



Functional Status and Mental Health Post COVID-19

Edian Fitriana^{1*}, Dewi Gayatri¹, Muhammad Adam¹, Tuti Herawati¹

¹ Fakultas Ilmu Keperawatan, Universitas Indonesia, Depok, Jawa Barat, Indonesia
deeanfit@gmail.com

DOI: <http://doi.org/10.29080/jhsp.v6i1.722>

Received : Maret 2022, Accepted : April 2022, Published : April 2022

Kata Kunci

COVID-19;
Status
Fungsional;
Kesehatan
Mental

Abstrak

Penularan COVID-19 sangat kuat dan tingkat infeksiya cepat. Tinjauan sistematis ini bertujuan untuk menganalisis dan meninjau literatur yang diterbitkan saat ini terkait dengan faktor-faktor yang berhubungan dengan status fungsional dan kesehatan mental pada pasien post COVID-19. Metode yang digunakan adalah dengan mencari database yang relevan dan menilai artikel penelitian yang memenuhi kriteria inklusi dan eksklusi. Setelah penyaringan awal dari artikel yang diidentifikasi melalui judul dan abstrak, 167 dipilih. Selanjutnya, 52 artikel teks lengkap dinilai dan ditinjau berdasarkan kriteria inklusi kami dan dengan demikian 16 artikel dianggap memenuhi syarat dan dianalisis dalam analisis ini. Semua studi termasuk populasi orang dewasa berusia antara 18 sampai 95 tahun. Median lama rawat inap pasien COVID-19 selama berkisar antara 12 hari hingga 21 hari. Gejala jangka panjang yang paling umum pada pasien COVID-19 antara lain termasuk: sesak napas, kelelahan, penurunan fungsi fisik, insomnia, gangguan fungsi kognitif, depresi, dan kecemasan. Faktor-faktor yang mempengaruhinya selain demografi juga termasuk lama rawat, tingkat keparahan penyakit, dan adanya penyakit penyerta atau komorbid. Dukungan dan pengobatan dengan strategi manajemen yang tepat dapat membantu mengembalikan dan meningkatkan kesehatan mereka setelah keluar dari rawat inap

Keywords

COVID-19;
Functional
status;
Mental Health;

Abstract

The new coronavirus disease 2019 (COVID-19) has been declared a pandemic by WHO. The transmission of Covid-19 is robust and the infection rate is fast. This systematic review aims to analyze and review the currently published literature related to factors associated with functional status and mental health in post COVID-19 patients. The method used is by searched the relevant databases and assessed research articles that met the inclusion and exclusion criteria. After an initial screening of articles identified by the title and abstract, 167 were selected. Furthermore, 52 full-text articles were assessed and reviewed against our inclusion criteria and thus 16 articles were deemed eligible and analyzed in this analysis. All studies included an adult population between 18 and 95 years. The median length of hospitalization for COVID-19 patients ranged from 12 days to 21 days. The most common long-term symptoms in COVID-19 patients include: shortness of breath, fatigue, decreased physical function, insomnia, impaired cognitive function, depression, and anxiety. Factors that influence it besides demographics also include the length of hospitalization, The severity of illness, and the presence of comorbidities. Therefore, having the right support and treatment with the proper management strategy can help restore and improve their health after being discharged from the hospital.

Introduction

Coronavirus disease 2019 (COVID-19) is a severe respiratory disease caused by the new coronavirus (SARS-CoV-2)(1). The high rate of spread, infection, and death become serious things related to the Covid-19. According to WHO data in December 3, 2021, more than 263 million people have been infected worldwide. The ten countries with the highest population infected with this virus include the United States, India, Brazil, Russia, France, Turkey, England, Italy, Spain, and Germany.

The patients infected by COVID-19 have a variety of clinical symptoms. The mild symptoms criteria for Covid-19 patients are no pneumonia or hypoxia. Those symptoms are; fever, cough, fatigue, anorexia, shortness of breath, and myalgia. In addition, other non-specific symptoms are; sore throat, nasal congestion, headache, diarrhea, nausea and vomiting, smell (anosmia), or loss of taste (ageusia). At the moderate level, the COVID-19 patients have pneumonia symptoms (fever, cough, shortness of breath, fast breathing), SpO₂ > 93% with room air, and in severe/severe pneumonia, namely patients with clinical signs of pneumonia (fever, cough, shortness of breath, fast breathing) plus one of: respiratory rate > 30 times breathing each minute, severe respiratory distress, or SpO₂ < 93% on room air.(1). Due to various severity in each person infected with COVID-19, after recovering from COVID-19 with a negative test from *Polymerase Chain Reaction* (PCR) result, the patient would not immediately feel healthy, but there was an impact on the recovered patient called *post-COVID-19 syndrome* (2).

There are changes in physical and mental health in post COVID-19 patients such as; fatigue, dyspnea during activity, myalgia, decreased concentration, irritability, feeling depressed and anxious. Similarly, (3)found that 90% of recovered post COVID-19 patients have various symptoms and various conditions. The most common symptom reported was fatigue. Most subjects who recovered from COVID-19 experienced mild symptoms such as fatigue and headaches and identified a few percent of these results with more critical manifestations such as stroke, kidney failure, myocarditis, and pulmonary fibrosis.

Persistent physical symptoms in post COVID-19 patients also increased dependence on others for personal care and difficulties in daily life activities that can affect the quality of life(4). The impacts not only occur in physical but also in psychological symptoms called the COVID stress syndrome. COVID stress syndrome is a complex phenomenon involving various types of fear, checking, and reassurance related to COVID, re-experiencing symptoms, and excessive avoidance of COVID-19. The COVID stress syndrome consists of anxiety and depression as traits associated with psychopathology(5). An immune response can cause this COVID stress syndrome due to infection with the SARS-Cov2 virus, and it can also be caused by psychological stressors such as; social isolation, the psychological impact of a severe and potentially fatal new disease, worries about infecting others, and stigma(6).

Based on the phenomenon, it is essential to identify factors related to functional status and mental health in patients who have recovered from COVID-19 and to analyse the shortcoming of the previous research research's shortcomings. therefore the health practitioners can plan nursing or rehabilitation actions to prevent or reduce the changes in functional status or mental health caused by the COVID-19.

Methods

The method used in this study is a literature review study, which was carried out in March 2022, with the implementation stages passing through several stages as follows:

Study Protocol; We conducted a literature review. Study Design and Data Collection of this literature review includes all observational, cross-sectional, prospective, and retrospective cohort studies. Preliminary search results of all published studies were initially filtered through abstracts and titles.

The Sources of Information and Methodology; The search was conducted using the following databases: ScienceDirect, EBSCOhost, Wiley, and SpringerLink, which aim to identify research related to functional status and mental health post-Covid-19 and the associated factors. The search strategy integrates the terms "Post COVID-19", "Functional status post COVID-19", "Mental health post COVID-19", "Related factors of Functional status and mental health" and "post COVID-19 syndrome".

This literature review uses the PICO model criteria, which include: (1) The population studied is Post-Covid-19, (2) the intervention review is research that mainly focuses on evaluating the functional status and mental health of post-COVID-19 (3) for comparison in this review using studies with a control group and some without a control group (4) the outcome measure is a study discussing factors related to functional status and mental health post COVID-19.

The following information was taken from each included study: authors, year of study, participants and their profiles, length of hospitalization, severity, mean of follow-up time, and clinical findings. It was a rapid review so that the risk of bias associated with the included studies was not assessed. Ethical clearance from the institutional ethics committee was not required because all data extracted were from published studies, and no patients or the public were interviewed or involved in this study.

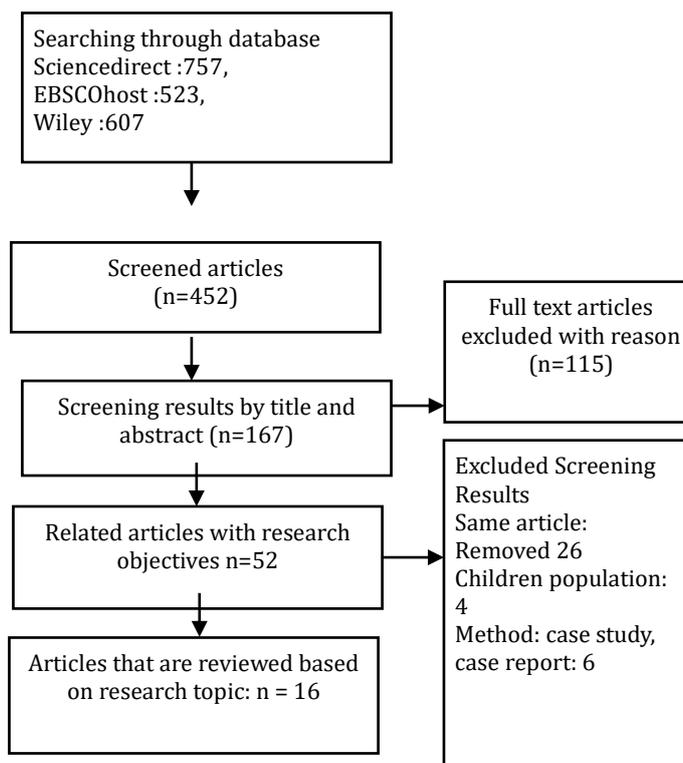


Figure 1: Prisma chart

Results

Study Selection We identified 2,618 records using a database search during the initial data search. Then 167 were selected through an initial screening of articles identified by title and abstract. Among them, 52 full-text articles were assessed and reviewed against our inclusion criteria, and thus 16 articles were deemed eligible and analyzed. Figure 1 is the study selection criteria presented in a PRISMA flow chart.

Study Characteristics Most studies evaluated post-Covid-19 specific symptoms such as; making telephone conversations to find out factors associated with the symptoms, follow-up interviews, standardized questionnaires, pulmonary function tests, patient-related outcome measurement information systems, standardized assessment methods, Chest CT, MRI, and Spirometry. These studies include data from different parts of the world, such as the UK/Europe, China, Italy, the Netherlands, France, Canada, Germany, and the United States. The observation ranged from a minimum of one month to a maximum of 12 months after the symptoms occurred or hospital discharge. Most of the studies are patients who had been diagnosed with mild, moderate, and severe active COVID-19. All studies included adults between 18 and over 95 years old. Males had a higher prevalence in almost all the studies reviewed, and the median length of stay of COVID-19 patients during the acute infection phase ranged from 12 days to 21 days (Table I).

Persistent symptoms in most post COVID-19 patients include fatigue, shortness of breath, cough, joint pain, chest pain, headache, loss of smell/taste, sore throat, memory loss, insomnia, depression, and anxiety. (Table 1) In the studied cases, we observed that at least one or more of the symptoms was reported, and these reported long-term symptoms were observed in mild, moderate, and severe disease types. Although patients with severe disease presented with a higher frequency of these symptoms, the factors related to physical/functional health status were evaluated in 14 studies, and those related to mental health status were assessed in 6 studies. It was found that age, period of hospitalization, the severity of the COVID-19 degree, and comorbidities were the most related factors to functional status and post-Covid-19 mental health.

According to an analysis by R.A. Evans (92.8%) of the 855 participants had at least one persistent symptom with a mean number of 9 symptoms. The ten most frequently reported persistent symptoms were muscle aches (pain), fatigue, physical slowing, impaired sleep quality, joint pain or swelling, limb weakness, shortness of breath, pain, short-term memory loss, and slowing down. Factors associated with poorer recovery were in the group of women, having at least two or more pre-existing comorbidities (50.1%), and using a mechanical ventilator at the time of hospitalization (73.6%). However, this analysis

did not find a linear relationship between age and the recovery rate, with the age group <30 years and >70 years experiencing better recovery than those aged 50-59 years(7).

Kamal stated that one of the factors closely related to the severity of post COVID-19 manifestations is the degree of severity when infected with COVID-19 and accompanied by comorbidities or comorbidities. In one of the prospective observational cohort studies, According by Leite et al. compared independence in performing Activity of Daily Living (ADL) after one month of discharge from the hospital for elderly COVID-19 patients, and 82.3% had lower ICU comorbidities (61.1%) compared to patients receiving treatment in the ordinary ward isolation(3,8).

Post COVID-19 neuropsychological disorder in this analysis is depression anxiety(8,9,10,11). Neuropsychological symptoms are influenced by age and gender factors. Women have *post-traumatic stress disorder* (PSTD) symptoms, much higher than men and at a younger age(12,11,13,7).Furthermore, mental health problems that affect mental abilities such as; fluctuating mood changes, anxiety, depression, and sleep disorders are frequently seen mainly in women. Additionally, other factors such as isolation during hospitalization and stress due to illness can worsen and cause mental health problems. Age factor or the presence of previous cerebrovascular disease can be associated with decreased neurological and psychiatric function, especially in patients admitted to the ICU(15).

The risk of bias in this literature review uses an assessment of the research method of each study, which consists of: 1) Design: The design is not in accordance with the research objectives, 2) Sample: There are 4 things that must be considered, namely population, sample, sampling, and size. samples that are not in accordance with the sampling rules, 3) Variables: The variables specified are not appropriate in terms of number, and do not consider confounding variables in conducting this study, 4) Data Analysis: There is no further data analysis, because this study only uses literature descriptive review

Table 1: research results

Author	Type of Study	Responden Post COVID-19			
		Hospitalization Period (Average)	Comorbid	Follow Up Period	Results
Leite et al., 2021	Cross-sectional	16 days	-	1 month after being discharged from the hospital	Independence for ADL was lower in the ICU-treated group than in the ward group 61.1%. IADL dependence was also more common in the ICU group 84.6%. The patients in the ICU showed more shortness of breath 45.2%, and 49% more difficult standing for 10 minutes(8)
Musheyev et al., 2021	Cross-sectional retrospective	-	Hypertension (47%), obesity (40%), diabetes (30%), asthma (13%).	when being discharged from the hospital	22% were discharged with a cane or walker, 49% were discharged on oxygen, and 14% were admitted to a rehabilitation facility. Prolonged mechanical ventilator use was associated with a significant reduction in functional status on discharge from the hospital. In addition, factors of age, male gender, a higher number of comorbidities, and pre-existing comorbidities including hypertension, diabetes, chronic obstructive pulmonary disease, and immunosuppression also worsened post-covid-19 functional status(13).
Fortini et al., 2021	Prospective	12 days, 27.1% ICU	Hypertension 47.5%, Cardiovascular disease 30.1%, Diabetes mellitus 15.2%, Atrial fibrillation 13.6, Obesity 16.9%	3-6 months after being discharged	22% of patients reported no sequelae, 28.8% had 1 or 2 symptoms, and 49.2% had three or more symptoms. The most common symptoms are fatigue, dyspnea on exertion, insomnia, and about one-fifth of patients report anxiety and depression. 16.9% and 15.2% of the population reported persistent changes in taste and smell, respectively. However, based on multivariate regression, it was found that age, gender, the burden of comorbidities (as stated by the Charlson Comorbidity Index), presence of Chronic Obstructive Pulmonary Disease (COPD), and clinical severity of COVID-19 during hospitalization did not predict the most common persistent symptoms that patients complained of (fatigue, dyspnea, anxiety, insomnia, depression, ageusia, anosmia)(8).

Méndez et al., 2021	Cross-sectional	18 days, 38.2% ICU	Hypertension (32.4%), diabetes (16.2), dyslipidemia (29.1%), CHF (5.6%)	2 months after being discharged	Impaired verbal memory 38%, verbal memory lag (11.8%), verbal fluency (34.6%) and working memory (executive function) (6.1%). 58.7% of patients had at least one neurocognitive functional impairment. Anxiety 29.6%, depression 26.8% and post-traumatic stress disorder 25.1%. 39.1% of patients had psychiatric morbidity. Delirium and psychiatric morbidity are associated with neurocognitive impairment, and the female gender is associated with psychiatric morbidity(10).
Mattioli et al., 2021	Kohort	97% Mild-Moderate	Hypertension 15%, obesity 8.3%, diabetes 3.3%	4 months post covid-19	At the 4-month follow-up, physical function indicated 19.1% anosmia, 15% fatigue, 10.8% dyspnea. Regarding mental health, 118/120 patients who took the MMSE neuropsychological exam had normal neurological results, whereas two exhibited neurological abnormalities. Anxiety, stress, and depression scores were considerably higher in the Covid-19 cases than in the non-Covid-19 cases. Moreover, this study's findings revealed no neurological deficits or cognitive impairments in the group of COVID-19 patients with mild-moderate degrees four months after diagnosis(9).
Schandl et al., 2021	Kohort Prospective	21 days, 62% invasive ventilator	Hypertension 47%, diabetes 20%, chronic lung disease 16%, CHF 10%	2 and 7 months post covid-19	According to the study's findings, around one-third of ICU patients suffered From post-traumatic stress disorder, anxiety, and depression. 26% experienced a decline in total lung capacity, 34% experienced a decline on the 6MWT test, and 50% were able to resume full-time employment. Compared to non-invasive ventilators, patients on invasive ventilator experienced more pain and lost up to 80% of their entire lung capacity. Comorbidity is one of the elements that aggravates clinical sickness and manifests after recovery(16)
Zhao et al., 2021	Prospective	15 days, 14.93% ICU	Hypertension 16%, diabetes 9%, CHF 4%	12 months after being discharged from the hospital	One year after being proclaimed cured, the most prevalent symptoms reported by responders were muscle fatigue and insomnia. A chest CT scan was abnormal in 71.28% of the patients. Aside from diffusing capacity of the lungs for carbon monoxide (DLCO), age considerations influence perceived symptoms(17).
R.A Evans et al., 2021	Kohort Prospective	9 days, 27% ICU	cardiovascular 42.2%, Respiration 26.4%, Diabetes 19.8%	6 months after being discharged from the hospital	During the follow-up, only 239 (29%) of the 830 participants felt entirely recovered, with 158 (20%) of 806 experiencing a new disability (assessed by the Washington Group Short Set on Functioning). Factors associated with not recovering were female gender, middle age (40-59 years), two or more comorbidities, and more severe acute illness(7).
Halpin et al., 2021	Cross-sectional	12 days, 32% ICU	Hypertension 41%, Obesity 35%, asthma 13%	1-2 months after being discharged from the hospital	72% of ICU patients reported persistent fatigue, 65.6% experienced shortness of breath, and 46.9% indicated psychological distress(18).

Aly & Saber, 2021	Cross-sectional retrospective	-	-	Minimum 1 month after being declared PCR negative	The findings of this study revealed that chronic fatigue syndrome was a very significant problem in older adult female Covid-19 patients (elderly), with 52.1 % of respondents having symptoms of chronic fatigue syndrome (CFS), 57 % experiencing fatigue, 48 % experiencing musculoskeletal symptoms, and 63 % experiencing sleep problems. CFS's post-recovery symptoms include stress, sadness, sleep difficulties, exhaustion, cognitive impairment, and frequent falls(19).
Taquet et al., 2021	Kohort retrospective	16% ICU	Hypertension 50.7%, diabetes 30.3%, heart disease 35.5%,	6 months after being discharged from the hospital	Based on the study's findings, age or the existence of prior cerebrovascular disease can be associated with impaired neurological and psychological function, particularly in patients admitted to ICU. Anxiety (19.15%) and mood swings (15.43%) occurred constantly; however, they diminished at the 6-month follow-up(20).
Wang et al., 2020	Kohort prospective	15 days, 52% severe	hypertension (3,08%), coronary heart disease (2,29%), diabetes (1,54%), chronic bronchitis (0,76%)	Every week for a month after being discharged from the hospital	Based on the findings of this study, the majority of severe Covid-19 patients (82.61%) were older, had comorbid hypertension and coronary artery disease, and had early symptoms, especially in severe patients, with fever being the most common (87.02%), followed by cough (56.49%), fatigue (27.48%), and dyspnea (25.95%). In the first and second weeks, as many as 53.4% of patients were still using one or more types of treatment, including traditional Chinese medicine 22.9%, taking cough medicine 11.46%, using oxygen therapy 6.87%, corticosteroids 3.82%, expectorant 4.58%, and returned to hospitalization 3.82%. During the third and fourth week after discharge, only 13% were still undergoing treatment, namely traditional Chinese medicine 6.11%, cough medicine 0.76%, oxygen therapy 0.76%, corticosteroid 1.53%, and re-hospitalization 2.29 % (21).
Kamal et al., 2021	Cross-sectional	Mild 82%, Moderate 14.9%, Severe 4.9%	Hypertension 7.7%, diabetes 5.2%	3 months after the Covid-19 infection phase	According to the findings, only 10.8 % of patients had no sequelae, while others had several symptoms and disorders; fatigue was the most commonly reported symptom (72.8 %), while 10.6 % had more severe disease, including stroke, renal failure, myocarditis, and pulmonary fibrosis. Comorbidities were seen in 83% of moderate-to-severe patients (diabetes, asthma and hypertension, and pregnancy). The severity of the Covid-19 sickness is likewise directly connected to age. Moreover, the severity of post-Covid-19 symptoms is influenced by the Covid-19 severity(3).
Baricich et al., 2021	Cross-sectional	12.9 hari, 10% ICU	Lung diseases 7.4%, obesity, heart diseases 15.2%, stroke 2.9%	3-6 months after being discharged from the hospital	Overall, 32% of patients had impaired physical function 3 to 6 months after being discharged from the hospital. There is a significant association between Intensive Care Unit hospitalization or mechanical breathing and the number of comorbidities with physical disturbances, particularly in capacity/ability to walk(22).

Romero-Duarte et al., 2021	Retrospective observational	15 days, 10.8% ICU	Hypertension 51.3%, diabetes 20.8%, heart diseases 20.6%, lung diseases 25.8%	6 months after being discharged from the hospital	During the first six months following hospital discharge, 63.9 % reported some sequelae. These sequelae vary greatly, but the most common are persistent respiratory symptoms (42.0 %), systemic problems (36.1 %), neurological (20.8 %), and mental health (12.2 %), all of which are connected with hospitalization isolation. Gender is one of the factors related to these long-term consequences. Women had a higher prevalence of headaches and persistent mental health problems, with 20.1 % of patients returning to Emergency Services, 35 (4.4 %) requiring hospitalization, and 8 (1.0 %) dying during follow-up(11).
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Discussion

The COVID-19 pandemic that has hit the world has not only had an impact on the physical health crisis, but also on other aspects of life, including the psychological condition and mental health of individuals, both for COVID -19 patients and the general public. The psychological condition of COVID -19 patients and the general public can be positively or negatively affected. Positive psychological impacts can be in the form of a sense of pride in being able to overcome pressure and survive during a pandemic, as well as satisfaction for providing help to others. While the negative psychological impact felt in the form of depression, stress, and anxiety. The causes of negative psychological impacts during quarantine are quarantine duration, fear, frustration and boredom, lack of supplies, and inadequate information (23)

The cases that occur in Indonesia are not as many as the countries that the author has mentioned above, but there is a possibility that there will be a continuous increase in the near future. The number of deaths that are increasing day by day due to the corona virus does not only cause symptoms and physical illness, but also has a major impact on the welfare of the Indonesian people, which includes mental health(24;25).

Although recovering from COVID 19, post covid patients have not completely recovered from mental health disorders caused by COVID 19, not only because of disrupted health problems to death, the risk of job loss caused by Covid also causes many patients and the public to experience stress, due to job loss. This research is in line with research in Malang, where COVID 19 has an impact on the mental health of people in Malang City, East Java. The mental disorders that occur are in the form of anxiety and fear of being infected with the virus, especially at the beginning of the emergence of COVID-19, which later turned into anxiety due to fear and losing their jobs by many people. This anxiety also triggers an increase in stress levels and a sense of hopelessness that is felt. Even so, the level of mental disorders experienced by the people of Malang City is not too severe when compared to other countries based on several previous studies(26).

Based on the above discussion, it is also necessary to take steps to prevent and control post- COVID-19 stress, in order to minimize the occurrence of post- COVID-19 stress whose impact can lead to mental disorders.

During the COVID -19 pandemic, millions of people became survivors, which later on impacted their health. Because of the long-term repercussions of this COVID -19 infection, numerous research has been conducted worldwide to obtain information concerning the post COVID-19 healing period. There has been plentiful research on changes in functional status and mental health in patients treated in the COVID -19 isolation rooms. In this analysis, researchers document the functional status and mental health of post-COVID-19 patients and their contributing factors. This comprehensive review reveals a high rate of extended symptoms in COVID-19 patients who had been pronounced healed, ranging from one month to the first six months.

According to pathophysiology, post COVID-19 symptoms are the result of an acute illness, namely the Coronavirus (SARS-CoV-2), which has a high affinity for the angiotensin-converting enzyme-2 (ACE-2) receptor, commonly found not only in the lungs but also in other organs such as the liver, kidneys, and blood vessels. Damage occurs in the lungs when the virus assaults the alveolar epithelium, particularly type II pneumocytes. This might result in scarring and pulmonary fibrosis, indicating lung injury, and such patients are clinically predicted to have long-term respiratory difficulties. The endothelium within the capillaries is also injured, which might cause an inflammatory reaction, leading to the microthrombus formation and pulmonary consolidation. This alters the diffusion capacity of the lungs for carbon monoxide (DLCO) in COVID-19 patients(9). According to this pathophysiology, it is connected with the most commonly reported physical symptoms, unusual shortness of breath and fatigue that interferes with daily activities.

Furthermore, the researchers proposed several factors that influence the majority of post COVID -19 patients' physical and mental health complaints, such as age, gender, comorbidities, disease severity,

and immobilization. Within 4 weeks of discharge from the hospital, people over 40 who had comorbidities reported a higher level of pain, discomfort, and reduced mobility(22).

The severity of the COVID-19 degree experienced by the patient influences the long-term post-COVID-19 symptoms. According to Weerahandi et al., patients with severe symptoms still had shortness of breath (92.9 %) and had poor functional status and mental health after more than one month out of the hospital. In line with that, Horwitz et al.(27)(28), there was a significant association between the severity of the disease and the loss of functional status and mental health up to six months following hospital discharge.

Having a history of shortness of breath and high anxiety levels are other factors that affect the hinge post COVID-19. Patients with this history have a higher risk of contracting COVID-19. This is because COVID-19 attacks the respiratory system, and will certainly aggravate the previous respiratory diseases. In addition, those with a history of physiological respiration had a lower immune response than others. In other words, the percentage of risk of being exposed to COVID-19 is 2.4 times higher(29)

The research needs further studies in terms of design which compares incidence between risk and non-risk groups post-covid. However, the findings and discussion of this research can be at least used to identify Covid-19 related factors, and treatment for post covid-19 patients.

Conclusion

The COVID-19 infection and the discovery of other additional variants which are quickly become the most severe public health issue afflicting people worldwide. Therefore, continuous monitoring of these patients, even after they have recovered and discharged, is required to focus on the long-term adverse effects of COVID-19 infection. The recovery has new health issue, like decreased physical function. This is due to age, gender, comorbid, period of treatment, and the COVID-19 degree. In addition, anxiety level, stress and depression during the treatment influence mental health of the post covid-19 patients.

Acknowledgements

The researcher would like to thank the Faculty of Nursing at the University of Indonesia for their assistance in completing this study.

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