

Research Article

A study to determine the effectiveness of health education on knowledge of dengue fever and preventive measures among high school students in a selected private school, Malaysia

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ABSTRACT

Background: Dengue fever is a global concern in subtropical and tropical countries as a total of 75,795 dengue cases with 212 deaths has been reported in Malaysia from January to August 2015; 26.8% higher compared with the report in 2014 (WHO, 2015). This study aimed to determine the knowledge on dengue fever and preventive measures before and after health education among high school students.

Methods: Quasi-experimental one group pre-test post-test research design was used in this study. Nonprobability convenient sampling was used to choose 63 subjects in the pre-test and 60 subjects in the post-test. The Cronbach's alpha coefficient measured was 0.7.

Results: Generally, all subjects knew about dengue fever but they had brief understanding about dengue causes, sign and symptoms, mode of transmission and preventive measures. The level of knowledge on dengue fever and preventive measures among high school students before health education was (M=60.44, SD=23.087) and after health education (M=76.55, SD=15.508). There was a significant difference statistically in the scores with p-value <0.05 with the confidence interval (CI) (54.48, 66.41) and (72.54, 80.55) respectively.

Conclusions: School students could be the additional resources and mediators to plead for meticulous dengue fever preventive measures. Hence, health education in the high school level is necessary.

Keywords: Dengue fever, Preventive measures, Health education, High school students, Effectiveness

INTRODUCTION

Acute mesenteric lymphadenitis is a well - defined entity Dengue fever continues to be a global concern in subtropical and tropical countries for the past decades where 2.5 billion populations are at risk.¹⁻⁶ It is apparently the most significant challenge since 1980s and has become a major public health concern in Asia Pacific (with 70% occurrence rate), Middle-East, Africa, the Caribbean and South America.^{6,7} World Health Organization defines dengue fever as the most common arthropod-borne communicable disease caused by four

flaviviral serotypes through the transmission by female *Aedes aegypti* and *Aedes albopictus*.⁴

One bite of an infected mosquito transmits any of the four viral serotypes from viraemic to susceptible humans.^{3,8} Heymann proposed that dengue fever is also addressed as a breakbone fever which is characterized by a sudden onset of fever for 2 to 7 days, followed by myalgia, arthralgia, intense headache, nausea, vomiting and anorexia. Generalized petechial, erythema or macular-papular rash are commonly present.⁹ In addition, leukocytopenia, thrombocytopenia and lymphopenia arise

concurrently secondary to the abrupt viral replication and cellular destruction in the bone marrow.⁵

Based on dengue surveillance summary, the World Health Organisation has documented an increase of dengue cases in Malaysia compared to year 2013 and 2014.⁴ As of 15th August 2015, there were 75,795 cases of dengue with 212 deaths reported in Malaysia. This is 26.8% higher compared with the same reporting period of 2014 (n=59,790).¹⁰

METHODS

A quasi-experimental one group pre-test post-test research design was used to determine the effectiveness of health education on knowledge of dengue fever and preventive measures before and after health education among high school students in a selected school in Malaysia. The target population was Form 4 and Form 5 high school students. Nonprobability convenient sampling method was used to choose the participants who fulfilled the inclusion criteria.

Inclusion criteria

- Form 4 or Form 5 students.
- Both male and female students.
- Able to understand and read English or Malaysian language.
- Willing to participate in the study.
- Not undertaken any teaching session on dengue preventive measures in last three months period.

Exclusion criteria

- Other than Form 4 or Form 5 students.
- Unable to understand and read English or Malaysian language.
- Unwilling to participate in the study.
- Undertaken teaching session on dengue preventive measures in last three months period.

The questionnaire was developed with the guidance from Isa, et al.¹¹ There are 3 parts in the questionnaire; Part A: Demographic characteristics, Part B: Knowledge on dengue fever and preventive measures and Part C: Dengue health education exposure. The questionnaire has multiple-choice questions and participants answered the questions by choosing the most relevant answers.

Health Belief Model guided this study as it is one of the commonest theoretical frameworks used in health promotion and health education studies.¹² The major objective of health belief model is to promote health, healthy environment and prevent individuals from harmful illness through modifiable- predictive theoretical constructs.¹³ The seven theoretical constructs discussed in this model are perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues

to action, motivating factors and self-efficacy (Figure 1).¹²

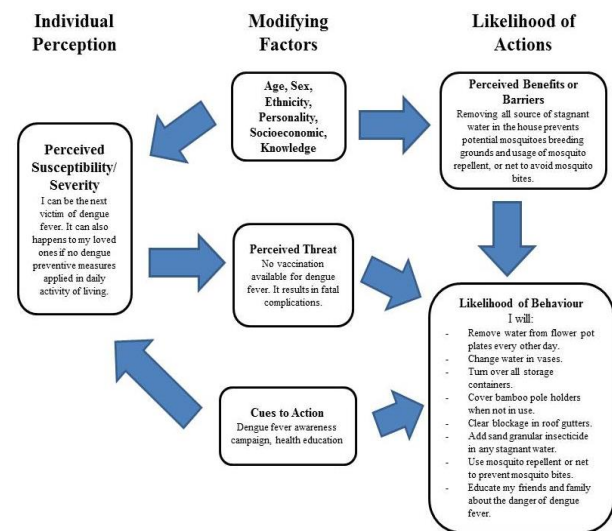


Figure 1: Health belief model on dengue fever preventive behaviours.

The pilot study was conducted among 20 participants in a private school. The Cronbach's alpha coefficient of the instrument measured was 0.7. The validity of the questionnaire was done by content experts. The instrument was modified and revised to suit the local context based on their suggestions. Dengue prevention power point slides were developed under the guidance of National Agency Environment Singapore.¹⁴ A respiratory physician from a private hospital validated the content of power point slides on dengue fever and preventive measures.

A total of 15 minutes was given to complete the three parts of questionnaire during the pre-test and post-test data collection. Following the presentation of power point slides on dengue fever and preventive measures, the same sets of questionnaires were distributed to the same sample as post-test data collection after 2 weeks.

The research was approved by the International Medical University (IMU) Joint Committee of the Research and Ethical Committee. Permission was obtained from the private school to conduct the study. Written consents were obtained from all participants. Participants' rights to privacy, autonomy, confidentiality, fair treatment, protection from discomfort and harm were well preserved.

RESULTS

The data was analyzed using Statistical Packages for the Social Sciences (SPSS) version 22. The demographic data was analyzed by descriptive statistics. Paired t-test was used to find the mean difference between pre and post dengue health education. There were 63 participants

in the pre-test while only 60 subjects participated in the post-test due to absence of 3 subjects during the post test.

Demographic characteristics

The results of demographic data are shown in Table 1. There were 63 participants in the pre- test and 60 participants in the post- test. Among them, 58.7% were male and 41.3% were female in the pre- test, while 60% male and 40% female participated in the post- test. Furthermore, 98.4% of them belonged to Chinese race in the pre-test and 98.3% in the post-test. Indians were 1.6% in the pre-test and 1.7% in the post-test. In addition, 36.5% subjects in the pre- test were from Science stream and 36.7% were from Science stream in the post-test. There was only 1.6% and 1.7 % subjects from art stream in the pre-test and post- test respectively. The rest of the subjects were from other study stream in the pre-test (61.9%) and post- test (61.6%) (Table 1).

Table 1: Distribution of demographic characteristics.

Demo-graphic characteristics	Pre-test (n=63)		Post-test (n=60)	
	Frequency	%	Frequency	%
Gender				
Male	37	58.7	36	60
Female	26	41.3	24	40
School level				
Form 4	63	100	60	100
Form 5	0	0	0	0
Race				
Malay	0	0	0	0
Chinese	62	98.4	59	98.3
Indian	1	1.6	1	1.7
Others	0	0	0	0
Type of study stream				
Science	23	36.5	22	36.7
Art	1	1.6	1	1.7
Others	39	61.9	37	61.6

Knowledge on dengue fever and preventive measures

The results in Table 2 shows a total of 88.9% subjects have heard of dengue fever in the pre-test compared to 100% subjects in the post-test. There are 58.7% subjects who claimed that dengue fever is transmitted by mosquito bites, 30.2% mentioned that it is transmitted through blood, 4.8% mentioned that dengue fever was waterborne and 6.3% subjects had no idea about the route of transmission in the pre-test. In the post test, there was significant increase in the understanding about dengue transmission route, where 85% of them mentioned as mosquito bites, 1.7% subjects as airborne, 11.6% subjects thought that it was blood borne and 1.7% waterborne. The response to the question on type of mosquito, Aedes mosquito was the highest selection in the pre-test (60.3%) and post-test (85%). About 35% subjects had no idea about dengue mosquito in the pre-test in which they demonstrated good understanding about mosquito involved after health education. Most subjects did not

know the mosquito biting time in the pre-test, as 49.2% subjects thought that 7 p.m. to 9 p.m. was the time duration when mosquito stays active. After the health education, a total of 85% subjects understood correctly that the mosquito biting time is from 6 a.m. to 8 a.m. and 7 p.m. to 9 p.m. (Table 2).

Table 2: Distribution of knowledge on dengue fever.

Knowledge of dengue fever	Pre-test (n=63)		Post-test (n=60)	
	Frequency	%	Frequency	%
Have you heard of dengue fever				
Yes	56	88.9	60	100
No	7	11.1	N/A	N/A
Dengue transmission				
Mosquito bite	37	58.7	51	85
Airborne	N/A	N/A	1	1.7
Blood transmission	19	30.2	7	11.6
Waterborne	3	4.8	1	1.7
Don't know	4	6.3	N/A	N/A
Type of mosquito				
Aedes	38	60.3	51	85
Anopheles	1	1.6	5	8.3
Culex	1	1.6	1	1.7
I don't know	23	36.5	3	5
Mosquito biting time				
6 a.m. to 8a.m.	N/A	N/A	1	1.7
7 p.m. to 9p.m.	31	49.2	5	8.3
6 a.m. to 8 a.m. & 7 p.m. to 9 p.m.	20	31.7	51	85
Other times	2	3.2	3	5
I don't know	10	15.9	N/A	N/A

The response to the questions on signs and symptoms of dengue fever, all subjects chose high fever in both pre-test (100%) and post-test (100%) followed by deep muscle and joint pain in the pre-test (88.9%) and headache in the post-test (95%) respectively. Only 6.3% subjects chose enlarged lymph nodes in the pre-test which shows significance statistically after the post-test (p-value <0.05). There was also significant difference in the knowledge on identification of dengue signs and symptoms of diarrhoea, headache, loss of appetite, eye pain and nausea and vomiting among the subjects after health education (p-value <0.05).

A total of 98.4% subjects chose roof gutter as the commonest mosquito breeding ground in the pre-test while 98.3% subjects chose flower pot trays as the commonest mosquito breeding ground in the post-test. About 69.8% subjects thought that there is availability of dengue vaccination in the pre-test.

Figure 2 shows the understanding of availability of dengue vaccination among the subjects. The awareness of

knowledge on vaccination increased to 82.5% after health education (Figure 2).

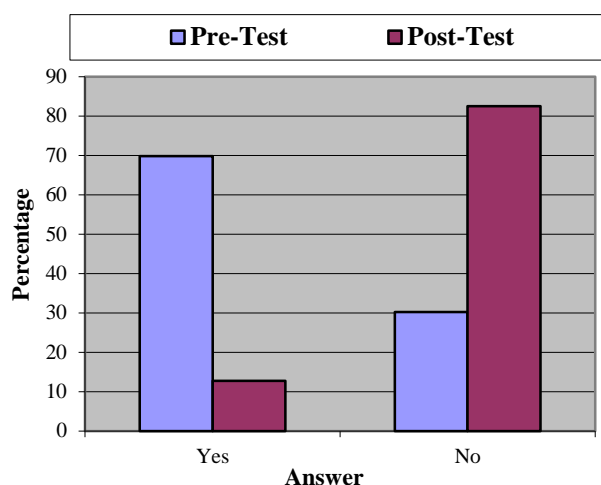


Figure 2: Response of subjects towards the availability of dengue vaccination.

About 96.8% subjects relatively agreed that keeping the drain free is essential to prevent dengue fever transmission during the outbreak in the pre-test and 96.7% subjects chose removing the water from flower pot trays as the vital aspect to prevent dengue fever transmission during the outbreak.

The highest rated dengue preventive measures to mosquito bites were usage of mosquito repellents and mosquito bed nets followed by wearing long pants respectively. Nevertheless, wearing socks and wearing shoes were the least rated dengue preventive measures in the pre-test while wearing shoes and usage of fans to reduce mosquito were the least chosen dengue preventive measure in the post-test.

Rating of importance to carry out dengue fever preventive measures when away for holidays were evaluated in the pre-test and post-test. The scores ranged 0 to 4 (0= Very important, 1= Important, 2= neither important nor unimportant, 3= Unimportant, 4= Very unimportant). Sealing off all gully traps ($M= 0.89$, $SD= 1.079$), sealing off all floor drainage sites ($M= 0.90$, $SD= 1.011$) and storage of water in tightly sealed containers ($M= 0.94$, $SD= 1.045$) were highly rated as the important dengue preventive measures to carry out when away for holidays in the pre-test ($n=63$). In addition, removal of all source of stagnant water ($M= 0.40$, $SD= 0.558$), inspection of drains for potential blockage ($M= 0.42$, $SD= 0.530$) and cover all toilet bowls ($M= 0.45$, $SD= 0.622$) were rated highly in the post-test ($n=60$). However, clearing drains from leaves was rated the least important dengue preventive measures to carry out when away for holidays in the pre-test ($M= 1.71$, $SD= 1.237$) and post-test ($M= 0.73$, $SD= 0.899$).

Dengue health education exposure

Dengue is not included in the school curriculum based on the results collected in the pre-test and post-test. The results also showed that there was no one school which organised dengue related campaign both in the pre-test and post-test.

There were different type of sources of dengue information obtained by the subjects in the pre-test and post-test. Television (93.7%, 93.3%), newspaper (90.5%, 88.3%) and internet (73%, 78%) were the commonest source of dengue information. However, dengue campaign (4.8%, 23.3%) and others (12.7%, 6.7%) were the least common sources of dengue information. Others included hospital, family and friends.

Relationship between health education and knowledge on dengue fever and preventive measures

The effective of health education was compared to the level of knowledge on dengue fever and preventive measures as demonstrated in the pre-test and post-test data. Paired t-test with the significant confidence of 0.05 was utilized to determine the effectiveness of health education on knowledge of dengue fever and preventive measures among the subjects. There was a statistical significant difference in the scores for pre - test ($M= 60.44$, $SD= 23.087$) and post - test ($M= 76.55$, $SD= 15.508$); $t(59) = -8.635$, $p\text{-value} = 0.000$ which is <0.05 , 95% with the confidence interval (CI) of (54.48, 66.41) and (72.54, 80.55) respectively. Therefore, the null hypothesis was rejected.

DISCUSSION

Knowledge on dengue fever

The pre-test study results show that 88.9% subjects heard of dengue which is similar to the results of a study conducted by Al-Dubai, et al 89.7%.¹⁵ Nevertheless, the percentage was relatively higher compared to 62.5% subjects heard of dengue in a study conducted by Paul and 77% subjects in a study by Dhimal, et al.^{16,17} Even though 88.9% subjects heard of dengue but only 60.3% understood that Aedes mosquito is the carrier of dengue fever and mosquito bite transmitted dengue fever (58.7%) in the pre-test which is supported in the study by Bota, et al, they reported that only 50% answered Aedes mosquito as the carrier correctly out of 94.4% subjects who heard of dengue.¹⁹ However, the percentage rose to 85% from 60.3% for Aedes mosquito and 85% for mosquito bites as dengue transmission in the post-test. In this study, 49.2% subjects pointed 7 p.m. to 9 p.m. as mosquito biting time and 31.7% subjects mentioned mosquito biting time from 6 a.m. to 8 a.m. and 7 p.m. to 9 p.m. in the pre-test. This result is also similar with Bota, et al, Neupane, et al and Yboa and Labrague.¹⁸⁻²⁰ Nevertheless, 85% subjects had

better understanding about the correct mosquito biting time after the health education which was appropriate to choose the best dengue preventive measures.^{19,21}

Only 61.3% subjects have understanding about dengue signs and symptoms. Therefore, it is vital to improve the awareness of dengue knowledge among school children. In the post-test, the finding of at least 84.3% subjects were able to perceive dengue signs and symptoms which was similar finding in the post-test study done by Suwanbamrung.²²

In the study conducted by Bota, et al, the subjects essentially had no clear image of mosquito breeding grounds (9.9%).¹⁹ However, in comparison with this previous study, 83.4% subjects had clear idea about the possible mosquito breeding grounds in the pre-test and 95.7% in the post-test. Most subjects were aware that the tray under the fridge, water container, flower pot trays, an opened water tank, roof gutter, an abandoned tyre and in the garbage could be breeding grounds for Aedes mosquito. This result had similar findings as Neupane, et al.²⁰

It is crucial to promote awareness and provide thorough health education among the school children. This is where health belief model is related; the element of perceived severity refers to individual's beliefs and perception about the severity or seriousness of a disease based on medical knowledge which could create a general effect in his or her life.¹²

Knowledge on dengue fever preventive measure

The pre-test finding showed that mosquito repellents were highly rated as dengue preventive measure followed by mosquito bed nets and wearing long pants. Static and stagnant surfaces are the attraction breeding grounds of mosquito.^{15,18,19,22} Hence, it is relevant and significant to educate the subjects regarding the importance of stagnant surfaces removal to prevent potential mosquito's breeding ground. Nonetheless, the removal of all source of stagnant water was the highest rated after health education followed by inspection of drains for potential blockage and cover all toilet bowls.

Dengue health education exposure

Comprehension of dengue fever preventive measure is a requisite to prevent dengue fever. But, dengue fever is not a part of school curriculum syllabi in the learning. All subjects did not receive any dengue related health information in the last 3 months according to the data in the pre-test (100%). This result corresponded to the findings in Suwanbamrung, Bota, et al and Isa, et al.^{11,19,22} All subjects did not engage themselves in any dengue prevention activities or health promotion activities before the conduction of this study. Television, newspaper and internet were the prevalent source of dengue health information in this study.

Relationship between health education and knowledge on dengue fever and preventive measures

Generally, subjects had better understanding of dengue fever and dengue preventive measures after health education. There was a significant difference statistically in the scores for pre - test (M= 60.44, SD= 23.087) and post - test (M= 76.55, SD= 15.508); $t(59) = -8.635$, $p\text{-value} = 0.000$ which is <0.05 . Therefore, the null hypothesis was rejected. Total commitment of dengue preventive measures obliges good foundation of dengue knowledge in which health education comes into place. There is necessity to expose dengue education as part of school curriculum to promote dengue awareness.

CONCLUSION

School students could be the additional resources and mediators to plead for meticulous dengue fever preventive measures. Hence, health education in the high school level is necessary.

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