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## PUBLIC HEALTH RESEARCH

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# A Cross-Sectional Study on Diploma Students' Knowledge, Attitudes, and Preventive Behavior about COVID-19 in Northeastern Thailand

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### ABSTRACT

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<b>Introduction</b>	COVID-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus-2.
<b>Methods</b>	A cross-sectional study aimed to investigate the knowledge, attitude, and practice of COVID-19 among diploma students. A total of 120 students were recruited from students of the diploma program at the Sirindhorn College of Public Health, Ubon Ratchathani, Northeastern Thailand. An online survey was obtained in June 2021. Data were analyzed using descriptive statistics and the independent t-test to understand the relationship between variables.
<b>Results</b>	The results found that most participants were female (87.5%), and the mean age was 22 years. The participants (59.17%) studied the Diploma of Sciences program in Emergency Medical Operation. The majority of them (49.71%) were in the first year. 93.33% of them were not underlying diseases (49.71%). The majority of respondents (57.5%) had a strong knowledge of COVID-19 (mean=17, S.D.=1.83). The majority of individuals (66.7%) had a positive attitude (mean=3.24, SD=1.35), and 80 % had good COVID-19 preventive behavior (mean=3.54, S.D.=1.35). When comparison of variables between knowledge, attitude, and practice for the prevention of COVID-19. The relationship between COVID-19 preventative behavior and variables such as gender, study program, and attitude toward the virus was statistically significant at $p<.05$ .
<b>Conclusions</b>	Even though our results indicate that the students had a positive attitude and practice regarding COVID-19. The knowledge, attitude, and practice about COVID-19 in participants' education remain to be continually improved.
<b>Keywords</b>	COVID-19; knowledge; attitude; preventive behavior; diploma student; Thailand

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## INTRODUCTION

COVID-19 is caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2). It is highly contagious spreading from human to human by respiratory droplet infection and close contact.<sup>1,2</sup> Which was firstly reported in Wuhan, China in December 2019.<sup>3,4,5</sup> The virus has infected worldwide.<sup>6,7</sup> Public health is now seriously threatened by the COVID-19 epidemic.<sup>8,9</sup> The first symptoms of COVID-19 normally appear after 6.4 days, even though the incubation period can be anywhere between 2.1 and 11.1 days.<sup>10</sup> Infected individuals may have full onset of symptoms between 2 and 14 days after contracting the infection fever, sore throat, coughing, exhaustion, headaches, and malaise are a few of the most prevalent symptoms.<sup>11,12</sup>

Due to the COVID-19 ongoing spread, daily rise in mortality rates, cessation of all activities, and unpredictable length of control, individuals are mentally affected by it.<sup>13,14</sup> Knowing someone's knowledge, attitudes, and behavior concerning COVID-19 is essential because it depends on these elements for the public to follow health recommendations.<sup>15</sup> Knowledge, attitudes, and practices about COVID-19 among the public are essential for knowing the epidemiological dynamics of the disease.<sup>16,17</sup> Investigating the COVID-19 linked to knowledge, attitude and practice (KAP) would help improve knowledge of the condition and develop preventative interventions.<sup>18</sup> Good KAP among students will affect families and communities because they can influence their surroundings by working as change agents and credible information sources.<sup>19</sup> Understanding students' attitudes about COVID-19 and conducting more analysis of the KAP variables can be crucial to developing and validating remedies for the next generation in the prevention of COVID-19.<sup>20</sup>

All other higher education institutions worldwide-188 countries were impacted by COVID-19. Despite the difficulties caused by COVID-19, educational interventions are implemented to maintain the pupils' education.<sup>21</sup>

Some students claimed to have felt anxious or nervous regularly or continuously during the epidemic.<sup>16</sup>

Since the Coronavirus initially emerged in China, it has spread to almost every country, and nations have adopted a range of safeguards to slow the epidemic's rapid expansion.<sup>22</sup> COVID-19 triggered the establishment of public health policies to stop the virus from spreading, many of which included social isolation, handwashing, and lockdown procedure.<sup>23</sup> Following prevention strategies is essential for stopping the Coronavirus disease of 2019 (COVID-19), and reducing the infection rate. Objective of this study aimed to study knowledge, attitude, and practice regarding COVID-19 outbreak among the diploma students in northeastern Thailand.

## METHODS

### Study design and sample

The cross-sectional study gathered data between June 2021 during the COVID-19 outbreak. Online questionnaires via Google form were used. We recruited 120 participants (83.33%) from a pool of 144 eligible students. We calculated the sample from the total population of 144 of the Diploma program as formula of Kelly & Maxwell (2003).

The study participants included males and females with a Diploma of Science Program in Emergency Medical Operation (Dip. Emergency Medical Operation) and Diploma in Pharmacy Technique (Dip. Pharmacy Technique) at the Sirindhorn College of Public Health, Ubon Ratchathani, Thailand. The diploma program studies only two years in college and graduation. Consider that they only attend college for two years before graduating. Looks like this study will be over soon. They were teens, a demographic at risk of infection during the COVID-19 outbreak. What preventive measures did they take to avoid contracting the disease during the COVID-19 outbreak? Regarding COVID-19, how well-informed and how they came across?

$$N_M = \left( \frac{Z_{(1-\alpha)/2}}{w} \right) \left( \frac{1 - R^2}{1 - R_{XY}^2} \right) \left( \frac{\chi^2_{(1-\gamma; N-1)}}{N - p - 1} \right) + p + 1$$

$N_M$ =Sample

$N$ =50% chance of getting 95% CI of  $R^2$  less than 0.1

$P$ =Number of predictor variables in the full model (set to 5 predictors)

$\alpha$ =0.05

$w$ =Half of the confidence intervals of the main predictor variables.

$R^2$ =Squared regression coefficients for the full model=0.569 (previous study of Yenpoca)<sup>24</sup>

$R^2_{x-xj}$ =Squares the regression coefficients of the main variable with the other variables=0.490 (previous study of Yenpoca)<sup>24</sup>

$\chi^2 (1 - \gamma ; N - 1)$ =Quartile of chi-square distribution.

The sample of 120 students was simple random sampling by proportion of year and program.

### Research Tools

We developed the research tools of practice by literature review. The knowledge (K), attitude (A), and practice (P) of participants regarding the COVID-19 pandemic were assessed using online questionnaires.

The questionnaire consisted of these four sections: gender, age, year of study, and presence or absence of concomitant diseases were among the sample characteristics.

The knowledge about COVID-19 section consisted of 28 items. Each question had a possible response of "Yes" and "No". The correct answer (Yes) was coded as 1, while the wrong answer (No) was coded as 0. The internal reliability of this part of the questionnaire by Kuder-Richardson 20 statistic was 0.90). The knowledge test included 28 questions about COVID-19. The total score for each participant was categorized into one of three levels; 1) Good: A score ranging from 20-28 points was a high level of knowledge. 2) Fair: A score ranging from 10-19 points was a moderate level of knowledge, and 3) Poor: A Score ranging from 0-9 points was a low level knowledge.

In the part of the COVID-19 that concerned attitude, there were 15 items. Participants were required to choose just one response from a rating scale with five levels. Each item was determined by the response and item type (positive versus negative). The responses were given on a 5-point Likert scale, with 5 (strongly agree), 4 (agree), 3 (not sure), 2 (disagree), and 1 (strongly disagree). The total score was calculated by summing the answers to all 15 questions. There were three levels based on the overall attitude score: 3.35 to 5.00 points for a good score, 1.67 to 3.34 points for a moderate score, and 1.00 to 1.66 points for a low score. The attitude questionnaire had a 0.85 Cronbach's alpha coefficient.

The preventive behavior COVID-19 section also included 25 items. The participants choose only one answer from five levels of a rating scale. There were 28 items to evaluate the practice to prevent COVID-19. To categorize practice to preventing COVID-19 was following five-item rating scale: 5 ("Regularly" (every day), 4 ("Often" (5-6 days/week), 3 ("Sometimes" (3-4 days/week), 2 ("Takes a long time to practice" (1-2 days/week), and 1 ("Never"). The total score for preventing COVID-19 were divided into three levels: 1) good: score ranged from 3.35-5.00 points, 2) moderate: score ranged from 1.67-3.34 points and 3) low: score ranged from 1.00-1.66 points. The Cronbach's alpha coefficient of the attitude questionnaire was 0.89.

### Inclusion and Exclusion Criteria

All the male and female students who study in the diplomas program at the Sirindhorn College of Public Health, Ubon Ratchathani, Thailand,

participated in the study. The program study includes a diploma of Science (Emergency Medical Operation) and diplomas in Public Health (Pharmacy Technique).

### Statistical Analysis

In statistical analysis to analyze cross-sectional data, the participant's responses were extracted from Google form and exported into Microsoft Excel. Descriptive statistics include frequency, mean, percentage, and standard deviation. To compare different variables using the independent t-test. Significant factor predicting the comparison of mean scores of the knowledge, attitude and practice regarding COVID-19 by participant personal characteristics ( $p$ -value < 0.05). An alpha level of  $p < 0.05$  is considered to be statistically significant.

### Ethics Approval and Consent to Participate

The protocol was approved by the Ethics Committee of Sirindhorn College of Public Health, Ubon Ratchathani, Thailand (Ref: SCPHUB I002/2021).

## RESULTS

### Characteristics of Sample

Most participants studied the diploma of Sciences program in Emergency Medical Operation (59.17%), and 40.83% studied the diploma of Public Health program in Pharmacy Technique. Participants were either in their first year (49.17%) or second year (50.83%). Most of the participants were female (87.5%), and only 12.5% of participants were male. The median age of the participants was 22 years (SD: 0.87). 93.33% of respondents (93.33%) were in good health. Only eight (6.7%) in the sample had the underlying illness. (Table 1)

### Knowledge, attitude and preventive behavior regarding the COVID-19

The participants' average knowledge of COVID-19 was moderate (mean=19.21, S.D.=0.43). Although, the practice and attitude toward COVID-19 were high. The average score for the COVID-19 attitude scale was 4.32 (S.D.=1.27). The participants' COVID-19 prevention skills were good (mean=3.37; S.D.=1.31). (Table 2)

The average respondent knew about COVID-19 (mean scores=17 points, S.D.=1.83). Most participants (57.5%) demonstrated strong knowledge of COVID-19 (mean score=17 points, S.D.=1.83). With a mean COVID-19 attitude score of 3.24 and a standard deviation of 1.35, the majority of them, 66.7%, were deemed to have a moderate attitude. A good COVID-19 prevention strategy was used by 80.0% of the participants (mean score=3.54, S.D.=1.35). (Table 3)

**Table 1** Characteristics of sample

Variables	Categories	N (%)
Gender	Male	15 (12.5)
	Female	105 (87.5)
Age (years)	19	43 (35.8)
	20	48 (40.0)
	21	23 (19.2)
	22	6 (5.0)
mean=20, S.D.=0.87, min= 19, max=22		
Program in study	Dip. Emergency Medical Operation	71 (59.2)
	Dip. Pharmacy Technique	49 (40.8)
Year of study	First year	59 (49.2)
	Second year	61 (50.8)
Underlying disease	No	112 (93.3)
	Yes	8 (6.7)

**Table 2** Number of questions, range of score, mean and standard deviation of knowledge, attitude and preventive behavior

Variables	Range of score	Mean score	S.D.	Level
Knowledge	10-19	19.21	0.43	Moderate
Attitude	1.67-3.34	4.32	1.27	Good
Preventive behavior	1.67-3.34	3.37	1.31	Good

**Table 3** Knowledge, attitude and practice regarding the COVID-19

Variables	Score	N	%	Mean	S.D.
<b>Knowledge</b>					
Good	20-28	51	42.5	22.00	2.28
Fair	10-19	69	57.5	17.00	1.83
Poor	0-9	0	0.0	-	-
mean=19.21, S.D.=0.43, min=11, max=28					
<b>Attitude</b>					
Good	3.35-5.00	80	66.7	3.54	1.26
Moderate	1.67-3.34	40	33.3	3.24	1.35
Low	1.00-1.66	0	0.00	-	-
mean=4.32, S.D.= 1.27, min=2.60, max=4.47					
<b>Preventive behavior</b>					
Good	3.35-5.00	96	80.0		
Moderate	1.67-3.34	24	20.0	3.08	0.29
Low	1.00-1.66	0	0.0	-	-
mean=3.37, S.D.=1.31, min=2.81, max=4.58					

**Table 4** Comparison of variables and mean KAP scores

Factors	Variables	N	Mean	S.D.	t	p-value
Knowledge (K)	Gender				-1.124	0.137
	Male	16	18.12	17.18		
	Female	104	19.37	16.92		
	Program in study				3.068	0.001*
	Dip. Emergency Medical Operation	49	20.55	15.84		
	Dip. Pharmacy Technique	71	18.28	15.89		
	Year of study				1.050	0.148
	First year	59	19.61	18.81		
	Second year	61	17.28	16.68		
	Underlying disease				-1.868	0.052
No	112	18.95	22.75			
Yes	8	15.23	31.92			

Attitude (A)	Gender				-0.460	0.325
	Male	16	3.52	0.049		
	Female	104	3.55	0.087		
	Program in study				0.386	0.350
	Dip. Emergency Medical Operation	49	3.55	0.095		
	Dip. Pharmacy Technique	71	3.53	0.073		
	Year of study				-1.483	0.071
	First year	59	3.50	0.050		
	Second year	61	3.58	0.110		
	Underlying disease				-0.540	0.302
No	112	3.54	0.083			
Yes	8	3.59	0.073			
Preventive behavior (P)	Gender				1.071	0.149
	Male	16	3.81	0.190		
	Female	104	3.69	0.198		
	Program in study				1.048	0.148
	Dip. Emergency Medical Operation	49	3.76	0.164		
	Dip. Pharmacy Technique	71	3.68	0.220		
	Year of study				-0.176	0.430
	First year	59	3.70	0.180		
	Second year	61	3.71	0.217		
	Underlying disease				1.301	0.115
No	112	3.72	0.198			
Yes	8	3.52	0.175			

\**p-value* < .05

Comparison of variables and knowledge (K), attitude(A) and preventive behavior (P) regarding COVID-19

The mean knowledge scores comparing males' and females' knowledge, attitude, and practice about COVID-19 were not statistically different. In the first and second years of study, the mean scores for knowledge, attitude and practice to prevent COVID-19 was not differed statistically significantly. Between participants with and without coexisting illnesses, there were no significant differences in terms of knowledge, attitudes, or preventive for preventing COVID-19. There was no statistically significant difference between the average knowledge scores for the COVID-19 prevention for the Dip. Emergency Medical Operation and Dip. Pharmacy Techniques. There was a statistically significant difference in the mean COVID-19 knowledge scores and the program of study. In addition, there was a statistically significant difference in the mean knowledge scores for COVID-19 between the Dip. Pharmacy Technique and the Dip. Emergency Medical Operation. (Table 4)

Most participants (99.17%) were aware that taking a shower as soon as possible helps reduce the risk of COVID-19 infection. They respond that people can contract COVID-19 from people with the disease who are not showing any symptoms, COVID-19 causes a severe lung infection, and COVID-19 is an emerging disease (98.33%). Additionally, coughing, sneezing, and flu-like

symptoms were known to be prevalent in 97.50% of COVID-19 patients, respectively. (Table 5)

The majority of participants (mean 4.66, S.D.=0.52) believed that anyone may contract COVID-19 and that travelling to areas where the virus has been recorded may increase one's chance of infection (mean 4.51, S.D.= 0.57). Increasing handwashing may reduce the chance of contracting COVID-19 (mean 4.45, S.D.= 0.56) respectively. (Table 5)

Preventive behaviors for COVID-19 that the majority of the participants practiced were consuming hot, freshly prepared food (mean 4.67, S.D.=0.56), wearing a mask every time they met people (mean 4.63, S.D.=0.59) and stay at home when you have a fever, runny nose, or cough (mean 4.39, S.D.=0.87) respectively. (Table 7)

Factors related to the preventive behavior of COVID-19 among Diploma students found that gender is related to COVID-19 preventive behavior statistically significant at 0.05 (OR=0.23; 95% CI=0.07 to 0.77; *p-value*=0.010). Female students' demonstrated self-protection behavior from COVID-19 is approximately 0.23 higher than that of male students (95% confidence interval between 0.07 and 0.77). (Table 8)

The Vocational Certificate course program study associated with the prevention behavior of COVID-19 statistically significant (OR=3.37; 95% CI=1.57 to 7.21; *p-value*=0.001), that is, the appropriate self-protection behavior from COVID-19 disease of students Diploma of Pharmacy Technique was higher than the program in

Emergency Medicine Operation are approximately 3.37 times and have a confidence interval of 95% between 1.57 and 7.21. (Table 8)

Attitudes are related to the preventive behavior of COVID-19 among Diploma students statistically significant (OR =4.76; 95% CI=2.19 to 10.35; *p*-value < 0.001), that is, appropriate self-

protection behavior from COVID-19 disease of students with good attitudes was higher than students with a moderated attitude approximately 4.76 times and had a confidence interval of 95% between 2.19 and 10.35. (Table 8)

**Table 5** Knowledge about COVID-19 among Diploma students

No.	Knowledge about COVID-19	Correct answer	
		n	%
	<i>Cause</i>		
1	The genomic material in COVID-19 is DNA.	53	44.17
2	COVID-19 is an emerging disease.	118	98.33
3	The coronavirus strain that causes Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) is also the source of COVID-19.	116	96.67
4	COVID-19 is a dangerous contagious disease.	102	85.00
5	The third wave of the COVID-19 virus, which is circulating in Thailand, is the Indian strain.	22	18.33
	<i>Symptoms</i>		
6	People can contract COVID-19 from people with the disease who are not showing any symptoms.	118	98.33
7	COVID-19 causes a severe lung infection.	118	98.33
8	The symptoms of COVID-19 infection in people with underlying health problems including diabetes and hypertension will not vary from those of people without such conditions.	56	46.67
9	Coughing, sneezing, and flu-like symptoms are common in COVID-19 patients.	117	97.50
10	People infected with COVID-19 will have a fever not exceeding 37.5 degrees Celsius.	66	55.00
11	Elderly people infected with COVID-19 have symptoms that are no different from the general population.	59	49.17
	<i>Incubation period</i>		
12	The incubation period for COVID-19 is approximately 2-14 days.	114	95.00
13	COVID-19 is not able to survive in natural environments.	76	63.33
14	Before they show symptoms, COVID-19 infections can spread among people in a period of 1-2 days.	83	69.17
15	Patients are unable to transmit COVID-19 throughout the incubation period.	77	64.17
	<i>Transmission</i>		
16	COVID-19 can be transmitted through breathing.	104	86.67
17	COVID-19 cannot be transmitted through contact with patient secretions.	69	57.50
18	On average, a COVID-19 patient can infect two to four persons.	85	70.83
19	Talking within 1 meter without wearing a mask, there is no chance of being infected with COVID-19.	72	60.00
20	There is no risk of getting COVID-19 when eating with close friends.	92	76.67
	<i>Prevention</i>		
21	Wearing a face mask reduces the risk of contracting COVID-19.	34	28.33
22	COVID-19 can be eliminated by washing the hands with 50% alcohol gel.	4	3.33
23	Showering as soon as you reach home may help in reducing COVID-19 infection.	119	99.17
24	Rapid testing for COVID-19 produces results that are similarly accurate as real-time PCR.	35	29.17
	<i>Treatment</i>		
25	Most of all COVID-19 patients die.	103	85.83
26	If a COVID-19 patient has a high fever, they can take paracetamol.	94	78.33
27	Treatment for COVID-19 is symptomatic.	112	93.33
28	COVID-19 disease after recovery will have the appearance of lesions in the lungs.	92	76.67

**Table 6** Attitudes of Diploma students towards COVID-19

No.	Attitude toward COVID-19	Mean	S.D.
1	COVID-19 is out of control.	2.68	1.21
2	COVID-19 infection could be present in patients with a high fever and runny nose.	3.77	1.05
3	Anyone can become infected with COVID-19.	4.66	0.52
4	Getting vaccinated is the only way to avoid contracting COVID-19.	3.25	1.17
5	The chance of contracting COVID-19 can be decreased by wearing a mask.	4.43	.68
6	Frequent exercise may help in the prevention of COVID-19 infection.	3.70	0.88
7	Handwashing may decrease the risk of COVID-19 infection.	4.45	0.56
8	If everyone is not immunized, there will be multiple waves of COVID-19 outbreaks.	3.93	.97
9	One way to slow down the COVID-19 outbreak is to isolate individuals who have come into high-risk contact with confirmed cases for 14 days.	4.25	0.78
10	Living in one's house and not leaving it reduces one's risk of contracting COVID-19.	3.72	1.01
11	COVID-19 is not actively prevented by currently available vaccines.	4.01	1.10
12	Visiting regions where COVID-19 is reported can increase the risk of infection.	4.51	0.57
13	The COVID-19 virus does not stop spreading when people use face masks.	2.94	1.46
14	Those of working age are more likely to be infected with COVID-19 than teenagers.	2.94	1.02
15	Learning online does not stop the COVID-19 virus from spreading.	3.10	1.33

**Table 7** Preventive behavior COVID-19 among Diploma students

No.	Preventive behavior COVID-19	Mean	S.D.
1	After getting something from someone, wash your hands with water.	4.03	1.06
2	You stay away from overcrowded locations.	4.27	0.97
3	You stay away from locations with inadequate ventilation, such as movie theatres.	4.37	1.23
4	When sneezing or coughing, put your lips and nose inside your sleeve.	4.34	0.98
5	You wear a mask when doing schoolwork or reporting with a friend.	3.15	1.42
6	When you go outside, you carry alcohol at least 70% concentrated for hand washing.	3.88	1.22
7	You avoid close contact with people who have flu-like symptoms.	4.31	0.98
8	You have visited a location where COVID-19 cases have been reported.	2.1	1.44
9	You follow news about the COVID-19 situation through various media.	4.25	0.95
10	When talking with friends, keep a distance from them of one to two meters.	3.73	1.21
11	Take vitamins and supplements to boost immunity.	3.03	1.60
12	You have to eat outside the home, such as a restaurant.	2.72	1.39
13	Consume hot, freshly prepared food.	4.67	0.56
14	Stay at home when you have a fever, runny nose, or cough.	4.39	0.87
15	Wear a mask every time when meet people.	4.63	0.59
16	Always have some alcohol gel on hand.	3.71	1.28
17	When you want to speak with other people, place the mask over your chin.	2.42	1.41
18	Exercise regularly	2.95	1.18
19	Do not share personal items with others.	4.08	1.06
20	Cover your mouth and nose with a tissue when you cough or sneeze.	3.94	1.01
21	Keep a distance of at least 1 meter when meeting and talking with other people.	3.89	0.93
22	Use your hands to rub your eyes or touch your face.	3.16	1.29
23	After opening or shutting public doors, wash your hands with 70% alcohol gel.	4.25	0.83
24	Reuse a face mask or cloth mask for several days without changing it.	1.94	1.36
25	Dispose of used masks with general waste.	2.65	1.41

**Table 8** Factors related to preventive behavior COVID-19

Variables	Preventive behavior COVID-19				OR	95% CI OR	p-value
	Moderate		Good				
	n	%	n	%			
1. Gender							0.010*
Male	4	6.15	12	21.82	1	-	
Female	61	93.85	43	78.18	0.23	0.07 to 0.77	
2. Age					0.67	0.44 to 1.04	0.074
3. Program in study							0.001*

Dip. Emergency Medical Operation	47	72.31	24	43.64	1	-	
Dip. Pharmacy Technique	18	27.69	31	56.36	3.37	1.57 to 7.21	
4. Year of study							0.725
First year	31	47.69	28	50.91	1	-	
Second year	34	52.31	27	49.09	0.87	0.42 to 1.80	
5. Underlying disease							0.327
No	62	95.38	50	90.91	1	-	
Yes	3	4.62	5	9.09	2.06	0.47 to 9.07	
6. Knowledge							0.188
Fair	30	46.15	32	58.18	1	-	
Good	35	53.85	23	41.82	0.61	0.29 to 1.27	
7. Attitude							0.001*
Good	43	66.15	16	29.09	1	-	
Moderate	22	33.85	39	70.91	4.76	2.19 to 10.35	

\**p*-value <0.05

## DISCUSSION

The COVID-19 pandemic is seriously threatening the public's health. It affected Thailand's College students' lifestyles. The risk of infection is present in close contact in the classroom. On-site or classroom techniques raise the danger of infection and transfer. Therefore, during the COVID-19 outbreak, educational institutions switch from on-site to online teaching. To preserve distance and reduce disease in the College. Lifestyle changes to prevent infection by wearing a mask. To avoid viral transmission, frequently wash your hands with soap or alcohol gel, and engage in more activities at home. Most education and instruction during a pandemic take place online. However, some subjects continue to offer on-site since these learning objectives require additional in-person instruction.

According to the study, College students had positive attitudes, preventive behavior, and knowledge of COVID-19. The College and the country considered a reasonable amount of knowledge, positive attitudes, and practices regarding COVID-19 prevention, which is one of the most the factors in their ability to manage COVID-19 effectively. To prevent infection, they wear masks, avoid social contact, and wash their hands with alcohol gel. The mean score of the participants showed knowledge about COVID-19 at moderate. They know that to help prevent COVID-19 from spreading, take a shower and wash your hair when you return home. The participants know that patients with infected COVID-19 don't have symptoms and can spread the disease to others. Coughing, sneezing, and flu-like symptoms are characteristic symptoms of Coronavirus disease 2019 infection in patients, and the other symptom that the participants knew they had COVID-19 caused a dangerous lung infection. The other knowledge about the prevention of COVID-19 was wearing a face mask reduces the risk of contracting COVID-19. Even though COVID-19 is an emerging disease that will make its first appearance in late

December 2019, the participants' attitudes and practices were still excellent. The participants had a positive attitude regarding COVID-19's ability to infect anyone. The likelihood of getting COVID-19 increases if you visit locations where cases have been reported and documented and frequently use soap, and hand washing is the best way to prevent the COVID-19 infection from spreading. Wear a mask whenever you meet new people, drink hot, freshly prepared meals, and remain in when you have a fever, cough, or runny nose as their preventive behaviors. When comparing the variables by paired t-test, no relationship between knowledge, attitude, and practice differences with gender, the study program, or year of study, with or without coexisting disorders, was observed. Additionally, the study program significantly impacted the knowledge score's mean ( $p < .05$ ). While, factors associated with COVID-19 preventive behavior, such as gender, study program, and attitude, were statistically significant at the .05 levels. Personal characteristics factors, including age, years of education, underlying disease, and knowledge about COVID-19 disease, were not related to COVID-19 preventive behavior. This result related to previous study of Elhadi et al,<sup>25</sup> they reported that gender of medical student related to preventive behavior.

However, various problematic behaviors could result in students catching COVID-19, such as; students don't wear a mask while doing homework or reporting to a friend. Because doing so puts them at risk of transmitting COVID, the students avoid wearing masks. They believe that due to the friendship and trust between friends, their friend did not infect with COVID-19. Asymptomatic people may spread the illness in the case of COVID-19 infection, especially if they are in close contact with one another. Some participants wear masks over their chins when they want to speak to others. Considering that they don't often wear masks all the time and that doing so makes their voices sound



muffled. As a result, when speaking, they pull the mask down to their chin, increasing the chance of infection. Other behaviors of concern were some of the responders touching their faces or wiping their eyes. This behavior induces pathogens to enter the body via the eyes and nose.

Compare our findings to those of other relevant studies from many countries; Indonesia, India, Japan, Jordan, and Pakistan. The research found that most Indian medical college students increased their frequency of handwashing while under the influence of COVID-19. And there was no significant relationship between the demographic knowledge factors.<sup>26</sup> Another study found that 50% of Indonesian medical students had adequate knowledge, a positive outlook, and effective COVID-19 prevention practices.<sup>27</sup> While the medical students in India demonstrated moderate knowledge, attitude, and practice to prevent COVID-19.<sup>28</sup> The higher education students in India and found the students have a high degree of knowledge of the COVID-19 disease, a positive attitude toward COVID-19, and desirable practices toward COVID-19.<sup>29</sup> Only about 30% of Indonesian medical students had sufficient knowledge, they had a positive attitude and were actively using COVID-19.<sup>30</sup> In Japan, reported that University students were high knowledge, attitude, and practice about COVID-19. All the responders demonstrated that they were aware need to stay away from confined spaces. The responders showed a moderate or greater frequency of hand washing or mask use.<sup>31</sup> The previous study found that Medical and non-Medical University students in Jordan presented comprehended COVID-19 symptoms quite well. In response to the attitude and behavior, many students nearly agreed that handwashing is essential to the avoidance prevention of infection. 68.4% of students believed wearing a mask would also be beneficial.<sup>32</sup> According to the study Malaysian students at Health Campus had good knowledge of COVID-19. Nearly 41% of participants implement poor COVID-19 prevention, compared to 50% who practice good prevention.<sup>33</sup> Another study reported the participants had a good impression of COVID-19. A little over 37% of the respondents practice good prevention. The majority of Pakistani university students reportedly have good knowledge of COVID-19.<sup>34</sup> The relevant research published in Saudi Arabia, China, Malaysia, and the United Arab Emirates, reported that College students at the University of Bisha in Saudi Arabia were well-versed in the Coronavirus. The previous study showed regarding the Coronavirus, the individuals showed excellent attitudes and behaviors,<sup>35</sup> while another reported that pupils in China covered their faces outside. College students had a strong awareness of the COVID-19 pandemic and a positive attitude toward it.<sup>36</sup> Saudi Arabian pharmacy students had high knowledge, positive

attitudes and good behavior with COVID-19.<sup>22</sup> The majority of participants in a public university in Malaysia showed positive behavior toward COVID-19 prevention.<sup>37</sup> Another previous study showed that most Malaysian students enrolled in medical, dental, and health science degrees possessed solid understanding. Half of the participants have a good practice.<sup>38</sup> There is no significant correlation between knowledge of COVID-19 and prevention of COVID-19, and the study found that University students in the United Arab Emirates demonstrated good knowledge, positive attitudes, and low-risk behaviors associated with COVID-19 prevention.<sup>39</sup>

## CONCLUSION

The COVID-19 is a threat to public health and lifestyle. The results of this study demonstrated that the diploma students had good knowledge, attitudes, and preventive behavior. Further emphasis needs to improve on advancements in health promotion and education. Our study found that the level of the students with knowledge, attitudes and practices regarding COVID-19 was quite good. One of the keys to initially successfully controlling COVID-19 is believed to be the high level of knowledge, attitudes, and adherence to practices of the students towards prevention. Additionally, this study has shown how important it is to keep students' knowledge, attitudes, and behaviors about COVID-19 prevention awareness increased and maintained throughout time. Factors related to prevention behavior for COVID-19 include gender, program of study, and attitude statistically significant at 0.05.

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