Evaluation Comparison of the Effectiveness of Full Dose Pfizer Vaccine with Pfizer Booster Society in Indonesia

Marthius Putra Yehezkie and Diana Laila Ramatillah

Faculty Pharmacy, Universitas 17 Agustus 1945 Jakarta, Indonesia

Keywords: Vaccine Effectiveness, the Complete Dose of Pfizer, Pfizer Booster, and Society in Indonesia.

Abstract: Efforts to socialize vaccination programs to achieve herd immunity worldwide are increasingly being carried out. The vaccination program is aimed at all people in the world, especially in Indonesia. In addition to full-dose vaccination, now booster vaccination is also shown to all people in the world, especially in Indonesia. The Indonesian government provides several types of full-dose vaccines as well as boosters, one of which is Pfizer. This study was conducted to evaluate the effectiveness comparison between the complete dose of Pfizer vaccine and Pfizer Booster in the community in Indonesia. This type of research is observational with a prospective invitational method. This study involved 600 respondents, of which 300 respondents were Pfizer boosters and 300 respondents were Pfizer complete doses. In this study, there were 372 males and 228 females. A significant correlation was found between the type of vaccine with side effects, age with side effects, and BMI with side effects. The effectiveness of each vaccine was 99.3% for the Pfizer booster and 99.1% Pfizer full dose vaccine. From this study, it can be concluded Pfizer booster more effective compare to full dose Pfizer vaccine.

1 INTRODUCTION

In late 2019, the coronavirus 2019 (COVID-19) outbreak became a public health threat to people worldwide. The lower respiratory tract is the main target for severe respiratory disease (SARS-CoV-2) infections (Lee *et al.*, 2020) It was recorded on the official Covid-19 website regarding the Development of Covid-19 Cases in Indonesia in the March 2022 update, and there were 5,630,096 confirmed positive patients and 4,944,237 recovered patients, and 149,036 deaths. Caused by Coronavirus Disease 2019 (COVID19) Severe Acute Respiratory Syndrome Coronavirus 2 (SARSCoV2) has been declared a new pandemic by the World Health Organization (WHO) '(Anka *et al.*, 2021). Vaccines are a way to control outbreaks of infectious diseases and reduce the risk of pandemics and epidemics. The sooner the vaccine is distributed, the sooner the outbreak can be brought under control '(Excler *et al.*, 2021). The Ministry of Health of the Republic of Indonesia provides six types of clinically passed Covid-19 vaccines for people in Indonesia that can be used by people in Indonesia, namely Sinovac, Astrazeneca, Moderna, Pfizer, Sinopharm, Janssen.

The first Covid 19 vaccine approved by the world's regulatory agencies to prevent respiratory syndrome coronavirus 2 (SARSCov2) is a comirnaty vaccine developed by Pfizer and BioNTech '(Nittner-Marszalska *et al.*, 2021). The Pfizer-Biotech Covid-19 vaccine is an mRNA vaccine in which lipid nanoparticles are modified utilizing nucleosides. Encoding the spike glycoprotein of SARS-CoV-2, the cause of the coronavirus disease (COVID19) (Sutardi and Ramatillah, 2022)

The Pfizer-BioNTech (BNT162b2) vaccine is an mRNA- vaccine containing modified lipid nanoparticles made using a nucleoside, which encodes the SARS-CoV-2 spike glycoprotein and is a coronavirus disease (coronavirus disease) (Sutardi and Ramatillah, 2022). According to research by The New England journal of medicine on Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. The efficacy of the Pfizer Vaccine against COVID-19 is 95% (Polack *et al.*, 2020).

Acquired Herd Immunity is formed at the individual level by natural infection by pathogens or by vaccines. Several current clinical trials are underway to evaluate new vaccine candidates and drug replacement strategies for preventing and treating SARS-CoV-2 disease. However, it is

unclear whether these studies will result in effective interventions, and although the optimistic estimate of each vaccine study is at least 12-18, these studies are considered effective '(Randolph and Barreiro, 2020).

1.1 Covid-19

Coronavirus (CoV) is part of the Coronaviridae family. Coronavirus (COVID19) began to spread in December 2019 and was detected in early January 2020. The virus began to spread in China from mid-January to late January. The virus spreads in the host and clinically shows several symptoms, such as the common cold to respiratory infections '(Randolph and Barreiro, 2020). Covid-19 is an RNA infection in the form of a royal attribute, having a diameter of approximately 60- 140 nm. It is transmitted through inhalation, namely coughing and sneezing. The Covid-19 virus enters the human nasal system by inhalation and begins to replicate. The main receptor for the Covid-19 virus is ACE2. Then the virus starts to spread with a limited immune response and can be detected with a feeling of discomfort in the nose. The COVID-19 virus then spreads and reaches the human respiratory tract, and the virus faces a more robust innate immune response. Most Covid-19 patients are elderly/elderly patients, such as lung disease, hypertension, malignant tumors, coronary heart disease, and chronic kidney disease (Ramatillah and Isnaini, 2021).

The Covid-19 virus belongs to the category of betacoronavirus viruses, such as MERS-CoV and SARS-CoV-1. The virus comes from animals, namely bats. The patients in the United States were similar to those obtained in China, suggesting the possible emergence of this new virus from animal reservoirs. There were reports that several pets had previously tested positive for SARS-CoV-2 in several countries such as Hong Kong, Belgium, and New York City zoos (López, de Casas Moreno and Mera, 2021)

The Covid-19 virus attacks the immunity of humans. Immunity in humans is the best fortress. The individual's immune system is divided into three categories, namely native immunity (quickly), adaptive immunity (long term), and passive immunity. The human immune system can detect and support antibodies, defending against viruses or invading germs. However, when it first attacks the body, the immune system cannot work correctly, and we become sick. Precisely what happened like Covid-19 (Ramatillah and Isnaini, 2021)

1.2 Symptom

Symptoms in patients with COVID-19 are similar to Middle East Respiratory Syndrome (MERS), starting from 2-14 days of exposure to SARS-CoV-2. Causes such as high body temperature, fatigue, and phlegm. In a sick person found, there are symptoms such as weakness, flu, inflammation, and excretion. These causes are usually easy and start slowly. Some patients contracted SARS- CoV-2 infection but did not show any reason and did not feel unwell(López, de Casas Moreno and Mera, 2021)

A retrospective analysis was performed on patients in Jinan and Rizhao, Shandong Province, from January 23 to February 15. There were 53 cases, including 67 cases with an average age of 41.47 years (range 21-65 years), and 26 cases (49.1%) were men. Most cases were mild (8 cases, 15.1%) and conventional (44 cases, 83%), with only one severe case (1.9%). The most common symptoms at the beginning of the illness were fever (60.4%), dry cough (54.7%), phlegm (37.7%), pharyngitis (35.8%), and fatigue (32.1%). Less common symptoms were headache (20.8%), anorexia (15.1%), myalgia (13.2%), chest pain, (11.3%), nausea (5.7%), diarrhea (3 .8%), dizziness (3.8%), and vomiting (1.9%) (Asaduzzaman *et al.*, 2020).

1.3 Vaccine

Vaccination against (SARS-CoV-2) remains the main hope in controlling the pandemic (COVID-19). (WHO) Approves COVID19 Vaccine Emergency Use List (EUL) contains (mRNA) Pfizer BNT162b2. BioNTech (Pfizer, Inc; Philadelphia, PA, USA) and Moderna mRNA vaccine 1273 (MODER) naTX, Inc.; Cambridge, Mass. USA); Viral vector vaccines (AstraZeneca, Cambridge, UK) and Janssen Ad26.COV2.S (Janssen Biotech, Inc; a pharmaceutical company owned by Janssen, Johnson & Johnson; New Brunswick, NJ, USA); and Sinopharm, Inactivated Virus Vaccine (China National Pharmaceutical Group) and Sinovac (Sinovac Biotech Ltd.; '(Al-Awwal *et al.*, 2022) AntiCoV2 vaccine was developed in a much shorter time than previous vaccinations. Previous vaccinations took 8 to 10 years for human use, while the antiSARSCoV2 vaccine took 8 to 10 months (Han *et al.*, 2020)

Most Covid-19 vaccines need to be given in two doses at intervals of 3-12 weeks to provide sufficient immunity for recipients of the Janssen vaccine, currently used as a single dose. The SARSCoV2

spike protein mRNA vaccine was retrieved and transcribed after being injected into host cells. It produces spike proteins, is presented to B and T cells on the cell surface, and induces an immune response. The vaccines used are already weakened germs, so they do not cause illness but create immunity (Al-Awwal *et al.*, 2022)

There are four types of vaccines, namely mRNA vaccines developed by PfizerBioNTech and Moderna. RNA and DNA vaccines are closer to using RNA or DNA made as if it were safe to build immune capabilities—vector vaccine virus (adenovirus) developed by AstraZeneca, Johnson & Johnson, Litera, Sputnik. Viral vector vaccines do not cause disease but use genetically modified viruses that detect viral germs to capture immunity better. Inactivated viral immunization was developed by Sinovac (Han *et al.*, 2020.)

2 MATERIALS AND METHODS

2.1 Design

This study used a prospective cross-sectional study to evaluate the comparative effectiveness of the Pfizer full-dose and Pfizer booster vaccines in the Indonesian population. A validated questionnaire was used to collect the data. For the sampling technique using convenience, the sampling follows the inclusion criteria. Inclusion criteria are people in Indonesia over 17 years who have received a total dose of Pfizer vaccine or Pfizer Booster and are willing to participate in the study. The exclusion criteria were all Indonesians over 18 years of age suffering from cancer, autoimmune diseases, HIV/AIDS patients, pregnant women, and Indonesians who only followed the 1st dose of the Pfizer vaccine.

2.2 Participant

Participants in this study were all people in Indonesia aged over 17 years who had been vaccinated with a total dose of Pfizer or Pfizer booster with a total of 600 respondents.

2.3 Data Analysis

The results obtained were analyzed using the SPSS version 25 application. Fisher, Chi-square, Mann-Whitney, and Kruskal-Walis tests were used to find the relationship between risk factors (gender, age, BMI, vaccine type) and side effects. A p-value of 0.05 was considered significant.

2.4 Ethical Approval

Ethical approval was obtained prior to conducting the study. The ethical approval was sourced from the health research ethics committee of the Universitas 17 Agustus 1945, Jakarta, with the approval letter No.38/KEPK- UTA45JKT/EC/EXP/07/2022.

3 RESULTS AND DISCUSSION

3.1 Prevalence of Participants by Domicile

The study this conducted in Indonesia with a percentage domicile for each respondent 79% from the island of Java, 18% from the island of Sumatra, 0.8% from the island of Kalimantan, 1.4%from the island of Bali, 0.3% from the island of Sulawesi and 1.2% from the island of Ternate (figure 1). Domicile is not one of the factors affecting vaccine effectiveness and side effects.
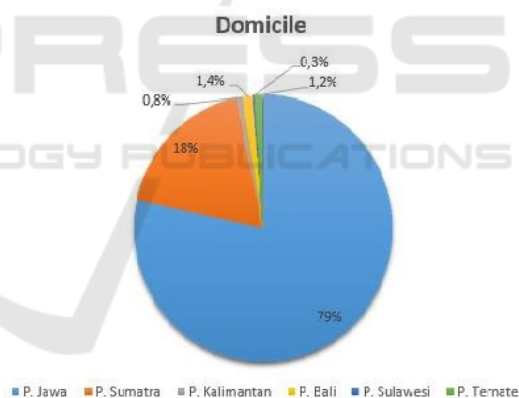

Figure 1: Domicile.

3.2 Prevalence of Participants by Comorbid

Figure 2 shows that from a total of 600 respondents, each of the 300 respondents who received the total dose of Pfizer vaccine and 300 respondents who received the Pfizer booster, the percentage of complications from the total was 0.3% diabetes, 0.3% hypertension, and 99.4%. Without comorbidities.
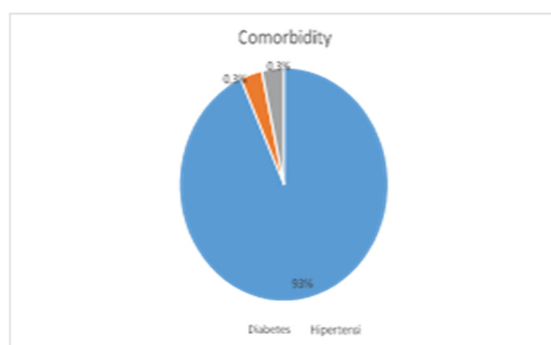
Figure 2 : Comorbidities

3.3 Relationship Between Types of Vaccines and Side Effects

From the fisher test results, where the variable type of vaccine as categorical data was analyzed with side effects questions as other categorical data, the results are as presented in table 1.

Significant results were obtained between the type of vaccine and the side effects experienced by vaccine participants after receiving the full dose of Pfizer vaccine and Pfizer Booster. The results showed that the Pfizer booster vaccine had more side effects than the complete dose of the Pfizer vaccine. It is known that from a total of 300 respondents who received the full dose of the vaccine, 18% felt side effects such as fever, 32% felt pain in the injection area, 8.6%.

Experienced diarrhea, 17% felt dizzy, 23% felt drowsy after the vaccine, and 20.6% felt pain in the upper arm. In contrast, in the other 300 respondents who received the booster vaccine, 42.6% felt fever, 74% felt pain in the injection area, 4 .3% felt diarrhea, 37.3% felt dizzy, and 45.6 felt drowsiness, and 54% felt pain in the upper arm. In addition to the type of vaccine, another variable that has a significant correlation with the side effects that appear is age.

3.4 Correlation Between BMI and Vaccine Side Effects

Variables of age, side effects, and the efficacy of each vaccine also have a significant correlation. In this study, the range of respondents aged 17-66 years with an average of 27 years. The details of the data are presented in table 2.

From the results of the Man-Whitney test for questions about side effects after the vaccine and test results. Kruskal Wallis for questions regarding monitoring side effects after 1-3 months after receiving the vaccine.

3.5 Relationship Between Age and Side Effects

The last variable that correlates with side effects and efficacy is BMI. The average BMI obtained is 23.7, shown in table 3.

Table 1: Relationship between types of vaccines and side effects.

Variable	Percentage %		p-value
	Complete Dose (n=300)	Boosters (n=300)	
Fever after vaccine	54/18	128/42.6	0.000
Painful in area injection after vaccine	97/32.3	222/74	0.000
Diarrhea after vaccine	26/8.6	13/4.3	0.020
Dizzy after vaccine	51/17	112/37.3	0.000
Feel sleepiness after vaccine	69/23	137/45.6	0.000
Painful in arm bag. on after vaccine	62/20,6	162/54	0.000

Table 2: Relationship between age and side effects.

Variable	Percentage	p-value
	Age (n=600 mean – average=27)	
Effect side pain in the area injection after vaccine	319/52.1	0.006
Infection Covid after 3 month vaccination	8/1.3	0.001
Monitoring change cycle menstruation 1-3 month after vaccine	29/4.7	0.011
Monitoring easy feel tired 2-3 months after vaccine	49/7.9	0.013
Monitoring painful in arm 2-3 month after vaccine	94/15.3	0.017
Monitoring easy dehydration after 2-3 month after vaccine	78/12.7	0.006

*Man-Whitney test, Kruskal Wallis test

Table 3 : Correlation between BMI and vaccine side effects

Variable	Percentage	p-value
	BMI (n=600 mean=23,7)	
Monitoring fatigue after 1-3 month vaccine	47/7.6	0.001
Monitoring pain in arm after 1-3 month vaccine	52/6.4	0.000
Monitoring easy ehydration after 1-3 month vaccine	49/7.9	0.000

*Kruskal Wallis Test

4 DISCUSSION

4.1 Efficacy and Side Effects

From the results of the study, it was found that people in Indonesia aged 17 years and over who received the complete dose of Pfizer and Pfizer booster vaccines, recipients of Pfizer booster vaccine were higher than the Pfizer complete dose vaccine levels of 99.3% for the Pfizer booster and

99.1 % for the full Pfizer dose. The results showed that the sponsoring group had the option of concurrently building up the level of the counter-acting agent seen after two doses, implying that the

decline in resistance after the third part would be slower even though a shortfall of time had passed to decide if the problem was.

Preliminary studies also show that antibody quality is higher after getting a booster. This immune system continues to create antibodies at specific sites and results in the experience of infection or immunization and exhibits a broader and stronger immune response after the third dose. The body's defense system has a second line of protection in T cells to fight off infected cells. Therefore, if antibodies are insufficient to prevent contamination, T cells can intervene to control the disease that previously contributed to the disease/disease (Andrews *et al.*, 2022).

Table 1 shows that the Pfizer booster vaccine has more side effects than the Pfizer whole dose vaccine. This is supported by the p-value of the variable, which shows the number <0.005. Some significant side effects were obtained, such as fever, pain in the injection site, diarrhea after the vaccine, dizziness, feeling drowsy, and pain in the upper arm. This is because the booster vaccine uses a larger dose.

4.2 Correlation Between Age and Side Effects

As shown in Table 2, age impacts vaccine side effects. The results of this study indicate that the average age of the vaccine participants is 27 years, and several side effects arise, namely pain in the area of the injection site, changes in the menstrual cycle in women, easy feeling tired, and easy dehydration. According to research in Saudi Arabia, differences in the immune system at age greatly affect the side effects after the vaccine, where the immune system of younger people is stronger and more efficient than the immune system of older people(Alamer *et al.*, 2021)

4.3 Correlation Between BMI and Side Effects

As shown in table 3, BMI impacts vaccine side effects. The results showed several side effects such as fatigue, arm pain, and dehydration. It is known that people with a high BMI due to obesity are overweight and easily feel tired to carry out their activities. According to research in Saudi Arabia, the vaccine's side effects can be exhausting because the vaccine has worked and reacted on the immune system (El-Shitany *et al.*, 2021).

The next side effect is pain in the arm. From writing in Iran various aspects can encourage pain

after injection such as the size of the needle and the length of the injection needle used. It is known that people with a high BMI have excess fat.

The following side effect is that you feel thirsty after the vaccine. It is known that people with a high BMI require a lot of body fluids than people with a normal BMI. According to another study, lymph nodes and adenoids become active after a booster vaccine, which causes thirst.

5 CONCLUSION

From the writing that has been done, it can be observed that the effectiveness of the Pfizer booster vaccine is higher than the Pfizer full dose vaccine, which is 99.3% for the Pfizer booster vaccine and 99.1% for the Pfizer complete dose vaccine. However, these two types of vaccines have a fairly high level of efficacy for people in Indonesia. For side effects, a significant correlation was found, indicating that the Pfizer booster vaccine had higher side effects than the Pfizer full dose vaccine. While the side effects that

REFERENCES

Al-Awwal, N. *et al.* (2022) 'A Review of SARS-CoV-2 Disease (COVID-19): Pandemic in Our Time', *Pathogens*, 11(3), pp. 1–14. Available at: https://doi.org/10.3390/pathogens11030368.

Alamer, E. *et al.* (2021) 'Side effects of covid-19 pfizer-biontech mrna vaccine in children aged 12–18 years in saudi arabia', *Vaccines*, 9(11), pp. 1–11. Available at: https://doi.org/10.3390/vaccines9111297.

Andrews, N. *et al.* (2022) 'Effectiveness of COVID-19 booster vaccines against COVID-19-related symptoms, hospitalization and death in England', *Nature Medicine*, 28(4), pp. 831–837. Available at: https://doi.org/10.1038/s41591-022-01699-1.

Anka, A.U. *et al.* (2021) 'Coronavirus disease 2019 (COVID-19): An overview of the immunopathology, serological diagnosis and management', *Scandinavian Journal of Immunology*, 93(4), pp. 1–12. Available at: https://doi.org/10.1111/sji.12998.

Asaduzzaman, M. *et al.* (2020) 'Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information ', *PLoS ONE*, 39(January), pp. 667–677. Available at: http://dx.doi.org/10.1371/journal.pone.0239254.

El-Shitany, N.A. *et al.* (2021) 'Minor to moderate side effects of pfizer-biontech COVID-19 vaccine among

saudi residents: A retrospective cross-sectional study', *International Journal of General Medicine*, 14, pp. 1389–1401. Available at: https://doi.org/10.2147/IJGM.S310497.

Excler, J.L. *et al.* (2021) 'Vaccine development for emerging infectious diseases', *Nature Medicine*, 27(4), pp. 591–600. Available at: https://doi.org/10.1038/s41591-021-01301-0.

Han, Y. nan *et al.* (2020) 'A comparative-descriptive analysis of clinical characteristics in 2019-coronavirus-infected children and adults', *Journal of Medical Virology*, 92(9), pp. 1596–1602. Available at: https://doi.org/10.1002/jmv.25835.

Lee, P.I. *et al.* (2020) 'Are children less susceptible to COVID-19?', *Journal of Microbiology, Immunology and Infection*, 53(3), pp. 371–372. Available at: https://doi.org/10.1016/j.jmii.2020.02.011.

López, A.M., de Casas Moreno, P. and Mera, J.M.B. (2021) 'Informative treatment and media competencies on COVID-19 in Ecuador', *Revista de Comunicacion*, 20(1), pp. 137–152. Available at: https://doi.org/10.26441/RC20.1-2021-A8.

Menni, C. *et al.* (no date) 'Prep rin ot p ee r r we d Pr ep t n p r r'.

Nittner-Marszalska, M. *et al.* (2021) 'Pfizer-biontech COVID-19 vaccine tolerance in allergic versus non-allergic individuals', *Vaccines*, 9(6), pp. 1–8. Available at: https://doi.org/10.3390/vaccines9060553.

Polack, F.P. *et al.* (2020) 'Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine', *New England Journal of Medicine*, 383(27), pp. 2603–2615. Available at: https://doi.org/10.1056/nejmoa2034577.

Ramatillah, D.L. and Isnaini, S. (2021) 'Treatment profiles and clinical outcomes of COVID-19 patients at private hospital in Jakarta', *PLoS ONE*, 16(4 April), pp. 1–11. Available at: https://doi.org/10.1371/journal.pone.0250147.

Randolph, H.E. and Barreiro, L.B. (2020) 'Herd immunity: Understanding Covid-19 by Haley etal', *Immunity*, 52(January), pp. 737–741.

Sutardi, A.Q.I. and Ramatillah, D.L. (2022) 'Evaluation Comparison Between Sinovac and Pfizer Vaccine Among Indonesian Children and Teenager Under 18 Years Old', *International Journal of Applied Pharmaceutics*, 14(Special issue 2), pp. 22–30. Available at: https://doi.org/10.22159/ijap.2022.v14s2.44745.