Environmental and Socioeconomics Factors Associated with Cases of Cinical Filariasis in Banyuasin District of South Sumatera, Indonesia

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Abstract

Background: Filariasis is a tropical chronic desease due to microfilariae and spread by mosquitoes bites of *Aedes, Mansonia, Anopheles, Culex* and *Armigeres*. In the year of 2012 there was 142 cases of clinical filariasis in Banyuasin districts. The case of filariasis spread by many environmental factors especially swamp water and pool area with many water plants. The other factors are socio-economics and behavioral community.

Aim and Objectives: The objectives of the research was to determine the environmental factors, such as swamp or pool in Banyuasin districts, and socio-economic factors that may cause of filariasis.

Methods : This research was an analytic survey approach with a case control study. The population of this research were all of a case of filariasis in Banyuasin districs in 2012. The cases of these research and the controls were 132 respondents. The ratio of cases to the controls were 1: 1. The Data was taken by observation and interview. After the collect the data, it was analyzed by using the chi-square test and logistic regression.

Results : Bivariate analysis by chi-square test showed that from 6 variables, there were 3 variables were probes to be the risk factors of filariasis at Banyuasin districts, which are: existance of swamp or pool water area with p value = 0.004 and OR = 4.348 , education of the respondent with p value = 0.034 and OR = 5.714, the level of knowledge with p value = 0.003 and OR = 4.667.

Conclusion : Environmental factors with many water plants such as swamp or pool water area, the education and level of knowledge may cause of filariasis. It is necessary to perform health promotion and extend the information related to filariasis.

Key words: Filariasis, Environmental, Socioeconomic, Banyuasin district

Introduction

Filariasis is a contagious disease, caused by chronic filarial worms are transmitted by various species of mosquitoes, which consists of the genus *Aedes, Mansonia, Anopheles, Culex, Armigeres*. There are three species of worms that cause filariasis: *Wuchereria bancrofti, Brugia malayi*, and *Brugia timori.* All of these species are found in Indonesia, but more than 70% of cases of filariasis in Indonesia caused by *Brugia malayi*. The worms live in the lymph nodes and channels, causing damage to the lymphatic system, which can cause acute and chronic symptoms. Acute symptoms such as recurrent fever and inflammation of lymph nodes and channels (adenolimfangitis) especially in the groin area and armpit, but can also be in other areas. Chronic symptoms caused by blockage of lymph flow, especially in the same area with inflammation and cause symptoms such as elephantiasis, breast augmentation and hidrokel. [1-4,18-21,23]

Filariasis, especially the chronic symptoms is a major cause of disability, social stigma, psychosocial barriers that persist and decreased work productivity of individuals, families and communities, causing huge economic losses. The results of the study together with the Department of Health School of Public Health, University of Indonesia (FKM-UI) in 2000, showed that the cost required by a patient with elephantiasis per year is about 17.8% of all household expenditures, or 32.3% of the cost for a meal . Thus, the patient will be borne by the family and the state.[1,2,4,12,15]

Since 2002, Indonesia has conducted programs to eradicate elephantiasis disease in endemic areas. However, because of the vast area of endemic and limited funds and facilities, there is much that can be done to reduce the morbidity and disability caused by the disease. With the development of science, in 1994 the World Health Organization (WHO) has declared that the filariasis can be eliminated. In 1997 the World Health Assembly made a resolution on the elimination of elephantiasis and in 2000 the WHO has set a global commitment to eliminate elephantiasis ("The Global Goal of Elimination of Lymphatic Filariasis as a Public Health Problem by theYear 2020").[1,2,4,12,15]

National Program for the Elimination of elephantiasis and Action Plan of 2002-2006 has been arranged and approved by WHO to be implemented gradually. Launching the start of the elimination of filariasis in Indonesia nationwide was conducted on 8 April 2002 in Mainan village of Banyuasin III district of Musi Banyuasin regent, South Sumatera Province by the Ministry of Health of the Republic of Indonesia, and is one of the priority programs. [1,2,5-7,24]

As we know the chain of transmission of filariasis occurs when there are three elements, namely: 1). Source of infection, human blood containing microfilariae 2). Vectors, namely mosquitoes and 3). Humans are susceptible.

In terms of environmental factors supporting a very influential factor is:

1. The physical environment (such as water or a puddle of water, basic water, water surface area, water depth, water flow, water clarity and illumination).
2. Biological Environment (presence of water plants as mosquito breeding place of *Mansonia spp*).
3. Social, economic and cultural (behavior, culture and traditions of the population, occupation, habbits).

Filariasis is still a public health problem in the District Banyuasin seen from the number of patients with chronic filariasis is not reduced, there is even a tendency to increase, although efforts have been made to the treatment of patients with filariasis.[3,11,13,15-17]

Based on the existing theory, the existence of the swamp as the physical and biological environment of the mosquito breeding places of mosquitoes as one of the chain of transmission of filariasis. The existence of a swamp in an area must be accompanied by measures to ensure that it does not become a swamp area where mosquito breeding is the vector of transmission of filariasis. In this case the presence of aquatic plants such as water hyacinth (*Eichornia crassipes*) can cause a breeding ground for mosquitoes as vectors transmitting. In addition, people's behavior as well as socio-economic conditions is also an important factor that contributes to the clinical filariasis cases, including medication adherence rate of filariasis for people who are already infected.[3,11,13,15,16]

Materials and Methods

This research used a case-control study approach. The method that were used are as follows :

1. Bivariate analysis, was used to determine the relationship and the risk (odds ratio / OR) with a free variable bound individually by using chi square test.
2. Multivariate analysis, was used to determine the effect of exposure together of several factors that influence the incidence of clinical filariasis. The statistical test used is by using logistic regression.

The population of this research consisted of all of the case of filariasis in Banyuasin district in 2012. The cases of these research and the control were 132 respondent by ratio of cases and the control were 1 : 1. Blood finger examination in the night was conducted to choose the respondent whom will be choosen as a control. The data was taken by observation and interview. After collect the data, it was analyzed by using chi square test and logistic regression.

Results

Bivariate analysis by chi-square test from 6 variable showed as follows:

The existence of Water Puddle (Swamp/Pool)

Based on the results of the study in accordance with the statistical analysis showed that there was a connection between the existing pool of water around the house on the incidence of filariasis, as shown in Table 8, where p value = 0.004

Risk Factors of Education

Based on the research level of education in the Banyuasin district well on bivariate analysis

(p value = 0.034) and after multivariate logistic regression analysis (p value = 0.021), showed a significant correlation to the incidence of filariasis.

Risk Factors of Knowledge Level

Based on the results empirically on the level of knowledge, especially about the symptoms, transmission, prevention and treatment of filariasis in Banyuasin district is known that there is a significant relationship between the level of knowledge-respondents to the incidence of filariasis, which gained p value = 0.003.

According to the multivariate analysis try to predict the incidence of filariasis opportunity to sample based on all respondents who have a relationship with the incidence of filariasis as shown in Table 7 were the existence of water puddle, education of the respondent and level of knowledge through the calculation of binary logistic regression. Based on the logistic regretion analytic toward the three potential variable, as like the table in fact the three variables above are risk factor of filariasis incidence in Banyuasin distric of South Sumatera in 2013 (p value $\leq$ 0,05).

Discussion

The existence of Water Puddle (Swamp/Pool).

Based on the results of the study in accordance with the statistical analysis showed that there was a connection between the existing pool of water around the house on the incidence of filariasis, as shown in Table 8, where p value = 0.004. These results are consistent with research conducted by Mulyono, *et al* (2008) on "Risk Factors of Environmental and Behavioral Related to Incidence of Filariasis (Case studies in Pekalongan)[8], that the existence of water puddle as a risk factor for the disease of filariasis (p value = 0.032).

The presence of water puddle (swamp or pool) is a potential breeding for mosquitoes (breeding places) and where mosquitoes rest (resting pleces) as a vector-borne filariasis. Stagnant water is one of the physical environmental factors to trigger the transmission of filariasis, because it can create mosquitoes breeding sites and resting. Swamp or pool is where mosquitoes density is higher than the other breeding places for example canned or forrmer bootle flooded by water.

From the explanations above, the researchers concluded that the presence of either a pool or swamp, is one of the chain of transmission of the filariasis. And to prevent the filariasis, it is necessary to do the actions or efforts of hygiene, such as reclamation of swamp forests into plantations. This action will affect the existence of the monkey (*Macaca fascicularis*) or langur (*Presbytis cristatus*) as an important hospes for the disease transmission of filariasis. In addition to eliminating the swamp, this action will also boost the economy of the surrounding communities. It is also necessary to regulate irrigation well in the field so it will not to be breeding places for the vector of mosquitoes.

Risk Factors of Education

Based on the research level of education in the Banyuasin district well on bivariate analysis (p value = 0.034) and after multivariate logistic regression analysis (p value = 0.021), showed a significant correlation to the incidence of filariasis. These results contrast with research conducted by Mulyono, *et al* (2008) which states there is no relationship between the incidence of filariasis education variable (p value = 0.61), as well as research conducted by Nasrin (2008) with a p value = 0.059 and OR = 2.647.

Actually, according to the theory that there is no mention that the level of education has no direct effect on the incidence of filariasis., But in general, the level of education will affect to the type of occupation and a person's health behavior. Does not mean that person who have low level of education will be exposed to the disease. Likewise, people who are highly educated will not be affected by the disease of filariasis. A scholar who did not understand about filariasis would be different with a health cadre with low education but is equipped with the knowledge associated with the disease.

According to researcher education levels accompanied with a good understanding of the disease about filariasis will effect on the incidence of filariasis. As already mentioned above that a person whose education is low, but when accompanied by a good understanding of the disease about filariasis will not infected the disease of elephantiasis (filariasis). This is consistent with the concept of health education that the education is a process of learning to individuals, groups or communities of not knowing about the health values become aware, of not being able to overcome his own health problems be capable of.

Risk Factors of Knowledge Level

Based on the results empirically on the level of knowledge, especially about the symptoms, transmission, prevention and treatment of filariasis in Banyuasin district is known that there is a significant relationship between the level of knowledge-respondents to the incidence of filariasis, which gained p value = 0.003 in the bivariate analysis, also the results multivariate analysis, in which the p-value = 0.001 valuenya.

These results are consistent with research conducted by Nasrin (2008), that there is a relationship between respondents' awareness of the symptoms of filariasis with the incidence of filariasis, in which the p-value = 0.006. As same as the research conducted by Rahayu, *et al* (2008) on "Factors associated with the transmission of filariasis in the community health center of Lasung in Kusan Hilir Village of Tanah Bambu district of South Kalimantan province" which states that there is a relationship between knowledge with the incidence of filariasis, p value = 0.019.

Knowledge is the result of the idea and this occurs after someone is doing the sensing of a particular object. Knowledge is essential to shape the attitudes and actions of a person. Most of the respondents, based on the results of interviews conducted by the researchers stated that they basically do not know well about the causes and symptoms of filariasis especially. From interviews with the case group, stated that they knew that they were suffering from filariasis (elephantiasis) after coming into places of health services, such as health centers, doctors, nurses or midwives in which they live. In general, people come already in an advanced stage, to cause permanent disabilities. Yet if this filariasis known earlier (acute stage), then the

persistent defects can be avoided. Thus, the level of knowledge of the community, including health care workers who are on the front line (nurses, midwives, physicians, and health cadres) needs to be improved and are always geared up to be more observant in detecting cases of filariasis in the early stages, so it does not get in on chronic stage can cause permanent disabilities. Therefore, the level of knowledge on anything in this disease will affect the incidence of filariasis, and vice versa.

Conclusion

From the analysis and discussion, it can be taken some conclusions as follows:

1. The variables are the risk factors on the incidence of filariasis (elephantiasis) in the district of South Sumatra province Banyuasin, namely:

   a. Risk Factor of the existence of Water Puddle (Swamp/Pool).. The risk factor for the incidence of filariasis with p value = 0.004 ($p < 0.05$).

   b. Risk Factors of Education. The risk factor for the incidence of filariasis with p value = 0.034) and after multivariate logistic regression analysis p value = 0.021 ($p < 0.05$).

   c. Risk Factors of Knowledge Level.

      The risk factor for the incidence of filariasis with p value = 0.003 ($p < 0.05$).

2. The variables that are not related and is not a risk factor for the incidence of filariasis (elephantiasis) in Banyuasin district of South Sumatra province were the existance of water plants, risk factor of the occupation and the income of the respondent.

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References

1. Ansyari. Risk factor of filariasis occurance in Tanjung Bayur Village of Pontianak , 2004.
2. Chandra G, Paramanik M, MondL SK and Ghosh AK. Comparative studies of different indices related to filarial vector of rural and an urban area of West Bengal India, *J Tropical Medicine & Surgery*. 2013; 1(1): 1-6.
3. Chin, J. *Mannual of Destroying Infectious Disease.*17th ed. Ed: Kandun IN. Jakarta, CV: Infomedika; 2006.
4. Departement of Health of Indonesia. *Guidence of Filariasis Elimination Program in Indonesia*. Jakarta, Departement of PP & PL; 2006.

5. Gordis L. *Case Control and Cross Sectional Studies in Epidemiologi, 2nd ed*. Philadelpia, W.B. Saunders Company; 2000:140-156.
6. Juriastuti P, Kartika , Djaja M, and Susanna D. Risk factors of filariasis occurance in Jati Sampurna Village. *J Makara Kesehatan*. 2010; 14(1): 31-6.
7. Lameshow S, Hosmers J, Klar J, and Lawanga SK. *Sampel size in health research*. Transleted by Pramono. Yogyakarta, Gajah Mada University Press, 1997.
8. Maharani A, Febrianto B, Sapto P, and Widiarti. *Study of risk factors of filariasis in Sambirejo Village in Pekalongan distric of Central Java.* Rinbinkes*;* BPVRP Salatiga; 2006.
9. Mulyono RA, Hadisaputro S, and Wartomo H. Risk factors of environment and behavioral related to incidence of filariasis in Pekalongan Area. *J Bina Sanitasi*.2008; 1: 1-10.
10. Nasrin. Relationship between environtmen and behavioral factors with the incidence of filariasis in West Bangka district Thesis. Semarang; Diponegoro University; 2008.
11. Notoatmodjo S. *Metodology of Health Research,* Jakarta, PT: Rineka Cipta, 2005.
12. Rahayu N, Soeyoko, and Sumarni S. The factors related to the incidence of filariasis in Lasung Community Health Center of Kusan Hilir Villlage of Tanah Bambu Distric of South Kalimantan Province. *J Kesehatan Masyarakat*. 2009; 2(3): 133–193.
13. Soedarto. *Infectious Disease in Indonesia*. Jakarta, CV: Widya Medika, 1990.
14. Sugiarto. *Tehnic of Sampling,* Jakarta, PT: Gramedia Pustaka Utama, 2003.
15. Wahyono TYM. Epidemiology of Filariasis in Indonesia*, J Epidemiologi Filariasis*. 2010; 1: 39-47.
16. WHO. *Lymphatic filariasis: the disease and its control. 5th report of the WHO expert committe on filariasis.*Geneva, 1992.
17. Eigege A, Kal A, Miri E, et al. Long-lasting insecticidal nets are synergistic with mass drug administration for interruption of lymphatic filariasis transmission in Nigeria. *J PLOS Neglected Tropical Diseases.* 2013; 7 (10): 1-4.
18. Kumari AK, Yuvaraj J, and L.K Das. Issues in Delivering Morbidity Management for Lympatic Filariasis Elimination: A Study in Pondicherry, South India. *J the Scientific*. 2012; 10: 1-6.
19. Molyneux D. Lymphatic filariasis (elephantiasis) elimination: a public health success and Development Opportunity. *J Filaria.* 2003; 2(13): 1-6.
20. Nwoke BEB, Nwoke EA, Ukaga CN and Nwachukwu. Epidemiological characteristics of bancroftian filariasis and the Negerian Environment. *J Public Health and Epidemiology*. 2010; 2(6): 113-117.
21. Pattanshetty S, Kumar A, Rao CR, et al. Mass drug administration to eliminate lympatic Filariasis in Sounthern India. *J AMJ*. 2010; 3(13): 847-850.
22. Ramakrishna U, Rao, Kumara C, et al. A comprehensive assessment of lymphatic filariasis in Sri Langka Six Years after cessation of mass drug administration, *J PLOS Neglected Tropical Diseases*. 2014; 8(1): 1-11.
23. Sharma A, and Kasar PK. Coverage and complience of mass drug administration for elimination of lymphatic filariasis in endemic areas of Sagar and Damoh Districts, Madhya Pradesh, National. *J Community Medicine*. 2013; 4(4): 653-657.
24. Sodahlon YK, Dorkenoo AM, Morgah K, et al. Succes story: Togo is moving toward becoming the first Sub-Saharan African Nation to eliminate lymphatic filariasis through mass drug administration and countrywide morbidity alleviation. *J PLOS Negleted Tropical Diseases*. 2013;7(4): 1-8.

Table 1: Relationship between the existance of water puddle (swamp/pool) with filariasis occurance

Existance of Water Puddle	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Exist	60	90,9	46	69,7	106	80,3		
Not Exist	6	9,1	20	30,3	26	19,7	0,004	4,348
Total	66	100	66	100	132	100		

Confidence Interval (CI) = 1,616 – 11,700

Table 2: Relationship between the existance of water plants with filariasis occurance

Existance of Water Plants	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Exist	48	72,7	47	71,2	95	72,0		
Not Exist	18	27,3	19	28,8	37	28,0	1,000	1,078
Total	66	100	66	100	132	100		

Confidence Interval (CI) = 0,504 – 2,305

Table 3: Relationship between occupation with filariasis occurance

Occupation	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Risk	58	87,9	54	81,8	112	84,8		
Not Risk	8	12,1	12	18,2	20	15,2	0,466	1,611
Totall	66	100	66	100	132	100		

Confidence Interval (CI) = 0,612 – 4,243

Table 4: Relationship between education with filariasis occurance

Education	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Low	64	97,0	56	84,8	120	90,9	0,034	5,714
High	2	3,0	10	15,2	12	9,1		
Total	66	100	66	100	132	100		

Confidence Interval (CI) = 1,201 – 27,192

Table 5: Relationship between income with filariasis occurance

Income	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Low (< Province Minimum Reward)	30	45,5	25	37,9	55	41,7		
High (≥ Province Minimum Reward)	36	54,5	41	62,1	77	58,3	0,480	1,367
Total	66	100	66	100	132	100		

Confidence Interval (CI) = 0,683 – 2,737

Table 6: Relationship between the level of knowledge with filariasis occurance

Level of Knowledge	Filariasis Occurance				Total	%	*p value*	*OR*
	Cases		Control					
	n	%	n	%				
Good	21	31,8	6	9,1	27	20,5		
Less	45	68,2	60	90,9	105	79,5	0,003	4,667
Total	66	100	66	100	132	100		

Confidence Interval (CI) = 1,741 – 12,511

Table 7: Recapitulation of significant variable with filariasis occurance in Banyuasin district of South Sumatera

No	Variable	*p value*	*OR*	95% *CI*
1	Existance of Water Puddle (Swamp/Pool)	0,004	4,348	1,616 - 11,700
2	Education	0,034	5,714	1,201 - 27,192
3	Level of Knowledge	0,003	4,667	1,741 - 12,551

Table 8: The result of analysis of potential variable with binary logistic regression with filariasis occurance at Banyuasin district in 2013

Variable	Coefisient	S.D.	Wald	df	*p*	Exp (B)
Existance of Water Puddle	-1.448	.671	4.656	1	.031	.235
Education	-2.352	1.019	5.324	1	.021	.095
Level of Knowledge	-2.382	.716	11.061	1	.001	.092
Constant	8.476	1.882	20.294	1	.000	4.800E3