KNOWLEDGE, ATTITUDES AND PRACTICES ON INFLUENZA A (H1N1) AMONG KELANTANESE SCHOOLCHILDREN

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Abstract. Assessment of schoolchildren's knowledge, attitudes, and practices towards influenza A (H1N1) is crucial as schools play a major role in spreading the infection. The aims of this study were to determine the level of knowledge, attitudes, and practices on influenza A (H1N1) and the factors associated with practices of preventive behavior.A cross sectional study was conducted from July until December 2010. Two public secondary schools for two districts in Kelantan, Malaysia were randomly selected. Data were collected using a self-administered questionnaire. The questionnaire consisted of five constructs: sociodemographic, risk factors of containing influenza A (H1N1) infection, knowledge, attitudes, and practices. The questionnaire had been tested for its construct validity and reliability. General linear regression was applied in the data analysis. A sample of 436 secondary school students were recruited in this study involved Malay students aged 16 years old. The total knowledge, attitudes and practices scores for the overall respondents were 69.4, 82.2, and 73.8%, respectively. The significant influencing factors for the practices of preventive behavior were attended talk on H1N1 and attitudes score.This study suggested that health education is important for promoting the health of adolescents and contributing to the overall health of the public so that they will take precautions against the H1N1 infection.

Keywords: KAP, influenza A (H1N1), schoolchildren, Kelantan

INTRODUCTION

Three influenza viruses have caused major pandemics during the 20th century: the 1918 H1N1 virus (Spanish influenza), the 1957 H2N2 virus (Asian influenza), and the 1968 H3N2 virus (Hong Kong influenza). On the 11th June 2009, the World Health Organization (WHO) declared an influenza pandemic caused by a new H1N1 strain, thus acknowledging the first pandemic of the 21st Century (CDC, 2009). WHO has reported over 18,138 deaths of influenza A (H1N1) worldwide on 30th May 2010 (WHO, 2010).

In Malaysia, the first confirmed case of H1N1 was on 15 May 2009, and this

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made Malaysia the 36 country to detect H1N1(Ministry of Health Malaysia, 2010a). While in Kelantan, Malaysia, the first case was reported on 1st July 2009, and by 31 August 2009, the number had increased to 329 cases with one death. Nearly three-quarters (74.0%) of H1N1 cases in Kelantan affected those in the 10-25 year-old age group. As of 14 August 2010, the number of deaths from of H1N1 remained 92, with 15,584 cases of H1N1, 34 cases in wards, and 3 cases in the intensive care unit (ICU) (Ministry of Health Malaysia, 2010b).

The first reports of the H1N1 pandemic suggested that the virus mainly affects children and younger adults, and the infection spread within households. During seasonal influenza epidemics, children are often the first to be detected, and high infection rates are usually detected in school-aged children. Schools provide a suitable environment for the transmission of influenza. Since the beginning of the H1N1 pandemic, several outbreaks in schools have been reported worldwide (Fielding *et al*, 2009; Fraser *et al*, 2009; Smith *et al*, 2009; Calatayud *et al*, 2010).

Despite the fact that generally schoolchildren do not have the highest mortality, they bear a substantial burden of influenza-related morbidity and other infections. Clinical attack rates in children in La Gloria, Mexico were twice those in adults (<15 years of age=61.0%; ≥15 years=29.0%) (Fraser *et al*, 2009). Schools and schoolchildren have been shown to play a major role in the spread of virus infection during the pandemic (Schmidt *et al*, 2009).

Schoolchildren need to be well equipped with knowledge regarding the prevention of H1N1 because schools play a major role in spreading the infection. Assessment of schoolchildren's knowledge, attitudes, and practices is crucial in developing strategies to prevent the transmission of the disease. This study was conducted to determine the level of knowledge, attitudes, and practices about H1N1 among schoolchildren, as well as the potential influencing factors for the practices of preventive behavior.

MATERIALS AND METHODS

A cross sectional study was conducted from July until December 2010. Two public secondary schools of two districts in Kelantan state were randomly selected. Students who were aged 16 years and literate were selected. Those who were slow learners, in a special class, and immigrants were excluded.

Sample size was calculated using single mean formula with the requirements for level of significance 0.05. Standard deviation (SD) of mean attitudes score was 1.01 (Kamate *et al*, 2009) and the estimated difference from population mean score was 0.20 giving the sample size 98 respondents. The sample size was multiplied by two to accommodate for the design effect, and a 20.0% drop out was considered. Therefore, the predetermined sample size was 236 respondents.

A two-stage cluster sampling method was applied. The first stage consisted of selecting two secondary schools for two districts in Kelantan state. Then, a simple random sample of Form Four classes was drawn from the selected secondary schools.

Data were collected by using a self-administered questionnaire. All respondents were informed of the purpose of the

study and the confidentiality of the data obtained. After obtaining the consent and parental permission, respondents were given a short briefing on the questionnaire. The ethical clearance was obtained from Human Ethics Committee of Universiti Sains Malaysia (USM) (Ref No USMKK/PPP/JEPeM[221.4.(1.6)], 2009 Dec 27) and from the Ministry of Education Malaysia (JPKn/SPS/1403/106/fJld.5(96), 2009 Dec 9).

The questionnaire consisted of five constructs: socio-demographic, risk factors for containing influenza A (H1N1) infection, knowledge, attitudes, and practices. The first construct, socio-demographic characteristics, included age, gender, race, family background, educational status of parents, and students' academic results.

The second construct, risk factors, consisted of history of flu within previous six months, smoking history, source of information regarding H1N1, attendance at H1N1 talks, and anthropometric variables (weight and height).

The third construct, knowledge, consisted of 50 'yes,' 'no,' and 'don't know' statements reflecting the different aspects of H1N1, which included etiology, main signs and symptoms, complications, risk factors, modes of transmission, preventive measures, and treatments for H1N1. The items were given a score of '2' for the correct response, '1' for don't know, and '0' for the incorrect response. A total possible maximum score on the knowledge domain was 100.

The fourth construct, attitudes, consisted of 16 statements on overall self-protection. Responses to the statements were 'strongly agree,' 'agree,' 'not sure,' 'disagree,' and 'strongly disagree.' A scoring system was applied using the Likert five-point scale: for a positive attitude, a score of '5' was assigned to 'strongly agree' and '1' to 'strongly disagree.' The scoring was reversed for negative attitude items. A total possible maximum score on the attitudes domain was 80.

The last construct, practices, had 16 statements regarding the practices of hand washing, mouth and nose protection, social distancing, home quarantine, travel restrictions, and taking vitamin and other alternative supplements during the epidemic. Responses to the statements were 'always,''occasionally,' and 'never.' Each item was given a score '3' for an 'always' response, 2 for 'occasionally,' and '1' for 'never.' A total possible maximum score on the practices domain was 48.

The questionnaire had been tested for construct validity and reliability (Basir, 2010). The Kaiser Meyer Olkin (KMO) measure of sample adequacy value for knowledge, attitudes, and practices were 0.68, 0.80, and 0.85, respectively; the Bartlett test of sphericity was significant ($p<0.001$). A total amount of 58.8, 67.2, and 58.9% of variance explained by a factor for knowledge, attitudes, and practices, respectively. The Cronbach's alpha coefficients for knowledge, attitudes, and practices were 0.69, 0.75, and 0.90, respectively.

Statistical analysis

Data were entered and analyzed using PASW® Statistics 18 (SPSS, Chicago IL). Non-responses were treated as missing values and therefore excluded from the analyses. In this study, the frequency of missing values for each and every variable ranged from 18 to 22. The total knowledge, attitudes, and practices scores were expressed as means and standard deviations (SD). All scores of knowledge, attitudes, and practices were converted into percentage scores. The potential influencing factors on practices were examined

by using univariable and multivariable analyses. For the univariable analysis, simple linear regression was applied to identify significant variables. Using the variables that had the p-value ≤ 0.25, biologically plausible and those under main interests of the study, forward general linear regression model was constructed to obtain a preliminary main effect model. After the variable selection, interaction and multicollinearity were checked to obtain the preliminary final model. The final model was obtained after checking model assumptions (linearity, independence, normality, equal variances, and fit of independent numerical variables). The results were presented by appropriate tabulations based on the determined variables, crude or adjusted regression coefficient with 95% confidence interval (CI) and its corresponding p-values. The level of significance was set at 0.05.

RESULTS

The sociodemographic characteristics of the respondents are shown in Table 1. A total of 436 secondary school students were recruited in this study that involved all Malay students aged 16 years old. More than half (58.3%) of the respondents were female.More than two-third of respondents had parents with a secondary education level. A significant number of respondents (59.2%) had attended a talk on H1N1. All of the respondents had heard about H1N1, and their sources were mostly from television (97.2%) and newspaper (93.8%).

The knowledge score for the respondents was 69.4%, with mean (SD) of 69.35 (8.81), out of a possible maximum score of 100. The attitudes score was 82.2%,with a mean (SD) of 65.77 (7.14), out of a possible maximum score of 80; the practices score was 73.8%, with a mean (SD) of 35.42 (6.19), out of a possible maximum score of 48.

The majority of respondents were aware that the main symptoms of H1N1 infection are high fever, coughing, runny nose, sneezing, sore throat, muscle pain and headache. However, less than half of the respondents were able to identify correctly the symptoms when the infection worsened, including recurrent fever, cyanosis, seizure and diarrhea (Table 2). More than two-thirds of them correctly answered that H1N1 is easily spread by coughing and shaking hands. However, more than half of the respondents mistakenly believed that the disease could be spread through food and drink (64.6% and 65.1%, respectively).

In terms of attitudes (Table 3), 76.1% of the respondents believed that controlling an epidemic of H1N1 was the responsibility of everyone. More than half (62.0%) of the respondents were not sure that H1N1 would affect their health. More than two-thirds of them (67.9%) believed that wearing a face mask would reduce the transmission of the disease. Less than half of the respondents (44.7%) believed that government would effectively control the H1N1 transmission.

For behavioral responses to H1N1 epidemic (Table 4), 31.3% of the respondents would wear a face mask when having symptoms of H1N1 and 23.0% would wear it in a public place. More than half of them (56.0%) took protective measures in their hygiene, including hand washing after touching infected individuals and their things; and after coughing or sneezing (51.9%). About half of the respondents (50.7%) limited their contact with those who are coughing or sneezing. However, less than one-third responded that they avoided crowded places, limited travel-

Table 1
Sociodemographic characteristics of the respondents (N=436).

Characteristics	Mean (SD)	n (%)
Gender		
Male		182 (41.7)
Female		254 (58.3)
Average academic marks	45.70 (14.20)	
Family member (person)	6.52 (2.04)	
Mother's education		
Secondary education		332 (76.1)
Tertiary education		104 (23.9)
Father's education		
Secondary education		317 (72.7)
Tertiary education		119 (27.3)
Family members age <5 years		
No		298 (68.3)
Yes		138 (31.7)
Family members age >65 years		
No		335 (76.8)
Yes		101 (23.2)
Any disease diagnosed by doctor		
No		392 (89.9)
Yes		44 (10.1)
Smoking history		
No		417 (95.6)
Yes		19 (4.4)
Experienced flu within previous 6 months	[a]2.00 (2.00)	
Number of family members experienced flu within previous 6 months	[a]2.00 (2.00)	
Attended talk on H1N1		
No		258 (59.2)
Yes		178 (40.8)
Body mass index (BMI)	20.61 (4.92)	

[a] Median (IQR)

ling, and used less public transport during the pandemic of H1N1.

On univariable analysis (simple linear regression), the significant potential influencing factors for practices were academic results, gender, father's education, attended talk on H1N1, knowledge score, and attitudes score.

On multivariable analysis (general linear regression), variables that were found as significant influencing factors for practices were attended talk on H1N1 and attitudes score. Crude and adjusted regression coefficient with corresponding 95% confidence interval and p-values for practices are shown in Table 5.

Table 2
Distribution of the respondents on knowledge about influenza A (H1N1) (*N*=436).

SN	Knowledge	Yes *n* (%)	No *n* (%)	Don't know *n* (%)
1	Influenza A (H1N1) originates from swine, avian and human	306 (73.2)	42 (10.0)	70 (16.7)
2	Epidemic of influenza A (H1N1) is caused by:			
	a. Virus	350 (83.7)	18 (4.3)	50 (12.0)
	b. Bacteria	219 (52.4)	98 (23.4)	101 (24.2)
3	Influenza A (H1N1) is a contagious disease	403 (96.4)	7 (1.7)	8 (1.9)
4	Influenza A (H1N1) is an inheritable disease	9 (2.2)	379 (90.7)	30 (7.2)
5	People with low immune system are at high risk to get influenza A (H1N1)	329 (78.9)	26 (6.2)	62 (14.9)
6	Main symptoms of influenza A (H1N1) are:			
	a. High fever	305 (73.0)	52 (12.4)	61 (14.6)
	b. Coughing	382 (91.4)	11 (2.6)	25 (6.0)
	c. Runny nose	335 (80.3)	36 (8.6)	46 (11.0)
	d. Sneezing	323 (77.3)	52 (12.4)	43 (10.3)
	e. Sore throat	322 (77.0)	44 (10.5)	52 (12.4)
	f. Muscle pain	280 (67.0)	64 (15.3)	74 (17.7)
	g. Headache	302 (72.2)	50 (12.0)	66 (15.8)
7	Symptoms of worsening influenza A (H1N1) are:			
	a. Continuous fever	376 (90.0)	13 (3.1)	29 (6.9)
	b. Recurrent fever	157 (37.6)	131 (31.4)	129 (30.9)
	c. Cyanosis	146 (35.0)	118 (28.3)	153 (36.7)
	d. Shortness of breath	270 (64.7)	57 (13.7)	90 (21.6)
	e. Seizure	76 (18.2)	198 (47.4)	144 (34.4)
	f. Vomiting	284 (67.9)	53 (12.7)	81 (19.4)
	g. Diarrhea	201 (48.1)	113 (27.0)	104 (24.9)
8	Complications of influenza A (H1N1) include:			
	a. Pneumonia	174 (41.6)	46 (11.0)	198 (47.4)
	b. Respiratory failure	147 (35.2)	59 (14.1)	212 (50.7)
9	Good ventilation (*eg*, open window) can reduce transmission of influenza A (H1N1)	116 (27.8)	191 (45.7)	111 (26.6)
10	Cleaning a patient's personal belonging with soap and water can reduce transmission of influenzaA (H1N1)	331 (79.2)	30 (7.2)	57 (13.6)
11	People who are at high risk to get complications of influenza A (H1N1) are:			
	a. Obese person	149 (35.6)	128 (30.6)	141 (33.7)
	b. Pregnant women	258 (61.7)	54 (12.9)	106 (25.4)
	c. Children younger than 2 years	314 (75.1)	29 (6.9)	75 (17.9)
	d. Person older than 65 years	267 (63.9)	39 (9.3)	112 (26.8)
	e. HIV/AIDS patients	167 (40.0)	79 (18.9)	172 (41.1)
	f. Diabetic patients	116 (27.8)	112 (26.8)	190 (45.5)
	g. Cancer patients	132 (31.6)	105 (25.1)	181 (43.3)
	h. Renal patients	102 (24.4)	115 (27.5)	201 (48.1)
	i. Asthmatic patients	277 (66.4)	34 (8.2)	106 (25.4)
	j. Smokers	164 (39.2)	92 (22.0)	162 (38.8)
	k. Patients on long term aspirin therapy	118 (28.3)	68 (16.3)	231 (55.4)

Table 2 (Continued).

SN	Knowledge	Yes *n* (%)	No *n* (%)	Don't know *n* (%)
12	Influenza A (H1N1) infection can be transmitted through:			
	a. Touching infected patient's hands and touch own nose or mouth	358 (85.6)	23 (5.5)	37 (8.9)
	b. Exposure to infectious droplet (while talking, sneezing or coughing)	388 (92.8)	12 (2.9)	18 (4.3)
	c. Within one meter from patient	234 (56.0)	90 (21.5)	94 (22.5)
	d. Object used by infected patient	327 (78.2)	32 (7.7)	59 (14.1)
	e. Food	270 (64.6)	71 (17.0)	77 (18.4)
	f. Drink	272 (65.1)	65 (15.6)	81 (19.4)
13	Quarantine patients with influenza A (H1N1) can reduce the transmission of the infection	340 (81.3)	20 (4.8)	58 (13.9)
14	Patients with influenza A (H1N1) are advised not to leave house until better	362 (86.6)	24 (5.7)	32 (7.7)
15	Patients who are infected with influenza A (H1N1) are the source of infection within 7 days after the symptoms begin	197 (47.1)	23 (5.5)	198 (47.4)
16	Quarantine for influenza A (H1N1) usually takes 7 days	212 (50.7)	44 (10.5)	162 (38.8)
17	Treatment for influenza A (H1N1) includes:			
	a. Antivirus	312 (74.6)	28 (6.7)	78 (18.7)
	b. Antibiotic	276 (66.0)	53 (12.7)	89 (21.3)
	c. Antipyretic	169 (40.4)	113 (27.0)	136 (32.5)
	d. Cough medication	157 (37.6)	123 (29.4)	138 (33.0)
18	There is a vaccine for influenza A (H1N1) infection	261 (62.4)	37 (8.9)	120 (28.7)

DISCUSSION

The findings from the present study indicated that the knowledge score for the overall respondents was 69.4%, while for attitudes, the score was 82.2%, and for practices, the score was 73.8%. These results indicated that the respondents had more than average level of knowledge, attitudes and practices scores of H1N1.

A similar finding was reported in a study conducted in a Malaysian population, about two months after Malaysia confirmed the first case of H1N1(Ministry of Health Malaysia, 2010a). This study reported that the total knowledge score for the overall sample was 56.2% (Wong and Sam, 2010). A study in Saudi Arabia conducted at the very beginning of Phase 6 (WHO pandemic alert status) regarding swine influenza, reported that only 5.2% of them had high level of knowledge, 54.3% had a high level of concern, and only 17.2% had preventive practices for H1N1 (Balkhy *et al*, 2010).

Different findings were reported in previous studies based on time the study was carried out and also in which population the study was conducted (Leslie *et al*, 2008; Fielding *et al*, 2009; Smith *et al*, 2009; Calatayud *et al*, 2010). This present study was conducted during Phase

Table 3
Distribution of the respondents on attitudes towards influenza A (H1N1) (*N*=436).

SN	Attitudes	Strongly agree *n* (%)	Agree *n* (%)	Not sure *n* (%)	Disagree *n* (%)	Strongly disagree *n* (%)
1	Obey government if ordered not to leave house	250 (59.8)	134 (32.1)	29 (6.9)	2 (0.5)	3 (0.7)
2	My immune system can fight the infection	23 (5.5)	33 (7.9)	244 (58.4)	70 (16.7)	48 (11.5)
3	Controlling epidemic is responsibility of everyone	318 (76.1)	70 (16.7)	21 (5.0)	3 (0.7)	6 (1.4)
4	My behavior can prevent transmission	60 (14.4)	104 (24.9)	189 (45.2)	51 (12.2)	14 (3.3)
5	I think I will get infected	6 (1.4)	12 (2.9)	259 (62.0)	66 (15.8)	75 (17.9)
6	If developed any sign and symptom:					
	a. See doctor	334 (79.9)	71 (17.0)	8 (1.9)	3 (0.7)	2 (0.5)
	b. Stay away from supermarket	197 (47.1)	134 (32.1)	67 (16.0)	12 (2.9)	8 (1.9)
	c. Stay away from market	208 (49.8)	131 (31.3)	64 (15.3)	12 (2.9)	3 (0.7)
	d. Stay away from public gathering	224 (53.6)	130 (31.1)	48 (11.5)	13 (3.1)	3 (0.7)
	e. Limit in taking public transport	217 (51.9)	132 (31.6)	56 (13.4)	12 (2.9)	1 (0.2)
7	Scared if get infected	246 (58.9)	112 (26.8)	47 (11.2)	8 (1.9)	5 (1.2)
8	Stay away from sick people	247 (59.1)	132 (31.6)	32 (7.7)	6 (1.4)	1 (0.2)
9	Stay away from visiting patients in hospital	115 (27.5)	129 (30.9)	126 (30.1)	42 (10.0)	6 (1.4)
10	Wear face mask	284 (67.9)	105 (25.1)	21 (5.0)	7 (1.7)	1 (0.2)
11	Government can control the transmission	187 (44.7)	118 (28.2)	102 (24.4)	4 (1.0)	7 (1.7)
12	Will accept influenza A (H1N1) vaccine	231 (55.3)	113 (27.0)	59 (14.1)	7 (1.7)	8 (1.9)

6 of influenza pandemic when cases of influenza A (H1N1) were still increasing. During an outbreak, people need to have adequate knowledge in order to respond to the situation appropriately. In terms of target population, this study was conducted among secondary school students and, based on previous literature; school-aged children were the group where high infection rates were usually detected. Because the number of infected cases in schools was increasing, some efforts were taken to equip students with adequate knowledge on prevention of this disease. As a consequence, the level of knowledge, attitudes, and practices were relatively higher if compared to studies done in different populations.

Almost two-thirds of the respondents in this study were able to answer correctly about the main symptoms of H1N1. However, less than half of them were able to identify correctly the symptoms when the infection became worse, which include recurrent fever, cyanosis and seizure. These findings were similar

Table 4
Distribution of the respondents on practices concerning influenza A (H1N1) (*N*=436).

SN	Practices	Always *n* (%)	Occasional *n* (%)	Never *n* (%)
1	Wear face mask when having symptoms of influenza A (H1N1) infection	131 (31.3)	184 (44.0)	103 (24.6)
2	Cover mouth with tissue/ handkerchief when sneezing or coughing	239 (57.2)	159 (38.0)	20 (4.8)
3	Wear face mask in public places	96 (23.0)	152 (36.4)	170 (40.7)
4	Wash hands after touching personal belongings of person with influenza A (H1N1) symptoms	235 (56.2)	121 (28.9)	62 (14.8)
5	Wash hands after touching person with influenza A (H1N1) symptoms	234 (56.0)	106 (25.4)	78 (18.7)
6	Wash hands with water and soap after coughing or sneezing	217 (51.9)	180 (43.1)	21 (5.0)
7	Throw tissue or used face mask into lidded dustbin	304 (72.7)	89 (21.3)	25 (6.0)
8	Avoid touching eyes, nose and mouth to prevent influenza A (H1N1) infection	140 (33.5)	214 (51.2)	64 (15.3)
9	Avoid close contact with those who are coughing or sneezing	212 (50.7)	185 (44.3)	21 (5.0)
10	Avoid shopping at supermarket	89 (21.3)	271 (64.8)	58 (13.9)
11	Avoid shopping at market	100 (23.9)	263 (62.9)	55 (13.2)
12	Avoid visiting patient in hospital	99 (23.7)	251 (60.0)	68 (16.3)
13	Avoid using public transport	113 (27.0)	225 (53.8)	80 (19.1)
14	Avoid travelling to other state in Malaysia	135 (32.3)	172 (41.1)	111 (26.6)
15	Take vitamin to increase body immune system	160 (38.3)	167 (40.0)	91 (21.8)
16	Take alternative traditional treatment to prevent influenza A (H1N1) infection	110 (26.3)	145 (34.7)	163 (39.0)

with the results presented by the Saudi study, which reported that the majority of respondents (94.0%) agreed that the symptoms were the same to symptoms of seasonal flu (Balkhy *et al*, 2010).

Although many knew that the mode of transmission was through touching infected objects and exposure to infectious droplet, transmission through food and drink was misperceived by more than half of the respondents in the current study. Similar findings were also reported in previous studies. In Hong Kong, 41.6% of the respondents had "unconfirmed beliefs" that influenza A (H1N1) could be transmitted through, among other modes, eating well-cooked pork (Lau *et al*, 2010). Another study in a Malaysian population reported that 31.3% of the respondents believed that eating improperly handled, and cooked pork and pork products were the modes of transmission of H1N1(Wong and Sam, 2010). These findings were likely due to the frequent references to H1N1 virus as "swine flu" in the early stages of the pandemic.

Concerning attitudes, about one-half of the respondents strongly agreed that the government could effectively control the transmission of H1N1. This is in contrast

Table 5
Associated factors of practices among respondents (*N*=436).

Variables	Simple linear regression		General linear regression	
	b[a] (95% CI)	*p*-value	b[b] (95% CI)	*p*-value
Academic results	0.03 (-0.01-0.07)	0.182		
Gender				
Male	0	-		
Female	0.78 (-0.44-2.00)	0.210		
Number of family members	-0.01 (0.31-0.29)	0.950		
Mother's education				
Secondary education	0	-		
Tertiary education	0.35 (-1.06-1.75)	0.628		
Father's education				
Secondary education	0	-		
Tertiary education	1.23 (-0.11-2.56)	0.071		
Had disease diagnosed by doctor				
No	0	-		
Yes	1.05 (-0.92-3.02)	0.295		
Smoking history				
No	0	-		
Yes	-1.47 (-4.42-1.48)	0.328		
Experienced flu in past 6 months	0.06 (-0.27-0.40)	0.718		
Number of family members experienced flu in past 6 months	0.14 (-0.25-0.54)	0.478		
Attended talk on H1N1				
No	0	-	0	-
Yes	2.18 (0.97-3.39)	<0.001	1.86 (0.75-2.97)	0.001
Body mass index (BMI)	-0.05 (-0.18-0.07)	0.411		
Knowledge score	0.16 (0.10-0.23)	<0.001		
Attitudes score	0.36 (0.28-0.44)	<0.001	0.35 (0.28-0.43)	<0.001

[a]Crude regression coefficient; [b]Adjusted regression coefficient
Stepwise forward general linear regression method applied. Model assumptions are fulfilled. There was no interaction amongst independent variables. No multicollinearity detected.
Coefficient of determination (R^2) = 0.190
Final model equation:
Practices score = 11.58 + (1.86*Attended talk on H1N1) + (0.35*Attitudes score)

to a study conducted in India, where only 32.5% of the respondents believed that the government would be prepared to quickly and effectively respond to the pandemic situation in the country (Kamate *et al*, 2009). The relatively high proportion found in the present study could have positive implications for compliance with official advice regarding the prevention of H1N1 infection.

In the present study, more than half of the respondents reported that they were worried that they would get infected with H1N1. This result was consistent with the

studies conducted by Kamate *et al* (2009) and Van *et al* (2010), where the majority of respondents were of the opinion that H1N1 would affect their health (70.9% and 90.7%, respectively) and believing that contracting H1N1 would have consequences on willingness for compliance with public health measures as reported in previous studies.

More than half of the respondents reported their willingness to comply with specific public health measures, including receiving an H1N1 vaccine, wearing a facemask, keeping themselves away from those who were infected, staying away from public events and shopping areas, and reducing the use of public transport. Similar findings were observed in the literature (Al-Shehri *et al*, 2006; Eastwood *et al*, 2009; Kamate *et al*, 2009; Balkhy *et al*, 2010).

Some of the preventive measures against H1N1 were limited. In the present study, washing hands, respiratory etiquette and throwing used tissues or facemasks into a lidded dustbin were the reported measures by more than half of the respondents. Other measures, such as the use of face mask, avoiding shopping areas, limiting travel and, the use of public transport, and taking any alternative traditional treatment were less frequently reported.

In the Saudi study, the respondents reported only two preventive measures frequently: washing hands (57.7%) and use of a facemask in crowded areas (56.2%) (Balkhy *et al*, 2010). A study in India reported that 59.5% of the respondents had not cancelled or postponed any social event and 67.6% had not reduced the use of public transportation. However, two preventive measures that were frequently reported were avoiding crowded places and washing hands with soap and water, more often than usual (Kamate *et al*, 2009).

In the current study, general linear regression analysis showed that those who had attended talks on influenza A (H1N1) and attitudes score were significant potential influencing factors for practices. The coefficient of determination (R^2) for this model was 0.190, which implied that the model explains 19.0% of the variability.

Different findings were observed in previous studies. In Australia, a study reported that male respondents were statistically associated with compliance to preventive measures (OR = 2.0; 95% CI 1.30-3.10) (Eastwood *et al*, 2009). The Saudi study supported this finding, where a high level of precaution was taken by males (p<0.001), older individuals (p=0.047), and those with higher level of knowledge (p<0.001) (Balkhy *et al*, 2010). However, findings from these studies contrast with a Hong Kong study, which reported that respondents were more likely to have high perceived confidence in prevention of H1N1 if they were female (OR = 1.61) (Wong and Sam, 2011).

Findings reported by the respondents in this study were consistent in terms of knowledge, their attitudes and also their preventive behaviors during the pandemic H1N1. However, information given by the respondents might not have really been accurate. The self-administered questionnaire used in this study was vulnerable to subject-reporting bias, such as recall bias, which results from inaccurate recall of past preventive behavior. In this study, practices in the questionnaire were "reported" practices. Errors in recall of these preventive behaviors would have introduced bias in the results of the practices part. Moreover, it was unlikely that respondents spent time giving reliable

and unbiased views of their knowledge, attitudes, and preventive behaviors resulting in possible information bias. In order to prevent these biases, verification of responses from the respondents should have been done. However, due to limitation of manpower and time, this was not possible.

This study has reported the baseline knowledge, attitudes, and practices parameters with adequate sample size that should be crucial for every study. The sample size obtained in this study was relatively larger than studies conducted elsewhere (Abbate *et al*, 2006; Akan *et al*, 2010). It even has accommodated for sample size determination based on design effect in cluster sampling. In addition, the sampling method applied in this study was appropriate to address the research question of this study.

This study investigated the levels of knowledge, attitudes, and practices as well as the factors contributing to the knowledge and practices about the prevention of H1N1. Learning more about the knowledge, attitudes, and practices of the students during an infectious disease outbreak can be useful in developing strategies and health education campaigns to prevent transmission of the disease, especially in school as schools are an important place for acquiring knowledge in general and health knowledge in particular. Health education in schools is important for promoting the health of young people and contributing to the overall health of the public so that they will take precautions against the infection.

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