PROCEEDING OF THE INTERNATIONAL WEBINAR COVID-19 PANDEMIC:

Impacts, Strategies, and Challenges on The Urban Health

WEBINAR SERIES
20 - 21 and 27 - 28 August 2021

PAPER PRESENTATION
"Impact of Covid-19 pandemic on health, medical education, healthcare, physical activity, and others"
3 - 4 September 2021

School of Medicine and Health Sciences
Atma Jaya Catholic University of Indonesia 2021

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PROCEEDING OF THE INTERNATIONAL WEBINAR COVID-19 PANDEMIC:

Impacts, Strategies, and Challenges on The Urban Health

EDITOR

Dr. dr. Veronika Maria Sidharta, M.Biomed.
apt. Sherly Tandi Arrang, M.Farm-Klin

FOREWORD

from the Chair – Organizing Committee:

I want to extend a warm welcome to all participants of Atma Jaya Catholic University of Indonesia's International Webinar 2021!

This international webinar is entitled 'COVID-19 Pandemic: Impacts, Strategies, and Challenges on the Urban Health'. The COVID-19 pandemic that began in March 2020 has changed many things in all areas of life. This webinar discusses the impact of the COVID-19 pandemic on urban health in the fields of infection, geriatrics, and addiction, which are the main fields of FKIK Unika Atma Jaya.

International experts from the UK, the Netherlands, Australia, Thailand, and Indonesia will present the material according to their expertise. This international webinar also provides an opportunity for other speakers to present their papers in the free paper session. The information from this webinar is undoubtedly beneficial for doctors, scientists, participants, and the government to overcome the pandemic, especially the impacts, strategies, and challenges in urban health.

I want to express my deepest gratitude to Alomedika for enabling this international webinar to be well organized and attended by many participants. Also, to the sponsors who have supported this international webinar.

Finally, to the speakers, free paper presenters, and participants, I congratulate you on joining this international webinar.

Thank you,
Nawanto Agung Prastowo

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INTERNATIONAL WEBINAR
"COVID-19 PANDEMIC: IMPACTS, STRATEGIES, AND CHALLENGES
ON THE URBAN HEALTH"

20-21 August 2021, 27-28 August 2021, 3-4 September 2021

FOREWORD

from the Dean – School of Medicine and Health Sciences:

First, I would like to express my gratitude to God Almighty because the online international webinar can run smoothly.

We held this international seminar as a form of our contribution in the scientific field. During this COVID-19 pandemic, holding online seminars has become normal and makes it very easy for us to interact with each other even though we are far apart. This online seminar is intended so that we can continue to share knowledge and experiences, especially those related to urban health problems that are developing during the COVID-19 pandemic. I hope that this international seminar can increase the knowledge and insight of the participants, especially on geriatric topics, infections, and addictions related to the COVID-19 pandemic.

Finally, I would like to thank the organizers who have worked hard to prepare for this event, the resource persons, Alomedika who have facilitated this online seminar, and the event's sponsors.

Stay healthy,
Felicia Kurniawan

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INTERNATIONAL WEBINAR
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INTERNATIONAL WEBINAR
"COVID-19 PANDEMIC: IMPACTS, STRATEGIES, AND CHALLENGES ON THE URBAN HEALTH"

20-21 August 2021, 27-28 August 2021, 3-4 September 2021

Saturday, 4 September 2021
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Factors that Influenced the Covid-19 Titer Antibody Post-Vaccination

Hana Ratnawati[1], Demes Chornelia[1], Steven Felim[2]

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Introduction: As of 8 August 2021, almost 24 million doses of Covid-19 vaccines have been administered in Indonesia and has covered 11,4% of the Indonesian population with two doses vaccines. The first Covid-19 vaccine used in Indonesia was the inactivated SARS-CoV-2 vaccine with aluminum hydroxide adjuvant, known as CoronaVac produced by Sinovac Biotech Ltd., Beijing, China, with the efficacy in Indonesia was 65,3%. SARS-CoV-2 as the cause of Covid-19, is a single-stranded RNA virus, which has envelope, membrane, nucleocapsid and spike glycoprotein (S). This spike protein consists of S1 subunits with the Receptor Binding Domain (RBD) and S2 subunit. The RBD protein has a strong affinity with ACE-2 receptor in the host cells and will mediates the entry of the virus. The purpose of this study was to analyze the vaccine recipient-related factors that influence the antibodies post-Covid-19 vaccination titer.

Methods: Participants were healthy adult, with no history of Covid-19, have been received two doses of CoronaVac, with intramusculair injection. Exclusion criteria include immuno- suppressive therapy, received of any blood products or immunoglobulins and bleeding disorders within the past 3 months. Quantitative antibody specific for the RBD of the SARS -CoV-2 spike protein was measured between 28-30 days after the second vaccination with ELISA Anti SARS- CoV-2-S RBD protein assay and were carried out at Prodia Clinical Laboratory. Data analyzed using Mann-Whitney non-parametric test and Pearson correlation to analyze the correlation between BMI and antibody titer.

Result: All participants (20 men and 16 women) showed reactive antibody results with the lowest titer was 1.51 U/mL and the highest titer above 250

Factors That Influenced the Covid-19 Antibody Titer Post-Vaccination

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Result: All participants (20 men and 16 women) showed reactive antibody results with the lowest titer was 1.51 U/mL and the highest titer above 250 U/mL. Participants over 45 years age showed lower antibody titers (58,18 U/mL) compared to the young adult group below 45 years age (85,94 U/mL). Gender also showed differences, men (61,47 U/mL) showed lower antibody titers than women (87,02 U/mL). Participants with obese (BMI >25.00 kg/m^2) has lower antibody titers (56,04 U/mL) compared to normal BMI (82,32 U/mL). Antibody titers were almost identical between those with comorbidities (73,24 U/mL) and those without comorbidities (72,50 U/mL). However, statistically, these factors were not significantly different ($p>0,05$). Pearson correlation coefficient -0.206 means a negative correlation between BMI and antibody titer, but the relationship is weak.

Conclusion: Factors related to vaccine recipients that affect Covid-19 antibody titers are gender, age, and obesity. There is an inverse correlation between BMI and Covid-19 titer antibody post vaccination.

Keywords: Covid-19, titer antibody post-vaccination, gender, age, basal metabolic index

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) has declared Coronavirus Disease 2019 (Covid-19) a pandemic, only 3 months since the first case of Covid-19 was discovered in Wuhan in December 2019, this is due to the rapid transmission of SARS-CoV-2[1]. As of March 12, 2021, one year after being declared a pandemic, there were a total of 118,058,503 positive cases worldwide with a death rate of 2,621,046 and has infected 223 countries in the world.[2] Based on the rapid transmission of Covid-19 and to reduce the impact of the virus on public health and the economy, it is necessary to develop a vaccine in a short time. By March 2021, more than 180 types of Covid-19 vaccines were being researched and were at various stages of development.[3]

In Indonesia, the Covid-19 vaccination has started since January 13, 2021 and is still ongoing until now. As of 8 August 2021, almost 24 million doses of Covid-19 vaccines have been administered in Indonesia and has covered 11,4% of the Indonesian population with two doses vaccines. The first Covid-19 vaccine used in Indonesia was the inactivated SARS-CoV-2 vaccine with aluminum hydroxide adjuvant, known as CoronaVac® produced by Sinovac Biotech Ltd., Beijing, China, with the efficacy in Indonesia was 65,3%.[3]

As we know that SARS-CoV-2 as the cause of Covid-19, is a single-stranded RNA virus, which has envelope, membrane, nucleocapsid and spike glycoprotein (S). This spike protein consists of S1 subunits with the Receptor Binding Domain (RBD) and S2 subunit. The RBD protein has a strong affinity with ACE-2 receptor in the host cells and will mediates the entry of the virus. The antibodies against RBD protein provide protection against viral invasion into cells and become a target for the induction of SARS-CoV-2 antibodies, but the amount of antibody formed can vary widely.[4,5] In this study will assessed the antibody against the RBD on the Spike protein of SARS-CoV-2. Post-vaccination antibody titers can be different for each individual. This post-vaccination antibody formation can be influenced by vaccine-related factors and vaccine recipient-related factors.[6]

Many factors influenced the formation of antibody post-vaccination and certainly the immune factor plays a very important role and several factors that can indirectly affect immune factors. The purpose of this study was to analyze the vaccine recipient-related factors that influence the antibodies post-Covid-19 vaccination titer, which are gender, age, basal metabolic index (BMI), and comorbidities of the Covid-19 vaccine recipients.

METHODS

This is a descriptive observational laboratory based study. Participants were healthy adult male or female, age over 18 years, have been received two doses of CoronaVac (3 μg β-propiolactone-inactivated SARS-CoV-2 in 0.5 mL aqueous suspension), with intramusculair injection, never been exposed to Covid-19 based on an intensive anamnesis. The exclusion criteria were pregnant, currently taking immuno-suppressive medicine, received of any blood products or immunoglobulins and bleeding disorders within the past 3 months, have a history of autoimmune disease or immunodeficiency.

First, the data of participants who met the inclusion criteria were recorded as independent variables. Then 6,5 cc of blood sample was taken from the cubital vein. Quantitative antibody specific for the RBD of the SARS-CoV-2 spike protein was analyze with Elecsys Anti SARS-CoV-2-S RBD protein ELISA assay between 28-30 days after the second vaccination and were carried out at Prodia Clinical Laboratory. The interpretation of the SARS-CoV-2 S RBD antibody titer results are determine as non-reactive if < 0.8 U/mL and determine as reactive if ≥0.8 U/mL.

Statistical analysis for each parameter using independent T-test and for analyzing the correlation of Basal Metabolic Index with the antibody titer, using Mann-Whitney non-parametric test and Pearson correlation.

This study has been approved by the Research Ethics Committee, Maranatha Christian University.

RESULT AND DISCUSSION

There were 36 participants aged between 25 until 85 years and consisted of 20 (55.6%) males and 16 (44.4%) females. All the participants showed reactive antibody results with the mean titer antibodies 72.83 U/mL. Therefore after second dose of CoronaVac, all the vaccinated participants developed humoral immune response, with the lowest titer was 1.51 U/mL and the highest titer above 250 U/mL. The following are antibody titers based on gender, age, BMI and comorbidities.

Participants over 45 years age showed lower antibody titers (58.18 U/mL) compared to the young adult group below 45 years age (85.94 U/mL), but not significantly different due to a very wide ranges of the antibody titer ($p>0,05$).
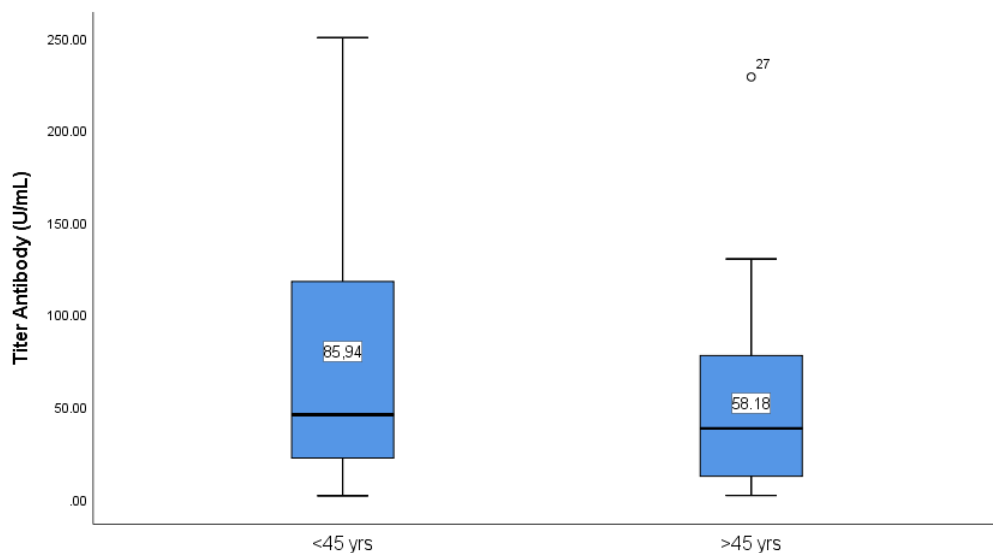

Figure 1. Post-vaccination Covid-19 antibody titer in young adult and recipients older than 45 years.

In Figure 1 showed that the mean antibody titer of young adult less than 45 years showed higher antibody titer (85,94 U/mL) compare to participants higher than 45 yeras (58,18 U/mL). Aging is often associated with decreased immune system function as well as response to vaccination.[7,8] With increasing age, the immune response and the ability to recognize new antigens can also decrease significantly.[9] In this study, 1 participant (number 27) was over 60 years of age but exhibited high antibody titers (228,7 U/mL). It's like Graham Lawton said that people of the same age can have very different immune systems, the age of immunity can vary.[10]

There are differences in the immune response between men and women when the body attacked by pathogens. Women often have better humoral immunity than men. Lymphocyte B cells plays a role in the humoral immunity, which will produce antibodies to achieve self-protection. Likewise in the post-vaccination situation, the formation of antibodies will be higher in women compare to men.[11] In this study, gender also showed differences, men (61,47 U/mL) showed lower antibody titers than women (87,02 U/mL) but not significantly different (p = 0.644).
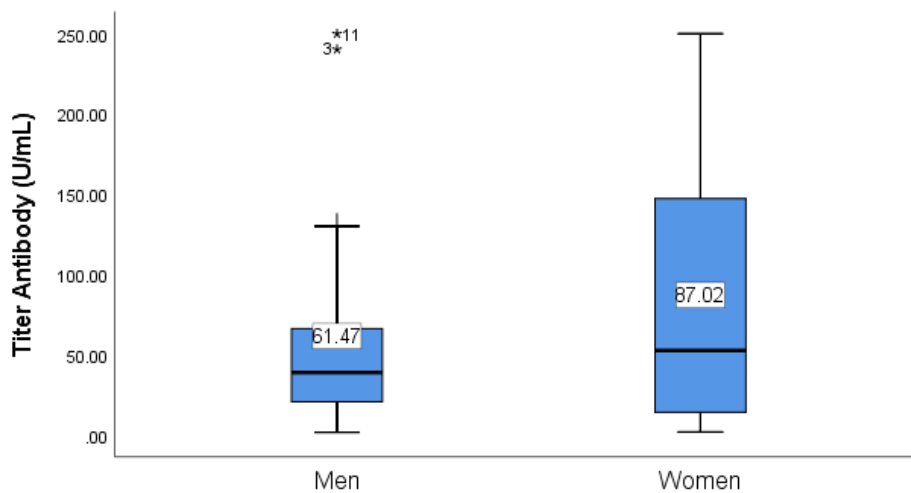
Figure 2. Post-vaccination Covid-19 antibody titer in men and women

Immune responses change throughout life and are influenced by gender, an individual's age and reproductive status. Sex hormones, such as progesterone, estrogen and androgens, contribute to the differential regulation of immune responses between gender and resulted in differences in post-vaccination antibody titers. Environmental factors, including nutritional status and microbiome composition, also alter immune system development and function differently in men and women.[12] There are differences in men and women in their effector and memory immune responses to foreign antigens. The difference is mainly in humoral immunity, which is present throughout life. This suggests

that genes and hormones play a role in humoral immunity. This difference also contributes to the post-vaccination antibody formation. Phylogenetically enhanced humoral immunity in women as compared to men, suggests an advantage for the transfer of protective antibodies to the offspring.[13]
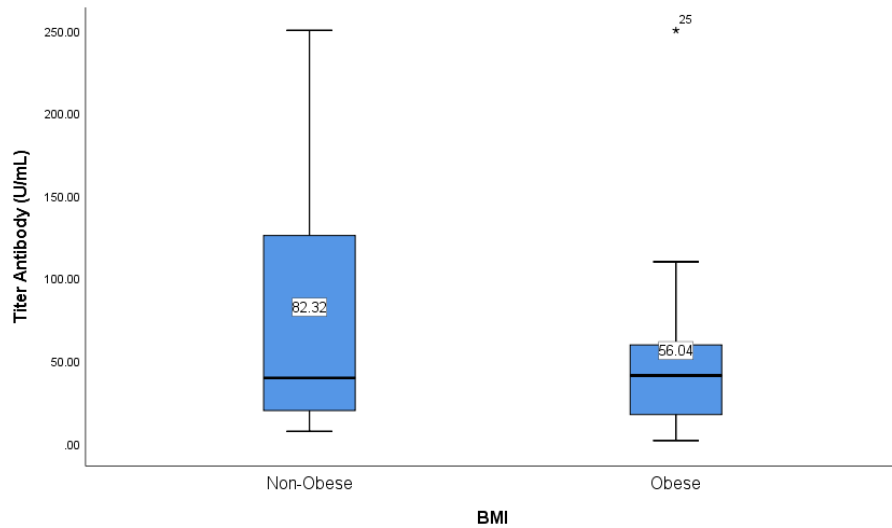
Figure 3. Post-vaccination Covid-19 antibody titer in obese and non-obese

In this study, we also analyze the influenced of obesity on antibody titers post-vaccination (Fig.3). The result showed that participants with obese (Body Mass Index >25.00 kg/m^2) has lower antibody titers (56,04 U/mL) compared to normal or underweight BMI (82,32 U/mL).
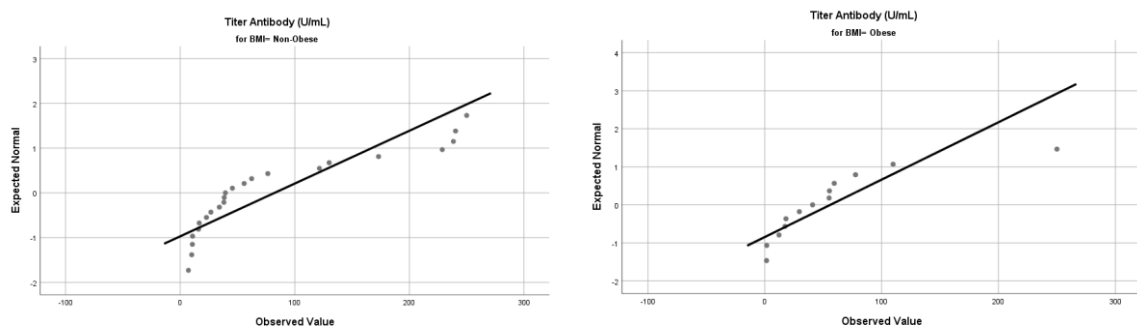

Figure 4. Distribution of post-vaccination Covid-19 antibody titer in obese and non-obese recipients.

Figure 4 showed the distribution of antibody titers in people with normal and underweight BMI compared to obese BMI (BMI>25). The antibody titers in recipients with a normal and underweight BMI varies from low to high (>250 U/mL), but in obese

recipients, antibody titers mostly in the range of 100 U/mL and below. There was only one obese participant with an antibody titer above 200 U/mL.

Obesity can induce persistent local and systemic inflammation, contribute to impaired immune cell function, and decreased immunity. Therefore post-vaccination antibodies were negatively associated with BMI. Obesity has been known as a risk factor for COVID-19 patients and often presents with more severe symptoms. There is a correlation between obesity, obesity-related comorbidities, and severe COVID-19 symptoms. It is known that obese adipose tissue is frequently infiltrated by immune cells, which triggers local inflammation.[14]

In this study also analyzed the correlation between BMI and RBD S protein antibody titer post Covid-19 vaccination. Pearson correlation showed that there is a negative correlation between BMI and the formation of antibody, but the relationship is weak with the coefficient correlation is -0.206.
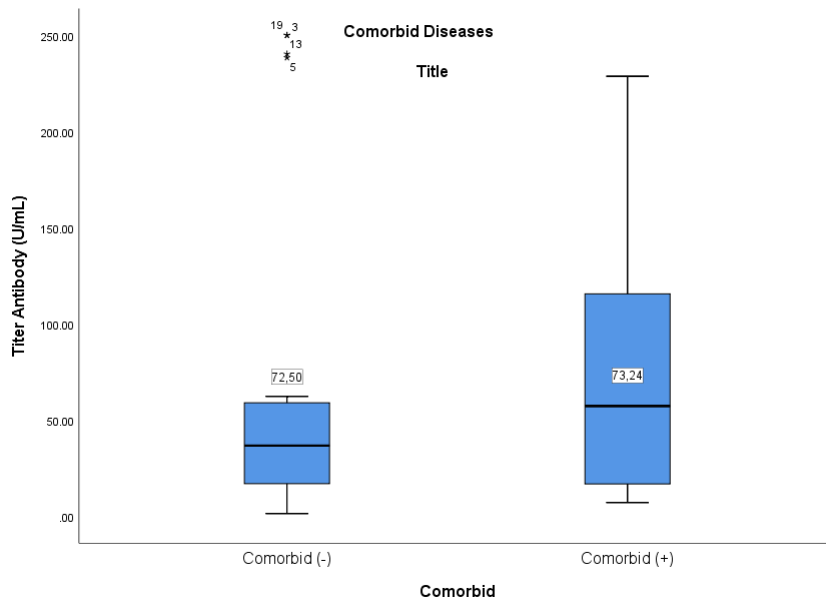

Figure 5. Post-vaccination Covid-19 antibody titer between recipients with and without comorbid diseases.

Figure 5 showed the influenced of comorbid diseases on antibody formation. The comorbid diseases were hypertension, diabetes mellitus, cardiovascular disease, autoimmune disease, immunodeficiency and cancer. The result showed that the antibody titers were almost the same between those with comorbidities (73.24 U/mL) and without comorbidities (72.50 U/mL). Moon SJ (2012), in his study on hemodialysis patients, only 30.9% showed antibody seroconversion after 4 weeks of vaccination, especially those who are elderly with low hemoglobin levels, have a higher risk of getting a lower seroconversion rate after A/H1N1 influenza vaccination. Patients older than 65 years also showed lower seroconversion rates compared to younger hemodialysis patients with p = 0.042.[15]

CONCLUSION

Factors related to vaccine recipients that affect the Covid-19 antibody titers are gender, age, and obesity. There is an inverse correlation between BMI and Covid-19 titer antibody post vaccination.

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