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Factors Related to the Existence of *Aedes Aegypti* Larvae in Endemic and Non Endemic Areas in Makassar City

Erniwati Ibrahim¹, Jusnita¹, Syamsuar Manyullei¹, Anwar Mallongi¹

¹Departemen of Environmental Health Department, Faculty of Public Health, Hasanuddin University, Makassar

Abstract

This study aims to determine the factors associated with the presence of *Aedes aegypti* larvae in endemic and nonendemic areas of DHF in Biringkanaya District. The type of research used was observational with cross sectional design and through direct observation. The population is all houses in the Village of Pai and Kelurahan Daya. Determination of the sample was carried out by proportional simple random sampling method in order to obtain a sample of 100 houses each. Data analysis was carried out was univariate and bivariate with chi square test. The results showed that the related variables were the actions of PSN in endemic areas ($p = 0.025$), water temperature ($p = 0.000$), house humidity ($p = 0.000$), container conditions ($p = 0.000$) in endemic areas and ($p = 0.002$) in nonendemic areas. Unrelated variables are knowledge ($p = 0.141$) in endemic areas and ($p = 0.824$) in nonendemic areas. The conclusion of this study is that there is a relationship between PSN action, water temperature, house humidity, and container conditions with the presence of larvae in endemic areas, but there is no relationship between respondents' knowledge in the two regions and the actions of PSN in nonendemic areas.

Keywords: Knowledge, action, humidity, temperature, container conditions

Introduction

Dengue hemorrhagic fever (DHF) or Dengue Hemorrhagic Fever (DHF) is no longer a foreign disease heard in the ears of the community, internationally, nationally or locally, which is still a public health problem. This disease is almost found in all parts of the world, especially in tropical and subtropical countries, both as an endemic and epidemic disease.¹ Currently, Indonesia ranks highest for dengue cases in the Asian Nations Association (ASEAN). In 2016 there were 204,171 DHF cases with a total of 1,598 deaths.² The number of DHF cases in 2016 increased compared to the number of cases in 2015 which was 129,650 cases. The number of deaths due to DHF in 2016 also increased from 2015 (1,071 deaths). Incidence Rate (IR) or the DBD morbidity rate in 2016 also increased from 2015, which was 50.75 to 78.85 per 100,000 population.

However, CFR has decreased from 0.83% in 2015 to 0.78% in 2016.³⁻⁵

Health behavior also determines the level of success in carrying out an activity such as the implementation of prevention or eradication of a source of disease in order to reduce the occurrence of mosquito larvae density.⁶ In the case of DHF, the proper method for preventing DHF is the Eradication of Mosquito Nest (PSN) through 3M Plus (Drain, Cover and Bury) plus larvicide sowing, spreading of fish in water reservoirs and other activities that can prevent or eradicate mosquitoes *Aedes aegypti* breed.⁷

In addition to the factor of clean living behavior, environmental factors are also very influential, especially the physical environment in this case is the temperature, humidity, and condition of the Water Reservoir (TPA). optimum 25-27 ° C, at temperatures below 10 ° C or above 40 ° C growth will stop.⁹ From this description, researchers intend to conduct research on factors related to the presence of *Aedes aegypti* larvae in this case are the characteristics of the physical environment (Temperature, humidity, and the condition of the landfill)

Corresponding Author:

Erniwati Ibrahim

Email : ernikhalid1@gmail.com

as well as community behavior towards PSN in endemic and nonendemic areas of Makassar City DBD.

Materials and Method

This research is an observational analytic study with cross sectional study design. This research was conducted in Pai and Biringkanaya sub-districts with a sample of 100 houses in each kelurahan, because the study sample was taken using proportional simple random sampling technique. The data collection process was carried out using a questionnaire to measure the variables of PSN knowledge and actions, an observation

sheet to measure air temperature, air humidity, and see the condition of containers of each house. Data analysis used the Package for Social Science (SPSS) program with the chi-square test and presented in tabular and narrative form.

Results

1. Relationship Between PSN Knowledge and Larvae Table 1. Correlation of PSN knowledge with the presence of Aedes aegypti larvae in Endemic Region (Pai Village) and nonendemic area (Daya Village) Biringkanaya District Makassar City

Table 1 shows that of the 100 respondents in endemic areas (Kelurahan Pai) dominated by respondents who had a lack of knowledge about PSN and there were larvae in their containers as many as 53.7% and respondents who had sufficient knowledge but there were larvae at 63% .

Subdistrict	Knowledge	Presence larvae				Total		p
		Present		Not Present		n	%	
		n	%	n	%			
Pai (Endemis)	Lack	29	53,7	25	46,3	54	100	0,141
	Enough	17	37,0	29	63,0	46	100	
Daya (Non Endemis)	Less	7	33,3	14	66,7	21	100	0,824
	Enough	22	27,8	57	72,2	79	100	
	Total	75	37,5	125	62,5	200	100	

2. Relationship Between PSN Actions and the Existence of Larvae

Table 2. Relationship between PSN actions with the presence of Aedes aegypti larvae in Endemic Areas (Kelurahan Pai) and nonendemic areas (Kelurahan Daya) Biringkanaya District, Makassar City

Subdistrict	Action	Presence larvae				Total		p
		Present		Present		n	%	
		n	%	n	%			
Pai (Endemis)	Negative	34	55,7	27	44,3	61	100	0,025
	Positive	12	30,8	27	69,2	39	100	
Daya (Non Endemis)	Negative	13	29,5	31	70,5	44	100	1,000
	Positive	16	28,6	40	71,4	56	100	
	Total	75	36,5	125	63,5	200	100	

Table 2 shows that out of 100 respondents in endemic areas (Pai Village) were dominated by respondents who had bad actions and there were larvae in their containers at 55.7%. As for the nonendemic area (Kelurahan Daya) of 100 respondents in the area, it was dominated by respondents who had good actions and there were no larvae at 71.4%. Based on the results of the Chi square test found that the value of $p = 0,025$ for endemic areas and 1,000 for endemic areas.

3. Relationship between Temperature and the Existence of Larvae

The temperature measured in this study is the temperature of the water in each container using a mercury thermometer. Temperatures are classified into two categories: potential and non-potential. Potentially categorized if the average water temperature measured is between 23°C and 27°C and not potential if the average water temperature is $<23^{\circ}\text{C}$ or $>27^{\circ}\text{C}$

Table 3. Relationship between Water Temperature and the presence of *Aedes aegypti* larvae in Endemic Region (Pai Village) and Nonendemic Area (Daya Village) Biringkanaya District Makassar City

Subdistrict	Category	Subdistrict				Total		p
		Subdistrict		Subdistrict		n	%	
		n	%	n	%			
Pai (Endemis)	Potensial	39	81,3	9	18,8	48	100	0,000
	Not Potensial	7	13,5	45	86,5	52	100	
Daya (Endemis)	Potensial	23	51,1	22	48,9	45	100	0,000
	Not Potensial	6	10,9	49	89,1	55	100	
	Total	73	36,5	127	63,5	200	100	

Table 3 shows that out of 100 houses in endemic areas (Pai Village) is dominated by houses with no potential water temperature and no larvae in their containers, which is 86.5%. Whereas in nonendemic areas (Kelurahan Daya) out of 100 houses in the area, there are also houses that have no potential water temperature and no larvae, which is 11%. Based on the Chi square test results it was found that the value of $p = 0,000$ for both regions. This indicates that there is a relationship between water temperature and the presence of *Aedes aegypti* larvae in endemic and nonendemic areas of DHF.

4. Relationship Between Moisture and the Existence of Larvae

Table 4. Relationship between House Humidity and the presence of *Aedes aegypti* larvae in Endemic Areas (Kelurahan Pai) and Nonendemic Areas (Kelurahan Daya) Biringkanaya District, Makassar City

Subsitrict	Category	Presence larvae				Total		p
		Present		Present		n	%	
		n	%	n	%			
Pai (Endemis)	Potensial	41	59,4	28	40,6	69	100	0,000
	Not Potensial	5	16,1	26	83,9	31	100	
Daya (Non Endemis)	Potensial	22	78,6	6	21,4	28	100	0,000
	Not Potensial	7	9,7	65	90,3	72	100	
	Total	75	36,5	125	63,5	200	100	

Table 4 shows that out of 100 houses in endemic areas (Pai Village) is dominated by houses that have potential moisture and there are Larvae in their containers, as many as 59.4%. As for nonendemic areas (Kelurahan Daya) out of 100 houses in the area, houses are dominated by potential humidity and no Larvae,

20 which is 90.3%. Based on the results of the Chi square test it was found that the value of $p = 0,000$ for both regions.

5. Relationship between Container Conditions and the Presence of Larvae

16 Table 5. Relationship between Container Conditions and the presence of *Aedes aegypti* larvae in Endemic Areas (Kelurahan Pai) and Nonendemic Areas (Kelurahan Daya) Biringkanaya District, Makassar City

Subdistrict	Category	Presence larvae				Total		p
		Present		Present		n	%	
		n	%	n	%			
Pai (Endemis)	Open	44	63,8	25	36,2	69	100	0,000
	Close	2	6,5	29	93,5	31	100	
Daya (Non Endemis)	Open	25	41,0	36	59,0	61	100	0,002
	Close	4	10,3	35	89,7	39	100	
	7 Total	75	37,5	125	62,5	200	100	

Table 5 shows that out of 100 houses in endemic areas (Kelurahan Pai) is dominated by houses that have containers in open condition and there are larvae in their containers, which is 63.8%. Whereas in nonendemic areas (Kelurahan Daya) out of 100 houses in the area, dominated by houses that have containers in open condition and no larvae, which is as much as 59.0%.

6 Discussion

The presence of *Aedes aegypti* larvae in an area is an indicator in efforts to control DHF. Monitoring the presence of *Aedes aegypti* larvae by implementing the Periodic larvae examination (PJB) is very important to assist in conducting an evaluation of threats in each city and so that actions to eradicate mosquitoes can be increased. Analysis of the presence of larvae is carried out by observation using a visual method, which is a survey conducted by seeing the presence or absence of larvae in each place of puddles (containers) without making larvae taking.¹⁰

9 For the Knowledge Variable, the results of the study found that of 54 respondents in endemic areas

(Pai Village) who had a category of less knowledge about PSN as much as 53.7% in the container contained larvae and 46.3% which did not have larvae. Whereas for respondents who have sufficient knowledge category there are 46 respondents, of whom 37.0% have larvae and 63.0% of houses have no larvae. As for nonendemic areas (Kelurahan Daya) of the 21 respondents who lacked knowledge, 33.3% were positive for larvae and 66.7% for larvae were not found in their containers. Whereas for respondents who have sufficient knowledge category, namely 79 respondents, 27.8% of them have larvae and 28.2% have no larvae. This indicates that although the respondents who have a sufficiently large level of knowledge are 46 respondents (endemic areas) and 79 respondents (nonendemic areas),

3 there is no relationship between the level of knowledge and the presence of larvae due to the very few houses found by larvae, ie only 17 houses (37%) for endemic areas and 22 houses (27.8%) for nonendemic areas. This can be due to the inconsistency of the level of knowledge with actions which means that although the community does not know the source / place of mosquito breeding and how to eradicate it, 3M or PSN activities are unconsciously always carried out because it is a routine activity in maintaining house cleanliness.

24 In other words, there is no correlation between the level of knowledge and PSN actions. So, even though housewives have a good level of knowledge or not about the actions of DHF PSN, it is not yet guaranteed that these mothers practice DHF PSN well or vice versa. This is evidenced by the results of in-depth interviews with several respondents, especially those who work as housewives, when they saw the larvae at the water reservoir, they assumed that it was a caterpillar and they immediately cleaned it on the grounds that the water was dirty. But not on the basis of knowledge that the small animal is a larva that will eventually become a mosquito.

3 Good and Less Knowledge can be influenced by several factors such as information sources and educational factors as well as the environmental sector the more people get information both from the family environment, neighboring environment from health workers and print media will affect one's level of knowledge. Good knowledge is obtained from a good learning process. Thus the cause of the high number of respondents who have unfavorable numbers, one of which is the lack of information that can be received by respondents when getting education. So it can be concluded that respondents who lack knowledge can be improved to be even better, based on observations this could be due to lack community interest to watch, read and listen to matters relating to health services, especially regarding PSN or larva eradication. 19 The results of this study are in line with research 11 conducted by Rochmadina (2018) who also said that there is a relationship between temperature and the presence of *Aedes aegypti* larvae.¹¹

15 The results of this study are in line with research conducted by Nani (2017) about the relationship of PSN behavior with the existence of *Aedes aegypti* larvae at

Pulang Pisau Port with the results of statistical analysis conducted using Chi square obtained $p = 0,000$ ($p < \alpha$) meaning that there is a relationship between PSN actions in the presence of *Aedes aegypti* larva at the 2 Pulang Pisau Port in 2016. These results indicate that endemic and non-endemic areas differ in terms of PSN actions.

In the previous discussion, community knowledge in nonendemic areas was very sufficient in relation to PSN, and that knowledge was actually realized in the form of actions. Community behavior has an influence on the environment because the environment is a land for the development of such behavior. routine and continuous it can prevent the development of *Aedes aegypti* mosquito larvae and prevent the occurrence of Dengue Hemorrhagic Fever. The temperature of the water in the container is measured using a mercury thermometer. The water temperature measured in each container is then averaged according to the number of containers found in each house and this is classified into two categories: potential and non-potential. Potential categorized if the temperature the average water measured is between 23°C to 27°C and has no potential if the average water temperature $<23^{\circ}\text{C}$ $> 27^{\circ}\text{C}$. According to the existing theory that, water temperature is one of the factors that can affect the development and survival of *Aedes aegypti* larvae, the water temperature suitable for the development of *Aedes aegypti* larvae. 6 one of the environmental parameters that is significantly related to the population density of *Aedes aegypti* larvae is the water temperature. Water temperature acts as a determinant for larval growth. It was also stated that the growth of mosquitoes would be completely stopped if the temperature is less than 10°C or more than 40°C . The cause of uniformity in the temperature of water in containers is due to the relatively high ambient temperature at the time of the study because the weather was always hot. The results of this study are in line with research conducted by Asrianti Arifin which also says that there is a relationship between temperature and the presence of *Aedes aegypti* larvae¹⁰.

The survival of *Aedes aegypti* the low is more caused by a slow metabolic process due to low temperature and humidity that can result in larval death. Based on this we know that moisture that does not meet the requirements will result in death of larvae, thereby reducing the likelihood of larvae being found. The results of this study

in line with research conducted by Herdianti which also says that there is a relationship between temperature and the presence of *Aedes aegypti* larvae.¹¹⁻¹²

Conclusions

The conclusion of this study is that there is a relationship between PSN actions, water temperature, house humidity, and container conditions with the presence of larvae in endemic areas and yet there is no relationship with respondents' knowledge in the two regions and PSN actions in nonendemic areas.

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