

**Case Report**

***Risk Factors for Mortality Due to Covid-19: A Case Study at a District Hospital in March-September 2020***

**Faktor Risiko Kematian Karena Covid-19: Studi Kasus pada Rumah Sakit Daerah Bulan Maret-September 2020**

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**ABSTRACT**

*The Covid-19 pandemic, which becomes a global health problem, has widely impacted not only health but also social, economic, and politics in Indonesia. Previous studies have indicated that the patient's prognosis is influenced by the degree of disease, age, gender, and comorbidities. District hospital in Bojonegoro is a Covid-19 referral hospital and 37,1 % of patients who died in March-September 2020. This study was conducted to identify risk factors for death in patients with Covid-19 in hospital so we can reduce case fatality rate in district hospital in Bojonegoro. The independent variables in the study were age, gender, and comorbid status, while the dependent variable was the output status (recovered or deceased). The study was conducted at a private hospital in East Java in October 2020 on 104 patients as subjects. Data were analyzed using the chi-square test. The results show that all the factors studied, age  $p = 0.006$ , gender  $p = 0.050$ , and comorbid status  $p = 0.001$ , have a statistically significant relationship with mortality. In short, at this hospital, advanced age, male gender, and comorbidities are the risk factors for Covid-19 death.*

**Keywords:** Covid-19, in-hospital mortality, risk factor

**ABSTRAK**

Pandemi Covid-19 merupakan permasalahan kesehatan dunia dengan dampak luas tidak hanya pada kesehatan namun juga sosial, ekonomi dan politik di Indonesia. Studi sebelumnya mengindikasikan prognosis pasien tidak hanya dipengaruhi derajat penyakitnya, namun juga umur, jenis kelamin, dan komorbid yang dimiliki. Rumah sakit daerah di Bojonegoro merupakan rumah sakit rujukan covid dengan angka kematian pasien sebesar 37,1 % dibulan Maret-September 2020. Penelitian ini dilakukan untuk mengidentifikasi faktor risiko kematian pada pasien Covid-19 sehingga dapat menurunkan angka kematian pasien Covid-19. Variabel independent dalam penelitian adalah adalah usia, jenis kelamin, status komorbid, dengan variabel dependen status keluaran (meninggal atau hidup). Penelitian dilaksanakan di salah satu rumah sakit daerah di Bojonegoro pada bulan Oktober tahun 2020 dengan 104 pasien sebagai subjek. Data dianalisis menggunakan uji Chi-Square. Hasil menunjukkan bahwa semua faktor yang dikaji: usia  $p = 0,006$ , jenis kelamin  $p = 0,050$  dan status komorbid  $p = 0.001$  mempunyai hubungan yang signifikan secara statistik dengan kematian. Dapat disimpulkan pada kasus di rumah sakit ini, semakin tua, lelaki, dan adanya komorbid menjadi faktor risiko kematian Covid-19.

**Kata Kunci:** Covid-19, faktor risiko, kematian di rumah sakit

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## INTRODUCTION

Coronavirus 19 disease, known as Covid-19, is an infectious disease first discovered in Wuhan, Hubei Province, China, on December 8, 2019. The disease has spread globally and was declared a pandemic on March 11, 2020 (1). According to the data on July 9, 2020, the number of confirmed cases worldwide is 11.84.226, with 545.481 deaths. In Indonesia, there are 70.736,000 confirmed cases with 3.417 deaths (2).

The developments of the case show that the dangers of Covid-19 have surpassed those of SARS and MARS despite vaccine and treatment development (3). Thus, the high mortality rate in Indonesia needs serious attention. Based on world data on March 2020, the highest case fatality rate is a history of disease besides preventive measures, a study to determine which group has a higher risk of dying from Covid-19 is essential. Understanding the risk of death can increase awareness and prevent this group from dying from Covid-19 and, at the same time, reducing mortality (4).

Several factors are believed to affect mortality in Covid-19. According to research conducted by Caramelo *et al.*, in China, there is a relationship between ages, gender, comorbidities with the death of Covid-19 patients. People aged 60 years or older only contribute about 6% of China's total population (5). On the other hand, the China CDC study found that most cases occurred among men (51.4%) and in the age range of 30-79 years. Older people or those with comorbidities are at risk for more severe disease. Covid-19 mortality was 10.5% in cardiovascular disease patients, 7.3% in diabetic patients, 6.3% in chronic respiratory disease patients, 6% in hypertension patients, and 5.6% in cancer patients. Although studies in one hospital may not be informative, the uniqueness of patients in each region and hospital requires a specific study. This study was conducted to identify risk factors for death in patients with Covid-19 in hospital. The study was conducted in district hospital in Bojonegoro.

## METHOD

An observational analytic with a retrospective study design was performed. This study was conducted in October 2020 with a population of 104 Covid-19 patients treated during March-September 2020 in district hospital in Bojonegoro. All population became a sample of this study. The age, gender, and comorbidities of confirmed Covid-19 cases were treated as independent variables, while the status (recovered or deceased) of Covid-19 patients was the dependent variable. Age is the age at which the patient was diagnosed with Covid-19 divided into <50 years old and >50 years old, gender is the sex of the covid-19 patient with criteria female and male, comorbidities is a disease that is suffered while being treated with Covid-19 with criteria with comorbid and without comorbidity. The Chi-Square analysis was used to determine the effect of age, gender, and comorbidities on the probability of Covid-19 patients who died from the disease.

## RESULT

The frequency distribution of age, gender, and comorbidities of Covid-19 patient deaths is presented in Table 1. The majority of Covid-19 patients who died were

male (64%). On the other hand, most patients who recovered from Covid-19 were under 50 years old (65.4%), and those who died were over 50 years old (61.6%). Patients with comorbidities who died were 52 patients (100%).

**Table 1. Covid-19 patient mortality status by characteristics**

Characteristics of COVID-19 Patients	Recovered (N=52)	Deceased (N=52)	All (N=104)	P-Value	OR
<b>Age</b>					
<50 years old	35 (67.3 %)	21 (40.3 %)	56 (54.9 %)	.006	3,039
>50 years old	17 (32.7 %)	31 (59.7 %)	48 (45.1%)		
<b>Gender</b>					
Female	30 (57.6 %)	20 (38.4 %)	50 (48 %)	.050	2,182
Male	22 (32.4 %)	32 (61.6 %)	54 (52 %)		
<b>Comorbidity</b>					
With Comorbidity	42 (80.8 %)	52 (100 %)	94 (90.4 %)	.001	
Without Comorbidity	10 (80.8 %)	0 (0 %)	10 (9.6 %)		

## DISCUSSION

### Age Risk on Covid-19 Mortality

The results show that age is a significant positive determinant of Covid-19 patients who died ( $p = 0.006$ ). Advanced ages have been proven a risk factor for Covid-19 death (OR: 3,039). The same previous study reported that the estimated case fatality rate (global CFR for Covid-19 cases under 60 years of age was 0.14%, while the CFR for Covid-19 cases equal to or above 60 years was 3.28%). The declining organ function among the elderly is associated with B and T cell function and an overproduction of type 2 cytokines that can lead to a prolonged pro-inflammatory response and deficiency in viral replication control; thus, potentially leading to poor outcomes. In addition, elderly patients may have other risk factors, such as sarcopenia and comorbidities. Previous studies have shown that Covid-19 infection is more likely to affect older men with comorbidities and can result in fatal respiratory illnesses, such as acute respiratory illness syndrome (6). The number of deaths that increasing day by day due to Covid-19 not only cause physical symptoms and disease but also on mental effect (7). Covid-19 patient who died were adult patients who became the backbone of the family, so their death impact on the socioeconomic conditions of the family.

### Gender

This study also shows that gender is a significant positive determinant of Covid-19 patients who died using the chi-square test ( $p < 0.05 = 0.05$ ). Men have been proven a risk factor for Covid-19 death (OR: 2,182). An explanation of this can be, the male has weaker immunity because of genetic and hormonal factors and has shown higher mortality in several infectious diseases (8,9). Differences in hormone levels between men and women theorized to be the reason why are men more prone to die (10).

In terms of biological characteristics, women produce a more robust immune response than men and are better at fighting off infections, including viral infections. A weaker male immune system makes men more susceptible to various infectious diseases. One potential explanation is that sex hormones are involved in how the immune system triggers an inflammatory response to pathogens. Some

researchers assume that this difference may also explain why men suffered more due to Covid-19 infection (11).

The increasing mortality rate of COVID-19 male patients was first observed in data from China in February; a study of 44,672 confirmed cases in Wuhan calculated case fatality rates of 2.8% and 1.7% in men and women, respectively. It is apparently influenced by behavioral factors associated with gender, that is smoking habits. The prevalence of smoking in China is 52.1% in men and only 2.7% in women. In contrast, in Italy, the difference in smoking rates between men (28%) and women (19%) is not significant. It shows that the difference in smoking rates by gender is thought to be the cause of the differences in the risk of death from Covid-19, which is higher in men than women, and needs to be studied further (6).

Covid-19 patient data by gender in Indonesia shows that the number of male patients is higher than women. According from CDC in China, most cases occurred in men (51,4% and occurred at the age of 30-79 years (2). The high death rate for men causes the burden on women to be higher. Women who doing work from home must be able to allocate time to take care of the household, accompanying, children study and work at the same time (12).

#### Comorbidity

In this study, comorbidity is proven a significant positive determinant of Covid-19 patients who died using the chi-square test ( $p = 0.001$ ). Comorbid disease suffered include hypertension, pneumonia, diabetes mellitus, and sepsis. Patients with diabetes mellitus have a immune suppression due to circumstances chronic hyperglycemia and disorder immune modulation so it can increase

mortality of Covid-19. Studies on the association between comorbid conditions and mortality in COVID-19 patients in China of all ages show mixed results. In a study involving 140 patients admitted to No.7 Hospital in Wuhan, no significant difference in the proportion of patients with hypertension, diabetes, and coronary heart disease was observed between severe and non-severe patients (6). Study by Du et al found if the patient has breathing disease can increase mortality (2,08-25.97) (13). In contrast, the opposite was noticed between 54 deceased patients and 137 recovered patients who were admitted to Jinyintan Hospital and Wuhan Pulmonary Hospital (6). At Jinyintan Hospital, the difference in the proportion of patients with hypertension, diabetes, and coronary heart disease between the two groups was quite significant even at the 1% significance level. The Government of DKI Jakarta Province stated that patients with comorbidities have a high risk of contracting Covid-19, so early treatment must be given to prevent lung problems and pneumonia that cause death (4). WHO states that people with low immunity, such as elderly people with comorbidities, have a higher risk of being infected with the Corona virus (4).

Everyone is potentially infected with the coronavirus, but some have higher risks of being exposed to Covid-19 and lead to death. People over the age of 50, male, and with comorbidities have a higher risk of contracting the coronavirus.

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