CORRELATION BETWEEN THE DENSITY OF Aedes Sp. WITH PREVALENCE OF DENGUE HEMORRHAGIC FEVER (DHF) IN KLATEN DISTRIC

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Abstract

Klaten is one district that has endemic of DHF. One factor that can influence the enhancement of DHF is the high vector density of the Aedes Sp. mosquitos. Based on the data from Public Health Center, also based on the HI values, Bayat Sub District has the high category risk on the transmission of high DHF. The aim of this study to find out whether there is a correlation between density of Aedes Sp. mosquitos with prevalence of DHF. This research is a case control and sample of this research is all houses in Wiro, Paseban, and Krakitan villages. The number of sample is 52 houses which are divided into two categories, namely 26 for case and 26 for control. Sampling technique is purposive sampling. Data is analyzed using univariate and bivariate through Chi-square and U-Mann Whitney T-test (= 0.05). Based on univariate analysis, the level of mosquito eggs density based on OI case and control is included in high and medium categories. Larval density of Aedes Sp. based on HI is included in high category, while based on CI and BI is included in medium and low categories. The density of Aedes Sp. mosquito based on MHD with mean rank in the case is higher than in the control. Based on bivariate analysis: OI have p-value 0.575 > 0.05, and CI have p-value 0.052 > 0.05. For inside MHD value is p-value 0.079 > 0.05 and outside MHD value is p-value 0.223 > 0.05. There is no correlation between the vector density of Aedes Sp. with prevalence of Dengue Hemorrhagic Fever (DHF).

Keywords : density, Aedes Sp. mosquitos., Dengue Hemorrhagic Fever, prevalence

1. INTRODUCTION

In the last few decades, DHF has spread throughout the world, including the Asian region. WHO member countries regularly report annual cases of DHF. The number of cases reported from 2010 as many as 2.2 million increased to 3.2 million in 2015 [1]. The highest rate of illness (Insidence Rate) and death rate (Case Fatality Rate) in Southeast Asia. WHO noted that Indonesia was the highest country in dengue cases in Southeast Asia from 1968 to 2013 [2]. In Indonesia in 2016 there were 11 provinces that had the highest CFR, Central Java ranked fourth in the province with a high CFR. DHF in Central Java is still a very important and serious problem, as evidenced by the high CFR value of 1.45%, and all districts in Central Java, which amount to 35 districts, have contracted dengue fever. One of them is Klaten Regency which ranks fifth [3]. In 2014, there was 260 cases of DHF in Klaten Regency and in 2015 it increased to 525 DHF cases. Likewise, the number of deaths also experienced a sharp increase, from 9 deaths in 2014 to 26 deaths in 2015. In addition, Klaten district is still one of the districts whose IR and CFR values are still above the

RPJMD target, namely IR in Klaten District 45.3 per 100,000 inhabitants and a CFR value of 5% [4]. Based on data from documents obtained from the Klaten District Health Office and Bayat Health Center, in Klaten District there are still a number of endemic villages in Bayat Sub-District, which include Wiro Village, Paseban Village and Krakitan Village. Based on data from the Bayat Health Center, the three villages over the past three years from 2015 to 2017 have always reported dengue cases. Based on other data, the coverage of healthy homes in the last five years in Bayat Subdistrict is always lower, which is always under 65% compared to the national target set at 80%. The vector density of Aedes Sp. is one of the factors that can influence the increase in the incidence of DHF, so that data and information are needed about the current situation of dengue fever vector density.

To find out the density of mosquito vectors in a place, some surveys are needed, namely egg surveys, larval surveys and adult mosquito surveys. [5] DHF cases in the Bayat District area are still declared endemic. So the researchers wanted to analyze the vector density indicator of Aedes Sp. by using Ovitrap Index (OI), House Index (HI), Container Index (CI), Breteau Index (BI), and Man Hour Density (MHD) to find out the correlation between Aedes Sp. with the prevalence of DHF in Bayat Sub district, Klaten Regency, Central Java.

2. METHODS

This type of research is an observational analytic study with a case control approach. This research was conducted in Wiro Village, Paseban Village and Krakitan Village, Bayat District, Klaten District, Central Java. Determination of the sample is based on all the houses in Wiro Village, Paseban and Krakitan Villages as many as 52 houses studied, with 26 cases based on the number of DHF patients in Wiro Village, Paseban Village and Krakitan Village for 3 years, from 2015 to 2017 and 26 controls with the frame taken based on the distance of the house at least ≤100 meters from the home of cases of dengue sufferers. The distance of the house is determined based on the flying distance of the Aedes Sp. that is ± 100 meters. The sampling technique uses purposive sampling which is a non random sampling sampling technique. Primary data collection was obtained from the Klaten District Health Office document and Bayat Health Center and secondary data was obtained by observation. Data analysis using univariate analysis, analysis bivariate using Chi-square and U-Mann Whitney T-test.

3. RESULTS AND DISCUSSION

3.1 Correlation between Egg Density Aedes Sp. based on the Ovitrap Index (OI) with The Prevalence of DHF

Ovitrap is a mosquito trap egg. The correlation between the density of eggs Aedes Sp. based on the Ovitrap Index (OI) using the Chi-square test as follows:

Table 1. Correlation between Egg Density Aedes Sp. based on the Ovitrap Index (OI) with The Prevalence of DHF in Bayat District

Ovitrap Index	DHF				Sum		OR	CI (95%)		p-value
	Cases		Control					Lower	Upper	
	n	%	n	%	n	%				
Very high	12	46.2	10	38.5	22	42.3	1.371	0.455	4.136	0.575
Low	14	53.8	16	61.5	30	57.7				
Sum	26	100.0	26	100.0	52	100.0				

Based on **Table 1**, of the 52 houses placed on ovitrap, the value of the Ovitrap Index was in a very high and low range. The Ovitrap value of the index category was very high in the case group as many as 12 ovitrap (46.2%) while in the control group there were 10 ovitrap (38.5%). For the low category Ovitrap Index in the case group were 14 ovitrap (53.8%) while in the control group 16 ovitrap (61.5%). The density of the Ovitrap Index is a risk factor for the incidence of DHF with a value (OR = 1,371). The very high Ovitrap Index in a house has a risk of 1,371 times suffering from dengue compared to the low Ovitrap Index. However, the value of this risk is still stated to be meaningless because the range of values (CI = 0.455 - 4.136) and number 1 are between the lower and upper value ranges. Based on these values supported by the significance of the statistical value p-value 0.575> 0.05 with (α = 5%), if the value of sig> α then Ho is accepted which means there is no relationship between the density of eggs Aedes Sp. based on the Ovitrap Index (OI) with the incidence of DHF.

The value of the Ovitrap Index in this study shows that the value of the Ovitrap Index of Aedes Sp. outside the home is higher than in the home both in the case group and in the control group. This is in line with research from [6] which states the same thing that Aedes Sp. tend to prefer laying eggs in containers outside the house. Although the level of mosquito density does not always reflect the high and low levels of dengue cases, it can be a description of the risk for transmission of dengue cases. Then it is necessary to pay attention to containers around the house such as used goods that have the potential to breed mosquitoes. Used goods around the house such as used cans, used tires and used buckets that can be filled with water when it rains are very potential as mosquito breeding sites. Therefore minimizing used items around the house can significantly reduce mosquito population density. The results of this study indicate that the distribution of eggs of Aedes Sp. in Kecamatan Bayat including grades with an OI level at level 2, namely the medium and level 3 categories, namely the high category. The high presence of Aedes Sp. caused by the density of eggs produced by mosquitoes. This is probably due to the fact that Kecamatan Bayat based on data from the Health Office of the District of Klaten is the region with the highest number of cases and close together so that the distribution of mosquito egg density in a house is high. In addition, the rainy season also affects the high presence of mosquito vector densities. High rainfall will increase the breeding of mosquito sites, especially in the environment outside the home so that it can increase its density [7].

In this study the results were not significant, namely there was no relationship between the density of eggs Aedes Sp. with the incidence of DHF. This is probably due to the process of population movement or mobility of the population that is dense and continuously from home or from village to village to carry out activities such as workplaces which are other factors as a cause of dengue transmission in this region. As the results of research conducted by (Gama & Betty, 2010) [8] which says that population mobility facilitates transmission from one place to another. The center of the source of transmission of the disease usually spreads following population traffic. The more crowded the traffic, the greater the possibility for the spread of disease. The value of OI outside the house in Kecamatan Bayat still needs to be watched out because the value is in the high category. High OI means that the area is one of the areas prone to dengue disease. Prevention that needs to be done in environmental management is to minimize used goods around the house so that it can reduce mosquito population density significantly. In addition, the PSN eradication program also needs to be done.

3.2 Correlation between Aedes Sp. based on the Container Index (CI) with The Prevalence of DHF

The larva survey in this study uses visual methods to see and record the presence or absence of larvae in containers, without taking and checking larva species. Correlation between the density of Aedes Sp. based on the Container Index (CI) using the Chi-square test as follows:

Table 2. Correlation between Aedes Sp. based on The Container Index (CI) with The Prevalance of DHF in Bayat District

Container Index	DHF				Sum		OR	CI (95%)		p-value
	Cases		Control					Lower	Upper	
	n	%	n	%	n	%				
Moderate	17	65.4	10	38.5	27	42.3	3.022	0.976	9.356	0.052
Low	9	34.86	16	61.5	35	57.7				
Sum	26	100.0	26	100.0	52	100.0				

Based on **Table 2.**, from 52 houses examined by containers, the value of Container Index with the moderate category in the case group was 17 houses (65.4%) while in the control group as many as 10 houses (38.5%). For the low Container Index value in the case group as many as 9 houses (34.6%) while in the control group as many as 16 houses (61.5%). Practically, the density of Container Index is a risk factor for the incidence of DHF with a value (OR = 3.022). Container Index which is in a house has a risk of 3,022 times suffering from dengue compared to the low Container Index. But this risk value is still stated to be meaningless because the value (CI = 0.976 - 9.356) and number 1 are between the lower and upper value ranges. Based on these values, it is supported by the statistical significance of p-value 0.052> 0.05 with (α = 5%), if the value is sig> α so that Ho is accepted which means there is no relationship between the density of Aedes Sp. based on the Container Index (CI) with the incidence of DHF.

Based on the results of the study in Bayat Subdistrict, it was shown that the calculation of the amount of Aedes mosquito larvae sp. based on the size used in the study (Joharina & Widiarti, 2014) and the level of density of the mosquito population (Density Figure / DF) to find out the larvae density category produced a percentage of positive larvae in each container examined at medium and low densities. Positive container density of larva with medium density is more dominant than low density (Restuti, Wahyuningsih & Hapsari, 2017) [9]. Based on the conditions in the field, it was shown that the majority of cases and control groups used buckets for their daily needs. In some respondents the use of a bathtub is less a protective factor because it is not as easy as draining or cleaning it like a bucket so that it affects the density of larvae in the container.

In the results of this study there was no significant correlation between the density of Aedes Sp. Larvae. based on the Container Index (CI) with the incidence of DHF. This is probably because many containers found at the time of observation at the study site were mostly not found in larvae and the conditions at the time of the study at the respondent's house mostly used buckets that were easy to clean. According to (Sofia, Suhartono, & Wahyuningsih, 2014) [10] also said that there were several cases of houses that were more protective of the existence of larva such as not using a bath but replacing it with a smaller size bucket so that it was easy to clean. Similar studies from (Restuti, Wahyuningsih, & Hapsari, 2017) also say that there is no correlation between Container Index and the incidence of Dengue Hemorrhagic Fever due to conditions in the field, indicating that most respondents use buckets for daily needs and not many use bath tubs. The use of buckets as a reservoir for daily use and easy to clean or drain so that the container does not become a place for breeding mosquitoes. Another study from (Saraswati & Martini, 2012) [11] stated that between HI, CI, and BI with the incidence of DHF there was no significant relationship.

This is because there is an assumption that maybe less than 5% of a mosquito population that exists in the transmission season will be a vector. Besides that it was also caused due to the short time of the study. Research in a short time is not expected to fully capture the variability of the larvae density index so that it cannot describe the actual correlation with the incidence of DHF.

3.3 Correlation between Adult Mosquito Density Aedes Sp. based on Man Hour Density (MHD) with The Prevalance of DHF

The results of the analysis of the relationship between adult mosquito density of Aedes Sp. based on Man Hour Density (MHD) using the U-Mann Whitney T-Test:

Table 3. Correlation between Adult Mosquito Density Aedes Sp. based on Man Hour Density (MHD) with The Prevalance of DHF

	DHF	n	Mean Rank	Minimum	Maximum	p-value
MHD of Indoor	Case	26	30.06	0.0	1.6	0.079
	Control	26	22.94	0.0	0.8	
	Sum	52				

Based on **Table 3.**, it shows that the mean rank value of MHD in the home in the case group is 30.06 while in the control group it is equal to 22.94. Thus the p-value of 0.079> 0.05 was obtained so that Ho was accepted which means there is no relationship between the density of the Aedes Sp. based on Man Hour Density (MHD) in the home with the incidence of DHF.

Table 4. Correlation between Adult Mosquito Density Aedes Sp. based on Man Hour Density (MHD) with the prevalance of DHF

	DHF	n	Mean Rank	Minimum	Maximum	p-value
MHD of Outdoor	Case	26	28.87	0.0	1.2	0.223
	Control	26	24.13	0.0	0.8	
	Sum	52				

Based on **Table 4**., it shows that the mean rank value of MHD outside the home in the case group is 28.87 while in the control group the value is 24.13. Thus the p-value obtained is 0.223> 0.05 so that Ho is accepted which means there is no relationship between the density of the Aedes Sp. based on Man Hour Density (MHD) outside the home with the incidence of DHF. From the results of research from 52 houses examined in each house with calculations based on MHD in the home, the mean rank value in the case was higher when compared to the control. For the value of MHD outside the home from cases and controls, the mean rank value was obtained in the higher cases than in the controls. The house of positive cases of adult mosquitoes is adjacent to the control house so that the mosquito vector is feared can be a transmission of dengue disease. It can be said that if there are sufferers in Bayat Subdistrict it is possible to experience rapid disease transmission because from the field survey results the average or mean rank of adult mosquitoes caught in the house and outside the house is higher after taking the mosquitoes. enter with an aspirator pack bag.

However, it was found that from the results of the study there was no relationship between the density of adult mosquitoes Aedes Sp. with the incidence of DHF. This is likely to occur

because the flight distance of mosquitoes is only ± 100 m and the distance between the case house and the control house is also close so that the mosquito can fly from the house to the control house or vice versa, and when Aedes Sp. there were many in the respondent's house during the day and most of the residents were doing activities outside the home and mobility of the population such as work or school. This research is in line with research from Deswara [12] who said that there was no significant relationship between the density of Aedes aegypti mosquitoes and the incidence of DHF. This happened because the measurement of the density of Aedes aegypti mosquitoes was not done as a whole. In addition there are many influencing factors such as occupancy density and population mobility.

4. CONCLUSION

Our results showed that there is no correlation between the vector density of Aedes Sp. with prevalence of Dengue Hemorrhagic Fever (DHF). The rementioned are prevention and control of dengue disease is needed by promoting programs such as the Eradication of breading places by inviting community with one house program one jumantik (supervisor of larva), and increasing surveillance of DHF transmitting vectors by conducting routine observations of dengue mosquito vectors by starting from the larval phase so that can reduce the breeding of dengue mosquito vectors. If possible, the supervisor in health center can monitor, evaluate and plan policies in the PSN program.

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