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Research article

High acceptance rate and factor associated with Covid-19 vaccination among the urban community in Indonesia

Susi Ari Kristina*, Hardika Aditama, Nada Nisrina Salsabila

Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta Indonesia

ABSTRACT

Covid-19 vaccine hesitancy due to the disinformation related to Covid-19 infection and vaccination remains a major problem to deal with during this pandemic in Indonesia. This study aims to examine the factors associated with Covid-19 vaccine hesitancy and identify the Covid-19 vaccine acceptance rate among the urban community in Indonesia. A cross-sectional survey using a developed questionnaire based on the scientific literature was conducted online from March to May 2021 among the urban community in Semarang, Yogyakarta, and Surabaya cities. A total of 1200 individuals older than 18 years old were selected to participate by convenience sampling technique. The questionnaire is divided into three parts to assess the characteristics of respondents, their perception of Covid-19 and vaccination, and their opinion towards Covid-19 disinformation. Data were analyzed descriptively and the association between participant's characteristics and willingness to Covid-19 vaccination was investigated using logistic regression. The acceptance rate of Covid-19 vaccination among participants was high (92.50%) and most of the participants believed that Covid-19 vaccines are effective (76.75%). The majority of participants also disagreed and did not believe Covid-19 disinformation (85.25%). We found the association between the willingness to be vaccinated with several factors, such as age, education, monthly income, working status, presence of comorbidities, living with elderly status, perceived risk to get Covid-19 infection, beliefs on the effectiveness of Covid-19 vaccine, and perception related to disinformation. A multidimensional approach is needed to increase the Covid-19 vaccine acceptance and reduce public hesitancy towards the vaccine. Trustworthy information and evidence from the government are important to build public trust and overcome this pandemic situation.

Keywords: Covid-19, Vaccine Hesitancy, Beliefs, Acceptance.

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***Correspondence:** Susi Ari Kristina ✉ susiari_k@ugm.ac.id **Orcid Id:** 0000-0003-4248-6830

Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia.

INTRODUCTION

As of 4th August 2021, the number of 3,532,567 persons with confirmed Covid-19 has been reported by the Government of the Republic of Indonesia with 24 of 34 provinces continued to experience an increase in reported cases, including five provinces with above 50% increase[1]. Hence, the Covid-19 vaccine intervention is one of the key strategies to reduce the cases and drive hope for normal life to be restored. However, the success of the vaccination program not only depends on the regulation but also the acceptance from the population. Despite the national target to administer two million doses of vaccine per day in August, the hesitancy towards Covid-19 vaccination still exists among Indonesian citizens.

The Strategic Advisory Group of Experts on Immunization (SAGE) stated that vaccine hesitancy refers to the delay in acceptance or refusal of vaccination despite the availability of vaccination services, which is complex and context-specific, varying across time, place, and vaccines[2].According to a review from Thomson et al., there are five fundamental non-socio-demographic determinants of under vaccination, the 5As taxonomy: challenges to Access, Affordability, Awareness, Acceptance, and Activation [3]. Moreover, nowadays the information and misinformation related to vaccination could be found easily on the internet and this may also drive the public to vaccine hesitancy. A study by Wilson and Wiysonge concluded that there is a significant relationship between organizations on social media and public doubts of vaccine safety, also a substantial relationship between foreign disinformation and declining vaccination coverage [4].

Numerous studies related to Covid-19 vaccine hesitancy and acceptance had been carried out worldwide since the beginning of the pandemic and up until now [5–9]. There is also a prior study from our country conducted by Harapan et al., which found that the acceptance rate of Covid-19 among Indonesian reached 93.30% [10]. However, the study was carried out only at the beginning of the Pandemic, 25th March to 6th April 2020 [10]. Therefore, our study is aimed to investigate the socio-demographic determinants of Covid-19 vaccine hesitancy and identify the recent vaccine acceptance rate among the urban community in Indonesia.

METHODS

A cross-sectional survey was conducted from March to May 2021 in three urban areas in Indonesia including Semarang, Yogyakarta, and Surabaya cities. The online questionnaire is developed based on a literature review and consisted of three main parts which address participant's socio demographic backgrounds, their perception about Covid-19 vaccination, and their opinion towards Covid-19 disinformation. The translation was performed using the standard forward and backward method. The content validity of the questionnaire was accomplished by experts in the public health and social pharmacy fields.

A pilot study was carried out among 30 non-sample participants in Yogyakarta city before the timeline of the real survey. Data were collected online from 1200 individuals older than 18 years old from three cities which were selected through the convenience sampling method. Our trained surveyors informed the participants about the study purposes and detailed explanations of certain terms online. All individuals had signed and provided online informed consent before participating in this study, and their confidentiality would be secured. This study had been reviewed and approved by the Medicine and Health Ethics Committee of Universitas Gadjah Mada.

Descriptive analysis was performed to present participant's characteristics, perception towards the Covid-19 vaccination, and their opinion on the disinformation. Logistic regression was used to investigate the association between participant's socio demographic characteristics and willingness to Covid-19 vaccination. All data were analyzed using Statistical Package for Social Science (SPSS) version 21 and Microsoft Excel 2016. All results were demonstrated in the form of tables.

RESULTS

The online survey was completed by 1200 individuals in Semarang, Yogyakarta, and Surabaya cities. In general, more men (54.17%) and individuals around 50-60 years (36.00%) answered the questionnaire. A large number of participants had a secondary degree (74.17%). Almost half of the participants had a monthly income of less than 2 million (45.17%) and work in the informal sector (44.92%). More than half of participants were already married (69.00%) and around 53.08% of participants believed that they were in healthy condition when fulfilled the survey. Over one-third of participants (44.92%) had no comorbidities and only 10.58% of participants had respiratory diseases. Most of the participants live at home without the elderly (71.17%). All characteristics of participants are presented in Table 1.

Table 1: Characteristics of the respondent (N=1200)

Variable	Category	N	%
Gender	Male	650	54.17
	Female	550	45.83
Age	18-30	243	20.25
	31-50	401	33.42
	50-60	432	36.00
	>60	124	10.33
Education	Elementary	128	10.67
	Secondary	890	74.17
	University	182	15.17
Monthly income (IDR)	<2 million	542	45.17
	2-<4 million	320	26.67
	4-6 million	210	17.50
	>6million	128	10.67
Working status	Informal sector	539	44.92
	Formal sector	329	27.42
	Unemployed	332	27.67
Marital status	Single	372	31.00
	Married	828	69.00
Perceived health status	Healthy	637	53.08
	Fair	438	36.50
	Poor	125	10.42
Comorbidities	None	539	44.92
	Respiratory diseases	127	10.58
	Diabetes	245	20.42
	Hypertension	289	24.08
Living at home with elderly	Yes	346	28.83
	No	854	71.17

Participant's perceptions on Covid 19 and vaccination are presented in Table 2.

Table 2: Perception on Covid-19 and vaccination

Perception on Covid-19 and vaccination	Response	N	%
Perceived risk to get Covid-19 infection	High risk	356	29.67
	Moderate	542	45.17
	Low	302	25.17
Beliefs on the effectiveness of Covid-19 vaccine	Effective	921	76.75
	Not effective	120	10.00
	Not sure	159	13.25
Perception on adequacy on tracing and testing	Very adequate	329	27.42
	Adequate	542	45.17
	not adequate	329	27.42
Willing to be vaccinated this year	Definitely	1008	84.00
	Probably	102	8.50
	No	90	7.50

Most participants gave moderate responses towards the perceived risk to get Covid-19 infection (45.17%). The majority of participants believed that the Covid-19 vaccine is effective (76.75%) and were willing to be vaccinated this year (84.00%). Around 45.17% of participants also believed that the tracing and testing towards Covid-19 infection are adequate. There were also 8.50% of participants who stated that they were probably willing to be

vaccinated this year, hence, the acceptance rate of Covid-19 vaccination is accounted for 92.50%.

The questionnaire also asked participant's opinions related to anti-vaccine disinformation which is demonstrated in Table 3. A vast majority of participants disagreed that getting vaccinated is a violation of civil liberties (85.00%). Several 82.42% participants also disagree about the dangers of vaccine side effects. Only 12.00% of participants agree that vaccine-preventable diseases are not dangerous. Most participants also disagreed that conspiracy theories related to Covid-19 are existed (82.17%). Generally, almost all of the participants showed negative opinions and disagree with the anti-vaccine disinformation (85.25%).

Table 3: Opinion related to anti-vaccine disinformation

Opinion related to anti-vaccine disinformation	Disagree	%	Agree	%
Vaccines as a violation of civil liberties	1020	85.00	180	15.00
Dangers of vaccine side effects	989	82.42	211	17.58
Vaccine-preventable diseases are not dangerous	1056	88.00	144	12.00
Conspiracy theories are existed	986	82.17	214	17.83
The general perception of anti-vaccine information	1023	85.25	177	14.75

This study also explored the association between characteristics and willingness to Covid-19 vaccination which was shown in Table 4. Younger individuals were slightly more likely to take the vaccine against Covid-19 infection than individuals older than 50 years old (OR: 2.31, CI: 1.32-3.42). Individuals with a university educational background were more likely to take the Covid-19 vaccine than those who had a secondary degree (OR: 2.34, CI: 1.12-4.21). Participants who had a monthly income of more than 4 million IDR had a higher odds ratio of willingness to Covid-19 vaccination than those who had a monthly income of less than 4 million IDR (OR: 2.31, CI: 1.10-4.56).Individuals who work in the formal institution were more likely to accept the Covid-19 vaccination 2.42 times than those who work in the informal sector and unemployed persons (CI: 1.23-4.23). Participants who had no comorbidities were more likely to take the vaccination than those with comorbidities (OR: 2.37, CI: 1.32-4.31), while participants who live with the elderly in their house were slightly more likely to be vaccinated against Covid-19 than those who live without elderly (OR: 2.18, CI: 1.09-3.22). Individuals with a high risk towards Covid-19 infection had a higher odds ratio than those who had less risk (OR: 2.42, CI: 1.20-4.87). Those who believe that the Covid-19 vaccine is effective against the infection were more likely to take the vaccine than those who believe that the Covid-19 vaccine is not effective (OR: 2.67, CI: 1.32-5.43). The highest association was found between the individuals who disagreed towards the disinformation of the Covid-19 vaccine and the willingness to be vaccinated (OR: 3.46, CI: 1.22-5.32). These findings were obtained by performing logistic regression of statistical analysis with a p-value of <0.05.

Table 4: Association between characteristics and willingness to Covid-19 vaccination

Variable	Category	OR	CI
Gender	Male	1.35	0.86-2.18
	female	1	
Age	18-50	2.31*	1.32-3.42
	>50	1	
Education	University	2.34*	1.12-4.21
	Secondary	1	
Monthly income	>4 million	2.31*	1.10-4.56
	4 million and more	1	
Working status	Formal	2.42*	1.23-4.23
	Informal	1.21	0.56-2.11
	Unemployed	1	
Marital status	Single	1.12	0.45-1.98
	Married	1	
Perceived health status	Healthy	1.68	0.86-2.35
	Fair	1.26	0.78-2.45
	Poor	1	
Comorbidities	None	2.37*	1.32-4.31
	With comorbid	1	
Living with elderly	Yes	2.18*	1.09-3.22
	No	1	
Perceived risk to get Covid-19 infection	High risk	2.42*	1.20-4.87
	Moderate	1.46	0.167-2.11
	Low	1	
Beliefs on the effectiveness of Covid-19 vaccine	Effective	2.67*	1.32-5.43
	Not effective	1	
Perception on adequacy on tracing and testing	Not adequate	1.09	0.68-1.56
	Adequate	1	
Perception related to disinformation	Disagree	3.46*	1.22-5.32
	Agree	1	

*significant at the p<0.05

DISCUSSION

Our study found that the acceptance rate of the Covid-19 vaccine among participants remains high (92.50%) with 84.00% of participants are willing to be vaccinated this year and 8.5% of participants probably willing to do the same. This acceptance rate is slightly lower than the prior similar study in Indonesia by Harapan et al. which found that from 25th March to 6th April 2020 the Covid-19 vaccine acceptance rate among Indonesian was accounted for 93.30% [10]. To our knowledge, only this study has assessed the Covid-19 vaccine acceptance and hesitancy in Indonesia previously. The difference in the number of participants and the setting of the study may be the potential cause of these diverse results. Nevertheless, both results show the high enthusiasm of Indonesian to accept the Covid-19 vaccine against the infection. Generally, Indonesia stands with other countries that had high Covid-19 vaccine acceptance rates such as Ecuador (97.00%) [11], Malaysia (94.30%) [12], and China (91.30%) [13]. The high Covid-19 vaccine acceptance is supported by the next finding which suggests that 76.75% of participants believed that the Covid-19 vaccine is effective.

Moreover, almost all of the participants in our study refused to agree with the foreign Covid-19 disinformation (85.25%).Prior studies have shown that disinformation and conspiracy theories promoted by the coordinated anti-vaccination groups could drive heightened emotions related to vaccination [14–16].The vaccine disinformation campaigns even developed rapidly throughout the Covid-19 pandemic and the heightened emotions produced may contribute to vaccine hesitancy and declines in vaccine acceptance [16,17]. As the participants in this study could dismiss the disinformation, it is more likely to be optimistic about the growth of Covid-19 vaccine uptake in Indonesia.

We also found that the following factors were associated with the willingness to accept Covid-19 vaccine: younger age, higher education, higher monthly income, formal sector employees, absence of comorbidities, living with elderly status, perceiving high risk to get Covid-19 infection, beliefs on the effectiveness of Covid-19 vaccine, and disagree towards the disinformation. There was an intriguing finding which reported that younger participants (18 - 50 years old) had a higher likelihood of Covid-19 vaccine uptake compared to older participants, in contrast with several previous studies [5,17,18]. This result was in line with a study by Khawla et al. which assumed that this case may be a reflection of the younger adult's higher chance of coming into contact with perceived high-risk groups as mandated by work, social, or study environment [19]. Our study also reported that the tendency to acquire the Covid-19 vaccine increase with increasing education and income level, similar to the other prior studies [17,20].

This study found that formal sector employees were likely to accept vaccination compared to those who work in the informal sector or are unemployed. This may be due to a similar reason related to the perceived-high risk group of their work environment. Regarding the association between perceived risk to get Covid-19 infection with vaccine acceptance, our result was consistent with the other studies worldwide which reported that those with higher perceived risk were more likely willing to take a Covid-19 vaccine [17,20]. Participants without comorbidities also displayed a higher likelihood of accepting the Covid-19 vaccine. A study conducted by Tsai et al. found that nearly one in five individuals with serious comorbid conditions harbor Covid-19 hesitancy which may also happen in our study [21]. We also found that participants who believe that the Covid-19 vaccine is effective were more likely to be vaccinated. Interestingly, a study from Kuwait reported that the Covid-19 vaccine acceptance would likely to be increase as the hypothetical effectiveness increased, and vice versa[22]. Results from our study can suggest the need for further research to explore why Indonesia has experienced the rise of vaccine acceptance throughout the Covid-19 pandemic. Figueiredo et al. estimated that confidence in the importance, safety, and effectiveness of vaccines once fell in Indonesia between 2015 and 2019 which was partly triggered by Muslim leaders issuing a *fatwa* – a religious ruling – claiming that measles, mumps, and rubella (MMR) vaccine was *haram* and contained the ingredients derived from pigs that are not acceptable for Muslims. However, this confidence may experience a sudden rise during the Covid-19 pandemic, especially towards the Covid-19 vaccine. This may be due to the *halal* certification brought by The Indonesian Ulema Council Assessment Institute for Foods, Drugs, and Cosmetics (LPPOM MUI) and Halal Certification Agency (BPJPH) that all non-*halal* vaccines could be used in Covid-19 crisis to manage an emergency [23]. Furthermore, vaccine acceptance and hesitancy are complex and numerous factors could influence their level. Nonetheless, advanced improvement of vaccine acceptance is needed due to the pandemic preventive action from high vaccine coverage.

Our study has several limitations that should be acknowledged. The generalizability of our sample may be limited due to the online questionnaire distribution that could be missed by people who did not live in Semarang, Surabaya, and Yogyakarta cities and did not access smartphones or computers to participate. This may have also excluded older people and those with comorbidities, which are the vulnerable groups to Covid-19 infection, and may have resulted in an overestimate of the covid-19 vaccine acceptance. Due to the online data-generating, we were unable to assure the real participant's responses. Selection bias could also be found in this study because of the sampling technique and the various access to internet infrastructure across the country. Nevertheless, to date, this is the most recent study on Covid-19 vaccine hesitancy in Indonesia. the use of this online questionnaire is cost-effective and provides quick monitoring of the population's behavior and vaccine acceptance through time.

CONCLUSION

To conclude, our study suggested that 92.50% of the surveyed sample across three urban cities of Indonesia would be willing to accept the Covid-19 vaccine. Nonetheless, there were various socio demographic and other considerations towards acceptance that need to be carefully addressed. A multidimensional approach is vitally required to improve the Covid-19 vaccine acceptance. Evidence and accurate information should be delivered appropriately to the public for counteracting vaccine hesitancy.

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Conflict of Interest

The authors declared no conflict of interest in this study.

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