

# Attitude to vaccinate against coronavirus disease 2019 of high school students in chonburi province, Thailand: A study of grade 10–12 students of princess chulabhorn science school

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## ABSTRACT

**Background:** COVID-19 or coronavirus disease 2019 has rapidly affected all aspects of life around and becomes a major threat to public health around the world. One of the most important actions that need to be taken to stop the pandemic is vaccinations. Managing the COVID-19 pandemic in the long term, unwillingness to receive vaccinations and negative attitudes toward vaccines are major barriers. **Objectives:** This study aimed to investigate community knowledge, risk perceptions, and attitudes toward COVID-19 vaccinations among high school students in Chonburi, Thailand. **Materials and Methods:** The study was conducted using a questionnaire. A total of 303 students participated. COVID-19-related knowledge, risk perception, and attitude toward COVID-19 vaccines were assessed. Independent *t*-test and ANOVA were used to analyze differences between outcomes and sociodemographic. Attitudes toward vaccination were analyzed by a generalized linear model. **Results:** Students revealed a moderate level of COVID-19-related knowledge, correctly answering 7.09 (SD = 1.56) questions in a total of 10, a moderate level of risk perception of getting COVID-19, average score was 9.7 (SD = 3.03) of 12, and attitude toward vaccine against, the average scores at 3.02 (SD = 1.64), questions in a total of 21. **Conclusion:** This study revealed a moderate level of knowledge about COVID-19, risk perception, and attitude against COVID-19 vaccination among high school students at Princess Chulabhorn Science School, Chonburi, Thailand. Moreover, it reinforces that there is no relation between those factors and the attitude for accepting COVID-19 vaccines. However, the reasons behind the attitude against the COVID-19 vaccination were efficacy of vaccines. News about the side effects of the vaccines, such as chest pain, muscle pain, dizziness, fatigue, breathing problems, numbness, and facial tics, was widespread among people and brought more attitudes against COVID-19 vaccination. Considering precisely, increasing efficacy of the vaccine will lead to higher vaccine acceptance. Therefore, to control the pandemic in the long term, providing high vaccine efficacy will be one of the recommended solutions.

**KEY WORDS:** Coronavirus disease 2019 Vaccine; Coronavirus disease 2019; Attitude Toward Vaccination; High school student

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## INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an emerging disease caused by coronavirus 2 severe acute respiratory syndrome coronavirus (SARS-CoV-2), with more than 3.7 million deaths and more than 170 million reported cases worldwide, as of June 6, 2020. Thailand is now facing the

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third wave of COVID-19, with 172 thousand reported cases and 1177 deaths as at June 6, 2020. The transmission route of COVID-19 is made through droplets and respiratory secretions directly between humans and indirectly through contaminated surfaces. Fever, dry cough, and tiredness are the main symptoms of the disease, which may get worse among the elderly and chronically ill. The incubation period is 1–14 days. Public measures, such as border closures, school closures, face mask requirement, and social distancing, have been used to control the pandemic in almost all countries.<sup>[1]</sup>

Throughout the century, vaccinations have become the most effective way to protect ourselves against ill health. They prevent up to 3 million deaths worldwide every year by providing direct immunity and preventing disease among vaccinated individuals. Herd immunity also can be reached when enough people have been vaccinated against a disease and have developed protective antibodies against future infection. Herd immunity, immunity in a sufficient proportion of the population, is acquired for the long-term success of public health response to the COVID-19 pandemic. Vaccines are necessary for controlling COVID-19 transmission. However, unwillingness to receive vaccines against COVID-19 becomes a challenge to achieve vaccination coverage for population immunity. During the period of this research, in Thailand, there were only two brands of vaccine provided, AstraZeneca and Sinovac, whose side effects were widely revealed through news and social media. PPTV News revealed that 41 health care workers at Chiangrai Prachanukroh Hospital were found to be infected with COVID-19 and 29 of them were already vaccinated with either AstraZeneca or Sinovac.<sup>[2]</sup> A major barrier to control COVID-19 pandemic can be related to vaccine hesitancy toward attitude to the of COVID-19 vaccines.<sup>[3]</sup>

The study aimed to identify attitudes to vaccination against COVID-19, related with knowledge and risk perception, among high school students of Grade 10–12 of Princess Chulabhorn Science High School, Chonburi.

## MATERIALS AND METHODS

### Participants and Procedure

This was an observational study. An online questionnaire was purposely developed and made available to all students in grade 10-12 at the Prince Chulabhorn Science School Chonburi, Thailand through Google Form between the 30<sup>th</sup> April to 30<sup>th</sup> May 2021. The invitation was sent to all the students by school social media groups. At Princess Chulabhorn Science School, Chonburi, all the students have access to the social media group so they receive an 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.

### Instrument

The questionnaire was developed based on a literature review including (1) information provided by and guidelines from the Department of Health, Ministry of Public Health in Thailand regarding infection and prevention control. (2) Studies already performed on the same topic in other countries 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 infection control specialists of a public hospital in Thailand to validate its content. A pre-test was then performed with a small sample of high school students to test for comprehension and difficulty. All the questions remained without modifications. The psychometric characteristics of the questionnaires were tested, as described in the statistical analysis subsection. The final version of the questionnaire contained 21 questions; first six questions about sociodemographic data (gender, grade level, parents occupation, weight condition, and congenital disease) and 16 questions divided into two sections.

### Statistical Analysis

The analysis was performed using SPSS for Windows, version 26.0, Armonk, NY, USA. To analyze the psychometric of infection and prevention control: Personal factors, knowledge, attitudes, environment, and behaviors characteristics of the scales, an exploratory factor analysis, using principal component analysis with varimax rotation, was carried out. The descriptive studies were presented in absolute (*n*) and relative (%) frequencies, mean (*M*), and standard deviations (*SD*). To assess the differences between the outcome variables (personal factors, knowledge, attitudes, environment, and behaviors toward infection and prevention control) and the sociodemographic characteristics, considering the sample size, independent *t*-tests and the ANOVA were used, as appropriate. Pearson's correlation calculated the correlations between the outcomes of the study. Finally, a generalized linear model was calculated to determine the predictive variables of the preventive behaviors. Exp ( $\beta$ ) and the respective 95% confidence intervals (95% CI) were presented. Statistical significance was defined as  $P < 0.05$ .

### Ethical Consideration

This research uses an anonymous data collection method to collect data from Grade 10 to 12 students of Princess Chulabhorn Science School, Chonburi, Thailand, using Google Forms. The invitation was sent by email to the institutional emails used by the students. In these emails, 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.

## RESULTS

This study comprised a total of 303 high school students. The sociodemographic characteristics of the sample are presented in Table 1. Most of the high school students were female ( $n = 192$ , 63.4%) and were studying in Grade 11 ( $n = 128$ , 42.2%). Most of the participants' parent's occupations were not in the medical field ( $n = 254$ , 84.8%), weight condition was according to the standard ( $n = 219$ , 72.3%) and most of the participants had no congenital disease ( $n = 255$ , 84.2%)

Concerning COVID-19-related knowledge, the average score was 7.09 (SD = 1.56) which is a moderate level, female students showed higher levels of COVID-19-related knowledge score 7.27 (SD = 1.55) compared to male students. Grade 12 students had the highest COVID-19-related knowledge score 7.49 (SD = 1.15). Students whose parents were in medical fields have higher COVID-19-related knowledge than those whose parents were not. In terms of weight conditions, students according to the standard had better knowledge compared to underweight and overweight students. The participants without congenital diseases also have higher scores in this section.

Students revealed a moderate level of risk perception of getting COVID-19, average score was 9.7 (SD = 3.03) of 12. Female students were more concerned, average scores 10.16 (SD = 2.90) than male students, average score 8.95 (SD = 3.09). Students in Grade 12 were concerned about their risk perception average at 9.81 (SD = 3.38) which was higher than other class levels as well as non-medical parents students had an average score of risk perception at 9.75 (SD = 3.00) higher than students with parents in medical fields. Students with a standard weight, average scores 9.79 (SD = 3.04), were more concerned about their risk of infection than underweight and overweight students. According to congenital disease, those without were more concerned than those who had congenital disease.

Regarding attitude toward vaccine against, Table 1 shows the average scores at 3.02 (SD = 1.64). To be more precise, male students had more attitudes toward vaccines against, average at 3.23 (SD = 1.64), higher than female students. Students in Grade 10 were more hesitant to vaccines, average at 3.25, than to Grade 11 and 12 students. Students with health science parents had more against the attitude to vaccines than those whose parents were not related to medical fields. Underweight and normal weight students had the same average number at 3.05 (SD = 1.69 and SD = 1.66, respectively). Students with no health issues were more against vaccines at 3.08 on averages (SD = 1.64).

Students revealed a moderate level of knowledge about COVID-19, correctly answering a mean of 7.07 (SD = 1.52) questions in a total of 10. Looking more precisely at each question, the top three questions that the students answered correctly were (1) What kind of disease is COVID-19? (2) How to prevent COVID-19? and (3) How long is the incubation period for COVID-19? More than 90% of the participants answer correctly. In contrast, the least three questions that the students answered correctly were (1) What are the treatments for COVID-19? (2) How many people are infected with COVID-19 in Thailand (as of April 27, 2021)? (3) What are the symptoms of COVID-19, with 33%, 35.3%, and 56.1% of the students, respectively? [Table 2].

Regarding risk perception of the participants, the large group with 37% indicated their risk of infection due to where they daily live at low level. Study or workplaces were rated to be at risk of COVID-19 infection by a majority of students at a medium and high level with nearly the same amount, 27.7% and 27.1%, respectively. About 68.3% of students thought their leisure activities are at a very low risk level to get the virus. According to risk in regular travel methods, 31% of students rated at low level [Table 3].

Results from a generalized linear model indicated that the educational level and the attitudes toward preventive behaviors had no statistically significant effect on the willingness to get vaccinated against COVID-19 of students [Table 4].

For participants who feel hesitant about COVID-19 vaccination were asked to give their reason of hesitancy, there were 183 participants who gave reasons and the reasons were categorized into four groups. Top three reasons for vaccine hesitancy were (1) prefer vaccines with high efficacy rate which were not provided by the government, (2) concern side effects from COVID-19 vaccine, and (3) do not feel that COVID-19 vaccine is necessary [Table 5].

## DISCUSSION

Negative attitudes toward vaccination is major barriers to managing the COVID-19 pandemic in the long term. Among high school students, this study found that COVID-19-related knowledge, risk perception, and willingness of vaccination were at a moderate level. There was no statistically significant result from a generalized linear model that the educational level and the attitudes toward preventive behaviors had an effect on the willingness to get vaccinated against COVID-19 of students.

During the period of this research, Thailand had implemented COVID-19 vaccination plans to provide two brands of COVID-19 vaccine for people; AstraZeneca and Sinovac.<sup>[4]</sup> There had been news about side effects from these vaccines

**Table 1:** Differences in outcomes according to the sociodemographic characteristics of participants ( $n=303$ )

Sociodemographic characteristics	<i>n</i>	%	Knowledge (range 0–10)		Risk perception (range 4–20)		Attitude to vaccinate against COVID-19 (range 1–5)	
			Mean	SD	Mean	SD	Mean	SD
Gender			7.09	1.56	9.70	3.03	3.02	1.64
Male	111	36.6	6.77	1.54	8.95	3.09	3.23	1.64
Female	192	63.4	7.27	1.55	10.16	2.90	2.90	1.64
Grade Level								
Grade 10	77	25.4	6.74	1.44	9.56	2.82	3.25	1.69
Grade 11	128	42.2	6.99	1.61	9.73	2.87	2.90	1.62
Grade 12	98	32.2	7.49	1.51	9.81	3.38	3.01	1.64
Parent occupation								
Medical	46	15.2	7.22	1.47	9.50	3.16	3.54	1.63
Non-medical	257	84.8	7.07	1.57	9.75	3.00	2.93	1.63
Weight condition								
Underweight	39	12.9	6.85	1.48	9.59	2.66	3.05	1.69
Standard weight	219	72.3	7.22	1.55	9.79	3.04	3.05	1.66
Overweight	45	14.9	6.67	1.61	9.44	3.31	2.89	1.58
Congenital disease								
No	255	84.2	7.13	1.54	9.76	3.11	3.08	1.64
Yes	48	15.8	6.88	1.66	9.44	2.54	2.71	1.64

**Table 2:** Frequency and percentage on level of COVID-19-related knowledge of the participants ( $n=303$ )

Question item about COVID-19-related knowledge	Correct answered (%)
What kind of disease is COVID-19	303 (99.7)
what virus causes COVID-19	267 (88.1)
How long is the incubation period for COVID-19?	279 (92.1)
What are the symptoms of COVID-19?	170 (56.1)
How is COVID-19 spread?	231(76.2)
How to prevent COVID-19?	283 (93.4)
What are the treatments for COVID-19?	100 (33)
What groups of people are at risk for severe symptoms if they are exposed to COVID-19?	172 (56.8)
What strains of the coronavirus are epidemic in Thailand (as of April 27, 2021)?	237 (78.2)
How many people are infected with COVID-19 in Thailand (as of April 27, 2021)?	107 (35.3)

such blood clotting, Thai PBS revealed that after receiving the Sinovac vaccine, nine student nurses at Thammasat University, two experienced minor side effects of a little pain in the arm they were vaccinated in, while seven felt substantial reactions including chest pain, muscle pain, dizziness, fatigue, breathing problems, numbness, and facial tics. One case of severe side effects was a female nursing student felt fatigued immediately after receiving the jab. Two days later, she briefly felt that her legs and hands were numb but soon felt better. Later that evening, symptoms strengthened, with eye and facial spasms, dizziness, fatigue, and weakness in her hands.<sup>[5]</sup> AstraZeneca, Thairath News reported that a

police officer died 5 days after AstraZeneca vaccination, his wife said “After the vaccination, he complains that he can’t breathe and fatigue, then his chest becomes tight, wheezing, and diarrhea until the blackout.”<sup>[6]</sup> As well as efficacy of the available COVID-19 vaccine, PPTV News revealed that 41 health care workers at Chiangrai Prachanukroh Hospital were found to be infected with COVID-19 and 29 of them were already vaccinated with either AstraZeneca or Sinovac. This may lead to even more attitudes against COVID-19 vaccine among students. Considering precisely, due to efficacy of COVID-19 vaccines, increasing efficacy of the vaccine will lead to higher vaccine acceptance. To control the pandemic, providing high vaccine efficacy will be one of the recommended solutions. The participants had a moderate level of COVID-19-related knowledge. According to the results, the participants, students from Grade 10–12, had a good understanding of what is COVID-19, what virus is related, how it spreads, what its symptoms are, and what are the preventive methods (average score of 7.03 out of 10). Female students had scores higher in COVID-19-related knowledge than male, and students from Grade 12 also had a better understanding of COVID-19 than Grade 10 and 11 students. This may be due to the fact that the students had received good information about COVID-19 from their parents, school, or online access. A previous study of knowledge, attitudes, and preventive behaviors toward coronavirus disease-19: A study among high school students in Bangkok by Petpaiboon (2021) also showed that there is a high understanding of knowledge about COVID-19 among high school students, and the score from female students was higher than male.<sup>[7]</sup> Alves *et al.* (2020) studied knowledge,



**Table 3:** Frequency and percentage on level of risk perception of getting COVID-19 of the participants (n=303)

Question item about risking perception of getting COVID-19	Very low	Low	Medium	High	Very high
Do you think the place where you live in your daily life is at risk of contracting COVID-19?	54 (17.8)	112 (37)	89 (29.4)	31 (10.2)	17 (5.6)
Do you think your place, study, or work is at risk of COVID-19 infection?	33 (10.9)	44 (14.5)	84 (27.7)	82 (27.1)	60 (19.8)
Do you think your leisure activities are at risk of COVID-19 infection?	207 (68.3)	73 (24.1)	18 (5.9)	3 (1)	2 (0.7)
Do you think your regular travels are at risk of COVID-19 infection?	69 (22.8)	94 (31)	79 (26.1)	40 (13.2)	21 (6.9)

**Table 4:** Generalized linear model predicting willingness to vaccinate against COVID-19

Variable	B	S.E.	t	Sig	95% confidence interval	
					Lower	Upper
Intercept	2.685	3.431	0.783	0.435	-4.075	9.445
Knowledge about COVID-19	-0.102	0.071	-1.448	0.149	-0.242	0.037
Risk perception of getting COVID-19	0.007	0.035	0.205	0.837	-0.062	0.077

**Table 5:** Reason for vaccination hesitancy

Reasons for vaccination hesitancy	n (%)
Prefer vaccine with high efficacy rate which were not provided by the government	146 (48.18)
Concern side effects from COVID-19 vaccine	11 (3.63)
Do not feel that COVID-19 vaccine is necessary	2 (0.66)
Personal reasons such as having congenital disease	24 (7.92)

attitudes, and preventive behaviors toward COVID-19: A study among higher education students in Portugal found that female participants had a better knowledge in COVID-19 compared to male, and students with higher educational level also understand about COVID-19 disease better than lower ones.<sup>[8]</sup> Glomjai *et al.* (2020) studied knowledge and behavior of people regarding self-care prevention from novel coronavirus 2019 (COVID-19) found that the participants, which about 75% aged between 51 and 60 years old, had a very good level of knowledge about COVID-19 and know how to prevent from the disease because they had more experiences according to facing previous epidemic situations such as new influenza virus (H1N1) or bird flu (H5N1).<sup>[9]</sup> Thus, they comprehended better about how to prevent contagious disease. Therefore, information about COVID-19 should be continuously publicized to the public, especially to students, through parents, school, or online access because they are still inexperienced about epidemic disease. The participant had a moderate level of risk perception owing to the fact that data were collected during the third wave of COVID-19 in Thailand and the government had taken measures to control the epidemic such as the closure of the tutoring institute and all types of educational institutions, also disallowing any test, training sessions, or

activities that involve many people.<sup>[10]</sup> Therefore, most of Thai people had quarantine at home, including students. Students were required by emergency decree from going to tutoring institutions like a normal semester break, but study online instead, this may lead to the moderate level of risk perception among students. Considering risk perception related to gender, females were more concerned about risk of getting COVID-19 virus than males as well as the study of Regina Ferreira Ales and Tawan Petpaiboon, because women are the gender with more attention. Johannes *et al.* (2001) studied gender differences in planning, attention, simultaneous, and successive cognitive processes and achievement, which found that girls outperformed boys on the planning and attention scales of the cognitive assessment system.<sup>[11]</sup> Willingness to vaccinate against the vaccine of the participants is at moderate level (3.02 of out 5 points). The key reasons that the participants hesitate to vaccinate were (1) quality of the vaccine provided by the government and (2) unseen side effects. Woluwe (2020) conducted a study about willingness to get vaccinated against COVID-19: Profiles and attitudes toward vaccination in Belgium found that 34% will definitely vaccinate with a COVID-19 vaccine and 39% probably vaccinated with a COVID-19 vaccine, 18% said “probably not” and 9% said “definitely not.” Intended uptake was strongly associated with age and opinion on the government’s dealing with the COVID-19 pandemic.<sup>[12]</sup> Peretti-Watel *et al.* (2020) conducted a study about a future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicization found that 26% of respondents stated that, if a vaccine against SARS-CoV-2 becomes available, they would not use it.<sup>[13]</sup> Because participants’ acceptance of a vaccine against SARS-CoV-2 strongly depended on their vote at the first round of the 2017 presidential election; those who had voted for a far left or far right candidate were much more likely to state that they would refuse the vaccine, as well as those who abstained from voting. In Indonesia, a previous study of Harapan *et al.* (2020) “Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia” explained that among 1359 respondents, 93.3% would like to be vaccinated for a 95% effective vaccine, but this acceptance decreased to 67.0% for a vaccine with 50% effectiveness.<sup>[14]</sup>

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.

The study was conducted during the COVID-19 pandemic, therefore, students who could participate were one who could access the internet and had a connection device during the study period.

Therefore, attitude toward the government may not play an important part toward willingness to be vaccinated, but the quality of the vaccine instead that affect vaccine acceptance. People were more willing to be vaccinated with a high effective vaccine because of the concern of side effects after injection. Meanwhile, the government was responsible for finding high efficacy vaccines to people and informing them with information about COVID-19 and vaccines, also gaining trust in the government.

## CONCLUSION

This study revealed a moderate level of knowledge about COVID-19, risk perception, and attitude against COVID-19 vaccination among high school students at Princess Chulabhorn Science School Chonburi, Thailand. Moreover, it reinforces that there is no relation between those factors and the attitude for accepting COVID-19 vaccines. However, the reasons behind the attitude against the COVID-19 vaccination were efficacy of vaccines. News about the side effects of the vaccines, such as chest pain, muscle pain, dizziness, fatigue, breathing problems, numbness, and facial tics, was widespread among people and brought more attitudes against COVID-19 vaccination. Considering precisely, increasing efficacy of the vaccine will lead to higher vaccine acceptance. Therefore, to control the pandemic in the long term, providing high vaccine efficacy will be one of the recommended solutions.

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