Research Article

Dengue Risk Factor in Banguntapan III Primary Health Centre, Bantul, Indonesia

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ABSTRACT

Background: Dengue Haemorrhagic Fever (DHF) is an infectious disease caused by Aedes aegypti mosquito. DHF is widespread in many regions worldwide, with the number of patients continues to increase every year. This study aimed to determine the risk factors for DHF include vector control (3M+) program implementation, residential distance, hanging clothes habit, napping habit, repellent usage, and sunlight conditions.
Method: Analytic observational study with a case-control approach was applied in this study. Samples divided into case and control. Of 16 cases and 32 controls were participated in this study who purposively selected. Data were collected using a questionnaire. Univariate and bivariate using chi-square tests were employed to analyze the result.
Result: Three variables are associated with the dengue incidence in research location: napping habit (OR=11.667), residential distance (OR=1.696), and sunlight condition (OR=0.0289).
Conclusions: napping habits, residential distance, and sunlight conditions are the risk factor of DHF incidence.

INTRODUCTION

Dengue Haemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and be transmitted by (Aedes aegypti) (1). Currently, known four dengue virus serotypes: DEN-1, DEN-2, DEN-3, and DEN-4. Dengue virus raises some symptoms such as high fever accompanied by manifestations of shock and bleeding that could end with death (2). Globally, the number of cases and areas infected by dengue continues to increase each year (3).

Dengue Haemorrhagic Fever (DHF) are found in the tropics and sub-tropics area. Dengue cases arise throughout the year, especially during the rainy season coincided with the optimal conditions for mosquito breeding. At that time, the number of infected people will be increasing in the short period (3). Before 1970, only nine countries experienced an outbreak of dengue fever. But currently, dengue is endemic in more than 100 countries, including Africa, the Americas, the Eastern Mediterranean, Southeast Asia, and the Western Pacific.

America, Southeast Asia, and the Western Pacific have the highest number of dengue cases meaning that dengue increases not only in terms of the number but also the area infected (4).

Indonesia Ministry of Health reported that the mortality of DHF by 2016 and 2017 was reduced three folds from 1,598 and 493, respectively. Dengue was found first time in Indonesia in 1968. Since then, DHF spreads across the country. In 2015 showed that dengue has spread in 34 provinces in Indonesia (5); one of which is Yogyakarta. There are three districts with dengue endemic in Yogyakarta: Yogyakarta, Bantul, and Sleman. Over the past two years, the dengue cases in Bantul were increasing significantly, with 62 cases in 2014 and 1,417 cases in 2015. Banguntapan sub-district is one of the dengue-endemic in this location.

Based on data from the Bantul District Health Office, there was an increase of dengue morbidity in 2014 to 2016, (0.64 ‰), (1.48 ‰), and (2.62 ‰), respectively. The number of DHF cases decreased in 2017 (0.55 ‰) and 2018 (0.18 ‰). Banguntapan sub-district consists of 8 villages and served by three health centers: Primary Health Centre I, II, and III. The population density of 3,984 people / km^2. In 2015, the larvae free rate or called *Angka Bebas Jentik* in three PHC were varied, but all of them were below the national standard (95%). Banguntapan I, II, and III had 84%, 80%, and 82%, respectively (6).

Dengue disease transmits through mosquito bites that contain the virus on their saliva. On the other hand, dengue is an environmental disease because environmental conditions influence mosquito development. Dengue disease is as well as influenced by socio-ecological factors (7). Some previous research revealed that environmental factors and people's habits strongly influence the increase in dengue incidence. The determinant of dengue fever, namely gender, home environment, mobility, not using mosquito repellent, house walls, dug wells, and the residential density is a risk factor getting dengue infections. Besides, people's knowledge, attitudes, and practice are the risk factors for dengue hemorrhagic fever (8–10). Research related to a dengue risk factor is essentials to support policymaker in developing dengue prevention efforts.

METHODS

This study is observational analytic with a case-control design to study the relationship between risk factors of dengue incidence. The case was defined as people who diagnosed with DHF in Puskesmas (PHC) Banguntapan III from January-November 2019. There were 30 cases during that period, and we did total sampling to recruited the respondent. Control was defined as people who not diagnosed with DHF in the same period with the case.

Sampling for case and control were selected by purposive sampling with inclusion and exclusion criteria. Inclusion criteria for the case are the person recorded in the PHC information system as DHF positive and willing to participate in this study. We did a matching with 1:2 ratio case vs. control. Control should live in the same neighbourhood as the case. Exclusion criteria for case and control were someone moves to another place, so it cannot be interviewed.

We used a questionnaire to collect the data. Data were analyzed using univariate and chi-square tests in bivariate.

RESULTS

In total, 48 respondents were participated in this study, consist of 16 cases and 32 controls. The characteristic respondent is presented in Table 1. Most of the respondents are

in the 20-29 years and 40-49 years. The majority of the respondent is female (60.4%), and the majority of respondents are holding university education (39.6%).

Table 1. Characteristics of Respondents

Characteristics of Respondents	Frequency	Percentage
	n	%
Age group		
20-29	12	25.0
30-39	11	22.9
40-49	12	25.0
50-59	6	12.5
60-69	5	10.4
70-79	2	4.2
Gender		
Male	19	39.6
Female	29	60.4
Education		
Primary School	7	14.6
Secondary School	11	22.9
High School	11	22.9
University	19	39.6

Chi square analysis shows, there were three variables associated with dengue incidence: residential distance (p value = 0,020), napping habit (p value = 0,021), and sunlight condition (p value = 0,032) (Table 2).

Table 2. Dengue Risk Factors Analysis in Banguntapan III PHC, Bantul

Risk Factors DBD	P-value	OR	Confidence Interval (CI)	
			Lower	Upper
Vector Control (3M) Implementation	0.918	1.296	0.379	4.434
Residential Distance	0.020	1.696	1.305	2.203
The habit of Hanging Clothes	1.000	1.140	0.332	3.916
Napping Habit	0.021	11.667	1.371	99.294
Repellent Usage	0.460	0.429	0.800	2.308
Sunlight Conditions	0.032	0.289	0.183	0.457

DISCUSSIONS

Our research revealed, the current vector control program called 3M (Menutup, Menguras, and Mengubur), meaning covering of water containers, cleaning of water containers, and burying of discarded containers (11), is not associated with dengue infection. Our finding is different from other research previously in Pare PHC, who stated that vector control had a significant association with dengue incidence (12). Other studies mentioned that vector

control contributed positively to the prevention of dengue outbreaks in Mataram (p <0.05) (8). Vector control is the most appropriate approach to prevent and control dengue outbreaks. Vector control can be well implemented when the community has good behavior on dengue prevention. But, in Banguntapan III, PHC found that the implementation of vector control is quite low. Likewise, WHO (2000) stated that the elimination of the Aedes mosquito larvae with a grain Temephos with a dose of 1 ppm with the residual effects for three months is quite effective to reduce Aedes mosquito populations or increase the number of larvae free, also reduce the risk of dengue outbreaks (13).

Based on the bivariate analysis, there is no relationship between the residential distance and DHF incidence, with the Odds Ratio (OR) of 1.696 with a confidence interval (CI) from 1.305 to 2.203 and p = 0.02. It means a person who lives within the adjacent house had 1,696 times greater risk for DHF compared with people who have space between the house. This factor related to the mosquito flight range that is 100 meters. Accordingly, when the distance between the house less than 100 m, it could be easy for the mosquito to reach other homes to find people or breeding places. Moreover, it will be exacerbated if people have poor behavior, particularly when they less paying attention to the house condition. Our result does not correspond to a survey conducted by Astuti and Lustiyati (2018), who stated that there was no significant relationship (p = 0.662) between the distance of the building with dengue incidence of dengue (14).

The bivariate test shows there is no relationship between habits of hanging clothes with the incidence of DHF. This result is different from Amrieds et al., who stated that there was a relationship between the practice of hanging clothes with the incidence of dengue in 19 November village, Wundulako District of Kolaka in 2016 (15). The WHO says that the mosquito Aedes aegypti prefers to rest in a dark place, moist, hidden area of the building, including a bed, toilet, bathroom, and kitchen. This mosquito seldom found rest outside the house, such as in the plantation or shelter (13). In this study, many respondents use mosquito repellent (79.2%) that could influence the presence of mosquito inside the house.

The person who has napping habit, 11.667 times greater risk for DHF compared with people who do not have napping habit. To see the significance of the coefficient by comparing the value of significance with alpha (5%), the value of significance is 0,021 less than the alpha 0.05, which means that the variable habit of napping is statistically significant with DHF. These findings are consistent with Amrieds et al., which states that there was a relationship between napping habits with dengue incidence in Wundulako District of Kolaka 2016 with p-value = 0.001. It could happen because Aedes has biting time in the early morning and late afternoon when residents nap. Accordingly, people who have napping habit without protection: mosquito nets or repellent is at risk of being bitten by mosquitoes Aedes while respondents were not napping. People also could be bitten by mosquitoes when they are working (15).

We found that there is no relationship between the use of insect repellent with the incidence of DHF. These findings are consistent with research conducted by Riana sari et al., who stated that there was no correlation between the use of anti-mosquito habits with the incidence of dengue in Mustikajaya village with p = 0.066 (p≤0,05) (16). Use individual protection protects people from mosquito bites. These efforts have been undertaken by most of the respondents (79.2) in both the case and control groups. So that in this study, we found no correlation between the use of insect repellent with the incidence of DHF.

The results showed that among the 48 respondents, most respondents (93.8%) have a home with proper sunlight conditions, while three respondents (6.3%) had insufficient sunlight. Based on the bivariate analysis, it shows there is a relationship between sunlight condition and dengue incidence. But light is rolled as a protective factor for dengue

incidence. This research is in line with research Wijirahayu and Sukesi (2019), who stated that no statistical relationship between variable sunlight with dengue incidence (p = 0.39). Houses with insufficient sunlight, high-density family member, and poor behavior of sanitation contributed to the proliferation and spread of the mosquito Aedes aegypti.

CONCLUSIONS

From the results known that residential distance, napping habit, and sunlight conditions are the most potential risk factor in the research location.

Authors' Contribution

DS, HH, MA, and YA are responsible for data collection and manuscript preparation. DN contributed to research permits, data analysis, and manuscript preparation. SS conducted a literature review. SN did research permit application and data collection.

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Conflict of Interest

There are no conflicts of interest.

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