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Exploring COVID-19 Vaccine's Adverse Event Following Immunization on educational staff at the Faculty of Medicine

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Abstract

Background: COVID-19 was declared a global pandemic on March 11, 2020. Vaccination is one of the efforts to prevent and treat COVID-19. One thing that needs to be considered in the COVID-19 vaccination is the emergence of Adverse Event Following Immunization (AEFI). The reactions after vaccination can be local, systemic, or other.

Objective: This study aimed to depict the AEFI of the COVID-19 vaccine on educational staff, Faculty of Medicine, ULM

Methods: This study was a retrospective descriptive study with a cross-sectional approach using primary data in the form of a questionnaire given directly to the respondents. This research was conducted in October-November 2022 at the Faculty of Medicine, ULM.

Results: The results showed that 84.4% of the respondents experienced AEFI in the first vaccination dose. The AEFIs were most experienced by groups of 41-50 years (36.84%), females (65.79%), S1 (55.26%), and the Sinovac vaccine type (84.21%). Besides, for the second dose, 77.8% respondents experienced AEFI. Most AEFIs were experienced by the group of 20-30, 31-40, and 41-50 years (31.43%), female (71.43%), S1 (57.14%), and the Sinovac vaccine type (80%). The most common symptom was pain at the injection area (48.89%). The onset was most often on the first day (48.89%), and it took 1-2 days, with 35.5% as the response to the first dose and 26.6% for the second dose.

Conclusion: Most of the AEFIs in the first vaccination dose were experienced by the 41-50-year-old group. Meanwhile, the second vaccination dose was administered to groups of 20-30, 31-40, and 41-50. The AEFI occurred most often in females, S1, and the Sinovac vaccine type. The most common AEFI symptom was pain at the injection site, followed by drowsiness and fatigue. The most AEFI cases were on the first day, and the duration was 1-2 days.

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INTRODUCTION

COVID-19, which is caused by the SARS-CoV-2 virus, was declared a global pandemic by the WHO on March 11, 2020. One of the efforts made by the government to prevent and treat COVID-19 is through vaccination[1]. COVID-19 vaccination aims to reduce transmission, morbidity, and mortality, achieve herd immunity, and protect the community to remain productive socially and economically[2].

One thing that needs to be considered in the COVID-19 vaccination is the emergence of Adverse Events Following Immunization (AEFI). AEFIs are medical events suspected to be related to vaccination, which can be in the form of vaccine reactions, procedural errors, coincidences, anxiety reactions, or causal relationships that cannot be determined. Reactions that may occur can be local, systemic, or other reactions.[2]

The most common local reaction following the COVID-19 vaccination is pain and swelling at the injection site. Systemic reactions often appear in fever, malaise, dizziness, drowsiness, and headaches.[3,4] One of the reactions that also appears after the COVID-19 vaccination is a change in appetite, either decreased or increased appetite.[3,5] The onset and duration of COVID-19 vaccination reactions vary. Basuki[6] reported the earliest onset on the first day after vaccination and no later than the following day. The shortest duration was 10 minutes with complaints of itching and vomiting, while the longest duration was 7 days with complaints of pain at the injection area.[6,7,8,9]

Educational staff are devoted to supporting the implementation of education, carrying out administration, management, development, supervision, and technical service activities to support the educational process in educational units.[10] In an educational unit, staff often deal with many people, including educators, students, and other parties. Therefore, educational staff are at a high risk of COVID-19. The Faculty of Medicine is one of the faculties at the University of Lambung Mangkurat, which participates in carrying out the vaccination program for all employees through the university's program to form group immunity against the COVID-19 virus. The types of vaccines given are Sinovac, Moderna, AstraZeneca, and Pfizer.

Based on the background above, it is known that the reactions that occur after receiving the COVID-19 vaccine are varied. However, studies on the responses that appear after receiving the COVID-19 vaccination are still limited in Indonesia, especially in South Borneo. Besides, there was a high risk of COVID-19 among the educational staff. Therefore, this study examined the exploration of Adverse Event Following Immunization after receiving the COVID-19 vaccine at the Faculty of Medicine, University of Lambung Mangkurat.

METHOD

A descriptive design with a cross-sectional approach was applied in this study. This research was conducted at the Faculty of Medicine ULM, Banjarmasin City, in October-November 2022, when the incidence of COVID-19 decreased significantly. In collecting the data, primary data was gathered retrospectively, and it was in the form of a closed-ended questionnaire given directly to

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the respondents. The population in this study was all the educational staff of the Faculty of Medicine ULM. The sample in this study was all FK ULM educational staff who had received the COVID-19 vaccine. A non-probability sampling technique, through purposive sampling, was used to determine the respondents. The inclusion criteria for this study were educational staff from the Faculty of Medicine at Lambung Mangkurat University who had received two doses of the COVID-19 vaccine and were willing to participate as research subjects. Any criteria to be fulfilled by the respondents are those of the Faculty of Medicine ULM, who have received two doses of COVID-19 vaccination, and those of the Faculty of Medicine ULM who are willing to be respondents. The respondents sign the informed consent form before filling out the questionnaires. This study has received a letter of ethical approval from the Health Research Ethics Commission of FK ULM, No. 365/KEPK-FK ULM/EC/IX/2022.

RESULTS

The demographic characteristics of the sample in this study were divided based on gender, age, and educational level. Most of the respondents were female, 32 people (71.1%), the largest group was of age 41-50 years, 15 people (33.3%), and the highest educational level was S1, 24 people (53.3%). This information can be seen in Table 1.

From the total number of respondents (45 respondents) who participated in the study, 38 people (84.4%) experienced AEFI after the first dose of COVID-19 vaccination, and 35 people (77.8%) experienced AEFI after the second dose of COVID-19 vaccination. The number of respondents who experienced AEFI after the first COVID-19 vaccination was higher than after the second dose.

Table 2 shows the description of COVID-19 vaccination AEFI among educational staff of FK ULM based on gender, age, and academic levels is shown in Table 2. Based on gender, the AEFI on COVID-19 vaccination among educational staff at FK ULM was dominated by females (65.79%) on the first and 71.43% on the second. Based on age, in the first dose of vaccination, the group of age 41-50 years old had the highest frequency (36.84%), meanwhile for the second dose, the three group of age 20-30 years old, 31-40 years old, and 41-50 years old have the same proportion (31.43%). The description of AEFI on the educational staff of FK ULM based on their level of education showed that the bachelor's degree had the most significant proportion (55.26%) for the first dose of vaccination and 57.14% for the second dose of vaccination. This educational level category was not related directly to the AEFI perceived by respondents.

Figure 1 shows that AEFI on the educational staff of FK ULM, based on the type of vaccine, the Sinovac vaccine has the highest frequency, with 84.21% of the total number of vaccine types on the first dose of vaccination and 80% in the second dose.

Based on the symptoms in Figure 2, in the first dose of COVID-19 vaccination on educational staff at FK ULM, the most common local reaction was pain at the injection site (48.89%), followed by swelling at the injection site (13.3%), and then redness at the injection site (4.4%). The most frequently reported systemic reactions were drowsiness (42.2%), followed by fatigue (20%), muscle/joint pain (15.5%),

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fever (13.3%), and headache (6.7%). Other reactions that were also reported were increased appetite (15.55%) and shortness of breath (2.2%).

Table 1. The demographic characteristics of COVID-19 AEFI among educational staff at FK ULM

Characteristics	Number	Percentage (%)
Gender		
Male	13	28.9
Female	32	71.1
Age		
20-30 Years Old	13	28.9
31-40 Years Old	14	31.1
41-50 Years Old	15	33.3
51-60 Years Old	3	6.7
Educational levels		
Primary School	-	-
Junior High School	-	-
Senior High School	14	31.1
Diploma	5	11.1
S1 (Bachelor)	24	53.3
S2 (Master)	2	4.4
S3 (Doctoral)	-	-

Table 2. Description of AEFI of COVID-19 vaccination on educational staff at FK ULM based on gender, age, and academic levels

Characteristics	Dose 1		Dose 2	
	Number (N)	Percentage (%)	Number (N)	Percentage (%)
Gender				
Male	13	34,21%	10	28,57%
Female	25	65,79%	25	71,43%
Age				
20-30 years old	11	28.95	11	31.43
31-40 years old	11	28.95	11	31.43
41-50 years old	14	36.84	11	31.43
51-60 years old	2	5.26	2	5.71
Educational Levels				
Primary School	-	-	-	-
Junior High School	-	-	-	-
High school	12	31.58	12	34.28
Diploma	3	7.89	2	5.71
S1 (Bachelor)	21	55.26	20	57.14
S2 (Master)	2	5.26	1	2.86
S3 (Doctoral)	-	-	-	-

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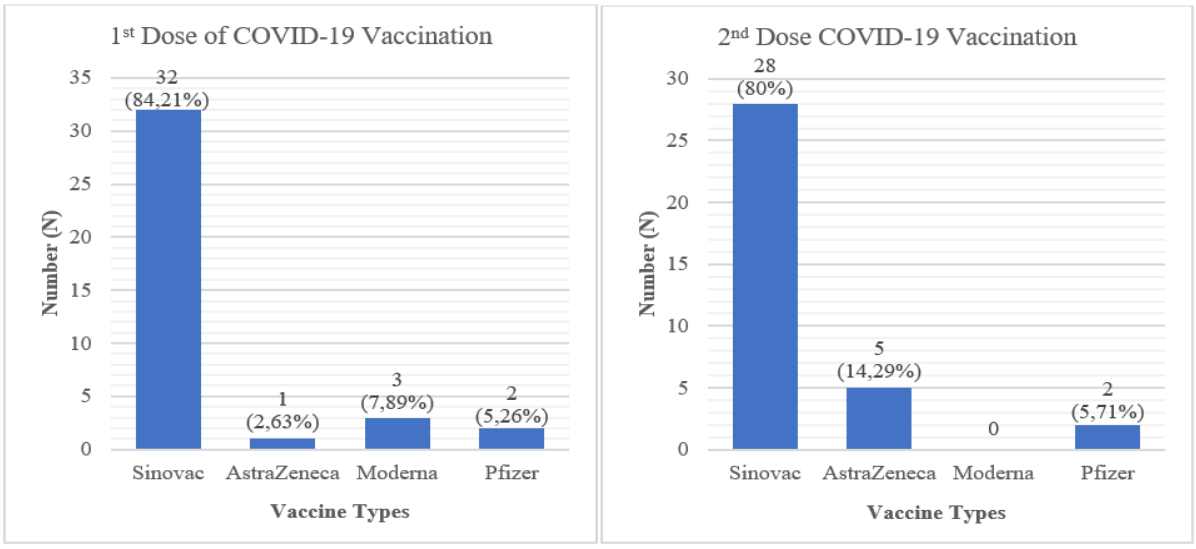
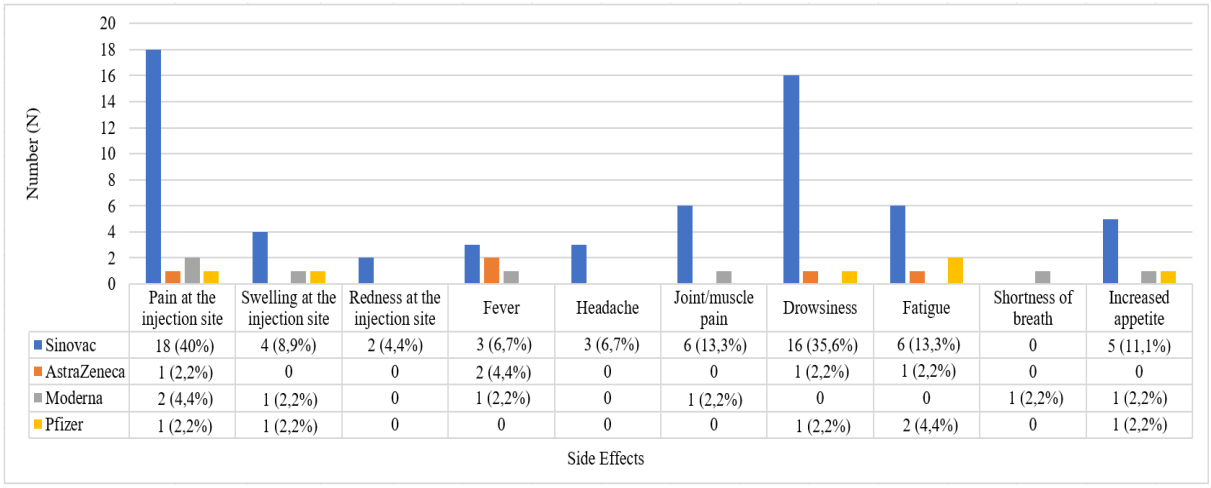
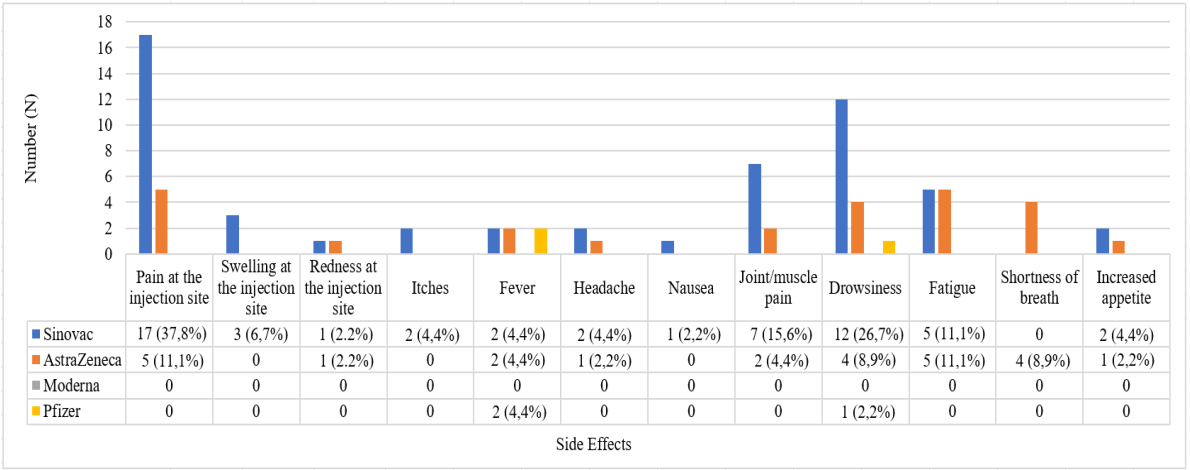


Figure 1. AEFI on the Educational Staff of FK ULM Based on the Type of Vaccine



	Pain at the injection site	Swelling at the injection site	Redness at the injection site	Fever	Headache	Joint/muscle pain	Drowsiness	Fatigue	Shortness of breath	Increased appetite
Sinovac	18 (40%)	4 (8,9%)	2 (4,4%)	3 (6,7%)	3 (6,7%)	6 (13,3%)	16 (35,6%)	6 (13,3%)	0	5 (11,1%)
AstraZeneca	1 (2,2%)	0	0	2 (4,4%)	0	0	1 (2,2%)	1 (2,2%)	0	0
Moderna	2 (4,4%)	1 (2,2%)	0	1 (2,2%)	0	1 (2,2%)	0	0	1 (2,2%)	1 (2,2%)
Pfizer	1 (2,2%)	1 (2,2%)	0	0	0	0	1 (2,2%)	2 (4,4%)	0	1 (2,2%)

Figure 2. Frequency distribution of side effects felt by respondents after the first dose of COVID-19 vaccination



	Pain at the injection site	Swelling at the injection site	Redness at the injection site	Itches	Fever	Headache	Nausea	Joint/muscle pain	Drowsiness	Fatigue	Shortness of breath	Increased appetite
Sinovac	17 (37,8%)	3 (6,7%)	1 (2.2%)	2 (4,4%)	2 (4,4%)	2 (4,4%)	1 (2,2%)	7 (15,6%)	12 (26,7%)	5 (11,1%)	0	2 (4,4%)
AstraZeneca	5 (11,1%)	0	1 (2.2%)	0	2 (4,4%)	1 (2,2%)	0	2 (4,4%)	4 (8,9%)	5 (11,1%)	4 (8,9%)	1 (2,2%)
Moderna	0	0	0	0	0	0	0	0	0	0	0	0
Pfizer	0	0	0	0	2 (4,4%)	0	0	0	1 (2,2%)	0	0	0

Figure 3. Frequency distribution of complaints felt by respondents after the second dose of COVID-19 vaccination

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In the second dose of COVID-19 vaccination, the most common local reaction was pain at the injection area (48.89%), followed by swelling at the injection site (6.7%) and redness at the injection site (4.4%). The most common systemic reaction was drowsiness (37.78%), followed by feeling fatigue (22.2%), muscle/joint pain (20%), fever (13.3%), and headache (6.7%). %), and nausea (2.2%). Other reactions that were also reported were shortness of breath (8.9%) and increased appetite (6.7%). The distribution table for the onset of side effects felt by respondents was divided into 2 based on the vaccine dose. Table 5 shows the distribution of the onset of the first dose of COVID-19 vaccination, while Table 6 shows the distribution of the onset of the second dose of COVID-19 vaccination.

Table 5. Distribution of onset of side effects felt by respondents after the first dose of COVID-19 vaccination

No	Side effects	Vaccine types	Onset	Number(N)	Percentage (%)
		Local reaction			
1	Pain at the injection site	Sinovac	Min: day 1	18	40%
			Max: day 1	18	40%
		AstraZeneca	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Moderna	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Pfizer	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Modus: day 1		22	48.89%
2	Swelling at the injection site	Sinovac	Min: day 1	4	8.9%
			Max: day 1	4	8.9%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Pfizer	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Modus: day 1		6	13.3%
3	Redness at the injection site	Sinovac	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		2	4.4%
		Systemic reaction			
1	Fever	Sinovac	Min: day 1	3	6.7%
			Max: day 1	3	6.7%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Pfizer	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Modus: day 1		6	13.3%

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2	Headache	Sinovac	Min: day 1	3	6.7%
			Max: day 1	3	6.7%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		3	6.7%
3	Muscle/ joint pain	Sinovac	Min: day 1	5	11.1%
			Max: day 3	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		6	13.3%
4	Drowsiness	Sinovac	Min: day 1	16	35.5%
			Max: day 1	16	35.5%
		AstraZeneca	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Modus: day 1		19	42.2%
5	Fatigue	Sinovac	Min: day 1	5	11.1%
			Max: day 2	1	2.2%
		AstraZeneca	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Modus: day 1		8	17.8%
		Other reactions			
1	Shortness of breath	Sinovac	Min: -	-	-
			Max: -	-	-
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		1	2.2%
2	Increased appetite	Sinovac	Min: day 1	4	8.9%
			Max: day 2	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Pfizer	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Modus: day 1		6	13.3%

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Note: The identical minimum and maximum onset values correspond to the same respondent.

Table 6. Distribution of onset of side effects felt by respondents after the second dose of COVID-19 vaccination

No	Side effects	Vaccine types	Onset	Number (N)	Percentage (%)
		Local reaction			
1	Pain at the injection site	Sinovac	Min: day 1	17	37.7%
			Max: day 1	17	37.7%
		AstraZeneca	Min: day 1	5	11.1%
			Max: day 1	5	11.1%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		22	48.89%
2	Swelling at the injection site	Sinovac	Min: day 1	3	6.7%
			Max: day 1	3	6.7%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		3	6.7%
3	Redness at the injection site	Sinovac	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		AstraZeneca	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		2	4.4%
4	Itches	Sinovac	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		2	4.4%
		Systemic reaction			
1	Fever	Sinovac	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		AstraZeneca	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Modus: day 1		6	13.3%
2	Headache	Sinovac	Min: day 1	2	4.4%
			Max: day 1	2	4.4%

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		AstraZeneca	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		3	6.7%
3	Nausea	Sinovac	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		1	2.2%
4	Muscle/ joint pain	Sinovac	Min: day 1	5	11.1%
			Max: day 3	1	2.2%
		AstraZeneca	Min: day 1	2	4.4%
			Max: day 1	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		7	15.5%
5	Drowsiness	Sinovac	Min: day 1	12	26.7%
			Max: day 1	12	26.7%
		AstraZeneca	Min: day 1	4	8.9%
			Max: day 1	4	8.9%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: day 1	1	2.2%
			Max: day 1	1	2.2%
		Modus: day 1		17	36.6%
6	Fatigue	Sinovac	Min: day 1	4	8.9%
			Max: day 2	1	2.2%
		AstraZeneca	Min: day 1	5	11.1%
			Max: day 1	5	11.1%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		9	20%
		Other reactions			
1	Shortness of breath	Sinovac	Min: -	-	-
			Max: -	-	-
		AstraZeneca	Min: day 1	4	8.9%
			Max: day 1	4	8.9%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: day 1		4	8.9%
2	Increased appetite	Sinovac	Min: day 1	1	2.2%
			Max: day 2	1	2.2%

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	AstraZeneca	Min: day 1	1	2.2%
		Max: day 1	1	2.2%
	Moderna	Min: -	-	-
		Max: -	-	-
	Pfizer	Min: -	-	-
		Max: -	-	-
	Modus: day 1		2	4.4%

Note: The identical minimum and maximum onset values correspond to the same respondent.

Table 7. Distribution of duration of side effects felt by respondents after first dose of the COVID-19 vaccination

No	Side effects	Vaccine types	Duration	Number(N)	Percentage (%)
	Local reaction				
1	Pain at the injection site	Sinovac	Min: <1 day	2	4.4%
			Max: >2 day	3	6.7%
		AstraZeneca	Min: >2 day	1	2.2%
			Max: >2 days	1	2.2%
		Moderna	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		Pfizer	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Modus: 1-2 days		16	35.5%
2	Swelling at the injection site	Sinovac	Min: 1-2 days	2	4.4%
			Max: >2 days	2	4.4%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		Pfizer	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		Modus: >2 days		4	8.9%
3	Redness at the injection site	Sinovac	Min: 1-2 days	1	2.2%
			Max: >2 days	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		1	2.2%
	Systemic reaction				
1	Fever	Sinovac	Min: 1-2 days	3	6.7%
			Max: 1-2 days	3	6.7%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		Pfizer	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Modus: 1-2 days		6	13.3%
2	Headache	Sinovac	Min: 1-2 days	3	6.7%
			Max: 1-2 days	3	6.7%
		AstraZeneca	Min: -	-	-
			Max: -	-	-

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		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		3	6.7%
3	Muscle/ joint pain	Sinovac	Min: 1-2 days	5	11.1%
			Max: 1 month	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		6	13.3%
4	Drowsiness	Sinovac	Min: <1 days	3	6.7%
			Max: 1-2 days	13	28.9%
		AstraZeneca	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: 1-2 days	1	2.2%
			Max: >2 days	1	2.2%
		Modus: 1-2 days		14	31.1%
5	Fatigue	Sinovac	Min: 1-2 days	5	11.1%
			Max: 1 month	1	2.2%
		AstraZeneca	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		Modus: >2 days		7	15.5%
		Other reactions			
1	Shortness of breath	Sinovac	Min: -	-	-
			Max: -	-	-
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		1	2.2%
2	Increased appetite	Sinovac	Min: <1 day	1	2.2%
			Max: 1 month	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Pfizer	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Modus: >2 days		5	11.1%

Note: The identical minimum and maximum duration values correspond to the same respondent.

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Table 8. Distribution of duration of side effects felt by respondents after the second dose of COVID-19 vaccination

No	Side effects	Vaccine types	Duration	Number(N)	Percentage (%)
		Local reaction			
1	Pain at the injection site	Sinovac	Min: <1 day	2	4.4%
			Max: >2 days	6	13.3%
		AstraZeneca	Min: >2 days	5	11.1%
			Max: >2 days	5	11.1%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: >2 days		11	24.4%
2	Swelling at the injection site	Sinovac	Min: 1-2 days	1	2.2%
			Max: >2 days	2	4.4%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: >2 days		2	4.4%
3	Redness at the injection site	Sinovac	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		AstraZeneca	Min: >2 days	1	2.2%
			Max: >2 days	1	2.2%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: >2 days		2	4.4%
4	Itches	Sinovac	Min: <1 day	1	2.2%
			Max: 1-2 days	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		1	2.2%
		Systemic reactions			
1	Fever	Sinovac	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		AstraZeneca	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		Modus: 1-2 days		6	13.3%
2	Headache	Sinovac	Min: 1-2 days	2	4.4%
			Max: 1-2 days	2	4.4%
		AstraZeneca	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%

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		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		3	6.7%
3	Nausea	Sinovac	Min: <1 day	1	2.2%
			Max: <1 day	1	2.2%
		AstraZeneca	Min: -	-	-
			Max: -	-	-
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: <1 day		1	2.2%
4	Muscle/ joint pain	Sinovac	Min: 1-2 days	6	13.3%
			Max: 2 months	1	2.2%
		AstraZeneca	Min: >2 days	2	4.4%
			Max: >2 days	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		6	13.3%
5	Drowsiness	Sinovac	Min: <1 days	2	4.4%
			Max: >2 days	1	2.2%
		AstraZeneca	Min: 1-2 days	2	4.4%
			Max: > 2 days	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%
		Modus: 1-2 days		12	26.6%
6	Fatigue	Sinovac	Min: 1-2 days	4	8.9%
			Max: >2 days	1	2.2%
		AstraZeneca	Min: >2 days	5	11.1%
			Max: >2 days	5	11.1%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: >2 days		6	13.3%
		Other reactions			
1	Shortness of breath	Sinovac	Min: -	-	-
			Max: -	-	-
		AstraZeneca	Min: 1-2 days	2	4.4%
			Max: >2 days	2	4.4%
		Moderna	Min: -	-	-
			Max: -	-	-
		Pfizer	Min: -	-	-
			Max: -	-	-
		Modus: 1-2 days		2	4.4%
2	Increased appetite	Sinovac	Min: <1 day	1	2.2%
			Max: >2 days	1	2.2%
		AstraZeneca	Min: 1-2 days	1	2.2%
			Max: 1-2 days	1	2.2%

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Moderna	Min: -	-	-
	Max: -	-	-
Pfizer	Min: -	-	-
	Max: -	-	-
Modus: 1-2 days		2	4.4%

Note: The identical minimum and maximum duration values correspond to the same respondent.

Tables 5 and 6 found that the fastest side effect appeared on the first day after vaccination, and the longest on the second and third days after vaccination. Most of the onset of complaints appeared on the first day after vaccination, which was reported by 22 respondents (48.89%). The results of this study are in line with research conducted by Basuki et al., which stated that almost all AEFI symptoms after termination of COVID-19 appeared on the first day after breastfeeding, with the fastest onset of symptoms being 1 day, and onset of symptoms could appear on the second day. Pain at the injection site was the most common side effect on the first day after vaccination (48.89%). This side effect appeared after receiving the first and second doses of vaccination. This effect was followed by complaints of swelling at the injection site, with the most frequent onset on the first day after the first vaccination dose (42.2%) 36.6% in the second vaccination dose. In addition, 17.8% of the respondents felt fatigue on the first day after the first dose of vaccination, and 20% after the second dose of vaccination. The distribution table for the onset of side effects based on the vaccine dose felt by respondents was divided into 2.

Table 7 shows the distribution of the onset of the first dose of COVID-19 vaccination, and Table 8 shows the distribution of the onset of the second dose of COVID-19 vaccination. Tables 7 and 8 found that the most frequent complaints were 1-2 days, as reported by 16 respondents (35.5%). The most extended duration reported was muscle/joint pain for 2 months, which was reported by one respondent (2.2%); fatigue for 1 month was also reported by one respondent (2.2%), and increased appetite for 1 month was felt by one respondent (2.2%). In the first dose of vaccination, the duration of the most complaints was about 1-2 days, namely complaints of pain at the injection site (35.5%), followed by drowsiness (31.1%), and Fatigue (15.5%). In the second dose of vaccination, the most common duration occurred in complaints of drowsiness, it was about 1-2 days (26.6%), followed by pain at the injection site for >2 days (24.4%), and fatigue for > 2 days was reported by 13.3% of the total number of respondents.

DISCUSSION

Based on Table 1, the number of respondents who experienced AEFI after the first COVID-19 vaccination was higher than after the second dose. The result of this study is in line with Simanjorang's study, which found that the proportion of side effects was higher in the first dose of COVID-19 vaccination than in the second.[7] This may be due to the complaints that are felt mainly in the form of local reactions. More local reactions were felt after the first dose of vaccination, while systemic reactions were more common after the second dose of vaccination. [11,12] At the first dose of vaccination, the complaints felt were generated by the initial adaptive immune response and

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the innate immune response that occurred immediately, so the reactions that are usually caused are local and mild. [13] In the second dose of vaccination, more systemic reactions occurred due to previously formed immunity. [14] The humoral and cellular immune responses formed in the first vaccination make the reactions elicited stronger in the second vaccination. In this case, the first dose of vaccine acts as a booster, which increases the reactogenicity of the second dose of vaccination[15]

The study's results in Figure 1 are because most respondents got vaccinated with the Sinovac vaccine. In this case, the type of vaccine received by the respondent is not based on the respondent's preference but on the vaccine's availability. Based on data on the type and number of COVID-19 vaccines that arrived in Indonesia until December 31, 2021, Sinovac is the most common type of vaccine available in Indonesia, with a total of 255,947,100 doses [16]. This study result is contrary to Sutardi, who found that AEFI on Pfizer types of vaccine is higher than the Sinovac vaccine.[17]

Furthermore, the differences in AEFIs based on the type of vaccine may be due to differences in vaccine platforms. The Astra-Zeneca vaccine is a viral vector that uses the chimpanzee adenovirus platform (ChAdOx1), and the Sinovac vaccine is an inactivated virus vaccine with an alum adjuvant. In contrast, the Pfizer and Moderna vaccines are mRNA vaccines.[18] Inactivated vaccines are designed to produce antibodies to prevent infection. Viral vector and mRNA vaccines are platform technologies that can induce antigen-specific humoral and cellular immunity. The viral vector and mRNA platforms allow antigen delivery to cells and their subsequent uptake by Antigen-Presenting Cells (APC). Viral vector vaccines can strongly induce CD8+.[19] Side effects that occur with viral vector vaccines related to the remaining adenovirus vector or adenovirus vector DNA surviving in a transcriptionally active form, as well as preformed anti-vector immunity.[20] In vaccines with an mRNA platform, mRNA encoding protein S is delivered via Lipid Nanoparticles (LNP) to human cells that produce mature viral proteins or related antigens. 22 IgG and NAB levels were highest when using mRNA vaccines, followed by viral vector and inactivated vaccines.[21] High levels of IgG and NAB increased the induction of stronger local inflammatory reactions after vaccination.[22,23]

The first and second doses of the COVID-19 vaccine can be administered homologously or heterologously. Homologous vaccines are when the vaccine given in the first and second doses of vaccination uses the same type. Heterologous vaccines are when the vaccine given in the first and second doses of vaccination uses a different kind.[24] Based on the study results, 28 respondents received the Sinovac homologous vaccine, two received the Moderna homologous vaccine, and two received the Pfizer homologous vaccine. One respondent received the AstraZeneca homologous vaccine in the first and second doses of vaccination. Meanwhile, three respondents received the Sinovac-AstraZeneca heterologous vaccine, one received the Sinovac-Pfizer heterologous vaccine, and one received the Moderna-AstraZeneca heterologous vaccine.

Based on tabulation of research data, it was found that respondents who received hetero-

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logous vaccines tended to experience AEFIs more than those who received homologous vaccines. Previous studies have suggested that heterologous vaccines induce stronger humoral and cellular responses. Heterologous vaccines cause strong induction of antibodies and T cells. IgG, CD4, CD8, and NAB levels in heterologous vaccines are ten times higher than in homologous vaccines with viral vector platforms.[25,26] High IgG levels induce stronger local inflammatory reactions at the injection site.[22] High T cell levels increase the severity of the response and the type of symptoms after vaccination.[27] High IgG levels and neutralizing antibodies increase the occurrence of local reactions after vaccination.[23] Heterologous immunization, such as a combination of inactivated vaccines with mRNA vaccines or viral vectors, improves the immune response compared to homologous vaccines to provide better protection against viruses.[28]

The results of the study regarding the complaints felt by respondents after the first and second doses of COVID-19 vaccination in Figure 2 and Figure 3 are in line with the studies that was conducted by Nisak[9], Supangat[4] and Basuki[6] which found that the most common local reaction after COVID-19 vaccination was pain at the injection site, followed by swelling, redness, and itching. The study's results regarding systemic responses were in line with Nisak's study, which stated that systemic reactions after COVID-19 vaccination were drowsiness, muscle aches, headaches, fever, joint pain, and fatigue.

In addition, the research results regarding other reactions align with the research by Basuki[6] and Nisak[9,] which stated that increasing appetite is a reaction that occurs quite often after the COVID-19 vaccination. In contrast to increasing appetite, shortness of breath is a reaction that rarely occurs after a COVID-19 vaccination, but the vaccination itself does not necessarily cause this reaction; it is caused by the body's response to being too anxious or stressed. The sensitivity of a person's body response can be affected by tension. For example, after hearing stories, negative information, or hoaxes about vaccines, a person may feel anxious, which can cause symptoms (e.g, shortness of breath) that do not react to the vaccine.[29] Bhandari[30] states that shortness of breath or dyspnea is one of the common side effects of post-immunization. In the mass vaccination carried out in the United States, there were 0.74% cases of anxiety related to vaccine reactions in the form of dyspnea, hyperventilation, chest pain, tachycardia, drowsiness, hypotension, and headaches.[30] The results of this study show that local reactions appeared post-vaccination COVID-19; there are more than systemic reactions, so it can be interpreted that the COVID-19 vaccine is safe to use because the majority of the side effects caused are local and mild.

Based on Table 7 and Table 8, symptoms of side effects after vaccine immunization usually appear on one or two days after vaccination and last several days.[6] Post-vaccination complaints of COVID-19 that are felt in the long term may be influenced by medical history, history of allergies, body mass index, and previous history of suffering from COVID-19.[31]

The results of this study can be considered and used as a reference by the Health Department and healthcare workers in educating the public

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to strengthen confidence in the safety of the COVID-19 vaccine as an effective measure for COVID-19 prevention. The strength of this study and the difference between this research and previous research is that it examines the onset and duration of AEFI experienced by the respondents, and this study has never been conducted before among the educational staff of the Faculty of Medicine at Lambung Mangkurat University. This study's limitations were that it was only performed on educational staff in the Faculty of Medicine, University of Lambung Mangkurat, and several respondents did not clearly remember the physical complaints they felt after receiving the first and second doses of the COVID-19 vaccination.

CONCLUSION

Based on the results of the study regarding the description of COVID-19 vaccine AEFI on educational staff at the Faculty of Medicine, University of Lambung Mangkurat, it can be concluded that the type of vaccine that affected AEFI was Sinovac, which was 84.21% in the first dose and 80% in the second dose. Furthermore, the most common AEFI symptoms at the first dose of vaccination were pain at the injection site (48.89%), followed by drowsiness (42.2%) and fatigue (20%). The most common symptoms for the second dose were pain at the injection site (48, 89%), followed by drowsiness (37.78%) and fatigue (22.2%). The most frequent onset of AEFI at the first dose of vaccination was on the first day, the side effects were pain at the injection site (48.89%), drowsiness (42.2%) and fatigue (17.8%), while the onset of the second dose of vaccination was happening on the first day, the side effects were pain at the injection site (48.89%), drowsiness (36.6%), and fatigue (20%). In addition, the duration of most AEFIs in the first vaccination dose was 1-2 days. The side effects were pain at the injection site (35.5%), drowsiness (31.1%), and feeling tired (15.5%). In contrast, in the second dose, the highest duration was 1-2 days with drowsiness (26.6%), followed by pain at the injection site, which was less than 2 days (24.4%), and fatigue was also experienced less than 2 days (13.3%) as the common side effects.

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