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Physical Condition of Houses and Aedes Aegypti's Larva Index As Predictor Of Dengue Hemorrhagic Fever's Occurrence And Control Management At Manukan Kulon Public Health Center Surabaya

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Abstract- Dengue Hemorrhagic Fever is a contagious disease found in tropical regions with geographical distribution a kind to malaria. The World Health Organization estimated that approximately 50 million people throughout the world is infected with Dengue Hemorrhagic Fever each year. Manukan Kulon Sub-district of Tandes is one of the endemic regions for Dengue Hemorrhagic Fever in Surabaya. The purpose of this study is to analyze the homes physical environmental factors and larvae of Aedes aegypti index as a predictor of the incidence of Dengue Fever and management control in Manukan Kulon Community Health Centers. This study use case-control design by sampling were 100 houses, 50 houses for the case-review group and 50 houses as control group. The results of this research show that Index for houses with Dengue Hemorrhagic Fever was 21,95 %, 126 % container Index with mosquito's density reach 7,33. It was on high category. Efforts to control the spread of dengue hemorrhagic fever is through establishing control toward its vector; implemented by managing the environment and utilizing chemical method, setting up qualified air vents in household, community empowerment, strengthening of Dengue Hemorrhagic Fever free partnerships, improvements on professionalism in Management and developmental environmental health program.

Keywords: - Physical Condition of Residences, Larva Index, Dengue Hemorrhagic Fever (DHF)

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1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease that is found in tropical area with geographical spread that is similar with malaria. Dengue hemorrhagic fever (DHF) was transmitted to human by Aedes aegypti mosquitoes(Kalyanamitra, 2012).Around 2,5 billion of people had risk to be infected by dengue virus. TheAedes aegypti mosquitoes were a vector that had role in transmission of this dengue hemorrhagic fever (DHF). Moreover, these mosquitoes lived in house, in bathroom, in dark place, and outside the house (Misnadiarly, 2009).World Health Organization (WHO) estimated 50 millions of people in the world were infected by dengue in each year (WHO, 2004).Data which was from all countries in the world showed that Asia placed in first place in total of dengue patients each year (Depkes RI, 2010).

The total of dengue patients and the wide area of spread of the disease were more and more along with the increase of the people's mobility and density. In Indonesia, dengue hemorrhagic fever (DHF) was firstly found in Surabaya in 1968 and there were 58 people were infected and 24 people of 58 people died and death rate (Angka Kematian (AK)) was41,3 %. Since then, this disease spread extensively to all areas of Indonesia (Kemenkes RI, 2010).

The high death rate due to dengue hemorrhagic fever (DHF) in Indonesia was caused by dense population and having active relation in transportation with other areas. Hence, the effect of high mobility in population was assumed to have contribution to the spread of the disease that was suffered by human as carier and it made difficulties in detecting the source of place where the disease spread out (Suroso, 2004). Until in 2012, dengue hemorrhagic fever (DHF) was still one of health problems in Indonesia that the Incident Rate/IR of dengue hemorrhagic fever (DHF) was occurred in 65,70 for 100.000 people and this number was higher than national target in National Medium Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional(RPJMN)) and Strategic Plan of Ministry of Health (Rencana Strategis (Renstra) Kementerian Kesehatan) in 2012 - 2014 that was settled in 55 for 100.000 people (Kemenkes RI, 2010-2014).

Since first time the dengue hemorrhagic fever (DHF) was found in Surabaya in 1968, the incident rate of dengue hemorrhagic fever (DHF) tended to increase by the time. Moreover, the place where the people suffered dengue hemorrhagic fever (DHF)

spread to 400 districts of 474 districts in Indonesia and made an outbreak (Kejadian Luar Biasa/ KLB) in a year in some high endemic areas (Siregar, 2004).

In 2008-2010, for three years sequentially, Surabaya had been occurred KLB of dengue hemorrhagic fever (DHF) with high incident rate and high death rate and increased more and more which in 2008 was occurred 527 cases (IR 19,35/100.000 people) and 2 patients were dead (CFR 0,38%.), in 2009 was occurred 660 cases (IR 20,08/100.000 people) and three patients were dead (CFR 0,45%), in 2010 was occurred 1.014 cases (IR 37,80/100.000 people) and three patients were dead (CFR 0,30%). Meanwhile, in 2011 the case of dengue hemorrhagic fever (DHF) decreased which it was occurred 170 cases (IR 9,21/100.000 people) with no patients died (CFR 0). However, in 2012, the case of it increased again which was occurred 1,091 cases (IR 38,60/100.000 people) and 6 patients were dead (CFR 0,55%) (Dinkes Surabaya, 2013).

Moreover, there were some areas in Surabaya where were occurred dengue hemorrhagic fever (DHF) in high number of cases such as in sub-district of Sukomanunggal, Tandes, Benowo, Simokerto, Krembangan, Sawahan and Wiyung. (Dinkes Surabaya, 2013).The action of 3M had positive role to prevent the KLB of dengue hemorrhagic fever (DHF) in Surabaya (Chi-square, $p<0,05$) with RR = 2,65. So did the action of giving abate that had role in decreasing the risk of dengue hemorrhagic fever (DHF) (Chi-square, $p<0,05$) with RR = 2,51 (Fathi, 2005).

The sub-district of Manukan Kulon,Tandes, was one of endemic areas of dengue hemorrhagic fever (DHF) in Surabaya that annually was occurred continuously the increase of the total of case. The existence of Aedes aegypti larva and lack of study about physical condition of a house (temperature, humidity, light, ventilation, floor type, and wall condition) of an area was a predictor of the population ofAedes aegypti mosquitoes in the area.

The activities were done such as systematic observation continuously which supported responsiveness / caution to a change of people's health status (Dinkes Prov Jatim, 2013). The purpose of Early Caution System (Sistem Keawaspadaan Dini (SKD)) was in order to anticipate, detect early, and do rapid and effective action (Hidayah dan Hargono, 2008). Moreover, the problem of the case of this study was the people's physical house and the relation of larva index of Aedes aegyptimosquitoes in Public Health Center of Manukan Kulon was still unclear. Therefore, a predictor in anticipating KLB was very needed. In addition, the purpose of this study was to analyze the factor of physical house and larva index of Aedes aegyptias the predictor of dengue hemorrhagic fever (DHF) and the management control in Public Health Center of Manukan Kulon, Surabaya.

2. RESEARCH METHODS

This study was a descriptive analytic observational study by using case control design. The case study of case control in this study was epidemiological study design that analyzed about the correlation between the clarification (the factors of the research) and the disease by comparing case group and control group based on its clarification status.

The amount of the sample was taken based on criteria (WHO 1972) in order to determine HI, BI, CI and based on the criteria of Indonesian Minister of Health No. 1091, 2004 which was about the calculation of ABJ. In order to be able to calculate the density of larva population, it was needed minimum total of 100 houses. The determination of these samples was by looking at some criteria as follows:

1. The selection of larva as the sample of this study was done by single larva method, which each container of each people's house was taken one larva, afterwards, the researcher examined to determine the species of Aedes aegypti in laboratory.
2. Some houses saved some secondhand either inside or outside the house that had potency to become breeding place for Aedes aegypt mosquitoes.
3. Then, from 100 houses which were chosen, they were divided by 2 groups of sample which were sample that was taken from 50 houses of negative dengue hemorrhagic fever(there were not any dengue patients) and sample that was taken from 50 houses of positive dengue hemorrhagic fever.

Moreover, the determination of physical condition of the house was by doing observation. Meanwhile, the independent variable of physical condition of the house involved temperature, light, humidity, ventilation, floor type, and wall condition and larva index that consisted of House Index, Container Index, and Breteau Index. Whether, for the dependent variable was the occurrence of dengue hemorrhagic fever that was the dengue case in Manukan Kulon, Tandes, Surabaya.

3. RESULTS AND DISCUSSION

3.1 The Correlation between Temperature and the Occurrence of Dengue Hemorrhagic Fever

According to the result of chi square calculation, the value of 4,00 with $p = 0,046$. With (α) was in 0,05, hence, it would have significant impact if $p < \alpha$ ($0,046 < 0,05$). It meant that there was a significant correlation between the temperature and the occurrence of dengue hemorrhagic fever in Manukan Kulon with Odd Ratio (OR) in 0,44. If it was in< 0,05, it would be 95% of confidence level, odds ratio was stated significant that meant it could represent the whole population. The result of Odd Ratio(OR) calculation showed that the house that did not have

unqualified temperature had possibility to make the people who lived in it suffered dengue hemorrhagic fever in 0,44 times higher than in a house which had qualified temperature. This was appropriate with Yuniarti's study (2010) who stated that the temperature and the rainfall did not had significant correlation with the occurrence of dengue hemorrhagic fever in Administration City of East Jakarta in 2004-2008 where the temperature could be related with the facility in the house such as door and window as the component that supported well to create qualified temperature in the house (Ramachandra et al, 2013). In the other hand, a study conducted by Nirwana et al. (2013) stated that temperature was the factor that influenced the occurrence of dengue hemorrhagic fever. This was because different place that caused different factors of dengue hemorrhagic fever occurrence.

3.2 The Correlation between Humidity and the Occurrence of Dengue Hemorrhagic Fever

According to the result of the study about the influence of humidity toward dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya was known that houses which had humidity in<60% at the dengue patient's house were60% or30 houses and the houses which there were not any dengue patients were 48% or24 houses. Meanwhile, the houses that had humidity in >60% at the dengue patient's house were40% or 20 housesand the houses which there were not any dengue patients were52% or 26 houses. The result ofchi square calculation was 1,449 with p = 0,229. With the fault degree (α) was in 0,05, hence, it did not influence significantly if p < α (0,229 > 0,05). It meant that there was no a significant correlation between humidity and dengue hemorrhagic fever in Manukan Kulon. Moreover, it was in contrast with a study conducted by Yuniarti (2010) who showed that there was significant correlation between humidity and the occurrence of dengue hemorrhagic fever with p=0,01.

3.3 The Correlation between Light and the Occurrenceof Dengue Hemorrhagic Fever

Light was one of environment factors of physical house that influenced the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya. The result of the study about the influence of light toward the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya was known that houses which had light >60 lx at the dengue patient's house were 28% or14 housesand at the houses which there were not any dengue patients were 62% or31 houses. Meanwhile, houses which had light in <60 lx at the dengue patient's house were72 % or36 housesand at the houses which there were not any dengue patients were38 % or19 houses. The result ofchi square calculation was11,677 with p = 0,001. With the fault degree (α) was in 0,05, hence, it would have significant influence if p < α (0,001 < 0,05) which meant that there was a significant correlation between the light and the occurrence of dengue hemorrhagic fever in Manukan Kulon with Odd Ratio (OR) in 4,19.

The result of Odd Ratio (OR) calculation showed that a house that had light in< 60 lx had possibility to make the people who lived in it to be suffered dengue hemorrhagic fever in 4,19 times higher than a house that had the light in > 60 lx. This was supported by another study conducted by Sholihah (2014) who stated that the light factor had significant correlation toward the occurrence of dengue hemorrhagic fever in Lontar, Sambikerep, Surabaya.

3.4 The Correlation Between Ventilation and the Occurrenceof Dengue Hemorrhagic Fever

Ventilation was one of environment factors of physical house that influenced the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya.Based on the result of the study about an influence of ventilation toward the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya was known thathouses which had a ventilation in <10% at the dengue patient's house were20% or 10 houses and at the houses which there were not any dengue patients were 38% or 19 houses, meanwhile, houses which had ventilation in >10% at the dengue patient's house were80% or 40 houses and at the houses which there were not any dengue patients were62% or 31 houses.

The result of chi square calculation was 3.934 with p = 0.047. With the fault degree (α) was in0.05, hence, it would have significant influence if p < α (0,047 < 0,05). It meant that there was a significant correlation between ventilation and the occurrence of dengue hemorrhagic fever in Manukan Kulon with Odd Ratio (OR) in 2.45. Moreover, the value of Asymp Sig (2-Sided) showed p value or the signification of odds ratio value. If it was in < 0.05, it would be 95% of confidence level, odds ratio was stated significant that meant it could represent the whole population.

The result of Odd Ratio (OR) showed that a house which had ventilation in <10%, it had a possibility to make the people who lived in it to be suffered dengue hemorrhagic fever in 2.45 times higherthan house that had ventilation in>10%. Moreover, it was supported by a study conducted by Sholihah (2014) who stated that a condition of ventilation at house influenced to the occurrence of dengue hemorrhagic fever. Good standard of ventilation size becameone of the most basic efforts in preventing dengue hemorrhagic fever because it was related to the condition or construction of the house where the people lived daily.

3.5 The Correlation Between Floor Type and the Occurrenceof Dengue Hemorrhagic Fever.

Based on the result of the study about an influence of floor type to the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya, was known that houses that had unqualified floor type at the dengue patient's houseswere16% or 8 houses and at the houses which there were not any dengue patients were12% or 6 houses. Meanwhile, the houses that hadqualified floor type at the dengue patient's houseswere84% or 42 houses and at the houses which there were not any dengue patients were 88% or 44 houses.

The result chi square calculation was 0.032 with p = 0.564. Withfault degree (α) was 0.05, hence, it would not have a significant influence if $p < \alpha$ (0.564 > 0.05). It meant that there was no significant correlation between floor type and the occurrence of dengue hemorrhagic fever in Manukan Kulon. Furthermore, it was supported a study conducted bySholihah (2014) who stated that floor type did not give an influence to the occurrence of dengue hemorrhagic fever in Lontar, Sambikerep, Surabaya.

3.6 The Correlation Between Wall Condition and the Occurrence of Dengue Hemorrhagic Fever.

Based on the result of the study about an influence of a wall condition to the occurrence of dengue hemorrhagic fever in Manukan Kulon, Tandes, Surabaya, was known that houses that had unqualifiedwall condition at the dengue patient's houseswere 18% or 9 houses and at the houses which there were not any dengue patients were 14% or 7 houses. Meanwhile, the houses that had qualifiedwall condition at the dengue patient's houseswere 82% or 41 houses and at the houses which there were not any dengue patients were 86% or 43 houses.

The result of chi square calculation was 0.298 with p = 0.585. The fault degree (α) was 0.05, hence, it would not have a significant influence if $p < \alpha$ (0.585 > 0.05). It meant that there was no significant correlation between wall condition and the occurrence of dengue hemorrhagic fever. In addition, it was supported by a study conducted by Sholihah (2014)who stated that a wall condition in the house did not give an influence to the occurrence of dengue hemorrhagic feverin Lontar. Sambikerep, Surabaya.

Recommendation of Control Management of Dengue Hemorrhagic Fever in Manukan Kulon, Surabaya

The control of dengue hemorrhagic fever in one area with others, it could be done by using different way based on a cause of the problems. In this study, the environmental factorsthat had significant correlation with the occurrence of dengue hemorrhagic fever in Manukan Kulon, werethe variable of temperature, ventilation and light. The unqualified Ventilation could light less the house, hence, the temperature would be humid. As we know that Aedes aegypti mosquitoes lived in a humid place and were protected by sunlight. The control of dengue hemorrhagic fever could be done by preventing a vector (Aedes aegypti) which can be implemented by managing an environment and chemical method (fogging, spraying by using insecticide, the using of mosquito essence and the using of abate). (Depkes RI, 2005).

The supplying of ventilation must be done to create a healthy house. Enough temperature and light of certain house would be avoided by Aedes aegypti mosquitoes. Moreover, the ventilation was very important in the house due to many reasons. First, it would create good circulation of air in the room. Second, it became the way for entering the sunlight to the inside of the house, so the house would not be dark in the morning, afternoon and evening. Therefore, the qualified healthy house should have standard ventilation.(Depkes RI, 2005).

The selection of an activity in controlling of dengue hemorrhagic fevermust be based on the principle of REESA (Rational, Effective, Efficient, Sustainable, and Acceptable). The controlling of dengue vector was done based on REESA, by the understanding of :

1. Rational: an area of controlling vector activity was suggested to be infected by the vector and this infection fulfilled the criteria which were decided. It included endemic area of IR based on national target and CFR>1%.
2. Effective: it was chosen as a kind of activity in controlling a vector or combination of two methods which was supported each other. It was supposed as the mostsuccessful way to prevent the infection of dengue. The selection of the effective method must be supported by the data of epidemiology, entomology, and knowledge of society's behavior (pengetahuan sikap perilaku (PSP).
3. Efficient: Among the other methods of effective controlof vector, they must be chosen a method that had the cheapest price.
4. Sustainable: an activity in controlling the vector was chosen because it must be done continuously based on the target. The result must be maintained by other activities that had low price.
5. Acceptable: an activity that was accepted and supported by the society.

The control management of an environment was also supported by the program that had been done. Besides, an evaluation was needed to evaluate a survey, giving abate, and giving an information. The realization of survey in control program could be done by many ways based on Kemenkes RI (2011), as below:

a. Role of society

One key of success for controlling of dengue hemorrhagic fever was increasing an active role of society to prevent dengue itself. It could be realized by doing many activities such as social marketing, advocacy, and any information of health which were done intensively and continuously through any mass media either in individual or group by paying attention more to the aspect of specific local social culture.

b. The increase of partnership for preventing free dengue hemorrhagic fever

An effort for controlling dengue could not only be doneby the health sector, but also a role of other sector was very needed here. An identification of stakeholder became the beginning step to increase this partnership. They held through regular meeting by compiling available resource from each. Regular meeting began from planning, monitoring, and appraising through a group of Kelompok Kerja Operasional (POKJANAL DBD) in administration level.

c. The increase ofProfessionalismof Manager in Program

Skilled human resource was an important thing to reach the success of implementing the program in controlling dengue hemorrhagic fever.

d. Decentralization

An optimalization of authority delegation in controlling dengue hemorrhagic fever toward the government was done through SPM in health field.

e. Development of Environmental Health Knowledge

The increase of the quality of environment could prevent the risk of dengue hemorrhagic fever transmission to human. Hence, it would decrease the Incident Rate (IR) as the cause of dengue infection.

4. CONCLUSION

In Manukan Kulon, it was obtained the House Index (HI) that was from dengue patient's house in 64%, Container Index in 22.03%, Breteau Index (BI) in 126% with the number of the population of the mosquitoes (DF) in 7.33% which was categorized as high density. In addition, it was also obtained the House Index (HI) in the non-dengue patient's house in 52%, Container Indexin 19.46%, Breteau Index (BI) in 100% with the number of the population of the mosquitoes (DF) in 6.67% which was categorized as high density. Based on the result above, it could be concluded that the area of Manukan Kulon was categorized as high transmission area of dengue infection. Moreover, the predictor which was used to predict the occurrence of dengue hemorrhagic fever in Manukan Kulon, Surabaya depended on the number of the population of Aedes aegypti mosquitoes and physical condition of house such as temperature, ventilation, and light.

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