Clinical Characteristics and Severity of COVID-19 at COVID-19 Referral Hospital in Bogor, West Java, Indonesia

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Abstract **Introduction:** Although many studies were published during the COVID-19 pandemic's early stages, we still do not know much about the severity of COVID-19 in terms of clinical evidence about signs and symptoms and specific clinical characteristics. When exposed, even asymptomatic (OTG) patients have a terrible prognosis. This study aimed to examine the connection between clinical features and COVID-19 poverty during the 2020 pandemic at the Covid-19 referral hospital in Bogor City, Indonesia. **Methods:** The research is cross-sectional. Data extended from the National Institute of Health Research and Development's ongoing research into comorbidities and COVID-19 prevention behavior in Bogor (NIHRD). The respondents in the study were validated by PCR swabs based on reports from the COVID-19 task force in Bogor. Samples were gathered from 148 suitable respondents for analysis. COVID-19 severity, supportive examination results (blood tests, radiography, and ECG), signs and symptoms, and demographic factors were all assessed. In the statistical study, simple and multivariate logistic regressions were used. **Results:** We found that 50.0% of respondents experienced severe symptoms as a result of COVID-19 exposure; symptomatic respondents 78.4%, blood group O 56.10%, age group 8-59 years 71.0%; male 56.1%; impaired blood glucose profile 18.3%, impaired erythrocyte sedimentation rate profile 14.9%, impaired leukocyte profile 64.9%, impaired lymphocyte profile 54.8%, impaired platelet profile 16.4%, impaired AST (ASPARTATE AMINOTRANSFERASE) profile 16.2%, impaired creatinine profile 9.5%, 67.6% of X-ray with GGO/infiltrates. Several risk factors were associated with the severity of COVID-19, including symptom factors (OR 12.59, p-value 0.002, 95% CI=1.46-55.20). ECG examination factor (OR 8.31, p-value 0.002, 95% CI=3.51-107.88) was also associated with severity. **Conclusion:** Therefore, to avoid the severity of COVID-19, clinical characteristics must be assessed as soon as feasible.

Keywords Clinical Sign, Characteristic, Symptom, COVID-19, Bogor

1. Introduction

Coronavirus Disease 2019 (COVID-19) was declared by World Health Organization (WHO) [1] as a world pandemic. The increase in cases occurred quite quickly and spread to various countries quickly. As of July 9, 2020, WHO reported 11,84,226 confirmed cases with 545,481 deaths worldwide (Case Fatality Rate/CFR 4.6%). Indonesia reported its first case on March 2, 2020. Cases are increasing and spreading rapidly throughout Indonesia. Three waves hit Indonesia. The first peak occurs in early January 2021, with 304 cases dying on average per week (CFR 2.5%). The second peak, in July 2021, will have an average of 1,778 deaths per week (CFR 3.6%). The third-highest peak was at the end of February 2022, with an average of 55,675 new cases per week, but COVID-19 deaths decreased by 287 cases per week (CFR 0.5%) [2]. Bogor Referral Covid Hospital is located in Bogor municipality. It is 60 km eastern from Jakarta, the Capital Republic of Indonesia. Bogor municipality population was 1,04 million people in 2020. In the earlier pandemic era, it must serve the people who got covid from the capital of Jakarta and surrounding area. In 2022, CFR of covid 19 in Bogor was 0.86% and cured rate was 19.9% [3].

The clinical characteristics of SARS-CoV-2 infection vary from asymptomatic to mild respiratory symptoms, respiratory failure, and even death. This condition is found in most Wuhan hospital patients because of the coronavirus. The results of several studies from hospitals in Wuhan state that the common symptoms shown by COVID-19 are fever, cough with sputum production, myalgia or fatigue [4], muscle aches, confusion, headache, sore throat, diarrhea, nausea and vomiting, dry cough [5], lymphopenia, prothrombin time prolongation, and increased lactate [6].

COVID-19 varies widely, ranging from asymptomatic to mild pneumonia-like symptoms to severe [7]. Respiratory failure in hospitalized COVID-19 patients was affected by pneumonia (61.9%), Acute Respiratory Distress Syndrome (ARDS) 8.73%, and both (7.25%). The research results at Prince Mohammed Bin Abdulaziz Hospital, Riyadh, showed that complications were also influenced by comorbidities in COVID-19 patients, especially Diabetes Mellitus (DM), hypertension, asthma, and inflammation of the nasal mucosal glands (chronic rhinosinusitis) [8] Several publications on the characteristics of COVID-19 only appeared in Indonesia one year during the pandemic, despite the fact that there was no outbreak. Jahja Wijaya [9] discovered the highest death rate in the age range of 61-70 years with comorbid hypertension; Aqmarina [10] discovered the highest death rate in the group over 65 years with comorbid DM [11].

Even though there have been several publications on the early pandemic, victims still suffer in hospitals because of a new type of the Sars-CoV-2 virus. There is no clinical evidence regarding signs and symptoms or definite clinical characteristics related to the severity of COVID-19, so it is still unknown. There are few research findings in Indonesia concerning the clinical picture of COVID-19 severity and as regional Covid referral Hospital we can compare the characteristics our patient with the others.

2. Materials and Methods

2.1. Design and Participants

A cross-sectional design was conducted to determine the relationship between clinical characteristics and the severity of COVID-19 during the Covid-19 pandemic referral hospital in Bogor city. All respondents studied the relationship between comorbidities and preventive behavior toward COVID-19 in Bogor in 2020. According to medical records, of 315 respondents who participated in the studies, 165 confirmed COVID-19 (PCR) and were considered for inclusion. Exclusion criteria were non-COVID-19, as many 150 respondents and COVID-19 confirmed, but there was insufficient information. A total of 148 respondents, according to medical records, were eligible samples for data analysis. Respondents with COVID-19 cases were collected during the study from August to November 2020 based on a hospitalization history with a positive PCR test certificate before being hospitalized and through a PCR test at the initial treatment at the hospital. Then, a positive test result for COVID-19 was recorded in the medical record as a confirmed COVID-19 respondent before going to the hospital and at the initial treatment.

2.2. Research Data Variables

The data were collected from the Nasional Institute of Health Research and Development's electronic database (NIHRD). Severity, results of supporting examinations (blood tests, radiology, and ECG), signs, and symptoms were the research variables. The clinical conditions in patients are confirmed for COVID-19 according to COVID-19 prevention and control guidelines rev.5 (mild, moderate, and severe) according to the symptom criteria. [8]. The conclusions of the hospital research team are used to evaluate the results of clinical and laboratory examinations (medical team). Demographic variables include age, gender, and blood type.

2.3. Data Analysis

Version 26.0 of the Statistical Package for Social Science was performed for statistical analyses. Subsequent bivariate analysis using chi-square and risk and significance analysis with basic logistic regression to see the link between the primary variable and other covariate variables with the dependent variable. The multivariate

study used multiple logistic regression to assess the pure effect of COVID-19 symptomatic factors on the severity of COVID-19 after controlling for other variables.

2.4. Ethical Clearance

This research received ethical approval no. LB.02.01/2/KE.505/2020, issued and endorsed by the health research ethics committee of the Ministry of Health's 2020 Balitbangkes.

3. Result

3.1. Demography Profile

From the analysis of individual characteristics in **Table 1**, it was found that most cases of COVID-19 occurred in males (56.1%), range of age 8-59 years old (71.0%), married (77.7%) and with O blood type (56.1%).

3.2. Clinical Characteristic

The findings of laboratory examination results (table 1) to confirmed cases of COVID-19 were as follows: the majority of respondents' X-ray/CT-scan interpretation of GGO/infiltration/ pleural effusion /consolidation (67.6%); impaired C-Reactive Protein (CRP) of 42.6%; impaired High Blood Pressure of 23.07%; high blood sugar 16.9%; impaired AST (Aspartate Aminotransferase) 16.2%; impaired both ALT (Alanine Aminotransferase) and blood sedimentation rate (LED) 14.9%; impaired leukocyte profile 14.2%, impaired ECG interpretation with cardiac disorder 13.5%, impaired platelets 9.5%, impaired creatinine 8.1%, impaired HbA1c 5.4%, impaired lymphocytes 4.1%, impaired lactic acid 4.7%, impaired procalcitonin (PCT) 1.4%, and impaired favorable smear profile 0.7%.

Table 1. Characteristics and Clinical Profile of COVID-19 Responders

Characteristics of COVID-19	Frequency (n=148)	Percentage (%)
Severity		
Yes	74	50,00
No.	74	50,00
Symptom		
A Symptomatic	108	78,40
Symptomatic	40	21,60
Gender		
Man	83	56,10
Woman	65	43,90
Age		
8-59 year	116	71,00
<7 dan >60 year	42	29,00
Marital status		
Married	115	77,70
Not married	33	22,30
Blood Pressure		
High (>130 systolic / >100 diastolic) mm Hg	34	23,00
Low (Systolic <100 / <70 systolic)mm.Hg	1	0,70
Blood Group		
A	22	14,90
B	27	18,20
AB	16	10,80
O	83	56,10

Table 1 continued

Blood Sugar		
Increase	25	16,90
Decrease	2	1,40
HbA1c		
Increase (>5,7)	8	5,40
Normal (≤ 5,7)	4	2,70
LED profile (mNo.hr)		
Increase	22	14,90
Leukocytes		
Increase	21	14,20
Decrease	75	50,70
Lymphocyte		
Increase	6	4,10
Decrease	75	50,70
Platelet		
Increase	14	9,50
Decrease	10	6,80
AST *(Aspartate Aminotransferase)*		
Increase	24	16,20
ALT *(alanine aminotransferase)*		
Increase	22	14,90
Creatinine		
Increase	12	8,10
Decrease	2	1,40
C-Reactive Protein (CRP)		
Increase	63	42,60
Procalcitonin (PCT≥ 0,5 ngml)		
Increase	2	1,40
Lactic Acid		
Increase	7	4,70
Electrocardiogram (ECG)		
Heart Disorders	20	13,50
Profil BTA (Mikroskopis/TCM)		
BTA Positif	1	0,70
X-ray/CT-scan profile		
GGO/Infiltration/ pleural effusion/consolidation	100	67,60
pulmonary TB	3	2,00

3.3. Demography and the Severity of COVID-19

Table 2 shows a relationship between respondent characteristics and COVID-19 severity: age group 8-59 years with a p-value = 0.001 and Odd Ratio=3.02 (95% CI: 1.41-6.46), unmarried group status with a p-value = 0.01 and OR= 2.89 (95% CI: 1.26-6.61), and symptomatic patient with a p-value of 0.001 and OR 12.38 (95% CI: 1.97-25).

Table 2. Correlation between Clinical Characteristics and Examination with the Severity of COVID-19

Descriptive	Severity of COVID-19				Total		P-value	OR	(95%CI)
	Yes		No						
	n	%	n	%	n	%			
Symptom									
Symptomatic asymptomatic	69	63,90	39	36,10	108	100,0	0,00*	12,39	4,48-34,21
Symptomatic	5	12,50	35	87,50	40	100,0			
Gender									
male	28	43,10	37	56,90	65	100,0	0,14*	1,64	0,85-3,16
female	46	55,40	37	44,60	83	100,0			
Age									
8-59 year	45	42,50	61	57,50	103	100,0	0,00*	3,02	1,41-6,46
<7 dan >60 year	29	69,00	13	31,00	42	100,0			
Marital									
Married	10	30,30	23	69,70	33	100,0	0,01*	2,89	1,26-6,61
Not married	64	55,70	51	44,30	115	100,0			
Blood Pressure									
Impaired	24	68,60	11	31,40	35	100,0	0,01*	2,75	1,23-6,15
No Disorder	50	44,20	63	55,80	113	100,0			
Blood Sugar dan HbA1c Profile									
Impaired	23	76,70	7	23,30	30	100,0	0,00*	4,32	1,72-10,84
No Disorder	51	43,20	67	56,80	118	100,0			
LED (mm/jam)									
Impaired	19	86,40	3	13,60	22	100,0	0,00*	8,18	2,30-29,04
No Disorder	55	43,70	71	56,30	126	100,0			
Leukocytes									
Impaired	16	61,50	10	38,50	26	100,0	0,20*	1,77	0,74-4,20
No Disorder	58	47,50	64	52,50	122	100,0			
Lymphocyte									
Impaired	48	59,30	33	40,70	81	100,0	0,01*	2,29	1,18-4,45
No Disorder	26	38,80	41	61,20	67	100,0			
Platelet									
Impaired	13	54,20	11	45,80	24	100,0	0,66	1,22	0,51-2,93
No Disorder	61	49,20	63	50,80	124	100,0			
AST) & ALT									
Impaired	19	61,30	12	38,70	31	100,0	0,16*	1,79	0,80-4,01
No Disorder	55	47,00	62	53,00	117	100,0			
Creatinin									
Impaired	9	75,00	3	25,00	12	100,0	0,09*	3,28	0,85-12,63
No Disorder	65	47,80	71	52,20	136	100,0			

Table 1 continued

C-Reactive Pprotein (CRP), PCT ≥ 0,5 ngml & Lactic Acid									
Impaired	45	70,30	19	29,70	64	100,0	0,00*	4,49	2,23-9,05
No Disorder	29	34,50	55	65,50	84	100,0			
Electrocardiogram									
Impaired	17	85,00	3	15,00	20	100,0	0,00*	7,06	1,97-25,28
No Disorder	57	44,50	71	55,50	128	100,0			
X-ray/CT-scan profile									
Impaired	62	60,20	41	39,80	103	100,0	0,00*	4,16	1,93-8,98
No Disorder	12	26,70	33	73,30	45	100,0			
Blood Group									
A	12	54,50	10	45,50	22	100,0	0,82	1,12	0,44-2,87
B	14	51,90	13	48,10	27	100,0	0,16	2,64	0,69-10,18
AB	5	31,30	11	68,80	16	100,0	0,85	1,11	0,36-3,45
O	43	51,80	40	48,20	83	100,0			

* Statistically significant related variables

3.4. Clinical Characteristics of Severity

Based on the bivariate analysis in **Table 2**, we found a relationship between clinical examination results with the severity of COVID-19. We have impaired blood pressure (high/low) with a p-value = 0.01 and OR 2.75 (95% CI: 1.23-6.15) and impaired HbA1c status with a p-value = 0.001 and OR= 4.32 (95% CI: 1.72-10.84). Impaired LED with p-value 0.001 and OR 8.18 (95% CI: 2.30-29.04). Impaired Lymphocyte with a p-value = 0.01 and OR= 2.29 (95% CI: 1.18-4.45). Impaired C-Reactive protein (CRP), PCT, and lactate profiles with a p-value = 0.001 and OR = 4.49 (95% CI: 2.23-9.05).

We observed impaired X-ray/CT-scan radiology findings by infiltration/pleural effusion/ consolidation / TB with a p-value =0.001 and OR= 4.16 (95% CI: 1.93-8.98). Poor ECG results from a heart condition with a p-value = 0.001 and an OR = 7.06 (95% CI: 1.97-25.28). Other variables, including gender, leukocyte profile, platelet profile, AST (Aspartate Aminotransferase) & ALT (Alanine Aminotransferase) profile, creatinine profile, and blood group, did not significantly relate to COVID-19 severity (P value > 0.06).

Variables included in the multivariate analysis, **Table 3**, were variables during the bivariate analysis having a p-value <0.25, namely sex, marital status, age group, symptoms, leukocyte profile, lymphocyte profile, platelet profile, blood pressure, creatinine profile, LED profile, X-ray, ECG, AST (Aspartate Aminotransferase) and ALT (Alanine Aminotransferase) profile, PCT, Lactate and CRP profile, and blood sugar profile. Variables are arranged hierarchically as a complete model, and from the analysis, results excluded variables that are not significant (p>0.05) one by one from the model with the principle of hierarchical backward elimination. After multivariate analysis, the latest model found that the severity of COVID-19, controlled by age groups (elderly or toddlers), lung (X-ray/CT-Scan results), and lymphocytes disorders, was associated with impaired erythrocyte sedimentation, blood sugar level, and heart, which significantly increases the risk of severity. This model contributes 75.2% to the severity of Covid-19 in Bogor City.

Table 3. Multivariate Model with Conditional Logistic Regression

Variable	B	S. E	Wald	P-value	OR	95% CI
Age Group	0,02	0,56	0,00	0,967	0,98	0,33-2,92
Symptom	2,53	0,66	14,75	0,000*	12,59	3,46-45,88
Impaired Lymphocyte	0,56	0,45	1,57	0,210	1,75	0,73-4,22
Impaired LED	2,97	0,87	11,56	0,001*	19,40	3,51-107,21
Impaired Xray	0,79	0,54	2,11	0,146	2,19	0,76-6,33
Cardiac Disorder (electrocardiogram)	2,20	0,93	5,62	0,018*	8,99	1,46-55,20
Impaired Blood Sugar	1,20	0,59	4,10	0,043*	3,31	1,04-10,51

* Statistically significant related variables

4. Discussion

Coronavirus disease 2019 (COVID-19) is a new type of disease caused by the coronavirus. The disease has spread to almost everyone, so WHO has declared it a pandemic. Because the epidemic is still ongoing, there has been little research that can provide precise answers. To obtain these answers, epidemiologically, everything is still trial and error. Moreover, other factors influence 24.8%. Thus, not many comparisons of research results can be quoted to support the conclusions of the COVID-19 study in Bogor cities. Some of the study's findings align with WHO recommendations for responding to the COVID-19 pandemic [13], [14].

According to WHO [1], the COVID-19 virus is transmitted in two ways: through inhalation and direct contact with sufferers. Transmission via the respiratory route occurs when droplets produced by coughing or sneezing (droplets) from someone infected with COVID-19 are present. People over 50, being pregnant, having a weak immune system, having a long-term illness, and other things are thought to increase the risk of death in COVID-19 patients. The findings of COVID-19-affected countries' reports at the beginning of the pandemic, 40% of cases had mild sickness, 40% had a severe disease, including pneumonia, 15% had a severe illness, and 5% had a critical condition. People who are older (elderly) or have pre-existing medical disorders such as high blood pressure, heart and lung difficulties, diabetes, and cancer are more likely to experience severe symptoms[16].

According to the data collected from 5 COVID-19 referral institutions, about 74 patients were confirmed positive for COVID-19 and were experiencing severity (moderate/severe). The patient has admitted to the hospital with the results of the PCR swab examination confirmed positive for COVID-19, both before entering the hospital (referral to other health facilities and independently on the patient and family's initiative) and after entering the hospital (PCR swab). When the patient was taken to the hospital, he had multiple comorbidities, including ARI/COPD/Pneumonia (18.2%), diabetes (16.9%), and hypertension (16.2%) [17].

When 148 patients were admitted to the hospital and treated, they had laboratory investigations, and the findings of the examinations were classified as a disorder or not. Our findings show various clinical indicators related to the severity of COVID-19, including blood sugar profile, sedimentation rate, blood lymphocyte count, high C-Reactive Protein (CRP) enzyme, high procalcitonin (PCT), high lactate, and radiology results. Initial treatment of COVID-19 patients also has a critical influence on the severity of COVID-19, particularly X-ray results with GGO/infiltration/pleural effusion/TB consolidation and ECG with signs of cardiac issues. Although the profile of leukocytes, platelets (thrombocytopenia), AST (Aspartate Aminotransferase)/ ALT (Alanine Aminotransferase), and creatinine is not significantly associated with the severity of COVID-19, there is a tendency to increase the risk of severity owing to COVID-19. The severity of COVID-19 is experienced by as many as five people (12.5%) in symptomatic patients (63.9%).

Susu He and his friend [18] found the same results, clinical characteristics in the severity of COVID-19 with pneumonia, at the time of admission, the patient experienced thrombocytopenia 19%, lymphocytosis 76%, increase in AST (Aspartate Aminotransferase) 19% / ALT (Alanine Aminotransferase) 24%, creatinine 14%, increase in C-reactive protein 86%, increase in Procalcitonin 38%. Increased levels of PCT, D-dimer, and coagulation parameters are not adequate to anticipate disease worsening or qualify as critical patients requiring intensive care. However, if X-ray/CT scan results mark a picture of lung inflammation, there is a severity risk [18], [19].

At the beginning of the pandemic, researchers in Wuhan studied differences in clinical characteristics between two hospitals in Wuhan using a SOFA (Sequential, Organ Failure Assessment) score. Patients with COVID-19 had 48% of comorbidities, including hypertension (30%), diabetes (19%), and coronary heart disease (8%). According to multivariate data, the elderly have an increased risk of death [20], [21]. It is consistent with this study's findings, which found that the unproductive age group (elderly/toddlers) has a risk (OR 1.2), albeit not statistically significant [18]. People who do not survive COVID-19 are typically elderly, extremely ill to critically

ill at the time of hospitalization, and require ICU care and it is found that older macaques had a natural response to the virus. It meant they were more resistant to the virus than younger macaques, even though they were still infected [22]. MuLBSTA, which stands for "multilobular infiltration, lymphopenia, bacterial co-infection, smoking, high blood pressure, and age," is one of six- score factors used in COVID-19 to predict the likelihood of death [5].

The cardiovascular characteristics of people infected with Sar-CoV-2 contribute to significant mortality. The pathophysiology of ARI caused by coronavirus two is characterized by increased production of excessive inflammatory cytokines (IL-6 and TNF-α), which produce systemic inflammation and multiple organ dysfunction syndromes that have an immediate effect on the cardiovascular system. Increased us-troponins one was related to inflammatory biomarkers (IL-6 and C-reactive protein (CRP), leukocytosis, lymphocytosis, lactate, procalcitonin, and erythrocyte sedimentation rate), indicating myocardial damage and virus-induced inflammatory hyperactivity. Sars-CoV-2 Tropism and RAAS (Renin, Angiotensin, Aldosterone System) interactions via the ACE2 receptor may augment the inflammatory response and cardiac aggressiveness [18], [23]. According to 19 articles, comorbidities such as diabetes, cardiovascular disease, and chronic respiratory illness were more common in severe COVID-19 patients than in moderate COVID-19 patients[8], [21], [24].

There are limitations to our analysis, particularly for patients who were asymptomatic with positive confirmation on admission to the hospital and experienced worsening and death, as well as supporting examination data that were not collected in patients with moderate disease. Furthermore, the duration of treatment for each patient was not recorded. Therefore, it could not be examined. Because most patients with blood group O (56%) cannot be compared to other blood groups, the blood type cannot be analyzed multivariate. Although some blood groups, such as blood group B (OR 2.6), AB, and A (OR 1.1), are more likely than blood group O to encounter the severity of COVID-19. Other studies have found that blood groups A and B are more susceptible than blood group O, which is more protective. However, none of these studies were statistically significant and had no relation to death or the severity of COVID-19 [25], [26].

5. Conclusions

The pandemic is still ongoing along with the mutation of the coronavirus, which gives an uncertain clinical picture. The potential for asymptomatic can be a poor prognosis with age, comorbidities, and the immune system in each individual, so testing/screening of clinical characteristics is significant to help clinicians identify poor prognosis early and optimal intervention in the future

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Authors' Contributions

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Conflict of Interest Disclosure

The authors declare that there are no competing or potential conflicts of interest.

REFERENCES

[1]   WHO, 'Weekly Operational Update on COVID-19', Emergency Situational Updates, no. 77, pp. 1–10, 2021.

[2]   John Hopkins Center for Systems Science and Engineering, 'Situasi Covid-19', Statistik Situasi Corona, Mar. 07, 2023. systems.jhu.edu/research/public-health/ncov/ (accessed Mar. 07, 2023).

[3]   District Health Office, 'Dasboard of COVID-19 Respon 2022 in Bogor City', Bogor, Dec. 2022. Accessed: Mar. 13, 2023. [Online]. Available: https://dinkes.kotabogor.go.id/home/detailpost/informasi-data-penanggulangan-covid-19-kota-bogor-4-september-tahun-2022

[4]   S. Liu et al., 'Clinical characteristics and risk factors of

patients with severe COVID-19 in Jiangsu province, China: A retrospective multicentre cohort study', BMC Infect Dis, vol. 20, no. 1, Aug. 2020, doi: 10.1186/s12879-020-05314-x.

[5] N. Chen et al., 'Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study', Lancet, vol. 395, no. 10223, pp. 507–513, 2020.

[6] Wei-jie Guan et al., 'Clinical characteristics of 2019 novel coronavirus infection in China', medRxiv preprint first posted online Feb. 9, 2020, vol. 3154, no. 01, pp. 18–27, 2020, doi: doi: dx.doi.org/10.1101/2020.02.06.20020974.

[7] P. Santus et al., 'Severity of respiratory failure at admission and in-hospital mortality in patients with COVID-19: a prospective observational multicentre study', BMJ Open, vol. 10, no. 10, p. e043651, 2020, doi: 10.1136/bmjopen-2020-043651.

[8] O. Al Hussain, 'Clinical characteristics and Co-morbidities among patients admitted with COVID-19', Annals of Medicine and Surgery, vol. 78, no. May, p. 103898, 2022, doi: 10.1016/j.amsu.2022.103898.

[9] J. T. Widjaja, L. Kwee, A. K. Giantara, H. A. Subagiyo, C. Edwin, and R. L. Putri, 'Characteristics of Hospitalized COVID-19 Patients at Immanuel Hospital Bandung, Indonesia', Journal of Medicine and Health Karakteristik Pasien COVID-19 Rawat, vol. 3, no. 2, pp. 164–75, 2021.

[10] A. Aqmarina, N. Adnan, and E. Budi Hastuti, 'COVID-19 Deaths with Age Standardization by Region in Indonesia from March 2020 to May 2021', Jurnal Epidemiologi Kesehatan Indonesia, vol. 6, no. 2, pp. 1–10, May 2022.

[11] A. Puspitasari Dyah Nugroho et al., 'Analysis of COVID-19 Deaths with Age Standardization by Region in Indonesia for the period March 2020 - May 2021'.

[12] Kementrian Kesehatan RI, Pencegahan, Pedoman, Dan Pengendalian CORONAVIRUS DISEASE (COVID-19). 2020.

[13] P. Chico-Sánchez et al., 'The effectiveness of mRNA vaccines to prevent SARS-CoV-2 infection and hospitalisation for COVID-19 according to the time elapsed since their administration in health professionals in the Valencian Autonomous Community (Spain)', Prev Med (Baltim), vol. 163, no. June, p. 107237, 2022, doi: 10.1016/j.ypmed.2022.107237.

[14] S. Pramod et al., 'Effectiveness of Covishield vaccine in preventing Covid-19 – A test-negative case-control study', Vaccine, vol. 40, no. 24, pp. 3294–3297, 2022, doi: 10.1016/j.vaccine.2022.02.014.

[15] World Health Organization, 'Pertanyaan jawaban terkait COVID-19, HIV, antiretroviral di Indonesia', 2020. https://www.who.int/indonesia/news/novel-coronavirus/qa/qa-how-is-covid-19-transmitted (accessed Aug. 21, 2022).

[16] Ministry of Health of the Republic of Indonesia, CORONAVIRUS DISEASE (COVID-19) PREVENTION AND CONTROL GUIDELINES, 1st ed., vol. 1. Jakarta: SUBDIT PIE, 2020. doi: 10.29239/j.agrikan.9.2.i-iii.

[17] F. P. Senewe, 'Relationship between Comorbidities and Preventive Behavior on COVID-19 cases in Bogor City in 2020', Jakarta, 2020.

[18] S. He, L. Fang, L. Xia, S. Lin, J. Ye, and D. Luo, 'Clinical Characteristics and Early Interventional Responses in Patients with Severe COVID-19 Pneumonia', Comput Math Methods Med, vol. 2021, pp. 5–10, 2021, doi: 10.1155/2021/6676987.

[19] J. C. Leemans, M. J. B. M. Vervoordeldonk, S. Florquin, K. P. Van Kessel, and T. Van Der Poll, 'Differential role of interleukin-6 in lung inflammation induced by Lipoteichoic acid and peptidoglycan from Staphylococcus aureus', Am J Respir Crit Care Med, vol. 165, no. 10, pp. 1445–1450, 2002, doi: 10.1164/rccm.2106045.

[20] F. Zhou et al., 'Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China : a retrospective cohort study', The Lancet, vol. 395, no. 10229, pp. 1054–1062, 2020, doi: 10.1016/S0140-6736(20)30566-3.

[21] E. S. Sulistyowati, S. S. Muninggar, and V. Silalahi, 'Risk Factors of Covid-19 Confirmed Died Patients in Dr. Kariadi Hospital: A Retrospective Study', Indonesian Journal of Tropical and Infectious Disease, vol. 9, no. 1, p. 1, 2021, doi: 10.20473/ijtid.v9i1.22609.

[22] N. Simkhada et al., 'Comparison of clinical characteristics and short-term outcomes among COVID-19 patients in a tertiary care center during second wave pandemic in Nepal: a cross-sectional study', F1000Res, vol. 11, p. 903, 2022, doi: 10.12688/f1000research.123123.1.

[23] R. B. Azevedo et al., 'Covid-19 and the cardiovascular system: a comprehensive review', Journal of Human Hypertension, vol. 35, no. 1. Springer Nature, pp. 4–11, Jan. 01, 2021. doi: 10.1038/s41371-020-0387-4.

[24] M. Mudatsir et al., 'Predictors of COVID-19 severity: a systematic review and meta-analysis [version 2; peer review: 2 approved]', F1000Res, vol. 9, no. January, pp. 1–26, 2021, doi: 10.12688/F1000RESEARCH.26186.2.

[25] Y. Kim et al., 'Relationship between blood type and outcomes following COVID-19 infection', Seminars in Vascular Surgery, vol. 34, no. 3. W.B. Saunders, pp. 125–131, Sep. 01, 2021. doi: 10.1053/j.semvascsurg.2021.05.005.

[26] R. Rana, V. Ranjan, and N. Kumar, 'Association of ABO and Rh Blood Group in Susceptibility, Severity, and Mortality of Coronavirus Disease 2019: A Hospital-Based Study From Delhi, India', Front Cell Infect Microbiol, vol. 11, Nov. 2021, doi: 10.3389/fcimb.2021.767771.