



Risk Factors of Filariasis in Brebes Regency

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Abstract

Filariasis or elephantiasis is an infectious disease affecting lymph nodes (lymph nodes) caused by filarial worms and transmitted by various species of mosquitoes. Brebes Regency is an area with the highest cases of Filariasis in Central Java Province. The number of cases of Filariasis until 2018 there were 65 patients. In addition, the discovery of new cases in the past two years has increased exactly in 2018 by 5 cases to 8 cases in 2019. The purpose of the study was to analyze the risk factors for the incidence of filariasis in Brebes Regency. This study used a case control design. The population consists of all people whose blood samples have been examined through a finger blood examination and recorded at the health center and Brebes District Health Office. The sample consisted of 32 patients with filariasis and 32 not sufferers of filariasis with the Purposive Sampling technique. The instruments used questionnaire and observation sheets. Data analysis used Chi-squared test and logistic regression test. The analysis shows that there is a correlation between resting place ($p=0.000$), breeding place ($p=0.000$), wire netting ($p=0.002$), the presence of livestock ($p=0.015$), knowledge ($p=0.001$), occupation ($p=0.000$), behaviour ($p=0.024$), and economic status ($p=0.024$) with the incidence of filariasis. The most dominant risk factors for obesity are work, resting place, and breeding place. The existence of a resting place and breeding place can increase the risk of filariasis so efforts are needed to maintain a clean and healthy environment.

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INTRODUCTION

Filariasis disease or often called elephantiasis is an infectious disease affecting the lymph nodes (lymph nodes) caused by filarial worms and transmitted by various species of mosquitoes (Zulkoni, 2011). Worms live in lymph nodes and channels, causing damage to the lymphatic system which can cause acute and chronic symptoms. This disease attacks all ages is chronic and permanent disability in the form of enlarged legs, arms, breasts, and genitals in women and men (Mutiar, 2016).

In Indonesia, there are 3 types of parasitic nematodes that cause lymphatic filariasis in humans, namely *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori* (Fatie *et al.*, 2016). This parasite is spread throughout the Indonesian archipelago by various species of mosquitoes belonging to the genus *Aedes*, *Anopheles*, *Culex*, and *Mansonia* which can act as vectors (Nurjazuli *et al.*, 2018).

Facts shown by the World Health Organization (WHO) in 2016 stated that 1.5 billion of the world's population living in 83 countries are at risk of contracting filariasis, with around 40 million experiencing physical disabilities and limitations in their activities. The total population at risk of filariasis in the world around 65% of them are in Southeast Asia, with Indonesia being the country with the highest cases.

Filariasis cases in Indonesia have increased respectively since 2012 to 2014, from the number of 12,714 cases to 14,932 divided in 34 provinces. However, in 2015 it had decreased to 13,032 cases which were divided in 29 provinces with an average prevalence of 4.7%. The decrease in the number of cases could be due to the difference in the number of provinces. The province with the highest cases was East Nusa Tenggara, with as many as 2,864 cases (Sarungyulius *et al.*, 2012).

According to the 2017 Indonesian Health Profile Report, Central Java is one of the Endemic Filariasis Provinces that has not succeeded in reducing the number of microfilaria to <1% and is still a province that is not free from filariasis elimination even though the scope of POPM implementation has reached 9 districts.

In 2015, the number of cases of filariasis in the province of Central Java was 508 cases (Sarungyulius *et al.*, 2012). Filariasis case finding in Central Java has increased every year. In 2014 there were 15 new cases of filariasis. Then in 2015 it increased to 22 cases. In 2016 there were 34 new cases discovered. In 2017 there were 36 new cases of filariasis found. Filariasis case finding in Central Java in 2013 - 2017 is found in 9 regencies / cities, Brebes Regency, Semarang City, Pekalongan City, Pekalongan Regency, Pati Regency, Demak Regency, Blora Regency, Wonosobo Regency, and Grobogan Regency.

Brebes Regency is the region with the highest case of Filariasis in Central Java Province. The cumulative total of Filariasis cases until 2018 there were 65 patients. In addition, the discovery of new cases in the past two years has increased in 2018 by 5 cases to 8 cases in 2019. The highest contributor to the number of cases is in the working area of the Ketanggungan Health Center, which is the endemic area of the Filariasis case for Brebes Regency (Brebes Regency Health Office, 2018).

Filariasis is caused by filarial worms carried by vectors, mosquitoes of the genus *Mansonia*, *Culex*, *Anopheles*, *Aedes*, and *Armigeres*. While filariasis transmission factors, environmental factors which include: physical environment; biological environment; and social, economic and cultural environment. Apart from environmental factors are host factors (human), which include: age; gender; immunity; and race. Factors included in socioeconomic factors for the occurrence of filariasis include work, knowledge, income, habits out of the house, using mosquito coils, habits using mosquito nets, and using closed clothes. Research conducted by Ibrahim Edy Sapada in 2017 said that there was a socioeconomic relationship with the incidence of filariasis in Kanyuasin District, Ilir City (Sapada *et al.*, 2014).

Another factor that influences the incidence of filariasis is environmental factors. Most of the environment in Brebes Regency is onion farming, which is the largest producer of shallots in Central Java. The area of shallot agriculture in Brebes Regency is 30,954 hectares or 309.54 km² (BPS

Brebes Regency, 2019b). The area of shallot farmland is one third of the area of Brebes Regency (1,662.96 km²). Shallot field is an agricultural land which is characterized by the presence of puddles between the onion plants which can be a vector breeding environment. Apart from onion agriculture, Brebes Regency has 998.65 km² of paddy fields. This rice field is a wet agricultural land with a pool of water which of course can also be a vector breeding facility (BPS Brebes Regency, 2019a).

The physical condition of the home environment can affect the incidence of filariasis, including the type of wall of the house, the installation of wire mesh on each ventilation of the house, and the condition of the house floor. Based on the study in India, houses with tile / ceramic floors have a risk of 1.6 times higher against filariasis (Mutheneni et al., 2016). The presence of wire mesh in each vent is important because it can prevent mosquitoes from entering the house. According to Purnama (2017) almost every house does not install gauze on the ventilation of his house, so that it can be at risk for contracting filariasis (Purnama et al., 2017). The same thing was found by Juriastuti (2010) in which the presence of wire mesh was related to the incidence of filariasis (Juriastuti et al., 2010).

Other environmental factors that can affect filariasis are the existence of larvae and fish-eating animals, which are included in biological environmental factors. The existence of various types of mosquito larvae-eating fish will affect the mosquito population in an area. In addition, the presence of large livestock such as cattle, buffaloes and pigs can reduce the number of mosquito bites in humans, if the cattle are kept not far from home (Wu Y, Preston G, 2008).

Subsequent filariasis transmission factors are socioeconomic factors. Based on the area of agricultural land in Brebes Regency, the majority of occupation is farmers. The population working in the agricultural sector amounted to 317,438 people from the total population employed by 767,841 people. Apart from farmers, the majority of the population of Brebes Regency are free workers, totaling 180,948 people (BPS Brebes Regency, 2017). According to the type of occupation of the population, in 2017 the poverty

rate in Brebes Regency was 19.14%. This figure is still considered high because it is far above the average of Central Java Province, which is 12.23% (BPS Brebes Regency, 2019a).

Other factors that can influence the spread of filariasis include population mobility. Research conducted by Ikhwan et al in 2016 found that population mobility from endemic areas of filariasis to other regions or vice versa had a greater effect of 1.381 on the incidence of filariasis, this has the potential to be a medium for the spread of filariasis between regions (Ikhwan et al., 2016).

Following up on the high filariasis case, the government has carried out a prevention and eradication program. The role of government in the prevention and eradication of filariasis is to break the chain of transmission and provide services in the form of treatment and care for sufferers to prevent secondary infections and reduce the frequency of acute attacks (Nasrin, 2008)

Impacts that can arise due to someone experiencing filariasis include depression. This psychological disorder can arise because sufferers feel their self-esteem has fallen which then makes life satisfaction levels become low (Obindo et al., 2017). Filariasis is a chronic infectious disease. In addition, the incidence of post-treatment follow-up filariasis is a symptom that arises due to the reaction of an individual's immunity to filarial worms that die and symptoms that arise due to side effects of Filariasis drugs after POPM Filariasis or treatment of sufferers of filariasis (Ministry of Health, Republic of Indonesia, 2014). Thus, appropriate precautions are needed in accordance with the factors for each endemic area.

According to several studies, the incidence factors of filariasis include resting places, breeding places, the presence of house walls, wire mesh installation, the presence of fish, the presence of livestock, level of education, level of knowledge, occupation, economic status, and behavior. Resting place is a place where mosquitoes rest, while breeding places are breeding places for mosquitoes. The impact of filariasis in the form of permanent disability decreases the work productivity of individuals, families and

communities and causes social stigma in the community. Therefore it is necessary to conduct a study related to the identification of socioeconomic factors that influence the incidence of the spread of filariasis cases in Brebes Regency as one of the districts that is not yet free of filariasis, where each year accounts for the number of cases of filariasis that causes the prevalence of cases to continue to increase. The aim of the study is to analyze risk factors the incidence of filariasis in Brebes Regency.

METHOD

This research is a quantitative study using case control design. The population in this study is all of the people who have had blood samples examined through a finger blood examination and registered at the health center and Brebes District Health Office selected using the Purposive Sampling technique. The minimum number of samples obtained as many as 32 patients with filariasis (case group) and not 32 patients with

filariasis (control group). The inclusion criterion for the case group was to be a respondent and the patient listed as a patient who performed a finger blood (SDJ) examination at the health center or Brebes District health office. The inclusion criteria of the control group were willing to be respondents, stated negative finger blood examination (SDJ) at the health center or Brebes District Health Office showed no clinical symptoms of filariasis did not live with the case group came from the same village as the case group respondents domiciled in Brebes Regency has a minimum of 3 years, has the possibility of being exposed to the same risk factors as the case group and has the same characteristics as the case group respondents (max age difference ± 1 year). Exclusion criteria were the respondent died and children and adolescents aged under 17 years. Data analysis using the Chi-square test, and logistic regression test. Data processing using the SPSS v.20 application.

RESULTS AND DISCUSSION

Table 1. Bivariate analysis by group (n=64)

Nutrient	Category	Group		<i>p-value</i> *	OR	IK 95%	
		Conrol	Case			Min	Max
Resting place	There is no	22	1	0.000	68.200	8.129	572.176
	There is	10	31				
Breeding place	There is no	19	1	0.000	45.308	5.479	374.680
	There is	13	31				
Home wall type	Concrete	31	29	0.606			
	Timber	1	3				
Gauge wire installation	Installed	15	3	0.002	8.529	2.153	33.788
	Not Installed	17	29				
The existence of farm animals	There is no	15	5	0.015	4.765	1.464	15.508
	There is	17	27				
Knowledge	Good	17	4	0.001	7.933	2.257	27.880
	Less	15	28				
Education	Intermediate	7	4	0.508			
	Basic	25	28				
Profession	No risk	19	3	0.000	14.128	3.546	56.285
	Risk	13	29				
Behavior	Good	13	4	0.024	4.789	1.354	16.936

	Less	19	28				
Economi	Adequate	13	4	0.024	4.789	1.354	16.936
status	Kurang	19	28				

*Chi-square

Based on the results of the Chi-square test analysis, factors related to the incidence of filariasis include resting places, breeding places, wire mesh installation, the presence of livestock, knowledge, occupation, behavior and economic status (p -value < 0.05). As for the factor of the type of house walls and education, statistically did not relate to the incidence of filariasis (p -value > 0.05).

Resting place has an important role in the life cycle of mosquitoes. Mosquito resting places around the house can increase the risk of filariasis transmission. According to the results of the study, resting place is the correlation between resting place and the incidence of filariasis in Brebes Regency (p -value 0.000). This result is supported by the existence of a resting place in most of the case group and control group respondents' home environments. The discovery of places included in the resting place include hanging clothes, dark corners and under beds.

The results of this study are consistent with the study by Ardias (2012). Ardias (2012) found that there was a significant correlation between the resting place and the incidence of filariasis (p value = 0.006) (Ardias et al., 2012). Places that can be categorized as resting places one of which is the hanging clothes. According to Juriastuti (2010), it was found that the existence of dependent goods had a significant relationship with the incidence of filariasis (Juriastuti et al., 2010).

The existence of breeding place can affect the risk of transmission of filariasis. Based on the results of the study, breeding places have a correlation with the incidence of filariasis (p -value 0.000). Most of the breeding place findings include water in a sewer / gutter that does not flow and is dirty around the respondent's home environment. In addition, the existence of large rice fields can also be a breeding place for mosquitoes.

This study is in line with several previous studies which found that there is a correlation between mosquito breeding places, especially the

presence of swamps and the incidence of filariasis (Amelia, 2014; Sapada et al., 2015). In addition, research by Wulandhari (2017) found that many filariasis incidents were found in places with bushes in the environment around the house (Wulandhari & Pawenang, 2017).

The wall type of a house can affect the transmission of filariasis in terms of the raw materials used. If the raw material used is concrete, it can reduce the sidelines or holes that can be used by mosquitoes to enter the house. Meanwhile, if the raw material used to make a house wall is wood, it can increase the risk of mosquitoes entering the house through the sidelines or holes (Chesnais et al., 2014).

The analysis results get a p value of 0.606, which can be concluded that there is no correlation between types. Based on the findings, the results of this study are in accordance with research by Juriastuti (2010), who found that there was no correlation between wall construction and the incidence of filariasis (Juriastuti et al. ., 2010). This finding could be because the majority of respondents tend to have a type of concrete wall in their house, so statistically the type of wall of the house is not much related to the incidence of filariasis.

Installation of wire mesh on the vents will cause less contact with mosquitoes outside the home with the occupants of the house where mosquitoes cannot enter the house. The analysis results get a p value of 0.002, so that H_0 is rejected and H_a is accepted. It can be concluded that there is a significant correlation between wire mesh installation and the incidence of filariasis. Installation of wire mesh has a correlation with the incidence of filariasis due to the presence of wire mesh in each ventilation of the house minimizing the vector entering the house. Most of the respondents did not install wire netting in their homes especially in the homes of respondents suffering from filariasis. Therefore, it is most likely that vectors can enter the house to transmit filarial worms to the human body.

These findings are consistent with previous study that there is a correlation between the presence of wire mesh with the incidence of filariasis (Juriastuti et al., 2010). In addition, according to the research of Sapada et al. the use of gauze in ventilation can reduce contact between *Anopheles* mosquitoes and humans (Sapada et al., 2014).

Chi-square analysis showed that there was a significant correlation between the presence of livestock and the incidence of filariasis (p value = 0.015). The results of this analysis are because there are still many respondents who have livestock not far from home. Therefore, the existence of livestock can help be a shield in the attack of mosquito bites on humans. The presence of livestock can help to be a shield against mosquito bites against humans. With the presence of livestock, it is hoped that mosquitoes would prefer to bite cattle compared to humans. This is supported if the animal is kept in a cage not far from home (Wu Y, Preston G, 2008).

It is different with the some previous studies which found that there is no correlation between the presence of livestock with the incidence of filariasis (Sularno et al., 2017; Syuhada et al., 2012). The difference between these findings is partly because most respondents from previous studies did not have livestock, so there is no statistical correlation between the presence of livestock and the incidence of filariasis.

According to the results of the bivariate analysis between knowledge and the incidence of filariasis, the value of $p = 0.001$. Based on these results, then H_0 is rejected and H_a is accepted, it can be concluded that there is a significant correlation between knowledge and the incidence of filariasis. Knowledge can influence the prevention of filariasis transmission. Based on the results of the study it was found that the majority of respondents had poor knowledge about filariasis. The limited knowledge of respondents can be due to the community who still neglect about the health status and cleanliness of the surrounding environment. In addition, it is also found that people tend to have low education. This situation then becomes the cause that the

knowledge factor is related to the incidence of filariasis.

Knowledge can influence the prevention of filariasis transmission. This can happen because with good knowledge, it can lead to good behavior as well. However, previous research found that there was no relationship between knowledge and the incidence of filariasis (Garjito et al., 2013; Sularno et al., 2017). This difference arises because of differences in the findings in the study. Several previous studies found that most respondents already knew about filariasis. This contrasts with the results in this study which found that most respondents still did not know about filariasis.

Education, indirectly has a relationship with the incidence of filariasis. From education then knowledge will be obtained which will then influence attitudes and then shape behavior. In addition, in his research Fatie found that education was related to the incidence of filariasis (Fatie et al., 2016).

The results of the analysis using the Chi-square test showed that p value = 0.508. These results prove that H_0 was accepted and H_a was rejected so it can be concluded that there is no correlation between education and the incidence of filariasis in Brebes Regency. However, the results of this study are in harmony with research by Hamdan (2019) in Pekalongan City. Hamdan (2019) found that low levels of education had no relationship with the incidence of filariasis (Hamdan et al., 2019).

However, the results of this study differ from the findings by Sapada (2015) that education is a risk factor for filariasis. The risk of education in filariasis is 5,714 times (Sapada et al., 2015). These findings have differences can be due to the level of education of the respondents in this study are mostly low and there is no variation so that statistically unrelated.

Work can be one of the factors that influence the incidence of filariasis. Types of work that are at risk include farmers, or those who require activities outside the home at night. The analysis shows that p value = 0,000, which can be concluded that there is a significant relationship between work and the incidence of filariasis.

Most respondents claimed that before suffering from filariasis, they had a job as an onion farm laborer where most of the activities were in the paddy fields with lots of standing water and activities at night. From the activities in carrying out this work it can cause a relationship between work and the incidence of filariasis. In addition, the results of this study are in accordance with previous studies that there is a relationship between work at night with the incidence of filariasis (Windiastruti et al., 2013).

Behavior can affect exposure to a disease and disease-carrying vector. In addition, behavior has a relationship with the incidence of filariasis (Ibrahim, 2016). Behaviors that can be related to the incidence of filariasis include: the habit of going out at night; usage of mosquito nets; and the use of anti-mosquito drugs. The results of the analysis showed that there was a relationship between behavior and the incidence of filariasis (p value = 0.024). The results found that the people of Brebes Regency tend to have the habit of going out at night. In addition, almost all respondents in this study did not use mosquito nets while sleeping. From this behavior, it can increase the risk of filariasis transmission. Vectors will be easier to bite if there is no self-protection. In addition, with the presence of unfavorable behavior, it can also provide a greater risk of the incidence of filariasis.

Based on the results of the study that has been done, has a similarity with study conducted by Juriastuti (2010). In his study found that there is a relationship between behavior and the incidence of filariasis (Juriastuti et al., 2010). In addition, the habit of going out at night also has a relationship with the incidence of filariasis

(Garjito et al., 2013; Windiastruti et al., 2013). The use of anti-mosquito drugs is one aspect of behavior that is assessed. According to some previous studies found that the use of anti-mosquito drugs is associated with the incidence of filariasis (Garjito et al., 2013; Syuhada et al., 2012). In addition, the behavior of hanging dirty clothes can also be a risk of filariasis transmission (Siwiendrayanti et al., 2016). This finding is in line with the results of the study which found that almost all of the respondents' homes had dirty clothes hanging.

The results of the analysis showed that the p value was 0.024, so H_0 was rejected and H_a was accepted. It can be concluded that there is a relationship between economic status and the incidence of filariasis. The economic status of the people of Brebes Regency tends to be weak. Most have low family incomes. The income from which has been obtained is mostly used for primary needs such as food, clothing and shelter needs, educational needs. There are still some residents who even meet the educational needs of the underprivileged, so that the health needs are still not being met.

The results of this study are supported by previous studies which have similar results. According to Jontari et al. (2014) low economic status causes the purchasing power ability to meet the needs of preventing filariasis risk is also low which causes the possibility of high filariasis transmission (Jontari et al., 2014). In addition, it was also found in India that people with low socio-economic status were more vulnerable to filariasis (Mutheneni et al., 2016).

Table 2. Multivariate analysis of risk factors for filariasis (n=64)

	Coefficient	S.E.	Wald	df	<i>p-value</i>	OR	IK 95%	
							Min	Max
Profession	1.909	0.936	4.161	1	0.041	6.748	1.078	42.254
Resting place	3.239	1.185	7.476	1	0.006	25.515	2.503	260.140
Breeding place	3.042	1.223	6.188	1	0.013	20.956	1.907	230.334
A constanta	-6.152	1.733	12.608	1	0.000	0.002		

Table 2 shows the results of the logistic regression test of risk factors for the incidence of filariasis I in Brebes Regency. The results of

multivariate analysis showed that the risk factors for filariasis in Brebes Regency included work, resting place, dan breeding place.

The work has an OR value of 6.748 (95% CI: 1.078 - 42.254). From these results it can be concluded that work at risk has an effect of 6,748 times greater on the incidence of filariasis compared to work that is not at risk. In addition, someone who has a risky job has a risk of at least 1,078 times and the greatest is 42,254 times the incidence of filariasis compared with someone who has a riskless job.

Most of the people of Brebes Regency have jobs as farmers or farm laborers. In doing their work, they are more in contact with onion paddy fields where there are many puddles or ditches. In addition, they will be more active at night, where vectors will be more active in finding food. Therefore, the people of Brebes Regency who have jobs that are at risk of filariasis transmission will be more at risk of the incidence of filariasis. In addition, the results of this study are in accordance with research by Chesnais et al. which found that farmers had a 2.21 times greater risk of being infected with filariasis (Chesnais et al., 2019).

Another risk factor for filariasis is a resting place around the residence. According to the analysis of the existence of a resting place get an OR value of 25.515 (95% CI: 2.503 - 260.140). Based on the results of the analysis it can be concluded that the existence of a resting place has a risk of 25.515 times greater than the incidence of filariasis compared to the absence of a resting place. In addition, the existence of a resting place has a risk of at least 2,503-fold and as high as a risk of 260,140 times the clay of the incidence of filariasis compared to the absence of a resting place.

The existence of resting places in the Brebes Regency environment is still commonly found. The presence of bushes around people's homes is still commonly found. Besides that, people's behavior on health is still not good. There are still many dirty clothes hanging, so these places can be used as vector resting places. In addition, under the beds and corners of houses that are less clean and dark will attract mosquitoes to stay. Therefore, the resting place has a significant influence on the incidence of filariasis in Brebes Regency.

The results of this study are identical to previous studies which found that the existence of

resting places has a relationship with the incidence of filariasis (Windiastuti et al., 2013). In addition, according to Purnama (2017) in his research also has found that resting places have a relationship and affect the incidence of filariasis in Ketapang, West Kalimantan (Purnama et al., 2017).

Breeding place a place used by mosquitoes to breed. According to the results of the study, it was found that the OR from the existence of breeding place was equal to 20,956 (95% CI: 1,907 - 230,334). From these results, it can be interpreted that the presence of breeding places has a risk of 20,956 times greater than the incidence of filariasis compared to the absence of breeding places. The existence of breeding place has the smallest risk is 1,907 times and the biggest risk is 230,334 times the incidence of filariasis.

Breeding places for mosquitoes are still commonly found in the area of Brebes Regency. The onion paddy fields with their characteristics there are ditches / puddles between shallot plants are one of the breeding places. Stagnant water, ditches / gutters with stagnant water (not flowing) are still commonly found in the Brebes Regency area especially during the dry season which is when the research is conducted. In addition, the existence of a drainage ditch will further increase mosquito's interest in making it a breeding place. In addition, the findings of this study are supported by Windiastuti (2013) which found that the presence of breeding places has a risk of 2.974 times for the transmission of filariasis (Windiastuti et al., 2013).

CONCLUSION

The risk factors for filariasis in the community in Brebes Regency are based on the order of statistical results that have a large influence including the existence of a resting place, a breeding place, and risky work. Therefore, some efforts are needed to minimize the existence of resting places and breeding places. Efforts that can be made include providing knowledge related to a clean and healthy environment. In addition, it needs real efforts from the relevant agencies and health workers and the community to work together to improve environmental conditions so that they are cleaner and healthier.

In addition, the risk factors for work (farmers) will be more difficult to minimize the numbers. Because most of the livelihoods of the people of Brebes Regency are farming. In addition, Brebes Regency is the largest producer of shallots in Central Java Province.

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