International Journal of Sciences: Basic and Applied Research (IJSBAR)

ISSN 2307-4531
(Print & Online)

http://gssrr.org/index.php?journal=JournalOfBasicAndApplied

Effectiveness of Abatezation and Fogging Intervention to the Larva Density of Aedes Aegypti Dengue in Endemic Areas of Makassar City

Erniwati Ibrahim[a*], Veny Hadju[b], Armin Nurdin[c], Hasanuddin Ishak[d]

[a,d]*Department of Environmental Health, Faculty of Public Health, Hasanuddin University*

[b]*Nutrition Study Program, Faculty of Public Health, Hasanuddin University*

[c]*Faculty of Medicine, Hasanuddin University*

[a]*Email: erwin_kael@yahoo.co.id*

Abstract

Dengue Fever is an acute infectious disease caused by the dengue virus and transmitted through the bite of Aedes aegypti. Indonesia is one country that is still at risk of Dengue Hemorrhagic Fever (DHF), for up to 2010 about 70% of districts / cities are still categorized as endemic, (DG P2PL MoH, 2011). This study aimed to analyze the effectiveness of interventions abatezation and fogging on the density of larvae in the endemic area of Makassar. Type this research is the observation with a descriptive approach. The samples were 200 houses selected by proportional random sampling. The results showed that abatezation and Fogging effectively improve Figures Free Flick (ABJ) and lower Larva Density Index (House Index) of 8.6%, although the percentage is lower compared to simply abatezation. In the village who do not abatezation and fogging decreased and increased significantly in Figures Free Flick (ABJ) and the House Index (HI), amounting to 16.6%. Further research is needed deep and ongoing to further examine the impact of implementation of abatezation and fogging, good for people's health and the health of the environment.

Keywords: DBD; abatezation; fogging; ABJ; House Index.

---

* Corresponding author.

1. Introduction

Dengue hemorrhagic fever (DHF) is a disease caused by dengue virus infection is still a health problem society. This disease is found almost in all parts of the world, especially in countries of tropic and subtropics well as endemic and epidemic diseases. Each year there are an estimated 50-100 million dengue infections occur worldwide [1]. Indonesia also included one of the countries that are still at risk of dengue disease, because until 2010, approximately 70% of districts / cities are still categorized as endemic, MoH RI [2]. Figures Free Flick (ABJ) Aedes aegypti mosquito in the city of Makassar in 2010 amounted to 84.66%, in 2011 ABJ amounted to 82.76% and in 2012 ABJ amounted to 84.46% [3].

2. Materials and Methods

2.1. Study Design

The design of the study is a Quasi Experimental (Quasi Experiment), the Prospective approach.

2.2. Population and Sample

The population in this study is any houses to be observed to see the presence of larvae, determining the density of aedes aegypti mosquito larvae, and Figures Free Flick.

2.3. Location and Time Research

The research was conducted on five areas endemic villages, namely Gunung Sari village, Village Tamalanrea, Paccerakkang Village, Village and Village Karuwisi Rappokalling. Research was conducted during 2 (two) months, namely in March until May 2014. Data processing was performed using SPSS program, and the analysis was done descriptively, presented in tabulation term.

3. Results

Table 1 shows that of five endemic villages where research was conducted, it was found Paccerakkang village with the highest percentage of homes were found larvae, as many as 64.0% of 25 houses. while the Village Rappokalling have the least percentage of homes found larva that is 12.5% of 56 samples home.

Table 2 shows that from 5 endemic villages where research was conducted, it was found karuwisi village with the highest percentage of homes were found larvae, as many as 68.8% of 16 houses. while the Village Gunungsari have the least percentage of homes found larva that is 5.7% of 35 samples home.

Table 3 shows that before abatezation, there are 14 homes were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 79.4% and 20.6%. Then after abatezation, there are 5 houses found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 92.7% and 7.3%. This indicates that the effective increase ABJ abatezation activity and lower House Index of 13.3%

Table 1: Distribution Of Sample Based Intervention Before Existence Of Larva (Abatezation and Fogging) in Village Endemic

Endemic District	Larvae existence				Number	
	Positive		Negative			
	n	%	n	%	n	%
Tamalanrea	14	20.6	54	79.4	68	100.0
Paccerakkang	9	64.0	16	36.0	25	100.0
Gunungsari	5	14.3	30	85.7	35	100.0
Karuwisi	5	31.3	11	68.7	16	100.0
Rappokaling	7	12.5	49	87.5	56	100.0

Table 2: Distribution of Sample Based Existence of Larva after the Intervention (Abatezation and Fogging) in Village Endemic

Endemic District	Larvae existence				Number	
	Positive		Negative			
	n	%	n	%	n	%
Tamalanrea	5	7.3	63	92.7	68	100.0
Paccerakkang	7	28.0	18	72.0	25	100.0
Gunungsari	2	5.7	33	94.3	35	100.0
Karuwisi	11	68.8	5	31.2	16	100.0
Rappokaling	13	23.2	43	76.8	56	100.0
Total					200	100.0

Table 3: Distribution of Sample Based Existence of Larva, Larva Free Numbers (Abj / Hi) and the Existence of Cases Before and After Dbd Abatezation Tamalanrea Villages in the District Tamalanrea Makassar

Larvae existence, LFN and HI	Before Abatesasi n = 68	After Abatesasi n = 68	Effectivity (%)
Larvae existence	14	5	Efektif
Larvae free number	79.4%	92.7%	(13.3%)
House Indeks (HI)	20.6%	7.3%	

Table 4: Distribution 0f Sample Based Existence 0f Larva, Larva Free Numbers (Abj) and House Index (Hi) Before and After in the Villages Paccerakkang Fogging Sub Biringkanaya Makassar

Larvae existence, LFN and HI	Before Fogging N = 25	After Fogging N = 25	Effectivity (%)
Larvae existence	9	7	Efective
Larvae free number	64.0%	72.0%	(8.0%)
House Indeks (HI)	36.0%	28.0%	

Table 4 shows that prior to fogging, there are 9 homes were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 64.0% and 36.0%. Then after abatezation, there are 7 homes were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 72.0% and 28.0%. It indicate that effectively increases the activity abatezation ABJ and lowering House Index by 8.0%.

Table 5: Distribution of Sample Based Existence of Larva, Larva Free Numbers (LFN) and House Index (HI) Before and After Fogging Abatezation and Villages in the District Rappocini Gunungsari Makassar

Larvae existence, LFN and HI	Before Abatezation + fogging n =35	After Abatezation + fogging n = 35	Affectivity (%)
Larvae existence	5	2	**Affective**
Larvae free number	85.7%	94.3%	(8.6%)
House Indeks (HI)	14.3%	5.7%	

Table 5 shows that before abatezation and fogging, there are 5 houses found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 85.7% and 14.3%. Then after abatezation, there are two houses were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 94.3% and 5.7%. It indicated that effectively increases the activity abatezation ABJ and lowering House Index by 8.6%

Table 6: Distribution of Sample Based Existence of Larva, Larva Free Numbers (Abj) and House Index (Hi) Rappokalling Villages in The Region and District Karuwisi Tallo and Panakukang Makassar

Larvae existence, ABJ and HI	Before Intervention N =72	After Intervention N = 72	Affectivity (%)
Larvae existence	12	24	
Larvae free number (ABJ)	83.3%	66.7%	
House Indeks (HI)	16.7%	33.3%	Not effective (16.6)

Table 6 shows that before the intervention (abatezation + fogging), there are 12 homes were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 83.3% and 16.7%. Then, after the intervention, there were 24 homes were found to have larvae, with Figures Free Flick (ABJ) and the House Index (HI) respectively 66.7% and 33.3%. This indicates that without any intervention activities (abatezation + fogging) can lower and raise ABJ House Index by 16.6%.

Table 7: House Index (Hi) Before and After Intervention in Whole Village Endemic Makassar

Endemics District	House Indeks (Hi) Before intervention (%)	House Indeks (Hi) After intervention (%)	Efectivity (%)
Tamalanrea (Abatezation)	20.6	7.3	13.3
Paccerakang (Fogging)	36.0	28.0	8.0
Gunungsari (Abatezation+Fogging)	14.3	5.7	8.6
Karuwisi + Rappokalling (Non Intervesi)	16.7	33.3	16.6

4. Discussion

4.1 Effectiveness of Density Abatezation Larva (Density Larva)

Abatezation namely providing abate powder in places that are filled with water, including the bathtub, vase and so with the intent to kill mosquito larva of Aedes. aegypti and prevent the outbreak of dengue fever. Giving abate powder to do two to three months, at a dose of 10 g abate to 100 liters of water or 2.5 grams altosid to 100 liters of water. The results showed that an increase Figures Free Flick and a decrease in density of larvae (House Index) after abate giving. Where previously found 79.4 and after Abatezation increased to 92.7%, as well as larval density index (House Index) decreased from 20.6% to 7.3%. This shows that the effective increase abatezation action figure Free Flick lowering Larva Density Index (House Index) of 13.3%.This can be explained, for the provision of abate powder on a container of water, can kill mosquito larva thus lowering the population, thereby hindering growth into adult mosquitoes. Abate is more commonly known as killer mosquito larvae, especially larvae of Aedes aegypt. The use of abate to control mosquito larvae have been made since 1965 and to date, abate is the only class of organophosphorus compounds are used for such purposes.

In this study, the type of container that is mostly found their larvae / larvae, that containers bucket (53.81%), then the tub (24.74%), the barrel (11:55%), while a barrel, and the drum is a type of container Paing bit found their larvae (8:25% and 1.65%). According to [4, 5] Aedes aegypti mosquito larvae are found in the environment around humans. Because the larvae are container-inhabiting- mosquitoes, which means that mosquitoes like water in a place that is not natural / man-made, like a bathtub. Samarawicrema in [6] says that the Aedes aegypti mosquito larvae can be found in five locations, namely: drums containing water, cans and bottles, coconut shells, carcasses of cars and tree holes containing water. In another study, Soedarto [7] found that the larvae of Aedes aegypti like a puddle of water on the vessels in the house as well as clean natural puddles outdoors. Sutherland and Wayne as well as Arsunan [8,9] found that the larvae of Aedes aegypti are found in puddles - puddles of water and does not flow.

In some countries in the world, abate allowed to be used in a drinking water storage, because it is considered safe for humans. How it works abate the larvae is by affecting the central nervous system so that the larvae dying larvae. If the man accidentally eats abate in very large quantities, it would appear poisoning symptoms are similar to other organosofat compound poisoning, such as nausea and vomiting. Larviciding right namely to sprinkle directly on water reservoirs. not by wrapping it and hung it in the tap water because the active substance was not on the wall larvasida water reservoirs. Sowing larvicides also indirectly carried out in the middle of the shelter but around so that the active substance can larvicides against the wall of water reservoirs. The volume of water should be calculated before sowing larvacides that every 10 grams to 100 liters of water. Sowing is done every two larvacides till three months and if before that period depleted water reservoirs, then larvaciding should be sown again.

Although chemical insecticides such as abate likely to be carcinogenic when used in the long term, but the research related to it as scientific evidence is still measures undertaken to date.

Activity sprinkled abate the water reservoirs have a significant association with the presence of larvae that are indirectly related also to the level of incidence of dengue. The results are consistent with research conducted by Respati [10] who found that there is a relationship between abatezation the existence of larva with a low degree of closeness of relationship. This shows that the house has ever done abatezation by health workers no larvae, while the house has never been done abatezation by health workers there larvae so abatezation significant relationship to the existence of larva of 0.315. From these results mean that the house had never done abatezation by health workers at risk have a flick of 0.315 times greater than the house ever done abatezation by health officials. So far the government, in this case the Ministry of Health still make abate as one of the strategies of dengue fever control program known as abatezation program.

4.2 Effectiveness of Density Fogging Larva (Density Larva)

Fogging is spraying insecticides in areas with no DHF cases (endemic), aimed to eradicate the mosquito A. aegypti. Fogging is done at a distance of 100-200 meters from the house patients with DHF. The results showed that there was an increase and decrease in Figures Non larva larvae density (House Index) after spraying (fogging). ABJ where previously discovered after fogging 64.0% and increased to 72.0%. Similarly, the larval density index (House Index) decreased from 36.0% to 28.0%. This shows that the act of fogging (fumigation) effectively increases and lower figure Free Flick Larva Density Index (House Index) of 8.0%. This is because fogging can kill adult mosquito population resulting reduced. With the reduction of the adult mosquito population, it decreases the chances that mosquitoes breed to produce eggs or larvae. However fogging does not kill the larvae, so the larva 'existing water reservoirs, can still develop into adult mosquitoes despite spraying / fogging. Thus fogging continue to provide opportunities for the development of larvae and lowering ABJ.

Adult mosquito nest eradication is to control adult mosquito populations by using insecticides which are given by way of spraying / fogging (fogging). Insecticides used in this study is from the class of organophosphate that malathion. Materials used in fogging consists of Pesticides and Solar. With pesticides (poisons), men can be impaired health because pesticides can enter the human body through the skin (Contact poison) and this is a case that is found, in addition to pesticides can enter through breathing (respiratory poison) and oral (mouth poison) when our hands, the food we eat, cutlery / drinking. Theoretically, Pesticides can cause chronic effects, namely the nervous system, neurotoxins: severe memory problems, difficulty concentrating, personality changes, paralysis, loss of consciousness and coma; then vomiting, abdominal pain and diarrhea are common symptoms of poisoning; also disrupt the immune system and. Hormonal balance.

The symptoms that often arise begins with headache, dizziness, nausea, chest pain, vomiting, scabies, muscular pain, excessive sweating, cramps, diarrhea, difficulty breathing, blurred vision and can eventually lead to death. Long-term impact of pesticides posed, namely: karsinogenic (formation of cancerous tissue in the body); mutagenic (genetic damage for generations to come); teratogenic (birth disability of mothers poisoning) and residual residues harmful to consumers. Medium impact of fuel Solar. Solar is one of the fuels derived from fossil fuels. Emissions of combustion such as CO, NOx, SOx. CO-Hb (blood) => HbCO, should HbO2, CO binds Hb 210x stronger than O2. The impact shortage O2. NO2 is toxic, resulting in inflammation of the lungs (cured 6-8 weeks), compression bronchioli (may die 3-5 weeks).SO2 is an irritant, easily absorbed by the

mucous membranes of the respiratory tract, excessive mucus production, irritation. Repeated exposure risk of nasal cancer.

As for the influence of the environment to Pesticides: 1. Pesticides as toxic substances, including pollutants that are harmful to the environment (soil, water and air). 2. Pesticide residues in food of vegetables and fruits (accumulation of residues), resistance of pests (including mosquitoes) and it should be non-target animals. NOx in the air, NO2, NPO3; In the blood HbNO3, O2 deficiency. Due to lack of O2 (Anoxia) then result in paralysis ototrespirasi (breathing). Further due to supply shortages brain O2 (limp, pale, sleepy, died) [11].

Based on the above theory, indicating that the fogging harm done to eradicate mosquitoes, because a lot of negative effects, the more frequent fogging mosquitoes more resistant, so it requires the composition of the mixture of drugs for fogging next louder and kept getting louder, so not only powerless to kill mosquitoes but also able to kill humans. While theoretically have presented a variety of negative impacts and damages that may result from the use of pesticides as base material fogging, but in reality in society is not enough evidence was found, so it still requires deep research and continuing to examine further the impact of the use of implementation of the fogging good for people's health and the health of the environment. Related peneltian resistance of this material was made by Wan-Norafikah, [12] which found that use as an ingredient permethrin insecticide resistance correlated significantly against mosquitoes in Kuala Lumpur,

C. Abate giving and Effectiveness of Density Fogging Larva

The results showed that there was an increase and decrease in Figures Non larva larvae density (House Index) after abatezation and spraying (fogging). ABJ where previously discovered after abatezation 85.7% and increased to 94.3%, as well as larval density index (House Index) decreased from 14.3% to 5.7%. This shows that effective action increase abatezation and fogging and lowering ABJ and Larva Density Index (House Index) of 8.6%. This can be explained because by doing abatezation combined with fogging, then the chances of survival of adult mosquitoes as well as pre-adults in this case, the larvae of mosquitoes can be prevented, so that the larvae that there can be killed with abatezation similarly adult mosquitoes can be killed by fogging , When compared with the area of non-intervention, then there is a significant difference in the numbers of ABJ and HI. Where Figures Free Flick (ABJ) and HI before the intervention, found 83.3% (ABJ) and 16.7% (HI) and then after the intervention decreased ABJ be 66.7% and 33.3% increase in HI be. Thus the results of this study indicate that without action abatezation and fogging, can lower the ABJ and improve HI of 16.6%.

Abatezation is one of the ways used weeks to eradicate the dengue disease by killing larvae (larvae) it by sprinkling abate the shelters water. Besides abatezation other programs are mass fogging, Fogging focus. Fogging activities (spraying) is done with the aim to eradicate the mosquito A. aegypti as one of the efforts to eradicate the disease Dengue Hemorrhagic Fever (DHF). This method is able to instantly turn off all the mosquitoes that spread of the disease can be stopped, but larvae still left alive then the spread of the disease will recur, because in a short time will appear mosquitoes newly hatched from breeding [13]. The emphasis on the prevention of dengue fever mosquitoes causing dengue fever occur because until now there is no vaccine available for prevention. Besides medications to eradicate the dengue virus has not been found.

5. Conclusions and Recommendations

5.1 Conclusion

1. Implementation abatezation effectively improve Figures Free Flick (ABJ) and lower Larva Density Index (House Index) of 13.3%

2. Implementation of fogging effectively improve Figures Free Flick (ABJ) and lower Larva Density Index (House Index) of 8.0%

3. Combination Fogging abatezation and effectively improve Figures Free Flick (ABJ) and lower Larva Density Index (House Index) of 8.6%, although the percentage is lower compared to imply abatezation. 4. In the Territory of villages which do not abatezation and fogging decreased and increased significantly in Figures Free Flick (ABJ) and the House Index (HI), amounting to 16.6%.

5.2 Suggestion

1. Although in theory have presented a variety of negative impacts and damages that may result from the use of pesticides as base material abatezation and fogging, but in reality in society is not enough evidence was found, so it still requires deep and ongoing research to examine further the impact of the use of implementation of the fogging good for people's health and the health of the environment.

2. For the development of research and knowledge, survey should be conducted related to the presence of virus in the body flick, which is theorized to as giving contribution in the spread of dengue disease and the causes of the growing population of Aedes aegypti mosquito vector.

References

[1] World Health Organization (WHO, 2004. Panduan Lengkap Pencegahan dan Pengendalian Dengue dan Demam Berdarah Dengue, haemorrhagic fever in South-East Asia Region : report of WHO consultation. New Delhi: Regional office fo South-East Asia

[2] Dinkes Kota Makassar. P2PL, 2012. *Data Penderita DBD di Kota Makassar*.

[3] Ditjen P2PL Kemenkes. 2011. Kebjakan Nasional Pengendalian DBD.

[4] Novak R, 1992, The Asian Tigers Mosquito: Ades Albopictus, Wing Beats3.5

[5] Oktaviani, N., 2009. Faktor - Faktor yang Berpengaruh Terhadap Densitas Larva Nyamuk Aedes aegypti di Kota Pekalongan. Fakultas Ilmu Kesehatan, Universitas Pekalongan *journal.unikal.ac.id/index.php/kesehatan/article/.../33*

[6] Samarawickrema, et al, 1993.The Relative Importance and Distribution of Aedes Polynensiensis and

Aedes Aegypti Larval in Samoa, Medical and Vetenary Entomology 7 (27-36)

[7] Soedartho, 1996. Penyakit - penyakit Infeksi di Indonesia. Jakarta, Penerbit, Widya Medika

[8] Sutherland DJ, 2001. Larval Habitat. New Jersey Agriculture Experiment Station Publication. (www.cci.rutgers.edu/-insect/hjmos.htm)

[9] Arsunan, A.A. 2013. Epidemiologi Demam Berdarah di Indonesia. Masagena BPress,

[10] Respati, Yunita Ken., dan Keman, Soedjadjadi. 2007. *Perilaku 3M, Abatezation dan keberadaan jentik Aedes hubungannya dengan Kejadian Demam Berdarah Dengue*. Surabaya: Jurnal Kesling. Vol.3, No.2 jan 2007 (107-118).

[11] Anonim, 2013 http://www.sumbarsehat.com/2013/09/efektifitas-fogging-dalam-pemberantasan.html

[12] Wan-Norafikah, et al, 2010, *Permethrin resistance in Aedes aegypti (Linnaeus) collected from Kuala Lumpur, Malaysia.* Journal of Asia-Pacific Entomology 13 (175-182).

[13] Widagdo, Laksmono, 2008. Kepadatan Jentik Aedes aegypti Sebagai Indikator Keberhasilan Pemberantasan Sarang Nyamuk (3M Plus) Di Kelurahan Srondol Wetan, Semarang. [online]http://repository.ui.ac.id/contents/koleksi/2/ead246ab2a3f2206ed8e1deb7dff8ad289b6059a.pdf [diakses 20 mei 2013].