

Clinical characteristics and mortality associated with COVID-19 in Islamic hospital of Jemursari, Surabaya, Indonesia: A hospital-based retrospective cohort study

Evi Awwaliyah^{1,2}, Hotimah^{3*}, Michio Shimabukuro⁴

¹Department of Internal Medicine, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya;

²Department of Internal Medicine, Islamic Hospital of Jemursari, Surabaya Indonesia;

³Department of Biochemistry and Biomolecular Science, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia;

⁴Department of Department of Diabetes, Endocrinology and Metabolism, Fukushima Medical University, Japan;

*Corresponding author:
Hotimah;

Department of Biochemistry and Biomolecular Science, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia;
dr.hotimah@unusa.ac.id

Received: 2022-07-16

Accepted: 2022-08-18

Published: 2022-09-15

ABSTRACT

Introduction: According to WHO, the COVID-19 epidemic a public health emergency came to international attention in March 2020, and the pandemic quickly spread around the world. This disease is caused by the novel coronavirus SARS-CoV-2, which may enter human target cells via angiotensin-converting enzyme 2 (ACE2). This study aimed to assess the risk factors associated with poor prognosis among COVID-19 patients in the Islamic Hospital of Jemursari, Surabaya, Indonesia.

Methods: This study was a retrospective cohort study that used patients hospitalized with COVID-19 at the Islamic Hospital of Jemursari, Surabaya as a study subject. Patients of all ages who enter the hospital and were confirmed with a positive real-time polymerase chain reaction (RT-PCR) result for SARS-CoV-2 were inclusion criteria of this study.

Results: We included 554 COVID-19-positive patients with the highest age at 26-35 years old as much as 26.72%, followed by the second highest at 36-45 years old at 20.86%. In addition, from all the patients in this study, it was found that the most patients were 281 male and 273 female. Characteristics of comorbidities in COVID-19 patients, where type 2 diabetes mellitus is the most comorbid factor 88.89% in recovered COVID-19 patients and 11.11% in patients who have died. In addition, hypertension is also the second most comorbid 96.55% of Covid-19 patients.

Conclusion: Based on this study, the independent risk factors related to critical outcomes among COVID-19 cases include old age, males, diabetes mellitus, cardiac-related disease history, and the presence of two or more comorbidities. In future research, we suggest designing a unique multi-item scale system to prognosticate COVID-19 patients.

Keywords: COVID-19, characteristic, mortality, prognosis.

Cite This Article: Awwaliyah, E., Hotimah., Shimabukuro, M. 2022. Clinical characteristics and mortality associated with COVID-19 in Islamic hospital of Jemursari, Surabaya, Indonesia: A hospital-based retrospective cohort study. *Bali Medical Journal* 11(3): 1202-1206. DOI: 10.15562/bmj.v11i3.3541

INTRODUCTION

SARS-CoV2 or Severe acute respiratory syndrome coronavirus 2, is a virus that causes coronavirus disease 2019 (COVID-19) and has spread rapidly around the world since it was first reported in Wuhan, China in December 2019.¹ In recent days, virus continue to spread and most of the cases currently occurred in low- and middle-income countries (LMIC)², these regions has different characteristics in age distribution, comorbidities, access to quality health services, and other factors which may affect trends regarding severe outcomes, however the data are still limited.^{3,4} Indonesia is the known as the fourth most crowded country with its population approximately of 274 million and it has endured the most elevated number of COVID-19 affirmed cases and

passings in Southeast Asia, moment as it were to India in Asia.² Since the primary two laboratory-confirmed SARS-CoV-2 contaminations were detailed on March 2, 2020, Indonesia has detailed an add up of 1,012,350 cases and 24,468 passings (2.8% affirmed case casualty rate) up to January 26, 2021, of which 25% (254,580) of cases and 17% (4077) of passings within the capital city of Jakarta. COVID-19 cases and passings in Jakarta quickly heightened amid the primary two months of the episode (March-April 2020), and have consistently trended upward through January 2021.

The clinical manifestation of COVID-19 has wide spectrum including asymptomatic and mild upper respiratory tract symptoms to severe illnesses with multiorgan failure and fatally can cause death.^{5,6} It remains a challenge to predict

the clinical course and determine the deterioration risk in the patients. Previous reports showed that old age and male gender are risk factors for disease severity and mortality.¹ There are also certain comorbidities are associated with poor prognoses such as cardiovascular disease, diabetes mellitus, chronic respiratory disease, and hypertension.⁷ Moreover, distinct clinical signs or even laboratory findings are correlated with worse outcomes.¹

ACE2 has ended up central in understanding the pathogenesis of COVID-19, as SARS-CoV2 employments ACE2 as a receptor for cellular entry.⁸ ACE2 is found to be expressed in several cells and tissues.^{9,10} It remains as a question whether ACE2 is a potential harmful or useful role in COVID-19. Higher levels of ACE2 may provide extra invasion

target of the virus, targets empowering viral attack of ACE2-expressing cells, in any case, higher ACE2 moreover has advantageous impacts in control of the renin-angiotensin framework (RAS), which is basic for controlling hypertension and related cardiometabolic disorders.¹¹

Obesity, characterized by excess fat mass, is one of the strongest risk factors reported for severity in patients with COVID-19, but the mechanism underlying this increased risk remains unclear. It is well known that adipose tissue, consisting of adipocytes, endothelial, immune and vascular cells, can be an energy reservoir and endocrine organ, and secretes various hormones, cytokines, and chemokines.¹² According to the Genotype-Tissue Expression (GTEx) resource of gene expression in 54 tissues, the adipose tissue was known as highest sites of ACE2 expression in the body.¹³

Several potential mechanisms have been proposed for the contribution of adipose tissue to COVID-19 clinical severity¹⁴, and its influence may in fact be multi-factorial. Adipose tissue has been shown to act as a viral reservoir for numerous viruses, including SARS-CoV and type A influenza¹⁵, and may contribute to prolonged viral shedding. Adipose tissue is also a prime candidate contributor to the widely-repostered cytokine storm characteristic of severe COVID-19.^{14,16} Most importantly, obesity is a potentially modifiable COVID-19 risk factor, and deeper understanding of the contribution of adipose tissue to COVID-19 severity, as well as to cardio-metabolic risk more generally, may better inform therapeutic strategies, and motivate policies supporting healthy weight maintenance programmes. Based on this background, this study aims to determine whether ACE2 expression in adipose tissue is associated with metabolic syndrome risk factors for COVID-19. Furthermore, this study aimed to identify the characteristics of the patients including demographics and comorbidities aspects associated with severe disease and death. This study also aimed to describe the symptom that may predicted progression to severe disease and death in COVID-19, and we examine the mechanism of ACE2 in adipose cell culture.

METHODS

Study Design

This study was retrospective cohort study that obtained the data from hospitalized patient with COVID-19 at the Islamic Hospital of Jemursari, Surabaya. Patients of all ages who presented to the hospital and had a positive real time polymerase chain reaction (RT-PCR) result for SARS-CoV-2 were inclusion criteria of this study. A list of medical record numbers (MRNs) was extracted from the integrated electronic medical record (EMR) for all patients with COVID-19 positive test results hospitalized between April 1, 2020 and July 31, 2020. There were 554 patients admitted during this study period.

Data Collection

The data were obtained from medical records at the Jemursari Islamic Hospital which contained data such as, the onset of illness (including the date), the results of SARS-CoV-2 PCR test, hospital admission, and results (discharge or death) were recorded, along with age, gender, clinical signs and symptoms, comorbidities, and several important indicators (eg, prompt admission to the intensive care unit). The patients' comorbidities were recorded at admission by attending clinical staff, either based on clinical assessment or patient

reporting. Fever is a condition of the body that defined as an axillary temperature of at least 38 °C or higher.

Data Analysis

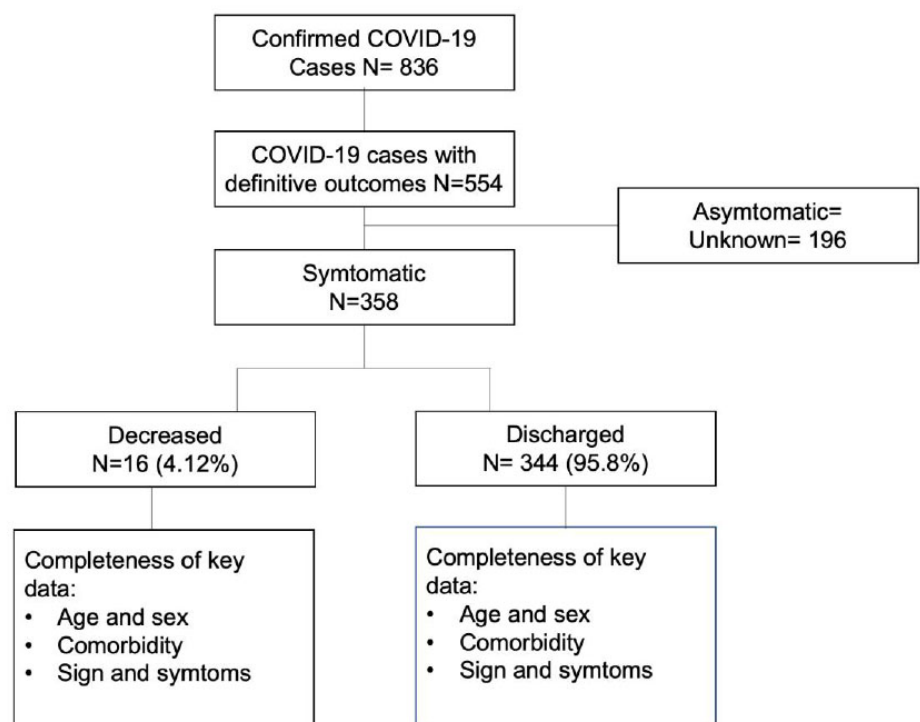
Descriptive statistics included proportions for categorical variables and medians and interquartile ranges (IQRs) for continuous variables. We calculated time in days from symptom onset to hospital admission, and length of hospital stay until death or discharge. We used the Mann-Whitney U test, χ^2 test, or Fisher's exact test to compare characteristics between deceased and discharged patients.

RESULTS

Demographic and clinical characteristic

Data from April 1 to July 31, 2020, found 554 confirmed COVID-19 patients at the Jemursari Islamic Hospital of Surabaya. Where there was an increase in the number of COVID-19 patients in April as many as 26 patients, in May 36 patients, in June 96 patients and increasing in July as many as 398 patients. This is illustrated in the [figure 1](#).

[Table 1](#) presents the characteristics of the 554 patients included in the analysis. The highest age was at 26-35 years old as much as 26.72%, followed by the second



highest at 36-45 years old at 20.86%. In addition, from all the patients in this study, it was found that the most patients were 281 male and 273 female. From these data, there is no difference in the number of COVID-19 sufferers in men and women.

Confirmed and reported cases of COVID-19 have symptoms that range from mild complaints, such as fever and cough, to more critical cases associated with difficulty breathing. In this study, 358 patients had symptoms and 196 patients

had no symptoms. The most symptoms suffered by COVID-19 patients were cough, as much as 91.3% in recovered patients and 8.7% in deceased patients. In addition, fever was suffered by 86.3% of patients and 13.8% of patients who died (figure.2 A).

The increasing mortality rate in COVID-19 patients is often associated with the comorbid factors they suffer. Figure 2.B presents the characteristics of comorbidities in COVID-19 patients, where type 2 diabetes mellitus is the most comorbid factor 88.89% in recovered COVID-19 patients and 11.11% in patients who have died. In addition, hypertension is also the second most comorbid 96.55% in Covid-19 patients.

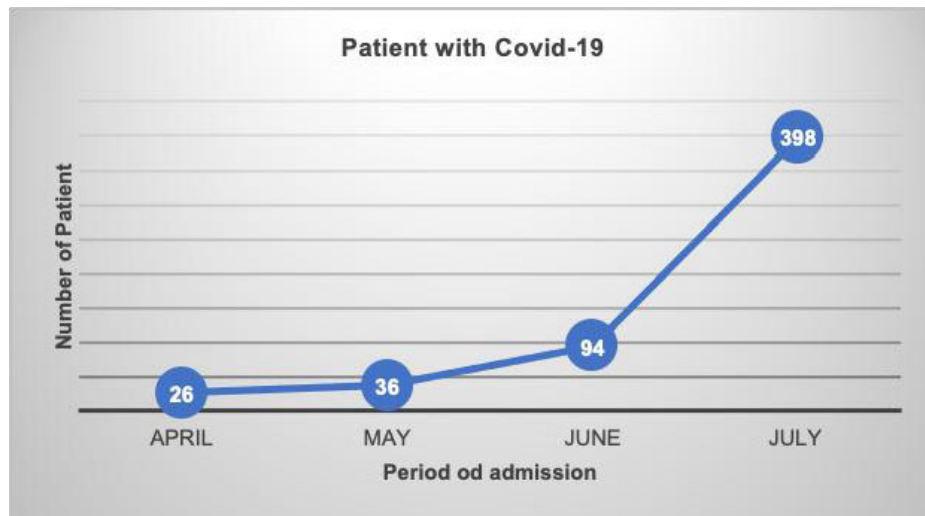


Figure 1. Presenting number of patient with Covid-19.

Table 1. Demographics, clinical characteristics, and outcomes of COVID-19.

	Total N= 554	Deceased N= 16	Discharged N= 538
Age group, years			
0 – 4 years,	3 (0.52%)	0	3 (100%)
5 – 11 years.	5 (0.86%)	0	11 (100%)
12 – 16 years.	0	0	0
17 – 25 years.	30 (5.17%)	0	30 (100%)
26- 35 years.	155 (26.72%)	0	155 (100%)
36- 45 years.	121 (20.86%)	2 (1.65%)	119 (98.35%)
46- 55 years.	114 (19.66%)	3 (2.63%)	111 (97.36%)
56 – 65 years.	87 (15%)	8 (9.2%)	79 (90.8%)
≥65	39 (6.72%)	3 (7.69%)	36 (92.31%)
Sex			
Male	281 (50.72%)	8 (2.85%)	273 (97.15%)
Female	273 (49.28%)	8 (92.93%)	265 (97.07%)
Type of Comorbidity			
Diabetes Mellitus	36 (6.45%)	4 (11.11%)	32 (88.89%)
Hypertention	29 (5.23%)	1 (3.45%)	28 (96.55%)
CVA	8 (1.44%)	0	8 (100%)
Renal Disorder	5 (0.90%)	2 (40%)	3 (60%)
Cardiovascular diseases	6 (1.08%)	0	6 (100%)
Co-exixting infection	3 (0.54%)	0	3 (100%)
Risporatory system	3 (0.54%)	0	3 (100%)
Pregnancy	12 (2.16)	0	12 (100%)
Without comorbidity	459 (82.85%)	10	449 (97.82%)

DISCUSSION

Based on this study, most of the COVID-19 patients were people in young adults to middle-aged persons (26-35 years). This study has different results from the previous study which found that most of the patients that can be found infected with COVID-19 were people in 60-69 years (21%) in Brazil, and 17.4% in the Iran population.^{17,18} These different results may happen due to changes in an activity where younger people may return to their hometown after going abroad for work or college.¹⁸

In this study, men were more likely to have COVID-19 compared to females. This study also has similar results to a previous study that also found male has a greater number than female getting infected with SARS-CoV-2. It also showed in various regions and it can be attributed to biological aspects. A previous study stated that males can be more susceptible to viral infections.¹⁸

According to this study, the common symptoms that can be seen in COVID-19 patients are anosmia, runny nose, myalgia, and cough. This finding also has similar results to a previous study in Thailand, which found that cough and myalgia are also the most common symptoms that can be found in patients. However, in the previous study, the anosmia did not occur in most of the patients with COVID-19 (5.7%), thus it has slightly different characteristics from our study.¹⁹

This study also showed some

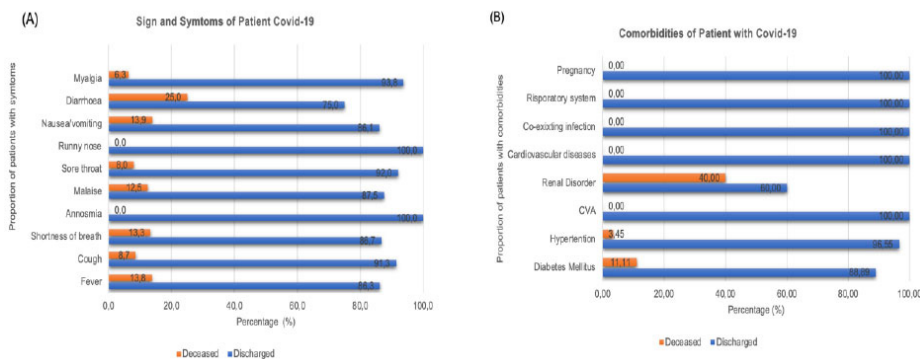


Figure 2. (a) Sign and Symptoms of Patient COVID-19 (b) Comorbidities of Patient with COVID-19.

comorbidities related to COVID-19 patients. Most of the patients had diabetes mellitus and hypertension. This finding also has similar results to the previous study that found the underlying disease in COVID-19 patients were hypertension (10.1%) and Diabetes Mellitus (9.8%). This condition may occur due to higher expression of angiotensin-converting enzyme 2 (ACE2) receptors in patients with these two related diseases that consumed the ACE2-stimulating treatments. Furthermore, this receptor is considered to have an important role related to the COVID-19 pathogen, SARS-CoV-2 when entering the human cells.¹⁸

CONCLUSION

Based on this study, the independent risk factors related to critical outcomes among COVID-19 cases include old age, males, diabetes mellitus, cardiac-related diseases history, and the presence of two or more comorbidities. In future research, we suggest designing a unique multi-item scale system to prognosticate COVID-19 patients.

DISCLOSURE

Author Contribution

All authors have contributed to this research process, including conception and design, analysis and interpretation of the data, drafting of the article, critical revision of the article for important intellectual content, final approval of the article, collection and assembly of data.

Funding

The authors are responsible for all of the study funding without a grant or any external funding source.

Conflict of Interest

There is no conflict of interest for this manuscript.

Ethical Consideration

This study was approved by the Health Research Ethics Committee of the Jemursari Islamic Hospitals (0185/KEPK-RSI JS/VII/2020).

ACKNOWLEDGEMENT

The authors would like to thank Nahdlatul Ulama Surabaya University which has helped a lot during this research. We would also like to express gratitude to all final year nursing student and fellow friends for their continuous encouragement, support, and cooperation.

REFERENCES

- Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020;395(10229):1054–62.
- Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis*. 2020;20(5):533–4. Available from: [http://dx.doi.org/10.1016/S1473-3099\(20\)30120-1](http://dx.doi.org/10.1016/S1473-3099(20)30120-1)
- Clark A, Jit M, Warren-Gash C, Guthrie B, Wang HHX, Mercer SW, et al. Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study. *Lancet Glob Heal*. 2020;8(8):e1003–17.

- Nachega JB, Leisegang R, Kallay O, Mills EJ, Zumla A, Lester RT. Mobile Health Technology for Enhancing the COVID-19 Response in Africa: A Potential Game Changer? *Am J Trop Med Hyg*. 103(1):3–5.
- Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA*. 2020;323(11):1061–9.
- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet (London, England)*. 2020;01/30. 2020;395(10223):507–13.
- Guan W-J, Liang W-H, Zhao Y, Liang H-R, Chen Z-S, Li Y-M, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *Eur Respir J*. 2020;55(5):2000547.
- Hoffmann M, Kleine-Weber H, Schroeder S, Krüger N, Herrler T, Erichsen S, et al. SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. *Cell*. 2020/03/05. 2020;181(2):271–280.e8.
- Morrison S, McGee SL. 3T3-L1 adipocytes display phenotypic characteristics of multiple adipocyte lineages. *Adipocyte*. 2015;4(4):295–302.
- Seow JJW, Pai R, Mishra A, Shepherdson E, Lim TKH, Goh BKP, et al. Single-Cell RNA-seq Reveals Angiotensin-Converting Enzyme 2 and Transmembrane Serine Protease 2 Expression in TROP2(+) Liver Progenitor Cells: Implications in Coronavirus Disease 2019-Associated Liver Dysfunction. *Front Med*. 2021;8:603374.
- Tikellis C, Thomas MC. Angiotensin-Converting Enzyme 2 (ACE2) Is a Key Modulator of the Renin Angiotensin System in Health and Disease. Kim SH, editor. *Int J Pept*. 2012;2012:256294.
- Scheja L, Heeren J. The endocrine function of adipose tissues in health and cardiometabolic disease. *Nat Rev Endocrinol*. 2019;15(9):507–24.
- Aguet F, Brown AA, Castel SE, Davis JR, He Y, Jo B, et al. Genetic effects on gene expression across human tissues. *Nature*. 2017;550(7675):204–13.
- Ryan PM, Caplice NM. Is Adipose Tissue a Reservoir for Viral Spread, Immune Activation, and Cytokine Amplification in Coronavirus Disease 2019? *Obesity (Silver Spring)*. 2020;28(7):1191–4.
- M. BJJ, A. DRJ, J. VFL. Intracellular Infections Enhance Interleukin-6 and Plasminogen Activator Inhibitor 1 Production by Cocultivated Human Adipocytes and THP-1 Monocytes. *Clin Vaccine Immunol*. 2009;16(8):1222–7.
- Malavazos AE, Corsi Romanelli MM, Bandera F, Iacobellis G. Targeting the Adipose Tissue in COVID-19. *Obesity (Silver Spring)*. 2020;28(7):1178–1179.
- Peres IT, Bastos LSL, Gelli JGM, Marchesi JF, Dantas LF, Antunes BBP. Since January 2020

Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website. Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre-including this research content-immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement

of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. Sociodemographic factors associated with COVID-19 in-hospital mortality in Brazil. 2020;(January).

18. Sohrabi MR, Amin R, Maher A, Bahadorimonfared A, Janbazi S, Hannani K, et al. Sociodemographic determinants and clinical risk factors associated with COVID-19 severity: a cross-sectional analysis of over 200,000 patients in Tehran, Iran. *BMC Infect Dis.* 2021;21(1):1–13.
19. Bruminhent J, Ruangsubvilai N, Nabindhakara J, Ingsathit A, Kiertiburanakul S. Clinical characteristics and risk factors for coronavirus disease 2019 (COVID-19) among patients under investigation in Thailand. *PLoS One.* 2020;15(9 September):1–14. Available from: <http://dx.doi.org/10.1371/journal.pone.0239250>



This work is licensed under a Creative Commons Attribution