Dengue Hemorrhagic Fever Knowledge, Perception, and Preventive Behavior among Secondary School Students in Bangkok

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Objective: *To explore dengue hemorrhagic fever (DHF) knowledge, perception, and preventive behavior among secondary school students in Nong-Kheam, Bangkok, Thailand.*
Material and Method: *A cross-sectional descriptive study was conducted with 300 students between 12 and 16 years old currently attending secondary schools in the Bangkok metropolitan areas using self-administered questionnaires. Data were subsequently summarized using descriptive statistics.*
Results: *Only 18.0% of students had a good level of overall knowledge of DHF, but more than half had a good level of perception of DHF. The results also revealed that only 4.7% of students had a good level of preventive behavior and 75.6% required improvement.*
Conclusion: *The levels of knowledge, perception, and preventive behavior were low. Health education programs should be continued and intensified with emphasis on improving the knowledge of students on prevention and control practices.*

Keywords: *Preventive behavior, knowledge, perception, dengue, students*

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Over half of the world's population resides in areas potentially at risk for dengue transmission, making dengue one of the most significant human viral diseases in terms of morbidity and mortality. The incidence of dengue fever (DF) has grown dramatically around the world in recent decades and some 2.5 billion people, or two-fifths of the world's population, are now at risk for contracting dengue. The World Health Organization (WHO) currently estimates there may be 50 million dengue infections world-wide every year[1]. Over 50 million infections, with about 400,000 cases of dengue hemorrhagic fever (DHF), are reported annually and the disease is a leading cause of childhood mortality in several Asian countries[2]. An estimated 50-100 million dengue infections occur every year, including 500,000 cases of DHF that require hospitalization; this is the equivalent of approximately one DHF case every minute[3]. At least 21,000 deaths from DHF occur every year, mostly among children, which is the equivalent of one young life lost to DHF almost every 20 minutes[4]. The acute severities were found within unusual manifestations and vertical transmission to infants[5,6].

The rise in the incidence of dengue has been marked by expanding geographical distribution of the virus and the mosquito vector *Aedes aegypti*, which is found worldwide in tropical and sub-tropical areas. Dengue viruses, the causative agent of DF and DHF and dengue shock syndrome (DSS), are comprised of four distinct serotypes (DEN-1, DEN-2, DEN-3, and DEN-4). Recovery from infection from one serotype provides lifelong immunity against that serotype but confers only partial and transient protection against subsequent infection by the other three.

DHF has become a leading cause of hospitalization and death among children in several countries[7]. Researchers have noted that, despite growing levels of knowledge and awareness about dengue and mosquitoes, many people are still not taking action. In some countries, people know dengue is caused by mosquitoes and that mosquitoes can breed in water containers, yet they fail to take preventative

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measures and containers are left unprotected. Therefore, WHO has facilitated strengthening epidemiological surveillance, accelerated training, and supported adoption of WHO standard clinical management guidelines for DHF. These guidelines promote behavioral change at the individual, household, and community levels to improve prevention and control and seek to accelerate research on vaccine development, host-pathogen interactions, and development of tools and interventions. Therefore, focus needs to be placed on changing behaviors to overcome the problem of DHF and not only on increasing knowledge and raising awareness.

Nong-Khaem is situated in Bangkok and has a population density of 3,587 persons/km^2. According to annual data from district health office, dengue cases occur throughout the year. The school curriculum in the district includes dengue prevention and control activities organized by Bangkok Metropolis Administration (BMA). This program was initiated more than five years ago and is administered in collaboration with the Ministry of Education. In order to reduce morbidity and mortality related to DHF, activities are conducted in the school and home environments.

The objectives of this study were to assess the current preventive behavior, knowledge, and perception of dengue fever as well as to describe the general characteristics of respondents. The theory used in this research integrated the health belief model in the framework for understanding the mechanism of health related behaviors. During real-life situations, there was a relationship among several aspects of knowledge and perception with the students' behavior in preventing DHF, all of which are interesting reasons to study this framework.

Material and Method

Research design

This research was a descriptive cross-sectional study design that aimed to investigate dengue knowledge, perception, and preventive behaviors among secondary school students using self-administered, structured questionnaires.

Study site and study population

The present study was conducted in Bankhunprated and Watudomranqsee Schools, two government secondary schools in Nong-khaem, Bangkok. The target population was students in Grades 7 to 9. No previous research about preventive behaviors and knowledge of this age group existed prior to the present study. The area of the study is situated in a semi-urban area near Bangkok where dengue prevalence is high.

Sample size and sampling technique

The sample size was calculated by the following formula[8]: $n = Z^2_{\alpha/2} P (1-P)/d^2$ where n is the sample size, $Z_{\alpha/2}$ is the value from normal distribution associated with 95% confidence level (= 1.96), p is the proportion of good preventive behavior on dengue hemorrhagic fever in 2007 (71.02%)[9], and d is the allowable error (0.055). When these values were substituted in the formula, the resulting sample size was 220 students. From a total of 24 classrooms the two schools, one class per grade from each school was randomly selected, resulting in a sample population of six classes with 50 students each. Data were collected from all the students in each class for a total sample group size of 300.

Research instruments and measurements

The research instrument was a self-administered questionnaire composed of four parts including Part I: general characteristics, Part II: knowledge of DHF, Part III: perception of DHF, and Part IV: preventive behavior for DHF. The self-administered questionnaire form was prepared in Thai and self-administered. The perceived severity, benefits, and barriers to the perception on DHF were modified from the Health Belief Model (HBM)[10].

The questionnaires were prepared and reviewed for content validity by experts. Before actual data collection, pre-testing was done with 30 students in a Bangkok secondary school. Cronbach's alpha was used to test the internal consistency of the scale[11]. The reliability result was 0.701 for knowledge level, 0.621 for the perception and 0.713 for preventive behavior.

EpiData software version 3.1 was used for statistical analysis. Frequency and percentage were used to analyze all variables. Mean, standard deviation, minimum, and maximum were calculated for the analysis of quantitative data such as age of respondent, number of family members in the household, and number of children under 15 years of age in the household.

The questionnaire was structured as follows:

Knowledge of DHF

This refers to the ability of a person to understand DHF in terms of mode of transmission, signs and symptoms, severity, and prevention and control

activities.

Twenty questions tested knowledge about mosquitoes' characteristics and method of transmission (twelve questions), signs and symptoms (three questions) and prevention and control (five questions). One point was awarded for a correct answer and no points were awarded for incorrect or missing answers. Possible scores could range from 0 to 20. The knowledge level of students was categorized into three groups. Good level of knowledge was more than 80% correct, moderate level of knowledge was 60-80% correct, and needs improvement level was less than 60% correct answers.

Perception of DHF

This refers to respondents' various perceptions including perceived susceptibility, perceived severity, perceived benefits and perceived barriers to performing dengue prevention and control activities. The perception topics were measured by 20 questions within three scales: agree (3 scores), uncertain (2 scores) and disagree (1 score) for positive statements and agree (1 point), and reversed the scores for negative statements. Variables concerning the level of perception of students were categorized into three levels: good level of perception was more than 80% scores, moderate level of perception was between 60-80%, and needs improvement level of perception was less than 60%.

Perceived susceptibility

This refers to the respondents' subjective perception of the risk of contracting dengue through the mosquito vector.

Perceived severity

This refers to the respondents' feelings concerning the seriousness of contracting dengue including clinical consequences (death, shock, and other hemorrhagic signs).

Perceived benefits

This refers to the respondents' beliefs regarding the effectiveness of available vector control activities on dengue infection and perceived benefits of taking preventive measures.

Perceived barriers

This refers to the respondents' feelings about potential negative aspects of vector control activities, which may act as obstacles in undertaking preventive behavior against dengue.

Preventive behavior on dengue

This refers to dengue prevention activities which can be done individually or in groups, such as larval control activities, insecticide spraying in schools, sleeping under bed nets at home, eliminating mosquito breeding sites, and environmental modification measures like cleaning brush and removing discarded items in which mosquitoes can breed.

Twenty-five questions tested preventive behavior. A three-point scale was used with points calculated as: 2 for always, 1 for sometimes, and 0 for never. The total score from each student was summarized. The highest score was 50 and the lowest score was 0. The scores were then calculated as percentages of the total score. Preventive behavior levels were then categorized into three levels by using the following scale. A good level of behavior was more than 80%, a moderate level of behavior was between 60-80%, and a needs improvement level was less than 60%.

Ethical aspect

The present study was approved for ethical clearance by the Ethics Committee for Human Research, Faculty of Public Health, Mahidol University No. MUPH 2009-058. Permission to conduct this study was received from the chief provincial medical officer and the school principal in Nong-Khaem. Informed consent forms were obtained from students and their parents.

Results

Demographic characteristics of the respondents

Information collected about the characteristics of students included age, sex, place of residence, parents' education and occupation, number of family members, number of children under 15 years of age in the household, type of house, current living status, people who sought treatment in hospital in the six months prior to data collection, and where information regarding dengue activities was gathered.

The mean age was 14 years with 98% between 12 to 15 years old. Most of the students (81.1%) resided in Nong-Khaem. Nearly half the students' fathers and mothers, had only a primary school education. Most students' fathers and mothers were laborers (62% and 54.7%, respectively). About two-fifths of students resided in a single, own area house and one-fourth was in rented-shared house. A total of 62% of students lived with both parents and 19% lived with only their

mother. Nearly three-fourths of the students had between three and six family members living in their house. Twenty-seven respondents (9%) had a previous dengue infection and sought treatment in a hospital during the six months prior to data collection. Details are shown in Table 1.

Knowledge of DHF

A total of 97% of students gave correct answers on the appearance of mosquitoes that can transmit dengue (black and white stripes) and 92% knew that mosquitoes rest in dark, humid places. More than half of the students knew that dengue infection is not transmitted by inhalation. Over 90% of students knew that high fever with vomiting and rashes are symptoms of dengue infection, 96% knew that dengue must be treated in a hospital, and 96.3% knew dengue infections could be severe and result in death if treatment is not received promptly. Over one-fourth of students, or 27.7%, knew dengue could not spread from patients to healthy people. More than 90% knew that covering water containers and using larval eating fish are effective preventive methods. Just over at this time-fourth of students knew DHF could not be prevented at this time by vaccine. 69.7% knew using an electric fan can keep mosquitoes away. Details are shown in Table 2.

Perception of DHF

Over 90% of students had a good level of perception about DHF (94.3%). The students understood both children and adults can get dengue if they do not prevent mosquito bites, and that DHF can occur throughout the year, and patients who have already been infected cannot be infected again in a short time (6 months up to 1 year), with 94.3%, 74%, and 62%, respectively. Regarding perceived severity, 72.3% of students had an agreed perception of dengue's seriousness. About one-third of students agreed that DHF is more severe in the elderly than in children and high temperatures with coffee-ground vomiting and red spots are recovery signs of DHF, 91.3% agreed that DHF could lead to death if prompt and accurate treatment is not given. According to student perceptions, they agreed on weekly changing of water containers to destroy larvae and eggs was quite common perception (88.7%) on prevention of DHF. Students agreed that putting small larval eating fish in domestic water containers is an easy way to reduce larvae and that removing old tires and discarded items to prevent mosquitoes from laying eggs are effective preventive measures at 86.3% and 84.3%, respectively. They also knew removing water in open containers, using mosquito repellent during the day, and using mosquito coils during the day are easy ways to prevent DHF, at 81.7%, 73.7%, and 61%, respectively. Seven questions asked about barriers to dengue preventive behavior. Most had fewer lowers to tightly covering water container (69.3%) or weekly changing of containers (64%) as shown in Table 3.

DHF preventive behavior

Questions about behavior included personal protection, environmental management, biological control, chemical control, and school activities (Table 4). More than half the students (68.3%) always use an electric fan when sleeping during the day. More than one-third of students (38%) always use bed nets/ window screens when sleeping during the day. Regarding environmental control, 61.3% of the students occasionally help their parents clean brush and discarded items around their houses. 68% of the students occasionally cleaned the area surrounding their school, while 6.8% never cleaned the dark corners in their house. Considering biological control, one-third of respondents always used larvae eating fish in home water containers. In school, 45% of students always clean the classroom and 52.3% sometimes participate in weekly campaigns for activities like larval control. For chemical control, the most common method of dengue prevention was using chemicals (68.7%) and spraying in the classroom (41.7%). More than two-thirds of students participated in school activities concerned with DHF.

Levels of preventive behavior, knowledge, and perception

Overall levels of knowledge, perception, and preventive behavior are presented in Table 5. It was found that 75.6% of respondents needed to improve their level of preventive behavior and only 4.7% had a good level of DHF preventive behavior. Only 18% had a good overall level of knowledge. More than half had a high level of perception with regard to various aspects, the lowest of which was perceived barriers (67.0%) and the highest susceptibility (91.7%).

Discussion

Knowledge of secondary school students regarding DHF

Even though many respondents had some knowledge about dengue, which is similar to results of

Table 1. General characteristics of students by number and percentage

General characteristics	Number	Percent
Age (years old)		
12	13	4.3
13	98	32.7
14	88	29.3
15	95	31.7
16	6	2.0
Min-Max: 12-16, Mean $\pm$ SD = 13.94$\pm$0.947		
Sex		
Male	118	39.3
Female	182	60.7
Place of residence		
Nong-Kham	243	81.0
Other districts	57	19.0
Father's education level		
None	2	0.7
Primary school	132	44.0
Secondary school	59	19.6
High school	51	17.0
Graduated college	18	6.0
Don't know	38	12.7
Mother's education level		
None	5	1.7
Primary school	149	49.6
Secondary school	63	21.0
High school	32	10.7
Graduated	22	7.3
Don't know	29	9.7
Father's occupation		
Unemployed	4	1.3
Laborer	186	62.0
Business	32	10.7
Government employee	6	2.0
Others (such as monk, deceased)	47	15.7
Don't know	25	8.3
Mother's occupation		
Unemployed	29	9.7
Laborer	164	54.7
Business	26	8.7
Government employee	5	1.7
Others (such as nun, deceased)	62	20.7
Don't know	14	4.5
Type of house		
Single own house	125	41.7
Rent-shared house	73	24.3
Townhouse	54	18.0
Condominium	25	8.3
Apartment	13	4.3
Other (such as cottage, temple)	10	3.4
Current living status with whom		
Both Parents	186	62.0
Mother	57	19.0
Other Relative	37	12.3
Father	20	6.7

Table 1. (Cont.)

General characteristics	Number	Percent
Family size (persons)		
2	10	3.3
3-4	129	43.0
5-6	98	32.7
7-9	47	15.7
10-17	16	5.3
Min-Max: 2-17, Mean ± SD = 5.24±2.305		
Children under 15 years old in each household (persons)		
1	160	53.3
2	86	28.7
3	37	12.3
4-6	17	5.7
Min-Max: 1-6, Mean ± SD = 1.73±0.980		
Number of respondents who sought treatment for DHF at hospital within the previous 6 months		
1	23	7.7
2	2	0.7
3	1	0.3
5	1	0.3
Mean ± SD = 1.09±0.287		

Table 2. Number and percentage of correctly answered questions on knowledge of DHF

Statements	Answered correctly	
	No.	%
Characteristics of mosquitoes and transmission of DHF		
Has black and white stripes	291	97.0
Rests in dark, humid places	276	92.0
Lays eggs in clean water	203	67.7
Transmitted by inhalation	194	64.7
Dengue mosquitoes bite at day time	132	44.0
Larvae are easier to eliminate than adults	112	37.3
Lays eggs in sand and polluted water	107	35.7
DHF can spread from patients to healthy people	83	27.7
Transmitted by blood transfusion	79	26.3
Signs and symptoms		
Severe symptoms which could result in death if not prompt treated	289	96.3
Must be treated in hospital	288	96.0
High fever with vomiting and rashes	272	90.7
Prevention and control of DHF		
Covering water containers	280	93.3
Larval eating fish in domestic water	270	90.0
Abating chemicals applied to water containers	219	73.0
Fog spraying killed mosquitoes	217	72.3
Electric fans to keep away mosquito	209	69.7
Vinegar and detergent to kill larvae	191	63.7
Avoiding mosquito bites	135	45.0
DHF can be prevented by vaccine	82	27.3

Table 3. Number and percentage of correctly answered questions on DHF perception

Statements	Agree		Uncertain		Disagree	
	No.	%	No.	%	No.	%
Perceived susceptibility						
Both children and adults can get DHF	283	94.3	12	4.0	5	1.7
DHF occurs the whole year	222	74.0	59	19.7	19	6.3
Malnourished children have a greater chance of getting DHF	88	29.3	148	49.3	64	21.4
Once a person is infected they cannot get DHF again	19	6.3	95	31.7	186	62.0
Perceived severity						
DHF can result in death if not promptly treated	274	91.3	15	5.0	11	3.7
High temperature and coffee ground vomiting are recovery signs	104	34.7	75	25.0	121	40.3
DHF is more severe in the elderly	95	31.7	151	50.3	54	18.0
Perceived benefits						
Weekly changing of water containers can destroy larvae	266	88.7	26	8.7	8	2.6
Small fish reduce larvae in water containers	259	86.3	30	10.0	11	3.7
Removing discarded items to prevent laying eggs	253	84.3	38	12.7	9	3.0
Removing water to reduce breeding	245	81.7	47	15.7	8	2.6
Using repellent is an easy way to prevent DHF	221	73.7	69	23.0	10	3.3
Use of mosquito coils in daytime prevents DHF	183	61.0	97	32.3	20	6.7
Perceived barriers						
Remove discarded things to reduce laying eggs	242	80.7	38	12.7	20	6.6
Larvae are easier to kill than adults	199	66.3	71	23.7	30	10.0
Mosquito spray is not cost effective	116	38.7	116	38.7	68	22.6
Eliminating larvae reduces mosquito but is always not always needed	80	26.7	67	22.3	153	51.0
Don't have time to clean up to prevent breeding	64	21.3	85	28.3	151	50.4
Changing water containers weekly is good but I can't do it	45	15.0	63	21.0	192	64.0
Tight covers on water containers are unnecessary	44	14.7	48	16.0	208	69.3

other studies[12,13], and realized dengue is a disease which spreads via mosquito vector, several misconceptions were identified. In terms of detailed knowledge on DHF, most students knew the characteristics of dengue mosquitoes but were confused about whether mosquitoes can breed on soil or polluted water (35.7%). This result was consistent with a study from Brazil, which found the majority of students had a low level of knowledge regarding the locations in which *A. aegypti* reproduce[14].

When asked whether DHF can spread from patients to healthy people, a large number of students considered dengue contagious, and nearly 70% were not sure whether person-to-person transmission was possible. Only one-third gave the correct answer. These finding were not consistent with similar studies done in the South Asian region in 2005 concerned with dengue awareness and related preventive practices where respondents understood dengue was transmitted by mosquito bites[15]. Only one-third of the students knew that DHF could not be prevented by vaccine. They confused DHF with other vaccine preventable diseases. Regarding knowledge on prevention and control, more than 90% of students knew that covering water containers is one method to prevent mosquitoes laying eggs. Other preventions and control measures like fog spraying, adding chemicals to water containers, and inserting larvae eating fish in water containers were also known among more than 70% of students. These measures were included in their school curriculum.

Perception of secondary school students towards DHF

Students seem to have good perception on susceptibility, severity, benefits, and barriers. More than half (62%) of students gave incorrect awareness to the statement that a person who has had one infection can never be infected with DHF during their lifetime. This is an important perception because

Table 4. Number and percentage of correctly answered questions on DHF preventive behavior

Statements	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
Use electric fans to avoid mosquitoes	205	68.3	82	27.3	13	4.4
Clean classrooms	135	45.0	155	51.7	10	3.3
Sleep under bednet/window screening room	114	38.0	103	34.3	83	27.7
Clean vases or pots	109	36.3	161	53.7	30	10.0
Use larvae eating fish in containers	106	35.3	137	45.7	57	19.0
Clean dark corners	98	32.7	179	59.7	23	7.6
Get knowledge from school teachers	83	27.7	176	58.7	41	13.6
Use salt	80	26.7	114	38.0	106	35.3
Participate in weekly campaigns	80	26.7	157	52.3	63	21.0
Use mosquito repellent/coils	79	26.3	147	49.0	74	24.7
Remove discarded things	76	25.3	172	57.3	52	17.4
Put abate sand in containers	75	25.0	131	43.7	94	31.3
Competition of dengue motto contest	73	24.3	141	47.0	86	28.7
Clean bushes around house	70	23.3	184	61.3	46	15.4
Clean surroundings	62	20.7	204	68.0	34	11.3
Use chemicals	57	19.0	110	36.7	133	44.3
Change water containers	57	19.0	160	53.3	83	27.7
Use vinegar	54	18.0	130	43.3	116	38.7
Use detergent	50	16.7	133	44.3	117	39.0
Clean drains	50	16.7	160	53.3	90	30.0
Display posters	45	15.0	142	47.3	113	37.7
Clean bushes around school	38	12.7	147	49.0	115	38.3
Spray classroom	35	11.7	90	30.0	175	58.3
Wear long sleeves during the day time	31	10.3	134	44.7	135	45.0
Use oil	30	10.0	91	30.3	179	59.7

Table 5. Levels of knowledge perception and preventive behavior of DHF

Statements	Needs improvement		Moderate		Good	
	No.	%	No.	%	No.	%
Knowledge						
Overall knowledge	62	20.7	184	61.3	54	18.0
Knowledge of transmission and signs and symptoms of DHF	49	16.3	201	67.0	50	16.7
Knowledge of DHF prevention and control	85	28.3	144	48.0	71	23.7
Perception						
Perceived susceptibility	3	1.0	22	7.3	275	91.7
Perceived severity	2	0.7	81	27.0	217	72.3
Perceived benefits	1	0.3	16	5.3	283	94.4
Perceived barriers	8	2.7	91	30.3	201	67.0
Preventive behavior	227	75.6	59	19.7	14	4.7

everyone should be on alert to prevent DHF even though they may have had a onetime experience with DHF. Four serotypes of dengue can cause infection more than one time. There is the risk of shock during secondary infections. This factor should be included in school training on DHF.

One question about perceived severity asked about recovery signs of DHF, and found students

(34.7% agreed and 25% uncertain) had misconceptions about recovery signs and clinical symptoms of the disease. According to WHO criteria on clinical diagnosis, these facts are clinical symptoms of dengue. Students should know the disease pattern to increase awareness and prevent disease severity and death. Their ability to recognize the signs and symptoms of dengue is important for them to seek early treatment. They also had positive perception that both children and adult can get dengue if they do not prevent mosquito bites, dengue infection can lead to death if not promptly treated, and that weekly cleaning and changing of water containers can destroy larva and eggs. Students also had awareness of putting small larvae eating fish in domestic containers for reducing larvae. They also had awareness on environmental measures like removing old tires and discarded items prevent mosquito laying of eggs.

Preventive behavior on DHF among secondary school students

The most prevalent preventive behavior among students was using an electric fan while sleeping during the day (68.3%), which was different from results from a study in Pakistan[16]. where it was found that the preferred preventive measures among the adult population were the use of mosquito repellent and coils. In Thailand, electrical devices are easily accessible for the urban population. This finding also differed from other studies in Thailand where results showed that the most commonly used preventive method was covering water containers, similar to a study in Vietnam[17]. The second most prevalent preventive measure that students participated was cleaning classrooms (45%). They also participated in weekly dengue campaigns for larvae- free schools (26.7%).

More than one-third of students always sleep under bed nets and/or use window screens during the day. Most of these students came from laborer families. However, nearly one-third of students used neither type when sleeping during the day. This may be due to using another type of preventive measure like sleeping in an air-conditioned room or using an electric fan. Only 10% of students always wore long sleeved shirts during the day when they were sleeping. Thailand is situated in a tropical region and during the daytime, the weather is quite hot and most children do not want to wear long sleeves.

In schools, vector control is implemented using environmental management. More than 80% of students cleaned brush from around their home and school to reduce breeding sites of mosquitoes. This finding was not the same as a previous study in 2001, where the least common practice of 3 areas in Thailand was eliminating breeding places (used temephos or abate sand changing stored water). This may be due to the improvement of school activities concerned with dengue[18].

Over one-third of students always put larvae eating fish into water containers for reducing larvae density. Schools also support this activity as one of the vector control measures. This finding did not coincide with results of a 2007 study of preventive behavior among migrants in Thailand, where using larvae eating fish was the least commonly practiced preventive measure in this community[9]. Only one-fourth of students always used chemicals to kill larvae mosquitoes in their home and school. Nearly 10% always participate in spraying the classroom to reduce the adult mosquito density. A previous study mentioned that neighbors are important for controlling larval habitats and they were the key persons who asked the government to fumigate adult mosquitoes[19]. The least common preventive measures for the students were putting oil in water containers (10%) to prevent the laying of eggs. The results displayed that the study population was using adequate preventive methods aimed at controlling both the vector's breeding and its spread.

Even though our study found good levels of perception and moderate and good levels of knowledge, three-fourths of students (75.6%) need improvement in their preventive behaviors (Table 5). The samples have the knowledge to prevent DHF as a whole but need to improve their knowledge. It was found that the level of perception of the severity of disease (27.7%) and perceived barriers level (33.0%) had one-fourth sections in improvement and moderate group results in DHF preventive behavior is low too. This is consistent with findings from other research[18,20], which found that Health Belief Model (HBM) has been used in understanding the health related behaviors. It was determined by personal beliefs or perceptions about a disease that strategies can be planned to decrease its occurrence. One report suggested that HBM might be applied as cues-to-action in one's cultural context to address dengue control issues[21].

Conclusion and Recommendation

Conclusion

Data analysis revealed that only 4.7% of students had a good level of preventive behavior. The

majority of students were female (60.7%), and the mean age was 14 years old (SD = 0.9). More than half of the respondents' parents had a primary school education level and worked as laborers. Most of them lived in a single, owned house or rented-shared house. Very few students (9.7%) had sought treatment for dengue in a hospital in the six months prior to data collection. Only 18% of students had a good overall level of knowledge while 61.3% had a moderate level. Each perceived level of DHF among students was quite good.

Recommendation

The findings revealed that the students did not have sufficient knowledge of dengue. The results of the study should be considered in the implementation of a strategic plan for prevention and control of DHF. Based on the present study, it is recommended that health education programs should be continued and intensified with emphasis on improving the knowledge of students on prevention and control practices. The sustainability of the weekly campaign and larval control activities should be presented at least once per three weeks. In addition to logo and poster contests, there should be other activities like games and role-play for the prevention and control of DHF within the school environment. Although previous studies have demonstrated that informal education does not lead to action being taken against the vector, we observed that information was learned from school health programs and recommend these should include media to help students take more interest in the subject. To improve perception, dengue education should be included in movies, radio, and television programs. Teachers should reinforce certain concepts, clarify doubts, and stimulate students to improve. In addition, schools should have training programs for teachers and training courses for student volunteers about health promotion programs for *Aedes* mosquitoes-free communities.

The present study will inform further studies about DHF prevention and control behavior in other communities. For better comprehension of knowledge and perception, a great deal of input is essential for predictive research in developing cost-effective and sustainable control programs in communities.

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Potential conflicts of interest

None.

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ความรู้ การรับรู้ และพฤติกรรมการป้องกันโรคไข้เลือดออกเดงกีในนักเรียนชั้นมัธยมต้นแห่งหนึ่งของกรุงเทพมหานคร

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วัตถุประสงค์: *เพื่อสำรวจหาพฤติกรรมการป้องกันโรคไข้เลือดออกเดงกี ความรู้และการรับรู้ในนักเรียนชั้นมัธยมต้นอำเภอหนองแขม กรุงเทพมหานคร ประเทศไทย*

วัสดุและวิธีการ: *เป็นการศึกษาภาคตัดขวางเชิงพรรณนาในนักเรียน 300 ราย อายุระหว่าง 12-16 ปี ที่กำลังศึกษาในชั้นมัธยมต้นของกรุงเทพมหานครโดยใช้คำถามให้ตอบด้วยตนเอง ข้อมูลที่ได้รับรวบรวมโดยโดยใช้สถิติพื้นฐานเชิงพรรณนา*

ผลการศึกษา: *พฤติกรรมการป้องกันโรค ความรู้ และการรับรู้พบว่า 18.0% มีความรู้โรคไข้เลือดออกในภาพรวมอยู่ในระดับดีและมากกว่าครึ่งหนึ่ง มีการรับรู้ต่อโรคไข้เลือดออกอยู่ในระดับดี (ต่ำสุดคือการรับรู้ด้านความช่วยเหลือ 67.0% และสูงสุดคือการรับรู้ด้านความรุนแรงของโรค 91.7%) ผลศึกษาแสดงให้เห็นว่า 4.7% ของนักเรียนมีพฤติกรรมการป้องกันโรคอยู่ในเกณฑ์ดีและ 75.7% ควรมีการปรับปรุง*

สรุป: *ผลการศึกษาสรุปได้ว่าพฤติกรรมการป้องกันโรคไข้เลือดออก ความรู้ และการรับรู้ที่ดี อยู่ในระดับต่ำการให้โปรแกรมสุขศึกษาจึงควรให้อย่างต่อเนื่องและเข้มข้นมากขึ้น เพื่อเน้นย้ำปรับปรุงความรู้ของนักเรียนในการควบคุมและป้องกันโรค*