The Study of Perspectives of Knowledge, Attitudes, Perceived Benefits, Risks, and Acceptance of the Covid-19 Vaccine

Tuangporn Pinudom[1], Passarin Phalitnonkiat[2] and Siwaporn Kunnapapdeelert[3]

Burapha University International College, Thailand[1,2,3]

Corresponding email: toungpornp@go.buu.ac.th[1]

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Abstract

The Covid-19 disease is a primary global concern, and the vaccine is one of the most effective ways to prevent the virus infections. This study aimed to investigate the respondents' knowledge, attitudes, perceived benefits, risks, and acceptance of Covid-19 vaccines and the correlation of those variables—the research design those variables. The research was designed by using the quantitative research method. The online questionnaires were distributed to 374 respondents by snowball sampling. The results revealed the mean scores of the respondents' knowledge of vaccines at 4.50, the positive attitudes toward vaccines at 4.47, the perceived benefits of vaccines at 3.94, the risks of vaccines at 2.88, and vaccine acceptance at 4.06. Hypotheses testing presented that there was a positive relationship between variables: knowledge and attitudes with 0.463, knowledge and perceived benefits of vaccines with 0.519, knowledge and vaccine acceptance with 0.563, attitudes toward perceived benefits of vaccines with 0.351, attitudes toward vaccine acceptance with 0.408, perceived benefits of vaccine and vaccine acceptance with 0.503. However, two negative relationships illustrate knowledge and risks, and vaccine acceptance.

Keywords: Attitudes of Covid-19 Vaccines, Covid-19 Vaccine Acceptance, Knowledge of Covid-19 Vaccines, Perceived Benefits of Covid-19 Vaccines, Risks of Covid-19 Vaccines

Introduction

As severe acute respiratory syndrome coronavirus 2 (SARS-Co-V 2) has caused Covid-19 pandemic since 2019, it becomes ongoing global pandemic. It had affected more than 110 million people and cause 2.4 million death all over the world (WHO, 2021)

Apart from treatment of patient with their symptoms, follow-up and monitor the patients after cure and discharge, the most effective method to control COVID-19 infections is vaccination. Taking vaccines helps to stimulate body to produce specific antibodies. There have been several researches to find the use of vaccinations to prevent further transmission of SARS-CoV-2 (Yan, Yang, Lai, 2021)

However, vaccine hesitancy is a continuum between vaccine approval and denial. This has become the most important issue in several countries. The delays in acceptance or refusal of vaccines are still happened, even though there is the availability of vaccination services (Butler, 2016). Several factors are believed to affect the acceptance of vaccines. People's perceived risk of the disease and the perceived safety of the vaccine are studied to understand more about how people make decisions to take the vaccine of COVID-19 (Karlsson, et al, 2020).

Therefore, this paper studies the factors behind vaccine acceptance in order to understand more about vaccine hesitancy in Thailand.

Research Objectives

This paper is aimed to study factors that can be possible to affect vaccine hesitancy. They include knowledge, attitudes, perceived benefits, risk, and acceptance of people who live in Thailand.

Literature Review

Definition of Knowledge

According to Bolisani and Bratianu (2018), knowledge is considered as one of the most specific human processes. Most theories integrate two significant perspectives: rationalism and empiricism. Knowledge results form a reasoning process, and our sensory experience does not have a role. We can obtain knowledge only from the rational part. "Knowledge consists in reflection, not in impressions, and perception is not knowledge" (Russel, 1972). Empiricism

emerged as a resistible perspective to rationalism. Knowledge creates a priori or innate in a deterministic form. It makes through our sensory interface with the real world, and our mind processes it in the final stage (Bolisani and Bratianu, 2018).

Definition of Attitude

Attitudes are considered a mental state, which can be conscious or unconscious. They are a value, belief, or feeling. These characteristics fit into three domains of attitudes (Altmann, 2008). According to Dawson (1992), an attitude is a disposition towards or against a specified phenomenon, person, or thing. This definition provides two aspects of philosophy that support the literature. First, an attitude is bipolar; it can be positive or negative, favorable or unfavorable. Second, an attitude is a response to a person, object, or situation.

Definition of Perceived Benefits

Perceived benefits are beliefs about positive outcomes. It relates to behavior responding to a real or perceived threat (Chandon et al., 2000). Perceived benefit is the perception of the positive consequences caused by a specific action. For behavioral medicine, the term perceived benefit usually is used to explain an individual's motives for performing a behavior and adopting an intervention or treatment. Several researchers have tried to measure positive perceptions, as they believe behavior affects an individual's cognition regarding acceptability, motives, and attitudes toward the behavior (Leung, 2013).

Definition of Risk

Risk is concerned with the foundation of insurance. It is defined as uncertainty as a loss. It portrays fate concerning the occurrence of a loss. It described the variation in outcome variables that could occur over a specified period. The lack of predictability of outcomes may term as a risk. (Outreville, 1998). However, no consensus exists on howit should be defined and interpreted (Aven, 2011). Different definitions are based on different variables. Some descriptions are based on probabilities, others on expected values, some on uncertainty, and others on objectives. Some authors defined risk as subjective and epistemic, depending on the knowledge available, while some regard it as aleatoric, due to the probabilistic character of specific parameters (Šotić and Rajić, 2015).

The Covid-19 Vaccines Acceptance

Even though the Covid-19 vaccines seem to be the solution to solve the situation of Covid-19 around the world, there are still people hesitating to take Covid-19 vaccines. It defines as the delay in acceptance or refusal of vaccines despite the availability of vaccination services. Factors including religion, gender, political ideology, and trust in medical institutions or hospitals showed a relationship with Covid-19 vaccine hesitancy (Kerr, Freemand, Marteau, and Linden, 2021).

Many studies examining the acceptance rate of COVID-19 vaccines have shown rates ranging from 23% to 91% among American medical students, adults, and Chinese adults. The studies on the moderating factors of the influenza vaccination program in China concluded that people, with higher education levels, perceive the vaccines as safe and effective. In addition, some studies found that less severe depressive and more severe anxiety symptoms were associated with higher vaccine acceptance. The factors of COVID-19 vaccine acceptability in different countries have been studied. Attitudes toward vaccines (i.e., perceived safety and effectiveness of COVID-19 vaccines) had a relationship with vaccine acceptability in the USA. At the same time, we also found similar results in Japan and China (Bai, et al., 2021).

The Public's accessibility to the information about Covid's 19 vaccines is essential for ensuring public trust in science (Blastland, Freeman, van der Linden, Marteau, Spiegelhalter, 2020). Usually, vaccination is a medical procedure with risks to the individual. In some countries, the decision to take the vaccination is treated as an individual medical decision and requires informed consent. However, many surveys worldwide have shown that the perceptions of COVID-19 vaccines are safe, effective, and critical predictors of COVID-19 vaccination intentions (Kerr, Freemand, Marteau, and Linden, 2021).

Hypotheses

The hypotheses can formulate as follows:

Ho: there is no relationship between knowledge and attitudes of the Covid-19 vaccine.

Ha: there is a relationship between knowledge and attitudes of the Covid-19 vaccine.

Ho: there is no relationship between knowledge and perceived benefits of the Covid-19 vaccine.

Ha: there is a relationship between knowledge and perceived benefits of the Covid-19 vaccine.

Ho: there is no relationship between knowledge and risks of the Covid-19 vaccine.

Ha: there is a relationship between knowledge and risks of the Covid-19 vaccine.

Ho: there is no relationship between knowledge and acceptance of the Covid-19 vaccine

Ha: there is a relationship between knowledge and acceptance of the Covid-19 vaccine.

Ho: there is no relationship between attitudes and perceived benefits of the Covid-19 vaccine.

Ha: there is a relationship between attitudes and perceived benefits of the Covid-19 vaccine.

Ho: there is no relationship between attitudes and risks of the Covid-19 vaccine.

Ha: there is a relationship between attitudes and risks of the Covid-19 vaccine.

Ho: there is no relationship between attitudes and acceptance of the Covid-19 vaccine.

Ha: there is a relationship between attitudes and acceptance of the Covid-19 vaccine.

Ho: there is no relationship between the perceived benefits and risks of the Covid-19 vaccine.

Ha: there is a relationship between the perceived benefits and risks of the Covid-19 vaccine.

Ho: there is no relationship between the perceived benefits and acceptance of the Covid-19 vaccine.

Ha: there is a relationship between the perceived benefits and acceptance of the Covid-19 vaccine.

Ho: there is no relationship between risks and acceptance of the Covid-19 vaccine.

Ha: there is a relationship between risks and acceptance of the Covid-19 vaccine.

Methodology

The research designed to use a quantitative method to measure the hypotheses. First, we collected the data through an online survey via Google Forms. Quantitative research focuses on gathering numerical data to understand levels of the respondents' perspectives of their knowledge, attitudes, perceptions, risks, and acceptance of Covid-10 vaccine in the current.

Sample size and data collection

An online questionnaire was distributed to 374 respondents by snowball sampling among Thai people aged 18 years and above. A published table invented by Yamane estimated the sample size of this study. The suggested sample size of 100,000 and larger population size, with a precision level of 7%, should be at least 204 respondents (Israel, 1992, p. 3). Therefore, the population aged 18 and above was more than 100,000, and the appropriate sample size was 204 (at least).

The questionnaire was structured into three sections. The first section was designed to ask about the respondents' profiles and experiences of contamination by the Covid-19 virus. For example, the respondents were asked to indicate if they were infected with COVID-19 or knew anyone in the family who was infected or died with confirmation of diagnosis using standard laboratory testing protocols. In sections 2 and 3, the respondents were asked more profound questions about their perspectives of knowledge, attitudes, perceptions, risks, and acceptance of the Covid-19 vaccine with the five-point Likert's scales (1= Strongly Disagree,2= Disagree,3= Neutral, 4= Agree, 5= Strongly Agree). The questionnaires required an estimated time of 10 minutes to complete. The questionnaires were initially developed in Thai. Descriptive statistics for survey respondents were applied by presenting the mean values and standard deviations (Table 2-6). Moreover, the correlations between constructs were shown in Table 7.

Results

We analyzed the data in this study by using descriptive statistics. The descriptive values, including frequency, percent, mean and standard deviation were conducted. Table 1 presented

the profiles of the respondents, including their experiences of Covid-19 virus contamination and their family members' experiences.

Table 1 The respondents' profiles (N=374)

Variables		Frequency	Percent
Age	18-30	86	23.0
	31-40	52	13.9
	41-50	44	11.8
	51-60	90	24.1
	> 60	102	27.2
Gender	Male	120	32.1
	Female	254	67.9
	Others	0	0
Status	Single	158	42.2
	Married	188	50.3
	Separated	4	1.1
	Divorce	12	3.2
	Others	12	3.2
Educational level	Lower than Bachelor's	14	3.7
	Bachelor's degree	240	64.2
	Higher than Bachelor's	120	32.1
Income/month (Baht)	<10,000	74	19.8
	10,000-30,000	118	31.5

Variables		Frequency	Percent
	30,001-50,000	84	22.5
	>50,000	98	26.2
Currently infected with Covid-19	Yes	6	1.6
	No	330	88.2
	Not tested/Doesn't know test result	38	10.2
Previously infected with Covid-19	Yes	8	2.1
	No	366	97.9
Have a family member or friend been infected with COVID-19	Yes	8	2.1
	No	344	92.0
	Not tested/Doesn't know test result	22	5.9
Have family members or friends died due to COVID-19?	Yes	4	1.1
	No	370	98.9

The following survey section counted the mean scores and standard deviation (S.D.) of each item and dimension. According to the mean scores and S.D., knowledge, attitudes, perceived benefits, risks, and acceptance of the Covid-19 vaccine consider.

Table 2 illustrates the respondents' knowledge of Covid-19 vaccine. From Table 2, the respondents thought the vaccines were necessary for their health at a rate of 4.60 out of 5.00.

Table 2 Knowledge of Covid-19 vaccine

Items (N=374)	Mean	S.D.
I think vaccines are important for the health of everyone.	4.60	0.607
Being vaccinated against infectious diseases reduces the morbidity and mortality rates of individuals.	4.59	0.617

Items (N=374)	Mean	S.D.
Usually, vaccination against infectious diseases is protective and improves the quality of life, especially for people with low immunity and those who suffer from chronic diseases.	4.32	0.863

Table 3 showed that the attitudes toward practical and affordable (or accessible) vaccine should be available to the people, while the mean score of the issue about selling the vaccine was lower at 3.91.

Table 3 Attitudes toward Covid-19 vaccine

Items (N=374)	Mean	S.D.
It is possible to find an effective vaccine that could protect against the COVID-19.	4.44	0.775
If an effective vaccine was found, do you think it could be readily available for everyone?	4.84	0.391
The benefits of vaccines usually outweigh the risks.	4.47	0.681
I think the COVID-19 vaccine should be afforded to everyone for free.	4.71	0.614
If the COVID-19 vaccine is available for sale, would you buy it?	3.91	1.117

Table 4 presents the respondents' perceptions of the Covid-19 vaccine's benefits. We found that the people believed the vaccine would help everything get back to normality, with a mean score of 4.18 out of 5.00; however, the respondents thought the vaccine could protect them and was safe, with mean scores of 3.71, and 3.72, respectively.

Table 4 Perceived benefits of Covid-19 vaccine

Items (N=374)	Mean	S.D.
The COVID-19 vaccine will be safe.	3.72	0.865
The COVID-19 vaccine will help things go back to normal.	4.18	0.772
If I receive the COVID-19 vaccine, it will protect me from COVID-19.	3.71	0.939
The COVID-19 vaccines, in general, will be useful in controlling the disease.	3.99	0.825
Receiving an authorized vaccine for the COVID-19 will be safe and trusty.	4.09	0.858

The respondents' risk perceptions toward the Covid-19 vaccine were that they thought they would have a side effect from the vaccination, with a mean score of 3.32, while they would die from the vaccination, with a mean score of 2.21 out of 5.00 as shown in Table 5.

Table 5 Perceived risks of Covid-19 vaccine

Items (N=374)	Mean	S.D.
I will have side effects from the COVID-19 vaccine	3.32	1.058
I will get sick from the COVID-19 vaccine	2.91	1.179
I will die from the COVID-19 vaccine	2.21	1.232
I am concerned about serious complications of the vaccines	3.07	1.310

In this part, the respondents ask whether they accept receiving the Covid-19 vaccine when approved and available by using the scale for a rating. The variables investigated as potential predictions of vaccine acceptance. We found that the respondents had a plan to get a vaccine, with a mean score of 4.53. Nevertheless, they found that the vaccines were distributed equitably and adequately, with a mean score of 3.50 out of 5.00, as shown in Table 6.

Table 6 Covid-10 vaccine acceptance

Items (N=374)	Mean	S.D.
I have a plan to get vaccinated.	4.53	0.712
I am willing to get all of the recommended vaccines for myself.	3.99	1.033
If offered a COVID-19 vaccine Likelihood of receiving it.	4.33	0.819
Likelihood of receiving it if required to return to work and/or school.	4.36	0.772
It will be easy for me to get the COVID-19 vaccine.	3.66	1.096
It will be easy to distribute the COVID-19 vaccine equitably and adequately.	3.50	1.178

In addition, Pearson's correlation coefficient designs for the continuous variables. Pearson correlation coefficients took on values between -1 and +1. It represents the positive or negative correlation. A Positive correlation means that while one variable went up, the other variable also went up, whereas, for a negative correlation, one variable went up, but the other went down. We can use the absolute value's size to indicate the relationship's strength. A perfect correlation of -1 or +1 shows that we can examine one variable's value by knowing the other variable's value. In contrast, a correlation of "zero" presented no relationship between the two variables (Pallant, 2005).

Table 7 The correlation between knowledge, attitudes, perceived benefits, risks and acceptance of Covid-19 vaccine

		Knowledge	Attitudes	Perceived Benefits	Risks	Acceptance
Knowledge	Pearson Correlation	1	.463**	.519**	-.138**	.563**
	Sig. (2-tailed)		.000	.000	.008	.000
Attitudes	Pearson Correlation	.463**	1	.351**	.086	.408**
	Sig. (2-tailed)	.000		.000	.097	.000
Perceived Benefits	Pearson Correlation	.519**	.351**	1	-.064	.503**
	Sig. (2-tailed)	.000	.000		.219	.000
Risks	Pearson Correlation	-.138**	.086	-.064	1	-.130*
	Sig. (2-tailed)	.008	.097	.219		.012
Acceptance	Pearson Correlation	.563**	.408**	.503**	-.130*	1
	Sig. (2-tailed)	.000	.000	.000	.012	
**Correlation is significant at the 0.01 level (2-tailed).						
*Correlation is significant at the 0.05 level (2-tailed).						

Table 7 presented the relationships between each variable (knowledge, attitudes, perceived benefits, risks, and acceptance of the Covid-19 vaccine). To investigate the direction of the relationships, the correlation coefficients that indicated significantly positive relations were

the correlation between knowledge and attitudes (0.463), between knowledge and perceived benefits (0.519), between understanding and acceptance (0.563), between attitudes and perceived usefulness (0.351), between attitudes and acceptance (0.408), between the perceived benefits and acceptance (0.503). However, the hostile relations between variables were illustrated, such as the relations between knowledge and risks (-0.138), between the perceived benefits and risks (-0.064), and between risks and acceptance (-0.130). From the earlier stated hypotheses, the null hypotheses were rejected, yet the alternative theories s were accepted, which some ideas presenting strong positive and negative relationships, as mentioned above.

Discussion

This research was conducted to understand knowledge, attitudes, perceived benefits, risk, and acceptance of people in Thailand to of the Covid-19 vaccine. Data were collected from a total number of 374 respondents in Thailand. Most of the respondents have knowledge about covid-19 vaccination. The study presented that the items related to the importance of vaccines for health and the ability against infectious diseases reduce the morbidity and mortality rates of individuals received a mean score of 4.50. This revealed that around 90 percent of the sample in this study realized the importance of the covid-19 vaccine. The attitude toward covid-19 vaccines, such as the vaccine's effectiveness, availability are also crucial to vaccination decision-making. It found that the mean score for the attitude of covid-19 vaccine is 4.47. Considering the perceived benefits of vaccination, it was revealed that the respondents believed that the covid-19 vaccine would help controlling the disease and help things go back to normal. It received a mean score of 3.94. The next issue concerns the risk perception of the possible side effect of the COVID-19 vaccine. Around 37 percent of the participants were likely to believe that they might get the side effect and become sick from the vaccine. However, the participants were likely to accept taking the covid-19 vaccines. The study's results suggested that most participants (64.17%) plan to get the vaccine.

According to hypotheses testing, which tended to understand the relationship between knowledge of covid-19 vaccination and attitude toward a covid-19 vaccine, learning and perceived benefits of covid-19 vaccination, knowledge of covid-19 vaccination and risk perception of the possible side effect of COVID-19 vaccine, understanding of and acceptance for COVID-19

vaccination, the attitude of covid-19 vaccine and perceived benefits of covid-19 vaccination, the perspective of covid-19 vaccine and risk perception of the possible side effect toward COVID-19 vaccine, the philosophy of covid-19 vaccine and acceptance for COVID-19 vaccination, perceive benefits of covid-19 vaccination and risk perception of the possible side effect toward COVID-19 vaccine, perceived benefits and acceptance for COVID-19 vaccination, and risk perception of the possible side effect toward COVID-19 vaccine and acceptance for COVID-19 vaccination which is similar to the results from previous studies (Bai, et al., 2021; Roy et al., 2022; Shakeel et al., 2022)

As a result of the first hypothesis, the correlation coefficient is 0.463. Therefore, it can interpret that there is a positive relationship between knowledge of covid-19 vaccination and attitude toward the covid-19 vaccine. The second hypothesis found that the correlation coefficient is 0.519. Therefore, it presented a positive relationship between knowledge and perceived benefits of covid-19 vaccination. According to the third hypothesis, the null hypothesis is rejected, while an alternative view is accepted. It means there is a negative correlation between knowledge of covid-19 vaccination and risk perception of the possible side effect of the COVID-19 vaccine with a value of -0.138. The fourth hypothesis concentrated on finding the relationship between knowledge of and acceptance of COVID-19 vaccination. The correlation coefficient value is equal to 0.563 meaning there is a positive relationship between understanding and acceptance of COVID-19 vaccination. The fifth hypothesis found a positive relationship between the attitude of covid-19 vaccine and the perceived benefits of covid-19 vaccination, with a correlation coefficient of 0.315. The null hypothesis is accepted in the sixth hypothesis, while an alternative view is rejected. This reveals that there is no correlation between the attitude of covid-19 vaccine and risk perception of the possible side effect of the COVID-19 vaccine. While the seventh hypothesis presented a positive correlation between attitude of covid-19 vaccine and acceptance of COVID-19 vaccination with 0.408. The eighth hypothesis showed that the null hypothesis is accepted while an alternative view is rejected. It described no relationship between the perceived benefits of covid-19 vaccination and risk perception of the possible side effect of the COVID-19 vaccine. The ninth hypothesis showed that the correlation coefficient is 0.503. It implies a positive relationship between perceived benefits and acceptance of COVID-19 vaccination. Lastly, the tenth hypothesis found that the correlation coefficient is -0.130. It presented a negative

relationship between risk perception of the possible side effect of the COVID-19 vaccine and acceptance of COVID-19 vaccination.

Conclusion

Potential factors influencing COVID-19 vaccine acceptance such as knowledge, attitudes, perceived benefits, perceived risks of the COVID-19 vaccine were investigated in this study. The results from 374 respondents in Thailand revealed that high acceptance of COVID-19 vaccine was found among the respondents. From the study, knowledge of COVID-19 affects the attitude of COVID-19 vaccine, perceived benefits of vaccination, and the acceptability of the vaccine. Attitudes towards the vaccine and perceived benefits of vaccination also have a positive relationship to the acceptance of the vaccine. This can show that providing knowledge of the COVID-19 vaccine can reduce concern of people about vaccine safety. This can enhance public confidence and acceptance of in COVID-19 vaccine.

The limitation of this study was mainly related to the data collection process. The respondent's distribution is might not disperse enough to represent the opinion of the whole population in Thailand due to the limitation to travel to various regions were restricted which imposed by the government. Therefore, the use of snowball sampling was used in this research.

Suggestions

It would be more beneficial to consider more detail related to acceptance of different type of COVID-19 vaccine such as type of vaccine that people are accepted such as messenger RNA (mRNA) vaccine, viral vector vaccine, inactivated virus vaccine, and protein subunit vaccine so that the manufactures would be able to design and develop the production plan that suitable to the situation and customer requirement. Future research might be applying the problems to machine learning approach for predicting the most relevant factors to the acceptance of COVID-19 vaccine which will be beneficial to future vaccination strategies and any other programs against COVID-19 pandemic.

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