



# The relationship between fatigue level and dyspnea in post-COVID-19 patients

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## ABSTRACT

**Background:** Post-coronavirus disease 2019 (Post-covid-19) is a term used to describe people with COVID-19 symptoms that persist after two weeks from the onset of symptoms. Some of the most common post covid-19 symptoms are fatigue and dyspnea. Fatigue is a feeling of physical or mental debilitation resulting from a person's immune and psychological changes. Breathing becomes faster and shorter when insufficient oxygen reaches the lungs, a condition known as dyspnea.

**Methods:** This study used the cross-sectional design. The

population of this study consisted of post-COVID-19 patients who live in Malang Raya, with a sample size of 56 respondents. Data collection using the Fatigue Severity Scale questionnaire to measure fatigue levels and the Borg Scale to measure dyspnea levels.

**Results:** The results of *Spearman's* test obtained a value of  $r= 0.498$ , with a moderate correlation, indicating there was a relationship between the level of fatigue and dyspnea.

**Conclusion:** There was a relationship between fatigue level and dyspnea in post-COVID-19 patients.

**Keywords:** borg scale, COVID-19 symptoms, dyspnea, fatigue, post-covid-19.

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## INTRODUCTION

Post-coronavirus disease 2019 (Post-COVID-19) symptoms are described as COVID-19 symptoms that appear two weeks after the onset of the first symptoms. Clinical signs and symptoms that persist for over 12 weeks develop during or after COVID-19.<sup>1</sup> People with a history of severe coronavirus two acute respiratory syndrome infection usually experience post-Covid-19 illness three months after diagnosis, with symptoms lasting at least two months.<sup>2</sup> Common symptoms of COVID-19 include cough, fever, fatigue, loss of sense of taste or smell, sore throat, headache, and more serious symptoms such as shortness of breath and chest pain.<sup>3</sup>

The most prevalent problems usually interfering with daily functioning are fatigue and dyspnea. Fatigue is one of the most frequent symptoms of Covid-19 patients and those who have recovered from the disease. Other signs of fatigue include a lack of energy and difficulty concentrating. Patients with comorbidities who have been admitted to hospital intensive care units (ICUs), who have moderate to severe symptoms after contracting Covid-19, and who experience persistent or protracted fatigue often describe this.<sup>4</sup> Chronic fatigue has several causes, some of which are due to psychological, environmental and peripheral nerve inflammation factors.<sup>5</sup> An overactive inflammatory response in some organs causes post-COVID-19 fatigue. Problems with glial lymphatics in the central

nervous system in long-term COVID patients lead to a buildup of toxins in the brain, which in turn causes fatigue. Fatigue, a common complaint, can majorly impact performance, health, family life, and social relationships.<sup>6,7</sup>

A recent study found that a higher frequency of complaints was associated with male gender, moderate to severe severity of COVID-19 infection, previous history of depression and anxiety, and post-COVID-19 fatigue symptoms. 52-70% of COVID-19 survivors said they felt exhausted in the first three months of illness.<sup>8</sup> Research suggests that the severity of COVID-19 may increase the risk of long-term COVID-19, which can lead to symptoms such as fatigue, difficulty concentrating, and sleeplessness and reduce patients' quality of life. It is still unknown what causes illness and fatigue after COVID-19 infection. Fatigue is a common reaction to viral infections and a sign of side effects of COVID-19.<sup>9</sup>

One of the symptoms of lung disease is dyspnea, often accompanied by extra breath sounds such as wheezing and rhonchi. Dyspnea is a clinical problem nearly as important as pain, affecting a quarter of the general population and half of the seriously ill patients (the latter comparable to pain's impact).<sup>10</sup> The covid-19 infection causes dyspnea, making it difficult for oxygen to diffuse into the lungs. A history of asthma, respiratory and cardiovascular conditions, and psychological problems such as stress are the leading causes of dyspnea. It takes some time for COVID-19 survivors to restore lung

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function to a condition without any interference.<sup>11</sup>

According to research by Crook et al. from 2021, 43.4% of 143 people still had dyspnea 60 days after the onset of COVID-19. In addition, it was explained that there are several possible mechanisms for respiratory distress after a COVID-19 infection. One of these mechanisms is chronic inflammation, which results in the continued production of pro-inflammatory cytokines and reactive oxygen species (ROS), allowing the infection to spread to tissues and the bloodstream. Widespread damage, fibrotic changes in lung tissue, and pulmonary vascular thrombosis are the effects of this.<sup>12</sup>

Based on the problems, the presentation of the results of preliminary studies, and the lack of research on the relationship between fatigue level and dyspnea in post covid-19 patients in Indonesia, this study was conducted to determine the correlation between fatigue level and dyspnea in post-covid-19 patients.

## METHODS

Analytical observational cross-sectional research was used in this study. In January 2023, this study was conducted online using Google Forms.

Patients living in Malang Raya who have recovered from COVID-19 became the population of this study. Based on predetermined inclusion and exclusion criteria, purposive sampling obtained 56 respondents. The fatigue severity and Borg scales measured patients' fatigue and dyspnea levels. The data were then examined using the SPSS 20 computer program with the *Kolmogorov-Smirnov* and *Spearman* correlation tests.

## RESULTS

The characteristics of respondents observed in this study were age, gender, fatigue level, and dyspnea level. Based on Table 1. it is known that most respondents are the age of 21-59 years as much 84%, male gender as much as 52%, most fatigue level patients often experience fatigue 46%, the most dyspnea does not experience shortness of breath as much as 46%.

Table 2 shows a significant result of  $p=0.00$  and a value of  $r=0.498$ , which means that there is a relationship between fatigue level and shortness of breath. In addition, the relationship between fatigue level and shortness of breath is relatively strong, with a value of 0.498.

## DISCUSSION

One of the symptoms most frequently mentioned by COVID-19 patients or those who have recovered from COVID-19 infection is fatigue. Patients with moderate to severe symptoms often complain of ongoing fatigue.<sup>13</sup> Complex autonomic nervous and immune system dysfunction are the leading causes of the disease. There are specific metabolic anomalies, such as muscle supply-induced oxygen depletion, skeletal muscle acidosis or proton dysregulation, impaired glucose absorption, and impaired glucose absorption, as well as a decrease in the amount of adenosine triphosphate in muscle cells.<sup>14</sup>

IgG-produced beta 2-adrenergic receptors and M3 acetylcholine receptor autoantibodies are thought to be significant contributors to fatigue.<sup>15</sup> Six months after recovery, nearly 75% of hospitalized COVID-19 patients still report problems such as fatigue, depression, and sleep problems.<sup>16,17</sup> One to three months after infection, 52-70% of patients with post-COVID-19 symptoms mentioned feeling tired.<sup>1</sup>

Immune response to viruses, when the body encounters a pathogen like Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), the immune system starts producing cytokines that trigger inflammation and mobilize immune cells to fight the infection. The inflammation caused by

**Table 1. Characteristics of Post-Covid-19 patient respondents**

Characteristics	Frequency	%
<b>Age</b>		
<20	9	16%
21-59	47	84%
<b>Gender</b>		
Male	29	52%
Female	27	48%
<b>Fatigue level</b>		
Never	9	16%
Sometimes	10	20%
Often	26	46%
Ever	11	20%
<b>Dyspnea</b>		
Not Congested	32	46%
Very mild	3	4%
Mild	17	24%
Moderate	14	20%
Slight weight	4	6%
Weight	0	0%
Very heavy	0	0%
Very heavy (can hardly breathe)	0	0%
Bad	0	0%

**Table 2. The relationship between fatigue level and dyspnea in post covid-19 patients in Malang Raya**

Variable	Frequency	P-value	r
Fatigue level	56	0.00	0.498
Dyspnea	56	0.00	0.498

COVID-19 is known to cause scarring or damage to the lungs, leading to respiratory distress in COVID-19 patients and a consequent drop in blood oxygen levels. Low oxygen levels, or hypoxemia, can cause symptoms of fatigue and then trigger the onset of dyspnea or heavy, labored breathing.<sup>18,19</sup>

Symptoms of severe dyspnea can quickly deteriorate into respiratory failure, metabolic irregularities, coagulation system diseases (blood clotting disorders), and cytokine storms that can harm internal organs. When inflammation is severe enough, the SARS-COV2 virus that causes COVID-19 can infect both parts of the lungs, causing a rapid decrease in oxygen saturation. The lungs will fill with a lot of fluid, phlegm, and cells in this state.<sup>20</sup> As a result, the air sac walls of the lungs are damaged, resulting in severe pneumonia or acute respiratory distress syndrome (ARDS), making breathing difficult for patients.<sup>21</sup> Due to respiratory failure, patients with these diseases require respiratory support from a ventilator.<sup>22</sup>

The limitation of this study is that the cross-sectional nature of our study lacks the advantage of follow-up in a longitudinal study to see the course of the disease.

## CONCLUSIONS

It was found in this study that in post-COVID-19 patients, there is a strong correlation between fatigue level and dyspnea. Future researchers should be able to focus more on the severity of dyspnea and impaired fatigue levels experienced by post-COVID-19 patients.

## ETHICAL CLEARANCE

Before beginning the study, the author got consent from the sample to confirm that they were willing to participate as respondents.

## CONFLICT OF INTEREST

The author reports no conflicts of interest in this work.

## FUNDING

No institution provided funding for this study.

## AUTHOR CONTRIBUTIONS

H developed the research design, collected and analyzed the data, and drafted the manuscript. AM and NAR interpreted the data, analyzed the data, and drafted the manuscript.

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