Research Article

Knowledge, attitude, and preventive behavior toward COVID-19 of high school students in Bangkok, Thailand: A study among students in Harrow International School

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ABSTRACT

Background: The coronavirus disease-19 (COVID-19) has rapidly emerged as a global pandemic that causes millions of deaths worldwide. It is transmitted from person to person by respiratory droplets and could cause fatigue, shortness of breath, and fever. **Objective:** The objective of the study was to assess COVID-19 related knowledge, attitude, and preventive behavior among high school students in Bangkok, Thailand. **Materials and Methods:** The study was conducted using a cross sectional online survey among Harrow's students Y 12–13. A total of 148 students participated. COVID-19-related knowledge, attitudes toward COVID-19, and preventive behaviors were assessed. Differences between outcomes and socio-demographic were analyzed through independent *t*-test and the Analysis of variance. Preventive behaviors were analyzed by a generalized linear model. **Results:** The undergraduate students showed a low knowledge about COVID-19, a mean of 6.38 (standard deviation [SD] = 1.69) questions in a total of 11. However, the result showed a standard level of attitude toward preventive behaviors on COVID-19 with an average score of 47.51 from a score range of 14–70 (SD = 4.45). Finally, preventive behaviors of participants were at a moderate level with an average score of 36.84 from a range from 12 to 60 (SD = 3.93). The data showed a statistically significant positive correlation between attitude toward preventive behavior on COVID-19 and COVID-19 preventive behavior ($r = 0.351^{**}$, $P = 0.01$). From a generalized linear model, attitude toward preventive behavior on COVID-19 (Exp (B) = 0.394, Confidence interval [CI]: 0.212–.485, $P < 0.05$) and Gender (Exp (B) = 0.203, 95%, CI: 0.376–2.807, $P < 0.05$) can be a predictive factor for the preventive behavior of Harrow International school students. **Conclusions:** The results assessed that Harrow international students had a lower level of COVID-19 general knowledge, but moderate level of attitude and preventive behavior. Moreover, it indicates that there is a causal relationship between attitude toward COVID-19 and preventive behaviors. Thus, attitudes toward COVID-19 are a major predictive factor of having preventive behaviors. Therefore, school and parents should always build awareness and provide safety to the students and remind students with rules that should be followed to secure them from risking of COVID-19.

KEY WORDS: Coronavirus Disease-19; Preventive Behavior; High School Students

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INTRODUCTION

The coronavirus disease-19 (COVID-19) or virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) are large enveloped positive-stranded RNA viruses which function for infecting a wide variety of mammalian and avian species.[1] SARS-CoV-2 are closely related

genetically to bat-borne-virus from the genus Rhinolophus. The coronavirus genome encodes several structural and some nonstructural proteins which act for viral assembly, morphogenesis, release of virus particles, viral replication, and transcription. Overall, SARS-CoV-2 is very well adapted to human cell receptors, so will easily infect humans and invade human cells. The first human cases of COVID-19, the COVID-19 caused by SARS-CoV-2, were first reported from uhan Huanan Seafood Wholesale Market, Wuhan City, China, in December 2019.[1-3]

Types of SARS-CoV-2 viruses are Alpha (B.1.1.7), Beta (B.1.351), Gamma (P.1), and Delta (B.1.617.1/2/3).[4-7]

Generally takes 5–6 days from when someone is infected with the virus for symptoms to show, however some may not show any symptoms for 14 days. Most common symptoms are fever (above 37.5°C), shortness of breath, chest pain, and fatigue, etc.[2,8]

People with personal medical conditions would have a higher risk to have further complications of the illness from COVID-19. However, most children below 14 would perform similar symptoms but would often have a mild illness. Some children and teens who are in the hospital with the COVID-19 would have an inflammatory syndrome.[9,10]

Coronaviruses are mainly transmitted from person to person by respiratory droplets, either by being inhaled or deposited on mucosal surfaces, including aerosols produced when coughing, sneezing and speaking.[10-12] Therefore, to prevent from COVID-19 are to wash your hands regularly with soap and water, or clean them with alcohol-based hand rub, maintain at least 1 m distance between you and people coughing or sneezing, avoid going to crowded places and indoor places, wear a mask, avoid touching your face, eyes, nose, or mouth, clean frequent touched space, stay home if you feel unwell, get vaccinated to help develop immunity by imitating an infection.[13-15] AstraZeneca vaccine is a viral vector vaccine, CoronaVac or SinoVac vaccine is an inactivated vaccine, Johnson and Johnson vaccine uses a shell of a virus to carry genetic material, DNA of SARS-CoV-2 virus into human cells, allowing for immunity against the virus. However, research has proven that Moderna, Pfizer, Johnson and Johnson/Janssen and sinovac are safe for clinical trials for people under 18.[16-18]

Special population groups for example, vaccination in people aged lower than 18, pregnant or breastfeeding women remains indecisive with limited clinical studies.[18] The priority for vaccines in Thailand are Health care personnel, both government and private sectors, Patients with underlying diseases, such as respiratory disease and cardiovascular disease, People aged over 60, respectively.[18]

Some statistics in Thailand are 207,724 cases in Thailand, 1555 deaths in Thailand, 172,316 recovered, 2.05 M is fully vaccinated in Thailand which is only just 2.9% of the whole population. However, only 14% COVID cases are children, leading to why I want to focus on students studying in Harrow International School.[19]

MATERIALS AND METHODS

Participants and Procedure

This was a cross-sectional observational study. An online questionnaire was purposely developed and available through Google From between July 4, 2021, and July 20, 2021. All students from Harrow International School, Bangkok in year 12–13 who were eligible and were invited to participate in the study. The invitation was sent by institutional email. All year 12–13 students have access to their school email, so they all receive an invitation. A preliminary draft of the survey was reviewed by the head department of "Infection Prevention and Control" of a public hospital in Thailand. Further revisions were made as seen as appropriate. Hence, information about the objectives of the study as well as the ethical guarantee of confidentiality and anonymity in the data collected as stated in the informed consent were explained. Participation was completely free and voluntary, and no personal data were collected from any participant. Of the 235 harrow students in year 12–13, a total of 148 students participated in the study (response rate: 63%).

Ethical Considerations

This research uses an anonymous data collection method to collect data from year 12 to 13 Students of Harrow International School, Don Muang, Thailand, using Google form. The Google form was sent through institutional email to year 12–13 students. In this form, information about the study's objectives and the ethical guarantee of confidentiality and anonymity in the data collected as stated in the informed consent was explained. Participation was completely free and voluntary, and no personal data were collected from any participant.

Instrument

The questionnaire was developed based on a literature review from European Centre for Disease Prevention and Control and World Health Organization[2] studies performed on the same topic where several common items were used to assess each of the dimensions analyzed in this study. The proposed items were then grouped and redundant items were removed. A preliminary version of the instrument was reviewed by 2 infection control specialists and a researcher to validate its content. A pretest was then performed with a small sample of Harrow students from year 12 to 13 to test for comprehension and difficulty. All the questions remain without modifications. The psychometric characteristics of the questionnaire were tested, as described in the statistical analysis subsection.

The final version of the questionnaire contained 37 questions; the questionnaire separates into three sections which consist of 11 questions about knowledge about COVID-19 and 12 questions about COVID-19 preventive behavior and 14 questions about attitude toward preventive behavior.

Knowledge about COVID-19

This scale consisted of 11 questions related to COVID-19 (What is the virus name for COVID-19, How is COVID-19 passed on, Can you tell if a person has COVID-19, Symptoms of COVID-19, Which organs are most affected by COVID-19, Who is more at risk to COVID-19, Can COVID-19 be self-cured, What are the main sub-groupings of coronaviruses, Approximately what percentage of Thailand population is fully vaccinated, How to prevent from COVID-19, Who is the first priority for vaccination in Thailand). The participants were asked to choose the correct answer from multiple choices. One point was assigned to each correct answer, while providing an incorrect answer received zero points. The sum of all items was made hence higher scores corresponded to a higher level of knowledge.

Attitude toward preventive behavior on COVID-19: This scale was composed of 14 items, and response categories consisted of a five-point Likert scale (from 1-strongly disagree, to 5 agree) with the highest score corresponding to more positive Attitude toward preventive behavior. Some items on the scale were inverted for the analysis. A sum of all the items was made to obtain a score. The "Attitude toward preventive behavior" factor consisted of 14 items and varied from 14 to 70 and the higher values corresponded to a more positive Attitude towards preventive behavior.

COVID-19 preventive behavior: This scales referred to the number of preventive behaviors adoption and included 12 items (How often do you leave your own house, How often do your family leave the house, How often do you wear your mask when you're outside, How often do you wash your hands, How confident are you with social distancing, How long do you sleep, What transport do you commonly use during this pandemic, How often do you exercise, How often have you stayed close to other people despite your family, How often do you eat raw food, How often do you check your own health condition, and How often do you check the news about COVID-19 in Thailand). Each item was answered using a five-point scale (From 1-Never to 5-Always), with one point assigned to each behavior that was always practiced. The number of behaviors practiced was added up. A high score on this scale indicated good preventive behaviors, ranging from 12 to 60.

Statistical Analysis

The analysis was performed using Statistical Package for the Social Sciences for windows, version 26. To analyze psychometric characteristics of the scales, an exploratory factor analysis, using principal component analysis with varimax rotation, was carried out. Reliability was analyzed through the calculation of item-total correlation coefficients and Cronbach's alpha (α) for the scales of the questionnaire. The descriptive analysis was presented in absolute (n) and relative (%) frequencies, mean (M), and standard deviations (SD). To assess the differences between the outcome variables (Knowledge about COVID-19, Attitude toward preventive behavior, COVID-19 Preventive Behavior) and the socio-demographic characteristics, considering the sample size, independent t-test, and the Analysis of variance were used as appropriate. The correlations between the outcomes of the study were calculated by Pearson's correlation. Finally, a generalized linear model was calculated to determine the predictive variables of the preventive behaviors. Exp (β) and the respective 95% confidence intervals (CI) (95% IC) were presented. Statistical significance was defined as $P < 0.05$.

RESULTS

The study comprised a total of 148 students. The socio-demographic characteristics of the sample presented in Table 1. Most participants were female students (n = 77, 52%), while the rest were male students (n = 71, 48%). There were an equal number of participants studying in year 12 and year 13 (n = 74, 50%) [Table 1]. Regarding knowledge about COVID-19, participants revealed low knowledge about COVID-19, correctly answering a mean of 6.38 (SD = 1.69) questions in a total of 11. Female students showed a higher COVID-19 knowledge score (M = 6.58, SD = 1.63) than male students (M = 6.15, SD = 1.74). Students in year 12 and year 13 scored nearly the same on knowledge about COVID-19 which was (M = 6.31, SD = 1.73) and (M = 6.45, SD = 1.66), respectively. Participants showed a standard level of attitude toward preventive behaviors on COVID-19 with an average score of 47.51 from a score range of 14–70 (SD = 4.45). Attitude toward preventive behaviors on COVID-19 of male students proved to be more positive with a score (M = 48.65, SD = 4.91) than female students (M = 46.50, SD = 3.70). Year 12 demonstrated a better attitude toward preventive behavior on COVID-19 with a score 47.73 (4.54) compared to year 13 students (M = 47.28, SD = 4.37). Preventive behaviors of participants were at a moderate level with a mean score of 36.84 from a range from 12 to 60 (SD = 3.93). Female students demonstrated a higher COVID-19 preventive behavior score (M = 37.27, SD = 3.66), whereas male students' preventive behavior scores were (M = 36.38, SD = 4.18). Moreover, the COVID-19 preventive behavior score of year 12 proved to be higher with an average score of 37.43 (SD = 3.72) than year 13 with a score (M = 36.26, SD = 4.07) [Table 2].

The analysis of the correlations between the outcomes of the study - knowledge, attitudes, and behavior - revealed the existence of positive correlations and one statistically

significant correlation between the COVID-19 preventive behavior and knowledge related to COVID-19 (r = 0.103, P < 0.01) and attitude toward preventive behavior on COVID-19 (r = 0.351**, P < 0.01) [Table 3].

Results from the generalized linear model indicated that the attitude toward preventive behavior (β = 0.394, P < 0.01) and gender (β = 0.203, P < 0.01) had a statistically significant effect on the preventive behaviors adopted [Table 2].

DISCUSSION

According to the outcome of the questionnaire, the results illustrated that Harrow international students had a low level of COVID-19 general knowledge. However, it showed that Harrow international school students had a moderate level of attitude and preventive behavior.

The results in regard to knowledge of COVID-19 in Harrow international school, Bangkok, Thailand students showed that there was a low understanding of about COVID-19 which involved risk of COVID-19 and prevention methods of COVID-19, etc. (mean score of 6.38 from a total of 11). A previous study on COVID-19 preventive behavior among high school students in Bangkok by Petpaiboon[20] which showed that students from grade 9 to grade 12 had a moderate level of understanding about COVID-19. In addition, this aforementioned research also studies International school students. However, this study used students from different schools and different provinces, so COVID-19 situation could have different levels of intensity in different places which could have an effect in the preventive behavior of the student. Moreover, different school students may have different lifestyles such as the society in the school, the security to COVID-19 that school provided, academics provided in different schools, and the wealth of their family which these factors could have contributed to different thoughts of the awareness to have knowledge about COVID-19. Furthermore, this research focused only on "Sixth form" Students (Y12 and Y13) which are closely related to each other as their academic curriculum is similar and the majority of lessons take place at the same place (statistic proved a closely score of knowledge with a

Table 1: Differences in outcomes according to the socio-demographic characteristics of participants (n=148)

Socio-demographic characteristics	*n* (%)	Knowledge about COVID-19 (Range 0–11) M (SD)	Attitude toward preventive behavior on COVID-19 (range 14–70) M (SD)	COVID-19 Preventive behaviour (Range 12–60) M (SD)
Overall knowledge		6.38 (1.69)	47.51 (4.45)	36.84 (3.93)
Gender				
Male	71 (48)	6.15 (1.74)	48.65 (4.91)	36.38 (4.18)
Female	77 (52)	6.58 (1.63)	46.50 (3.70)	37.27 (3.66)
Year				
Year 12	74 (50)	6.31 (1.73)	47.73 (4.54)	37.43 (3.72)
Year 13	74 (50)	6.45 (1.66)	47.28 (4.37)	36.26 (4.07)

M: Mean, SD: Standard deviations, COVID-19: Coronavirus disease-19

Table 2: Generalized linear model predicting preventive behaviors of COVID-19

Variables	B	SE	EXP (β)	Sig	95% CI	
					Lower	Upper
Gender	1.591	0.615	0.203	0.011	0.376	2.807
Year	−1.067	0.591	−0.136	0.073	−2.235	0.102
Knowledge about COVID-19	0.187	0.177	0.080	0.294	−0.163	0.537
Attitude toward preventive behavior on COVID-19	0.349	0.069	0.394	0.000	0.212	0.485

COVID-19: Coronavirus disease-19, CI: Confidence intervals

Table 3: Pearson's correlation coefficient between the study outcomes

Variables	Knowledge about COVID-19	Attitude toward preventive behavior on COVID-19	COVID-19 Preventive behavior
Knowledge about COVID-19	1		
Attitude toward preventive behavior on COVID-19	0.007	1	
COVID-19 Preventive behavior	0.103	0.351**	1

**Correlation is Significant at the 0.01, *Correlation is Significant at the 0.05, COVID-19: Coronavirus disease-19

mean score for Y12 and Y13 by 6.31 and 6.45, respectively). Therefore, High school students showed low knowledge about COVID-19 because they might have focused more on academics than focusing on information about COVID-19 as Thai health promotion have reviewed that COVID-19 related knowledge is a public knowledge; it is not a knowledge in the academic curriculum. Therefore, high school students who are focusing on university admission, exam preparation do not follow COVID-19 situations as much as adults. Thai students, especially in grades 11–12 or year 12–13, spend most of their time studying very hard to compete for university admission.[21] In contrast, in Thanee's study about Knowledge and COVID-19 preventive behavior of adults in Payao province, adults that participated had good knowledge about covid-19 due to following news about COVID-19, aged 51–60 years, mostly unemployed.[22] However, this study only looked into high school students' ages between 16 and 18 which high school students and adults could have different views about the importance of knowledge about COVID-19. It could be said that their school and family provided a safe environment to minimize risk of COVID-19 and always updated the COVID-19 situation so students felt that gaining knowledge about COVID-19 is unnecessary. Also, when the student community of the school has the same thoughts, no motivation of gaining COVID-19 knowledge from peers can be achieved. These points have linked into the attitude towards preventive behavior of COVID-19 because studying in an International School in Thailand requires high financial support by parents which could prove that most students live in an upper class family that provided students to have fully equipped with resources, guards, and knowledge to be safe from COVID-19. Therefore, the attitude of International Students can have a significant difference to Thai students. However, scores about attitude toward preventive behavior of COVID-19 were at a moderate level which has a mean score of 47.51 from a range between 14 and 70. The statistics have proven that attitude of Harrow International School students were significantly correlated to COVID-19 preventive behavior by. 351** which means that if students have a better attitude towards COVID-19, it would lead to better COVID-19 preventive behavior. However, correlation of knowledge of COVID-19 and COVID-19 preventive behavior were not significant which could show that knowledge was not essential to Harrow international school students but the attitude was vital for students to be aware and have excellent preventive behavior on COVID-19. In contrast, research of knowledge, attitudes, and preventive behaviors toward COVID-19 among university students in Portugal from Regina *et al*.[23] showed that having positive attitudes toward preventive behavior of COVID-19 predicted the adoption of those preventive behaviors (Exp (β) 5 1.340, 95% CI: 1.189–1.510, $P < 0.001$). This could result as the majority of university students live independently and do not have as much care from school and parents as high school students. Moreover, the learning lifestyle in university consists of more freedom to the students, so students are the only ones choosing their actions and gaining knowledge, attitude and preventive behavior toward COVID-19. Therefore, influences from others such as family and school can bring a significant impact to high school students. However, this study by Regina *et al*. are made from Portugal students[23] which may have different culture and COVID-19 situations that could affect the attitude and preventive behavior toward COVID-19. So, Poonaklom *et al*. who study the Factors Associated with Preventive Behaviors towards COVID-19 among Adults in Kalasin Province, Thailand, 2020[24] found that most participants had moderate level of knowledge about COVID-19, excellent level of attitude and excellent preventive behavior. Hence, this research can prove that the attitude of students will have a significant effect on the preventive behavior of COVID-19.

This statistic could have some limitations because it was possible that participants may search for answers from the internet. Furthermore, this research was conducted during the COVID-19 pandemic, so the lockdown caused most to stay home, thus this may have an impact on their preventive behavior toward COVID-19. In addition, This questionnaire consisted of questions about COVID-19 in general, however this research only focused on years 12 and 13 students, so the difficulty of this questionnaire might not suit years 12 and 13 students.

In conclusion, the results assessed that Harrow international students had a lower level of COVID-19 general knowledge, but moderate level of attitude and preventive behavior because students prioritized on other aspects over the risk of infecting COVID-19. Furthermore, their social status which links to their secure safety towards COVID-19 and their social environment could contribute significantly toward the given result. However, this level of preventive behavior of Harrow International School students is not efficient enough to be fully self-protected against COVID-19 and will cause risk of infecting COVID-19 when they are not staying in their private zone or exposed to risky areas with dense public populations or not following strictly to safety regulations. Therefore, it is recommend that good attitude is require for students to gain positive preventive behavior toward COVID-19 which attitudes of Harrow international school students can improve by the assistance of the school and parents to always building the awareness and provide safety to the students and reminding students with rules that should be followed that can secure them from risking of COVID-19. However, providing knowledge about COVID-19 in Thailand to students may not lead to a substantial impact in having a better preventive behavior on Harrow international school students. As a result, the knowledge of the students may not be able to be measured relative to the actual standards, but only attitude can develop the student to meet the suitable standard of preventive behavior that will keep them safe from COVID-19.

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CONCLUSIONS

The results illustrate that Harrow international students had a lower level of COVID-19 general knowledge, but moderate level of attitude and preventive behavior because students prioritize on other aspects over the risk of infecting COVID-19. Furthermore, their social status which links to their secure safety toward COVID-19 and their social environment could contribute significantly towards the given result. However, this level of preventive behavior of Harrow International School students is not efficient enough to be fully self-protected against COVID-19 and will cause risk of infecting COVID-19 when they are not staying in their private zone or exposed to risky areas with dense public populations or not following strictly to safety regulations.

Overall, this findings about Harrow international school students can recommend that good attitude is require for students to gain positive preventive behavior toward COVID-19 which attitudes of Harrow international school students can improve by the assistance of the school and parents to always building the awareness and provide safety to the students and reminding students with rules that should be followed that can secure them from risking of COVID-19. However, providing knowledge about COVID-19 in Thailand to students may not lead to a substantial impact in having a better preventive behavior on Harrow international school students. As a result, the knowledge of the students may not be able to be measured relative to the actual standards, but only attitude can develop the student to meet the suitable standard of preventive behavior that will keep them safe from COVID-19.

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