Demographic diversity of COVID-19 patients treated at ICU Special Hospital for Infections Surabaya

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Abstract

***Background*: The diversity demography of coronavirus disease 2019 (COVID-19) has prompted us to collect data in our workplace. These data are essential because they can serve as a data bank of demographics in one big hospital in East Java. We analyzed patients' characteristics with COVID-19 admitted to the Intensive Care Unit (ICU) Special Hospital for Infections, Airlangga University, Surabaya.**

***Methods*: Retrospective study from medical record of 180 patients with confirmed COVID-19 admitted to the ICU Special Hospital for Infections, Airlangga University of Surabaya between April - September 2020.**

***Results*: Most of the patients were male (67.2%), with median age was 55 (22-83) years. The body mass index (BMI) data consisted of normal (48.9%), overweight (39.4%), obesity class I 7.8%, obesity class II 1.1%, obesity class III 0.6%, and underweight 2.2%. We found severe acute respiratory distress syndrome (ARDS) in 63.9%. The use of invasive mechanical ventilation was 74% of the total patients. Most of the patients (85%) had comorbidity: hypertension, diabetes mellitus, and geriatrics. The average length of stay in the ICU was 8.5 days. We transferred 29% of patients to a low-care ward, and 66.7% died. We identified gastrointestinal symptoms on admission to the ICU were 43.3%, predominantly by nausea and vomiting. Forty-six point seven percent of patients with gastrointestinal symptoms during hospitalization consisted of gastric retention and diarrhea, some with hematin.**

***Conclusion*: The demographic data we present above are limited in our area. The demographic data of COVID-19 patients in other places may be different from the information we obtained. However, data like this may represent the patient's condition in areas similar to ours. Besides, this data can warn that the patient's condition, as in our data, requires special attention. It is necessary to add data from all corners of Indonesia to represent the demographic data of COVID-19 patients in Indonesia.**

Key words: COVID-19, patient's characteristic, clinical complaints, demography.

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Introduction

The cause of acute respiratory distress syndrome (ARDS) in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is a cytokine storm, an uncontrolled systemic inflammatory response caused by the release of large amounts of proinflammatory cytokines and chemokines. (1,2) This excessive immune response can cause lung damage and fibrosis, resulting in functional disability. (3) Some literature say that certain demographic conditions have a predisposition to being more easily infected with coronavirus disease 2019 (COVID-19). (4,5) Therefore, we collected demographic data on COVID-19 patients in Intensive Care Unit (ICU) Special Hospital for Infections

to strengthen existing data, even though the size of the study subjects we took was relatively small. The demographic data we collected were gender, age, body mass index (BMI), comorbid, ARDS type, length of stay (LOS), and outcome.

Previous studies have stated that COVID-19 does not always start with respiratory complaints but can also manifest in other organs, for example, gastrointestinal tract (GIT). The study by Xiao et al. (2020) reported that they could detect the virus in feces, even though it was clear in airway samples. (6) The explanation is that angiotensin converting enzyme 2 (ACE-2) protein is also highly expressed in intestinal epithelial cells, which functions as a co-receptor to enter nutrients into the intestine. (7) The theory mentioned before explains why the symptoms of COVID-19 are not only in the respiratory tract but also in the gastrointestinal tract. Many patients experience gastrointestinal disorders such as diarrhea, abdominal pain, etc., before being confirmed as COVID-19. Our retrospective descriptive study showed complaints of GIT before being admitted to the ICU Special Hospital for Infections, as well as criticisms of GIT while in the ICU Special Hospital for Infections. These findings expect to add data on the characteristics of COVID-19 patients that may have the advantage for the development of handling COVID-19.

Materials and methods

Our study was a retrospective study by taking the medical record of COVID-19 patients in the Intensive Care Unit of the Special Hospital for Infections, Airlangga University Surabaya, between April-September 2020. According to Berlin criteria, all cases included in this study were male or female adults aged ≥18 years, confirmed positive for SARS-CoV-2 infection, diagnosed with ARDS. Exclusion criteria were patients who finished ICU care before 3 days (discharge, moved to another room, died, or were referred to another hospital) because there was a periodic laboratory examination every 3 days to evaluate the patient's condition. We took the data regarding the gender, age, BMI, comorbidities, ARDS category, use of invasive mechanical ventilation, length of stay, outcome, and gastrointestinal symptoms. No conflict of interest regarding the publication. The author funded this research. We got ethical clearance from the Ethical Committee at Airlangga University Hospital, Surabaya, Indonesia (179/KEP/2020).

Results

A total of 180 medical records met the criteria. **Table 1** shows that subjects were dominated by male at 67.2%, while female was 32.8%. This study shows a minimum age of 22 years and a maximum age of 83 years, with a median age of 55 years of research subjects. BMI was normal at 48.9%, followed by overweight at 39.4%, obesity class I 7.8%, obesity class II 1.1%, obesity class III 0.6%, and underweight 2.2%. We found severe ARDS in 115 patients (63.9%), moderate ARDS in 58 patients (32.2%), mild ARDS in 7 patients (3.9%). In this study, 133 patients (74%) were under invasive mechanical ventilation. One hundred fifty-three patients (85%) had comorbidities; the top three were hypertension in 91 patients, diabetes mellitus in 89 patients, and geriatrics in 40 patients. The mean length of stay in the Intensive Care Unit was 8.5 (3-34) days. Fifty-two subjects (29%) were transferred to low-care rooms, and 120 subjects (66.7%) died. Overall data on gastrointestinal symptoms at ICU were identified in 78 patients (43.3%), predominantly nausea (48 patients) and vomiting (32 patients); the rest were decreased appetite, abdominal pain, diarrhea, bloating, and constipation. Meanwhile, gastrointestinal symptoms experienced during hospitalization were gastric retention in 76 patients (>100 ml, some patients with hematin) and diarrhea in 14 patients.

Discussion

In this study, male gender dominated as much as 67.2%. Previous research supported that diabetes mellitus, hypertension, male gender, and active smoking are risk factors for SARS-CoV-2 infection. This phenomenon is because of the increasing number of ACE-2 receptor expressions in this population. (8) Women are said to have more robust innate and humoral immune responses than men, giving them a better response to many viral, fungal, bacterial, and parasitic infections. One meta-analysis study said that the need for ICU care was almost three times higher in male patients, and the likelihood of dying was higher than that of women. Socio-cultural differences and gender-based behavior also contribute to the sex differences seen in the severity of COVID-19. (9)

In this study, the patients' mean age was 55 years, with the youngest 22 years, and the oldest 83 years. There is significant variation in cases of the severity of COVID-19 across countries. However, the main focus of COVID-19 is predominantly on older people; the study by Sudharsanan et al. (2020) showed that people of all ages were equally susceptible to severe acute metabolic syndrome infection. (10)

Most of the patients (48.9%) had normal body mass index, 39.4% were overweight, and 9.5% obese. If

we compare the data we got, there was no difference in the risk of COVID-19 between normal BMI, overweight, and obesity. Several things that may explain this phenomenon are that BMI cannot represent fat-free adipose tissue mass. So, people on a normal BMI scale can experience an increase in body fat percentage, especially in the visceral area; this is called normal weight obesity. (11) Visceral adiposity, regardless of BMI, is associated with a higher risk for critical illness in patients with COVID-19. (12,13)

We found severe ARDS in 115 patients (63.9%), moderate ARDS in 58 patients (32.2%), and mild ARDS in 7 patients (3.9%). In this study, 133 patients (73.9%) used invasive mechanical ventilation. Based on the previous literature, the reported mortality rate in COVID-19 ranged from 50 to 97% in those requiring mechanical ventilation. (14,15) Patients with moderate to severe ARDS required invasive mechanical ventilation and had a poor prognosis.

Total subjects with comorbidity were 153 patients (85%), mainly hypertension and diabetes mellitus, while geriatric was the third most common comorbid. Comorbidity can exacerbate the manifestations of COVID-19. In smokers, hypertension, and diabetes mellitus, it is suspected that there is an increase in ACE-2 receptor expression. (8) Older age is associated with decreased acquired immunity. It is also important to remember that in the elderly, body weight and muscle mass begin to fall. Still, the relative fat mass increases, especially in those with comorbidities such as cardiovascular and respiratory conditions. Older age is also associated with more hypertension and diabetes mellitus due to stiff blood vessels and impaired metabolic efficiency. Older people also have fewer cardiorespiratory reserves to fight COVID-19 infection. (16)

Our study presents the median length of stay in ICU was 8.5 days (3-34 days). The length of stay in our research is longer when we compare with the study by Rees and colleagues, which analyzed the length of stay in the ICU based on eight studies, 4 studies within China and 4 studies outside China, had a median of 8 (5-13) days for China, and 7 (4-11) days outside of China. (17) Understanding how long the hospitalization of COVID-19 patients is critical for planning and predicting bed capacity and staff and associated medical equipment needs.

Based on data analysis of 180 study subjects, 52 subjects (29%) were transferred to low-care rooms, and 120 subjects (66.7%) died. Although experience with COVID-19 continues to develop, the reported mortality rate was 50 to 97% in those requiring mechanical ventilation. (14) The mortality rate in our study was significantly higher than the published mortality rate for intubated patients with H1N1 influenza (35-46%) and other causes of ARDS. (18)

Gastrointestinal complaints were the main complaints of patients before being hospitalized, in addition to respiratory complaints. Gastrointestinal complaints before hospitalization were in 78 patients (43.3%), predominantly nausea (48 patients) and vomiting (32 patients); the rest were decreased appetite, stomachache, diarrhea, bloating, and constipation. Gastrointestinal symptoms during hospitalization included gastric retention in 76 patients (>100 ml, some patients had hematin) and diarrhea in 14 patients. Critically ill patients are prone to diffuse mucosal injury of the stomach, producing upper gastrointestinal bleeding associated with increased morbidity and mortality. The main risk factors for stress-related mucosal bleeding are prolonged mechanical ventilation and coagulopathy. (19) During critical illness, changes occur in the gut microflora, including circulating stress hormones, intestinal ischemia, immunosuppression, antibiotics, and nutritional deficiencies. Another reason for changes in the gut microbiota is the massive use of antibiotics. (20) It can cause dysbiosis and increase susceptibility to new infections and inflammatory disorders and cause antibiotic-related diarrhea.

Conclusion

The demographic data we present above are limited in our area. The demographic data of COVID-19 patients in other places may be different from the information we obtained. However, data like this may represent the patient's condition in areas similar to ours. Besides, this data can warn that the patient's condition, as in our data, requires special attention. It is necessary to add data from all corners of Indonesia to represent the demographic data of COVID-19 patients in Indonesia.

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Conflict of interests

All authors have no conflict of interest.

Table 1. Characteristics of COVID-19 patients in Intensive Care Unit (ICU)

Characteristic		Total, n (%)	Mean±SD	Median	Range
Gender	Male	121 (67.2%)			
	Female	59 (32.8%)			
Age		180 (100%)	55.17±11.14	55	22-83
BMI		180 (100%)	25.6±3.90	25	16.6-45.8
BMI category (kg/m^2)	Underweight (<18.5)	4 (2.2%)			
	Normal (18.5-24.9)	88 (48.9%)			
	Overweight (25.0-29.9)	71 (39.4%)			
	Obesity class I (30.0-34.9)	14 (7.8%)			
	Obesity class II (35.0-39.9)	2 (1.1%)			
	Obesity class III (>40)	1 (0.6%)			
ARDS category	Mild	7 (3.9%)			
	Moderate	58 (32.2%)			
	Severe	115 (63.9%)			
Use of invasive mechanical ventilation	Yes	133 (74%)			
	No	47 (26%)			
Comorbid	Yes	153 (85%)			
	No	27 (15%)			
Distribution of comorbid	Hypertension	91			
	DM type 2	89			
	Geriatrics	40			
	CKD (regular HD)	13			
	Obesity	10			
	AKI	7			
	Post surgery	5			
	Asthma	3			
	CVA history	3			
	Pregnancy	2			
	Others	27			
Length of stay		180 (100)	10.4±6.96	8.5	3-34
Outcome	Discharged from hospital	7 (3.9%)			
	Transferred to low-care rooms	52 (29%)			
	Referred to another hospital	1 (0.6%)			
	Died	120 (66.7%)			
Gastrointestinal symptoms	When entering the ICU: - Nausea - Vomiting - Decreased appetite - Stomachache - Diarrhea - Bloating - Constipation	78 (43.3%) 48 32 18 14 12 3 2			
	While in the ICU: - Gastric retention* - Diarrhea	84 (46.7%) 76 14			

Legend: COVID-19=coronavirus disease 2019; SD=standard deviation; BMI=body mass index; ARDS=acute respiratory distress syndrome; DM=diabetes mellitus; CKD=chronic kidney disease; HD=hemodialysis; AKI=acute kidney injury; CVA=cerebrovaskuler accident. *(>100 ml, some patients with hematin).

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