



Clinical Characteristics of COVID-19 Deaths: An Electronic Medical Records-based Study

Erling David Kaunang, Erwin Gidion Kristanto*, Jimmy Panelewen, Ivonne Elisabeth Rotty

Prof.dr.R.D Kandou Central General Hospital, Manado, Indonesia

Abstract

AIM: The aim of the study was to analyze the clinical characteristics of death cases with Coronavirus Disease 2019 (COVID-19).

METHODS: We collected clinical characteristics of confirmed COVID-19 patients who died from January 01, 2022, to March 31, 2022, in Prof. Dr. R. D. Kandou General Hospital, Manado, Indonesia. The patient's clinical features were obtained from the electronic medical records: Age, sex, history of COVID-19 vaccination, type of vaccine, s-gene target failure (SGTF) result, duration of hospitalization, comorbidities, and cause of death.

RESULTS: Seventy-nine medical records of COVID-19 patients treated and died at Prof. Dr. R. D. Kandou General Hospital, Manado, Indonesia, from January 01, 2022, to March 31, 2022. The mean age of patients was 56-years-old, 57% were males, and 43% were females. The mean duration of hospitalization was 5 days. Most patients (73%) had not received any COVID-19 vaccine. SGTF results showed a probable Omicron variant in 53% of the subject, 13% of non-probable Omicron, and 13% of others who did not have the test. A third of the deceased patients had at least one type of comorbid condition. Diabetes mellitus was the most common comorbidity in 66% of our subjects. Most of the issues died due to respiratory failure (63%), and the rest died due to multiple organ failures, septic shock, and cerebrovascular accidents.

CONCLUSION: One-third of COVID-19 patients who died at least had one type of comorbidity, commonly diabetes mellitus. Most of the subjects died due to respiratory failure. Most of the deceased patients had not received any COVID-19 vaccination.

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***Correspondence:** Erwin Gidion Kristanto, Prof.dr.R.D Kandou Central General Hospital, Manado, Indonesia. E-mail: kristantogidion@gmail.com
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Introduction

Coronavirus Disease 2019 (COVID-19), causing acute respiratory disease, was first detected in December 2019 in Wuhan, China, and declared a pandemic in March 2020 due to its rapid spread across countries [1], [2], [3]. Worldwide, Indonesia was on 18th rank in terms of cumulative cases. Indonesia revealed the main instance of affirmed COVID-19 disease in March 2020, and after a month, 6,038,664 people were positive. Indonesia had 96.4% recuperation rate and 2.6% case-casualty rates (<https://covid19.go.id/peta-sebaran-covid19>). Despite the widespread implementation of societal restrictions and “new normal” customs in many regions of Indonesia, SARS-CoV-2 contamination is steadily rising [4]. The Omicron variety was thought to be more contagious than previous versions and was immune to immunization [5], [6], [7].

Around 20–30% of COVID-19 sufferers experience severe sickness; some require additional treatment in the critical care unit (ICU) [8], [9]. In extreme situations, COVID-19 can cause organ failure, including acute respiratory distress syndrome (ARDS), shock, acute cardiac injury, and acute renal injury [1], [8], [9]. According to research, critically sick individuals are

more likely to be older, have underlying illnesses, and experience dyspnea symptoms [9]. The majority of comorbidities were linked to an increased risk, including autoimmune diseases, kidney, liver, and neurological disorders, as well as cardiovascular disease, diabetes, respiratory disease (including severe asthma), obesity, and history of hematological malignancy or recent other cancer [10].

This study aims to analyze the clinical characteristics of death cases with COVID-19.

Methods

A positive result from a nasopharyngeal swab utilizing real-time reverse-transcriptase polymerase chain reaction was considered a confirmation of COVID-19 patients. We collected clinical characteristics of confirmed COVID-19 patients who died from January 1, 2022, to March 31, 2022, in Prof. Dr. R. D. Kandou General Hospital, Manado, Indonesia. The clinical features of the patient obtained from the electronic medical records were: Age, sex, history of

COVID-19 vaccination, type of vaccine, s-gene target failure (SGTF) result, duration of hospitalization, comorbidities, and the cause of death. SGTF was done due to the increased incidence of the Omicron variant of COVID-19 at the sampling time. Descriptive analysis was reported as mean, standard deviation, and percentage. The Ethics Committee approved this study of Prof. Dr. R. D. Kandou General Hospital.

Results

We obtained 79 medical records of COVID-19 patients treated and who died at Prof. Dr. R. D. Kandou General Hospital, Manado, Indonesia, from January 1, 2022, to March 31, 2022. The mean age of patients was 56-years-old (SD 19 years), 57% of patients were males, and 43% were females (Figure 1). The mean duration of hospitalization was 5 days. Most patients (73%) had not received any COVID-19 vaccine, 23% received two doses of COVID-19 vaccine, and 4% received one dose of COVID-19 vaccine. Among those who received any COVID-19 vaccines, 67% received Sinovac vaccine, 28% received Astra Zanecca COVID-19 vaccine, and 5% received Moderna COVID-19 vaccine (Figure 2). SGTF results showed a probable Omicron variant in 53% of the subject, 13% of non-probable Omicron, and 13% of others who did not have the test. A third of the deceased patients had at least one type of comorbid condition; 33% had one comorbidity, 24% had two comorbidities, 22% had three comorbidities, and 8% had four comorbidities (Figure 3). Ten subjects (13%) had no significant comorbidities. Diabetes mellitus was the most common comorbidity found in 66% of our issues, followed by cardiovascular conditions in 52%, chronic kidney disease in 38%, and malignancy in 16%. Most subjects died due to respiratory failure (63%) and the rest died due to multiple organ failures, septic shock, and cerebrovascular accidents.

Discussion

Age and gender are well-established risk factors for severe COVID-19 outcomes, with over 90% of deaths in people over 60 and 60% in men [11]. The male predominance was also noted in our study, in which almost 60% of fatalities were male gender. The previous studies stated that men had a higher risk than women for death with a hazard ratio of 1.59 [10], [12]. Increasing age was also known to be a risk factor of death in COVID-19, with people aged 80 or over having a more than 20-fold-increased risk compared to

50–59 years old [10]. The most extensive cohort study in COVID-19-related deaths was the Open SAFELY study in 17 million patients, which found that COVID-19-related death was associated with: Being a male, older age and deprivation, diabetes, severe asthma, and various other medical conditions. Compared to people of Caucasian ethnicity, American-African and South Asian people were at higher risk even after adjustment for other factors [12].

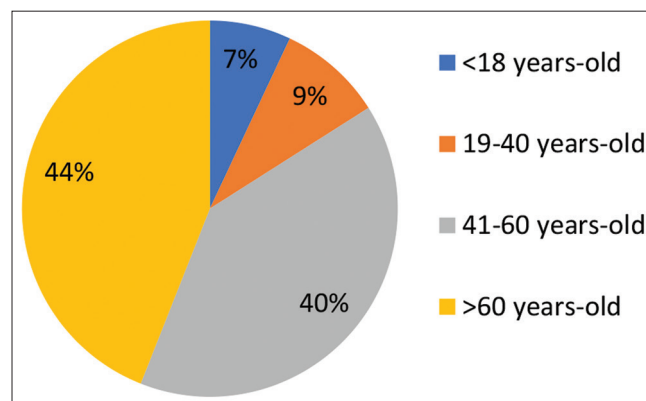


Figure 1: COVID-19 Deaths based on age

Our study found that comorbidities such as diabetes, hypertension, and chronic kidney disease were prevalent in our death cases, and 54% of patients had two or more comorbidities. These features are consistent with a study by Wang *et al.* [9], whose patients with underlying diseases are more likely to develop severe illnesses. Several comorbidities that increased the likelihood of COVID-19 deaths were a respiratory disease, severe asthma, diabetes mellitus, kidney diseases, chronic heart disease, liver disease, stroke, dementia, autoimmune diseases, and immunosuppressive conditions. Cancer patients comprised 16% of our subjects, which had much higher morbidity than those without cancer, suggesting that cancer patients are more likely to develop severe disease or die. These results are consistent with the findings from a study in China by Liang *et al.* [13] History of hematological malignancy had an at least 2.5-fold increased risk, which decreased slightly after 5 years. End-stage renal failure or a history of dialysis were linked to an elevated risk [10]. These results largely agree with other data, such as the UK International Severe Acute Respiratory and Emerging Infection Consortium study of hospitalized UK COVID-19 patients, which revealed an elevated risk of death with cardiac, pulmonary, and kidney disease, malignancy, obesity, and dementia [14], and a sizable Chinese study by Deng *et al.* that cardiovascular disease, hypertension, diabetes, respiratory disease, and cancers are linked to increased mortality [15].

Almost one-third quarter of our subjects had not received any COVID-19 vaccination. It is known that COVID-19 vaccination, particularly receipt of a booster dose, was associated with a lower likelihood of ICU admission and, among adults aged ≥ 65 years,

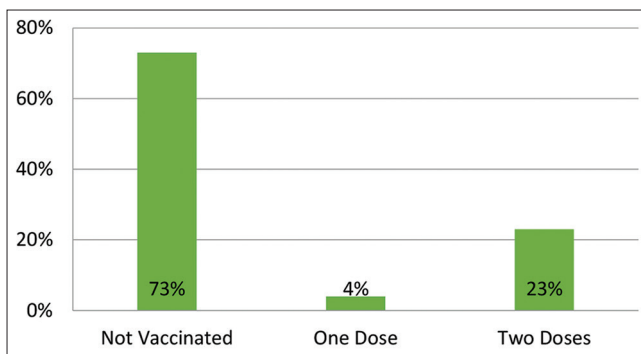


Figure 2: Vaccination status of deceased subjects

a lower chance of death [7], [16]. The previous studies showed a higher proportion of fully-vaccinated adults during Omicron-period than during Delta-period. Omicron-period COVID-19 infection was linked to decreased ICU hospitalization, invasive mechanical ventilation (IVM) use, and death compared to Delta-period [16]. When stratified by vaccination status, the proportion requiring ICU hospitalization and IVM did not differ noticeably. This finding showed that lower disease severity during Omicron predominance might be influenced by herd immunity. These findings support the importance of COVID-19 vaccination and its booster to reduce the risk of severe illness.

The previous studies showed that the Omicron variant had lower replication capacity in the lung, contributing to its lower severity. However, one-third of patients hospitalized in Omicron-period had lower respiratory symptoms and abnormal chest X-rays. These findings showed that Omicron variant infection still causes severe lower respiratory illness, despite observed changes compared with Delta. Similar data on patient symptoms were not available for Delta-period hospitalizations. On the other hand, Omicron-period patients might have a lower proportion of hypoxemia, indicated by a lower need for COVID-19-specific therapies. Alternatively, this change might have been driven by changes in prescribing practices or other unmeasured factors.

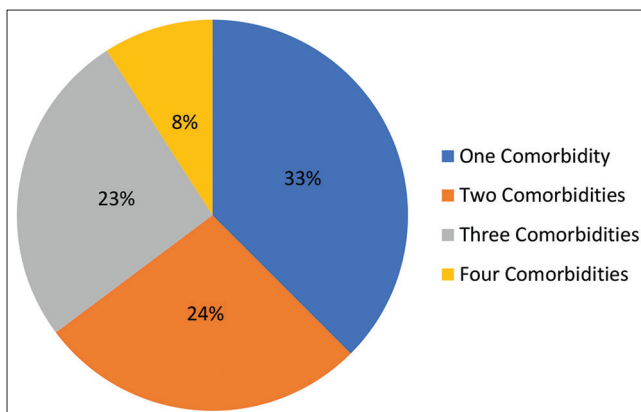


Figure 3: Comorbidities status of deceased subjects

We further analyzed the cause of death of patients with COVID-19 and found that respiratory failure

remained the leading cause of death. Angiotensin-converting enzyme 2 is the binding receptor for SARS-CoV-2 and is located in blood vessels and lung alveolar Type II epithelial cells. It is known that ACE2-expressing cells can adhere to SARS-CoV-2 [17]. ARDS, pulmonary edema, and lung cell desquamation could all result from SARS-CoV-2 infection of the lung cells [18]. Therefore, the primary cause of mortality identified by our research, respiratory failure, is compatible with the pathogenic mechanism underlying COVID-19. In our investigation, COVID-19 identified multiple organ failure, septic shock, cerebrovascular accidents, and respiratory failure as additional causes of mortality. We conclude that a third of COVID-19 patients who died at least had one type of comorbidity, commonly diabetes mellitus. Most of the deceased patients had not received any COVID-19 vaccination. Most of the subjects died due to respiratory failure.

Conclusion

Many deaths in COVID-19 patients occur in patients with comorbidities, even with just one comorbid.

Patients who have not received vaccinations experience the most deaths compared to those who have received one or two doses of vaccination. Most deaths occur in patients over 60 years of age. Diabetes mellitus was the most common comorbidity found in 66% of our issues.

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