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# Willingness to be vaccinated against COVID-19 among university students in Nakhon Pathom, Thailand: A Cross sectional online survey

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***Abstract:*** **Background: COVID-19 or Coronavirus disease 2019 has affected all aspects of life globally and become 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, vaccine hesitancy and negative attitudes towards vaccines are major barriers.**

**Objectives: This study aimed to investigate Mahidol University students' knowledge, risk perceptions and the willingness to be vaccinated against COVID-19 vaccinations among undergraduate students in Mahidol University, Thailand.**

**Materials and Methods: The study was conducted using a questionnaire. A total of 400 students participated. COVID-19 related knowledge, risk perception, and the willingness to be vaccinated toward the COVID-19 vaccines were assessed. Statistical test using SPSS statistics to analyze differences between intention to be vaccinated and sociodemographic was done using exact p value, Pearson's correlation and generalized linear model.**

**Results: Students revealed a good level of COVID-19 related knowledge. Intention to get vaccinated was 43%(n=172) and the unwillingness to get vaccinated was 57%(n=228).The analysis of a binary logistic regression indicated that the risk of perception had a statistically significant effect on the intention to get vaccinated.**

**Conclusion: There were 400 participants which were university students, 291 (72.8%) males and 109 (27.3%)females and aged between 18-22. The willingness to be vaccinated against COVID-19 was moderate(M=3.73, SD= 1.21). The knowledge of COVID-19 was moderate(M=7.87, SD=0.95). The risk perception of getting COVID-19 was moderate(M=17.03 , SD=2.25). The predictive factors for willingness to be vaccinated against COVID-19 were the risk perception(Beta=0.20, p<0.01) and congenital diseases (Beta=0.15, p<0.01).**

***Keywords:*** **COVID-19, Willingness to be vaccinated, COVID-19 Knowledge, Risk perception, Vaccine acceptance.**

## 1. INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus, which first emerged from Wuhan, China, and reported in late December 2019 as the 2019 novel coronavirus [1]. COVID-19 can spread through air particles or droplets of saliva when the infected person cough or sneeze [2]. Minor irresistible particles can wait within the discuss and collect in indoor places, particularly where numerous individuals assemble with destitute ventilation[3]. Subsequently, mask-wearing, hand cleanliness, and physical remove are essential to avoid COVID-19 [4].

According to the COVID-19 situation in Thailand on September, there have been 1,308,343 confirmed cases of COVID-19 with 13,283 deaths[5]. COVID-19 infections had decreasing everyday by the daily report of 14,802 new infections[6]. There are 4 vaccines available in Thailand which are AstraZeneca, Sinovac, Moderna, and Johnson-Johnson, having Sinovac being the most large in numbers[7]. Sinovac efficacy rate 50.4% is lower than other vaccines. Doctors and people who help tackle the problem of COVID-19 had prioritized, following by students and teachers[8].

This study focuses on the students because they are a new generation of people.They show confidence in decision making and posses a desire to make a difference in the world[9]. The survey revealed that there is a hesitancy of willingness to vaccinate because of mainly distrust, complaining about side effects, government and other personal factors. The main goal of this study is to observe the relationship between Knowledge, risk perception and the willingness to be vaccinated. Specifically, this study also focuses on the reasons why the students of Mahidol University are vaccinated and not vaccinated.

## 2. METHODS

### Participants and procedure

This was a cross-sectional observational study. An online questionnaire was purposely developed and made available through Google Form between 12 April 2021 and 21 June 2021. All university students who were eligible and were invited to participate in the study. The invitation was sent by the university social media groups. The students have access to university social media groups, so they all receive an invitation. In this invitation, information about the objectives of the study as well as the ethical guarantee of confidentiality and anonymity in the data collected as stated in the informed consent were explained. Participation was completely free and voluntary, and no personal data were collected from any participant. Of the 26,605 students a total of 400 students participated in the study (response rate:1.5%).

### Instrument

The questionnaire was developed based on a literature review including COVID-19 transmission and vaccine (2) studies performed on the same topic where several common items were used to assess each of the dimensions analyzed in this study. The proposed items were then grouped and redundant items were removed.

A preliminary version of the instrument was reviewed by the experts to validate its content. A pretest was then performed with a small sample of university students] to test for comprehension and difficulty. All the questions remained without modifications. The psychometric characteristics of the questionnaire were tested, as described in the statistical analysis subsection.

The final version of the questionnaire contained 23 questions; about 7 questions sociodemographic date (gender, age, year level, congenital disease and household income) and 16 items divided into 3 sections.

Knowledge and understanding about COVID-19 : this scale consisted of 9 questions related to COVID-19 and vaccine. 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.

Risk Perception of contracting COVID-19 : this scale was composed of 5 items, and response dent variable categories consisted of a five-point likert scale (from 1-strongly unsafe, to 5 strongly safe) and we reverse the score which the participants who get the higher score will have more risk. with the highest score corresponding to more risk perception of contracting COVID-19. The “Risk Perception of contracting COVID-19” factor consisted of 5 items and varied from 5 to 25 and the higher values corresponded to a higher risk of contracting COVID-19.

Willingness to be vaccinated against COVID-19 : this scales referred to the willingness to be vaccinated against COVID-19 and included 2 items. The first item was answered using a five-point scale (From 1-Not willing to 5-Willing). A high score on this scale indicated high willingness to be vaccinated against COVID-19 from 1 to 5.

### Statistical analysis

The analysis was performed using SPSS for windows, version 26. To analyse psychometric characteristics of the scales, an exploratory factor analysis, using principal component analysis with varimax rotation, was carried out. Reliability was analyzed through the calculation of item-total correlation coefficients and Cronbach’s alpha ($\alpha$ ) for the scales of the questionnaire. The descriptive analysis were presented in absolute (n) and relative (%) frequencies, mean (M) and standard deviations (SD). To assess the differences between the outcome variables (Knowledge, Risk perception and Willingness to vaccinate) and the sociodemographic characteristics, considering the sample size, independent t-test and the ANOVA were used as appropriate. The correlations between the outcomes of the study were calculated by Pearson’s correlation. Lastly, a generalized linear model was calculated to determine the predictive variables of the preventive

behaviors. Exp (β) and the respective 95% confidence intervals (95% IC) were presented. Statistical significance was defined as $p < 0.05$.

**Ethical Approval**.

Ethical approval was obtained from the study sites prior to data collection, and consent was assumed

as completing the survey questions. Participants were informed that their participation was voluntary and that they could withdraw from the study at any point or choose not to answer any question. Participants' confidentiality was maintained as no identifying information was collected and findings will be disseminated only in aggregate.

## 3. RESULT

This study comprised a total of 418 students. The sociodemographic characteristics of the sample are presented in Table 1. Most participants were male (n=291,72.8% ). Most participants age's were 21 and above (n=220,55% ) followed by 19 (n=76,19% ), 20 (n=60,15% ) and under 19 (n=44,11%) respectively. 198(49%) of the participants are in Year 4 followed by 110(27.5%) of Year 1 and others were in Year 3 and Year 2 with 28(7%) and 64(16%) respectively. 303(75.8%) of the participants had a recent vaccination, while the rest of 97(24.3%) participants have not gotten vaccinated in recent years. Most participants earned monthly income below 100,000(n=288,72% ) and had no congenital disease(n=350,87.5% ).

Regarding knowledge about COVID-19, participants revealed a good knowledge about COVID-19, correctly answering a mean of 7.64(SD=1.22) in a total of 9 questions. Male participants showed higher knowledge scores (M=7.91, SD=0.86) than female participants (M=7.76, SD=1.14). Participants who got the vaccination in the recent year showed the highest COVID-19 related knowledge score of 7.90 (SD=0.89). For the income group, participants who earned less than 100,000 showed the highest COVID-19 related knowledge score of 7.93 (SD=0.77). Year 3 had the highest COVID-19 related knowledge score of 7.96 (SD=1.04). Participants who had no congenital disease showed the highest COVID-19 related knowledge score of 7.89 (SD=0.96).

Focusing on the risk of perception of getting COVID-19, participants showed a bad level of the risk of perception of getting COVID-19 with the average score of 17 .00 out of 25. Male participants showed a higher attitude toward the risk of perception of getting COVID-19 scores (M=17.08, SD=2.26) than female participants (M=7.92, SD=2.26). Participants who got no vaccination in the recent year showed the highest risk of getting COVID-19 score of 16.58 (SD=3.93). For the income group, participants who earned less than 100,000 showed the highest risk of getting COVID-19 score of 17.20 (SD=1.92). Year 3 had the highest risk of perception of getting COVID-19 score of 18.35 (SD=2.16). Participants who had no congenital disease showed the highest risk of perception of getting COVID-19 score of 17.10 (SD=2.25).

Turning to the willingness to vaccinate, participants showed a medium level of the willingness to vaccinate with the average score of 3.66 out of 5. Male participants showed a higher attitude toward COVID-19 preventive behaviour scores (M=3.83, SD=1.19) than female participants (M=3.48, SD=1.22). Participants who got no vaccination in the recent year showed the highest attitude toward COVID-19 preventive behaviour score of 3.93(SD=1.33). For the income group, participants who earned less than 100,000 showed the highest attitude toward COVID-19 preventive behaviour score of 3.79(SD=1.16). Year 2 had the highest attitude toward COVID-19 preventive behaviour score of 4.11 (SD=1.18). Participants who had congenital disease showed the highest attitude toward COVID-19 preventive behaviour score of 4.24(SD=1.33).

**Table 1: Differences in outcomes according to the sociodemographic characteristics of participants (N=400)**

| Sociodemographic Characteristic | | Knowledge of COVID-19 (Range 0-9) | | Risk Perception of getting COVID-19 (Range 5-25) | | Willingness to vaccinate against COVID-19 (Range 1-5) | |
|---|---|---|---|---|---|---|---|
| | N (%) | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| **Gender** | | | | | | | |
| Male | 291 (72.8) | 7.91 | 0.86 | 17.08 | 2.26 | 3.83 | 1.19 |
| Female | 109 (27.3) | 7.76 | 1.14 | 16.89 | 2.22 | 3.48 | 1.22 |
| **Year Level** | | | | | | | |
| Year 1 | 110 (27.5) | 7.90 | 1.00 | 15.75 | 3.56 | 3.61 | 1.27 |
| Year 2 | 64 (16) | 7.61 | 0.94 | 16.91 | 1.80 | 4.11 | 1.18 |
| Year 3 | 28 (7) | 7.96 | 1.04 | 18.35 | 2.16 | 3.75 | 1.24 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year 4 | 198 (49.5) | 7.93 | 0.90 | 17.00 | 2.00 | 3.68 | 1.16 |
| **Household Income** | | | | | | | |
| < 100,000 | 288 (72) | 7.93 | 0.77 | 17.20 | 1.92 | 3.79 | 1.16 |
| > 100,001 | 112 (28) | 7.73 | 1.29 | 16.66 | 2.98 | 3.58 | 1.32 |
| **Recent Vaccination** | | | | | | | |
| Yes | 303 (75.8) | 7.90 | 0.89 | 17.20 | 2.12 | 3.67 | 1.16 |
| No | 97 (24.3) | 7.79 | 1.10 | 16.58 | 2.53 | 3.93 | 1.33 |
| **Having Congenital Disease** | | | | | | | |
| No | 350 (87.5) | 7.89 | 0.96 | 17.10 | 2.25 | 3.66 | 1.18 |
| Yes | 50 (12.5) | 7.78 | 0.89 | 16.66 | 2.21 | 4.24 | 1.33 |
| Total | 400 (100) | 7.87 | 0.95 | 17.03 | 2.25 | 3.73 | 1.21 |

The analysis of the correlations between the outcomes of the study - knowledge, attitudes and the risk of perception - revealed a positive statistically significant correlations between the preventive behaviors and risk perception of getting COVID-19 (r=0.166**, p>0.01) and Willingness to be vaccinated against COVID-19.

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

| Variable | Knowledge of COVID-19 | Risk Perception of getting COVID-19 | Willingness to be vaccinate against COVID-19 |
|---|---|---|---|
| Knowledge of COVID-19 | 1 | | |
| Risk Perception of getting COVID-19 | 0.050 | 1 | |
| Willingness to be vaccinate against COVID-19 | 0.084 | 0.166** | 1 |
| **Correlation is significant at 0.01 | | | |

Results from the generalization linear model indicated that the Risk perception of getting COVID-19 (Beta=0.20, p<0.01) and congenital disease (Beta=0.15, p<0.01) predict the willingness to be vaccinated against COVID-19.

**Table 3 Generalized linear model predicting willingness to be vaccinated against COVID-19**

| | B | SE | Beta | Sig | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| Intercept | 0.863 | 0.806 | | 0.285 | Lower Bound | Upper Bound |
| Age | -0.174 | 0.072 | -0.155 | 0.016 | -0.314 | -0.033 |
| Recent Vaccination | 0.205 | 0.154 | 0.073 | 0.183 | -0.098 | 0.508 |
| Gender | -0.256 | 0.134 | -0.094 | 0.056 | -0.519 | 0.007 |
| Household Income | -0.074 | 0.132 | -0.028 | 0.574 | -0.335 | 0.186 |
| Year Level | 0.067 | 0.059 | 0.073 | 0.254 | -0.048 | 0.183 |
| Congenital disease | 0.549 | 0.192 | 0.15 | 0.004 | 0.172 | 0.926 |
| Knowledge of COVID-19 | 0.119 | 0.063 | 0.093 | 0.059 | -0.005 | 0.243 |
| Risk Perception of getting COVID-19 | 0.108 | 0.027 | 0.2 | 0 | 0.54 | 0.161 |

## 4. DISCUSSION

As I had asked 400 people to complete the questionnaire to capture the willingness to be vaccinated against COVID-19 at Mahidol University. The results showed that the willingness to be vaccinated was moderate(M=3.73, SD= 1.21) because there were 2 choices of vaccines[10] which were AstraZeneca and Sinovac during the launch of the survey[11]. Malestudents (M=3.83,SD=1.19) were more willing to be vaccinated than female students (M=3.48,SD=1.22). People who had not vaccinated in the past year(M=3.93,SD=1.33) were more willing to be vaccinated than those who had vaccinated in the past year(M=3.67,SD=1.16) , consistent with Mungkalarungsi S.,Tangjongrach K and et al's [12]. Students who had congenital diseases (M=4.24,SD=1.33) were more willing to be vaccinated than those who had no congenital diseases(M=3.66,SD=1.18) because the vulnerable group has a higher risk of getting severe symptoms of COVID-19[13]. The knowledge of COVID-19 was moderate(M=7.87, SD=0.95) because COVID-19 is rising in today's

society, there was a lot of news about COVID-19 so the knowledge was relevant to the society[14]. The risk perception of getting COVID-19 was moderate(M=17.03 , SD=2.25) because the government had implemented a COVID-19 measure and the students mostly stayed at home[15]. Students do not want to be vaccinated against COVID-19 because they felt safe at home which indicates low risk perception. Students have provided their reasons such as side effects, government and the lack of knowledge about the vaccine.

Furthermore, there was a study supporting the results. According to Alexandra Maftei[16], the participants from the northeastern side of Romania showed the relationship between Threat perception and willingness of participants to vaccinate against COVID-19. They summed up that if the people perceived higher risk, they would be more willing to vaccinate against COVID-19. Besides Marta Caserotti [17], Italian residents were willing to get vaccinated for COVID-19 because of their beliefs about the vaccine and the risk perception .However, the previous flu vaccination was also correlated with the willingness. From Alqudeimat Y.[18], male adults who previously received vaccines living in Kuwait were willing to be vaccinated associated with the self-perceived chances of contracting COVID-19. According to Nurul Azmawati Mohamed [19], Malaysian participants who had low education and not living in the risk area do not accept the COVID-19 vaccine while the people with high education had high acceptability toward COVID-19 vaccine.

However, 228 people that I had surveyed on a questionnaire are hesitant to take the vaccine and were unwilling to vaccinate against COVID-19 and they have provided their reasons such as side effects, government and the lack of knowledge about the vaccine. Moreover, there were studies supporting the results. According to Elise Paul[20], the participants who are ethnic minority backgrounds are unwilling to receive the vaccine because of the mistrust of the vaccine benefits, side effects, commercial profiting, and preference for natural immunity. In addition to Roselinde Kessels [21], the participants who were female, less educated and some were against the government during the COVID-19 in Belgium were not willing to vaccinate against COVID-19. However, some of our participants showed a good knowledge about COVID-19.

**Limitation**

The survey was launched during COVID-19, so the survey had to be sent through on an online platform and this restricted the opportunity of people who do not have access to internet and social media.

## 5. CONCLUSION

There were 400 participants which were university students, 291(72.8%) males and 109 (27.3%)females and aged between 18-22. The willingness to be vaccinated against COVID-19 was moderate(M=3.73, SD= 1.21). The knowledge of COVID-19 was moderate(M=7.87, SD=0.95). The risk perception of getting COVID-19 was moderate(M=17.03 , SD=2.25). The predictive factors for willingness to be vaccinated against COVID-19 were the risk perception(Beta=0.20, $p<0.01$) and congenital diseases (Beta=0.15, $p<0.01$).

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**Conflict of Interest**

The author declares no conflict of interest.

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