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Comparison of the *Aedes spp* Eggs Number Trapped in Ovitrap Using Rainwater and Municipal Water

Perbandingan Jumlah Telur *Aedes spp* yang Terperangkap di Ovitrap Menggunakan Air Hujan dan Air PDAM

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Abstract

The area of the Seijang Health Center is an endemic area of Dengue Hemorrhagic Fever (DHF). This study aimed to determine the ratio of the number of eggs trapped in the ovitrap using rainwater and PDAM water. This type of research was quasi-experimental with posttest-only design. The total number of eggs trapped in the ovitrap was 3829 eggs. The number of rainwater ovitraps (2279) traps more Aedes spp mosquito eggs than PDAM water ovitraps (1553). Ovitrap index of 61% in this study was included in the level 4 category or high above 40%. There was no significant difference between the number of eggs trapped in rainwater ovitrap and PDAM water (pvalue=0.637>0.05). There was no difference in the average number of eggs in rainwater and PDAM water ovitrap media. The community is expected to always carry out the Mosquito Nest Eradication (PSN) movement at least once a week to reduce the proliferation of dengue vectors.

Keywords:
Ovitrap Index ; Aedes spp ; DBD

Abstrak

Wilayah Puskesmas Seijang merupakan daerah endemis Demam berdarah Dengue (DBD). Penelitian bertujuan untuk mengetahui perbandingan jumlah telur yang terperangkap di ovitrap menggunakan air hujan dan air PDAM. Jenis penelitian quasi eksperimen dengan rancangan posttest only design. Total telur yang terperangkap pada ovitrap adalah 3829 telur. Jumlah ovitrap air hujan (2279) lebih banyak memperangkap telur nyamuk Aedes spp dibandingkan dengan ovitrap air PDAM (1553). Ovitrap index sebesar 61% pada penelitian ini masuk dalam kategori level 4 atau tinggi diatas 40%. Tidak ada perbedaan yang signifikan antara jumlah telur yang terperangkap di ovitrap air hujan dan air PDAM (pvalue=0,637>0,05). Tidak ada perbedaan rata-rata jumlah telur pada ovitrap media air hujan dan air PDAM. Masyarakat diharapkan agar selalu melakukan gerakan Pemberantasan Sarang Nyamuk (PSN) minimal seminggu sekali untuk mengurangi perkembangbiakan vektor DBD.

Kata Kunci
Ovitrap Index; Aedes spp; DBD

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the bite of the

Aedes spp. Aedes spp. is the fastest-growing mosquito in the world and causes nearly 390 million people to be infected each year. Dengue fever has symptoms in the form of fever or pain in the pit of the stomach continuously, bleeding from the nose, mouth, gums, or bruising on the skin [1].

DHF is transmitted to humans through the bite of an Aedes spp mosquito infected with the Dengue virus. Dengue virus causes Dengue Fever (DD), Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). This virus belongs to the group B Arthropod Virus (Arboviruesis) which is now known as the genus Flavivirus, family Flaviviridae, and has 4 types of serotypes, namely: Den-1, Den-2, Den-3, Den-4 [1].

DHF is still one of the main public health problems in Indonesia. The number of sufferers and the area of their distribution is increasing along with the increasing mobility and population density. DHF was first discovered in Indonesia in the city of Surabaya in 1968, this disease spread widely throughout Indonesia[1]. The DHF Incidence Rate (IR) in 2016 in Indonesia was 78.9 per 100,000 population, relatively decreased in 2017 and 2018 (26.1 and 24.8) and increased again in 2019 to 51.5. The incidence rate of dengue fever in 2020 is 40 per 100,000 population. Riau Archipelago is the province with the fifth highest DHF incidence in Indonesia (78.2)[2].

The number of dengue cases in Tanjungpinang city is 430 cases. DHF cases in Tanjungpinang City increased from the previous year which amounted to 353 cases in 2018. In 2019 there were 430 cases of DHF with one death [3].

The number of cases of Dengue Hemorrhagic Fever (DHF) in 2020 in the working area of the Sei Jang Health Center was 78 cases. The highest number of cases was found in the Sei Jang sub-district, which amounted to 46 cases. DHF case data from 2015-2020 shows that the highest number of cases in the working area of the Sei Jang Health Center was in 2019 which amounted to 82 cases and the lowest number of cases was in 2017 which amounted to 17 cases.

Factors that play a role in the emergence of disease based on the epidemiological triangle are influenced by the environment, host, agent, and vector. The environment significantly affects pain for each individual, including social, economic and especially community behavior, increasing population mobility, residential density, better transportation facilities and there are still breeding places for dengue-transmitting mosquitoes [4].

Many efforts to control the Aedes aegypti mosquito have been carried out, including chemical, physical and biological control. However, until now control is still focused on the use of chemical insecticides. One method that can be used as a survey tool and a mosquito vector control tool recommended by the World Health Organization (WHO) is the mosquito egg trap or ovitrap [5].

Ovitrap is one of the mechanical vector control. Ovitrap has many advantages in producing more specific, economical and sensitive monitoring data. Ovitrap is very easy to care for and clean as you only need to change the water every week and brush the inside. This treatment is the same as the principle of draining a bathtub (3M), only carried out in a smaller container [6]. The results of research conducted by [7] showed that the number of eggs of Aedes aegypti mosquitoes found in municipal water media ovitrap had an average of 43 eggs. While in the rainwater ovitrap, the number of Aedes aegypti mosquito eggs found was 39 eggs.

Efforts to control dengue vectors carried out by the Sei Jang Health Center in 2019 were conducting group counseling about dengue disease, conducting epidemiological investigations, and recruiting jumantik cadres. The Puskesmas have often conducted counseling, but public awareness to carry out Mosquito Nest Eradication (PSN) through the 3M Plus movement is still low and cross-sectoral cooperation is still not maximized in

mobilizing 3M plus in the community, and until now there has been no research on the use of ovitrap. as a survey tool for mosquito vector density in the working area of the Sei Jang Health Center. It is proven that the ABJ rate in the Sei Jang sub-district is 81.2% and has not reached the national target of 95%. The researcher is interested in researching identifying the number of Aedes spp eggs trapped in ovitrap shelters using rainwater and municipal water in Sei Jang Village, Tanjungpinang.

METHOD

The type of research that will be conducted was a quasi-experimental design with a post-test only design. The research was conducted in two Neighborhood Units (RT) in the Sei Jang Village, which is an endemic area of DHF. The time of the research was carried out from February to May 2021.

The population in this study were all houses in Sei Jang Village. The sample is a house with dengue fever and its surroundings with a radius of 50-100 meters [8]. The selection of the sample site was carried out by a random sampling system. Determination of the sampling location is done by determining the point of the house of DHF sufferers and their surroundings. The number of houses used for research is 70 houses in the RT 2 and RT 3 areas.

Ovitrap is distributed in DHF endemic areas and then one patient's house is chosen randomly and then placed in a house with a radius of 100 meters from the patient's house according to the cardinal directions. If the number of houses <60,000 installations of ovitraps used to collect mosquito eggs is 100, if the number of houses is 60,000 to 120,000 installations of ovitraps are 150 units.

The sample in this study amounted to 200 ovitraps, each 100 pieces using rainwater and municipal water. the time for laying the ovitrap is from 10.00 to 14.00 WIB. Ovitrap retrieval is carried out 4-7 days after laying, by removing the Whatman paper from a plastic cup and airing it to dry after that it is put in an envelope to be brought and examined in the laboratory.

The tools and materials used in this study were Whatman paper, 14 oz plastic cup, black spray paint, rainwater, municipal water, label paper, envelopes, scissors, and a stereo microscope.

The data analysis used in this research is a univariate analysis and bivariate analysis. Univariate analysis was carried out to analyze each of the variables used with a frequency distribution. An independent t-test was carried out to see the difference in the average number of Aedes spp eggs trapped in rainwater and municipal water using ovitrap. However, if the normality of the data analyzed is not normally distributed, then the alternative test used is the Mann-Whitney test.

RESULT AND DISCUSSIONS

Table 1 shows that the total number of eggs was 3,832, of the eggs trapped in the ovitrap type of rainwater media, were 2,279 eggs and municipal water was 1,553 eggs. These results are from each ovitrap trap installed, namely 100 pieces for rainwater media and 100 pieces for municipal water media.

The calculation results show that the ovitrap index obtained from rainwater media is 70%

and municipal water media is 52%. So it can be concluded that the rainwater index ovitrap is more positive than the municipal water index ovitrap.

Tabel 1 Number of trapped Aedes spp eggs

No	Media Type	Number of Ovitrap Installed	Jumlah Ovitrap Positif	Positive Ovitrap Count	Ovitrap Index
1	Rainwater	100	70	2279	70%
2	Municipal water	100	52	1553	52%
Total		200	122	3832	61%

The average value (mean) of the highest number of eggs found in ovitrap using rainwater media, was 32.56 and the average value of the number of eggs found in ovitrap using municipal water media, which was 29.87 (Table 2). The minimum value of the number of eggs in rainwater media is 4 with a maximum value of 111. In contrast to municipal water media, it shows that the minimum value is 3 and the maximum is 89 (Table 2).

Tabel 2. Descriptive Table

Media Type	N	Minimum	Maximum	Mean
Rainwater	70	4	111	32,56
PDAM water	52	3	89	29,87

In this study, the results of the normality test of the data using the known p-value <0.005, which means the data is not normally distributed, thus the hypothesis test that will be used is the Mann-Whitney test. The results of the Mann-Whitney test in table 3 obtained a p-value of 0.637 > 0.05, so the results of this test can be interpreted statistically as there is no difference in the average number of eggs trapped in the ovitrap using rainwater and municipal water.

In this study, more eggs were found in rainwater than in municipal water. This finding is different from the research of Hidayah et al. (2013) that the average value of the number of Aedes aegypti eggs in rainwater ovitrap is 39.25 eggs and municipal water ovitrap is 43 eggs, which means the number of Aedes aegypti eggs is more found in minicipal water ovitrap compared to rainwater ovitrap.

The results of the ovitrap index from research conducted in Sei Jang Village RT 2 and RT 3 RW 1 got the highest value on rainwater media by 70% compared to municipal water media by only 52%. The ovitrap index criteria according to the Hong Kong FEDH in [9] can be compared with the ovitrap index classification from the calculation results. Based on the Hong Kong FEDH ovitrap index, the ovitrap index is level 1 or very low with an OI value of < 5%, level 2 or low < 20%, level 3 or moderate < 40%, and level 4 or high > 40%. According to the results of the calculation of the ovitrap index value obtained, it is rainwater media by 70% and municipal water media by 52%. It can be compared with the Hong Kong FEDH, the calculated ovitrap index value is included in level 4 (high), meaning that the area is prone to dengue fever because there are many Aedes spp larvae found in the area so environmental management prevention needs to be carried out such as the PSN (Mosquito Nest Eradication) movement with doing 3M plus (Depletion, Closing, and Recycling) or other actions need to be carried out routinely.

Based on previous research conducted by [10] an overview of the Aedes Aegypti Mosquito Density Level based on the Ovitrap Index in

Ternate City, it is known that the average ovitrap index value in Ternate City is in the medium to high category with a range between 20% to 60%, in ovitraps that are in houses with a fairly high density level. The ovitrap index in Ternate City based on the 2014 FEDH category was in the medium category (level 3) and high category (level 4). This means that it is recommended to carry out control activities to limit larval development by eliminating all potential breeding sites, and the role of the government and the private sector is needed in controlling mosquito development to carry out control measures using larvicides or adulticides.

The laying of ovitraps carried out in RT 2 and RT 3 RW 1 only outside the house, most likely the number of Aedes spp eggs trapped in the ovitrap is Aedes albopictus mosquito eggs. This is because the Aedes albopictus mosquito rests more outside the house in shady trees, used tires, bushes, battery boxes or batteries, waste containers, and pottery around the house. Aedes albopictus prefers to lay eggs outdoors such as places in the garden, namely in tree holes, indentations of plants and outside the house or forest edge areas [11]. The reason why the ovitrap was placed in the house was that at the time of the study the number of Covid-19 cases was still high, which caused research respondents to be reluctant to contact the researcher, especially to enter the house.

Several factors that can affect the results of observations of ovitrap media as a breeding ground for mosquitoes are temperature, turbidity, humidity, and acidity. Other factors that can affect the number of Aedes spp eggs trapped in the research location are environmental factors such as the presence of vacant land or the number of swamps and residential density.

Tabel 3 *Mann-Whitney* test analysis results

Variabel	Median (Minimum-Maksimum)	Pvalue
Ovitrap air hujan (n=70)	21,50(4-111)	0,637
Ovitrap air PDAM (n=52)	19,50(3-89)	

The results of the analysis using the Mann-Whitney test revealed that there was no significant difference in the average number of Aedes spp eggs trapped in rainwater ovitrap media with municipal water media ovitrap. The results of this analysis indicate that both types of water can be a breeding ground for Aedes spp. The findings of this study occurred because mosquitoes chose a water medium as a breeding ground based on the smell of ammonia and also based on the content of organic matter. Based on the results of measuring ammonia conducted by[7] rainwater has an ammonia content of 0.19 mg/l while municipal water is 0.004 mg/l, this shows that Aedes spp mosquitoes will prefer rainwater to municipal water as a breeding ground for laying eggs because rainwater has natural food for more mosquito larvae than municipal water.

CONCLUSION

The number of rainwater ovitraps traps more Aedes spp mosquito eggs than municipal water ovitraps. The ovitrap index in this study was categorized as level 4 or high. Statistically there was no difference in the average between the number of eggs trapped in rainwater ovitrap and municipal water. These

results indicate that both types of water can be a potential breeding ground for Aedes spp.

The number of eggs trapped in the ovitrap is very large, it is hoped that the community must be aware of the environment around their respective homes by carrying out the Mosquito Nest Eradication (PSN) movement. The PSN movement includes closing unused water reservoirs, draining bathtubs or other water reservoirs at least once a week, and recycling unused used goods suspected of being breeding grounds for mosquitoes.

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