

Nutritional Status and Number of Comorbid in Adult Patients With COVID-19

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ABSTRACT

During the last two years, the death rate due to the COVID-19 pandemic in Indonesia has reached 157,000 people, with comorbid diseases being the most significant factor in the incidence of mortality in COVID-19 patients. Examining the nutritional status and number of comorbidities in COVID-19 patients was the study's main goal. This study is an analytic observational, quantitative study that uses survey research design and cross-sectional approach design. The research samples were taken by a purposive sampling approach, so that all samples that met the inclusion criteria were taken (N= 136) According to the study's findings, there was no linkage among nutritional status and the amount of comorbidities among adults and the elderly. (p value = 0.910 and p = 0.220) and based on gender (p value = 0.937 and p = 0.795). For these reasons, In order to obtain more precise results, there is a need for further research on additional variables that can affect the frequency of comorbidities in COVID-19 patients.

Keywords : Comorbidities, COVID-19, Nutritional Status.

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INTRODUCTION

Coronavirus Disease 2019 is a health epidemic that has hit the whole world starting at the end of 2019 (COVID-19)¹. and spreading significantly so that since 2020, the World Health Organization (WHO) declared that COVID-19 was a pandemic and Indonesia had reached three peaks of the COVID-19 wave².

This virus spreads through droplet which can be transmitted to other individuals, then attach themselves to the ACE2 receptor. These damaged cells will produce newer virus copies that will spread to other cells³. Following this virus's infiltration of the body's cells, there will be a body response in the form of inflammation that attacks the infected body cells. If inflammation occurs in the lung mucosal cells, this will cause plasma leakage and inhibition of the process of diffusion of oxygen and carbon dioxide by the alveoli⁴.

Positive symptoms of COVID-19 include a dry cough, fever, anosmia (loss of

taste and smell), myalgia (pain in the muscles and joints), sore throat, headache, vomiting, and diarrhea. Breathlessness and thrombotic symptoms like angina and others are major indications that this condition is present³. Several variables, including immunity, concurrent disorders, dietary state, and environmental factors, affect COVID-19 disease⁵. Different age groups can be affected by COVID-19 disease, and the severity of the condition varies. However, those who are elderly and who have co-morbid conditions (comorbidities) are more likely to get a severe infection. Up to 88% of SARS-CoV-2 patient deaths have a history of coexisting conditions⁶, Patients with COVID-19 are most frequently co-morbid with hypertension and diabetes mellitus, with obesity (BMI > 25) being among the most comorbid conditions. Numerous research have demonstrated a link between obesity and other comorbid disorders. Obese individuals are more likely to develop type II DM, CVD, and renal failure⁷.

According to numerous studies in the US, where approximately to 48.3% of inpatients with COVID-19 had an obese nutritional status when they initially entered, as many as 48% of inpatients in the ICU of a Spanish hospital with COVID-19 had an obese nutritional status. According to the results of the nutrition risk screening tool (NRS-2002), that COVID-19 patients are at risk for malnutrition is between 77 and 88%, people with the disease have a high chance of developing it⁸. Based on research employing anthropometric criteria to assess nutritional status between 40 and 50 percent of hospitalized individuals with COVID-19 experience malnutrition⁹.

In COVID-19 patients, Comorbid conditions are the leading killers in Indonesia, according to the COVID-19 death rate has reached 157 thousand people during the past two years. Based on this, the researcher aims to further examine the nutritional status and the number of comorbidities in adult patients with Covid-19 along with the factors that influence it.

METHOD

This quantitative study uses a cross-sectional methodology and an analytical observational research design. This research sample was taken using the purposive sampling technique, using samples that meet the criteria. All inpatients at RST Dompot Dhuafa Bogor Hospital diagnosed positive for COVID-19 from March 2020 through December 2021, were above 26 years old, and body mass index was used to determine their nutritional condition. The exclusion criteria for this study were incomplete patient data and patients who died while being given treatment.

Research data collection used secondary data originating from the medical records of RST Dompot Dhuafa Hospital, Bogor, with two variables. The independent variable, namely the number of patient comorbidities (≤ 2 Comorbid and >2 Comorbid)¹⁰, and the dependent variable, namely nutritional status based on anthropometric body mass index of patients which is divided into two categories based on the 2018 Ministry of Health, namely normal nutritional status (BMI = 18.4 - 25) and abnormal nutritional status (BMI <18.5 and >25) with sex and age divided into two categories, namely adults (> 26 years) and the

elderly (> 60 years)¹¹, as control variables. 136 samples from 188 confirmed COVID-19 patients at Dompot Dhuafa Hospital in Bogor, West Java, were used in this research. Univariate analysis was done to assess the frequency distribution of gender, nutritional status, and the number of comorbidities. SPSS 26 was used to analyze the data. At the same time, bivariate analysis with who squares is used to see the relationship involving the dependent and independent variables with a significance level of 5%. The UPN Veteran Jakarta Research Ethics Committee approved this study under the number 480/XII/2022/KEPK.

RESULTS

Table 1. Characteristics of Research Subjects

Characteristic	N = 136
Sex	
Man, n (%)	64 (47,1)
Woman, n (%)	72 (52,9)
Age (Year), mean (min-max)	52 (26 – 82)
Adult (26 – 60) n (%)	98 (72,1)
Elderly(> 60) n (%)	38 (27,9)
Number of Comorbids	
≤ 2 Comorbids n (%)	113 (83,1)
>2 Comorbids n (%)	23 (16,9)
$\bar{1}$ (min-max)	24 (13 – 41)
Normal n (%)	81(59,6)
Abnormal n (%)	55 (40,4)

Source: *Medical Record RST Dompot Dhuafa Bogor Hospital, 2021*

According to table 1 above, of the 136 samples used in this investigation, 72 subjects (52.9) were predominately female patients, and 64 subjects were male (47.1). The sample for the study included a median age of 52 years, with participants as young as 26 and as old as 82. Participants were divided into adults aged 26 to 60 years old and elderly participants above 60 years old. Patients were separated into two groups based on the number of comorbidities they had: those less than equal to 2 and those with more than 2. There were 113 individuals (83.1) less than equal to 2, and up to 23 (16.9) of those had two or more. This classification based on This classification is based on research that has been conducted in China which shows that COVID-19 patients with a number of

comorbidities ≥ 2 show severe outcomes¹⁰. According to the Ministry of Health's classification of nutritional status, there are two categories of nutritional status. Patients with normal nutritional status (BMI = 18.5 to 25) and patients with abnormal nutritional status (BMI 18.5 and > 25) are the two groups to be discussed. There were as many as 81 participants in this study who had a normal nutritional state (59.6).

Table 2. Type of Comorbid Disease

Type of Comorbid Disease	n
Chronic Kidney Disease	18
Hypertension	18
Coronary Heart Disease	38
Diabetes Mellitus	44
Respiratory Disease Infection	111

Source: *Medical Record RST Dompot Dhuafa Bogor Hospital, 2021*

Based on research completed in 2020, the types of comorbid disorders utilized as a reference in this study were separated into five disease groups, as shown in table 2 above, which reported that the prevalence of comorbidities that dominated COVID-19 patients were hypertension, diabetes mellitus, Chronic Kidney Disease (CKD), Chronic Heart Disease (CHD), and systemic diseases respiratory. In 111 of the study subjects, the most common comorbid disease was respiratory tract infection¹².

Table 3. Relationship Based on Sex between COVID-19 Patients' Comorbidities and Nutritional Status.

Sex	Nutritional Status	Number of comorbids		p-value
		≤ 2 n (%)	> 2 n (%)	
Woman	Normal	37 (82,2)	8 (17,8)	0,937
	Abnormal	22 (81,5)	5 (18,5)	
Total		59 (81,9)	13 (18,1)	
Man	Normal	30 (83,3)	6 (16,7)	0,795
	Abnormal	24 (85,7)	4 (14,3)	
Total		54 (84,4)	10 (15,6)	

Source: *Medical Record RST Dompot Dhuafa Bogor Hospital, 2021*

According to table 3 above, it can be seen that 72 female patients with normal nutritional status were dominated by patients with comorbidities ≤ 2 , 37 patients (82.2%) and male patients with abnormal nutritional status. also dominated by patients who had a number of comorbidities > 2 as many as 22 (81.5). The results obtained were $p = 0.937$, indicating that there was no significant difference in the number of comorbidities among Covid-19 patients based on female gender for nutritional status.

In male patients, 64 patients were dominated by patients who had comorbid diseases with a total of ≤ 2 and had normal nutritional status in 30 patients (83.3) and abnormal nutritional status in 24 patients (85.7) with $p = 0.795$. This shows that there is no meaningful association between nutritional status and the number of total comorbidities among COVID-19 patients, regardless of male patient.

Table 4. Relationship between Nutritional Status and Number of Comorbidities in COVID-19 Patients Based on Age.

Age	Nutritional Status	Number of Comorbidities		p-value
		≤ 2 n (%)	> 2 n (%)	
Adult	Normal	44 (80)	11 (20)	0,910
	Abnormal	34 (82)	9 (20,9)	
Total		78 (79,6)	20 (20,4)	
Elderly	Normal	23 (88,5)	3 (11,5)	0,220
	Abnormal	12 (100)	0 (0)	
Total		35 (92,1)	3 (7,9)	

Source: *Medical Record RST Dompot Dhuafa Bogor Hospital, 2021*

Relationship Based on Sex between COVID-19 Patients' Comorbidities and Nutritional Status is shown in table 4. Although concomitant disorders were present in the majority of COVID-19 patients in the adult age range (26–60 years), as many as 44 patients (80) with normal nutritional status and 34 patients (82) with abnormal nutritional status reported statistically (p value = 0.910). Based on the adult age group, there was no meaningful association between nutritional health and the

number of comorbidities.

While the number of patients with normal and abnormal nutritional status was 23 (88.5) and 12 respectively, the elderly age group (> 60 years) was also dominated by patients who had a number of comorbidity conditions (100). According to this statistical analysis, the number of comorbidities in the geriatric age group did not significantly correlate with nutritional status (p value = 0.220).

DISCUSSION

The majority of COVID-19 patients, according to the study's findings, were female. This is connected to the study done by Wu et al.¹³. The majority of COVID-19 patients were men, according to different results from studies in China utilizing the meta-analysis methodology¹². Because of differences in sex hormones associated to the immune system, women have a lower chance than men of developing bacterial or viral illnesses. This is because women have higher innate and adaptive immune defenses than males.¹⁴

Additionally, it was discovered in this study that adults made up the majority of COVID-19 patients by age group (26-60 years). This outcome is consistent with the study of Al Omari, et al¹⁵ which discovered that COVID-19 patients tend to be younger than 50. This is because this age group is productive and still has high mobility compared to older age groups, making them more susceptible to COVID-19 infection, remarkably. if they don't follow health procedures¹⁶.

In this study, the normal BMI range of 18.5 to 25 dominated the nutritional condition of COVID-19 individuals. These findings contradict with data from the United Kingdom which found that inpatients with COVID-19 would have a risk of 2.37 times higher for abnormal nutritional status (BMI < 18.5 and > 25)¹⁷. Because of this, chronic inflammation with higher levels of IL-6 can happen in patients with abnormal nutritional status, particularly obesity, which can limit immune response, generate an imbalance in the gut flora, and have low cytokine profiles¹⁸. Obese people's nutritional status can affect their immune systems, both innate and adaptive, as well as lower lung volume and consequently lung function¹⁹.

This study found that the comorbidities that dominated COVID-19 patients were

respiratory tract diseases, such as pneumonia, tuberculosis, and others, which were in accordance with studies in China¹². Symptomatic respiratory disorders will have a 2.17 higher level of severity compared to patients who do not have these symptoms. This occurs due to the body's response to a viral infection that causes cell damage. This happens as a result of virus replication, which stimulates the immune system, the occurrence of an inflammatory process, and the emergence of various symptoms in patients, indicating that the process of viral infection has been ongoing and the virus has spread to other cells²⁰. Type II diabetes and coronary heart disease (CHD) are also included in the top three comorbid diseases in COVID-19 patients. This is consistent with studies done by 19. that type II diabetes mellitus and coronary heart disease are associated in COVID-19 patients. Oxidative stress and a weakened immune system are connected with CHD patients. Angiotensin converting enzyme-2 (ACE2) receptor expression is higher and the immune system is compromised in COVID-19 patients with a history of CHD. Coronavirus can bind to target cells through ACE2 receptors, which are expressed in several tissues; this process can result in changes in endothelium dysfunction, pro-inflammatory reactions, and post-receptor signaling pathways that cause vasoconstriction which can lead to myocardial injury and prothrombotic strategies²¹. The relationship between type II DM and COVID-19 occurs because diabetes can cause disruption of lymphocyte and macrophage function and interfere with individual immunological responses²².

Based on the research, it was determined that in positive inpatients at Dompot Dhuafa Hospital in Bogor who had COVID-19, there was no correlation between nutritional status and the number of comorbidities (≤ 2 Comorbids and >2 Comorbids). Meanwhile, based on research conducted at the Tripura Regional Hospital, India, it was found that as many as 66% of tuberculosis patients experienced malnutrition⁵. Malnutrition is a general occurrence that refers to a state of excess and deficiency of nutrition or both. The body is negatively affected by under nutrition or over nutrition. Infectious infections typically have a malnutrition state, one of which is tuberculosis. Poor dietary status combined with tuberculosis disease is a vicious cycle that, if not broken, will result in a high risk of death⁵. Due

to a weakened immune system, malnourished patients are more prone to TB. After TB disease, patients would be more susceptible to malnutrition due to a variety of circumstances, such as decreased food intake due to lack of appetite., loss of nutrition due to vomiting (nausea triggered by drugs) and changes in metabolism caused by viral infections ²³. Malnutrition is one of the risk factors that will exacerbate the incidence of COVID-19 ¹⁹.

Obesity increases a person's risk for many serious conditions, such as high blood pressure, low HDL, dyslipidemia, CHD, stroke, type II diabetes, and numerous malignancies ²⁴. Patients who are obese will experience changes in lung volume, function, and expansion, which will raise respiratory tract resistance, impede gas exchange, and decrease lung volume, all of which will have an effect on the patient's severity⁶.

In this study, the results were not significant because the nutritional status data used secondary data so that the accuracy of the measurements could not be guaranteed by the authors. In addition to using BMI, it is recommended to use anthropometric measurements of abdominal circumference and ensure the accuracy of the measurements ²⁵.

CONCLUSION

Based on the results of data analysis and discussion, adult COVID-19 patients at Dompot Dhuafa Bogor Hospital were shown to not have a significant association between their nutritional state and the number of comorbidities, so further research is needed using other factors that are thought to have an influence on the number of comorbidities in COVID-19 patients and using other measurement parameters to make nutritional status measurements more accurate..

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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