people with all risk factors is 95.9% for infected with filariasis with OR 23.5 times⁽¹⁶⁾.

Other research results are Pramono, about case analysis of filariasis disease in Nangroe Aceh Darussalam Province with approach of Zero inflated poisson (zip) regression method. The variable effect on the occurrence of filariasis in NAD is the mean distance to the nearest health service, the further distance to the service will increase the incidence of filariasis⁽¹⁷⁾. The results of this study indicate the relationship between the habit of using closed clothing to lymphatic filariasis incidence with odds Ratio (OR) 0.386 berarkai using closed clothing does not become a risk factor for the occurrence of filariasis. North Mamuju District still has a remote village, the village community holds the customs and culture of the tribe of da'a, so that the villagers are categorized by the traditional community that has a house with partially open walls, the habit of not wearing closed clothing and even every activity not wearing footwear sleep does not use any personal protective equipment, there are some people who use anti mosquito burn. The people of the tribe of da'a still depend on living with nature, so they like to live in the mountains and away from the city. There is a change in the behavior of tribal people of da'a that is using clothing although not completely closed.

They have different thinking patterns with ordinary people in North Mamuju District, so not many non-tribal people can understand their habits such as not trusting medical treatment and medical services, so that when sick they do not want to take medication given by officers and during child birth prefer to have a home delivery assisted by a shaman, although the sanctions that have been agreed by the officials to the tribal community of da'a are very heavy, but they are not affected by the sanctions.

Activity at night with various activities such as patrolling, the habit of not wearing long clothing or mosquito coils that can increase the risk of contracting lymphatic filariasis⁽¹²⁾.

This study is in line with Yehud Maryen's study of risk factors related to lymphatic filariasis occurrence in Manokwari District, West Papua Province, explaining that the behavior of not wearing fully covered clothing during activity is a risk factor for lymphatic filariasis incidence with value (OR = 4.147, p = 0.001, 95%CI = 1.761-9.764)⁽¹⁸⁾.

CONCLUSION

In conclusion, based on the results of study concerning on the epidemiology and risk factor on lymphatic filariasis strains of *Wuchereria bancrofti* in Indonesia, factors that have relation with lymphatic filariases are occupation inside the house. This study showed that there is considerable occupation variability within *W. bancrofti* populations in North Mamuju, differences that might explain the observed epidemiology of LF.

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