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Research Article

The relationship between knowledge and perceptions towards acceptance of the COVID-19 vaccine among health students at University of Muhammadiyah Malang

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ABSTRACT

Background: COVID-19 (coronavirus disease 2019) is a disease caused by SARS-CoV-2 that attacks the respiratory system. The government has made various prevention efforts, one of which is to create a COVID-19 vaccination program. **Objective:** to determine the level of knowledge, perceptions, and acceptance of the COVID-19 vaccine, as well as the relationship between the level of knowledge and perceptions towards acceptance of the COVID-19 vaccine among Health Students. **Methods:** This study is a quantitative study with a cross-sectional study design using online questionnaire. A sample size of 100 respondents was obtained. The relationship between respondent characteristics, knowledge, and perceptions of COVID-19 vaccine acceptance was tested using the *Chi-Square* and Logistic Regression statistical tests. **Results:** It was found that 97% of respondents had good knowledge, 61% of respondents had positive perceptions, and 50% of respondents had high acceptance of the COVID-19 vaccine. There is a relationship between respondent gender (p=0.028) and acceptance of the COVID-19 Vaccine. There is a relationship between perception (p=0.000) and acceptance of the COVID-19 vaccine. However, there is no relationship between knowledge (p=0.500) and acceptance of the COVID-19 vaccine. **Conclusion:** There is a relationship between perception and acceptance of the COVID-19 vaccine.

1. Introduction

COVID-19 is a disease caused by severe acute respiratory syndrome coronavirus2 (SARS-CoV-2), until now COVID-19 is still a major threat worldwide (Harapan et al., 2020). COVID-19 (coronavirus disease 2019) is a disease caused by severe acute respiratory syndrome coronavirus2 (SARS-CoV-2), a virus that attacks the respiratory system. Coronavirus can cause mild respiratory problems, severe lung infections, and death. Based on WHO data as of January 31, 2021, the Government of the Republic of Indonesia has reported around 1 million people confirmed with COVID-19 and 29,728 deaths related to COVID-19. This figure makes Indonesia the second after India which has the highest number of COVID-19 cases in the South-East Asia Region (SEAR) (World Health Organization, 2021).

Seeing such a large spread, it is necessary to take preventive measures, one of which is creating a COVID- 19 vaccine to reduce the spread of the COVID-19 virus. From the results of a survey on the acceptance of the COVID-19 vaccine that has been conducted by the Government of Indonesia, around 65% of respondents said they were willing, while eight percent of them refused. The remaining 27% expressed doubt. People may have different levels of confidence in the COVID-19 vaccine due to limited information about the type of vaccine. In addition, there are doubts from the public with their various perceptions of side effects, the effectiveness of the vaccine and others (Kementerian Kesehatan, 2020).

In this case, the role of health workers and medical staff is considered the most trusted at 57% in guiding people who are still hesitant to decide whether to agree or refuse to be vaccinated. (Kementerian Kesehatan, 2020). This is due to the task of health workers and medical staff in providing vaccination education. Good quality educational skills by health workers have been shown to be beneficial in increasing patient acceptance of vaccination and guiding decisions related to vaccination. (Kabamba Nzaji et al., 2020).

The knowledge and perceptions of a prospective health worker regarding issues that are developing in the community affect the success of health services later in answering the challenges of issues in society. Therefore, it is necessary to conduct research on the knowledge and perceptions of Health students regarding the acceptance of the COVID-19 Vaccine

2. Materials and Methods

This research is quantitative research with a cross-sectional study design as its approach. The instrument used is an online questionnaire distributed via the Whatsapp platform in the form of a Google Form link. The population in this study were students of the Faculty of Health Sciences and the Faculty of Medicine, University of Muhammadiyah Malang with active college status in the 2021 academic year, totaling 3063 students. This research has obtained ethical permission from the Health Research Ethics Commission Certificate Number E.5.a/166/KEPK-UMM/VII/2021. Respondents were taken using a non-probability sampling technique purposive sampling method according to the inclusion criteria Academic level students of the Faculty of Health Sciences consisting of Bachelor of Pharmacy, Bachelor of Nursing, Associate degrees of Nursing, Bachelor of Physiotherapy Study Programs and students of the Faculty of Medicine University of Muhammadiyah Malang who are active in the 2021 academic year. The Slovin formula is used to determine the number of samples needed (Masturoh & Anggita T., 2018). How to take samples with the Slovin formula as follows :

$$n = \frac{N}{1 + (N \times e^2)}$$

From the results of the calculations that have been rounded up, the respondents were obtained as many as 100 students. After that, the calculation of the proportion of each study program population was carried out in order to represent each of the study programs. The instrument used in this study is a questionnaire adapted from previous research with the title "Perception and Acceptance of Measles-Rubella Vaccine among Mothers in Yogyakarta Province, Indonesia" (Lienaningrum & Kristina, 2020). Validity and reliability tests were carried out on 36 respondents from pharmacy students at University of Brawijaya. The validity test results of each question >0.329 and reliability of 0.816 were obtained.

Data were analyzed using SPSS version 25 by conducting bivariate (Chi-Square) and multivariate (Logistic Regression) tests. The independent variables in this study are the level of knowledge and the level of perception of the COVID-19 Vaccine. Meanwhile, the acceptance of the COVID-19 Vaccine is the dependent variable. In (Masturoh & Anggita T., 2018) the classification of knowledge levels into three, namely, good with a score (76- 100%), sufficient with a score (56-75%), less with a score (<56%). The use of the median as a cut of point to determine the level of perception and level of acceptance. The perception level is divided into positive perception and negative perception and the acceptance level is divided into low acceptance and high acceptance (Lienaningrum & Kristina, 2020).

Assessment of perceptions in Health students at University of Muhammadiyah Malang regarding the COVID-19 Vaccine was carried out using the Health Belief Model (HBM) theory approach. The use of the Health Belief Model theory can predict various health behaviors from many beliefs about health or disease (Aristi & Sulistyowati, 2020). There are several perceptual components of the HBM theory that are examined in this study, namely perceived severity, perceived susceptibility, perceived benefits, perceived barriers, and cues to action (Walker et al., 2021).

3. Results and Discussion

The frequency distribution of respondent characteristics in this study can be seen in the following table:

Tabel 1. Respondent Characteristics

Variables	Respondent Characteristics	Frequency (n)	Percentage (%)
Gender	Male	23	23
	Female	77	77
Age	18 Years	5	5
	19 Years	15	15
	20 Years	20	20
	21 Years	27	27
	22 Years	29	29

	23 Years	4	4
Study Program	Bachelor of Pharmacy	38	38
	Bachelor of Nursing	21	21
	Associate degree of Nursing	5	5
	Bachelor of Physiotherapy	16	16
	Medicine	20	20
Semester Level	2nd semester	16	16
	4th semester	22	22
	6th semester	29	29
	8th semester	33	33
Religion	Islam	100	100
	Christian	0	0
	Buddha	0	0
	Hindu	0	0
	Confucianism	0	0
COVID-19 Survivors	Yes	10	10
	No	90	90
History of COVID-19 in Respondents' Families	Yes	59	59
	No	41	41
COVID-19 Vaccination Experience	Yes	66	66
	No	34	34
Sources of Information on the COVID-19 Vaccine	Health Workers	19	19
	Family or Friends	22	22
	Internet or Social Media	58	58
	Television	1	1

In Table 1 above, it can be explained that the majority of respondents in this study were women with a percentage of 77%. This can occur because the level of compliance of women in filling out questionnaires is better than men (Gallè et al., 2020). The majority of respondents in this study were 22 years old as much as 29%. Students are a period of entering adulthood which is generally in the age range of 18 -25 years (Hulukati & Djibran, 2018). The Pharmacy Study Program was the largest number of respondents with a percentage of 36%. The majority who filled out the questionnaire came from 8th semester students as much as 33%. This data is in line with research conducted (G. R. et al., 2021), semester level data shows that most respondents come from fourth year students (8th semester). It can be seen in Table 1 that all respondents are Muslim. This is in line with the COVID-19 Vaccine acceptance survey conducted by the government where the majority of respondents are Muslim (Kementerian Kesehatan et al., 2020).

Based on the results of the distribution of respondents' COVID-19 characteristics, in Table 1 it is known that 10% of respondents have a history of contracting COVID-19 while the rest do not. In research (Saied et al., 2021) It is known that as many as 21.6% of students have contracted COVID-19. In addition, 59% of respondents have family or relatives who have been infected with COVID-19. This is also in line with research (Saied et al., 2021) It is known that as many as 68.6% of students have an environment where their family or relatives have been infected with COVID-19. From table 1, it can also be seen that the number of respondents who have vaccinated against COVID-19 is 66%. It is known that in total, 1.5% of the population in Indonesia has received the first dose of the vaccine and 0.6% received the second dose. (CISDI, 2021). In addition, the internet or social media is the most chosen source of information by respondents, 58%. Social media is a source of all information and is able to provide education related to COVID-19, social media can support preventive measures to prevent transmission of COVID-19. (Sampurno et al., 2020). In (El-Elimat et al., 2021) stated that social media is an important source of information due to its easy accessibility and widespread.

However, given the novelty of COVID-19 and its rapid spread around the world, the internet and social media platforms are filled with information about the virus, yet most of this information is misleading.

Table 2 shows that the majority of respondents have good knowledge about the COVID-19 vaccine as much as 97% and only 3% of respondents have sufficient knowledge. In this study there were no respondents who had low knowledge about the COVID-19 Vaccine. This is in accordance with several similar studies, namely research on the knowledge of students in China regarding COVID-19 with good knowledge results as much as 82.3% (Peng et al., 2020). Research conducted by (Sukesih et al., 2020) shows that students knowledge of COVID-19 prevention is mostly good knowledge as much as 51.35%.

Tabel 2. Characteristics of Knowledge Level, Perception and Acceptance of COVID-19 Vaccine

Category		Total	Percentage (%)
Knowledge	Good	97	97
	Simply	3	3
	Low	0	0
Perception	Positive	61	61
	Negative	39	39
Acceptance	High	50	50
	Low	50	50

The results of the assessment of the level of perception, the majority of respondents have a positive perception of the COVID-19 Vaccine as many as 61% of respondents. While the remaining 39% of respondents had a negative perception of the COVID-19 Vaccine. This is in line with research (Kabamba Nzaji et al., 2020) it was stated that 67.37% of respondents had a positive perception of the COVID-19 Vaccine and the remaining 32.63% had a negative perception.

The results of the acceptance assessment can be seen that 50% of respondents who have high acceptance to be vaccinated against COVID-19 and the remaining 50% of respondents have low acceptance to be vaccinated against COVID-19. However, it can be seen from Table 1 that 66% of students have vaccinated against COVID-19, so it can be concluded that it does not mean that the 50% of students with a low level of acceptance absolutely refuse to be vaccinated, it's just that some of them have a desire to be

vaccinated against COVID-19 but their desire is quite low or still in doubt. In a study (Grech & Gauci, 2020) conducted on students of the Faculty of Health Sciences, Dentistry and Medicine at the University of Malta. It was found that for COVID- 19 vaccination, 44.2% of respondents chose to be vaccinated against COVID-19 and 30.5% of respondents chose not to be vaccinated and as many as 25.3% of students were still undecided. In addition, from research (Barello et al., 2020) conducted on university students in Italy. 86.1% of students stated that they would choose to be vaccinated against the COVID-19 corona virus and the remaining 13.9% of students stated that they did not want or were not sure about vaccination.

Based on the bivariate test regarding the relationship between sociodemographic characteristics with knowledge, perceptions and acceptance of the COVID-19 vaccine, there is a significant relationship between gender and the level of acceptance of the COVID-19 vaccine in students where the p-value is 0.028. This is in line with research (G. R. et al., 2021), there is a significant relationship between gender and the level of acceptance of the COVID-19 vaccine among students. It can be seen that female students have a high desire to be vaccinated against COVID-19 compared to male students. In research (Gallè et al., 2020), female gender is positively associated with better knowledge of disease and epidemic control and has appropriate practices against COVID-19.

Tabel 3. Characteristics of Respondents on Knowledge, Perception, and Acceptance of COVID-19 Vaccine

Characteristics	Knowledege						*p*	Perception				*P*	Acceptance				*p*
	Good n = 97		Simply n = 3		Low n = 0			Positive n = 61		Negative n = 39			HIgh n = 50		Low n = 50		
	n	%	n	%	n	%		n	%	n	%		n	%	n	%	
Gender																	
Male	21	21,6	2	66.7	0	0	0.131	11	18.0	12	30.8	0.110	7	14	16	32	0.028*
Female	76	78.4	1	33.3	0	0		50	82.0	27	69.2		43	86	34	68	
Age																	
18	5	5.2	0	0	0	0	0.181	1	1.6	4	10.3	0.140	1	2	4	8	0.096
19	15	15.5	0	0	0	0		7	11.5	8	20.5		4	8	11	22	
20	20	20.6	0	0	0	0		16	26.2	4	10.3		14	28	6	12	
21	27	27.8	0	0	0	0		17	27.9	10	25.6		14	28	13	26	
22	26	26.8	3	100	0	0		17	27.9	12	30.8		14	28	15	30	
23	4	4.1	0	0	0	0		3	4.9	1	2.6		3	6	1	2	
Study Program																	
Pharmacy	38	39.2	0	0	0	0	0.205	25	41.0	13	33.3	0.085	18	36	20	40	0.336
Associate degree of Nursing	5	5.2	0	0	0	0		3	4.9	2	5.1		2	4	3	6	
Bachelor of Nursing	21	21.6	0	0	0	0		8	13.1	13	33.3		10	20	11	22	
Physiotherapy	15	15.5	1	33.3	0	0		9	14.8	7	17.9		6	12	10	20	
Medicine	18	18.6	2	66.7	0	0		16	26.2	4	10.3		14	28	6	12	
Grade																	
1st year	16	16.5	0	0	0	0	0.521	6	9.8	10	25.6	0.097	5	10	11	22	0.267
2nd years	22	22.7	0	0	0	0		17	27.9	5	12.8		14	28	8	16	
3rd years	28	28.9	1	33.3	0	0		17	27.9	12	30.8		15	30	14	28	
4th year	31	32.0	2	66.7	0	0		21	34.4	12	30.8		16	32	17	34	

COVID-19 Survivors																
Yes	9	9.3	1	33.3	0	0	0.273	6	9.8	4	10.3	0.599	7	14	3	6	0.159
No	88	90.7	2	66.7	0	0		55	90.2	35	89.7		43	86	47	94	
History of COVID-19 in Respondents' Families																
Yes	57	58.8	2	66.7	0	0	0.635	39	63.9	20	51.3	0.148	29	58	30	60	0.500
No	40	41.2	1	33.3	0	0		22	36.1	19	48.7		21	42	20	40	
COVID-19 Vaccination Experience																
Yes	64	66.0	2	66.7	0	0	0.734	40	65.6	26	66.7	0.543	32	64	34	68	0.417
No	33	34.0	1	33.3	0	0		21	34.4	13	33.3		18	36	16	32	
Sources of Information on the COVID-19 Vaccine																
Health worker	17	17.5	2	66.7	0	0	0.192	11	18.0	8	20.5	0.852	9	18	10	20	0.561
Family or Friends	22	22.7	0	0.0	0	0		14	23.0	8	20.5		9	18	13	26	
Internet or Social Media	57	58.8	1	33.3	0	0		35	57.4	23	59.0		31	62	27	54	
Television	1	1,0	0	0	0	0		1	1.6	0	0		1	2	0	0	

*p<0.05

Relationship between Knowledge and Perception of COVID-19 Vaccine Acceptance

In this study, the Chi-Square test was conducted to determine whether there was a relationship between respondents' knowledge and perceptions of the acceptance of the COVID-19 vaccine, as shown in Table 4.

Tabel 4. Relationship between Knowledge and Perception of COVID-19 Vaccine Acceptance

Independent Variabel	**Category**	**Acceptance**				***p-value***
		High n = 50		**Low n = 50**		
		n	**%**	**n**	**%**	
Knowledge	Good	49	98%	48	96%	0.500
	Simply	1	2%	2	4%	
	Low	0	0%	0	0%	
Perception	Positive	42	84%	19	38%	0.000*
	Negative	8	16%	31	62%	

*p<0.05

In the results of bivariate analysis of the relationship between knowledge and perceptions of acceptance of the COVID-19 Vaccine, there is a significant relationship between perception and acceptance of the COVID- 19 vaccine but there is no significant relationship between knowledge and acceptance of the COVID-19 vaccine. In the analysis of the relationship between knowledge and acceptance of the COVID-19 vaccine, there is no significant relationship. This is in line with research (Kabamba Nzaji et al., 2020), the relationship between knowledge and acceptance of the COVID-19 vaccine has a p-value of 0.39, which means there is no relationship between knowledge and acceptance of the COVID-19 vaccine. In the study (G. R. et al., 2021) it was also found that there was no relationship between knowledge and acceptance of the COVID-19 Vaccine.

In the analysis of the relationship between perception and acceptance of the COVID-19 Vaccine, there is a significant relationship. This is in line with research (Kabamba Nzaji et al., 2020) and (Qiao et al., 2020), there is a relationship between the perceptions students have towards the acceptance of the COVID-19 Vaccine. The results show that students with lower negative perceptions of vaccination have higher acceptance of the COVID-19 vaccine.

Tabel 5. Results of Multivariate Analysis of COVID-19 Vaccine Acceptance

Independent Variabel	*p*	OR	Cl 95%
Gender			
Male		1	
Female	0.126	2.509	0.771-8.161
Semester Level			
2nd semester		1	
4th semester	0.178	3.308	0.579-18.898
6th semester	0.156	3.466	0.622-19.321
8th semester	0.242	2.752	0.505-15.001
COVID-19 Survivors			
No		1	
Yes	0.018*	10.726	1.501-76.624
History of COVID-19 in Respondents' Families			
No		1	
Yes	0.136	0.424	0.137-1.311
COVID-19 Vaccination Experience			
No		1	
Yes	0.633	1.310	0.432-3.977
Sources of Information on the COVID-19 Vaccine			
Health worker		1	
Family or Friends	0.358	0.470	0.094-2.348
Internet or Social Media	0.460	1.687	0.421-6.771
Television	1.000	771242265.080	0.000-.
Knowledge Level			
Simply		1	
Good	0.379	3.846	0.192-77.203
Perception Level			
Negative		1	
Positive	0.000*	10.346	3.430-31.212

*p<0.05

Multivariate analysis in this study was performed with Logistic Regression using SPSS 25 software to see the relationship between independent variables and acceptance of the COVID-19 vaccine. Based on the results of multivariate analysis in Table 5, there is an association between COVID-19 survivors and COVID-19 vaccine acceptance with a p value = 0.018 and an Odds Ratio (OR) value of 10,726 and a 95% CI value between 1,501 and 76,624. COVID-19 survivors will increase the acceptance of the COVID-19 vaccine. Students who

have been infected with COVID-19 are 10.726 times more likely to be willing to accept the COVID-19 vaccine than students who have never been infected with COVID-19. These results are in line with research (Reiter et al., 2020), there is a relationship between respondents with a history of COVID-19 and acceptance of the COVID- 19 Vaccine. Students who have been infected with COVID-19 will experience health motivation where there is a change in health behaviour after recovering from COVID-19 due to encouragement and awareness to maintain body immunity and take protective steps so as not to contract the virus again (Choiriyah et al., 2021). Protective steps that can be taken are implementing health protocols and vaccinating. COVID-19 survivors can be vaccinated 3 months after recovery. If after the first dose, the target is infected with COVID-19, the first dose of vaccination does not need to be repeated but the second dose is still given at the same interval of 3 months after being declared recovered (Kementerian Kesehatan, 2021).

In addition, there is an association between perceptions of the COVID-19 vaccine and acceptance of the COVID-19 vaccine with a p value = 0.000. This perception also has the highest Odds Ratio (OR) value of 10.346 with a 95% CI value between 3.430 and 31.212. Positive perceptions will increase acceptance of the COVID-19 vaccine. Students with positive perceptions are 10.346 times more likely to be willing to accept the COVID-19 vaccine than students with negative perceptions. These results are in line with research (Qamar et al., 2021), positive perceptions are a determinant of acceptance of the COVID-19 Vaccine. According to (Wang et al., 2020), positive perceptions of COVID-19 vaccination can explain the high acceptance of COVID-19 vaccination, because from the HBM theory they feel the benefits of vaccination compared to the fear of risk. In addition, positive perceptions in vaccine effectiveness, the risk of being infected with COVID-19 and risky side effects can reduce vaccine hesitancy and increase trust and confidence in vaccination. These hesitations can be addressed by increasing literacy and facilitating access to COVID-19 vaccination (Abbas et al., 2018)

4. Conclusion

Respondents who are health students have good knowledge about COVID-19, namely 97% and only 3% of respondents have sufficient knowledge. As many as 61% of respondents have a positive perception of the COVID-19 vaccine, while the remaining 39% of respondents have a negative perception of the COVID-19 Vaccine. A total of 50% of respondents were in the high acceptance category of the COVID-19 vaccine and 50% were in the low acceptance category. There is a relationship between the gender of respondents (p=0.028) with the acceptance of the COVID-19 Vaccine. There is a relationship between perception (p=0.000) and acceptance of the COVID-19 vaccine. However, there is no relationship between knowledge (p=0.500) and acceptance of the COVID-19 vaccine. Multivariate tests found that respondents who had been infected with COVID-19 were 10.726 times more likely to be willing to accept the COVID-19 vaccine. In addition, respondents with positive perceptions were 10,346 times more likely to be willing to accept the COVID-19 vaccine.

Socialization activities on the importance of COVID-19 vaccination can increase knowledge and straighten out students' incorrect perceptions, and can increase students' willingness to be vaccinated against COVID-19. In addition, students should always implement health protocols to avoid COVID-19 and protect those around us. With the limitations of this study where all respondents were Muslim, I suggest that future researchers conduct further research on the relationship between religious beliefs and acceptance of the COVID-19 vaccine in the community.

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