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ORIGINAL ARTICLE

DETERMINANT FACTORS OF COVID-19 MORTALITY IN EAST JAKARTA IN 2021

Faktor Determinan Kematian COVID-19 di Wilayah Jakarta Timur Tahun 2021

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ABSTRACT

Background: The Corona Virus Disease (COVID-19) pandemic, which lasted for more than a year in Indonesia, has caused various negative impacts, including rapid inter-individual transmission, followed by an increasing number of cases and even death. The total number of deaths from COVID-19 in East Jakarta from November-January 2021 was 30%. **Purpose:** This study aims to determine the factors that influence deaths from COVID-19 in East Jakarta. **Methods**: The study was conducted using a quantitative method and a case-control design with secondary data from November 2020 to February 2021 in East Jakarta. The incidence number of COVID-19 cases is 0.3 per 100,000 population, while the variables assessed were age, sex, respiratory symptoms, hypertension, cardiovascular diseases, and Chronic Obstructive Pulmonary Disease (COPD). The case sample was 74 people with COVID-19 who had died, while the control was 74 people who lived. Furthermore, the total sampling technique was used in the case group, while simple random sampling was employed in the control and data analysis was performed using the Chi-Square test. **Results**: Factors related to the incidence of COVID-19 death in this study were age with p-value = 0.01; OR = 3.99 95%CI 1.88 – 8.47 and male gender with p-value = 0.01; OR = 2.41 95%CI 1.25 – 4.68. Other factors analyzed, namely the presence of symptoms in the respiratory tract, comorbid hypertension, cardiovascular and COPD, did not have a significant relationship (p value> 0.05). **Conclusion:** Age and gender are factors associated with COVID-19 deaths in East Jakarta City between November 2020 and January 2021**.**

ABSTRAK

Latar Belakang: Pandemi COVID-19 yang telah berlangsung lebih dari satu tahun di Indonesia memberikan banyak dampak negatif diantaranya penularan antar individu yang sangat cepat diikuti angka kasus yang

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meningkat hingga kematian bagi para penderitanya. **Tujuan:** Penelitian ini bertujuan untuk mengetahui faktor apa saja yang mempengaruhi kematian akibat COVID-19 di Wilayah Kota Administrasi Jakarta Timur. **Metode:** Penelitian menggunakan desain studi kasus kontrol dan data yang diperoleh yaitu data sekunder yang berasal dari Dinas Kesehatan DKI Jakarta. Variabel penelitian antara lain usia, jenis kelamin, gejala saluran pernapasan, hipertensi, kardiovaskuler, dan Penyakit Paru Obstruktif Kronis (PPOK). Sampel kasus adalah penderita COVID-19 yang telah meninggal sebanyak 74 orang, sedangkan sampel kontrol adalah penderita COVID-19 yang hidup sebanya 74 orang. Teknik pengambilan sampel menggunakan *total sampling* pada kelompok kasus dan secara *simple random sampling* pada kelompok kontrol. **Hasil:** Faktor – faktor yang berhubungan dengan kejadian kematian COVID-19 dalam penelitian ini adalah usia (*p value*=0,00; OR=3,99 (95% CI 1,88 – 8,47)) dan jenis kelamin laki – laki (*p value*=0,01; OR=2,42 (95%CI 1.25 – 4.68)). Faktor lain yang diteliti yaitu adanya gejala pada saluran pernapasan, komorbid hipertensi, kardiovaskular dan PPOK tidak memiliki hubungan yang signifikan dengan kejadian kematian COVID-19 di Kota Jakarta Timur (*p value*>0,05). **Kesimpulan:** Usia dan jenis kelamin merupakan faktor yang mempengaruhi kejadian kematian akibat COVID-19 di Kota Administrasi Jakarta Timur Periode November 2020 hingga Januari 2021.

INTRODUCTION

Corona Virus Disease 2019 (COVID-19) is an infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The person-to-person transmission of the virus led to the isolation of infected patients (1). Infection can also be transmitted by touching the face, especially the eyes, nose, and mouth, after handling contaminated items (2).

There were 147,801,542 positive cases of COVID-19 with 3,122,712 deaths (CFR = 2.30%) and 125,352,400 recovered cases up until April 25th worldwide. The United States ranks first with the highest number of positive cases with 32,824,389, followed by India, which reported 17,313,163, and Brazil with 14,340,787 in the third place. Meanwhile, Indonesia is ranked 18th with a cumulative number of 1,641,194 positive cases and 44,594 deaths or a CFR (*case fatality rate*) of 2.70% (3).

The first case of death in Indonesia due to COVID-19 was recorded on March 11, 2020 in a 53-year-old woman foreign citizen who had co-morbidities including diabetes, hypertension, hyperthyroidism, and chronic obstructive pulmonary disease that worsened her condition (4). The number of death cases then continued to increase rising to a total number of 60 in a day on April 14, 2020, and 476 deaths per day on January 28, 2021 (5). This indicates an increase in deaths compared to other times.

The highest mortality rate due to COVID-19 in Indonesia up to January 2021 mostly came from East Java Province, accounting for 7,754 or 25% of total death cases. The second province with the highest number of deaths was Central Java Province, with 5,359, which is equivalent to 18% of the total in Indonesia. DKI Jakarta Province is in the third position with 4,225 cases or around 14% of the total death cases (6).

Based on the cumulative data in DKI Jakarta Province, East Jakarta Municipality had the highest number of COVID-19 deaths compared to other municipalities. About 628 from a total of 2095 deaths or 30% between November 2020 - January 2021 came from the city of East Jakarta (7). The high death rate due to COVID-19 will in turn increase the case fatality rate (CFR) in Indonesia. COVID-19 deaths will not only affect the CFR but also the life expectancy of a region. Therefore, this study aims to examine the "risk factors affecting deaths due to COVID-19 in the East Jakarta City Region between November 2020 and January 2021.

METHODS

This is an observational analytic study conducted using a case-control design to determine the risk factors that influence death due to

COVID-19 by comparing the group of patients who had died (the case group) with those who survived (the control group). Data collection on COVID-19 positive cases was performed using the Epidemiology and Immunization Surveillance Section for Disease Prevention and Control of the DKI Jakarta Health Office. The inclusion criteria of the case groups included COVID-19 patients who were declared dead in November – January 2021, filled in COVID-19 case data, and stayed in East Jakarta. Meanwhile, the inclusion criteria of the control groups are those who are positive for COVID-19 and stay in East Jakarta.

The independent variables included age which ranged between "18-59" years old and "≥60 years old", sex (male and female), respiratory symptoms of COVID-19 such as fever, cough, anosmia, shortness of breathing with responses of "yes" when patients show respiratory symptoms and "no" when there are no respiratory symptoms. The variables also include comorbid hypertension which is a condition where the blood pressure of the patient reached 140/90 or above. The response was "yes" when patients have pre-existing hypertension disease and "no" when there is no pre-existing hypertension disease.

Another variable was comorbid cardiovascular disease where there is a condition that affects the heart or blood vessels for example coronary heart disease, cardiac arrest, and arrhythmia with response of "yes" when patients have pre-existing cardiovascular disease and "no" when there is no pre-existing cardiovascular disease, as well as comorbid chronic obstructive pulmonary disease that block airflow or breathing-related problems like chronic bronchitis and emphysema. The response was classified as "yes" when patients have pre-existing COPD and "no" when there is no pre-existing COPD. Meanwhile, the dependent variable in this study was the death status of confirmed COVID-19 patients.

The study population included all COVID-19 sufferers in November 2020 - January 2021 residing in East Jakarta, and recorded in secondary data. The sample comprised 74 cases (dead patients) and 74 control groups (living patients). Moreover, the total sampling technique was used in the case group and random sampling in the control with a random sample generator application.

The analysis was carried out in two stages, including univariate and bivariate analysis using the Chi-Square test, as well as the *odds ratio* (OR) and 95% *confidence intervals* (CI) to determine the magnitude of the risk. This study received ethical approval with No.10.258.B/KEPK-FKMUMJ/VII/2021.

RESULTS

The results in Table 1 show that the distribution of COVID-19 deaths in East Jakarta City was primarily among residents who live in Duren Sawit Sub-district, with 15 cases (20.3%), while the lowest occurred in Pasar Rebo and Pulo Gadung Districts. In most cases, 40 patients (54.10%) were about 18-59 years old, and the majority of the control group namely 61 (82.40%) were aged 18 -59 years old. Furthermore, the statistical test showed that the *p value*= 0.00 (*p value* <0.05 the OR (*Odds Ratio*) was 3.99 (95% CI 1.89 – 8.47). In other words, the case group had 3.99 times more significant risk of death compared to the control.

In the gender variable of the case group, 43 patients (58.10%) were male, while the majority of the control group where women namely 47 (52.70%). The *p-value* obtained was 0.014 indicating a significant relationship between gender and COVID-19 mortality. In addition, the OR=2.42 (95% CI 1.25 – 4.68) means that male patients have a 2.4 times greater risk of death than females. The majority of the case and control groups namely 67 (90.50%) and 68 (91.20%) also had respiratory symptoms. The statistical test showed p value=1.00, indicating that there is no significant relationship between the presence of respiratory symptoms and COVID-19 deaths.

Furthermore, the majority of the patients had hypertension comorbid in the case and control groups, with 64 (86.50%) and 67 patients (90.50%) respectively. The P value =0.61, means that there is no significant relationship between comorbid hypertension and the incidence of death in patients with COVID-19.

The majority of patients also had cardiovascular comorbidities with 72 patients (97.30%) in the case group and 71 (95.90%) in the control. The bivariate test results showed p *value*=1.00 indicating that there is no significant relationship between cardiovascular comorbidities and the incidence of death in COVID-19 patients.

Table 1
Distribution of Deaths of COVID-19 Patients in East Jakarta City between November 2020–January 2021

Sub District	Case		Control	
	n	%	n	%
Cakung	10	13.50	12	16.20
Cipayung	5	6.80	9	12.20
Ciracas	5	6.80	1	1.40
Duren Sawit	15	20.30	10	13.50
Jatinegara	10	13.50	8	10.80
Kramat Jati	6	8.10	7	9.50
Makasar	7	9.50	12	16.20
Matraman	8	10.80	3	4.10
Pasar Rebo	4	5.40	4	5.40
Pulo Gadung	4	5.40	8	10.80
Total	74	100.00	74	100.00

The analytical test results show a significant relationship between age and mortality of COVID-19 sufferers. In addition, the *Odds Ratio* (OR) of 3.98 (95% CI 1.87 – 8,47) was obtained, which means that 60 years above is an important factor in the death of COVID-19. In other words, patients aged ≥60 years are 3.9 times more likely to die than those aged 18 – 59 years. This is in line with (8) which stated that age is a crucial factor because more than 80% of deaths in COVID-19 sufferers were found in those aged above 65 years old. In another study in China, patients aged over 60 years had an 8.54 more significant risk of deaths compared to those aged between 18-59 years (9). This means that older age is a potential risk factor for death among COVID-19 patients (10). Most of the older patients have some chronic diseases and lower immunity in the fight against viral infection, which might be one of the reasons leading to a fatal outcome (11) (Table 2).

There was a significant relationship between gender and death of patients with COVID-19 as demonstrated by a p-value of 0.01 *(P Value* <0.05) and an OR value of 2.40 (95% CI 1.24 – 4.67) indicating that males have 2.4 times greater risk of death than females. The results are consistent with a study conducted in Wuhan, China, where more cases of death were observed in male patients, namely 38 (70%), than in females comprising 16 people (30%) (12). Another study by Williamson et al. (2020) had a similar result where COVID-19 deaths occurred much more in male patients. Moreover, Rozaliyani et al. (2020) found an increased risk of death up to 1.90 times greater (P Value: 0.00) for male patients.

Analysis of the aggregated data on positive cases of COVID-19 by sex shows although it has the same number of cases between males and females, there appears to be a sex difference in mortality and susceptibility to the disease (14). Emerging evidence suggests that more men die due to sex-based immunologic or gender differences, such as lifestyle and smoking prevalence than women (15). The differences in the immune response to infection in sexes potentially lead to more effective viral control in females than males, which might contribute to the relatively lower risk of developing the severe disease (16).

Furthermore, the results showed no significant relationship between respiratory symptoms and the death of patients with COVID-19 (*p value* 1.00 0.05). This is in line with the results of Du et al. (2020), who found that when the patient has respiratory symptoms such as shortness of breath or coughing up phlegm, the risk of death can increase to 7.35 (2.08 - 25.97) times higher. Respiratory symptoms such as cough, running nose, shortness of breath, or sore throat increased the risk of death in COVID-19-positive patients by 2.17 (95%CI 1.26 - 3.72) times higher (18).

Another study in DKI Jakarta reported that the majority of 655 COVID-19 patients experienced respiratory tract symptoms such as fever, cough, and pneumonia (19). These symptoms arise from the body's response to the viral infection. The virus enters the body and then stimulates the body's defense system, causing an inflammatory process with the appearance of various symptoms experienced by the patient. These symptoms are a sign that the infection process has taken place, and the virus has begun to replicate and spread to other cells (17).

The data analysis in the hypertension comorbid variable obtained a p-value > 0.05, which is 0.60, indicating no significant relationship between comorbid hypertension and COVID-19 deaths. This result aligns with Satria et al., (2020) which obtained a p-value=0.42 and concluded that there is no significant relationship between hypertension and COVID-19 mortality. This is because the amount of data reported was small, thereby affecting the results of statistical tests. However, this contradicts the results of a study conducted in Wuhan, China, which found that patients with comorbid hypertension have a 3.59 times greater risk of death than others (20).

Table 2
Frequency Distribution of Risk Factors of COVID-19 Deaths in East Jakarta City

Variable	Case		Control		P value	COR (95% CI)
	n	%	n	%		
Age (years)						
≥ 60	34	45.90	13	17.60	0.01	3.99
18 – 59	40	54.10	61	82.40		(1.88 – 8.47)
Sex						
Male	43	58.10	27	47.30	0.01	2.42
Female	31	41.90	47	52.70		(1.25 – 4.68)
Respiratory Symptoms						
Yes	67	90.50	68	91.20	1.00	0.85
No	7	9.50	6	8.80		(0.27 – 2.64)
Hypertension						
Yes	64	86.50	67	90.50	0.61	0.67
No	10	13.50	7	9.50		(0.24 – 1.86)
Cardiovascular						
Yes	72	97.30	71	95.90	1.00	1.52
No	2	2.70	3	4.10		(0.25 – 9.38)
COPD						
Yes	74	100.00	71	95.90	0.25	-
No	0	0.00	3	4.10		
Total	74	100.00	74	100.00		

DISCUSSION

Hypertension is a comorbid disease commonly found in most people with COVID-19 (21). Populations with hypertension tend to have a higher number of ACE2 receptors, a drug used to control the condition, which causes the coronavirus to be more easily disseminated in the body (19). The results in this study were insignificant because most patients with COVID-19 in the case and control groups had a history of comorbid hypertension. Almost all the patients had a history of cardiovascular comorbidities, namely 72 (97.30%) in the case group and 71 (95.90%) in the control. This means that cardiovascular disease occurs in almost all dead and alive patients (22). The statistical test results showed a p-value of 1.00 (p value > 0.05), indicating no significant relationship between cardiovascular comorbidities and COVID-19 mortality.

The results align with the analysis conducted by Petrilli et al (23) which found that cardiovascular disease is one of the comorbidities experienced by several COVID-19 sufferers. However, it contradicts the study conducted by Noor and Islam (24) which reported that the risk of death in patients with cardiovascular comorbidities increased by up to 2.50 times greater. Chronic diseases such as cardiovascular have some common symptoms with infectious disorders, such as a pro-inflammatory state, and a weakened innate immune response that can increase the risk of death (21).

Based on the results, the case group all had a comorbid history of Chronic Obstructive Pulmonary Disease or COPD, namely 74 patients (100%). Similarly, in the control group, the majority were found to have a history of comorbid COPD namely 71 people (95.90%). The statistical test results showed a *p value* = 0.24 (*p value* > 0.05), meaning that there was no significant relationship between a history of COPD comorbidities and the incidence of death in patients with COVID-19.

The results are in line with Satria et al (25) which found that a history of COPD did not significantly affect COVID-19 mortality (*p-value* = 0.27. In contrast, Guan et al (26) and Mehra et al (27) reported that a history of COPD increased mortality by 2.68 (95% CI 1.42 – 5.05) and 2.82 (95% CI 1.92 – 4.14) respectively. In patients with comorbid COPD, the risk of death increases due to the existing lung conditions of inflammation and chronic obstruction that can worsen the patient's body condition (26).

Patients with COVID-19 are expected to continuously control their health and undergo treatment, especially for those who are elderly and have various comorbidities to minimize the risk of death. They are to maintain their health by living a

clean lifestyle and healthily, and implementing health protocols when required to carry out activities outside the home to prevent the transmission of the SARS-Cov2 virus.

Research Limitations (Optional)

This study used secondary data obtained by several individuals, therefore, many data were not filled out completely, and one cannot judge whether the data obtained are by the correct measurement standards or not. The study is also only limited to univariate analysis and bivariate analysis with the Chi-Square test, hence, it can only determine the comparison between two groups.

CONCLUSION

In the distribution of death cases frequency in East Jakarta City from November 2020 to January 2021, most occurred in COVID-19 sufferers who lived in Duren Sawit Subdistrict, while the least number occurred in Pasar Rebo and Pasar Rebo subdistricts Pulo Gadung. The associated risk factors associated are age and sex, while the presence of symptoms in the respiratory tract, comorbid hypertension, cardiovascular, and COPD had no significant relationship.

CONFLICT OF INTEREST

The authors state that there is no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

MF does conceptualization, methodology, and analysis, TF does data curation, editing, and reviewing, and NS does editing.

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