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Criteria of convalescent plasma donor that affects COVID-19 antibody titer at UDD PMI Tangerang City in 2021



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ABSTRACT

Introduction: Since the start of the COVID-19 pandemic, the use of convalescent plasma has been an approach being researched to treat this infection. Convalescent plasma contains antibodies produced by individuals who have recovered from COVID-19, and high levels of antibody titers are thought to be more effective in providing protection against infection. The data analyzed included the number of donors who passed, history/symptoms of COVID-19 infection, age, sex, and antibody titer results. This research will provide an understanding of the characteristics of an effective convalescent plasma donor, appropriate selection criteria, and expected antibody titer levels. The results of this study are expected to increase the effectiveness of using convalescent plasma in treating COVID-19 patients at PMI Tangerang City, as well as assist in efforts to control the spread of the virus more efficiently. This study aimed to analyze the criteria for convalescent plasma donors influencing COVID-19 antibody titers at UDD PMI Tangerang City in 2021.

Methods: This research was conducted at UDD PMI Tangerang City using a descriptive observational method. Data will be collected retrospectively from UDD PMI Tangerang City in 2021 to analyze the criteria for convalescent plasma donors and their effect on COVID-19 antibody titers.

Result: The results showed that the donor's clinical history/symptoms, age, and gender had an effect on the COVID-19 antibody titer. Donors with a history/severe clinical symptom (92%) tended to have higher antibody titers. In addition, the age group ≤ 18 years (74%) and 18-24 years (82%) and male donors (76%) tended to have higher levels of antibody titers.

Conclusion: The findings of this study indicate that criteria for convalescent plasma donors, such as clinical history/symptoms, age, and gender, can affect the antibody titer of COVID-19. Donors with a history/severe clinical symptoms, young age, and men tend to have higher antibody titers. This information can be used to increase the effectiveness of convalescent plasma therapy in treating COVID-19 patients.

Keywords: Convalescent plasma, antibody titer, COVID-19, donor, clinical history/symptoms, age, gender.

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INTRODUCTION

Since the start of the COVID-19 pandemic that started in 2019, this disease has spread widely around the world and has become a serious threat to global public health. COVID-19 infection is caused by the SARS-CoV-2 virus which attacks the human respiratory system.^{1,2} As it spreads rapidly, researchers and medical professionals have been looking for various strategies to contain this pandemic.^{3,4}

One approach that is being researched and used in the treatment of COVID-19 is the use of convalescent plasma. Convalescent plasma is part of the blood obtained from individuals who have

recovered from COVID-19 infection. This plasma contains antibodies produced by the body's immune system in response to infection with the SARS-CoV-2 virus. The use of convalescent plasma can provide passive protection to individuals who are sick or who are at high risk of infection.⁵ However, not all convalescent plasma has the same level of antibody titer. Antibody titer refers to the concentration or strength of the antibody in the plasma. High levels of antibody titers are considered more effective in providing protection against infection and reducing the severity of COVID-19 symptoms.⁶

In the context of UDD PMI (Blood Donor Unit) Tangerang City in 2021, it

is important to determine the criteria for convalescent plasma donors that affect the antibody titer of COVID-19. This criterion will assist in the process of selecting the right donor, so that the convalescent plasma collected has an optimal antibody titer level. Thus, this study aims to analyze the criteria for convalescent plasma donors and their relationship to COVID-19 antibody titers at UDD PMI Tangerang City in 2021.^{7,8}

Through this research, it is hoped that useful information will be found about the characteristics of convalescent plasma donors, criteria for effective selection, and antibody titer levels that can be expected from collected convalescent plasma.

This knowledge will be an important foundation in the use of convalescent plasma as a therapy for COVID-19 at PMI Tangerang City and can contribute to increasing the effectiveness of patient management and controlling the spread of COVID-19 more efficiently in the region.⁷

The general objective of this research is to analyze the criteria for convalescent plasma donors that affect the antibody titer of COVID-19 at UDD PMI Tangerang City in 2021. This study aims to provide a better understanding of the selection criteria for an effective convalescent plasma donor and the resulting antibody titer level, to increase the effectiveness of using convalescent plasma as a COVID-19 therapy.

METHODS

Study Design

The type of research used is descriptive observational research. Data will be collected retrospectively from UDD PMI Tangerang City in 2021 to analyze the criteria for convalescent plasma donors and their effect on COVID-19 antibody titers.

Data Collection

This research was conducted at PMI UDD, Tangerang City, Keadilan No. 7 Batu Ceper Street, Tangerang City. When this research was conducted on June 20, 2023 using data samples from testing for COVID-19 antibody titers and data on convalescent plasma donor selection for 2021. The inclusion criteria of this study were (1) individuals who have recovered from COVID-19 infection, (2) individuals who have undergone an antibody test to measure COVID-19 antibody titers, (3) convalescent plasma donors who have followed the selection procedure set by UDD PMI Tangerang City in 2021. The exclusion criteria of this study were (1) individuals with a history of significant autoimmune disease or immunodeficiency, (2) individuals with a history of blood transfusions or immunomodulatory therapy within a certain time before plasma donation.

Variable of the Study

The independent variable is convalescent plasma donor criteria (eg, age, medical

history, vaccination history, time since recovery). The dependent variable is test results for COVID-19 antibody titers in convalescent plasma.

Data Analysis

The collected data will be analyzed statistically using appropriate methods. The analysis will involve descriptive statistics to see the distribution of research variables and the use of relevant statistical tests to evaluate the relationship between convalescent plasma donor criteria and COVID-19 antibody titer levels.⁹

RESULTS

This research was conducted at UDD PMI Tangerang City where the data used was based on the results of testing for COVID-19 antibody titers and data on convalescent plasma donor selection. From the results of the study it was found that there was a relationship between the criteria for convalescent plasma donors and the results of the COVID-19 antibody titer examination.

Based on table 1, it is known that convalescent plasma donors based on history of COVID-19 infection at UDD PMI Tangerang City in 2021 based on history/symptoms of COVID-19 infection Mild 26% (501 donors), moderate 34% (656 donors) and severe 40% (766 donors).

Based on table 2, it is known that the selection of convalescent plasma

donors based on donor age at UDD PMI Tangerang City in 2021 shows that donors aged 18-24 years have the highest number of donors 42% (802 donors), donors aged 25-44 have a significant number of 28% (543 donor), Meanwhile, the age group <18 years, 45-59 years, and ≥ 60 years had a smaller number of donors.

Based on Table 3, it is known that the selection of convalescent plasma donors is based on gender at UDD PMI Tangerang City in 2021 Of these, 76% (1,457 donors) are male, while 24% (466 donors) are female. The data shows that the majority of convalescent plasma donors who pass in 2021 will be men.

Based on table 4, it is known that testing for COVID-19 antibody titers based on history/symptoms of COVID-19 at UDD PMI Tangerang City in 2021 The total number of donors with a history/mild clinical symptom was 501. Of these, 458 donors had antibody titers <1:80 (91%), while 43 donors had antibody titers > 1:80 (9%). The total number of donors with moderate clinical history/symptoms was 656. Of these, 289 donors had antibody titers <1:80 (44%), while 367 donors had antibody titers >1:80 (56%), the total number of donors with severe clinical history/symptoms was 766. Of these, 63 donors had antibody titers <1:80 (8%), while 703 donors had antibody titres >1:80 (92%).

Table 1. Data on selection of convalescent plasma donors based on a history of COVID-19 infection at UDD PMI Tangerang City in 2021

	Number of donors who pass in 2021	History/symptoms of COVID-19 infection		
		Light	Currently	Critical
Total	1923	501	656	766
Percentage (%)	100%	26%	34%	40%

Table 2. Data on convalescent plasma donor selection based on donor age in 2021

	Number of donors who pass in 2021	Age				
		<18 Years	18-24 Years	25-44 Years	45-59 Years	≥ 60 Years
Total	1923	399	802	543	179	0
Percentage (%)	100%	21%	42%	28%	9%	0%

Table 3. Data on selection of convalescent plasma donors by sex in 2021

	Number of donors who pass in 2021	Age	
		Man	Woman
Total	1923	1457	466
Percentage (%)	100%	76%	24%

Table 4. Data on testing for COVID-19 antibody titers based on history/symptoms at UDD PMI Tangerang City in 2021

History/Clinical Symptoms	Amount	Antibody Titers			
		<1:80	%	>1:80	%
light	501	458	91%	43	9%
currently	656	289	44%	367	56%
critical	766	63	8%	703	92%

Table 5. Data on antibody titer examination based on the age of the convalescent plasma donor in 2021

Age/Year	Amount	Antibody Titers			
		<1:80	%	>1:80	%
≤ 18	399	104	26%	295	74%
18-24	802	143	18%	659	82%
25-44	543	178	33%	365	67%
45-59	179	101	56%	78	44%
≥ 60	0	0	0%	0	0%

Table 6. Data on antibody titer examination based on sex at UDD PMI Tangerang City in 2021

Gender	Amount	Antibody Titers			
		>1:80	%	<1:80	%
Man	1457	1112	76%	345	24%
Woman	466	73	16%	393	84%

Based on table 5, it is known that the examination of antibody titers based on the age of the donor at UDD PMI Tangerang City in 2021. The total number of donors in the age group ≤18 years was 399. Of these, 104 donors had antibody titers <1:80 (26%), while 295 donors had antibody titers > 1:80 (74%). The total number of donors in the 18-24 year age group was 802. Of these, 143 donors had antibody titers <1:80 (18%), while 659 donors had an antibody titer result of >1:80 (82%), the total number of donors in the age group 25-44 years was 543. Of these, 178 donors had an antibody titer result of <1:80 (33%), while 365 donors had an antibody titer result antibody titer > 1:80 (67%), the total number of donors in the age group 45-59 years was 179. Of these, 101 donors had antibody titers <1:80 (56%), while 78 donors had antibody titers >1:80 (44%), There are no donors in the age group ≥60 years.

Based on table 6, it is known that antibody titer examination is based on gender at UDD PMI Tangerang City in 2021. The total number of male donors is 1,457. Of these, 1,112 donors had antibody titers > 1:80 (76%), while 345 donors had antibody titers <1:80 (24%). The total

number of female donors was 466. Of these, 73 donors had antibody titer >1:80 (16%), while 393 donors had an antibody titer <1:80 (84%).

DISCUSSION

Convalescent plasma is part of the blood obtained from individuals who have recovered from COVID-19 infection. This plasma contains antibodies produced by the immune system in response to infection with the SARS-CoV-2 virus. Antibodies are proteins produced by the immune system in response to invading pathogens, such as viruses. These antibodies bind to antigens on the virus and assist in the destruction and clearance of the virus. Antibodies against SARS-CoV-2, especially those targeted at the virus spike protein, are believed to have an important role in protecting against infection and reducing the severity of COVID-19 symptoms. The criteria used in the selection of convalescent plasma donors may include factors such as age, medical history, vaccination history, general health condition, and time since recovery from COVID-19 infection.^{10,11}

Based on the research results, it is

known that there are several important findings related to the criteria for convalescent plasma donors that affect the COVID-19 antibody titer at UDD PMI Tangerang City in 2021. In the analysis based on the history/clinical symptoms, it appears that the severity of the history/clinical symptoms has a significant effect on the antibody titer. Donors with severe clinical history/symptoms tend to have higher antibody titer levels, while donors with mild clinical history/symptoms tend to have lower antibody titer levels. This could be due to a stronger immune response in more severe cases and the influence of other factors such as the duration of infection and the strength of the individual's immune response.^{6,12,13}

Based on analysis by age group, it appears that the age group ≤18 years and 18-24 years have higher antibody titer levels than other age groups. This suggests that donors in the younger age group tend to have a better immune response and produce higher levels of antibody titers. On the other hand, the 45-59 year old group had lower antibody titers. The decrease in the level of antibody titers in the older age group may be related to the decrease in the immune response with age.^{4,14}

Analysis by sex showed that male donors tended to have higher levels of antibody titers than female donors. This can be caused by biological differences and hormonal factors that affect the immune response between men and women. Previous studies have also shown that males have a stronger immune response to viral infections, including COVID-19, which can affect the level of antibody titers produced.^{7,8}

These findings have important implications for the use of convalescent plasma as a therapy for COVID-19. Donors with a history/severe clinical symptoms, younger age groups, and males tend to have higher antibody titers. Convalescent plasma from donors with high levels of antibody titers will likely provide greater benefits in increasing the success of therapy in COVID-19 patients. Therefore, the selection of convalescent plasma donors needs to consider these factors to ensure the effectiveness of therapy.^{3,5,15}

CONCLUSION

The history or clinical symptoms of the donor affect the antibody titer. Donors with history/severe clinical symptoms tend to have higher levels of antibody titers than those with a history/mild clinical symptoms. Age group ≤ 18 years and 18-24 years had higher antibody titer levels than the other age groups, while the 45-59 year old group tended to have lower antibody titer levels. Male donors tend to have higher levels of antibody titers than female donors. Based on this, it is recommended that selection of convalescent plasma donors needs to consider history/clinical symptoms. Donors with severe clinical history/symptoms can be prioritized as donors of choice to ensure high antibody titer levels. In the selection of donors, it is necessary to consider the age of the donor. Donors in the younger age group, especially those aged ≤ 18 years and 18-24 years, can be prioritized as convalescent plasma donors because they tend to have higher levels of antibody titers. It is important to pay attention to the difference in antibody titer levels between men and women. Male donors with high levels of antibody titers can be the main choice in the convalescent plasma donor program. It is important to carry out further studies with actual data.

DISCLOSURES

Ethical Considerations

Ethical approval was obtained from The Health Research Ethics Committee (No.101/EC-KEP-UD/VII/2022).

Conflict of Interest

The authors have no conflict of interest.

Author Contribution

All authors similarly contribute to the think about from the investigate concepts, information acquisitions, information investigation, factual investigations, changing the paper, until detailing the consider comes about through publication.

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