



Effect of Health Education, Abate and Fogging to Larvae Index in Endemis Area at Gowa District, South Sulawesi, Indonesia

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Abstract

Dengue fever disease is still a public health problem in Indonesia in all age groups both children and adults. Health education, fogging and abate is a dengue prevention and control program conducted in Indonesia but fogging and abate programs are being questioned based on several studies in various places. This study aims to assess the effectiveness of health education, fogging and abate on vector density. Health education, fogging and abate were independently intervened in three different sites by taking area from highest number of dengue cases in Somba Opu sub-district of Gowa district respectively; Bonto-bontoa, Tompobulu and Batang Kalulu Villages. Examination of vector density and larva density in each house was calculated by Index House (HI), Breteau index (BI) and Larva density Index (LDI) before and after intervention. The results showed that health education, fogging and abate were still effective in reducing dengue vector density, abate have the highest ability followed by fogging and health education based on HI, BI and LDI. Results of this study confirmed that health education, fogging and abate were still effective in dengue vector control, more specific studies are needed for other areas in South Sulawesi, Indonesia as evidence suggests that some areas was no effective with these three interventions.

Keywords: Aedes Aegypti; health education; fogging; abate.

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1. Introduction

Dengue fever is an infectious disease that continues to be a public health problem; it has been around in Indonesia since 1968 and now become an endemic disease in various regions (Kosasih and his colleagues 2016; Sumarmo, 1987). The incidence of dengue fever has been increased in Indonesia for the last 45 years and its distribution not only children but almost all ages, it is indicated the importance of controlling this disease.

Control and prevention outbreak of dengue fever and protect the community from this disease is needed, especially mosquito breeding and increasing of understanding about disease transmission also public participation against dengue vector [1-3]. Indonesia and some countries with dengue outbreaks, programs aimed to prevent transmission and reduce number of dengue fever cases are using of insecticides with fogging or abate (temephos) [4-6]. Giving abate is a doubtful program now and need reconsideration because some evidence suggests this program is not effective in reducing dengue transmission [6, 7].

Health education, fogging and abate program are dengue fever control and prevention program in Gowa district, South Sulawesi province, Indonesia. This study aimed to compare density of dengue vector density at Somba Opu health center, Gowa district after giving health education, fogging and abate in three areas independently.

2. Material and Methods

The research was conducted in Somba Opu sub-district, district of Gowa which is Endemic of dengue fever area. Sample taking by cluster method, sample unit was 3 villages with the highest cases and finally taken 347 families. Data collection was obtained through field observation by conducting surveys using questionnaires and examination of larva density on each house that became the object of research and index calculated by using House Index (HI), Breteau index (BI) and Larva density Index (LDI).

After the Preliminary Surveys were carried out and preliminary data already exist then intervention treatment was conducted on each research object area. Fogging Focus at Tompo Balang village (105 families), Abate at Batangkaluku village (116KK) and health education at Bontobantua village (126KK). Density vector calculated one and two week after intervention.

3. Results

Data indicated that before program intervention, three villages in Gowa had 299 (69.2%) household with positive larvae at home and after program, it was decreased to 97 (27.95%) household with positive larvae. This difference was statistically significant ($p = 0.000$, $p < 0.05$) (Table 1).

The highest decreasing on Household Index (HI) was abate program, decrease from 99 (85.3%) to 18 (15.5%). It was similar with Container Index (CI), the highest decreasing was the abate program, decrease from 229 (59.2%) to 21 (5.4%). The Breteau Index (BI) also had abate program as the highest decreasing, from 194 to 17

(Table 2).

Table 1: Presence of larvae before and after programs at household

Aedes Aegypti Larvae	Before Intervention	After Intervention	P
Negative	48 (30.8%)	250 (72.05)	0.000*
Positive	299 (69.2%)	97(27.95)	

*Mc Nemar Test

Table 2: House Index, Container Index and Breteau Index before and after intervention

Index	Before Intervention			After Intervention		
	Fogging	Abate	Health	Fogging	Abate	Health
	Tompo balang	Batang kaluku	Education Bonto-bontoa	Tompo balang	Batang kaluku	Education Bonto-bontoa
House Index + (%)	96 (99.4)	99(85.3)	104(82.5)	33(31.4)	18(15.5)	46(36.5)
Container Index + (%)	191(57.2)	229(59.2)	189(46.4)	40(11.9)	21(5.4)	60(14.7)
Breteau Indeks+	182	194	144	36	17	48

Results showed that based on House Index (HI), Container index (CI) and Breteau index (BI), the most successful program to decrease larva index of Aedes aegypti mosquitoes was abate program following by fogging and health education.

Table 3: Index Differences after intervention

Index	Fogging	P*	Abatisasi	P*	Health Education
House Index + (%)	63(68)	0.000	81(69.8)	0.000	58(46)
Container index + (%)	151(45.3)	0.000	208 (53.8)	0.000	129(31.7)
Indeks Breteau +	146	0.000	177	0.000	96

4. Discussion

Dengue fever prevention and control programs intervened in this study; health education, fogging and abate showed significant decrease of larvae index but abate intervention had the highest frequency and larva index difference before and after intervention compared to others. It is reinforce that giving abate still can be used as a program of dengue fever even though there is controversy in some recent studies about effectiveness of abate.

Giving abate or temephos is a long-standing program with safety testing and continues to be a program to date [8, 9] A study also shows that cleaning the containers every week is more effective, temephos only effective on dragon jar in rural areas or when combined with other interventions [6, 9]. Another study reported that larvae

infestations reappeared after 9 weeks of intervention and 7 weeks after estimates of residual removal [10]

After abate, intervention with fogging also has a significant ability to decrease the distribution of positive larvae and its index. The results of this study also confirm that fogging is effective for controlling dengue fever [11]. Fogging related constraints are the community does not accept to be fogged indoors due concerns of contact between the insecticide with the equipment inside the house [12].

Health education concerning burying, closing and draining and vector breeding also proven effective in reducing distribution of positive to negative and decreasing larvae index. Awareness of dengue fever and its prevention is very important [13]. Health education programs should focus on strengthening knowledge about dengue and susceptibility to the disease [14].

5. Conclusion

The results of this study confirmed that health education, abate and fogging are still effective in reducing larvae index, more specific studies are needed for other areas in South Sulawesi as evidence suggests that some areas of the world are no longer effective with these three interventions.

Acknowledgement

The authors would like to acknowledge to friends and family for supporting me during this study.

Competing Interest

The authors declare that they have no competing interests.

References

- [1] Dhimal, M., et al., Knowledge, attitude and practice regarding dengue fever among the healthy population of highland and lowland communities in central Nepal. *PLoS One*, 2014. 9(7): p. e102028.
- [2] Jeelani, S., S. Sabesan, and S. Subramanian, Community knowledge, awareness and preventive practices regarding dengue fever in Puducherry - South India. *Public Health*, 2015. 129(6): p. 790-6.
- [3] Saied, K.G., et al., Knowledge, attitude and preventive practices regarding dengue fever in rural areas of Yemen. *Int Health*, 2015. 7(6): p. 420-5.
- [4] Oki, M., et al., Optimal timing of insecticide fogging to minimize dengue cases: modeling dengue transmission among various seasonalities and transmission intensities. *PLoS Negl Trop Dis*, 2011. 5(10): p. e1367.
- [5] Luz, P.M., et al., Impact of insecticide interventions on the abundance and resistance profile of *Aedes aegypti*. *Epidemiol Infect*, 2009. 137(8): p. 1203-15.
- [6] George, L., et al., Community-Effectiveness of Temephos for Dengue Vector Control: A Systematic Literature Review. *PLoS Negl Trop Dis*, 2015. 9(9): p. e0004006.

- [7] Khun, S. and L.H. Manderson, Abate distribution and dengue control in rural Cambodia. *Acta Trop*, 2007. 101(2): p. 139-46.
- [8] Laws, E.R., Jr., et al., Field study of the safety of abate for treating potable water and observations on the effectiveness of a control programme involving both abate and malathion. *Bull World Health Organ*, 1968. 38(3): p. 439-45.
- [9] Phuanukoonnon, S., I. Mueller, and J.H. Bryan, Effectiveness of dengue control practices in household water containers in Northeast Thailand. *Trop Med Int Health*, 2005. 10(8): p. 755-63.
- [10][1] Garelli, F.M., et al., Water use practices limit the effectiveness of a temephos-based *Aedes aegypti* larval control program in Northern Argentina. *PLoS Negl Trop Dis*, 2011. 5(3): p. e991.
- [11] Osaka, K., et al., Control of dengue fever with active surveillance and the use of insecticidal aerosol cans. *Southeast Asian J Trop Med Public Health*, 1999. 30(3): p. 484-8.
- [12] Pai, H.H. and E.L. Hsu, Effectiveness and acceptance of total release insecticidal aerosol cans as a control measure in reducing dengue vectors. *J Environ Health*, 2014. 76(6): p. 68-74.
- [13] Wong, L.P. and S. AbuBakar, Health beliefs and practices related to dengue fever: a focus group study. *PLoS Negl Trop Dis*, 2013. 7(7): p. e2310.
- [14] Chandren, J.R., L.P. Wong, and S. AbuBakar, Practices of Dengue Fever Prevention and the Associated Factors among the Orang Asli in Peninsular Malaysia. *PLoS Negl Trop Dis*, 2015. 9(8): p. e0003954.