Knowledge, attitudes, and preventive behaviors toward coronavirus disease-19: A study among high school students in Bangkok

Tawan Petpaiboon

Department of Science and Mathematics, International Community School, Bangkok, Thailand

Correspondence to: Tawan Petpaiboon, E-mail: tawanxpet@gmail.com

ABSTRACT

Background: Breaking the chain of infection is the process that is controlled by the infection control and contact tracing to inhibit infections of pathogens in more people which can be done by stopping the cycle of chain of infection. To prevent coronavirus disease (COVID)-19 from further spreading, breaking the chain of infection is required. In addition, in the chain of infection, the last key point is the factors that affect the behavior in disease transmission prevention of COVID-19. Research has shown that good knowledge and a positive attitude have contributed to a behavior that would prevent this disease. One of the most important actions that need to be taken to break the chain of infection is to set a healthy behavior in each individual. **Objectives:** The purpose of this study was to assess knowledge, attitudes, and behaviors about COVID-19 among high school students in Bangkok. **Materials and Methods:** The study was conducted using a questionnaire. A total of 177 students participated. COVID-19-related knowledge, attitudes toward COVID-19, and preventive behaviors were assessed. Differences between outcomes and sociodemographic were analyzed through independent t-test and the ANOVA. Preventive behaviors were analyzed by a generalized linear model. **Results:** Students revealed good knowledge about COVID-19, correctly answering 5.22 (SD = 1.57) questions in a total of 7, good attitudes toward preventive behaviors in the presence of rules 9.06 (SD = 2.12) and good attitudes toward preventive behaviors without the presence of rules 9.48 (SD = 2.36), and good preventive behavior 33.91 (SD = 6.06), question in a total of 47. There are statistically significant positive correlations shown: between attitudes toward preventive behaviors with the presence of rules and preventive behaviors (Exp (B) = 0.521, 95% confidence interval [CI]: 0.0–0.99, $P < 0.05$) and between attitude toward preventive behavior without the presence of rules and preventive behaviors (Exp(B) = 0.584, 95% CI: 0.14–1.02, $P < 0.05$. **Conclusion:** This study revealed high knowledge about COVID-19, positive attitudes toward preventive behaviors in the presence and absence of rules, and high preventive behaviors in high school students of International Community School, Bangkok, Thailand. Furthermore, it indicates that there is a causal relationship between attitudes toward COVID-19 in the absence of rules and preventive behaviors. Thus, attitudes toward COVID-19 in the absence of rules are a major predictive factor of having preventive behaviors. Therefore, to promote preventive behaviors, accurate knowledge about COVID-19 should be given consistently by the school. To build up the same positive attitudes in the absence of rules as in this research, teachers and staff should show a sense of trust to students since this may form preventive behaviors in students.

KEY WORDS: Coronavirus disease-19; Severe Acute Respiratory Syndrome Coronavirus-2; Coronavirus Infection; Preventive Behavior; Health Knowledge; High School Students

INTRODUCTION

Reported by the World Health Organization[1] on January 8, 2021, there have been 85,929,428 confirmed cases and 1,876,100 deaths of coronavirus disease (COVID)-19 in the global situation. The pandemic has caused many problems worldwide. COVID-19 is mostly lethal in many cases. Issues

in other areas have also formed. These issues separate into many categories, in which economic, political, psychological, and social effects will be explained from Russell Sage Foundation.[2]

Economically, one of the very common problems that result from this pandemic is that many companies go bankrupt. People start losing jobs, and many people do not have enough income for all their payments. Many, especially low-wage workers, are affected as well as prisoners as they are more prone to permanently losing their jobs. For example, Thailand's economy is based on tourism and exports, so most of the businesses were shut down. This greatly alters the economy of Thailand as claimed by the International Crisis Group.[3]

In general, the political issues are racial and ethnic factors: Immigrants and non-citizens have to live under bad conditions that have high possibilities of leading to getting infected. However, different countries cope to the pandemic differently. In South Korea, serious identification testing and a good healthcare system lead to an efficient lockdown. In the United States, lack of resource readiness such as personal protective equipment, hydroxychloroquine, and masks as well as weak enforcement and voluntary contribution of each individual's protection leads to a very weak system of handling the pandemic. Furthermore, protection policies in some countries became a problem. For example, in Thailand, the International Crisis Group[3] has explained that the political system still deals with the problem of whether certain actions should be decided by the popular sovereignty or the traditional hierarchy, specifically the government.

Psychologically, anxiety, and depression appeared in the population. People also worried about scarce demands of masks and other materials. This makes some people become overstressed and leads to competition over getting materials. For example, people in Thailand often stock up masks. As a result, some people lack even a single mask to wear daily.

Socially, social distancing weakened many relationships. Schools and workplaces shut down, turning to online systems. These online systems, however, are quite inefficient. For example, many students claim that they barely learn anything through online learning. Many events are also postponed. Opportunities like studying overseas, which are dreams of many people, are cancelled. In summary, the infrastructure of many countries was clearly not ready for this pandemic. Education, health systems, and many more things were not prepared to fight against this disease.

Infectious diseases are diseases that are caused by living pathogens such as viruses, bacteria, protozoan, and parasites. One of the emerging diseases that are commonly known today is called "COVID-19." Kandola[4] has explained that COVID-19, a disease caused by the virus called "SARS-CoV-2," or "Severe Acute Respiratory Syndrome Coronavirus 2," commonly known as coronavirus. COVID-19 originated from the related species of SARS-CoV-2 that started infecting bats. This similar species of virus then mutated and started causing the disease of COVID-19 in humans. The disease first appeared in Wuhan city of China in 2019. The common symptom of this disease is called pneumonia, which includes coughing, tiredness, and chest pain. Other symptoms include fever, headaches, muscle aches, appetite losses, and many more.

The prevention of this disease that can be done by every individual is to keep sanitation. This includes washing of hands, wearing masks, and sneezing or coughing without spreading the germs.

The transmission of COVID-19 happens in a series of events, as explained by Robertson et al.[5] More specifically, the chain of infection of this disease is explained in the following. First, the reservoirs of the pathogens are anywhere the infectious agents can proliferate. Second, the portal of exits in humans is respiratory droplets, blood, gastrointestinal secretions, and urinary excretions. The respiratory transmission is further divided into three types: Large particles exposed to mouth and nose, physical contact of droplets that transfer the pathogen onto the person's respiratory mucosa, and airborne transmission. Next, the portal of entry includes mucous membranes and non-intact skin. The susceptible host of the disease includes anyone with a weak immune system, uses invasive devices, and lives under poor conditions such as crowded places. Note that just because a person is exposed to the pathogen does not always mean he or she will be infected; the mentioned factors determine that. The effects of the surfaces where the pathogens lie are equally important. The pathogens for COVID-19 can survive on glasses, metals, and fibers for up to 9 days. They can also stay in coughs for 3 h. Furthermore, money is one key factor in spreading the disease.

In addition, in the chain of infection, the last key point is the factors that affect the behavior in disease transmission prevention of COVID-19. Research has shown that good knowledge and a positive attitude have contributed to a behavior that would prevent this disease.

Breaking the chain of infection is the process that is controlled by the infection control and contact tracing to inhibit infections of pathogens in more people which can be done by stopping the cycle of chain of infection. To prevent COVID-19 from further spreading, breaking the chain of infection is required.

One of the most important actions that need to be taken to break the chain of infection is to set a healthy behavior in each individual.

A behavior is an emotional or physical action that helps an organism adapt to an internal or external stimuli in the surroundings, in which it is affected by the organism's genes and its environment. Behavior and health are one of the complex topics that are studied in bio-behavioral sciences. These two things are connected in such a sense that scientists still cannot give a clear relationship. For example, the thought of smokers knowing the disadvantages of smoking is still taken in consideration. Therefore, it is important to understand what affects a behavior to maintain good health in a person. Behavioral factors on health can occur on any level, whether it is the influence from family members or the leaders in the society. For instance, a nutritious moderate diet can be established and maintained in children by having schools teach them about it. This will be beneficial to them if they keep the same diet as they approach into adulthood.

To set a healthy behavior and maintain it, many factors contribute to that action. These factors can happen in the individual themselves as well as in the society. Factors that can happen at the level of each person are education and counseling. For both factors, "intervention" is the key. Intervention in educating oneself about their health can encourage a behavior to maintain a healthy lifestyle. For counseling, some people prefer to talk face to face to a physician while some prefer to talk through the phone. Different levels of interventions can affect each individual differently. Thus, many health services have conducted population-based intervention trials to build healthy behaviors in individuals.

This research aims to study the effects of knowledge and attitude on the behavior of preventing the transmission of COVID-19 of Grade 9–12 students, International Community School, Bangkok, Thailand.

MATERIALS AND METHODS

This study is a quantitative research, which involves developing a survey. The survey is in the format of Google Forms which was developed through February 26, 2021–March 1, 2021, and was sent out to all International Community School, Bangkok, Thailand students on March 20, 2021. The survey was voluntary and 177 responses were received.

The survey was developed based on four aspects in the following: Knowledge and understanding regarding COVID-19, attitudes toward COVID-19 in the presence of rules and regulations, attitudes toward COVID-19 in the absence of rules and regulations, and behavior toward COVID-19.

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.

The final draft of the survey contained 27 questions; 4 about demographic data, 4 about knowledge and understanding regarding COVID-19, 4 about attitudes toward COVID-19, 4 about attitudes toward COVID-19 in absence of rules and regulations, and 11 questions about behavior toward COVID-19.

Demographic Data

The responses to the questions consisted of age, grade, gender, and household income. A number was assigned to each response for each question (e.g., for gender, 1 was assigned to male and 2 was assigned to female).

Knowledge and Understanding Regarding COVID-19

The questions consisted of four multiple-choice questions in regard to the knowledge of transmission and prevention of COVID-19. A point was assigned to each correct answer; for multiselect questions, 1 point was assigned to each correct selected choice. The sum of all the responses indicates the knowledge of COVID-19 of each individual, in which higher scores indicate more knowledge.

Attitudes Toward COVID-19 in the Presence of Rules and Regulations

There are four multiple-choice questions for each individual to answer. The responses to the questions consisted of the individual's concern for COVID-19. The three responses are limited to the following in general: Very much, moderate, and not at all. The answer was assigned a number (3 – very, 2 – moderate, and 0 – not at all). Other specific answers not listed in the former are assigned numbers as seen as appropriate (e.g., 0 – careless). The sum of all the responses indicates the attitudes of each individual in the presence of rules and regulation towards COVID-19, with higher scores indicating more positive attitudes.

Attitudes Toward COVID-19 in the Absence of Rules and Regulations

There are four multiple-choice questions for each individual to answer. The responses to the questions consisted of the individual's actions in the hypothetical condition where rules and regulations do not exist. The choices to the questions are limited to the following in general: *Yes,* yes but using the most convenient way, no. Each response was assigned a number (3 – yes, 2 – yes, but using the most convenient way, and 0 – no). The sum of all the responses represents the attitudes of each individual in the absence of rules and regulations, with higher scores representing more positive attitudes toward each hypothetical situation.

Behavior Toward COVID-19

Nine of the responses are in the format of 5-point linear scale (from 1 – never to 5 – always) and two responses are in the

format of multiple choice with two choices of never and always. The responses of the 5-point linear scale questions are assigned numbers as selected, and the responses of the multiple-choice questions are assigned numbers with never as 0 and always as 1. The sum of all the responses correlates with more preventive behaviors.

RESULTS

This study consisted of a total of 177 International Community School, Bangkok, Thailand students. The demographic data of the sample are presented in Table 1. Most were students of grade level 11 ($n = 69$, 39.0%). Thirty-one students (17.5%), 30 students (16.9%), and 47 students (26.6%) are in Grade 9, 10, and 12, respectively. The greatest amount of students fall in the age range of 15–18 years old ($n = 127$, 71.8%). Most participants are women ($n = 104$, 58.8%). The highest number of students has household income of above 400,000 baht ($n = 87$, 49.2%).

In regard to the knowledge and understanding of COVID-19, the average score of students is 5.22 out of 7 (SD = 1.58). Most students ($n = 48$, 27.1%) earned a score of 7, showing high knowledge for COVID-19.

For the attitude toward COVID-19 in the presence of rules and regulations, it leans toward the preventive behavior at an average score of 9.06 out of 12 (SD = 2.12). The mode of the scores is 10 ($n = 53$, 29.9%).

In the section of attitude toward COVID-19 in the absence of rules and regulations, the average score is 9.48 out of 12 (SD = 2.36). The mode of the scores is 11 ($n = 45$, 25.4%).

In concerns of the behavior of students toward COVID-19, the average score is 33.91 out of 46 (SD = 6.06). The scores of students range from 13 to 46, with 29 being the mode ($n = 16$, 9.0%) [Table 1].

The analysis of the correlation between the data of each section shows the following: There are positive and statistically significant correlations between the preventive behaviors and attitudes toward preventive behaviors with rules (r = 0.216, $P < 0.01$); the preventive behaviors and attitudes toward preventive behaviors without rules (r = 0.224, $P < 0.01$).

Because $P < 0.01$ for both correlations, it can be concluded that these correlations are significant. The attitudes toward COVID-19 in the presence and absence of rules and regulations have positive correlations with preventive behaviors [Table 2].

Referring to Table 3, the generalized linear model shows that attitudes toward preventive behaviors without rules had a significant effect on the preventive behaviors. Therefore, attitudes toward preventive behaviors without rules (Exp (β) = 0.584, 95% confidence interval: 0.14–1.02, $P < 0.05$) predicted the preventive behaviors of COVID-19 [Table 3].

Table 1: Differences in outcomes according to the sociodemographic characteristics of participants (n=177)

Sociodemographic characteristic	n (%)	COVID-19 knowledge (range 0–7)			Attitude toward following COVID-19 preventing guideline (range 0–12)			Attitude toward preventive behavior without rules (range 0–12)			Preventive behavior (range 1–47)		
		Mean	SD	t/F value	Mean	SD	t/F value	Mean	SD	t/F value	Mean	SD	t/F value
Age													
<15	49	4.45	1.67	8.875	8.35	2.67	3.922	8.53	2.63	5.81	33.8	4.76	1.36
15–18	127	5.52	1.45		9.33	1.82		9.84	2.15		34	6.47	
>18	1	5	-		9	-		10	-		24	-	
Gender													
Male	73	5.1	1.6	-0.878	9.23	1.9	0.926	9.37	2.23	-0.521	33.81	6.34	-0.186
Female	104	5.3	1.56		8.93	2.27		9.56	2.45		33.98	5.88	
Grade level													
Grade 9	31	4.74	1.57	4.91	9.13	2.01	1.18	9.77	2.32	1.08	34.42	5.91	2.24
Grade 10	30	4.77	1.9		9.47	2.06		9.6	2.22		35.87	6.17	
Grade 11	69	5.75	1.41		9.16	1.91		9.65	2.13		33.91	6.27	
Grade 12	47	5.04	1.4		8.6	2.48		8.96	2.73		32.32	5.49	
Household income													
<200,000	21	5.29	1.49	0.372	9.14	1.98	1.249	10.33	1.39	2.747	33.9	6.42	1.227
200,000–400,000	66	5.3	1.55		9.35	1.88		9.68	2.1		34.76	6.17	
>400,000	87	5.09	1.63		8.81	2.33		9.1	2.68		33.21	5.89	

COVID: Coronavirus disease

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

Variable	Knowledge about COVID-19	Attitudes toward preventive behavior with rules	Attitudes toward preventive behavior without rules	Preventive behavior
Knowledge about COVID-19	1			
Attitudes toward preventive behavior with rules	0.342**	1		
Attitudes toward preventive behavior without rules	0.405**	0.485**	1	
Preventive behavior	−0.072	0.216**	0.224**	1

**Correlation is significant at 0.01. COVID: Coronavirus disease

Table 3: Generalized linear model predicting behaviors

Generalized linear model predicting behaviors	B	SE	p	Beta	95% CI	
Intercept	28.35	2.223	0.000		23.79	32.57
Knowledge about COVID-19	−0.868	0.307	0.01	−0.22	−1.47	−0.26
Attitude toward preventive behavior with rules	0.521	0.238	0.03	0.18	0.05	0.99
Attitude toward preventive behavior without rules	0.584	0.221	0.01	0.22	0.14	1.02

COVID: Coronavirus disease, CI: Confidence interval

DISCUSSION

The results in regard to knowledge of COVID-19 in International Community School, Bangkok, Thailand students show that there is a high understanding of its symptoms and preventive methods (average score of 5.22 out of 7). A previous study in Phayao Province of Thailand by Glomjai et al.[6] also showed that there is a high understanding of knowledge among adults of the age between 51 and 60 years old (average score of above 80%). However, in contrast with this study in which 70% of the adults graduated from primary school, our study consisted of secondary students currently studying at an international school. The population from the Phayao study has received information of COVID-19 from the Center for the Outbreak of Coronavirus Disease Management 2019, while the population from our study have received information of COVID-19 from social media and parents.

Gallè et al.[7] studied understanding knowledge and behaviors related to COVID-19 epidemic in Italian undergraduate students found that students from life sciences courses also showed a high knowledge regarding the infection and the control measures. This result is consistent with the high knowledge of undergraduates from International Community School, Bangkok, Thailand, in our study. The gender differences referring to the mean value of the COVID-19-related knowledge of female students of International Community School, Bangkok, Thailand, have a higher value (average = 5.3) than the male student of International Community School's value of knowledge (average = 5.1). This result is consistent with the study of knowledge, attitudes, and preventive behaviors toward COVID-19 among higher education students in Portugal by Alves et al.[8] The results regarding attitudes toward preventive behaviors with rules of International Community School, Bangkok, Thailand students in Grades 9–12 have a high score (mean = 9.06 out of 12). In the study of Portugal undergraduates, the attitudes toward preventive behaviors are also high (mean = 32.73 out of 35). This may be due to the fact that one of the factors of attitudes is the sufficient amount of knowledge. Because the population in both studies have a high level of knowledge of COVID-19, their attitudes toward preventive behaviors are high. Since the dimension of the knowledge is aligned with the attitude, the attitudes also align with the preventive behaviors. Thus, this creates a tendency for a person to behave according to their knowledge and attitudes toward COVID-19. Referring to the attitudes toward preventive behaviors without rules of International Community School, Bangkok students in Grades 9–12, the score is higher (mean = 9.48 out of 12) than the attitudes toward preventive behaviors with rules. People having preventive behavior without rules can be explained by the relationship between trust and cooperative behavior discussed in the research of Jones.[9] According to the summary of Speed of Trust by Clark,[10] this is related to extended trust, a reciprocal form of trust in which the more trust a person puts into another, the better the behavior of the person who receives trust, which also builds back onto the trust that they receive. For the levels of preventive behaviors, the students' preventive behaviors are high; the possible contributing factors are high household income, easy access to information, and corresponding environments. From the results, the most powerful predictive factor for preventive behaviors is attitudes without rules. This can be interpreted that this population of students will have high preventive behaviors in absence of rules; the students have high preventive behaviors when given trust rather than when they are given a set of rules to follow. This can be explained

by Abrahm Maslow's Hierarchy of Needs, as explained by the MasterClass Staff.[11] Since the students have already received physiological needs, safety needs, and love and belonging needs, the next step they would want to achieve is self-esteem, which includes gaining trust from others.

Because the focus of the study population is high school students, thus the level of tested knowledge is basic for the population. As a result, the knowledge of the students may not be able to be measured relative to the actual standards.

CONCLUSION

This study revealed high knowledge about COVID-19, positive attitudes toward preventive behaviors in the presence and absence of rules, and high preventive behaviors in high school students of International Community School, Bangkok, Thailand. Furthermore, it indicates that there is a causal relationship between attitudes toward COVID-19 in the absence of rules and preventive behaviors. However, there is no causal relationship found between knowledge and attitude or behavior, in which the results are similar in the three experiments of Fabrigar *et al*.[12] Thus, attitudes toward COVID-19 in the absence of rules are a major predictive factor of having preventive behaviors. Therefore, to promote preventive behaviors, accurate knowledge about COVID-19 should be given consistently by the school. To build up the same positive attitudes in the absence of rules as in this research, teachers and staff should show a sense of trust to students since this may form preventive behaviors in students. Communication between students and parents or teachers needs to be improved, like Kannaiyan and Jaiganesh[13] solution in her study of evaluation on medical students' social responsibility.

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