Is Food Consumption Frequency Related to Dengue Haemorrhagic Fever Incidence on Toddler, Children, and Adolescents in Semarang City?

by Nur Endah Wahyuningsih

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Abstract

Background: Dengue Hemorrhagic Fever (DHF) is a major public health problem in Indonesia. This infectious disease is caused by dengue virus which is transmitted by *Aedes aegypti* and *Aedesalbopictus* and it can affect all age groups. Semarang is an endemic dengue city in Central Java and in 2015 there were 1,737 cases with 21 deaths (IR = 98.61 per 100,000 population and CFR = 1.21%). This researchwas carried out to analyze the relationship between food consumption frequency with the incidence of dengue in toddler, children, and adolescents in Semarang city.

Method: This research was an observational analytic study using cross sectional design and total sampling. The population in this study were all residents in Semarang city. Samples of 89 DHF cases and 89 healthy respondents were classified into three age groups i.e. toddlers (0-4 years), children (5-11 years) and adolescents (12-25 years). Food consumption frequency of the respondents were obtained using food frequency questionnaire. The data were analyzed by Chi-Square ($x2$).

Results: The results showed that vegetable, fruits, milk, or protein consumption frequency (p = 0.881, 0.881, 0.294and 0.177 respectively) was not related to the incidence of dengue fever in the Semarang city.

Keywords: DHF, food comsumption frequency, toddler, children

1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a infectious disease and it can affect all age groups, including toddler.[1] It is caused by dengue virus which is transmitted by *Aedes aegypti* and *Aedes albopictus*.[1]DHF was first discovered in Surabaya at 1968, where as many as 58 people were infected and 24 fatalities were found (Mortality (AK): 41.3%). Since then the disease was spread throughout Indonesia.[2]

According to the Ministry of Health of the Republic of Indonesia, the number of dengue hemorrhagic fever patients in 2015 in Indonesia was 129.650 cases with 1.071 deaths (Incidence Rate (IR) = 37,27 per 100.000 population and CFR (Case Fatality Rate) = 0.90%).[3] Central Java province is susceptible to dengue fever infection and 35 districts / cities have been

infected by DHF.[4] Semarang is an endemic dengue city in Central Java. The IR of DHF from 2006 to 2015 is always higher than IR of DHF in Central Java and at National level. In 2015 alone, there was 1.737 cases with 21 deaths (IR = 98,61 per 100.000 population and CFR = 1.21%).[5]

We therefore carried out the following research to analyze the relationship between food consumption frequency with the incidence of dengue in toddler, children, and adolescents in Semarang city.

2.   METHOD

This research was an observational analytic study using cross sectional design and total sampling. The population in this study were all residents in Semarang city. Samples of 89 DHF cases and 89 healthy respondents were classified into three age groups i.e. toddlers (0-4 years), children (5-11 years) and adolescents (12-25 years). Primary data of food consumption frequency were obtained by direct interviews using Food Frequency Questionnaire (FFQ) tables. The data were analyzed by Chi-Square (x^2). In the 2x2 tables, if the expected value (E) <5 was not found, then it was tested by Pearson Chi Square. Meanwhile, if the expected value (E)<5 was found, it was tested further by Fisher Exact.

3.   RESULTS

The characteristic of total respondents (89 DHF cases and 89 controls) were shown in Table 1. Most of the respondents, either DHF patients or healthy respondents, were children (40) followed by adolescents (37) and toddler (12). The youngest respondents was 1 year old and the oldest was 25 years old. The mean of respondents age was 11.3 years old.

Table 1. The Characteristic of Respondents

Age	Status						Min	Max	Mean	SD
	DHF patients		Healthy Respondents		Total					
	f	%	f	%	f	%				
Toddler	12	50,0	12	50,0	24	100,0				
Children	40	50,0	40	50,0	80	100,0	1	25	11,3	5,9
Adolescents	37	50,0	37	50,0	74	100,0				

Table 2 showed that the highest frequency of vegetable consumption i.e. >3 times/day was found in a smallest number both in DHF patients and healthy respondents. On the contrary, the lowest frequency of vegetable .

consumption i.e. 0-1 times/day was found in a largest number of DHF and healthy respondents. The same pattern was found for frequency of fruits, milk, and protein consumption

Table 2. Food Consumption Frequency in DHF Patients and Healthy Respondents

Food Frequency	Status					
	DHF patients		Healthy Respondents		Total	
	f	%	f	%	f	%
The frequency of vegetable comsumption per day						
0 - 1 time/day	34	50,7	33	49,3	67	100,0
1 - 2 times/day	28	49,1	29	50,9	57	100,0
2 - 3 times/day	21	52,5	19	47,5	40	100,0
>3 times/day	6	42,9	8	57,1	14	100,0
Total	89	50,0	89	50,0	178	100,0
The frequency of fruits comsumption per day						
0 - 1 time/day	62	48,4	66	51,6	128	100,0
1 - 2 times/day	19	52,8	17	47,2	36	100,0
2 - 3 times/day	5	50,0	5	50,0	10	100,0
>3 times/day	3	75,0	1	25,0	4	100,0
Total	89	50,0	89	50,0	178	100,0

Food Frequency	Status				Total	
	DHF patients		Healthy Respondents			
	f	%	f	%	f	%
The frequency of milk comsumption per day						
0 - 1 time/day	63	47,0	71	53,0	134	100,0
1 - 2 times/day	16	66,7	8	33,3	24	100,0
2 - 3 times/day	4	44,4	5	55,6	9	100,0
>3 times/day	6	54,5	5	45,5	11	100,0
Total	89	50,0	89	50,0	178	100,0
The frequency of protein comsumption per day						
0 - 1 time/day	30	45,5	36	54,5	66	100,0
1 - 2 times/day	31	51,7	29	48,3	60	100,0
2 - 3 times/day	22	53,7	19	46,3	41	100,0
>3 times/day	6	54,5	5	45,5	11	100,0
Total	89	50,0	89	50,0	178	100,0

The result of correlation test was shown in Table 3. The results showed that there were no correlation between vegetable consumption (p value = 0.881), fruit consumption (p value = 0.881), milk consumption (p value = 0.294) or protein comsumption frequency (p value = 0.177) to the incidence of dengue hemorrhagic fever in Semarang city.

Table 3. The Relationship of Food Comsumption Frequency and Dengue Haemorrhagic Fever Cases in Semarang City

Food Frequency	Status				Total		p value
	DHF patients		Healthy Respondents				
	f	%	f	%	f	%	
Comsumption of vegetable							
Not good	44	50,6	43	49,4	87	100,0	
Good	45	49,5	46	50,5	91	100,0	0,881
Total	89	50,0	89	50,0	178	100,0	
Comsumption of fruit							
Not good	44	49,4	45	50,6	89	100,0	
Good	45	50,6	44	49,4	89	100,0	0,881
Total	89	50,0	89	50,0	178	100,0	
Comsumption of milk							
Not good	41	46,1	48	53,9	89	100,0	
Good	48	53,9	41	46,1	89	100,0	0,294
Total	89	50,0	89	50,0	178	100,0	
Comsumption of protein							
Not good	39	44,8	48	55,2	87	100,0	
Good	50	54,9	41	45,1	91	100,0	0,177
Total	89	50,0	89	50,0	178	100,0	

Because there was no correlation, further study was taken by re-interviewing the previous respondents. Thirty two (32) case and 32 healthy respondents were randomly sampled and each group consisted of three age groups i.e. 12 toddler, 10 children and 10 adolescents. The portion of food in each meal was recorded using food frequency questionnaires to estimate daily nutrient intake. Food frequency data was converted to food adequacy and compared to Regulation of the Minister of Health of the Republic of Indonesia Number 75 year 2013. The results were shown in Table 4.

Table 4 showed that most respondents either DHF patients or healthy respondents were in the category of less adequate in fiber, vitamin C, calcium, and protein intake. On the basis of food adequacy, healthy respondents had better adequacy for fiber and protein. On

the other hand DHF patients had better adequacy for vitamin C and Calcium.

Table 4. Description of Food Adequacy Using *Resampling* of the Previous Respondents

Food Adequacy	Status					
	DHF patients		Healthy Respondents		Total	
	f	%	f	%	f	%
Fiber adequacy :						
Less	31	52,5	28	47,5	59	100,0
Enough	1	20,0	4	80,0	5	100,0
Total	32	50,0	32	50,0	64	100,0
Vitamin C adequacy :						
Less	17	42,5	23	57,5	40	100,0
Enough	15	62,5	9	37,5	24	100,0
Total	32	50,0	32	50,0	64	100,0
Calcium adequacy :						
Less	27	48,2	29	51,8	56	100,0
Enough	5	62,5	3	37,5	8	100,0
Total	32	50,0	32	50,0	64	100,0
Protein adequacy :						
Less	25	59,5	17	40,5	42	100,0
Enough	7	31,8	15	68,2	22	100,0
Total	32	50,0	32	50,0	64	100,0

4. DISCUSSION

The results showed that vegetable, fruit, milk, or protein consumption frequency (p = 0.881, 0.881, 0.294 and 0.177) were not related to the incidence of dengue fever in the Semarang city. This could be due to equal food consumption frequency both in DHF patients and healthy respondents. DHF is caused by dengue virus infection which is transmitted by *Aedes aegypti* or *Aedes albopictus* bites. The vulnerability of human host to dengue infection was affected by the immune system.[6,7] Strong immune system is reflected by strong immunity against infection and immunity is strongly related to nutritional status.[8] Up to date, there was no evidence yet to suggest that nutritional status could change host vulnerability to infection after mosquitoes bite. However, several studies showed that nutritional status or micronutrient supplementation such as vitamin D and E could reduce disease severity in patients.[9] Vitamin D is known to play an essential role in the immune system and vitamin D deficiency in the long-term has been associated with the immune disease as well as increased susceptibility to viral infections.[10] In addition, immune function could change easily according to vitamin E status. Vitamin E deficiency can prevent the immune system to fight against infection.[11] The possibility of someone being bitten by *Aedes aegypti*

mosquitoes and hence contracting DHF was influenced by other factors such as the presence of mosquito breeding place. A study by Riza et al (2016) showed that the presence of mosquito breeding places and container index was correlated with incidence of DHF in uptown region of Semarang city.[12]

5. CONCLUSION

It can be concluded that vegetable, fruit, milk, or protein consumption frequency was not related to incidence of dengue hemorrhagic fever with p *value* = 0,881, 0,881, 0,294, and 0,177 respectively.

6. SUGGESTION

Because food consumption frequency didn't describe food adequacy in detail it is suggested to use food recall to determine food adequacy for future research.

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