Factors Related to Acceptance of Covid-19 Vaccine among Hemodialysis Patients

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Research Article

Factors Related to Acceptance of Covid-19 Vaccine among Hemodialysis Patients

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ABSTRACT

Hemodialysis patients are at risk of being infected with Corona Virus Disease 2019 (Covid-19). On the other hand. End-Stage Kidney Disease (ESKD) plays a role as a predictor factor of severe Covid-19 infection. There is no data about factors that affect Covid-19 vaccine acceptance among hemodialysis patients in Indonesia. This study's goal is to determine the factors related to Covid-19 vaccine acceptance among hemodialysis patients. A Cross-sectional study occurred in September 2021 in the hemodialysis unit at Roemani Muhammadiyah Hospital Semarang. Inclusion criteria include ESKD patients who underwent hemodialysis ≥3 months, hemodialysis frequency twice a week, communicable, and agree to join in this study. While patients with incomplete data. and being treated in the Covid-19 isolation ward are excluded from this study. Collected data analyzed using chi-square using Statistical Program for Social Science (SPSS) 18.0 version. From 87 respondents, 36 (41.4%) respondents have been vaccinated and 51 (58.6%) respondents have not been vaccinated. Hemodialysis patients with high educational level, elderly, and has undergone hemodialysis >18 months have higher acceptances of Covid-19 vaccine (57.1% and 33.9%; 60.9% and 34.4%; 51% and 38.5%, p-value 0.04; 0.027; 0.03. Prevalence Ratio (PR) = 1.7; 1.8; 1.8). While gender, marital status, and history of Covid-19 infection did not have a significant relationship to Covid-19 vaccine acceptance (p >0.05). Educational level, elderly patients, and duration of hemodialysis have a higher acceptance of the Covid-19 vaccine among the hemodialysis population.

Keywords: Chronic Kidney Disease, End-Stage Kidney Disease, Immunity, SARS-CoV-2, Vaccination

Introduction

Coronavirus Disease 2019 (Covid-19) pandemic in Indonesia has lasted more than 18 months since its first case in March 2020 [1]. Hemodialysis patients are susceptible to viral infection, including Covid-19. It is due to recurrent exposure to medical personnel and poor immunity [2]. In 2018, more than 130,000 patients underwent hemodialysis in Indonesia [3]. The incidence of Covid-19 among Chronic Kidney Disease (CKD) Patients was 4,09%. It is 10 times higher than in the general population (0,46%) [4]. On another hand, End-Stage Kidney Disease (ESKD) plays a role as a predictor factor of severe Covid-19 infection and the mortality rate among hemodia-lysis patients is higher than in the general popu-lation [5]. The crude mortality rate among CKD patients with Covid-19 infection was higher than in the general population (44.6% VS 4.7%) [4]. Swan's

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study showed that the Covid-19 vaccine provides the benefit of preventing patients from experiencing severe Covid-19 symptoms [6]. The Indonesian Society of Internal Medicine has recommended that hemodialysis patients may be vaccinated [3]. But until now there is no data regarding vaccination coverage among hemodialysis patients in Indonesia.

Herd immunity occurs when a significant portion of people becomes immune to an infectious disease. So the risk of spread from person to person decreases and those who are not immune are indirectly protected. Immunity may be achieved either through infection or by vaccination [7]. New hope for Indonesian citizens in 2021 due to the start of the vaccine program in Indonesia [8]. Total target of vaccination in Indonesia is 181,554,468 people [9]. Until September 2021, more than 18% population in Indonesia has been fully vaccinated. This number is still far below the target of 70% [10].

Public perception of health and disease prevention is an important factor in the success of the Covid-19 vaccination program [9]. Initial survey on preparations for Covid-19 vaccination in Indonesia showed that 74% of respondents agree to receive Covid-19 vaccination [11]. Faturohman study showed that some factors such as age, occupation, marital status, and monthly income were associated with vaccine acceptance [12]. Garcia's study showed that younger patients and women were associated with vaccine acceptance among hemodialysis patients [13]. Andrian's study showed that age has a significant relationship with the acceptance of Covid-19 vaccine. But it was not significant in gender, dialysis vintage, and history of Covid-19 infection variables [14]. Blanchi's study in Italy and France showed that gender, educational level, and age had a significant relationship with the acceptance of Covid-19 vaccine [15].

From the description above, we know that there is a limited study about factors related to the acceptance of Covid-19 vaccine among hemodialysis patients. Even though by increasing vaccine coverage among hemodialysis patients, it is hoped that the risk of Covid-19 mortality among hemodialysis patients can decrease. This study is the first study that determines the related factors associated with the acceptance of Covid-19 vaccine among hemodialysis population in Indonesia. This study goal is to determine the related factors including age, educational level, marital status, elderly, duration of hemodialysis, and history of Covid-19 infection in the acceptance of Covid-19 vaccination among hemodialysis population in Indonesia.

Material and Methods

A cross-sectional study was conducted in September 2021 in the hemodialysis unit of Roemani Muhammadiyah Hospital Semarang. This study involved communicative patients who had agreed to be respondents and were undergoing chronic hemodialysis twice a week in the hemodialysis unit of Roemani Muhammadiyah Hospital Semarang. While patients with incomplete data, being treated in the Covid-19 isolation ward were excluded from the study. This research has received ethical approval from the health research ethics committee of the Roemani Muhammadiyah Hospital, Semarang with the number EA-041/KEPK-RSR/X/2021.

Patients who meet the criteria are asked to fill out the questionnaire guided by a researcher. The questionnaire consists of the patient's identity (name, age, gender, marital status, educational level, and religion), and the patient's vaccination status. Other data about patient's history of illness, time of the first hemodialysis, and the history of Covid-19 infection were collected from the patient's medical record in Roemani Muhammadiyah Hospital Semarang.

The independent variables in this study include gender, educational level, marital status, elderly, duration of hemodialysis, and history of Covid-19 infection. Gender is grouped into male and female. Educational level is grouped into low academic level (not formally school – Senior High School) and high educational level (Diploma degree – Doctoral degree). Marital status is grouped into married and non-married (have not married, divorced and death divorced). Elderly are grouped into elderly (age ≥ 60 years) and non-elderly (age < 60 years). Duration of hemodialysis is time in months from the patient's first hemodialysis until this research is done that grouped into ≥18 months and <18 months. The history of Covid-19 infection is grouped into yes and no. While the dependent variable in this study is Covid-19 vaccination status that grouped into yes and no. Covid-19 vaccination status defined as the patient received 2 doses of Covid-19 vaccination as recommended. The collected data was then

analyzed using chi-square.

Results and Discussion

Ninety two respondents underwent hemodialysis in Roemani Muhammadiyah Hospital. Semarang in September 2021. Of them. four respondents did not meet the inclusion. consisting of 3 respondents who underwent hemodialysis once a week and one respondent was couldn't communicate well. Of 88 respondents who met the inclusion. one respondent was excluded because of being treated in the Covid-19 isolation ward. Finally. there were 87 respondents joined this study. The selection sample in this study is shown in Figure 1.

This study consist of 55 (63.2%) male and 32 (36.8%) female. Respondent's marital status consist of 73 (83.9%) married, 3 (3.4%) respondents have not married yet, 3 (3.4%) respondents divorced, and 8 (9.2%) respondents death divorced. While respondent's educational level consists of 60 (69%) high education level and 27 (31%) low educational level. Respondent's religion consist of 85 (97.7%) Islam and 2 (2.3%) Christian. As many as 31 (35.6%) respondents were Covid-19 survivors. and 56 (64.4%) other respondents did not have a history of Covid-19 infection. While Covid-19 vaccination status consists of 36 (41.4%) respondents vaccinated and 51 (58.6%) respondents who have not been vaccinated. The mean age of respondents was 2 ± 11.2 years old. Respondents had been undergoing hemodialysis for 29.9 ± 26.1 months. The complete characteristic data are shown in Table 1.

From bivariate analysis using chi-square we got that educational level. elderly. duration of hemodialysis have a significant relationship to acceptance of Covid-19 vaccine among hemodialysis patients (p = 0.04; 0.027; 0.003. Prevalence Ratio (PR) = 1.7; 1.8; 1.8). While gender. marital status. and history of Covid-19 infection did not have a significant relationship to acceptance of Covid-19 vaccine among hemodialysis patients (p = 0.913; 0.191; 0.056). The complete data showed in Table 2.

The acceptance of Covid-19 vaccine among hemodialysis patients in this study is 41.4 %. This result is lower than the survey from the Indonesian Health Ministry that showed the acceptance of Covid-19 in Indonesia is around 74%. The difference in populations may cause this result. In the Indonesian Health Ministry's survey populations are general population in Indonesia [11]. While the population in this study is chronic hemodialy-

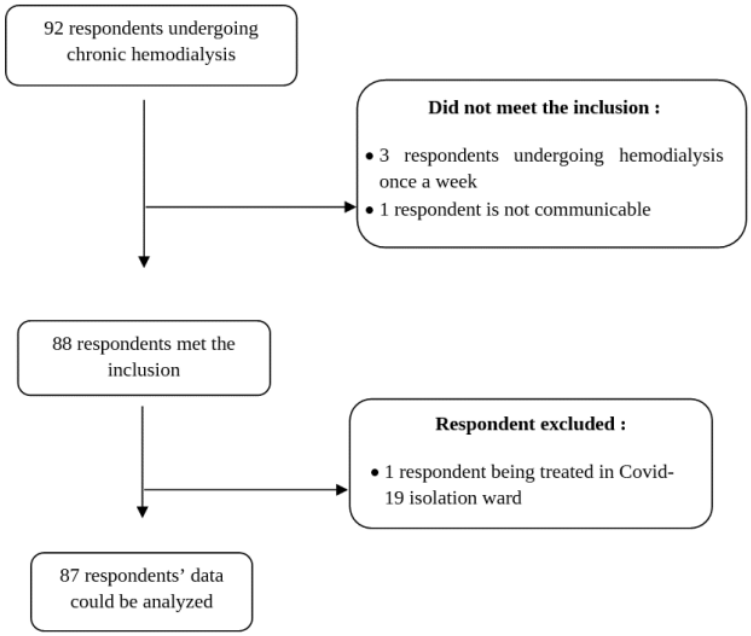

Figure 1. Sample selection process

Table 1. Characteristics Respondents

Variable	Value, N (%)
Sex	
• Male	55 (63.2)
• Female	32 (36.8)
Elderly	
• Elderly (≥60 years)	23 (26.4)
• Non-Elderly (<60 years)	64 (73.6)
Marital Status	
• Married	73 (83.9)
• Haven't Married	3 (3.4)
• Divorced	3 (3.4)
• Death Divorced	8 (9.2)
Educational Level	
• No School	3 (3.4)
• Elementary School	12 (13.8)
• Junior High School	15 (17.2)
• Senior High School	30 (34.5)
• Diploma Degree	5 (5.7)
• Bachelor Degree	16 (18.4)
• Master Degree	3 (3.4)
• Doctoral Degree	3 (3.4)
History of Covid-19 Infection	
• Yes	31 (35.6)
• No	56 (64.4)
Religion	
• Islam	85 (97.7)
• Christian	2 (2.3)
SARS-CoV-2 Vaccine Status	
• Vaccinated	36 (41.4)
• Unvaccinated	51 (58.6)
Variable	**Value, (Mean ± SD)**
Age (years)	52 ± 11.2
Duration of hemodialysis (months)	29.9 ± 26.1
Hemoglobin (g/dL)	9.1 ± 1.6
Ureum (mg/dL)	110 ± 32
Creatinine (mg/dL)	11.7 ± 3.9

sis patients.

There are several type of Covid-19 vaccine : (1) inactivated virus such as CoronaVac, and BBIBP Covid-19, (2) viral vector vaccine such as ChadOx1 nCoV-19 vaccine, Gam-COVID-Vac, Ad5-nCoV (3) messenger Ribo Nucleic Acid (mRNA) vaccine such as mRNA-1273, BNT16262, (4) protein subunit vaccine such as NVX-CoV2373 [16]. The Covid-19 vaccines used in Indonesia include CoronaVac, BBIBP Covid-19, ChadOx1 nCoV-19 vaccine, NVX-CoV2373 vaccine, mRNA-1273, BNT16262, Ad5-nCoV, and Gam-COVID-Vac. Each type of vaccine has different administration rules. Most vaccines in Indonesia are given in double doses with a certain time interval, except for Ad5-nCoV, which is only given in a single dose. BBIBP Covid-19 vaccine, NVX-CoV2373 vaccine, and Gam-COVID-Vac are given at intervals of 21 days. While CoronaVac and mRNA-1273 are given at intervals of 28 days. BNT16262 vaccine is given at intervals of 21-28 days. The longest time interval for administration is the ChadOx1 nCov-19 vaccine, which is 12 weeks [17]. In this study 36 (41.4%) respondents have been vaccinated consist of 31 (86,1%) got CoronaVac, 1 (2.8%) respondent got ChadOx1 n-Cov-19, and 4 (11.1%) respondents got mRNA-1273.

Covid-19 vaccine provides benefit of preventing patients from experiencing severe Covid-19

Table 2. Bivariate analysis

Variable	Vaccinated n=36	Unvaccinated n=51	Total	P-Value	PR
Gender				0.913	1.1
• Male	23	32	55		
• Female	13	19	32		
Educational Level				0.04	1.7
• High Education	16	12	28		
• Low Education	20	39	59		
Marital Status				0.191	0.7
• Married	28	45	73		
• Non-Married	8	6	14		
Elderly				0.027	1.8
• Elderly	14	9	23		
• Non-Elderly	22	42	64		
Duration of Hemodialysis				0.03	1.8
• ≥18 months	26	25	51		
• <18 months	10	26	36		
History of Covid-19 Infection				0.056	0.6
• Yes	9	23	32		
• No	27	28	55		

symptoms [6]. Is it useful given to hemodialysis patients? The main goal of Covid-19 vaccine is to generate immunity to the viral spike protein of the Severe Acute Respiratory Syndrome – Corona Virus 2 (SARS-CoV-2). It is created to prevent the interaction between spike protein and Angiotensin-Converting Enzyme - 2 (ACE-2). Response to vaccination in patients with kidney impairment may be weakened along with changes in the function of immune system [18]. All kinds of vaccines protect against symptomatic if seropositive conditions are achieved [19]. Chronic Hemodialysis patients find detectable cellular and humoral immune response to SARS-CoV-2 after double dose regimen of m-RNA vaccine [20]. Schrezenmeier's study showed that 55.6% of respondents developed SARS-CoV-2 Immunoglobulin G (IgG) antibodies in 1 week after double dose mRNA vaccines, whereas 88.9% of respondents demonstrated IgG detection in 2 weeks. In 10 weeks follow-up after double dose mRNA vaccine, 84.37% of hemodialysis patients showed reactive SARS-CoV-2 IgG antibodies [21]. Murt's study showed hemodialysis patients who received inactivated vaccines have a lower seropositivity rate and antibody levels than those received mRNA vaccine. The seropositivity rate within 21 – 28 days after double dose regimen of CoronaVac and mRNA was 80% and 97.1% [19].

This study shows for the first time in Indonesia an important adherence to the Covid-19 vaccine among hemodialysis patients. A single centered study in France showed 53% of patients declared being in favor of Covid-19 vaccination [14]. While Wallace's study in Victoria, Australia showed the acceptance of Covid-19 Vaccine among hemodialysis patients was 77.5% [22]. The acceptance of Covid-19 vaccine in this study is lower than Andrian and Wallace's study in France and Australia.

We hypothesized that the lower vaccine acceptance in this study might be due to patients' ignorance of whether hemodialysis patients can be vaccinated, the lower patient's information about the effectiveness, and the risk of vaccine complication, Even though, the Indonesian government have provided recommendations regarding the administration of Covid-19 vaccines to hemodialysis patients. The first Covid-19 vaccination recommendation in Indonesia that was declared in February 2021 exclude hemodialysis patients from receiving Covid-19 vaccination [8]. Then in March 2021, the Indonesian Society of Internal Medicine issued a recommendation to allow hemodialysis patients to be given Covid-19 vaccination [3]. This causes misinformation in the community. The Health Ministry of Indonesia also recommends that Covid-19 survivors may get vaccinated after 3 months after being confirmed [8]. As we know that the second wave of the

Covid-19 is currently hitting Indonesia between June to July 2021. This also impacts hemodialysis services, causing some hemodialysis patients infected with Covid-19. Based on the recommendation before, Covid-19 survivors from the second wave of the Covid-19 from June to July 2021 can be given the Covid-19 vaccine from September to October 2021.

In this study, acceptance of the Covid-19 vaccine among male and female patients were 41.8% and 40.6%. Gender did not have a significant relationship with acceptance of the Covid-19 vaccine among hemodialysis patients (p-value = 0.913). This result is similar to Andrian's and Blanchi's study that gender did not have a significant relation with the acceptance of the Covid-19 vaccine [14, 15]. But it contrasts with Garcia's study. Garcia's study showed a significant relationship between gender and acceptance of Covid-19 vaccine among hemodialysis patients. The female patient has 1,6 times higher acceptance of Covid-19 vaccine than male patient [13].

Acceptance of Covid-19 vaccine among high educated patient is higher than in low educated patients (57.1% and 33.9%; p-value 0.004, PR = 1,7). Patient with high education level has 1,7 times higher acceptance of Covid-19 vaccine than patients with a low education level. This result is similar to Humer's study that showed a lower willingness to Covid-19 vaccine among adolescents with lower education levels [23]. Education can expand someone's knowledge. Generally, someone who has higher-level education will have better knowledge than others with lower-level education. The level of education affects individual acceptance of information health [24].

There is no significant relationship between marital status and Covid-19 vaccine acceptance among hemodialysis patients. Nevertheless, Covid-19 vaccine acceptance among married group is higher than in non-married group (57,1% and 38,4%, p-value 0,191). This result is similar to Tasnim's study [25]. But, it contradicts Argista's study. Marital status is one of the factors that impact people's perceptions of Covid-19 vaccine. Married people tend to listen to their families' opinions about the Covid-19 vaccine, so it affects Covid-19 vaccine acceptance [26].

Acceptance of Covid-19 vaccine among elderly population in this study is significantly higher than in the non-elderly population (60.9% 34.4%, p-value 0.027, PR = 1.7). Elderly patients have 1.7 times higher acceptance of Covid-19 vaccine than non-elderly patients. It is similar to Andrian's study that elderly patients have a higher acceptance of Covid-19 vaccine [14]. Nevertheless, there are different terminology of elderly used in this study and Adrian's study. Adrian's study uses World Health Organization (WHO) criteria that define elderly as someone who is >65 years old [27]. While in our study, elderly is defined as someone who is >60 years old [28]. In Indonesia, the elderly population becomes the second priority for Covid-19 vaccine recipients after health workers. It is because an elderly patient is vulnerable to Covid-19 infection, at risk of severe Covid-19, and has higher mortality if infected with Covid-19. The elderly is one of the main targets for the Covid-19 vaccination. This may affect the high acceptance of the Covid-19 vaccine in hemodialysis patients [29].

Covid-19 vaccine acceptance in patients who had undergone hemodialysis for ≤18 months was higher than patients who had undergone hemodialysis for ≤18 months (51% and 38.5%, p-value 0.003, PR = 1.8). Patients who had undergone hemodialysis for >18 months have 1.8 times higher acceptance of Covid-19 vaccine than patients who had undergone hemodialysis ≤18 months. The longer the patient undergoes hemodialysis, the patient's level of compliance is also getting better [30]. This 18 month is based on the time of the first case the of Covid-19 pandemic in Indonesia [1]. The length of time a patient undergoes hemodialysis affects the patient's attitude and belief in health education delivered by health workers in the hemodialysis unit [30].

Acceptance of Covid-19 vaccine among Covid-19 survivor group is lower than non-Covid-19 survivor group, but the relation is not significant (28.1% and 49.1%, p-value 0.056). It may be caused Indonesian Health Ministry recommending that Covid-19 survivors in Indonesia may get vaccinated after 3 months after being confirmed [8]. Some of the respondents in this study got Covid-19 infection from June to July 2021. So, they are not included in the category that can be given the Covid-19 vaccine.

Some patients feel afraid to be vaccinated and do not know if hemodialysis patients recommend being vaccinated. On another hand, some others have less information and beliefs about the effectiveness and the risk of Covid-19 vaccine

complication in hemodialysis patients. Most of them were still open to the vaccine.. It is an opportunity to improve vaccination ratio among hemodialysis patients. Families and healthcare workers' supports are needed to be able to provide education and convince patients that the Covid-19 vaccine is effective and safe for hemodialysis patients.

Conclusion

Educational level, elderly patients, and duration of hemodialysis were significant with a higher acceptance of the Covid-19 vaccine among hemodialysis population. Gender, marital status, and history of Covid-19 infection did not have a significant relationship with acceptance of Covid-19 vaccine. Family and hemodialysis staff support have a key role in improving Covid-19 vaccine acceptance among hemodialysis patients.

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