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# Effect of the Use Lethal Ovitrap to Population Aedes sp

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***Abstract***

*Dengue vector control has been done in various ways, however, has not been able to obtain optimal results. Ovirap use to determine the presence of Aedes sp in a region is often done, but the application of lethal ovitrap for population control Aedes sp still rarely done. This study was aimed to assess the effect of LO applications on populations of Aedes sp.*

*This research includes quasi experimental design with a pretest-posttest control group without randomization. Research sites in dengue in endemic areas in Banyumas district, with a total sample of 100 homes in each treatment and control areas. Insecticides used on ovistrip is cypermethrin at a dose of 12.5 mg ai/strip. Populations of Aedes sp measured each week for three weeks prior to the intervention and twelve weeks during the intervention. The mean density of Aedes sp compared before and after intervention and between treatment and control areas.*

*The study showed the difference of mosquito densities before and after the intervention in the experimental group was 0,07 ( p-value 0.044), whereas the control group was 0.037 (p-value 0.341).*

*LO use with the addition of insecticide active ingredient cypermetrin on ovistrip impact on the decline density of Aedes sp.*

***Keywords***

*lethal ovitrap, DHF, Aedes sp*

## 1. Introduction

Dengue Haemorrhagic Fever (DHF) has been known in Indonesia as a disease that can cause death and cause anxiety in the community. The disease is common in Indonesia with tropical environment, poor sanitation as a potential mosquito breeding, and lack of public awareness. In 2010, dengue prevalence in Indonesia reached 150.000 cases, highest was recorded in Bali at 337 per 100.000 people, followed by Jakarta 227/100.000, East Kalimentan 167/100.000 and Yogyakarta 144/100.000 (Fondation, 2012).

The various serotypes of the dengue virus are transmitted to humans through the bites of infected Aedes mosquitoes, principally Ae.aegypti. This mosquito is a tropical and subtropical species widely distributed around the world, mostly between latitudes 35 $^{0}$N and 35 $^{o}$S (WHO, 2009). In average, each

aedes aegypti lives around 30 days and the female puts between 130 and 200 eggs in each gonotrophic cycle (Carlos & Mello, 2009).

Various efforts have been made both vector control with fumigation (adult mosquitoes), abatisasi (larvae), and PSN to eliminate mosquito breeding sites. All three of these methods have been carried out but the results are not optimal. Dengue vector control with 3 M plus an effort that is quite effective, but this effort is based on the participation of the community so that its success depends on the activity level of society. In addition, both the control with insecticides and mosquito larvae is no 100% effective. Thus, a lot of opportunities and needs to choose an alternative control methods that are environmentally friendly, cost effective, and suitable for integration with community-based control programs.

One innovation for dengue vector control method Ovitrap Lethal (LO) which is aimed at Ae. Aegypti adult stage. LO is a modified trap design mosquito eggs (ovitrap) with oviposition strip (ovistrip) insecticide that has been given so that there will be contact with Aedes sp females when they wanted to put their eggs in ovitrap. Based on research conducted in Brazil in 2003 showed that Lethal Ovitrap using deltamethrin insecticide active ingredient can significantly control the populations of Ae. Aegypti (Perich, 2003). The same study in Thailand also showed LO can reduce the population of adult Ae aegyti (Sithiprasasna, 2003). Therefore we proceeded to test the LO against the dengue vector populations in residential area of Banyumas. This study aimed to determine the effect of the application of lethal ovitrap density of Aedes sp.

## 2. Methods

This quasi-experimental study using a pretest posttest control group without randomisation (random allocation). The experiment was conducted in the fourth week of June through the third week of October 2012 in a residential neighborhood in Banyumas (Central Java). Location of the study is two housing (Ledug & Bojongsari, n.d.) in Banyumas which is endemic dengue. Research units are 100 houses in each of the housing, with the distance of the two housing more than 500 meters. Each house is placed 6 ovitrap (3 inside and 3 outside the house) made of pvc diameter of 3 inches and a height of 10 cm and coated ovistrip of filter paper size 4x25cm.

In the treatment group using insecticide-treated ovitrap Cypermethrin 12.5 mg ai/strip (LO) while control using filter paper. Collection of adult mosquitoes is done by one person using a flashlight and aspirator collector collects all the mosquitoes in the house for 10 minutes. Mosquitoes collected were placed in a container labeled with the date and the identification and returned to the laboratory for species identification and number recorded.

Activities are carried out once a week for 3 weeks prior to the intervention and 12 weeks during the intervention, in both treatment and control areas. Data analysis of the difference in the number of adult mosquitoes collected per house using t-test (Deny Kurniawan, 2008).

## 3. Results

Density of Aedes sp mosquitoes resting indoors baseline (pre-treatment) the two sites is relatively the same, after intervention by the LO and ovitrap at both locations are equally a decline in the density of mosquitoes, but in relatively larger treatment area (from 0.10 to 0.02) while in the control region of 0.11 to 0.05 (Table 1).

**Table 1. Density Measurement the Aedes sp Resting Indoor on the Treatment and Control Areas**

| Observation | Treatment | Control |
|---|---|---|
| | Resting indoor | Resting indoor |
| 1 | 0.05 | 0.04 |
| 2 | 0.11 | 0.14 |
| 3 | 0.13 | 0.15 |
| Mean (pre treatment) | 0.10 | 0.11 |
| 4 | 0.05 | 0.06 |
| 5 | 0.02 | 0.06 |
| 6 | 0.08 | 0.10 |
| 7 | 0.02 | 0.10 |
| 8 | 0.00 | 0.02 |
| 9 | 0.01 | 0.09 |
| 10 | 0.01 | 0.01 |
| 11 | 0.03 | 0.01 |
| 12 | 0.01 | 0.02 |
| 13 | 0.02 | 0.02 |
| 14 | 0.02 | 0.03 |
| 15 | 0.01 | 0.03 |
| Mean (post treatment) | 0.02 | 0.05 |

**Table 2. The Mean Difference Densities of Aedes sp Resting between Treatment and Control Group**

| Mean difference in treatment and control | | | | | |
|---|---|---|---|---|---|
| Pre test | | | Post test | | |
| Treatment | control | p-value | Treatment | control | p-value |
| 0.10 | 0.11 | 0,383 | 0.02 | 0.05 | 0.007 |

The density of Aedes sp mosquitoes resting on the treatment unit before the intervention ranged from 00:05 to 00:13 (0:10 average), while the unit comparison (control) ranged from 0:04 to 0:15 (mean

0:11). Although the mean density of resting on the intervention units lower than comparable units, but there is no significant difference (p = 0.383). This means that the density of mosquitoes resting conditions before the intervention, at both sites are relatively similar. Equivalence is the basis for the impact of the intervention on the density of Aedes sp mosquitoes in the house.

**Table 3. The Mean Difference Resting Density of Aedes sp Before and After Treatment**

| Mean difference before and after treatmen | | | |
|---|---|---|---|
| Treatment | | control | |
| Treatment | p-value | control | p-value |
| 0.07 | 0.044 | 0.037 | 0.341 |

Different from the average density of Aedes sp mosquitoes resting on treatment after intervention ranged from 0.0267 to 0.0967 (mean 0.07), whereas in controls ranged from 0.11 to 0.07 (mean 0.037). The mean density of mosquitoes resting post-intervention significantly lower than controls (p = 0.007).

**4. Discussion**

Effect of application of LO measured density decreased resting Aedes sp before and after the intervention, and compared between the treatment and control. Difference in mean mosquito density before and after the intervention in the experimental group was 00:07 (significantly different, p-value 0.044), whereas the control group was 0.037 (not significantly different, with a p-value 0.341). The calculation results show that the intervention LO with the addition of insecticides on ovistrip can lower population density of Aedes sp in the study site. LO may be of interest to trap the eggs of Aedes sp females will lay eggs and can simultaneously kill mosquitoes that have contact with the insecticide contained in ovistrip. This appeal can be reinforced with attractant substances such as water soaking hay 10%.

LO applications for twelve weeks (84 days) led to the regeneration of the mosquito Aedes sp mosquitoes were disconnected because the eggs hatch into larvae even when examination time ovitrap will be drawn so that the offspring is lost and dead adult mosquitoes exposed to insecticide. One cycle of the mosquito eggs, larvae, pupae and mosquito takes about 14 days or two weeks (Judarwanto, 2007). A female mosquito can survive up to 8 weeks, and had 4-6 times the period of egg-laying. Every time laying eggs, the female Aedes mosquito can spend about 150 eggs, so long as his life can produce 600-900 eggs. If the breeding cycle can be terminated means can reduce the Aedes population in a region significantly.

Although in area treated mosquito density is relatively low but there is the assumption that <5% of a mosquito population that there will be a vector in the transmission season (Ministry of Health of Indonesia, 2003). Decrease in the mosquito population can minimize the potential for a vector due to

the density of mosquitoes also affect survival mainly to do with the threat of enemy/predator. Morbidity and mortality that occurs in some countries due to several factors such as the high density of the vector (Stanley, 2008).

However, other researchers noted that until now has not been proven relationship between population density Ae.aegypti/Ae. Albopictus to the outbreak. Never found despite dengue outbreak populations of Ae. Aegypti is low and vice versa (Lulus, 2012).

Vector control efforts using LO applications, consideration should be given the results showed no statistically significant differences in the parameters of entomology at the treatment area with control. Lethal ovitrap made insecticide Cypermethrin 12.5 mg ai/strip to reduce the density of mosquitoes because mosquitoes will lay eggs that come into contact with treated bed ovistrip and will die. The nature and workings of Cypermethrin is acting as a contact poison that affects the nervous insects by disrupting the normal functioning of the nervous system, causing paralysis and even death within a relatively short time (Stanley, 2008). According to the World Health Organization (WHO), the insecticide active ingredient Cypermethrin has a moderate risk (moderately hazardous) or two levels of categories including toxic than other insecticides such as malathion which is toxic low risk category (Lulus, 2012).

In conclusion, LO use of pvc that has been modified with the addition ovistrip positive impact of insecticide-treated mosquito density can decrease resting at home. This proves that there is now ovitrap which can be developed as a dengue vector control tools more effective and applicable. Dengue vector control with LO application that will be able to obtain significant results when combined with optimal PSN effort so that no one other than a breeding ground for the LO itself.

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