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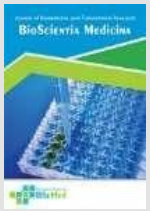

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The Role of Nutritional Status on SARS-CoV-2 IgG Levels After COVID-19 Vaccination in Palembang

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A B S T R A C T

Background: The elderly and geriatric population is the population most at risk for complications of COVID-19. Preliminary data show that individuals aged >59 years are estimated to experience five times more severe COVID-19 symptom onset than those aged 30 to 59 years. Nutritional status is believed to play a role in the body's ability to produce antibodies after COVID-19 vaccination. **Methods:** A cross-sectional analytic observational study to determine the role of nutritional status on levels of IgG SARS-CoV-2 after COVID-19 Vaccination in Palembang. IgG levels were assessed by the ECLIA method. Data analysis was carried out univariate and bivariate. **Results:** The mean quantitative IgG of SARS-CoV-2 in underweight nutritional status was higher with a value of 5757.42±2594.08 U/mL and with the lowest mean quantitative IgG SARS-CoV-2 in overweight nutritional status with a value of 2998.13±4386.95 U/mL. **Conclusion:** Nutritional status did not play a role in SARS-CoV-2 IgG levels after the COVID-19 vaccination in Palembang.

1. Introduction

At the end of December 2019, pneumonia with symptoms of fever, dry cough, and fatigue, as well as intermittent gastrointestinal symptoms, became an epidemic. The pathogen of this outbreak was later identified as a novel beta-coronavirus, named 2019 novel Coronavirus (2019-nCoV).[1] In February 2020, World Health Organization (WHO) named this virus SARS-CoV-2, and the name of the disease is Coronavirus Disease 2019 (COVID-19). In March 2020, WHO COVID-19 was a pandemic. Until

February 2021, it is known that confirmed cases of COVID-19 worldwide reached 113,467,303 cases and deaths reached 2,520,550 people in a total of 223 affected areas.[2.3]

The elderly and geriatric population is the population most at risk for complications of COVID-19.[4] Preliminary data show that individuals aged >59 years are estimated to experience five times more severe COVID-19 symptom onset than those aged 30 to 59 years.[5] The geriatric population experiences an aging process in their immune system, where aging causes a decrease in immune function from both the specific and non-specific immune systems. Comorbid geriatric conditions also place this population at high risk for exacerbation of the immune response and even chronic inflammation. The exact etiology of dysregulation of immune response in the elderly population is still not known with certainty, but aging causes changes in lung microstructure and physiological function and impairs activation of T lymphocytes.[6-8]

Vaccination is a procedure to increase the degree of immunity, providing protective immunity by inducing a response. The memory of pathogens or toxins by using preparations of non-virulent or non-toxic antigenic.[9] Vaccination is considered effective because it induces immunological memory in T cells, B cells, and APCs.[10] In vaccination, a good immune response must include the effect of antibodies on the epithelial surface. This effect is obtained from local IgA or local extravascular IgG and IgM. IgG is the most important of the antiviral antibodies. In the course of the vaccination program, it will spur the maturation process of public perception regarding the possible side effects of the vaccine, resulting in the re-emergence of the disease.[9] In SARS-CoV-2, the superiority of the vaccine has been proven in immunogenicity by frontier vaccine candidates: post-vaccination antibody examination showed serum IgG higher than that of convalescent plasma.[11] Saadat S, et al. conducted a study of health workers who received a single dose of vaccine. It was stated that from 59 health workers, 42 people who received a single dose of vaccination and had a history of exposure to COVID-19 had higher IgG antibody titers. Higher than those who had never been exposed. Antibody titers began to rise on 7th day and reached a point on the 14th day.[12]

This study is an initial study that aims to assess the role of nutritional status in increasing antibodies in the elderly after COVID-19 vaccination. Good nutritional status is believed to be able to provide antibodies. This study assesses the role of nutritional status with levels of IgG SARS-CoV-2 after COVID-19 vaccination in the elderly.

2. Methods

This study is an analytical observational study with a cross-sectional approach in order to determine the role of nutritional status on post-immunization SARS-CoV-2 IgG levels in Palembang. A total of 80 research subjects took part in this study, where research subjects met the inclusion criteria: individuals whose condition was deemed eligible to be given the vaccine based on screening from PAPDI (Indonesian Internal Medicine Expert Association), individuals who underwent the first and second COVID-19 vaccines according to schedule. And willing to participate in the study and signed informed consent. This study has been approved by the medical and health research ethics committee of Dr. Mohammad Hoesin, General Hospital Palembang, Indonesia. The research subjects explored nutritional status, namely weight and height measurements, and evaluated SARS-CoV-2 IgG levels using the ECLIA method.

Processing and data analysis using SPSS 25.00 for windows program. Data is presented in the form of tables or graphs. Subject characteristics were analyzed univariately and presented in the form of a frequency distribution table for categorical. Numerics are presented with a mean ± SD/median (minimum-maximum) depending on the distribution of normal or abnormal data. Next, an analysis was carried out with Kruskal Wallis to see differences in SARS-CoV-2 IgG levels between nutritional status categories.

3. Results

Table 1 shows that the mean quantitative IgG of SARS-CoV-2 in underweight nutritional status is higher with a value of 5757.42±2594.08 and with the lowest average quantitative IgG SARS-CoV-2 in overweight nutritional status with a value of 2998.13±4386.95. From the significance value of the Kruskal-Wallis of p = 0.49, it can be concluded that there is no difference in the quantitative IgG level of SARS-CoV-2 on the degree of nutritional status.

Table 1. Quantitative IgG levels of SARS-CoV-2 based on nutritional status

Variable	Underweight	Normal	Overweight	Obesity I	p*
Quantitative IgG SARS-CoV-2 (U/ml)	5757.42±2594.08	3459.09±8089.77	2998.13±4386.95	3285.60±5064.57	0.49

*Kruskall- wallis test, p<0.05

4. Discussion

The results showed that there was no significant difference between the quantitative IgG levels of SARS-CoV-2 formed after COVID-19 vaccination and nutritional status. The same result was stated by another study that examined the efficacy of the SARS -CoV-2 Quantitative IgG antibody response after receiving 2 doses of the COVID-19 vaccine, where the results stated that there was no difference in the mean quantitative IgG levels of SARS-CoV-2, which was influenced by body mass index.[13.14]

Another study also demonstrated similar results where body mass index did not have a statistically significant relationship to the formation of antibody responses after COVID-19 vaccination.[16] Vaccines only provide antigenic stimulation, and the body's reaction to vaccination is influenced by nutritional status, which of course, will vary between individuals. Vaccines will be difficult to administer and less effective in stimulating the immune response in malnourished individuals or groups. An effective immune response after vaccination requires good nutritional status. Good nutrition is very important for the SARS-CoV-2 virus vaccination to work effectively.[15,16]

An effective immune response requires good nutritional status. In this regard, the European Food Safety Authority has determined the function of nutrients such as vitamin A (including beta carotene), B6, B9 (folate), B12, vitamins C and D, as well as minerals such as Zinc, Se, Fe, and Cuprum have a role in regulating the function normal immune system. The link between obesity and vaccination-associated immune responses is a decreased vaccination-associated immune response and obesity, in which there is an uptake of lipids to adipose and the accumulation of excess adipose tissue in body fat stores and organs such as the liver. The pro-inflammatory hormone leptin has many immunological functions and has been shown to be related to body fat mass because leptin is produced and secreted from adipose tissue. Adipose tissue consists of adipocytes and macrophages that can produce signaling molecules such as TNFα, IL-6, leptin, and resistin that induce chronic inflammatory conditions, which can exacerbate conditions of both immune and metabolic complications in obesity. Adipose tissue is recognized as an endocrine organ, and inflammatory cytokines and hormones play a role in poor vaccine response in obese individuals. Chronic inflammatory conditions can be associated with poor vaccine response through several mechanisms, including impaired production of cytokines and T cells, reduced NK cell activity, and poor response to antigens, resulting in immune system dysregulation.[17-21]

5. Conclusion

This study shows that there is no role of nutritional status on the levels of IgG SARS-CoV-2 after the COVID-19 Vaccination in Palembang.

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