Age and Comorbidity Factors Associated with COVID-19 Mortality in Java Island

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Abstract. COVID-19 mortality in Java Island was the highest in Indonesia. The COVID-19 mortality can be influenced by various factors, including elderly and comorbidity. This article aims to describe the COVID-19 mortality in elderly and people with comorbidity in Java Island. It was descriptive study with data sources used in this article were secondary data from daily reports of COVID-19 cases in Indonesia, Indonesian health profile, and Indonesian basic health research. The data on COVID-19 cases used are data as of April 5, 2022. The result showed that from six provinces in Java Island, more than 35% of deaths due to COVID-19 occur in the age group over 60 years, with the highest number of deaths in the elderly occurring in Jakarta. Meanwhile, the age group that has the lowest percentage of COVID-19 mortality was the age group 0-5 years. Diabetes mellitus showed the highest prevalence in four of six provinces in Java Island. Based on Indonesian basic health research 2018, five of six provinces in Java Island had a prevalence of diabetes mellitus more than the national prevalence. So, it can be concluded that elderly and diabetes mellitus are the two conditions that can increase mortality due to COVID-19 in Java Island.

Keywords: Covid-19, mortality, age.

1 Introduction

The COVID-19 pandemic that has spread the whole world has been going on for more than two years. Even so, this pandemic is still a major health problem experienced throughout the world. COVID-19 is a respiratory disease caused by the SARS-CoV-2 virus[1]. The SARS-CoV-2 virus is a new type of virus that belongs to the Coronavirus family. The World Health Organization declared COVID-19 as a pandemic on March 11, 2020 and various countries around the world are trying to control and suppress the spread of COVID-19[2]. One of the steps taken is to know the epidemiological pattern of COVID-19 so that efforts to prevent transmission can be carried out[3]. The risk factors that can lead to the severity and death of COVID-19 are age and comorbidities. The age group that is susceptible to being exposed to COVID-19 and experiencing severity of symptoms due to COVID-19 is the elderly group. Besides that, people who have a history of diabetes are more susceptible to experiencing severity when exposed to COVID-19[4].

In the world, as of April 11, 2022, there were around 500 million people who were confirmed to be exposed to COVID-19 with 6.18 million of them died (1.24%). Indonesia ranks 18th with the highest COVID-19 cases in the world. In Asia, Indonesia is in the top five countries with the highest COVID-19 cases along with India, South Korea, Vietnam, and Japan. Then in

Southeast Asia, Indonesia is in second place after Vietnam which has the highest number of COVID-19 cases[5].

As of April 11, 2022, in Indonesia there were 6,033,903 positive confirmed cases of COVID-19 out of a total of 61,352,083 people (9.8%). Of the total cases, 1.2% were still active cases, 96.3% recovered, and 2.6% died. Java Island is the island in Indonesia with the highest COVID-19 cases. Six provinces in Java Island occupy the top six positions with the highest COVID-19 cases, with Jakarta ranking first, followed by West Java, Central Java, East Java, Banten, and the Special Region of Yogyakarta[6]. Due to the high incidence of COVID-19 on Java Island, the death rate from COVID-19 on Java Island also ranks the highest in Indonesia. Due to the high incidence and mortality of COVID-19 in Java, the authors are interested in presenting data related to the distribution of age and comorbidities that associated with COVID-19 mortality in Java Island.

1.1 Objectives

The objectives of this article are dercribe distribution of COVID-19 mortality based on the sex, age group, symptoms, and comorbidities in Java Island, Indonesia.

2 Literature review

2.1 COVID-19

COVID-19 is a disease that attacks the respiratory tract which was first discovered in Wuhan, China in December 2019[7]. From Wuhan, then this disease spread to various countries in the world until finally the World Health Organization (WHO) declared that COVID-19 became a global pandemic in March 11, 2020[2]. COVID-19 is caused by a virus named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2 or 2019-nCoV)[8]. Symptoms of this disease vary, ranging from asymptomatic, mild symptoms, to severe symptoms. Mild symptoms caused by exposure to COVID-19 include fever, dry cough, dyspnea, headache, diarrhea, and so on. Meanwhile, most of the severe symptoms experienced include shortness of breath, Acute Respiratory Distress Syndrome (ARDS), infectious complications, significant hypoxia, and multiorgan failure. The average incubation period for the appearance of symptoms due to COVID-19 is 5 to 6 days[9].

The main organ that is attacked by the SARS-CoV-2 virus is the respiratory tract. However, other organs can also be attacked by the SARS-CoV-2 virus[10]. The life cycle of the SARS-CoV-2 virus in the host can be divided into: attachment, penetration, biosynthesis, maturation, and release[11]. Starting from the attachment which is the attachment of the virus to the host receptors. Then the virus will enter the host body through endocytosis or membrane fusion (penetration). Furthermore, the viral contents enter the host cell, then the viral RNA virus enters the host nucleus and replicates. The viral mRNA is used to make viral proteins (biosynthesis). Then, new viral particles will be formed and undergo maturation, and then released. When the virus has multiplied in the body and reaches the body's tolerance limit to fight the virus, then it will cause inflammation in the body and cause the body to become sick[12].

2.2 COVID-19 Mortality and the Risk Factors

COVID-19 mortality is the death experienced by patients diagnosed with COVID-19 and COVID-19 is the main cause of death. Epidemiological studies show that deaths from COVID-19 are more common in the elderly group and the incidence of COVID-19 is more experienced in the adolescent to the elderly age group than in children[13]. Factors that cause death from COVID-19 include age and comorbidities[14]. Based on various studies that have been carried out, age is the main factor that causes death from COVID-19. The elderly group is known to have a greater risk of dying if exposed to COVID-19. As many as 80% of deaths due to COVID-19 occur in the age group over 65 years[15].

COVID-19 mortality has a close relationship with the presence or absence of comorbidities possessed by COVID-19 patients. Patients who have comorbidities have a higher risk of dying from COVID-19 compared to patients who do not have comorbidities. Comorbidities that affect deaths from COVID-19 include cardiovascular disease, hypertension, lung disease, diabetes mellitus, and kidney disease[16]. In addition, smoking habits are also known to have a relationship with COVID-19 mortality. Based on several studies, hypertension and diabetes mellitus are the leading risk factors for the severity and mortality of COVID-19[17].

In addition to these two risk factors, socio-economic status is also known to have a relationship with COVID-19 mortality. Countries that have low socioeconomic levels and social densities are known to have lower mortality rates. This shows that poor socioeconomic status in a country does not have a bad outcome on COVID-19 deaths[18]. However, this is also still a concern for developing countries that have poor infrastructure and health services regarding the impact of this pandemic[19].

3 Methods

The type of research used in this article is descriptive analysis research with secondary data as the source. The data sources used consist of daily reports of COVID-19 cases in Indonesia, Indonesian health profiles, and Indonesian basic health research. The data used to analyze the distribution of age and comorbidities on COVID-19 mortality in Java Island is data on April 5, 2022 with the number of new confirmed positive cases of COVID-19 as many as 1,774 cases (77.74%) and new cases of death due to COVID-19 were 44 cases of death (61.11%).

4 Results and discussion

Java Island is an island in Indonesia which has 6 provinces, namely Banten, Jakarta, West Java, Central Java, Special Region of Yogyakarta, and East Java. On April 5, 2022, the number of new confirmed positive cases of COVID-19 in the 6 provinces was 1,774 cases (77.74%), with details: 280 cases (15.78%) from Banten, 568 cases (32.02%) from Jakarta, 405 cases (22.83%) from West Java, 288 cases (16.23%) from Central Java, 68 cases (3.83%) from the Special Region of Yogyakarta, and 165 cases (9.3%) from East Java. The number of deaths on April 5, 2022 in Java was 44 cases (61.11%), with details: 1 case (2.27%) from Banten, 5 cases (11.36%) from Jakarta, 6 cases (13.64%) from West Java, 12 cases (27.27%) from Central Java, 4 cases (9.09%) from the Special Region of Yogyakarta, and 16 cases (36.36%) from East Java. The data collected is data on the distribution of COVID-19 mortality based on sex, age group, symptoms, and comorbidities for each province in Java. The data is obtained from the daily report on COVID-19 Indonesia.

4.1 Distribution of COVID-19 Mortality by Sex

Table 1 shows that deaths from COVID-19 do not show a significant percentage difference between male and female. However, deaths from COVID-19 in all provinces on the island of Java are more common in male. The Province of Special Region of Yogyakarta has the highest percentage of male COVID-19 mortality, namely 56.17% and East Java has the lowest percentage with 50.17%. On the other hand, East Java has the highest percentage of COVID-19 mortality in female with 49.83% and the Special Region of Yogyakarta has the lowest percentage with 43.97%. The higher percentage of COVID-19 mortality in males is in line with the cross-sectional study conducted by Albitar, et.al. (2020) which states that 59.1% of deaths due to COVID-19 are male and 40.9% female[20]. However, the difference in the percentage of COVID-19 mortality between women and men did not have a significant difference. The high death rate from COVID-19 in men could be due to the possibility that males have a higher expression of angiotensin-converting enzyme 2 (ACE2) than females. This causes male to be more at risk of exposure to COVID-19 and also tend to have worse clinical symptoms[21].

Table 1. Distribution of COVID-19 Mortality by Sex

No	Province	Sex	
		Male	Female
1.	Banten	56.04%	43.96%
2.	Jakarta	52.69%	47.31%
3.	West Java	50.94%	49.06%
4.	Central Java	52.89%	47.11%
5.	Special Region of Yogyakarta	56.03%	43.97%
6.	East Java	50.17%	49.83%

4.2 Distribution of COVID-19 Mortality by Age Group

The distribution of COVID-19 mortality by age group in Java shows that the age group that has the highest percentage of deaths due to COVID-19 is the age group over 60 years. Of the 6 provinces on the island of Java, only Banten has the highest percentage of COVID-19 mortality in the 46-59 year age group. This shows that the distribution of COVID-19 mortality in Java Island is dominated by the elderly. Jakarta Province has the highest percentage of deaths due to COVID-19 in the age group over 60 years, which is 65.08%. Meanwhile, the province with the lowest percentage of deaths from COVID-19 in the age group over 60 years is Banten, which is 39.13%. The condition in Java Island which shows that the age group over 60 years has a higher percentage of COVID-19 mortality is in line with research conducted by Li, et.al. (2020) which stated that 42.2% of COVID-19 mortality in Wuhan was aged 45-64 years and 38.3% were aged over 65 years[22]. In addition, research conducted by Sousa, et.al. (2020) also stated that the risk of death from COVID-19 was 3.7 times higher in the elderly. This shows that old age is one of the risks of COVID-19 mortality[23]. One of the reasons for the increased risk of death from COVID-19 in the elderly is that the level of an individual's immunity tends to decrease with age, so that the body's natural immunity is more difficult to fight off incoming viruses. In addition, in the elderly group, organ function tends to decrease so that it can cause susceptibility to infections and drug reactions[21].

Table 2. Distribution of COVID-19 Mortality by Age Group

No	Province	Age (year)					
		0-5	6-18	19-30	31-45	46-59	≥60
1.	Banten	0.48%	0.65%	3.71%	16.49%	39.54%	39.13%
2.	Jakarta	0.26%	0.39%	1.56%	7.9%	24.8%	65.08%
3.	West Java	0.73%	1.2%	4.85%	15.11%	38.08%	40.02%
4.	Central Java	0.61%	0.47%	2.91%	13.24%	37.59%	45.18%
5.	Special Region of Yogyakarta	0.22%	0.45%	2.04%	10.08%	30.53%	56.69%
6.	East Java	0.4%	0.37%	2.82%	13.45%	38.87%	44.09%

4.3 Distribution of COVID-19 Mortaity by Symptoms

Table 3 shows the distribution of COVID-19 mortality based on symptoms. The graph shows that the dominant symptom experienced by patients who died from COVID-19 was cough, i.e. more than 2% of patients who died from COVID-19 in all provinces on the Java Island had cough symptoms. The highest percentage occurred in Jakarta Province with a percentage of 11.3% and the lowest was in Banten Province with 2.4%. Of the 6 provinces on the island of Java, cough symptoms have the highest percentage compared to other symptoms in 4 provinces. Meanwhile in East Java Province, the symptom with the highest percentage is hard to breathe and in Central Java Province, the symptom with the highest percentage is fever. Research through meta-analysis conducted by Alimohamadi, et.al. (2020) stated that 81.2% of patients with COVID-19 had symptoms of fever, 58.5% had symptoms of cough, 38.5% had symptoms of fatigue, 26.1% had symptoms of dyspnea, and 25.8% had symptoms of sputum[24]. The symptoms that COVID-19 patients have vary widely, ranging from asymptomatic, mild symptoms, to severe symptoms.

Table 3. Distribution of COVID-19 Mortality by Symptoms

No	Province	Symptoms				
		Cough	Difficult to Breathe	Fever	Sore throat	Flu
1.	Banten	2.4%	2%	2%	0.8%	0.4%
2.	Jakarta	11.3%	10.3%	4.6%	4%	2.9%
3.	West Java	5.2%	4.9%	4.1%	3.1%	2.6%
4.	Central Java	9.5%	9.3%	10.3%	1.7%	2.1%
5.	Special Region of Yogyakarta	8.9%	7.9%	8.6%	0.2%	1.5%
6.	East Java	7.3%	7.9%	6.8%	3.3%	5.6%

4.4 Distribution of COVID-19 Mortality by Comorbidities

Table 4 shows that diabetes mellitus is a comorbid with the highest percentage of patients dying from COVID-19 in 4 of 6 provinces in Java Island. The other two provinces showed hypertension as a comorbid that had the highest percentage of patients dying from COVID-19. The Jakarta Province as the province that has the highest percentage of deaths in Java Island and Indonesia, shows that 16.1% of patients who died from COVID-19 had comorbid

hypertension. Then in Central Java showed that 15% of patients who died from COVID-19 had comorbid diabetes mellitus. Based on data from Indonesia basic health research 2018, it shows that 5 out of 6 provinces in Java Island have a higher prevalence of diabetes mellitus than the national prevalence rate. This shows that the number of people with diabetes mellitus in Java Island is quite high. This condition can also be one of the causes of the high COVID-19 death rate in Java Island, especially in COVID-19 patients with diabetes mellitus.

Based on research conducted by Sousa, et.al. (2020), stated that COVID-19 patients with a history of cardiovascular disease had a 19.3 times higher risk of death due to COVID-19, 14.3 times higher in patients with diabetes mellitus, 32.6 times higher in patients with neurological disease, and 9.9 times higher in patients with renal disease[23]. Comorbid have the possibility to reduce the function of the body's immune response, so that if the body exposed to COVID-19 has aggravating conditions, their immune system cannot fight the virus optimally. These conditions cause COVID-19 mortality is higher in patients with comorbidities[21].

Table 4. Distribution of COVID-19 Mortality by Comorbidities

No	Province	Comorbidities			
		Hypertension	Diabetes Mellitus	Heart Disease	Kidney Disease
1.	Banten	4.6%	2.8%	0.9%	1.9%
2.	Jakarta Capital Special Region	16.1%	11.9%	8.3%	3.7%
3.	West Java	6.6%	7%	5.2%	1.7%
4.	Central Java	13%	15%	3.9%	1.7%
5.	Special Region of Yogyakarta	10.8%	13.7%	4.9%	9.8%
6.	East Java	7.8%	8.2%	2.1%	1.1%

5 Conclusion

On the Java Island, the percentage of COVID-19 mortality in male is higher than female. The age group over 60 also increases the risk of dying from COVID-19. Furthermore, the most common symptom experienced by patients who died from COVID-19 on the Java Island was cough. Diabetes mellitus has the highest percentage as a comorbid cause of COVID-19 mortality in Java Island. So, it can be concluded that male, elderly, and diabetes mellitus are the conditions that can increase mortality due to COVID-19 in Java Island.

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