

Adverse Events Following Immunization (AEFI) of COVID-19 vaccines and their association with comorbidities in health personnel and public servants in Indonesia

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Doi: <https://dx.doi.org/10.36685/phi.v8i2.587>

Received: 24 May 2022 | Revised: 9 June 2022 | Accepted: 18 June 2022

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Abstract

Background: Health workers and public servants as the front line in service are prioritized to get the COVID-19 vaccination. The phenomenon of side effects is a major issue in administering the vaccination.

Objective: The research aimed to identify Adverse Events Following Immunization (AEFIs) and their correlation with comorbidities in health workers and public servants in Indonesia.

Methods: A cross-sectional study design was used in this study among 262 participants selected using purposive sampling. Data were collected using Google Form. Univariate analysis and Chi-Square were used for data analysis.

Results: Of all participants, 74.8% were not comorbid, and 25.2% were comorbid. The incidence of AEFI was 56.9%, relatively occurring after the vaccination I, II, and I and II. AEFI started 40.1% within 24 hours post-vaccination with a 48.7% symptom duration within 1-24 hours. AEFI reactions 42.3% are other reactions in the form of allergic reactions, drowsiness, and increased appetite. The Chi-Square test showed a p-value of 0.894, indicating that both comorbid and non-comorbid patients had the same risk of developing AEFI.

Conclusion: Comorbid or non-comorbid is safe to get COVID-19 vaccination. Supervisors reporting on AEFI is important to anticipate the severity condition. Health protocols must be implemented continually.

Keywords: vaccination; COVID-19; health workers; public servants; comorbidities; Indonesia

Background

The world is currently wary of the spread of the coronavirus. This virus was first discovered on December 2, 2019, in Wuhan, China; and attacks the respiratory system and spreads rapidly throughout

the world (Ciotti et al., 2020; Tosepu et al., 2020c). The coronavirus entered Indonesia on March 2, 2020, and it must suppress its spread both from within and outside (Supangat et al., 2021; Tosepu et al., 2020a). Efforts from outside are the implementation of health protocols, while those from within are vaccinations (Supangat et al., 2021;

Tosepu et al., 2020b). Health workers and public servants are a group at high risk of being exposed to the coronavirus, especially those with a history of comorbidities (Irnaningsih et al., 2021; Jaiswal et al., 2021). Many health workers in the productive age that provide direct services suffer from comorbid diseases; therefore, it is necessary to get vaccinated first (Choi & Cheong, 2021; Jaiswal et al., 2021). The COVID-19 vaccination is still creating doubts in various circles, especially those with follow-up symptoms after the COVID-19 vaccination. The evidence-based showed that the comorbidities have a high risk as a predictor of morbidity or mortality due to COVID-19 (Anjorin et al., 2021). Based on this phenomenon, the COVID-19 vaccination given to people with comorbidities will likely cause more severe post-immunization follow-up symptoms.

The number of health workers in Indonesia in 2019 was more than 250,000 people; in East Java, the number of health workers was 96,949 people (Dinas Kesehatan Provinsi Jawa Timur, 2020), and the number of health workers in Bojonegoro was 2698 people (Dinkes Kabupaten Bojonegoro, 2021b). While the number of public services includes 199 agency services, consisting of 18 service units located in local governments, the rest are banking services, both government and private and village government services. The COVID-19 vaccination target in Bojonegoro is 4,574 health workers and 55,673 public services, while the achievement of COVID-19 vaccination until February 2021, namely for 5,337 health workers (116.68%) and 21,063 public services (37.83%) (Dinkes Kabupaten Bojonegoro, 2021a). The side effect of vaccination is an adverse effect following immunization (AEFI). Most of the AEFI of COVID-19 vaccines were clinically proved as light and moderate categories. Meanwhile, 42 out of 1,000,000 AEFIs are in the serious category (Ahmad et al., 2021). The analysis of the incoming data shows that the symptoms are generally mild, such as nausea, difficulty breathing, tingling, weakness, and fever (Ahmad et al., 2021; Silva et al., 2021).

The spread of COVID-19 occurred in a very short time, and COVID-19 caused millions of Indonesians to be exposed and confirmed to COVID-19, both in the community and among health workers who directly handle patients. The COVID-19 vaccination program is one of the efforts to increase the body's immunity against the coronavirus. The body is given

antigens in the form of dead or live microorganisms that are attenuated, either intact or parts of it, which have been processed into toxoids, recombinant proteins which, when given to someone, will give rise to immunity (World Health Organization, 2018). Efforts to provide the COVID-19 vaccine were not immediately accepted by the public for fear of the impact after following the vaccination. If the immunization achievement is low, it will inhibit the occurrence of group immunity. Health workers and public servants are parties who directly provide services to the community, so vaccination must be given first so that they become an example for the community to vaccinate and be healthy. The COVID-19 vaccination has an impact on follow-up symptoms after immunization (AEFI). The World Health Organization (WHO) describes AEFI or Adverse event following immunization as any medical event occurring simultaneously or after immunization within 24 hours. Post-immunization follow-up events (AEFI) are all medical events that occur after immunization that are of concern and are suspected to be related to immunization (World Health Organization, 2018). Health workers and public servants are at the forefront who must receive the COVID-19 vaccine first, especially those with a history of comorbidities. Follow-up symptoms after immunization vary, from local symptoms at the injection site to systemic symptoms and allergies. Severe AEFIs are rare but can have serious consequences. Severe AEFIs are generally caused by the immune system's response to vaccines and cause severe allergic reactions to vaccine ingredients, decreased platelets, cause seizures, and hypotonia critical. The vaccination may cause an excessive post-immunization reaction because it is influenced by several factors, including health conditions, immune systems, psychological conditions, and other factors (Joshi et al., 2021).

Vaccination efforts have been proven medically effective in preventing infection and death from infectious diseases. Vaccination is also important in disease control and eradication efforts so that disease transmission becomes less frequent or even eradicated from the community (World Health Organization, 2018). Apart from the various risks that can be posed, the immunization process is a safe procedure. COVID-19 vaccination is very beneficial compared to post-vaccination reactions; therefore, adequate information about vaccination and AEFI reactions needs to be understood by health workers

and public servants so that if it happens to them immediately anticipated. Reporting and recording of AEFI reactions are immediately recorded. Health workers with a history of comorbid diseases should receive a recommendation from a specialist before vaccination for COVID-19 and always consume and continue treatment of comorbid illnesses. Always increase stamina by exercising and eating nutritious foods. Implementing the Health protocol includes wearing masks, washing hands, and keeping a distance because the COVID-19 vaccine only provides immunity to the body so that when exposed to the COVID-19 virus, the body can provide resistance to the COVID-19 virus. So that health workers and public servants can still perform their roles in the new normal era of the COVID-19 pandemic. The research aimed to determine the Post-Immunization Adverse Events (AEFI) of COVID-19 and their associations with comorbidities in health workers and public servants.

Methods

Study Design

This study used a cross-sectional approach. Data on comorbid variables and the incidence of AEFI were collected at the same time simultaneously without follow-up. The research was conducted from August until December 2021 in Bojonegoro District, Indonesia. Due to the pandemic COVID-19, the study was implemented online by social media.

Sample/Participants

The sample/participant of the research were all public servants and health workers in Bojonegoro. Inclusion criteria were all public servants and health workers with access to social media and under age > 18 years old. The exclusion criteria of the research were non-health workers and non-public servants. In this study, 262 respondents were selected using purposive sampling.

Instruments

The research instrument in the form of a questionnaire includes general data, namely age, gender, occupation, and education. Meanwhile, specific data include vaccination history, post-vaccination symptoms, comorbidities, types of comorbidities, the emergence of AEFIs and types of reactions, time of appearance of AEFIs, and duration of AEFIs, as well as reporting of AEFIs.

A questionnaire to identify comorbidities and describe the incidence of AEFI was used, and its validation and reliability were based on a standardized guidebook used in East Java, namely 'Surveilans KIPJ Jatim' (Josephine, 2020) and validated by face validation by the surveillance and vaccination section of the Bojonegoro District Health Office, Indonesia.

Data Collection

Data collection on post-immunization follow-up (AEFI) and comorbid variables were taken simultaneously. Data were collected through google forms using a questionnaire. The questionnaire consists of the respondent profile, vaccination, AEFI profile, and comorbid. The question requires short answers, one answer, and can't be answered more than one answer. Google Forms are submitted to health agencies and educational institutions to meet the sample size. The data that have been collected were checked. To avoid subject bias, duplicate data were omitted to obtain single data, and incomplete data were eliminated.

Data Analysis

Data were analyzed descriptively and analytically. Descriptive data include age, gender, education, occupation, time of occurrence of the incident, duration of the incident, and type of incident experienced by the respondents. The comorbid variable includes respondents who have or do not experience comorbidities and the types of comorbidities experienced. The Chi-Square test was used to analyze comorbid conditions and determine their effect on the incidence of AEFI. The magnitude of the effect is determined using the effect size of the variable (Murti, 2003).

Ethical Considerations

Ethical clearance was conducted by the Investment office and Integrated Service Center of Bojonegoro District (number 070/019/412.215/2021). Each respondent has signed an appropriate informed consent.

Results

Table 1 explains that of the 262 respondents, the majority aged 18-59 years (99.6%) are female (66.1%) with most of their jobs as health workers (49.6%), and the majority are highly educated (92.4%).

Table 1 Demographic data of respondents

Variables	f	%
Age		
18-59	261	99.6
> 60	2	0.4
Sex		
Man	94	35.9
Woman	168	64.1
Profession		
Health care	130	49.6
Administration	9	3.4
Civil servant	33	12.6
Teacher/lecturer	89	34
Other	1	0.4
Education		
High school	20	7.6
College	242	92.4

Table 2 shows that out of 262 respondents, 149 (56.8%) showed symptoms after the vaccine, and 113 (43.2%) did not. Symptoms appear evenly distributed in the first, second, and first and second vaccinations (14%-26%). 70.5% of symptoms occurred within 24 hours after vaccination, and 48.7% lasted 1-24 hours. Of respondents who experienced symptoms after vaccination, 70.3% did not report the incident because they thought it was a normal thing that should have happened (96.2%).

Table 3 shows that from 262 respondents, 196 (74.8%) respondents did not have comorbid diseases, and 56.8% had post-vaccination follow-up symptoms. AEFI reaction is mostly a local reaction that is pain at the injection site (20.6%). There was no difference between the incidence of AEFI in comorbid and non-comorbid patients (p -value = 0.894). This means both comorbid and non-comorbid patients have the same risk of developing AEFI.

Table 2 Distribution of the frequency of COVID-19 vaccination on public servants and health workers

Variables	f	%
Occurrence of the incident after vaccines		
First vaccines	68	26
Second vaccines	44	16.8
First and second vaccines	37	14.1
Not exist	113	43.1
Symptoms appear time		
In 24 hours	105	70.5
>24 hours	44	29.5
Duration of incidence		
1-24 hours	73	48.7
2-3 days	48	32
4-7 days	18	12
>7 days	11	7.3
Report of post-vaccine symptoms		
Reporting	44	29.7
Not reporting	104	70.3
Reason not reporting		
A usual condition	100	96.2
Worrying not being accepted	1	1
Worrying being considered as a disease	1	1
Worrying being considered as COVID-19	1	1
Others	1	1

Table 3 Distribution of comorbid and adverse events following immunization

Variables	f	%	p-value
Comorbid			
Exist	66	25.2	
Not exist	196	74.8	
AEFI			
Exist	149	56.8	0.894
Not exist	113	43.2	
AEFI category			
Local reaction	54	20.6	
Systemic reaction	32	12.2	
Other reaction	63	24	
Not reaction	113	43.2	

Discussion

The results showed that 74.8% of respondents were not comorbid, and 25.2% were comorbid. The incidence of AEFI is 56.9%, with a relatively even incidence after the vaccination I, II, I and II. AEFI started 40.1% within 24 hours post-vaccination with 48.7% duration of symptoms within 1-24 hours. 42.3% AEFI reaction is another reaction in the form of allergic reactions, drowsiness, and increased appetite. The correlation between comorbid conditions and the incidence of AEFI shows a p-value of 0.894, meaning that comorbid and non-comorbid patients have the same risk of developing AEFI. Conceptually, it is said that AEFI is a reaction that occurs due to immunization or vaccines in the first 24 hours ([World Health Organization, 2018](#)). The emergence of AEFI is related to the body's resistance or the immune system. The higher a person's immune system, the less likely the occurrence of AEFIs will occur, regardless of whether the respondent has a comorbid or non-comorbid risk ([Choi & Cheong, 2021](#)). Everyone's immune system is different. Differences in the immune system can be influenced by genetic factors, disease, gender, diet, psychology, and the environment ([Parati et al., 2008](#)).

The results showed that 64.1% of respondents were female. Theoretically, it is said that women are more sensitive, so they rely more on feelings than rationality. With symptoms that appear, they always think about it, and women use their right brain more often, which is why women are better able to see from various points of view and draw conclusions. Research showed that women's brains are more

able to relate memory and social circumstances. This is the reason women rely more on feelings. Women can absorb information five times faster than men ([Basavaraja et al., 2021](#)). This is the reason why women are faster at concluding things than men and what is more dominant is feelings that have an impact on everyone's thinking about it continuously so that it will make the condition more severe and eventually affect the body, which can become physically sick, especially after the vaccine so that AEFI appears in 24 hours after Vaccine may also continue for more than 24 hours.

The study results showed that 53.4% of respondents had an experience of having a vaccine even though it was not a COVID-19 vaccine. This means that respondents have experience and have experienced vaccines even though the impact of non-COVID vaccines is not clearly explained, in addition to the emergence of information received from social media, both printed and electronic or directly from health workers, that the impact of the COVID vaccine is fever, even chills, pain, nausea, vomiting. So that this thing becomes embedded in a person's mind about the information received so that it overshadows and can become a real condition, so that the AEFI experienced by the respondent appears, in addition to previous conditions that have trained our immune system to respond to certain circumstances ([Srivastava et al., 2021](#)). Some forms of mild to moderate AEFI that may be experienced post-vaccination include soreness around the injection site, low-grade fever, fatigue, headache, muscle or joint aches, chills, and diarrhea. These are the statements and observations of vaccination participants who experienced serious AEFIs. Participants who experience serious complaints are

diagnosed according to their symptoms, for example, by x-rays. However, in many cases, the results of observations showed normal physical conditions. Post-vaccination complaints that arise are not caused by the vaccination itself but by a person's body's response to being too anxious or stressed. "A person's vulnerability can be affected by tension; for example, after hearing a story or seeing a frightened person, negative information or hoaxes about vaccines can cause anxiety (Rahayu, 2021), including causing symptoms that are not actually a reaction to the contents of the vaccine, such as weakness, nausea, shortness of breath, and other things.

According to Bloom, a person's health status is influenced by four main factors: environmental factors, behavior, health services, and heredity or genetics (Budiono, 2016). If the body experiences these symptoms, it must remain calm. If there is a reaction such as pain, swelling, or redness at the injection site, compress with cold water at that location, rest if needed, and take medicine as recommended by health workers because the body needs time to build immunity. In addition, post-vaccine clients are recommended to rest for at least 30 minutes, with the aim that if post-vaccine symptoms appear, follow-up can be carried out immediately. In this study, AEFIs can occur within 24 hours because respondents are health workers and public servants are workers, so after the vaccine, they do not rest and immediately return to activities while in the body, there is a reaction to the impact of giving the vaccine. This study implies that COVID-19 vaccination is safe for both comorbid and non-comorbid patients. This is important for the community to know to increase confidence and motivation to get complete vaccinations, thereby increasing herd immunity, and the COVID-19 pandemic case will end soon.

Conclusion

Adverse events following immunization (AEFI) can occur in comorbid and non-comorbid patients. Most AEFI events occur as local reactions that are not dangerous. However, serious events must be reported to avoid things that endanger lives. Vaccination as an effort to protect against COVID-19 needs to be continuously socialized, especially comorbid conditions are often a concern for carrying

out vaccinations; it needs to be straightened out from all hoax news.

Declaration of Conflicting Interest

No conflict of interest in this research.

Funding

This research was funded by Sekolah Tinggi Ilmu Kesehatan Rajekwesi Bojonegoro.

Acknowledgment

We extend our deepest appreciation to the health workers and public services participating in this research. Thanks to the Director of Rajekwesi Health Institute of Bojonegoro for supporting this study.

Author Contribution

WU contributed to research administration management and preliminary stage preparation; R contributed to research methodology, data management, and results analysis; SP managed the discussion part; and IW was a Consultant of Covid-19 Expert to prepare the questionnaire. All authors approved the final version to be published.

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Cite this article as: Utami, W., Rahmawati., Patonah, S., & Wahyudi, I. (2022). Adverse Events Following Immunization (AEFI) of COVID-19 vaccines and their association with comorbidities in health personnel and public servants in Indonesia. *Public Health of Indonesia*, 8(2), 39-45. <https://dx.doi.org/10.36685/phi.v8i2.587>