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Knowledge, Attitude and COVID-19 Preventive Behavior among High School Students in Bangkok, Thailand

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Abstract: Background: **The coronavirus disease 2019 (COVID-19) has spread around the world resulting in millions of deaths worldwide. There is currently no specific treatment available. This means we need to rely on preventive measures which include vaccination and adopting preventive behaviors. At the time of research, the vaccine rollout in Thailand is still in progress. Even after being vaccinated, one can still catch and spread the virus. This means we have to strictly rely on preventive behaviors to avoid being infected.**

Purpose**: To assess knowledge about COVID, attitudes towards preventive behaviors and COVID-19 preventive behaviors among grade 10-12 high school students in Bangkok.**

Methodology: **In September 2021, all students from a Bangkok high school were invited to participate in completing an online questionnaire. A total of 478 students participated. Knowledge about COVID, attitudes towards preventive behaviors and COVID-19 preventive behaviors were assessed. Differences between outcomes and social demographics were analyzed through independent t-tests and the ANOVA. A generalized linear model was made to determine the predictive variables of COVID-19 preventive behaviors.**

Findings: **A total of 478 students participated in this study. They generally revealed a good level of COVID-19 knowledge, correctly answering 11.03 out of 12 (SD=1.49), a good level of attitudes towards COVID-19 preventive behaviors, with a score of 13.65 out of 15 (SD=1.65) and a high score in terms of COVID-19 preventive behaviors, at 51.74 out of 60 (SD=7.55). There was a positive and statistically significant correlation between COVID-19 Preventive behaviors and Attitude toward Preventive Behaviors (r=.442**, p<0.01) and Knowledge about COVID-19 (r=.249**, p<0.01). The result from the generalized linear model indicated that attitude toward preventive behaviors (β=.407, p<0.01) and knowledge about COVID-19 (β=.159, p<0.01) were predictive factors of COVID-19 preventive behavior adopted.**

Originality / Values: **From the findings, to keep high school students protected from COVID-19, a level of preventive behaviors should be maintained consistently,therefore knowledge about COVID-19 and all the updates should be communicated to the students persistently. That would influence their attitude and it is best if the level of attitudes stays high. This can be done effectively through the news channel that could penetrate to most participants. The policy maker could also arrange health education among high school students to increase the level of knowledge and understanding and to emphasize COVID-19 preventive behaviors.**

Keywords: **COVID-19, adolescent, Preventive behaviors.**

1. INTRODUCTION

The coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide and was declared a pandemic by WHO on the 11th of March 2020. It has accumulated over two hundred million cases and has caused millions of deaths worldwide [1]. Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, and loss of smell and taste. In severe cases patients might

face pneumonia, respiratory failure, shock or multi-organ dysfunction. Symptoms may begin one to fourteen days after exposure to the virus. Older people and those who are chronically ill are at a higher risk of developing severe symptoms. There is currently no specific treatment available. However, several COVID-19 vaccines have been approved and distributed in various countries. Other preventive measures include social distancing, quarantining, ventilation, covering coughs and sneezes, hand washing, keeping unwashed hands away from the face and the use of face masks and face shields in public settings. [2]

In Thailand, as of 8 October 2021, there has been a total of 1.68 million cases with 17,420 deaths. Bangkok, the capital of Thailand, had a total of 368,046 cases since the 1st of April 2021 making it the province with the most total COVID cases in Thailand. Current policy includes a lockdown, which has been eased on the 1st of September 2021 and a vaccine rollout. The first phase, with limited doses available, prioritizes medical personnel in both government and private sector in contact with infected patients, people with chronic diseases and certain illnesses, people aged 60 or above and disease control workers in contact with patients. The second phase, with greater availability of doses, will cover recipients of the first phase, other health personnel, tourism-related workers, workers who travel internationally, the general public, diplomats, staff of international organisations, foreign business people and expatriates, workers in the industrial and service sectors. For the general public, adolescents are not the most prioritized for vaccination and there are currently 2 options for teenagers aged 12-18, which are Pfizer and Sinopharm, while adults have more choices. Moreover, very few teenagers have completed their 2 or all their doses of vaccination at the time of this research. This means preventive behaviors are currently very important to the health of Thai teenagers. [3]

With this information, this study aims to assess as well as study the effects of knowledge about COVID-19 , attitude towards COVID-19 preventive behavior, and COVID-19 preventive behaviors among grade 10-12 students, Triamudom suksa school, Bangkok. The study is done through a survey containing 34 questions; 5 about demographic data, 12 about general COVID-19 knowledge, 5 about attitudes toward COVID-19 and 12 about COVID-19 preventive behavior.

2. METHODS

Participants and procedure

This was a cross-sectional observational study. An online questionnaire was purposely developed and made available through Google From between 8-Sep-21 and 12-Oct-21. All students were eligible and were invited to participate in the study. The invitation was sent to school social media groups. The students have access to school social media groups, so they all receive an invitation. In this invitation, 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 4,398 students, a total of 478 students participated in the study (response rate: 10.87 %).

Instrument

The questionnaire was developed based on a literature review including (1) Infection control, chain of infection, COVID-19 preventive behavior, COVID-19 knowledge from WHO (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 three experts to validate its content. A pretest was then performed with a small sample of students to test for comprehension and difficulty. All the questions remained without modifications. The psychometric characteristics of the questionnaire were tested, as described in the statistical analysis subsection. The final version of the questionnaire contained 34 questions; 5 about social demographic data (gender, class, study plan, channels used for following COVID-19 news, and infection risk perceived) and 29 items divided into 3 sections

1.COVID-19 related knowledge : this scale consisted of 12 statements related to general knowledge, symptoms, transmission, prevention and variants. The participants were asked to choose the correct answer from multiple choices of 4. 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.

2.Attitude towards COVID-19 prevention : this scale was composed of 5 items, and response categories consisted of a three-point likert scale (from 1-strongly disagree, to 3 agree) with the highest score corresponding to more positive attitudes toward preventive behaviors. A sum of all the items was made to obtain a score. The “Attitude toward COVID-19 prevention” factors consisted of 5 items and scores varied from 3 to 15 and the higher values corresponded to a more positive attitude toward COVID-19 prevention.

3.COVID-19 preventive behavior : this scale referred to the number of preventive behaviors adopted and included 12 items (protective equipment, washing hands, ventilation and social distancing). The data analysis reports 12 items. 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 SPSS for windows, version 26. To analyse 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 were presented in absolute (n) and relative (%) frequencies, mean (M) and standard deviations (SD). To assess the differences between the outcome variables (Knowledge, attitudes and behaviors) and the sociodemographic characteristics, considering the sample size, independent t-test and the ANOVA were used as appropriate. The correlations between the outcomes of the study were calculated by Pearson's correlation. Lastly, a generalized linear model was calculated to determine the predictive variables of the preventive behaviors. Exp (β) and the respective 95% confidence intervals (95% IC) were presented. Statistical significance was defined as $p < 0.05$.

Ethical Considerations

This research uses an anonymous data collection method to collect data from grade 10-12 Students of Triam Udom suksa School, Bangkok, Thailand, by using Google form. The invitation was sent to school social media groups. In these invitations, 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.

3. RESULT

This study comprised a total of 478 students. The sociodemographic characteristics of the sample are presented in Table 1. Most participants were male (n=359, 75.1%). Most participants were from M.5/Grade 11 (n=381, 79.7%) followed by M.4/Grade 10 (n=59, 12.3%). Most students studied in the science-mathematics program (n=382, 79.9%) followed by the language-arts program (n=55, 11.5%). Out of a score of 5, most students perceived their risk of COVID-19 infection at 3 (n=153, 32%) followed by 2 (n=151, 31.6%) and 1 (n=96, 20.1%) respectively.

Regarding knowledge about COVID-19, participants revealed good knowledge about COVID-19, correctly answering at the mean of 11.03 (SD=1.49) questions out of 12. Female participants showed higher knowledge scores (M=11.43, SD=0.80) than male participants (M=10.90, SD=1.64). Class level of M.6 showed the highest COVID-19 related knowledge scores (M=11.53, SD=0.76), followed by M.4 (M=11.12, SD=1.63). Students in the science-mathematics program showed the highest knowledge scores (M=11.14, SD=1.20), followed by the arts-mathematics program (M=11.12, SD=1.10). Participants who perceived their risk, out of a score of 5, of COVID-19 infections at 4 showed the highest knowledge (M=11.37, SD=0.85), followed by those who perceived their risk at 2 out of 5 (M=11.26, SD=0.80) and those who perceived their risk at 3 out of 5 (M=11.11 SD=1.32) respectively.

Participants showed a good level of attitude toward COVID-19 preventive behaviors with the average score of 13.65 (SD=1.65) out of 15. Female participants showed a higher level of attitude (M=13.97, SD=1.45) than male participants (M=13.54, SD=1.45). Class level of M.6 showed the highest level of attitude (M=13.87, SD=1.49), followed by M.4 (M=13.73, SD=1.84). Students studying in the science-mathematics program showed the highest level of attitude (M=13.71, SD=1.58), followed by the arts-mathematics program (M=13.61, SD=1.69). Participants who perceived their risk, out of a score of 5, of COVID-19 infections at 4 showed the highest level of attitude (M=13.86, SD=1.41), followed by those who perceived their risk at 3 out of 5 (M=13.68, SD=1.60) and those who perceived their risk at 2 out of 5 (M=13.68, SD=1.62) respectively.

Concerning COVID-19 preventive behavior, participants showed a good score in terms of COVID-19 preventive behavior. Male participants showed a slightly higher score (M=51.81, SD=7.72) than female participants (M=51.55, SD=7.01). Students in M.5 showed the highest COVID-19 preventive behavior score (M=52.02, SD=7.34), followed by students in M.6 (M=51.63, SD=8.43). Students studying in the arts-mathematics program showed the highest COVID-19 preventive behavior score (M=53.51, SD=5.68), followed by students in the science-mathematics program (M=51.77, SD=7.19). Participants who perceived their risk, out of a score of 5, of COVID-19 infections at 1 showed the highest COVID-19 preventive behavior score (M=53.35, SD=8.06), followed by those who perceived their risk at 4 out of 5 (M=52.46, SD=7.18), and those who perceived their risk at 2 out of 5 (M=51.53, SD=7.30) respectively.

Table 1: Differences in outcomes according to the sociodemographic characteristics of participants (N =478)

Sociodemographic characteristics	N (%)	Knowledge about COVID-19 (Range 0-12) M (SD)	Attitude toward COVID-19 preventive behaviors (Range 5-15) M (SD)	COVID-19 Preventive behavior (Range 12-60) M (SD)
Gender				
Male	359 (75.1)	10.90 (1.64)	13.54 (1.70)	51.81 (7.72)
Female	119 (24.9)	11.43 (0.80)	13.97 (1.45)	51.55 (7.01)
Class Level				
M.4	59 (12.3)	11.12 (1.63)	13.73 (1.84)	50.02 (8.18)
M.5	381 (79.7)	10.97 (1.52)	13.62 (1.64)	52.02 (7.34)
M.6	38 (7.9)	11.53 (0.76)	13.87 (1.49)	51.63 (8.43)
Study Program				
Science-Mathematics	382 (79.9)	11.14 (1.20)	13.71 (1.58)	51.77 (7.19)
Arts-Mathematics	41 (8.6)	11.12 (1.10)	13.61 (1.69)	53.51 (5.68)
Language- Arts	55 (11.5)	10.20 (2.80)	13.24 (2.01)	50.24 (10.47)
Risk Perception				
1	96 (20.1)	10.41 (2.33)	13.62 (1.75)	53.35 (8.06)
2	151 (31.6)	11.26 (0.80)	13.68 (1.62)	51.53 (7.30)
3	153 (32)	11.11 (1.32)	13.68 (1.60)	50.77 (7.06)
4	78 (16.3)	11.22 (1.35)	13.59(1.71)	52.06 (8.06)
Total	478 (100)	11.03 (1.49)	13.65 (1.65)	51.74 (7.55)

The analysis of the correlation between the outcomes of the study - knowledge, attitudes and behavior - revealed the existence of positive and statistically significant correlations between the preventive behavior and knowledge about COVID-19 ($r=.249^{**}$, $p<0.01$), the attitude toward preventive behavior ($r=.442^{**}$, $p<0.01$). (Table 2)

Table 2: Pearson's correlation coefficient between the study outcomes

Variables	Knowledge about COVID-19	Attitude toward preventive behaviors	COVID-19 Preventive behavior
Knowledge about COVID-19	1		
Attitude toward preventive behaviors	.275**	1	
COVID-19 Preventive behavior	.249**	.442**	1
**Correlation is Significant at the 0.01 *Correlation is Significant at the 0.05			

Results from the generalized linear model indicated that the attitude toward preventive behavior ($\beta=.407$, $p<0.01$), knowledge about COVID-19 ($\beta=.159$, $p<0.01$) had a statistically significant effect on the preventive behaviors adopted. (Table 3)

Table 3: Generalized linear model predicting preventive behaviors of COVID-19

	B	SE	EXP (β)	Sig (p)	95% CI	
					Lower	Upper
Gender	-1.372	0.74	-0.079	0.065	-2.827	0.083
Class Level	0.762	0.69	0.045	0.271	-0.595	2.118
Study Program	0.522	0.473	0.046	0.269	-0.406	1.451
Risk Perception	-0.624	0.304	-0.087	0.041	1.221	-0.026
Knowledge about COVID-19	0.804	0.221	0.159	0	0.37	1.238
Attitude toward preventive behaviors	1.86	0.194	0.407	0	1.48	2.241

As a side note, the most used channel for following COVID-19 related news is Online media (ex YouTube, social media) (n=475, 99.37%), followed by Television (n=306, 64.02%) and others (n=98, 20.50%). (Table 4)

Table 4: Channel used for following COVID-19 news

Channel used for following COVID-19 news	N (%)
Television	306 (64.02)
Online Media ex YouTube, Social Media	475 (99.37)
Newspaper	37 (7.74)
Radio, Podcast	69 (14.44)
Others	98 (20.50)
No channel used	5 (1.05)

*more than one channel can be selected

4. DISCUSSION

Participants showed good knowledge about COVID-19, correctly answering at the mean of 11.03 (SD=1.49) questions out of 12. The questions regarding knowledge are mostly general knowledge that is commonly known, for example symptoms, origin or causes, hence the high score. The question that participants got wrong the most was about the most prevalent variant in Thailand (the delta variant at the time of research). This knowledge can be acquired from following current news only, unlike the other more general questions, which the answers would not change after a period of time. Participants revealed a good level of attitude toward COVID-19 preventive behaviors with the average score of 13.65 (SD=1.65) out of 15. This might be due to the education which builds a good level of attitude, as well as knowledge. A positive correlation between knowledge about COVID and attitude towards preventive behavior was also found ($r=.275^{**}$, $p<0.01$). Participants also showed good scores in terms of COVID-19 preventive behavior at 51.74 (SD=7.55) out of 60. During the time of the research, the total numbers of COVID cases in Bangkok since the 1st of April 2021 had exceeded 368,000 cases and Bangkok was also on lockdown. This might nudge participants to adopt preventive behavior more seriously.

Regina Ferreira Alves [4] conducted a study on COVID-19 knowledge, attitudes and preventive behaviors among Portuguese higher education students. The participants in this study also showed a good level of knowledge about COVID-19, generally highly favorable attitudes toward preventive behavior. However, participants showed a moderate score in terms of preventive behavior (5.81 from 12 on average). This might be because the pandemic was not as serious as it is now, and so the preventive behaviors were not taken as seriously. The study revealed positive correlations between the preventive behaviors and knowledge related to COVID-19, the attitudes toward preventive behaviors and the risk perception. Interestingly, this study showed that educational level does not correlate with COVID preventive behavior with Ph.D students scoring lowest and masters scoring slightly higher than bachelors, possibly because the sample group of Ph.D students is small (3.82%).

A previous study conducted by Glomjai *et al.* [5] in Phayao, Thailand also showed that participants have a high understanding of COVID knowledge (average score of over 80%), a good level of preventive behavior scores and a positive correlation between the two variables was also found, despite having different social demographics to my study. The participants were mostly adults aged 51-60(77.3% of the participants), compared to grade 10-12 students in my study. The ways they received COVID news were also different (Mostly television compared to mostly online media) yet the result still seems similar.

Another study conducted among grade 9-12 students in International Community School, Bangkok, Thailand, by Tawan Petpaiboon [6] also showed that participants have good knowledge about COVID (over 70%), good attitudes towards preventive behaviors both with and without the presence of rules (the latter showing a slightly higher score) and good preventive behaviors. The study showed positive and statistically significant correlations between the preventive behaviors and attitudes toward preventive behaviors both with and without rules. This study consists of participants of similar age to mine, but the difference in education (with theirs being an international school with less rules and restrictions) might be why students have better attitudes without rules presented.

Leelapa Piyachotisukij [7] conducted a study on knowledge attitude and preventive behaviors of COVID-19 among grade 10-12 high school students in Saint Joseph Convent School, Bangkok, Thailand. The study showed that participants have a high understanding of COVID knowledge, a good level of preventive behavior scores and a good level of behavior towards preventing COVID-19 transmission. Despite the high scores no statistically significant correlation was found between the three variables. Interestingly, a positive correlation between attitudes towards supporting the environment

and guidelines and attitudes towards COVID-19 preventive behavior was found significant at 0.01. This might be because the participants in this study have a good attitude from their school or society.

Limitation

The data was collected via an online platform, which might be biased. Participants might have searched for answers to questions regarding COVID knowledge. Furthermore, this research was conducted during lockdown. This means most people did not go out much and so they might not find preventive behaviors as important as when there was no lockdown. This can possibly affect the scores. Also, the questionnaire, being sent via online platform, may be sent to students outside of Triam Udom Suksa, which would be outside the expected social demographics and could also affect the scores.

5. CONCLUSIONS

A total of 478 students participated in this study. They generally revealed a good level of COVID-19 knowledge, a high level of attitudes towards COVID-19 preventive behaviors and a high score in terms of COVID-19 preventive behaviors. The study also showed a positive and statistically significant correlation between COVID-19 Preventive behaviors and Attitude toward Preventive Behaviors ($r=.442^{**}$, $p<0.01$) and Knowledge about COVID-19 ($r=.249^{**}$, $p<0.01$). The generalized linear model also showed that attitude toward preventive behaviors ($\beta=.407$, $p<0.01$) and knowledge about COVID-19 ($\beta=.159$, $p<0.01$) were predictive factors of COVID-19 preventive behavior adopted.

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