Jurnal Kesehatan Prima

Determinants of Affecting Factors Mortality of in The Elderly Covid-19 Patients

Sudarmi[1]✉, Rohani[2], Irianto[3], Ni Putu Dian Ayu Anggraeni[4]

[1,3,4]Poltekkes Kemenkes Mataram, Indonesia
[2] Dinas Kesehatan Provinsi Nusa Tenggara Barat, Indonesia
✉Sudarmia53@yahoo.com , Phone: +6285339454453

ABSTRACT

The elderly groups to be infected with COVID-19 with a relatively high mortality rate, so they need attention. This study aims to determine the determinants of factors that affect the mortality of COVID-19 patients in the elderly in West Nusa Tenggara Province. The design of this study was cross-sectional with a purposive sampling technique, namely all elderly patients diagnosed with COVID-19 with PCR swab (+) who were treated in hospitals throughout NTB Province during the period March to December 2020. the total sample is 569 people. The variables of this study were age, gender, cluster, treatment status and, history of comorbidities. Data were analyzed using bivariate analysis using Chi-Square and multivariate with Logistic Regression. The results of the study were that most of the elderly COVID-19 patients were in the early 60-70 years (81.7%), the sex was primarily male 339 people (59.6%), without cluster 484 people (85.5%), history of comorbidities with comorbid 470 people (82.6%) and recovered after treatment 454 people (79.8%). COVID-19 patients in the elderly mainly died aged 60-70 years 85 people (73.9%), male sex, namely 71 people (61.7%), without cluster 107 people (94.7%) and 62% died without comorbidities as many as 72 people due to COVID-19. There is a significant relationship between clusters and comorbidities on the death of the elderly infected with COVID-19. Comorbidities (with comorbidities) are the most dominant influencing mortality in the elderly by 60.9% based on logistic regression model analysis involving four variables affecting the mortality of COVID-19 in the elderly, and other factors influence the rest.

KEYWORDS : Determinants of Mortality;COVID-19;Elderly

INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a new type of coronavirus that has never been previously identified in humans with symptoms of acute respiratory distress such as fever, cough, and shortness of breath. In severe cases of COVID-19, it can cause pneumonia, acute respiratory syndrome, kidney failure, and even death. WHO has declared March 11, 2020, a Public Health Emergency of International Concern (PHEIC). The increase in the number of cases took place quite quickly/ and spread to various countries in a short time. More than 79 million reported cases and more than 1.7 million deaths globally since the start of the pandemic. Based on the COVID-19 distribution map Indonesia report, the first case was on March 2, 2020. Cases are increasing and spreading rapidly throughout Indonesia. As of June 25, 2021, 2,053,995 positive cases have been confirmed, with 88.9% recovered

cases and a 2.7% mortality rate. West Nusa tenggara Province contributed 12,803 (0.6%) COVID-19 cases (Kementerian Kesehatan RI Direktorat Jenderal Pencegahan dan Pengendalian Penyakit (P2P), 2020).

COVID-19 infection is generally susceptible to a relatively high mortality rate in older patients with a statistically significant difference in severity between the middle-aged and 65-79-year-old patient groups, compared to the older group of 80 years in symptomatic cases in 14 days. In this study, mortality due to COVID-19 infection in the elderly was 8.3%. Death in the elderly is influenced by the presence of comorbidities such as Diabetes Mellitus (DM) and hypertension. The meta-regression showed that the relationship with a poor composite outcome was influenced by age (p = 0.003). The severity and mortality of cases of COVID-19 based on data in Spain is influenced by age and gender. COVID-19 in Chile shows that male seniors, especially those aged 70 and are among the Countries with the highest reported mortality rates globally (Zeng *et al.*, 2014; Huang, Lim and Pranata, 2020; Moraga *et al.*, 2020; Niu *et al.*, 2020; Undurraga Fourcade, Chowell and Mizumoto, 2021).

Death from COVID-19 in the elderly is also often accompanied by comorbidities Pneumonia and other comorbid diseases often occur in racial and ethnic minority groups who are not well served. In this study, it was found that the mortality of the elderly with COVID-19 pneumonia who received standard Covid-19 care plus 1 and 2 doses of tocilizumab was 10.4% on day 28 and 8.6% in the placebo group (there was a 2% weight difference) and 15.2% in the tocilizumab group and 19.7% in the placebo group had severe side effects on day 38. The higher rates of serious illness and death in the elderly are related to environmental stress/oxidative stress which is an important biological process that can increase an individual's susceptibility to environmental disturbances (Salama *et al.*, 2021).

The estimated proportion of deaths due to COVID-19 or adjusted CFR from the beginning of the pandemic to early April 2020 is 2.39% (3.05% for men and 1.92% for women). Within each age stratum where deaths were reported, males were found to have a significantly higher CFR than females. Estimated CFR increases substantially from 60 years of age in men and from 70 years of age in women. Not different from previous studies in South Korea showed the overall CFR was 1.97% (95% credible interval: 1.94-2.00%). The CFR was highest among the elderly aged 80 years and 70-79 years (22.88% and 7.09%, respectively). The cumulative incidence rate was highest among individuals aged 80 years and 60-69 years. The cumulative mortality rate was highest among individuals aged 80 and 70-79 years (Newall *et al.*, 2020; Shim, 2021).

The existence of restrictions on activities in the community impact on all routine services, including health services for the elderly who are affected in terms of access and quality of service. Restrictions on these activities have caused the elderly to be afraid to go to health services for reasons of fear of infection, calls to postpone health checks for the elderly, and the lack of ready services in terms of facilities and infrastructure, including the lack of personal protective equipment.

Based on this background, researchers are interested in identifying the determinants of factors that affect the mortality of COVID-19 patients in the elderly in West Nusa Tenggara Province. This study aims to identify characteristics (age, cluster, the status of treatment history, and comorbidities, then place the relationship between part and mortality of

COVID-19 patients in the elderly and analyze the factors that influence the incidence of mortality in COVID-19 patients in the elderly with COVID-19 in West Nusa Tenggara province.

METHOD

The design used for this research is Cross-Sectional and has been declared to have passed research ethics No. LB.02.01/4.3/4697/2021. The population of this study was patients infected with COVID-19 based on the results of the PCR(+) Swab examination as many as 5848 patients. In comparison, the samples of this study were all elderly people, who were diagnosed with COVID-19 as many as 569 patients with PCR Swab at the first examination and were treated in all hospitals in West Nusa Tenggara Province in 2020.

Sampling was carried out purposively based on the medical record register during the month period-March to December 2020. Data preparation was carried out by studying research variables from the results of patient medical record documentation using a data collection format in the form of a master table, then constructing composite variables from several questions, re-coding the variables according to research needs. The patient's comorbidity data has been classified as having one or more comorbidities including Diabetes Mellitus, tuberculosis, hypertension, kidney, pneumonia, stroke, people with mental disorders, joint disease, fever, heart disease, encephalitis, thyroid CA and generalized tetanus. The variables of this study were age, gender, cluster, history of comorbidities, and treatment status. Data were analyzed using bivariate analysis using Chi - Square and multivariate with Logistic Regression.

RESULTS AND DISCUSSION

1. Descriptive determinant Factors Patient COVID-19 in the elderly

This study is a descriptive study of the characteristics of COVID-19 patients in the elderly (elderly), including age, gender, cluster, history of comorbidities, and treatment status. The results of this study showed that most of the elderly COVID-19 patients were in the early 60-70 years old (81.7%) and aged more than 70 years as many as 104 people (18.3%). The results can be seen in the following table:

Table 1 Descriptive Data Analysis Determinant FactorsAffects Patient Mortality COVID-19 in the elderly in West Nusa Tenggara

No	Variable	n = 569	%
1	**Age**		
	Early Elderly (60 – 70 years old)	465	81.7
	Elderly (>70 years old)	104	18.3
2	**Gender**		
	Male	339	59.6
	Female	230	40.4
3	**Cluster**		
	With cluster	83	14.6
	Not cluster	484	85.5
4	**History of co-morbidities**		
	Comorbid	99	17.4
	Not comorbid	470	82.6
5	**Treatment Status**		
	Get well	454	79,8
	Died	115	20,2

Based on Table 2.1 above shows that most of the elderly COVID-19 patients are in their early 60-70 years (81.7%), gender, most of them are 339 people (59.6%), without cluster 484 people (85.5%), comorbid history with 470 people (82.6%) and recovered after treatment 454 people (79.8%).

The age factor is a crucial factor for the outcome of COVID-19. According to Geriatric Experts, the factor that makes the elderly vulnerable to contracting COVID-19 is because the elderly experience a decrease in functional capacity in almost all of their body systems. Elderly patients are more at risk of death compared to young and middle-aged patients, especially elderly patients with COVID-19 are more likely to develop more severe complications. (Hakim, 2020; Liu *et al.*, 2020; Satria, Tutupoho and Chalidyanto, 2020).

The elderly can experience physical changes and psychological changes due to the degenerative process. In the aging process, changes in lung connective tissue occur, the total capacity remains. Still, the volume of lung reserves increase to compensate for the increase in lung space, and the air flowing into the lungs decreases. In addition to changes in the respiratory system, there are also gastrointestinal changes, namely tooth loss or periodontal disease, decreased sense of taste, loss of sensitivity of the taste buds to salty, sweet, bitter tastes, dilated esophagus, decreased hunger motility and decreased gastric emptying time, weak peristalsis and usually appear constipation or diarrhea (TURSINA, 2020).

2. Bivariate Determinants of the Factors Affecting the Mortality of COVID-19 Patients in the Elderly

There is a significant relationship between clusters and comorbidities on the death of the elderly infected with COVID-19. The results can be seen in the following table :

Table 2 Data analysis Bivariate Determinants of the FactorsAffecting the Mortality of COVID-19 Patients in the Elderly in West Nusa Tenggara

No	Variabel	Get well		Died		p
		n	%	n	%	
1	**Age**					
	Early Elderly (60-70 years old)	380	83.7	85	73.9	0.13
	Elderly (> 70 years old)	74	16.3	30	26.1	
2	**Gender**					
	Male	268	59.0	71	61.7	0.597
	Female	186	41.0	44	38.3	
3	**Cluster**					
	With Cluster	77	17.0	6	5.3	0,02
	No Cluster	377	83.0	107	94.7	
4	**History of comorbidities**					
	Comorbid	27	5.9	72	62.6	0,000
	No Comorbid	427	94.1	43	37.4	

Based on Table 2.2 above, it shows that COVID-19 patients in the elderly mainly died aged 60-70 years, 85 people (73.9%), male sex, namely 71 people (61.7%), without cluster 107 people (94.7%) and 62% died without comorbidities as many as 72 people due to COVID-19. There is a significant

relationship between clusters and comorbidities on the death of the elderly infected with COVID-19.

The gender of elderly patients treated with COVID-19 at the NTB Provincial General Hospital mainly were men, 339 people (59.6%). The results of this study are almost the same as the previous study by Beijing Emergency Medical Services (EMS) in designated hospitals from January 20 to February 29, 2020, that 56.7% of elderly patients who were treated and confirmed COVID-19 were male. Age and gender are strongly associated with COVID-19 cases. Different assumptions result in different CFR values, higher CFR in old age and men. Symptoms found are fever, cough, dyspnea, and fatigue. In general, most elderly patients do not experience symptoms of sore throat, rhinorrhea, anosmia, nausea, vomiting, diarrhea, and abdominal pain. (Moraga *et al.*, 2020; Niu *et al.*, 2020; Rahmah, 2021).

Other characteristic data found in elderly patients with COVID-19 in this study mainly without clusters, 484 people (85.5%), history of comorbidities with comorbidities 470 people (82.6%) and recovering after treatment for 454 people (79.8%). Complications arising from COVID-19 will be more severe if the sufferer already has comorbid diseases. In addition to disorders of the lungs, Coronavirus infection can reduce the function of other body organs so that the chronic disease conditions that sufferers already have will get worse,

even leading to death. Elderly patients have a tendency to experience multi-system organ dysfunction, including disorders of immune system components that cause inflammation. (Rahmah, 2021).

The elderly are susceptible to various diseases including COVID-19 caused by the Corona virus, because their immune system changes causing the elderly body's defenses to not work as strong as when they were young.

The difference in immunological profiles between mild and severe COVID-19 cases can be seen from one study in China. The study found lower lymphocyte counts, higher leukocyte and neutrophil-lymphocyte ratios, and lower percentages of monocytes, eosinophils, and basophils in severe cases of COVID-19. Proinflammatory cytokines, namely TNF-, IL-1, IL-6, IL-8, and infection markers such as procalcitonin, ferritin, and C-reactive protein, were also found to be higher in severe clinical cases. Helper T cells, suppressor T cells, and regulatory T cells were found to be decreased in COVID-19 patients with lower levels of T helper and T regulators in severe cases (TURSINA, 2020).

In this study, there is also data that explains the types of comorbid diseases that cause death in elderly patients with COVID-19.The results can be seen in the following table :

Table 3 Analysis of Descriptive Data Types of History of Comorbidities COVID-19 patients in the elderly in West Nusa Tenggara

Types of Comorbidities	n = 99	%
- Diabetes Mellitus	40	40,4
- Hypertension	18	18,1
- Pnemonia	11	11,1
- Kidney	10	10,1
- Tuberkolosis	7	7
- Heart	7	7
- Stoke	2	2
- Mental Disorder	1	1
- Joint disorder	1	1
- Enchepalitis	1	1
- Tyroid cancer	1	1

Based on Table 3 above, it shows that most of the elderly COVID-19 patients with a history of comorbidities, namely Diabetes Mellitus 40 people (40.4%), Hypertension 18 people (18.1%), Pneumonia 11 people (11.1%), Kidney Disorders 10 people (10.1%), Tuberculosis 7 people (7.0%), Heart Disease 7 people (7.0%), Stroke 2 people (2.0%), People with Mental Disorders (ODGJ) 1 person (1.0%), Joint Disorders in 1 person (1.0%), Encephalitis in 1 person (1.0%), and Thyroid Cancer in 1 person (1.0%). Most of the elderly COVID-19 patients with a history of comorbidities in this study were mostly Diabetes Mellitus 40 people (40.4%), Hypertension 18 people (18.1%), followed by pneumonia 11 people (11.1%) and Kidney Disorders. 10 people (10.1%) and tuberculosis 7 people (7.0%) and heart disorders 7 people (7.0%). This study is the same as that of the Bhakti Dharma Husada Hospital Surabaya which shows that patients with comorbid diabetes and heart disease are risk factors for COVID-19 death, patients with comorbid diabetes have a 4,384 times greater risk of dying from COVID-19 than patients without comorbid diabetes, and patients with cardiac comorbidities have a 4,319

times greater risk of dying from COVID-19 than patients without cardiac comorbidities (Satria, Tutupoho and Chalidyanto, 2020).

Death due to COVID-19 in the elderly is exacerbated by the presence of comorbidities such as hypertension and diabetes mellitus. Meta-regression showed that the association with poor composite outcome was influenced by age and hypertension. the average age of 55 years is more at risk of experiencing COVID-19 compared to <55 years. DM can cause death, more severe COVID-19, ARDS, and the development of other diseases in patients with COVID-19. Other studies have shown that the risk factors for death in COVID-19 include male gender, advanced age, diabetes, and hypertension. (Huang, Lim and Pranata, 2020).

3. Multivariate Determinants Which Affecting the Mortality of COVID-19 in the Elderly

COVID-19 patients with comorbidities are the most dominant influencing mortality in the elderly. The results can be seen in the following table :

Table 2.3 Analysis of Data Multivariate Determinants WhichAffecting the Mortality of COVID-19 Patients in the Elderly in West Nusa Tenggara

No	Variable	Koefisien	p value	RR	95%CI
1	Age	0,82	0,015	0,084	0,16 – 1,52
2	Gender	0,15	0,661	0,012	0,42 - 0,66
3	Cluster	0,45	0,184	0,051	0,24 – 1,26
4	History of comorbidities	5,93	0,000	0,626	5,56 - 6,97

r value = 0.609

Based on Table 2.3 above/ shows that comorbidities (with comorbidities) are the most dominant influencing mortality in the elderly. Based on the analysis of the logistic regression model involving four variables, the mortality of COVID-19 in the elderly was 60.9%, the rest was influenced by other variables.

The whole world has recognized that the elderly are at higher risk of contracting COVID-19, and if they are sick, they have a higher risk of death and are age-related due to impaired immunity. According to the Chinese Centers for Disease Control and Prevention, the mortality rate in the 60-69 year age group is 3.6% and can even reach up to 18% for those aged 80 years and over. In this study, after a bivariate analysis was carried out, namely the factors that influenced the mortality of elderly patients with COVID-19 in NTB Province, it was found that there was a significant relationship between clusters and comorbidities on the mortality of elderly infected with COVID-19. Furthermore, based on the results of multivariate analysis, it was found that comorbidities (with comorbidities) were the most dominant influencing mortality in the elderly. Based on the analysis of the logistic regression model involving four variables, the mortality of COVID-19 in the elderly was 60.9%, the rest was influenced by other variables (Banerjee, 2020; Perrotta et al., 2020).

It is no different from this study that deaths caused by COVID-19 in the elderly are exacerbated by the presence of comorbid diseases such as hypertension and diabetes mellitus. Meta-regression showed that the association with poor composite outcome was influenced by age and hypertension. the average age of 55 years is more at risk of experiencing COVID-19 compared to <55 years. DM can cause death, more severe COVID-19, ARDS, and the development of other diseases in patients with COVID-19. Other studies have shown that the risk factors for death in COVID-19 include male gender, advanced age, diabetes, and hypertension. (Huang, Lim and Pranata, 2020; Satria, Tutupoho and Chalidyanto, 2020).

Complications that arise due to COVID-19 will also be more severe if the sufferer already has the diseases in this study, such as 2 strokes (2.0%), 1 person with mental disorders (ODGJ) (1.0%), Joint Disorders in 1 person (1.0%), Encephalitis in 1 person (1.0%), and Thyroid Cancer in 1 person (1.0%). Coronavirus infection not only causes disturbances in the lungs, but can also reduce the function of other body organs so that the chronic disease condition that the patient already has will get worse, even leading to death. Everyone is required to strictly follow Health protocols and limit face-to-face contact with friends and family, especially if: 1. aged 60 years and over; 2. have comorbid diseases (comorbidities) such as diabetes mellitus, cardiovascular disease (hypertension), respiratory disease, and cancer (Fischer et al., 2020; Perrotta et al., 2020).

Chronic diseases in the elderly predispose to death in COVID-19 cases. Elderly people with psychiatric disorders also cause persistent inflammation to predispose them to severe COVID-19 symptoms. The application of social restrictions is one solution to prevent transmission. However, for the elderly, this isolation activity will worsen their mental and social conditions due to a cytokine storm that causes inflammation in the central nervous system. This study examines the effect of Covid-19 infection on mental disorders. This epidemic of emotional disorders can occur in several countries such as France, which is preparing to face this epidemic (Grolli *et al.*, 2021).

In this study, the highest comorbid disease suffering from COVID-19 was diabetes mellitus (40.4%). Other research according to statistical data in India also shows that diabetics have the second largest number of infected with COVID-19. Patient with diabetes mellitus with COVID-19 will experience symptoms that are twice as severe as a result of metabolic disorders, namely an increase in blood sugar levels which will increase from normal levels. normal. Patients with diabetes mellitus have a poor immune response to infections, including viruses, bacteria, parasites, and fungi compared to non-diabetic patients. Mortality will be higher in this case due to the inflammatory response that can cause the rapid spread of COVID-19 infection (Kashyap *et al.*, 2021; Morales-Franco *et al.*, 2021).

CONCLUSION

Elderly patients with COVID-19 are mainly in the early elderly (60-70 years), male gender, without clusters, cured, and without comorbidities. There is a relationship between clusters and comorbidities of COVID-19 patients in the elderly. The most dominant comorbid variable affecting the mortality

of COVID-19 patients in the elderly and contributing 60.9%, the rest is influenced by other factors. It is hoped that the government and related agencies will pay attention to this elderly group so they don't get infected, so it is necessary to prioritize getting Covid-19 vaccinations, implementing health protocols, routine services in the form of daily checks and psychological support, and being able to carry out early detection of co-morbidities that are often experienced by the elderly. We would like to thank the Head of the NTB Provincial Health Officer and the Head of the Family Health Section for cooperating and support for information on COVID-19 data for the elderly.

REFERENCES

Banerjee, D. (2020) 'The impact of Covid-19 pandemic on elderly mental health', *International journal of geriatric psychiatry*.

Fischer, F. *et al.* (2020) 'COVID-19 and the elderly: who cares?', *Frontiers in public health*, 8, p. 151.

Grolli, R. E. *et al.* (2021) 'Impact of COVID-19 in the mental health in elderly: psychological and biological updates', *Molecular Neurobiology*, 58(5), pp. 1905–1916.

Hakim, L. N. (2020) 'Perlindungan Lanjut Usia Pada Masa Pandemik Covid-19', *Info Singkat, XII (10/II/Puslit/Mei/2020)*.

Huang, I., Lim, M. A. and Pranata, R. (2020) 'Diabetes mellitus is associated with increased mortality and severity of disease in COVID-19 pneumonia–a systematic review, meta-analysis, and meta-regression', *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(4), pp. 395–403.

Kashyap, S. *et al.* (2021) 'Uncurtaining the effect of COVID-19 in diabetes mellitus: a complex clinical management approach', *Environmental Science and Pollution Research*, pp. 1–8.

Kementerian Kesehatan RI Direktorat Jenderal Pencegahan dan Pengendalian Penyakit (P2P) (2020) *Pedoman Pencegahan dan Pengendalian*

Coronavirus Disease (COVID-19) Revisi ke-4. Jakarta. Available at: http://infeksiemerging.kemkes.go.id.

Liu, K. *et al.* (2020) 'Clinical features of COVID-19 in elderly patients: A comparison with young and middle-aged patients', *Journal of Infection*, 80(6), pp. e14–e18.

Moraga, P. *et al.* (2020) 'Assessing the age-and gender-dependence of the severity and case fatality rates of COVID-19 disease in Spain', *Wellcome Open Research*, 5.

Morales-Franco, B. *et al.* (2021) 'Host-Pathogen Molecular Factors Contribute to the Pathogenesis of Rhizopus spp. in Diabetes Mellitus', *Current tropical medicine reports*, pp. 1–12.

Newall, A. T. *et al.* (2020) 'Delay-adjusted age-and sex-specific case fatality rates for COVID-19 in South Korea: Evolution in the estimated risk of mortality throughout the epidemic', *International Journal of Infectious Diseases*, 101, pp. 306–311.

Niu, S. *et al.* (2020) 'Clinical characteristics of older patients infected with COVID-19: A descriptive study', *Archives of gerontology and geriatrics*, 89, p. 104058.

Perrotta, F. *et al.* (2020) 'COVID-19 and the elderly: insights into pathogenesis and clinical decision-making', *Aging clinical and experimental research*, pp. 1–10.

Rahmah, D. D. (2021) 'COVID-19 pada Lanjut Usia: Tinjauan Literatur', *Wellness And Healthy Magazine*, 3(1), pp. 37–41.

Salama, C. *et al.* (2021) 'Tocilizumab in patients hospitalized with Covid-19 pneumonia', *New England Journal of Medicine*, 384(1), pp. 20–30.

Satria, R. M. A., Tutupoho, R. V. and Chalidyanto, D. (2020) 'Analisis Faktor Risiko Kematian dengan Penyakit Komorbid Covid-19', *Jurnal Keperawatan Silampari*, 4(1), pp. 48–55.

Shim, E. (2021) 'Delay-Adjusted Age-Specific COVID-19 Case Fatality Rates in a High Testing Setting: South Korea, February 2020 to February 2021', *International Journal of Environmental Research and Public Health* . doi: 10.3390/ijerph18105053.

TURSINA, A. (2020) 'COVID-19 dan lansia', in. Pusat Penerbitan Unisba (P2U) LPPM UNISBA.

Undurraga Fourcade, E. A., Chowell, G. and Mizumoto, K. (2021) 'COVID-19 case fatality risk by age and gender in a high testing setting in Latin America: Chile, March–August 2020'.

Zeng, Y. *et al.* (2014) 'Use of complementary and alternative medicine across the childbirth spectrum in China', *Complementary Therapies in Medicine*, 22(6), pp. 1047–1052. doi: https://doi.org/10.1016/j.ctim.2014.10.009.