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The Factors Associated With Dengue Hemorrhagic Fever Cases in the Coverage Area of Temanggung Public Health Center in Temanggung Regency, Central Java

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Abstract: *Dengue Hemorrhagicfever is a disease that is rapidly growing in the world. Temanggung is one of the regencieswhere the number of dengue hemorrhagicfever cases was foundconstantly increasing since 2012 until 2016. In Temanggung regency, the cases of denguehemmorhagicfever were always found in the Temanggung sub-district. The sub-district has twoPublic Health Centers namely Temanggungpublic health center and Dharmarinipublic health center. InTemanggung public health center, there were always found the cases of death for 2 years in a row. The purpose of this study was to determine the factors associated with the cases of denguehemorrhagic fever in the coverage area of Temanggung public health center. Research Methods: A case control with a sample of 31 people who suffered from denguehemorrhagic fever in 2017 and 31 people living around the homes of people the denguehemorrhagic fever with a maximum distance of 100 meters from their home. The measurementwasconducted by using questionnaire that had been prepared by the researcher. Statistical tests: chi-square. Results: There is relationship between shower behavioral with the case of dengue hemorrhagicfever (p-value = 0.000 and OR = 12.711 (95% CI = 3.708 to 43.569). There isno relationship between the blood groupwith denguehemorrhagicfevercases(p-value = 0.115) and OR = 2.695 (95% CI = 0.925 to 7.852).There isno relationship betweennutrition status with denguehemorrhagicfever cases(p-value = 0.612) and OR = 3.214 (95% CI = 0.316 to 32.741). Conclusion: The variables associated with the cases of denguehemorrhagic fever in Temanggungpublic health center are bathbehavior.*

Keywords: *hemorrhagic dengue fever (HDF), blood group, nutritional status, personal hygiene*

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I. Introduction

Dengue hemorrhagic fever (DHF) is a major cause of hospitalization and death among children and adults in Latin America and most countries in Asia. The denguehemorrhagic fevercases in the United States in 2015 were 2.35 million cases. From the 2.35 million cases mentioned before, there were 10,200 cases diagnosed as severe denguehemorrhagic fever which caused 1,181 deaths. Meanwhile, in 2016, there was an outbreak of dengue hemorrhagicfever worldwide.(1)(2)In 2015, there was an increase of denguehemorrhagic fever cases compared to the previous year of 61.1 / 100,000 population of 54.8 / 100,000 population in the previous yearin Indonesia. The extraordinary event of DHF percentage in 2016 was 0.6%.(3)TemanggungRegency is a region which experienced an increase of dengue hemorrhagic fever cases since 2012 until 2016. In 2016 there were 5 cases of death from denguehemorrhagic feverin 5 districts and CFR of the DHF extraordinary events= 1.81%.(4)Based on previous studies in Health Office of Temanggungdistrict it was obtained thatthere were always found the cases of death in Temanggungpublic health centersin 2016 and 2017. In terms of environmental conditions, Temanggungdistrict has a height and a temperature to match that of Aedes mosquito breeding which is located less than 1000 m above sea level with a temperature of 30-20 ℃. In addition, the dictricthas the highest population density compared to other sub-districts, this can lead to the possibility of transmission of dengue to be faster.(5)Individual factors can also affect a person experiencing dengue hemorrhagicfever. The individual factors such as nutritional status may influence a person's immunity so it is easier to have the dengue fever. In terms of personal hygiene such as bathing behavior, it is found that one can have body odor caused by perspiration, the odor emitted is attractive to mosquitoes to suck the blood. Based on the literature, blood group ‘O’ associated with the cases of DHF and people with this type of blood can have

odor which is attractive to mosquitoes.[6][7] The purpose of this study was to determine the factors associated with the cases of dengue hemorrhagicfever in TemanggungPublic Health Center of TemanggungRegency, Central Java.

II. Method

This study is a quantitative method with observational case control design. The data used in this study are primary data taken directly by the researchers using a measuring instrument and secondary data of dengue hemorrhagicfever cases in 2017 which were obtained from Temanggung Health Office. This research was conducted by comparing the population who suffered from dengue hemorrhagic fever recorded in Temanggung public health center as a group of cases with people who were not suffered from dengue in the same area as the control group were then measuring whether the personal hygiene (bathbehaviour), blood type, and nutritional status effortsdone by the respondents associated with the cases of dengue hemorrhagicfever in Region Health Center Temanggung. The location of the research is in the coverage area of Temanggung public health center, namelyTemanggung II village, Jampiroso, Kertosari, Tlogorejo, Kebonsari, Jurang, Manding, and Sidorejo where the DHF patients were found there in 2017. The research was conducted in June 2018. The available population of this research is 31 people with DHF in the coverage area of Temanggung public health center in 2017. This study usestotal sampling of 62 respondents consisting of residents recorded suffered from dengue illness of 31 people as case group and 31 people who were not and stayed around the DHF patients with house distance of<100 meters from the homes as a control group. The bathing behavior and blood typeefforts were conducted by interview based on the sheets of questions which had been prepared by researchers. BathBehaviourwere conducted by observation and than nutritional status measurement was conducted by measuring height, weight and asking the respondents' age(body mass index per age). and the analysis of the patients' blood type if there were some patients who did not know their blood type as weel.

The researchers proposed Ethical Clearance to Health Research Ethics Committee of the Faculty of Public Health, University of Diponegoro and sent request to Regent ofTemanggung Regency, andTemanggung Health Office and TemanggungCommunity Health Center as a research locationbefore the study was conducted. Researcher took complete data of patients with denguehemorrhagicfever (DHF) in Temanggung Health Office and visited the houses of people with DHF to collect the data using a measuring instrument which has beed been provided accompanied by health volunteers from the local territory. The researchers then asked for the respondents to sign inform candidates concerned after visitation. After measurements on patients with DHF, the researchers visited the patients' neighbors to do the same measurements as the control group.

III. Results

Here are the characteristics of the respondents; gender, education, age,employment and the research environment description based on the group with DHF and group with no DHF. (Table 1 and Table 2)

Table 1. Characteristics of Respondents by Gender, Education and Employment

Variables	With DHF		With noDHF		Total (%)
	N	%	N	%	
Gender					
- Man	19	61.3	8	25.8	27 (43.5%)
- Woman	12	38.7	23	74.3	35 (56.5%)
Education					
- Not completed in primary school	4	12.9	4	12.9	8 (12.9)
- Elementary school	4	12.9	4	12.9	8 (12.9)
- Junior High School	6	19.4	6	19.4	12 (19.4)
- High School / General / Vocational	12	38.7	9	29	21 (33.9)
- College	5	16.1	7	22.6	12 (19.4)
- Other (D1, D2, D3)	0	0.0	1	3.2	1 (1.6)
Employment					
- Civil Servant	3	9.7	3	9.7	6 (9.7)
- Private Employees	6	19.4	3	9.7	9 (14.5)
- Farmer	1	3.2	3	9.7	4 (6.5)
- Laborer	2	6.5	1	3.2	3 (4.8)
- Army	1	3.2	0	0.0	1 (1.6)
- Student	12	38.7	0	0.0	12 (19.4)
- housewife	4	12.9	11	35.5	15 (24.2)
- Other (traders, retired, honorary / contract employees)	2	6.5	10	32.3	12 (19.4)

Table 2. Age of Respondents and the description of the research environment based on Group with DHF and Group with no DHF

Variables		With DHF	With No DHF
Age	mean	29.10	49.45
	median	24	50
	SD	16.193	15.641
	Min-Max	8-62	25-75
House temperature	mean	28.16	28.76
	median	28	28.40
	SD	1,387	1.3542
	Min-Max	25.9 to 30.5	26 to 31.6
Water temperature	mean	26.50	25.46
	median	27	26
	SD	1.252	1.501
	Min-Max	24-28	23-28
House humidity	mean	71.51	70.56
	median	72	71
	SD	4.566	6.183
	Min-Max	59-78	58-87

Here is a frequency distribution of shower behaviors, blood type and nutritional status efforts undertaken by the group of respondents with DHF and group of respondents with no DHF (Table 3, Table 4, and Table 5)

Table 3. Bath behavior score based on the groups

Bath Behaviour	median	Groups			
		With HDF		With no HDF	
		n	%	n	%
Bad	8	22	91	5	16.1
Good		9	29	26	83.9
Total		31	100	31	100

Table 4. Respondents' Blood Typebased on the groups

blood type group of A, B, O	Groups			
	With HDF		With no HDF	
	n	%	n	%
O	15	48.4	8	25.8
AB	1	3.2	5	16.1
A	7	22.6	7	22.6
B	8	25.8	11	35.5
Total	31	100	31	100

Table 5. Respondents' Nutritional status based on the groups

Nutritional status	Groups				Total
	With HDF		With no HDF		
	n	%	n	%	
Very thin	1	3.2	0	0.0	1
Thin	2	6.5	1	3.2	3
Normal	17	54.8	20	64.5	37
Over weight / Grease	6	19.4	7	22.6	13
Obesity	5	16.1	3	9.7	8
Total	31	100	31	100	62

Table 6 shows the test analysisresults ofthe relationship of bath behaviors, blood type and the nutritional status efforts on the cases of Dengue Hemorrhagic Fever in the coverage area of Temanggung Public Health Center.

Table 6. Analysis Results of the Relationship of thefactors associated with the cases of Dengue Hemorrhagic Fever in the coverage area of Temanggung Public Health Center

No.	variables	*p-value*	OR	CI 95%	Information
1	Bath behaviour	0,000	12.711	3.708 to 43.569	There is Relationship
2	Blood group	0,115	2,695	0.925 to 7.852	No Relationship
3	Nutritional status	.612	3,214	0.316 to 32.741	No Relationship

IV. Discussion

A person's bath behavior affects mosquitoes to suck the blood because someone who has a bad bathroom behavior will cause the odor generated from lactic acid produced by the body through sweat which can attract the mosquitoes to suck the blood.[8][7][9][10]Based on the analysis of the relationship between the bath behavior with the the cases of DHF in the coverage area of Temanggung Public Health center, it was found that the bath behavior has a significant relationship to the cases of DHF in the coverage area of Temanggung Public Health centerwith a p-value = 0.000) and OR = 12.711 (CI = 3.708 to 43.569), so that it can be interpreted that respondents who have bad bath behavior have 12.711 times of higher riskto have DHF than respondents who have good bath behavior.

The results of this research differ from research conducted by Husnah (2016) which states that there is no relationship between the bath behavior with the cases of DHF in Semarang with a p-value = 0.171 and OR = 2.513 (CI95% = 0.826 to 7.642), which means that the behavior of the bath is not a risk factor or protective factor against the cases of DHF in Semarang.[11] The cause of the difference of the results of this research with the research conducted by Husna is because, in a study conducted by Husna, it was onlyconducted by the interview so it could not be ascertained whether the respondents did really have bath behavior in accordance with the answers given during the interviews. The relationship between the bath behaviour with the cases of DHF in the coverage area of Temanggung Public Health Center was found because in this study the majority of respondents who have DHF are in productive age with the minimum age of 8 years old. If it is considered based on employment status of respondents in the group with DHF, it was found that most respondents are students with a percentage of 38.7%. The activities of students in schools are studying and playing, those what make them sweat more. Then, when they return home during the day after school, they perform activities which are usually nap directly without showering first. The odor caused by perspiration will attract mosquitoes to suck the blood. Besides, the nature of the mosquito that likes to suck in the morning until late afternoon.

Khode's research in 2013 showed that dengue infection is higher in group of blood type'O' and stated that there is a relationship between a person who has blood type 'O' with DHF but a group of blood type is not associated with the severity of dengue virus infection.[6]In Levi (2016), it is stated that O blood typeraises odor which is attractive to mosquitoes.[7]Based on relationship analysis of blood type with the cases of DHF in Temanggung, it was found that there is no relationship between blood type with the cases of DHF with a p-value = 0.115. The results of this study differ from research conducted by Alvionita (2017) which resulted that that group of blood type O is a group who most experienced DHF. With regression analysis, it is showed that the blood type has a strong relationship with the the cases of DHF.[12] Although the results of this research differs from research conducted by Khode (2013) and Alvionita (2017), but when it is considered by the number of respondents based on the groups, it showed that 48.4% respondents with DHF have blood type 'O',and it is more than the respondents with blood type O in the group with no DHF, that is 25.8%.

Adequate nutrition affects the immune enhancement. So with a good immune conditions it can decrease the chances of a to be infected by dengue virus.[13]Based on the analysis the relationship between nutritional status and the cases of DHF results thatthere is no significant association between nutritional status and the cases of DHF in the coverage area of Temanggungpublic health center with p-value = 0.612 and OR = 3.214 (95% CI = 0,316- 32.741). Based on the results of univariate analysis shows that the nutritional status of respondents in this study is mostly normal with 37 out of 62 respondents. Those respondents with normal nutritional status are from the group of respondents with no DHF. This study is in line with research conducted by Zarkasyi (2015) who obtained the result that there is no relationship between nutritional status with the the cases of DHF with a p-value = 0.150 and OR = 0.494 (95% CI = 0.187 to 1.303).[14]In the study the nutritional status is measured by the weight of respondents per age (W/A) where the weight can be changed depends on the person's condition. Samples of the research conducted by Permatasari (2015) are people with DHF which are likely to experience a decrease in appetite and it contributes to weight loss of the respondents. Meanwhile, in this study the determination of the nutritional status of respondents is measured by using a body mass index per age (BMI /A).

V. Conclusion

Variables associated with the case of dengue hemorrhagic fever in the coverage are of Temanggung public health center is bath behavior. Bloth type and nutrition status of respondents is not relation with DHF in

Temanggung. Although there is no relationship between the nutrition status andbloth type with the cases of DHF in Temanggung, but the temperature of the environment in Temanggungregencyis suitable for breeding Aedes, that is 27^0c. Moreover, the home environment temperature, humidity in the home of the respondents are also potential for mosquito breeding sites, that is> 60%. The environment in Temanggung Regencywhich fits toAedes mosquito's breeding sites needs to be balanced with the behavior of good mosquito eradication to avoid the increase in dengue cases.

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