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Knowledge, Attitudes, and Preventive Behavior of COVID-19 among High School Students

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Abstract: **Background: COVID-19 (CoronaVirus disease 2019) is a new highly contagious respiratory disease caused by the SARS-CoV-2 virus. SARS-CoV-2 is thought to spread from person to person through droplets released when an infected person coughs, sneezes, or talks. COVID-19 was announced by the World Health Organization (WHO) to be a Public Health Emergency of Concern. This infection is considered to be a top priority for WHO and many countries due to how fast the infection spreads and how it is spread. However, COVID-19 is still considered to be less severe than previous viral infections. Many people who caught the virus can be carriers and spread while not showing any symptoms.**

Objective: To assess knowledge, attitude, and COVID-19 prevention behavior

Design/ Methodology: Grade 10-12 students from Saint Joseph School, Bangkok, Thailand were invited to participate in completing an online questionnaire.COVID-19 related knowledge, attitudes toward preventive behavior, and COVID-19 preventive behavior were assessed. Differences between outcomes and socio-demographics were analyzed through independent t-test and the ANOVA. A generalized linear model was calculated to determine the predictive variables of preventive behaviors.

Methods and Materials: This was a cross-sectional observational study. An online questionnaire was purposely developed and available through Google From between January and June 2021. All students from Grade 10 to Grade 12 of Saint Joseph Convent School (English Program), Bangkok, Thailand were eligible for this study and were invited to participate in the study. The invitation was sent to classroom social media groups (to make sure that all eligible for this study receive an equal chance to participate in the study) The students have access to classroom 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 was explained. Participation was completely free and voluntary, and no personal data were collected from any participant. Of the 180 students, a total of 125 students participated in the study (response rate: 69.4%). This research uses an anonymous data collection method to collect data from grade 10 to 12 Students of Saint Joseph Convent School, Bangkok, Thailand, by using Google form. The invitation was sent to classroom 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. The analysis was performed using SPSS for Windows, version 26.

Results: A total of 125 students participated. Students showed a high level of knowledge about COVID-19, correctly answered 4.18 out of 5 questions (SD=0.83), their attitudes towards preventing the spread of COVID-19 scored 12.87 out of 15 (SD=1.29), attitude towards supporting environment scored 12.91 out of 15 (SD=1.49), and behavior towards preventing COVID-19 transmission scored 36.02 out of 50 (SD=4.80). Students' behavior and attitude towards supporting the environment have a significant correlation. Attitude toward Environment support and guideline was a predictive factor for COVID-19 preventive behavior adoption (Exp (B) = 0.221, $p<0.01$).

Conclusion: A total of 125 students participated in the study and showed a high level of knowledge and attitudes towards preventing COVID-19 along with environmental support scores. However, their behavior did not correspond. Their behaviors revealed medium levels. Attitudes towards preventing COVID-19 had a positive correlation with COVID-19 preventive behaviors. The generalized Linear Model also revealed that attitudes were a predictive factor towards COVID-19 preventive behavior. Therefore, the best method to make sure that the students will exhibit COVID-19 preventive behaviors is to reinforce strict rules and guidelines for them to follow.

Keywords: **COVID-19, Preventive behavior, High School students.**

1. INTRODUCTION

COVID-19 (CoronaVirus disease 2019) is a new highly contagious respiratory disease caused by the SARS-CoV-2 virus. SARS-CoV-2 is thought to spread from person to person through droplets released when an infected person coughs, sneezes, or talks. COVID-19 was announced by the World Health Organization (WHO) to be a Public Health Emergency of Concern. This infection is considered to be a top priority for WHO and for many countries due to how fast the infection spreads and how it is spread. However, COVID-19 is still considered to be less severe than previous viral infections. Many people who caught the virus can be carriers and spread while not showing any symptoms.

In 2020, Thailand, like other countries, had been experiencing a COVID-19 pandemic. As of February to December of 2021, there are a total of more than six thousand cases. From the 3rd of January 2021 to the 23rd of July 2021, there had been approximately 468,000 confirmed cases of COVID-19 with 3,811 deaths (1). In total, there are around five hundred thousand confirmed cases of COVID-19 in Thailand with 4,146 deaths which are 0.81% of confirmed cases. Approximately 12 million citizens had been vaccinated with only the first dose which is only 17.01% of the population. Almost four million people had been vaccinated with both the first and the second dose of the COVID-19 vaccine, as of 26 July 2021 (2). It is found that the most effective ways to prevent the spread of COVID-19 are to wear masks, wash hands regularly, and remain physically distant in public facilities. Bangkok has been on lockdown since 12 July 2021 along with 9 other cities with high new cases. Department stores and salons are closed. Only supermarkets, pharmacies, and banks remain open. Restaurants in Thailand are closed for sit-in customers, take-aways only. However, the cases are still increasing every day (3).

This shows that in the entire 2020 there were significantly fewer cases when compared to only half a year of 2021. This research focuses on finding out which aspect has the most impact on highschool students' COVID-19 preventive behaviors. This information can be useful to build hygienic and good preventive behaviors among teens to lessen case number in this age group.

2. METHODS

This was a cross-sectional observational study. An online questionnaire was purposely developed and available through Google From between January and June 2021. All students from Grade 10 to Grade 12 of Saint Joseph Convent School (English Program), Bangkok, Thailand were eligible for this study and were invited to participate in the study. The invitation was sent to classroom social media groups (to make sure that all eligible for this study receive an equal chance to participate in the study) The students have access to classroom 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 was explained. Participation was completely free and voluntary, and no personal data were collected from any participant. Of the 180 students, a total of 125 students participated in the study (response rate: 69.4%).

Instrument

The questionnaire was developed based on a literature review including research done by Supakarn Vathanakitanond about Knowledge, attitudes, and preventive behaviors toward pathogens transmission: A study among Grade 10–12 students of Mahidol University International Demonstration School at Nakhon Pathom 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 infection control specialists to validate its content. A pretest was then performed with a small sample of students to test for comprehension and difficulty. The psychometric characteristics of the questionnaire were tested, as described in the statistical analysis subsection.

The final version of the questionnaire contained 29 questions; 4 about the sociodemographic data (age, gender, grade level, and weekly income from guardians) and 25 items divided into 3 sections

Knowledge and understanding of COVID-19: this scale consisted of 5 statements related to Knowledge and understanding, definition, transmission, symptoms, appropriate preventive behavior, and reservoir of COVID-19. The participants were asked to choose the correct answer from multiple choices of 3. 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.

Attitudes towards COVID-19 preventive behavior: 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. Some items on the scale were inverted for the analysis. A sum of all the items was made to obtain a score. The Attitudes towards COVID-19 preventive behavior factor consisted of 5 items and varied from 5 to 15 (and the higher values corresponded to a more positive attitude towards COVID-19 preventive behavior.

Attitudes towards supporting environment and guidelines: 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. Some items on the scale were inverted for the analysis. A sum of all the items was made to obtain a score. The supporting environment and guidelines factor consisted of 5 items and varied from 5-15 and the higher values corresponded to a more positive preventive behavior due to supportive environments and guidelines.

Behavior towards preventing COVID-19 transmission: this scale referred to the number of preventive behaviors adopted and included 10 items (how often students leave their homes, follow guidelines, public transportations are used, wash their hands, share personal items, and exercise) The data analysis reports to xx 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 10 to 50.

3. STATISTICAL ANALYSIS

The analysis was performed using SPSS 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 and understanding, attitudes, supporting environment and guidelines, and behaviors) and the sociodemographic characteristics, considering the sample size, an 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 to 12 Students of Saint Joseph Convent School, Bangkok, Thailand, by using Google form. The invitation was sent to classroom 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.

4. RESULT

This study comprised a total of 125 students. The sociodemographic characteristics of the sample are presented in Table 1. Most students were of age 15-18 years old (n=117, 93.6%). Nearly half of all students participating were in Mathayom 5 (n=59, 47.2%) followed by Mathayom 6 students (n=35, 28%). Almost half of the total participants' weekly pocket money was between 501-800 Baht (n=59, 47.2%).

In regards to knowledge of COVID-19, students revealed good knowledge about COVID-19. The mean of accurate answers is 4.18 (SD=0.83) out of 5 questions. Students between the age of 15 and 18 showed higher knowledge and understanding scores (M=4,23, D=0.78). Mathayom 4 students showed the highest knowledge and understanding score (M=4.42, SD=0.67) followed by Mathayom 6 students (M=4.14, SD=0.97). Students who received weekly pocket money between 501 and 800 baht had higher knowledge of COVD-19 score (M=4,25, SD=0.86) than those with less than 500 baht of pocket money (M=4.21, SD=0.68) and those with pocket money more than 800 baht (M=4.05, SD=0.88).

Students showed a good attitude towards preventing the spread of COVID-19 with an average score of 12.87 (SD=1.29). Students 18 or more years old revealed a better attitude score (M18, SD=1.31) than students in age 15-18 (M=12.86, SD=1.29). Mathayom 5 showed the best attitude score (M=12.98, SD=1.09). Students with 800 baht or more showed the

best attitude towards preventive behavior (M=12.92, SD=1.14). Students with pocket money between 501-800 baht revealed the least attitude score (M=12.85, SD=1.40).

Concerning supporting the environment and guidelines criteria, students at the age of 15-18 presented better scores (M=13.03, SD=1.33) than those at the age of 18 or more (M=11.23, SD=2.53). Mathayom 4 showed the best score (M=13.10, SD=1.33) while Mathayom 6 showed the least (M=12.83, SD=1.58). People with 501-800 baht as their weekly pocket money illustrated the highest score for guidelines (M=13.36, SD=1.17) followed by those with more than 800 baht as their pocket money (M=12.38, SD=1.75)

Regarding behavior in preventing COVID-19, students of age 15-18 showed better scores (M=36.09, SD=4.80) than 18+ years old (M=34.88, SD=4.94). Mathayom 5 students presented the best score (M=36.44, SD=5.48) closely followed by Mathayom 6 students (M=36.17, SD=3.85). Students with 500 baht or less pocket money showed the best behavior (M=36.38, SD=3.96), and students with 800 baht or more weekly pocket money's behavior score were the least (M=35.57, SD=5.03). (Table 1)

Table 1: Differences in outcomes according to the sociodemographic characteristics of participants (N=125)

Sociodemographic Characteristic		Knowledge and Understanding of COVID-19 (Range 0-5)		Attitude towards COVID-19 preventive behavior (Range 5-15)		Attitude toward Supporting environment and Guidelines (Range 5-15)		Behavior towards preventing COVID-19 transmission (Range 10-50)	
	N (%)	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age		4.18	0.83	12.87	1.29	12.91	1.49	36.02	4.80
15-18	117 (93.6)	4.23	0.78	12.86	1.29	13.03	1.33	36.09	4.80
> 18	8 (6.4)	3.50	1.20	13.00	1.31	11.13	2.53	34.88	4.94
Year Level									
M.4	31 (24.8)	4.42	0.67	12.90	1.08	13.10	1.33	35.03	4.33
M.5	59 (47.2)	4.08	0.79	12.98	1.09	12.86	1.54	36.44	5.48
M.6	35 (28)	4.14	0.97	12.66	1.71	12.83	1.58	36.17	3.85
Weekly Pocket Money									
< 500	29 (23.2)	4.21	0.68.	12.86	1.27	1.69	1.49	36.38	3.96
501-800	59 (47.2)	4.25	0.86	12.85	1.40	13.36	1.17	36.12	5.07
> 800	37 (29.6)	4.05	0.88	12.92	1.14	12.38	1.75	35.57	5.03
Total	100 (125)	4.18	0.83	12.87	1.29	12.91	1.49	36.02	4.80

The analysis of the correlations between the outcomes of the study revealed the existence of positive and statically significant correlations between behavior and supporting environment related to COVID-19 (r=.213*, p<0.01).

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

Variable	Knowledge and Understanding of COVID-19	Attitude towards COVID-19 preventive behavior	Attitude toward Supporting Environment and Guidelines	Behavior towards preventing COVID-19 transmission
Knowledge and Understanding of COVID-19	1			
Attitude towards COVID-19 preventive behavior	.090	1		
Attitude toward Supporting Environment And Guidelines	.229*	.346**	1	
Behavior towards preventing COVID-19 transmission	-.109	.094	.213*	1
**Correlation is significant at 0.01 **Correlation is significant at 0.05				

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

Results from the generalized linear model indicated that environmental support and guidelines (Beta=.221, p<0.01) had a statistically significant effect on the preventive behaviors adopted. (Table 3)

Table 3: Generalized linear model prediction of preventive behavior of COVID-19

	B	SE	Beta	Sig
Intercept	29.439	6.046		0
Age	-1.022	1.918	-0.052	0.595
Year Level	0.661	0.607	0.1	0.278
Weekly Pocket Money	-0.401	0.589	-0.061	0.497
Knowledge and understanding of COVID-19	-0.969	0.533	-0.167	0.072
Attitude towards preventive behavior of COVID-19	0.159	0.356	0.043	0.656
Attitude toward Supporting Environment And Guidelines	0.709	0.327	0.221	0.032

5. DISCUSSION

Students of Saint Joseph Convent school show a higher level of knowledge and attitude regarding COVID-19 preventive behavior. However, their behaviors do not correspond with their attitudes. Questions about generic knowledge of COVID-19, like what it is, how it spreads, symptoms, and its reservoir, were asked and almost everyone answered them correctly. Regarding the attitudes of students in Grade 10-12 in Saint Joseph Convent School, both age groups showed high-level attitudes regarding the prevention of the spread of COVID-19 with 18 or more years old having a higher attitude score (M=13). The result showed that a supportive environment and guidelines have the most impact on students of Saint Joseph Convent school preventive behaviors. More specifically, the result showed that the highest age group (18 years old or more) had the best attitude towards COVID-19 preventive behavior, but had the lowest behavior score.

Supakarn Vathanakitanond and Intaporn-Udom studied students of Mahidol University International Demonstration School about knowledge and attitude preventing the spread of COVID-19 showed that their students also show a medium attitude level despite lower-level knowledge scores (4). They said that this is because, during this period of adolescence, teenagers were more rebellious along with a higher desire to be independent. They were more likely to make rash decisions out of their carelessness. Since the research of Mahidol University International Demonstration School's students and Saint Joseph Convent school's students were of the same age and grade, both of these findings have many similarities and were correspondent.

Temyord conducted research in the Department of Science and Mathematics, Shrewsbury International School Bangkok Riverside, Bangkok, Thailand (5). The study showed a significant correlation between environmental support and behavior which was very similar to our finding. The more supportive and convenient the preventive behavior can be done, the more people will start exhibiting those hygienic behaviors. According to research conducted at International Community School, Bangkok, Thailand, by Tawan Petpaiboon, it was shown that there is more possibility of people in supportive and strict guidelines to exhibit preventive behaviors than places that do not have a supportive environment (6). Another research about awareness and habits of secondary school about Cleanliness and Hygiene from Various Variables, studied by Çelik Ebru Yilmazel and Yüce Zeynep, was also consistent with the fact that the environment has the most impact on behaviors (7). This way, no matter how little they care or know about preventing the COVD-19, they will exhibit these preventive behaviors.

18 years old or more age group had the least behavior score. This may be because they were of legal age to drive; therefore, they had more freedom to go outside than the other age group. Same with pocket money, students who received 800 or more baht per week also had the least score for preventive behavior. The more money they had, the more these students were willing to go outside and spend their money. Teenagers in this age group tended to acknowledge policies and rules about supporting environment to prevent the spread of COVID-19; however, they chose to not follow the guidelines themselves (Behavior towards preventing COVID-19 transmission: Age 18+ M=34.88, Age 15-18 M=36.09). However, the 15-18 years old age group had shown a significant correlation between supporting environment and behavior as younger thai children tended to listen and were more obedient than those older as table 2 and 3 also supports this correlation. Therefore, a supportive environment has the most impact on their behaviors. This can also be interpreted that the preventive behaviors were affected by grade level, weekly pocket money, or age. However, those factors did not have the most significant impact. The theory of teenagers' rebellious behavior can be one of the reasons for this result. A theory by Ajzen and Fishbien stated that people with different beliefs may have different beliefs on the outcome of

performing behavior that determines their intention and behavior (8). This rebellious act might be caused by wanting independence and starting to have their own opinions which may not be cohesive with adults'. This led to defiance of rules and instructions given to them (4). They wanted to do things on their own and in their own ways and pace, without anyone bossing them around. Their lack of logic can cause them to make mistakes and impulsive decisions.

Data was collected via online form (Google Form) which means that answers that were given may be searched to answer, not solely by their memory. This survey was conducted during the COVID-19 pandemic lockdown so students were studying from home; therefore, there is a possibility that these students did not feel the fear of catching COVID-19. This form and questions were made to be answered by highschool students so the questions might be easier than what might be asked with general adults. The data was collected in SJC highschool students which means that there is no male answering this survey.

To summarize, there are many factors that contribute to SJC Highschool students' COVID-19 preventive behavior. Supporting environment had shown to be the most impactful factor considering all age groups, grades, and pocket money. This was in agreement with Temyord's research in Department of Science and Mathematics, Shrewsbury International School Bangkok Riverside, Bangkok, Thailand.

6. CONCLUSIONS

Students showed a high level of knowledge and attitudes towards preventing COVID-19 along with environmental support scores. However, their behavior did not correspond. Their behaviors revealed medium levels. Attitudes towards preventing COVID-19 had a positive correlation with COVID-19 preventive behaviors. The generalized Linear Model also revealed that attitudes were a predictive factor towards COVID-19 preventive behavior. Therefore, the best method to make sure that the students will exhibit COVID-19 preventive behaviors is to reinforce strict rules and guidelines for them to follow.

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Conflict of Interests

Author declared no conflict of interest

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