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Long Covid Incidence and Influencing Factors of Covid-19 Survivors in the Working Area of Lubuk Begalung Health Center, Padang

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ABSTRACT

Background. Corona Virus Disease 2019 (COVID-19) is an acute respiratory infection caused by the Severe Acute Respiratory Syndrome-Corona Virus-2 (SARS-CoV-2). Clinical symptoms depending on the clinical severity of the patient which consists of mild, moderate, severe and critical. In COVID-19 patients who recover, pulmonary fibrosis can occur, which can lead to impaired lung function. In addition, there are also long covid complaints such as shortness of breath, nausea, coughing. **Methods:** The research design is an observational study. The study was conducted at the Lubuk Begalung Padang Health Center from January 2021 to March 2021. The study population was all mild, moderate to severe COVID-19 patients in the working area of the Lubuk Begalung Padang Health Center and experienced long covid symptoms. **Results:** The average age of COVID-19 survivors in this study was 46 years with a higher prevalence of women than men. The results of the pulmonary vap examination of most of the respondents were within normal limits. The most common distribution of clinical severity in this study was mild. The most common symptoms of long covid are weakness and muscle aches. **Conclusion.** No correlation was found between the clinical complaints of survivors with the clinical severity and lung function.

1. Introduction

Corona virus disease 2019 (COVID-19) is an acute respiratory infection caused by the severe acute respiratory syndrome-corona virus-2 (SARS-CoV-2.). The first case reported in December 2019 occurred in Wuhan, Hubei Province, China. Initially, this infection was associated with an atypical pneumonia outbreak from the Marine Fish Market in the city of Wuhan, China, where seafood, bats, chickens, pheasants, and other animals were traded, so it was assumed to be a zoonotic disease.[1]

COVID-19, which was initially identified as having a transmission mechanism through droplets and close contact, is currently undergoing changes, namely that it can also be transmitted through the air or airborne. Marawska and Milton in an open letter to WHO dated July 6, 2020, representing 239 scientists in 32 countries describe evidence showing hundreds of saliva particles smaller than droplets (aerosols) can float and move in the air further so that they can be transmitted through the air when inhaled. COVID-19 is caused by the SARS-CoV-2 virus, which is a single-stranded RNA virus that infects various host species. into 4 genera, namely, α, β, γ, dan δ based on the structure of the genome. SARS-CoV, Middle East respiratory syndrome

coronavirus (MERS-CoV), and SARS-CoV-2 are included in the -coronavirus. Patients infected with this virus can be asymptomatic (no symptoms) and can also show symptoms of mild respiratory tract infections (fever, cough, malaise) to severe symptoms (pneumonia). Deterioration in patients infected with COVID-19 is caused by immune system dysfunction which will then cause a cytokine storm where this situation will cause organ damage including the lungs, when the lungs are damaged, oxygen cannot enter the body optimally. This will then lead to ARDS (acute respiratory distress syndrome), most patients infected with COVID-19 die of ARDS.[5]

The worsening of COVID-19 is not only due to the presence of a cytokine storm and damage to lung organs, it is also due to comorbidities and an immunocompromised state. Comorbidities that exacerbate COVID-19 include asthma, chronic obstructive pulmonary disease (COPD), and pulmonary interstitial disease. In addition, the most deadly co-morbidity is Idiopathic Pulmonary Fibrosis, where this disease causes decreased lung function and causes respiratory failure. Pulmonary fibrosis may develop after chronic inflammation or a primary fibroproliferative process, as in idiopathic pulmonary fibrosis (IPF). Pulmonary fibrosis is one of the sequelae of ARDS.[6] The data show that approximately 40% of COVID-19 patients are at risk of ARDS, and 20% of cases of severe ARDS. Progressive fibrotic irreversible interstitial lung disease is characterized by decreased lung function, increased fibrosis on CT *scan*, worsening symptoms, and quality of life. Restrictive lung disorders can affect impaired activity tolerance and poor quality of life of patients after the recovery period so that patients infected with COVID-19 and experiencing ARDS symptoms then recover, showing changes in lung function and radiological features.[7]

Pulmonary fibrosis is one of the sequelae of ARDS.[6] The data show that approximately 40% of COVID-19 patients are at risk of ARDS, and 20% of cases of severe ARDS. Progressive fibrotic irreversible interstitial lung disease is characterized by decreased lung function, increased fibrosis on CT *scan*, worsening symptoms, and quality of life. In the initial follow-up study of patients with SARS, 15 (62%) of 24 patients had CT evidence of pulmonary fibrosis at 37 days post-hospitalization. Similar restrictive lung conditions can be seen in hypersensitivity pneumonitis, autoimmune disease, and drug-induced interstitial lung disease. Patients requiring ICU admission with SARS had a significantly limited pulmonary function at 6 months after disease onset compared with 6 months afterward care.[7,8] Restrictive lung disorders can affect impaired activity tolerance and poor quality of life of patients after the recovery period so that patients infected with COVID-19 and experiencing ARDS symptoms then recover, showing changes in lung function and radiological features.[7]

There is a need for research on the relationship between lung function and severity when infected with COVID-19 in Indonesia, especially in West Sumatra, which has not been widely carried out. This is what underlies the need for research to see the relationship between pulmonary function descriptions of post-COVID-19 patients as seen from the results of spirometry examinations with the severity of disease in COVID-19 patients at Dr. M. Djamil General Hospital Padang.

2. Methods

The research design was an observational study. The study was conducted at the Lubuk Begalung Padang Health Center from January 2021 to March 2021. The study population was all mild, moderate to severe COVID-19 patients in the working area of the Lubuk Begalung Padang Health Center. The research sample is part of the study population that meets the inclusion and exclusion criteria. The number of samples in this study was 72 samples with inclusion criteria: Age > 18 years when diagnosed with confirmed COVID-19, Patients at least 4 weeks after being declared COVID-19 cured, and having long covid complaints such as weakness, cough, shortness of breath, etc. In addition, patients are willing to follow the entire research process until it is completed.

The exclusion criteria in this study were samples that Having the following diseases: Chronic Obstructive Pulmonary Disease (COPD), Asthma, Post

Tuberculosis Obstructive Syndrome (SOPT), bronchiectasis, Interstitial Lung Disease (ILD), Myasthenia Gravis (MG), Guillain Barre Syndrome (GBS), chest wall abnormalities (kyphosis, pectus carinatum, pectus exavatus, scoliosis*),* lung tumors, mediastinal tumors, ascites and Pregnant patients and patients who are unable to perform spirometry maneuvers properly. Data were collected from medical records, research questionnaires, and spirometry examinations and processed computerized.

3. Results

Based on Table 1, it is known that the average age of respondents was 46,35±13,67 at mild degrees and 47,53±13,95 at moderate to severe degrees. critical. There were 39 more female respondents than 33 male respondents. The average nutritional status of the respondents was 24,45 ± 2,8 at a mild degree and 23.88 ± 3,1 at a moderate to the severe critical level. There were more non-smokers than smokers and ex-smokers, namely 58. Based on statistical tests there was no difference between age, gender, nutritional status with mild or moderate clinical severity to critically severe (p>0.05).

Table 1. Table of study characteristics based on degree of clinical severity

Characteristics	**Degree of clinical severity**		**P-Value**
	Mild	**Moderate – Severe critical**	
Age	46,35±13,67	47,53±13,95	0,757[a]
Gender			0,693[b]
Male	72,7%	9 27,3%	
Female	79,5%	8 20,5%	
Nutritional status	24,45±2,8	23,88±3,1	0,480[a]
Smoking status			n/a[b]
Smoker	100%	0	
Non-smoker	77,6%	22,4%	
Former smoker	42,9%	57,1 %	

Table 2 clinically known COVID-19 survivors in this study found shortness of breath in 13 cases, weakness in 29 cases, joint pain in 17 cases, muscle pain in 18 cases, palpitations in 6 cases, cough in 15 4 cases, chest pain in 4 cases, anxiety in 3 cases, sleep pattern disturbance in 6 cases, fever in 4 cases, diarrhea in 1 case, loss of smell and taste in 2 cases, and no complaints in 25 cases. Based on the Chi-square clinical test of COVID-19 survivors in the form of shortness of breath, weakness, joint pain, muscle pain, cough, and no complaints, there is no difference between COVID-19 survivors with mild or moderate clinical severity - critical (p >0.05).

In the table, it is known that respondents with restrictive pulmonary function disorders were all found in COVID-19 survivors with moderate to severe clinical severity as many as 8 respondents. Most of the respondents had normal lung function at mild clinical severity, namely 55 respondents (85.9%).

Table 2. Relationship between clinical complaints of people with COVID-19 survivors based on degree of clinical severity

Clinical survivor	Frequency	Degree of clinical severity		P-value
		Mild	Moderate – Severe critical	
Shortness of breath	13	69,2%	30,8%	0,490[a]
Weak	29	72,4%	27,6 %	0,712[a]
Joint pain	17	58,8%	41,2%	0,098[a]
Muscle pain	18	72,2%	27,8%	0,750[a]
Palpitations	6	100%	0	n/a[a]
Cough	15	86,7%	13,3%	0,495[a]
Chest pain	4	100%	0	n/a[a]
Anxiety	3	100%	0	n/a[a]
Sleep pattern disturbance	6	100%	0	n/a[a]
Fever	4	100%	0	n/a[a]
Diarrhea	1	100%	0	n/a[a]
Loss of smell and taste	2	100%	0	n/a[a]
No complaints	25	76%	24%	1,000[a]
Lung function:				
Normal				N/a
Restriction	66	85,9%	14,1	
	8	0	100%	

4. Discussion

This study was conducted on 72 COVID survivors - 19 to find out clinical complaints and pulmonary function of people with COVID-19 survivors with a degree of disease severity at the Lubuk Begalung Health Center Padang. A longitudinal study conducted at Renmin Hospital of Wuhan University, Wuhan, China reported on the prevalence, nature, and risk factors for long-term cases of COVID-19 in COVID-19 survivors. A total of 538 COVID-19 survivors were respondents in this study and the average age of respondents in this study was 52 years. Based on gender, there were more women than men, namely 54.5% of cases.[30]

There are more non-smokers than smokers and ex-smokers, namely 58, 7 smokers, and 7 ex-smokers. Zhao et al, from 55 respondents who survived COVID-19, 4 patients were smokers and 2 were ex-smokers.[29] Huang et al reported the same thing, from 1276 COVID-19 survivors, 7% were smokers. This study reported 82% of cases were non-smokers and 11% of cases were ex-smokers.[31]

Based on the results of the study, it was known that normal lung function based on spirometry examination was obtained as many as 64 respondents (88.9%) and 8 respondents (11.1%) experienced restriction. A retrospective study has been conducted a study to assess the lung function of COVID-19 survivors after 8 months of recovery from COVID-19. Most of the respondents in this study showed normal FVC and one respondent (2.5%) showed an abnormal total lung capacity (TLC) <80% of the predicted value. Respondents with abnormal TLC results were associated with a longer COVID-19 recovery time.[32]

Lerum et al conducted a study to determine the quality of life and lung function in COVID-19 survivors after 3 months of hospital admission. This study consisted of 103 COVID-19 survivors, 15 of whom were patients with severe symptoms who had been treated in the ICU. The average lung function of the respondents obtained normal results where FVC and FEV1 were 94% and 92%, respectively.[33] Fumagalli et

al, conducted a study to assess respiratory function at the time of clinical recovery and 6 weeks after hospital discharge. The results of the spirometry examination during recovery showed that FEV1 and FVC were lower than the predicted values, while the results of the FEV1/FVC examination were higher. Re-examination after 6 weeks after COVID-19, lung function began to improve but there were still some respondents with FVC that was lower than the predicted value.[34]

Based on the results of the study, the frequency of clinical severity was found to be more mild than moderate to severe criticism. Respondents with mild clinical severity were 55 respondents (76.4%) and respondents with moderate to severe clinical severity were 17 respondents (23.6%). A retrospective study was conducted in the State of Lagos on COVID-19 survivors. A total of 274 people became respondents in this study. Most of the respondents had mild clinical severity (50.7%), followed by moderate clinical severity (39%), asymptomatic (7.7%), and severe (2.5%).[20]

A retrospective cohort study reports on a study aimed at estimating the prevalence of disability in COVID-19 survivors. This study was conducted at 28 hospitals in eight provinces in China. A total of 432 laboratory-confirmed COVID-19 survivors were respondents in this study. The clinical severity in this study was divided into severe and not severe. Most of the respondents 65.97% in this study had mild symptoms and 34.03% of patients had severe symptoms.[35]

Clinical COVID-19 survivors in this study found shortness of breath in 13 cases, weakness in 29 cases, joint pain in 17 cases, muscle pain in 18 cases, palpitations in 6 cases, cough in 15 cases, chest pain in 4 cases, anxiety in 3 cases, pattern disturbances. 6 cases of sleep, 4 cases of fever, 1 case of diarrhea, 2 cases of loss of smell and taste, and 25 cases of no complaints. Based on the Chi-square clinical test of COVID-19 survivors in the form of shortness of breath, weakness, joint pain, muscle pain, cough, and no complaints, there is no difference between COVID-19 survivors with mild or moderate clinical severity - critical ($p > 0.05$).

Huang et al reported that the frequency of weakness was the most common sequelae. Muscle weakness or fatigue was found in 636 cases (52%) of 1230 COVID-19 survivors at 6 months after COVID-19. The second most common sequelae in this study were sleep disturbances in 27% of cases, followed by hair loss, impaired smell, palpitations, and joint pain.[31] Tabacof et al, reported clinical sequelae in COVID-19 survivors who reported fatigue (92%), loss of concentration/memory (74%), weakness (68%), headache (65%), and dizziness (64%). Sequelae symptoms in this study were found on average on day 151 after acute infection.[36]

A cross-sectional study conducted at the post-COVID-19 review clinic at James Hospital, Dublin, Ireland reported the incidence of long covid. Based on clinical severity, this study divided the groups of respondents into not requiring treatment, requiring treatment, and requiring intensive care unit treatment. The results of this study indicate that persistent respiratory symptoms do not have a significant relationship with the severity of the disease. This explains that all post-COVID-19 patients need the same rehabilitation regardless of the degree of clinical severity.[37]

The results of the above study are different from other studies, Zhou et al conducted a study of COVIS-19 survivors to determine the clinical prevalence of long void. This study was conducted on post-COVID-19 patients who were discharged from 4 hospitals in Wuhan. A total of 72 respondents were included in this study consisting of 4 groups according to the degree of clinical severity, namely 19 severe critical symptoms, 20 mild-moderate, 16 asymptomatic, and 17 control groups. The results of this study indicate the relationship of sequelae in COVID-19 survivors with the degree of clinical severity, especially in respondents with critically severe symptoms.[38]

COVID-19 patients with critically severe clinical symptoms had a higher increase in cytokines accompanied by lymphopenia, especially CD4+, CD8+, T cells, B cells, and natural killer (NK) cells, and a reduced percentage of monocytes and eosinophils. Increased cytokines in patients with critically severe clinical-grade showed an increase in interleukins 6 and

1β, as well as interleukins 2, 8, and 17, granulocyte-macrophage colony-stimulating factor (GM-CSF), interferon (IFN), -inducible protein 10 (IP). -10), monocyte chemotactic protein (MCP), macrophage inflammatory protein (MIP) 1α, and tumor necrosis factor (TNF). This situation will cause the worsening of several organs that require a longer repair time and cause sequelae.[38]

Most of the respondents in this study showed normal lung function in 85.9% of cases in survivors with mild clinical severity and 14.1% in survivors with moderate to severe clinical severity. Respondents with pulmonary function disorders in the form of restriction were reported to be 8 respondents and survivors with moderate to severe clinical severity was critical.

A descriptive observational study conducted on hospitalized patients with critically severe symptoms of COVID-19 at the Arnau University Hospital and the Santa Maria University Hospital in Spain reported sequelae in these patients. Patients after ICU treatment were evaluated 3 months after discharge from the hospital. The most frequently reported sequelae were dyspnea (46.7%) and cough (34.4%). This is also related to the patient's pulmonary function showing impaired lung diffusion capacity of less than 80% in 82% of cases. In addition to the results of pulmonary function examination through spirometry, CT scan results showed abnormal results with reticular lesions in 49.1% of cases and fibrotic patterns in 21.1% of cases. Pulmonary function outcomes that experienced worsening post-acute infection were significantly related to age and duration of use of invasive mechanical ventilation during treatment in the ICU.[39]

A prospective cohort study reported the incidence of pulmonary complications in post-COVID-19 patients after 4 months of hospital discharge. Patients with severe clinical severity associated with impaired pulmonary function. The results of this examination are seen either on spirometry examination or on a CT scan. Post-COVID-19 infection patients with severe clinical severity are significantly associated with functional and radiological abnormalities that have the potential to develop small airways or lung parenchymal disease.[40]

Brugge et al conducted a study to assess the impact of COVID-19 on lung function and quality of life of patients after 6 weeks of discharge from the hospital. A total of 101 patients were included as respondents in this study with 27.7% moderate cases and 73% severe critical cases. The results of this study showed that diffusion limitations were found in 66 cases of 92 cases, 26 cases of obstruction from 101 cases, and 21 cases of restriction. Impaired pulmonary function was significantly more seen in patients with severe clinical severity than moderate.[41] Limitations of the study The sample in this study was small, making it difficult to describe the clinical course of long covid to the fullest, so it is better to have more research samples. Further research is needed with a larger number of samples.

5. Conclusion

The average age of COVID-19 survivors in this study was 46 years with a higher prevalence of women than men. The results of the pulmonary function examination of most of the respondents were within normal limits. The most common distribution of clinical severity in this study was mild. There was no association between the clinical complaints of survivors and the degree of clinical severity and lung function.

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