

Knowledge and Attitude on Dengue Fever and Practice on Preventive Measures among Malaysia Medical Students

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Abstract: Due to the absence of an approved vaccine or a cure, the most effective measure to prevent and control dengue fever is by preventing the disease transmission by its vector, the *Aedes mosquito*. The control measure requires awareness, support and empowerment of the community. The study is designed to assess the knowledge and attitudes of Malaysia medical students on dengue fever and to find out the practices of preventive measures among them. Total 200 medical students from Year 1 to Year 5 are involved in the study that the overall level of knowledge of medical students on dengue fever was adequate. The attitudes towards dengue prevention and control was also good. However, the practice of dengue control was unsatisfactory. Senior medical students knew dengue fever better than their younger counterparts. There was significant association between gender and knowledge of dengue serotypes.

Keywords: Knowledge, attitude, practice, dengue fever

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I. Introduction

The most effective measure to prevent and control dengue fever is by preventing the disease transmission by its vector, the *Aedes mosquito*. The control measure requires awareness, support and empowerment of the community. To date, there is no definitive treatment for dengue fever (Whitehorn J et al., 2011) and its complications can be fatal. The most effective measure in the prevention and control of dengue fever is by preventing the transmission of the disease by its vector, the *Aedes mosquito*. The control measure requires awareness, support and empowerment of the community. Therefore, it is important to know the level of knowledge, attitudes and the practices of the community on dengue fever. It is also crucial to determine if good knowledge has an influence on practice of prevention and control of dengue.

Dengue disease remains a major public health concern in Malaysia and is likely to remain endemic for a long time. There has been an increase in the incidence of all forms of dengue disease over 2000–2012 (Rohani A et al., 2011). This study is carried out to assess the overall knowledge, attitudes and practices of Malaysia medical students on dengue fever. Taking medical students as a baseline, these findings will also help to provide some information of the general public on dengue fever in Malaysia. It will be applicable in evaluating the success of the ongoing dengue prevention and control programmes in Malaysia as well as to redesign and improve future programmes.

II. Literature Review

2.1. Causal Organism

Dengue fever is an acute viral infection caused by dengue virus. The dengue virus is a small single-stranded RNA virus that includes four distinct serotypes, namely DEN-1, DEN-2, DEN-3 and DEN-4. These serotypes of the dengue virus are from the genus *Flavivirus* and family *Flaviviridae*. Within each serotype, distinct genotypes or lineages (viruses highly related in nucleotide sequence) have been identified. This highlights the extensive genetic variability of the dengue serotypes (Simmons CP et al., 2012).

2.2. Transmission

The dengue virus is transmitted by the bites of infected, female *Aedes* mosquitoes. Principally, they are *Aedes aegypti* and *Aedes albopictus*. Infection with one serotype confers lifelong immunity against that serotype. However, there is no evidence for cross immunity. Therefore, a man can have multiple infections with dengue virus during his lifetime (Simmons CP et al., 2012). Individuals suffering an infection are protected from clinical illness with a different serotype within 2 to 3 months of the primary infection but with no long-term cross-protective immunity (Kurane I, 2007).

Studies suggest that most female *Aedes aegypti* may spend their lifetime in or around the houses where they emerge as adults. This means that people, rather than mosquitoes, rapidly move the virus within and between communities (Gubler DJ, 1998).

2.3. Pathophysiology

During the acute phase of illness, the virus is present in the blood and its clearance from this compartment generally coincides with defervescence. Humoral and cellular immune responses are considered to contribute to virus clearance via the generation of neutralizing antibodies and the activation of CD4+ and CD8+ T lymphocytes. The innate host defense may limit infection by the virus. After infection, serotype specific and cross-reactive antibodies and CD4+ and CD8+ T cells remain measurable for years (Kurane I, 2007). Plasma leakage, hemoconcentration and abnormalities in homeostasis characterize severe dengue. The mechanisms leading to severe illness are not well defined but the immune response, the genetic background of the individual and the virus characteristics may all contribute to severe dengue (WHO. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control, 2009).

2.4. Clinical Features

The incubation period for dengue infection is 4 to 7 days. The range is 3 to 14 days. After the incubation period, the illness begins abruptly and will be followed by three phases: febrile, critical and recovery phase.

Infection with any of the four dengue virus serotypes produces a spectrum of clinical illness ranging from clinically asymptomatic or transient nonspecific febrile illness to classic dengue fever (DF) and dengue haemorrhagic fever/dengue shock syndrome (DHF/ DSS).

The usual presenting clinical features of patients with classical dengue fever (DF) and early DHF/DSS are fever, headache, rash, bone and muscular pains with or without abdominal pain. These presenting features are broad and non-specific. Thus, these may also be caused by other viral and bacterial infections or even non-infective cause of systemic inflammatory process occurring in the early phase of acute illnesses such as autoimmune diseases (Simmons CP et al., 2012). The clinical warning signs of dengue fever are abdominal pain, persistent vomiting and/or diarrhoea, restlessness, altered conscious level, clinical fluid accumulation, tender liver or mucosal bleed. Patients who present with the warning signs have high possibility of rapid progression to severe dengue (WHO. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control, 2009).

2.5. Investigations

Baseline haematocrit (HCT) and white cell count should be established during the first visit in all patients with suspected dengue infection. Serial full blood count and HCT must be monitored as dengue infection progresses. Diagnostic tests include point of care testing such as dengue NS1 antigen test and rapid combo tests (NS1 antigen and dengue IgM/IgG antibodies). Other laboratory tests include NS1 antigen test, dengue antibody detection tests including IgM and IgG ELISA, dengue genome detection assay (real time RT-PCR) and dengue viral isolation assay (WHO. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control, 2009).

Specifications for an ideal dengue test include the ability to differentiate between dengue and other diseases with similar clinical presentation, to detect during the acute stage of infection, provides rapid results, inexpensive and easy to use. However, the interpretation of diagnostic results should be done with the clinical context. (Vorndam V et al., 1997).

2.6. Management

Currently, there is no specific antiviral treatment available for dengue fever. General recommendations include controlling fever and pain with paracetamol rather than aspirin as aspirin may promote bleeding. Supportive care with analgesics, fluid replacement and bed rest is usually sufficient. (WHO. Dengue Guidelines for Diagnosis, Treatment, Prevention and Control, 2009).

2.7. Prevention

Mosquitoes are increasingly resistant to fogging of toxic insecticide, fueling of out-of-control of *Aedes* mosquito-borne viral disease spread around our country and the world. A worrying increase in the incidence of dengue cases nationwide has the Health Ministry of Malaysia pleading the public to take step to combat the mosquito-borne menace.

In the preventions of dengue fever, the most effective way is to prevent mosquitoes bite during the daytime. Wear long-sleeve cloth or long pant to cover the hands and legs from mosquito bites and apply mosquitoes repellent spray on your skin for all your outdoor garden and sport activities. Lean the house gutter to prevent rain water stagnation. Make sure water storage areas are covered to prevent breeding of mosquitoes.

Frequent check and remove stagnant water from your garden and home. Report to the nearest local city council for stagnant water seen in any house under renovation or building under construction area and report to the nearest health center of any suspected case of haemorrhagic fever in the neighborhood. Isolate patient suffering from haemorrhagic fever for at least 5 days. Break the cycle of mosquito-human-mosquito infection. (Mazrura S et al., 2010).

2.8. Epidemiology

Dengue cases reported weekly in 2017-2018 by Department of Health, Malaysia has been sought. In week 26, 2,053 cases with three deaths were reported, recording a cumulative total of 32,435 cases and 53 deaths during the first half of 2018. Although a total number of cases and deaths were fewer compared to same period of last year, it continues to show an upward trend since week 19 (WHO. Dengue Situation Update Number 546, 2018).

III. Methodology

A cross-sectional study was conducted in two private medical universities in northern Malaysia. Total of 200 medical students were involved in the study, including year 1 to year 5 students. Random selection of the participants was done until sample size was achieved regardless of their age and sex. Medical students who refused to participate were excluded in the study. Structured questionnaire was then used for the data collection by using self-administered method. Confidentiality of questionnaires collected was assured.

IV. Results

5.1. Background of the Respondents

The response rate of this study was 100.0%. All 200 medical students that were surveyed have responded (n=200). Among them, 57.0% were female and 43.0% were male. 80 students were from pre-clinical years while the remaining 120 students were from clinical years.

5.2. Knowledge on Dengue Fever among the Respondents

Most medical students knew that there are more than 3 dengue serotypes (68.0%) and were aware of the 2 species of Aedes mosquitoes that transmit dengue fever (60.5%). Majority of the medical students (84.5%) correctly discerned clean stagnant water as the preferred breeding site of Aedes mosquitoes. More than half of the medical students, albeit only to a slight extent (55.5%), agreed that dengue haemorrhagic fever usually occur to people who have had several dengue fevers in the past.

As low as 21.0% of the medical students noticed that Aedes mosquitoes bite in other time of the day besides dusk and dawn. The remaining thought that Aedes mosquitoes only bite during dusk and dawn. 86.0% of the medical students understood that contact with infected patients will not transmit dengue fever. About half of the medical students (52.5%) knew that dengue fever can be transmitted through blood transfusion and organ transplant. Up to 88.0% correctly identified the warning signs of dengue fever. However, 60.5% of them had the misconception that there are classical rash with generalized pruritus during critical phase of dengue fever.

Nearly half (54.5%) of the medical students knew that ELISA and PCR can be utilized to diagnose dengue fever. In this study, 70.0% of them correctly interpreted that blood transfusion is required when platelet count is less than 10,000 and has active bleeding. Furthermore, 64.0% of them agreed that aspirin is not the choice of medication to treat pain and fever in dengue patients.

Only 35.0% of the medical students realized that fogging is not the best method to combat dengue outbreak. As many as 159 medical students, which were close to 80.0% of them, did not know of the disease notification of a suspected dengue fever case. Approximately two-third of the medical students failed to know that Dengvaxia is not available in health facilities in Malaysia.

The data of the knowledge of the respondents on dengue fever was summarized in Table 1.

Table1: Knowledge of medical students on Dengue Fever

Knowledge			Frequency (n)	Percent (%)
1.	Dengue haemorrhagic fever usually occurs to people who have had several dengue.	Yes	111	55.5
		No	63	31.5
		Do not know	26	13.0
2.	There are 3 dengue serotypes.	Yes	28	14.0
		No	136	68.0
		Do not know	36	18.0
3.	Dengue is transmitted in humans by 2 species of Aedes mosquitoes.	Yes	121	60.5
		No	52	26.0

		Do not know	27	13.5
4.	Aedes mosquitoes prefer to breed in clean stagnant water.	Yes	169	
		No	26	13.0
		Do not know	5	2.5
5.	Aedes mosquitoes bite during dusk and dawn.	Yes	154	77.0
		No	42	21.0
		Do not know	4	2.0
6.	Contact with infected patients might transmit dengue.	Yes	23	11.5
		No	172	86.0
		Do not know	5	2.5
7.	Dengue can also be transmitted through blood transfusion and organ transplantation.	Yes	105	52.5
		No	77	38.5
		Do not know	18	9.0
8.	During the critical phase, patient may have a classical rash with generalized pruritus.	Yes	121	60.5
		No	45	22.5
		Do not know	34	17.0
9.	The warning signs of dengue fever include abdominal pain, vomiting or diarrhoea.	Yes	176	88.0
		No	19	9.5
		Do not know	5	2.5
10.	ELISA and PCR can confirm dengue infection.	Yes	109	54.5
		No	37	18.5
		Do not know	54	27
11.	Transfusion is advisable if a person's platelet count is less than 10,000, and he has active bleeding.	Yes	139	69.5
		No	24	12.0
		Do not know	37	18.5
12.	Aspirin (acetylsalicylic acid) is a medication used to treat pain, fever in dengue fever.	Yes	37	18.5
		No	128	64.0
		Do not know	35	17.5
13.	Fogging is the best method for the dengue outbreak.	Yes	113	56.5
		No	70	35.0
		Do not know	17	8.5
14.	Dengvaxia is the vaccine administered in Malaysia for dengue fever.	Yes	66	33.0
		No	64	32.0
		Do not know	70	35.0
15.	Suspected dengue cases must be notified within one week to the nearest health office.	Yes	117	58.5
		No	41	20.5
		Do not know	42	21.0

5.3. Attitudes on Dengue Fever among the Respondents

Up to 90.5% agreed that dengue fever is a serious and possibly fatal disease. 88.0% of the medical students either agreed or strongly agreed that everyone is at risk of getting dengue fever in Malaysia. Out of the 200 medical students, only 6 medical students thought that dengue fever cannot be prevented. 15.5% of the medical students thought that the control of dengue fever is the responsibility of the government. In contrast, 93.0% of them felt that everybody should actively participate in controlling mosquitoes.

Table 2 depicted the attitudes on dengue fever among the respondents.

Table 2: Attitudes of medical students on Dengue Fever

Attitudes			Frequency (n)	Percent (%)
1.	Dengue fever is a serious illness and is possibly fatal.	Strongly agree	80	40.0
		Agree	101	50.5
		Not sure	14	7.0
		Disagree	5	2.5
		Strongly disagree	0	0.0
2.	Everyone is at risk of getting dengue fever in Malaysia	Strongly agree	73	36.5
		Agree	103	51.5

		Not sure	18	9.0
		Disagree	5	2.5
		Strongly disagree	1	0.5
3.	Dengue fever can be prevented	Strongly agree	69	34.5
		Agree	110	55.0
		Not sure	15	7.5
		Disagree	6	3.0
		Strongly disagree	0	0.0
4.	Dengue fever can be treated at home.	Strongly agree	10	5.0
		Agree	77	38.5
		Not sure	31	15.5
		Disagree	54	27.0
		Strongly disagree	28	14.0
5.	It is only government responsibility to control mosquitoes.	Strongly agree	20	10.0
		Agree	11	5.5
		Not sure	11	5.5
		Disagree	104	52.0
		Strongly disagree	54	27.0
6.	Everybody should actively participate in controlling mosquitoes.	Strongly agree	112	56.0
		Agree	74	37.0
		Not sure	10	5.0
		Disagree	1	0.5
		Strongly disagree	3	1.5

5.4. Practices of Dengue Preventive Measures among the Respondents

The results show 28% of the students used long sleeved and long pants daily, those who wore weekly and monthly showed 12% and 1.5% respectively. However, 34.5% of medical students seldom wore long sleeved and long pants as dengue preventive measures and 24% never wear long sleeve and long pants for protection from mosquitoes bite.

Burning midnight oil was a less common practice among medical students as 73.5% of students seldom or never burned mosquito coil to prevent dengue. Those who used daily, weekly and monthly were 19%, 4.5% and 3% respectively.

More than half of the medical students (55.0%) never slept under mosquito net at night to prevent dengue fever and 21% seldom used the mosquito net. Among the respondents, 21% used it daily; those used weekly and monthly were 1.5% and 1% respectively.

Approximately one fourth (28.0%) of medical students used mosquito repellents daily to prevent dengue fever, 14% used weekly and 6% used monthly.

5.5. Association between Knowledge and Year of Study

Table 3: Summary of the Chi-Square Tests to Study the Association between Knowledge and Year of Study of Medical Students

No	Association	Chi-square value	p-value	Significant or not
1	Association between Knowledge of Dengue Serotypes and Year of Study	34.773	0.000	Significant
2	Association between Knowledge of Aedes Species and Year of Study	11.431	0.003	Significant
3	Association between Knowledge of Phases of Dengue Fever and Year of Study	20.264	0.000	Significant
4	Association between Knowledge of Dengue Prevention and Year of Study	18.763	0.000	Significant
5	Association between Knowledge of Disease Notification of Dengue Fever and Year of Study	9.913	0.007	Significant

The summary table demonstrated that there was statistically significant association between knowledge and the year of study. All associations gave significant result with p-value <0.05. Clinical students showed better result than pre-clinical students.

5.6. Association between gender and their knowledge on Dengue Fever

Table 4: Summary Findings of the Chi-Square Test to Study the Association between Knowledge and Gender of Medical Students

No	Table	Chi-square value	p-value	Significant or not
1	Association between Knowledge of Dengue Serotypes and Gender	0.318	0.853	Not significant
2	Association between Knowledge of Aedes Species and Gender	5.425	0.066	Not significant
3	Association between Knowledge of Phases of Dengue Fever and Gender	4.606	0.100	Not significant
4	Association between Knowledge of Dengue Prevention and Gender	9.056	0.011*	Significant
5	Association between Knowledge of Disease Notification of Dengue Fever and Gender	1.065	0.587	Not significant

Table 4 demonstrated significant association between knowledge of Dengue Prevention and Gender. However no statically significant association between gender and knowledge of Dengue serotypes, Aedes species, Phases of dengue Fever ad disease notification.

5.7. Sources of Information

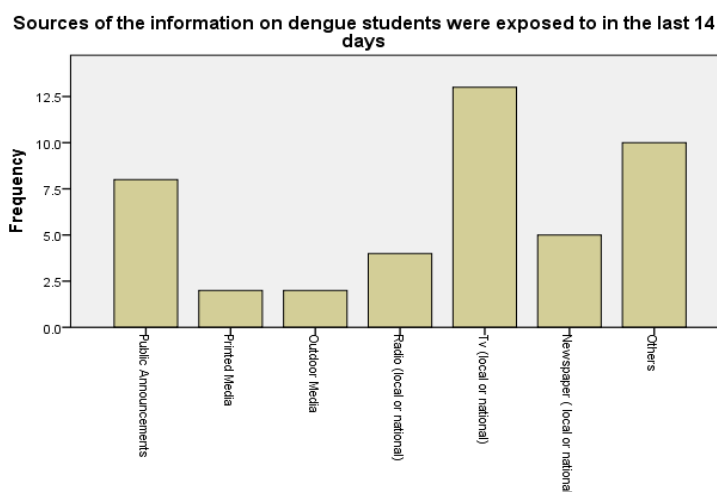


Figure.1: Sources of Information on Dengue Students Were Exposed to in the Last 14 Days

Among 44 responded students, as high as 78.0% of the respondents did not receive any information regarding dengue in the last 14 days. 44 out of 200 medical students, which was merely 22% of them, received information on dengue from different sources in the last 14 days. The main sources of information were from TV, social media and public announcement. The two most under-utilised sources of information were printed media and outdoor media.

V. Discussion

The study revealed that most medical students knew about the number of dengue serotypes and Aedes mosquito’s species that transmit dengue fever. However, the exact dengue serotypes and the naming of the two Aedes mosquitoes that are primarily responsible for dengue fever were not assessed.

The overall level of knowledge of medical students on the preferred breeding site of Aedes mosquitoes and the transmission of dengue fever were good. This is important as with this knowledge the chain of infection can be broken. Even so, this has to be put into practice. Medical students’ knowledge is seldom put into practice as majority of the students did not wear long sleeved and long pants and burn mosquito coil to prevent dengue. Mosquito repellent on the other hand was a more preferable option as 48% of medical students used it at least once a month.

Despite having the knowledge of its breeding site, transmission as well as its danger, most medical students failed to actively involved in community cleaning of household and surroundings (gotong-royong) and health promotion activities on dengue fever. Thus, it is fair to infer that there was a discrepancy between knowledge and practice. Further studies can be conducted to explore the association between knowledge and practice among medical students and to come to a more definitive conclusion.

The majority of respondents managed to identify the warning signs of dengue fever. Their ability in recognising warning signs is crucial for them to seek early medical attention so that prompt treatment can be given.

The level of knowledge was poorest in two areas: disease notification and Dengvaxia. Many respondents did not know of the disease notification of a suspected dengue fever case. Many were not aware that Dengvaxia is not available in health facilities in Malaysia as it is still under review by the Ministry of Health.

The study illustrated that most respondents did not receive any information regarding dengue in the last 14 days. Among those few who were exposed to information on dengue, TV, social media and public announcement were the main sources of information. Printed media and outdoor media were poorly utilised. The main intent of any media is to pass information to the public, be it electronic or printed media. Therefore, printed media will still make its stand in the digital age, but a shift will definitely be required to engage with the younger demographic.

As for the attitudes towards dengue prevention and control, most medical students believed that it is not just the responsibility of the government, everyone has a role to play. As comforting as this might sound, attitudes are difficult to gauge and many do not practise what they know and what they think or feel.

There was significant association seen between knowledge and year of study. Medical students in clinical years performed better than those in pre-clinical years. This showed that formal education in medical school might be contributing to their level of knowledge apart from their major sources of information.

VI. Conclusion

In conclusion, the study showed that the overall level of knowledge of medical students on dengue fever was adequate. The attitudes towards dengue prevention and control were also good. However, the practice of dengue control was unsatisfactory. There was a significant association between knowledge and year of study. Senior medical students knew dengue fever better than their younger counterparts. There was significant association between gender and knowledge of dengue serotypes. Future programmes have to focus on transformation of good knowledge and attitudes into practice.

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