

Evaluation of the Full Dosage Sinovac and Pfizer COVID-19 Vaccination into Adolescent

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Abstract: Coronavirus Disease 2019 (COVID-19) is an illness caused by Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The purpose of this study was to determine the amount of exposure to Covid-19, to determine the sociodemographic description of the variables of age, gender, vaccine type, BMI, vaccine side effects, to determine the relationship between age, gender, BMI, vaccine side effects and exposure to Covid-19. A prospective cross-sectional study was conducted in this study. This study only involved 600 respondents aged 11-18 years who had been vaccinated against Sinovac and Pfizer. The results obtained in this study were the amount of exposure to Covid-19 in Sinovac and Pfizer vaccination participants in adolescents 6 participants were in Sinovac 4 participants and Pfizer 3 participants. Other influencing factors are the type of vaccine and side effects with the p-value of each variable <0.05 . there is a relationship between the type of vaccine and vaccine side effects.

1 INTRODUCTION

In 2019, the world was rocked by the COVID-19 pandemic which started in Wuhan, Hubei, People's Republic of China. The extent of the virus, which is classified as SARS, was not previously determined until finally, a month after it was discovered that COVID-19 was a highly contagious virus. COVID-19 can be transmitted mainly through the particles that come out of the breath when individuals are within one meter of it (Darwis et al., n.d.).

The virus that causes COVID-19 is called SARS-CoV-2. Coronavirus is zoonotic (transmitted between animals and humans). One of the study reported that SARS was transmitted from civet cats to humans and MERS from camels to humans. Meanwhile, the animal that is the source of the transmission of COVID-19 is still unknown (Darwis et al., n.d.).

Symptoms are usually mild and appear gradually and some infected individuals may show no signs and still feel well. According to one study, it was stated that WHO officially declared COVID-19 a pandemic on Wednesday, March 11, 2020, and cases have been steadily increasing since then (Ramatillah et al., 2021).

According to Arnanda N, Ramatillah DL. SARS-CoV2 infection and disease can be divided into three

phases: I. asymptomatic, phase with or without detectable virus; II. milder symptoms, phase with upper airway involvement; and III. severe, potentially lethal disease with hypoxia, 'ground glass' infiltrates in the lungs, and progression to acute respiratory distress syndrome (ARDS) (Arnanda & Ramatillah, 2022).

There are 3 categories of severity of COVID-19 according to Gee S, Gaughran F, et al : (1) Critical Covid-19 [Acute respiratory distress syndrome (ARDS), sepsis, septic shock, or patients requiring life-sustaining therapy] (2) Severe COVID-19 [$SpO_2 < 90\%$, had signs of ARDS and pneumonia] (3) Non-severe COVID-19 [no criteria for severe or critical signs] (Gee et al., 2020).

The COVID-19 epidemic has resulted in a significant increase in mortality and has thrown the country into recession. Although the virus spread can be slowed by physical separation, face coverings, testing, and tracing, effective vaccines are given to a large portion of the world's population to prevent serious illness and disease and achieve herd immunity to transmit the virus (Sutardi & Ramatillah, 2022). According to WHO: Some countries have given emergency use authorization for mRNA vaccines for use in the adolescent age group (aged 12-17 years) BNT162b2 developed by Pfizer. two inactivated vaccines (Sinovac-CoronaVac and BBIBP-CorV)

and these products were approved by Chinese authorities for age indication of 3-17 years; although these vaccine products have received EUL for adults, they have not received WHO EUL for children(*WHO SAGE ROADMAP FOR PRIORITIZING USE OF COVID-19 VACCINES*, 2022).

2 METHOD

2.1 Design

This research was conducted with a quantitative approach using a retrospective cross-sectional design using a questionnaire. The data collection technique was carried out using a survey method using a google form which was distributed online to adolescents who had been vaccinated against complete doses of Sinovac and Pfizer.

2.2 Population and Sample

Participants in this study were Indonesian people >18 years old who had received the complete dose of AstraZeneca vaccine with a total of 310 respondents.

2.3 Instrument

This study uses a questionnaire distributed through social media (WhatsApp, Facebook, Instagram, and Telegram). The number of questionnaires in this study was 67 questions about nonidentity and comorbidities. 67 questions were about the side effects received after the first and second doses of vaccination in the short and long term, as well as monitoring the side effects of the vaccine for 1-6 months after being vaccinated. For validating the questionnaire in this study using a standardized questionnaire where the Cronbach alpha was appropriate as in the following literatur(Ramatillah et al., 2019).

2.4 Selection Criteria

Inclusion Criteria

- a. Adolescent boys and girls
- b. Adolescents 11-18 years old
- c. Adolescents who have been vaccinated with Sinovac and Pfizer complete doses for a minimum of 2 months
- d. Adolescents who are willing to take partin researchha
- e. Indonesia citizens

Exclusion Criteria

- a. Adolescents 11-18 years who have not been vaccinated at full doses
- b. Cancer, Autoimmune, Hepatitis, HIV AIDS
- c. He Pregnant women

2.5 Statistical Analysis

The collected results were analyzed using the SPSS version 25 application. Fisher, Chi-square, and Mann-Whitney test was used to find the relationship between risk factors (gender, age, BMI, vaccine type), and a side effect-valuable of 0.05 was considered significant.

2.6 Ethical Approval

As stated in figure 1 ethical approval was obtained before conducting the study. Ethical approval comes from the Health Research Ethics Committee, University of 17 August 1945 Jakarta, with approval letter No.49/KEPK-UTA45JKT/EC/EXP/07/2022

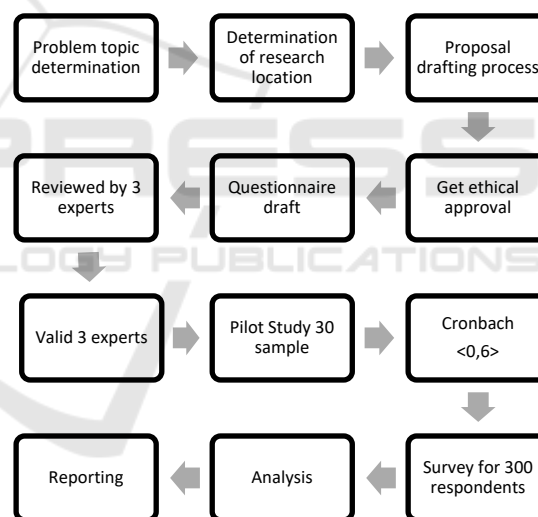


Figure 1: Research Framework.

3 RESULT

In this study, 600 participants were used with an average age of 11-18 years. To get participants in this study, social media WhatsApp, Telegram and Instagram were used for distributing questionnaires.

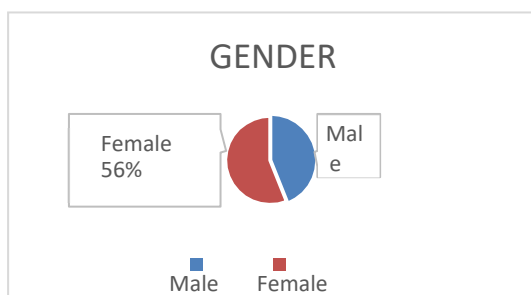


Figure 2: Participants by Gender.

Based on Figure 2, it can be seen that there were 600 participants of different genders, 44% (264) of participants, and 56% (336) of feeparticipants.

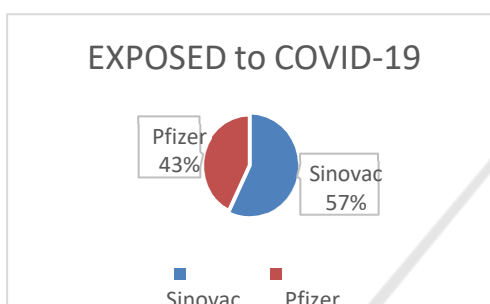


Figure 3. Participants Affected by COVID-19.

Based on figure 3, it can be seen from 600 participants that 57% (4) Sinovac vaccine participants were affected by Covid-19 and 43% (3) Pfizer vaccine participants were affected by Covid-19.

Table 1: Relationship between vaccine types and comorbidities.

Variable	Frequency/Percentage (%)		P.Value
	Sinovac (n=300)	Pfizer (n=300)	
Asthma	10/3.33	15/5	0.414

*Fisher test, #Chi-Square

From a total of 600 participants with 300 Simovac and 300 Pfizer each with a p-value 0.005 of all participants, there was only astma in the Sinovac vaccine at 3.33% and the Pfizer vaccine at 5%. As showtablee 1. There is no significant data so there is no relationship between vaccine typed and comorbidity.

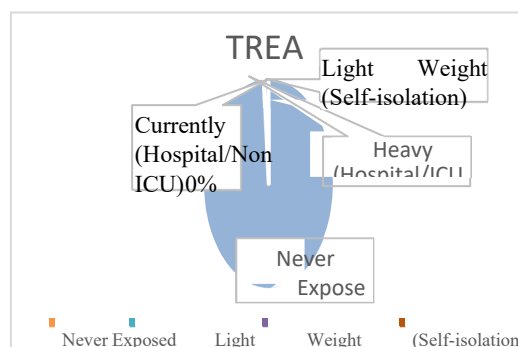


Figure 4; Presentation treated from Covid-19.

Figure 4. It can be seen that 99% of those who are not exposed and those who are self-isolating are 1%, in hospital/Non-ICU and Hospital/ICU 0%

Table 2. Correlation between vaccine type and exposure to COVID-19.

Kind of Vaccine	Exposed to Covid-19/Percentage	P-Value
Sinovac	0	
Pfizer	3/1	
Total p-value		0.249

*Fisher test, #Chi-square

It can be seen in table 2. There is no significant data on the correlation between the type of vaccine and exposure to COVID-19 with a p-value of 0.249>0.005.

Table 3: Correlation between age, BMI, and vaccine side effects.

Variable	Frequency/Percentage (%)			P-value
	Overall (n=600)	Sinovac (n=300)	Pfizer (n=300)	
Median age	15.34/2.55	15.78/5.26	14.90/4.96	19.82
Median BMI	24.72/4.12	27.72/9.24	21.72/7.24	75.70

*Man-Whitney test, #Kruskal Wallis test

It can be seen in the table above that there is no significant difference between age and BMI. The median total agent can be seen at 2.55%, and the median Bis MI is 2.12%. For Sinovac median age 5.26%, Sinovac median BMI 9.24%. for Pfizer's median age of 4.96%, and Pfizer median BMI of

7.24% the P.Value value was significant (<0.005) while in the media age (1.982) and median BMI (75.70) there was no correlation between age and BMI.

Table 4: Correlation between vaccine type and dose of vaccine side effect.

Variable	Frequency/Percentage (%)		P-Value
	Sinovac=300	Pfizer n = 300	
Side Effects of Fever After The 1st Vaccination	124/41.3	135/45	0.365
Pain in The 1st Vaccination Injection Area	152/50.6	180/60	0.027
Side Effects of Coughing After The 1st Vaccination	22/7.33	28/9.33	0.460
Experienced Diarrhea After The 1st Vaccination	12/4	19/6.33	0.268
Feel Sleepy After The 1st Vaccination	132/44	115/38.3	0.184

*Fisher test, #Chi-square

It can be seen in the table above that the only significant data was pain in the injection area due to its p. value (0.027) while the others were not significant for fever (0.365), cough (0.460), diarrhea (0.26,8), and drowsiness (0.184).

Table 6: Correlation between vaccine type and vaccine efficacy dose 1.

Variable	Frequency/ percentage (%)		P-Value
	Sinovac n = 300	Pfizer n = 300	
Loss of Loss and Taste After The 1st Vaccination	3/1	0	0.249
Experienced Cough and Sore Throat After The 1st Vaccination	3/1	0	0.249
Having Head Pain After The 1st Vaccination	3/1	0	0.249

*Fisher test, #Chi-square test

Table 5: Correlation between vaccine type and dose of vaccine side effects 2.

Variable	Frequency/percentage (%)		P-Value
	Sinovac n=300	Pfizer n=300	
Side Effects of Fever After The 2nd Vaccination	110/36.6	150/50	0.001
Side Effects of Coughing After The 2nd Vaccination	19/6.33	33/11	0.058
Feeling Dizzy After The 2nd Vaccination	65/21.6	74/24.6	0.439
Feel Sleepy After The 2nd Vaccination	105/35	83/27.6	0.064
Feel Pain in The Upper Arm After The 2 nd Vaccination	85/28.3	69/23	0.161

*Fisher test, #Chi-square

It can be seen in the table above that the significant data is only fever (0.001), and the no significant is cough (0.058), dizziness (0.439), drowsiness (0.064), Pain in the Upper Arm (0.161).

In table 6 there is no significant data value of $p > 0.005$ at the efficacy of dose 1, it can be seen that there is no correlation between the type of vaccine and the efficacy of the dose 1 vaccine.

Table 7: Correlation between vaccine type and vaccine efficacy dose 2.

Variable	Frequency/ percentage (%)		P-Value
	Sinovacn = 300	Pfizer n = 300	
Loss of Loss and Taste After The 2nd Vaccination	0	3/1	0.249
Experienced Breathing Difficulty AfterThe 2nd Vaccination	0	3/1	0.249
Experienced Cough and Sore ThroatAfter The 2nd Vaccination	0	3/1	0.249
Experienced Fever After The 2ndVaccination	0	3/1	0.249
Having Head Pain After The 2ndVaccination	0	2/0.66	0.499

*Fisher test, #Chi-square test

In the table above there is no significant data on the efficacy of dose 2.

Table 8: Correlation between age and vaccine side effects after 6 months.

Variable	Frequency/ percentage (%)	P. Value
	Age Mean n= 600 15.34	
Have Been Exposed to COVID-19 4-6 Months After Vaccination	1/0.16	0.250
Feel Easy Fatigue 4-6 Months After Vaccination	1/0.16	0.250

*Man-Whitney test, #Kruskal Wallis test

From the results of the Man-Whitney test regarding age and side effects for 6 months, the percentage value for being exposed to COVID-19 4-6 months

after the vaccine was 0.16%, and for easy fatigue, 4-6 months aftervaccination was 0.16% with a P-value 0.250

Table 9: Correlation between body mass index (BMI) and vaccine side effects after 6 months.

Variable	Frequency/Percentage (%)	P.Value
	Gender mean n = 600 24.72	
Have Been Exposed to COVID-19 4-6 Months After Vaccination	1/0.16	0.452
Feel Easy Fatigue 4-6 Months After Vaccination	1/0.16	0.452

*Man-Whitney test, #Kruskal Wallis test

From the results of the Mann-Whitney test regarding BMI and side effects for 6 months, the p-value of 0.452 is not significant. With a presentation on exposure to COVID-19 0.16% and easily tired 4-6 months presentation0.16%.

4 DISCUSSION

This study evaluates exposure to COVID-19 by Sinovac and Pfizer vaccination participants to adolescents. The Sinovac vaccine uses dead virus particles to induce antibody production (Halim, 2021).

Whereas Pfizer has utilized lipid nanoparticles (LNPs) with a formulated mRNA vaccine (Sutardi & Ramatillah, 2022). This study involved 600 participants from 300 Sinovac vaccines and 300 Pfizer vaccines in this study there were 56% female participants and 44% male participants can be seen in (figure 2). According to an article, two injections of the Sinovac coronavac vaccine provide 94% effectiveness for preventing Covid-19 (Kezia & Ramatillah, 2022). According to research by Klein SL et al., women are often less likely to receive the vaccine, but this comparison differs from that of Indonesian adolescents who receive the vaccine (Hoffmann et al., 2020). Women after being vaccinated develop a higher and longer-lasting protective antibody response, compared to men. However, they experience more frequent and intense side effects than men (Hoffmann et al., 2020).

The chi-square test in table 1 can be seen that there is no significant type of vaccine and comorbidity. The p-value of 0.414 for participants WHO have asthma is. Control Center and Disease Prevention China reported that cardiovascular disease, hypertension, diabetes, respiratory disease, and cancer are associated with an increased risk of death (Ramatillah & Isnaini, 2021). According to research, the relationship between asthma and obesity does not depend on gender, age, and the severity of asthma (Jay et al., 2012). One hypothesis of the possible influence of asthma on obesity is reduced energy expenditure due to low levels of physical activity in children with asthma (Jay et al., 2012). Comorbidities besides demographic differences and lifestyle changes are one of the most important determinants that cause various disease manifestations (Mitra et al., 2020). The association of body mass index (BMI) from adolescence to adulthood with obesity-related diseases in young adults has not been fully delineated (Tirosch et al., 2011). Disease in neonates, infants, and children has also been reported to be significantly milder than in their adult counterparts (Singhal, 2020). An increase in BMI in childhood and adolescence may be closely related to a higher incidence of coronary heart disease and type 2 diabetes mellitus in young adults (Nogueira-de-Almeida et al., 2020). Efforts to prevent the spread of COVID-19 will result in more weight gain and a higher BMI, leading to growth differences from conventional seasonal variations in children (Han et al., 2021).

The percentage of respondents exposed to COVID-19 was more exposed 57% of Sinovac vaccine recipients than 43% of Pfizer vaccine recipients (figure 3). According to research, There is no evidence

from this national survey data that men are more likely to be affected than women (Ramatillah et al., 2022). Initial S-Ab and N-Ab antibody responses to the mRNA vaccine (Pfizer) were significantly higher than those elicited by the inactivated virus vaccine (Sinovac) (Lau et al., 2022). According to the severity of symptoms, patients can be classified as light, heavy, and critical types (He et al., 2020). In the severity of the study, 99% never had exposure to COVID-19, and 1% There were mild symptoms (self-isolation) and moderate symptoms (Hospital/Non-ICU) and severe (Hospital/ICU) 0% (figure 4). Based on evidence that efficacy and immunogenicity are as high as (or higher than) in older individuals with rare serious side effects (Held et al., 2021). Judging from the results of the study in table 2 there is a correlation between vaccine type and exposure to COVID-19 which has a p value > 0,005 which means that there is no significant difference between the type of vaccine and exposure to COVID-19. Observational studies show that vaccination is associated with reduced COVID-19- related hospitalizations, intensive care unit admissions, and mortality in adolescents (Held et al., 2021).

As shown in Table 2. Gender and age showed a p-value > 0.005, which means that gender and age were not correlated with vaccine side effects. The lack of age-related changes in the sex-differential effects of vaccines suggests that genetic or other factors may be involved (Ciarambino et al., 2021). Gender is considered in clinical trials for Covid-19 vaccine development to include analysis of efficacy, vaccine response, and adverse reactions (Ciarambino et al., 2021). Finally, we found that gender influenced vaccine acceptance, with adolescent boys showing a higher desire to be vaccinated. Previous studies on gender and acceptance of the COVID-19 vaccine are inconclusive. As summarized by Bono et al., several studies support lower vaccination willingness by women, possibly due to their higher fear of side effects (Humer et al., 2021).

Based on Tables 3&4 it can be seen that there is a significant correlation in injection site pain where the presentation rate of Pfizer is greater than Sinovac. Pfizer 60% and Sinovac 50.6% different from the second vaccine, a significant correlation occurs in fever, the second dose of the Pfizer vaccine has higher side effects than Sinovac. As can be seen in table 5 the presentation value of Pfizer is 50% and Sinovac 36.6%. For vaccine 1 side effects, fever, cough, diarrhea, and drowsiness are not correlated with side effects, p-value > 0.005, while for side effects of vaccine 2 coughs, dizziness, and drowsiness were not correlated with side effects, p-value > 0.005.

According to Riad, A., et al. Side effects tend to be more pronounced with the second dose, especially for those who receive the PfizerBioNTech vaccine. Health workers in Turkey report that younger women and individuals are more likely to report vaccine-related side effects (Elnaem et al., 2021). Reported side effects include fever, sore throat, myalgia, eye muscle pain, loss of smell or taste, shortness of breath, headache, numbness, palpitations, and gastrointestinal symptoms. Women report more side effects than men. This type of side effect after receiving the vaccine was common and consistent with other studies that found myalgia, headache, gastrointestinal symptoms, and fever among the frequently reported side effects (Alghamdi et al., 2021). Side effects are more common after the full vaccination dose. mRNA-1273 vaccine, and in participants with younger age, female gender, previous COVID-19, Asian race, early pregnancy, and marijuana use. Older age, black or African American race, social status higher subjective well-being, asthma, and anemia were associated with a lower likelihood of reporting side effects (Beatty et al., 2021). Mild severity of side effects (AE), both local and systemic, with a frequency of and lower severity in the older group (>65 years old) (Oyebanji et al., 2021)

5 CONCLUSIONS

This study found that for side effects there was a significant correlation where Pfizer had higher side effects than Sinovac, the side effects that occurred with these two vaccines were a pain in the vaccination area and fever. No significant side effects were found with either of these two vaccines. The variable that affects side effects and efficacy is the type of vaccine.

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