

# ANALYSIS OF COMORBID DISEASE RISK FACTORS ON COVID-19 PATIENTS TO MORTALITY RATES IN SORONG CITY

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## Abstract

**Introduction:** The COVID-19 mortality rate in Sorong City has increased in recent months. One of the risk factors that can affect the mortality rate of COVID-19 is underlying disease or comorbid. Comorbid diseases can aggravate patients who are positive for COVID-19. Comorbid diseases such as heart and metabolic, acute inflammation, and decreased organ function (heart, kidneys, liver, and hematology) experienced by patients at the beginning of treatment can increase the risk of death due to COVID-19 infection. Some of the most common comorbid diseases found in Sorong City are hypertension, diabetes mellitus, and cardiovascular disease.

**Methods:** This research is an analytical observation using a case-control study design. The study population is 140 COVID-19 patients in Sorong City, divided into two groups: 70 for the case group and 70 for the control. The data were analyzed using the odds ratio (OR) to see the relationship between comorbidities and the mortality rate of COVID-19 patients.

**Results:** We found an OR value of 7,794, an upper limit value of 3,670, and a lower limit value of 16,553. This shows that COVID-19 patients with comorbidities have a greater mortality risk of 7,794 times more than patients who do not have comorbidities.

**Conclusion:** Comorbid diseases are a risk factor for the mortality rates of COVID-19 patients in Sorong city.

**Keywords:** Comorbidities, COVID-19, Mortality Rates.

## INTRODUCTION

In 2020 a new type of pneumonia virus broke out, known to have originated in a city called Wuhan, Hubei Province in China, which appeared in November 2019 and spread rapidly to 216 countries. This outbreak is named Corona Virus Disease 2019 (COVID-19). According to WHO (2020) Corona Virus Disease 2019 (COVID-19) is caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), which is spread from human-to-human transmission by inhalation of the droplets<sup>1</sup>.

The government officially announced the case of COVID-19 in Indonesia on 2nd March 2020.

Two optimistic Indonesians said they were in direct contact with Japanese nationals visiting Indonesia. On 11th March 2020, for the first time, there was a death case due to the COVID-19 infection in Solo City. Meanwhile, COVID-19 cases in Sorong city first appeared in April 2020 at Sele Be Solu Hospital in Sorong City, and for the first time, there were death cases from COVID-19 in mid-April 2020.

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From data from the Sorong City COVID-19 Task Force in August 2021, COVID-19 cases in Sorong City have reached 118 COVID-19-positive patients, of which 112 are temporarily quarantined, and six patients are currently still being treated<sup>3</sup>.

In Sorong City, the mortality rate has increased from a few months earlier. Several risk factors can affect mortality rates with comorbid diseases COVID-19. Comorbid diseases are subordinate diseases that can aggravate patients who are COVID-19 positive. Comorbid diseases such as heart and metabolic, acute inflammation, and decreased organ function (heart, kidneys, liver, and hematology) experienced by patients at the beginning of treatment can increase the risk of death due to COVID-19 infection<sup>4</sup>. Some of the most common comorbid diseases found in Sorong City are hypertension, diabetes mellitus, and cardiovascular disease<sup>5</sup>.

Coronary heart disease is a risk factor for the severity of COVID-19, meaning that coronary heart disease will increase the risk of COVID-19 infection more than those not suffering from coronary heart disease. In several studies, people with diabetes mellitus are more at risk of experiencing the severity of COVID-19 than people who do not have diabetes mellitus <sup>6</sup>. People with COVID-19 with diabetes will increase kidney failure causing uncontrolled diabetes and hypertension as comorbidities of COVID-19. Hypertension and diabetes mellitus are diseases that are connected. Both can cause an effect. Hypertension can cause insulin resistance, a risk factor for diabetes mellitus. However, the mechanism linking hypertension to insulin resistance remains unclear, although insulin resistance is the leading cause of elevated blood glucose levels <sup>7</sup>.

The prevalence of comorbid COVID-19 cases globally is 57.7%, and non-comorbid COVID-19 cases are 42.3%. The most common comorbid diseases in COVID-19 are hypertension, DM, cardiovascular disease (CVD), chronic obstructive pulmonary syndrome (COPD), chronic kidney disease (CKD), cancer, and other concomitant diseases that include liver disease, GI disorders, immunocompromised, neurological disorders, psychiatric disorders, metabolic disorder, a blood disorder, transplant, chronic pancreatitis, connective tissue disorder, smoking, obesity, hyperlipidemia. The highest percentage of COVID-19 patients with comorbidities is hypertension at 27.4%, followed by DM at 17.4%, CVD at 8.9%, COPD at 7.5%, cancer at 2.6%, CKD at 3.5%, and other diseases at 15.5% <sup>8</sup>.

Comorbid diseases that attack the respiratory and cardiovascular systems or other metabolic diseases will be more at risk of being infected with COVID-19. In addition to being more at risk for exposure to COVID-19, groups with comorbidities will also be at risk of severity to cause death. <sup>9</sup>.

## MATERIALS AND METHODS

a) This research is an analytical observation using a case-control study design. This study is an observational study that assesses the relationship between disease exposure by determining a group of diseased people (called cases) and a group of people who are not diseased (called control), then comparing the frequency of exposure in both groups of 10. Determination of sample size in this study using Stanley Lemeshow formula as below:  $n = Z_{1-\alpha/2} \{ 1 / [ P_1 ( 1 - P_1 ) + 1 / [ P_2 ( 1 - P_2 ) ] ] \} / \{ \ln ( 1 - \beta ) \}^2$ <sup>11</sup>. Based on the calculation of the size of the sample obtained at least for case 70 when it is assumed that the case and control ratio is 1: 1, then the minimum sample number obtained is 140 samples. Sampling techniques use Systematic Random Sampling and matching to suppress the effects of confounding and improve the quality of measurements against groups that are indeed at risk. Matching is done on the gender of the respondent. The study used secondary data obtained from the medical records of Sorong City COVID-19 Referral Hospital. The data is analyzed using SPSS with the Odds Ratio (OR) statistical test. The provisions used by the odds ratio are :

1. Confidence Interval (CI) of 95%.
2. The value of effectiveness to see the relationship of the risk factor with the case is determined based on the lower limit value (lower limit) and the upper limit value (upper limit).
  - a. Interpretation of OR :
  - b. OR = 1, the independent variable is not a risk factor for the independent variable.
  - c. OR < 1, the independent variable is a protective factor against dependent variables.
  - d. OR > 1, the independent variable is a risk factor for the dependent variable.
  - e. If the upper and lower limit values are both below the value of 1 or both above the value of 1, then the results of the analysis are declared meaningful. Conversely, if the distance between the lower limit value through the value of 1 means that the lower limit value < 1 while the upper limit value > 1 then the analysis results are declared.

## RESULTS

### a. Univariate Analysis

Table 1. Distribution of Respondents Based on Age

Age	n (%)
20 – 40	30 (21,4%)
41 – 60	54 (38,6%)
61 – 80	56 (40%)
Total	140 (100%)

Table 1 shows that the characteristic data of respondents based on age, the age group of 20-40 years as many as 30 (21.4 %), the age group of 41-60 years as many as 54 (38.6 %), and the age group of 61-80 years as many as 56 (40 %).

Tabel 2. Distribution of Respondent Based on Comorbid COVID-19

No	Characteristics	n (%)
1	Comorbid	
	Diabetes Mellitus	40 (57,1 %)
	Hypertension	28 (40 %)

Table 6. Risk Factors for Comorbid Diseases in COVID-19 Patients on Mortality Rates in Sorong City

Category		Case		Control		Total		OR	UL-LL
		N	%	n	%	Value	(%)		
COVID-19	Dead	53	75,7%	20	13,2%	73	52,1 %	7,794	3.670 -16.553
	Not Dead	17	24,3%	50	30,9%	67	47,9 %		
Total		70	100	70	100	140	100%		

Based on table 6 above, of the 70 respondents with COVID-19 disease with comorbidities, 53 (75.7%) died and 17 (24.3%) did not. Of the 70 respondents who had no comorbid COVID-19 disease, 20 (13.2%) died and 50 (30.9%) did not. After doing the analysis using the odds ratio, the OR value is 7,794 > 1.

## DISCUSSION

COVID-19 is an acute disease that can be cured but is also deadly, with a case fatality rate (CFR) of 4%. The clinical spectrum of COVID-19 pneumonia ranges from mild to severe conditions. Severe disease onset can lead to death due to massive alveolar damage and progressive respiratory failure<sup>13,14</sup>. This disease will be more severe, and the risk of death is quite high if the patient has comorbidities.

Diabetes Mellitus, hypertension, and cardiovascular disease are comorbid diseases suffered by COVID-19 patients in Sorong City with the highest number of diabetes mellitus at 40 (57.1%) followed by hypertension at as many as 28 (40%) and heart disease as much as 2 (2.9%) (Table 2). COVID-19 patient with comorbid diabetes mellitus will increase the secretion of hyperglycemic hormones such as catecholamine and glucocorticoids by producing glucose elevation in the blood, abnormal glucose variability and diabetes complications. COVID-19 patient with diabetes will increase kidney failure causing by uncontrolled diabetes and hypertension as comorbid COVID-19. The uncontrolled impact of diabetes will cause cytokine inflammation that cause multiple organ failure. Patients with comorbid cardiovascular such as hypertension and coronary heart disease (CHD) are more at risk for severe manifestations if infected with SARS-CoV-2 and contribute to the majority death cases of COVID-19. This is thought to be due to higher

Coronary Heart Disease		2 (2,9 %)
2	No Comorbid	70 (50%)
Total		140 (100%)

Table 2 shows that the respondents' characteristic data is based on comorbidities. Covid-19 patients with comorbidities consist of: Diabetes Mellitus as much as 40 (57.1 %), Hypertension as much as 28 (40 %) and Coronary Heart as much as 2 (2.9 %)

### b. Bivariate Analysis

Angiotensin Converting Enzyme 2 expression in people with cardiovascular disease 7,15. Based on the results, the analysis of data obtained an OR value of 7,794, with a Confidence Interval value (3,670 -16,553). This shows that comorbid diseases are a risk factor for death rates due to Covid-19 in Sorong City.

Guo et al., reported several factors related to the output of hospitalized COVID-19 patients including a history of cardiovascular disease (hypertension, coronary heart disease, or cardiomyopathy), found 28% of cases of acute myocardial injuries (which were characterized by an increase in troponin-T (TnT) more than the upper limit of the 99th percentile, and a higher mortality rate in patients who had higher troponin T values (59.6% vs. 8.9% ; P <.001). Patients with higher troponin scores are usually older, male, and accompanied by comorbidities such as hypertension, coronary heart disease, cardiomyopathy, chronic kidney disease, leukocyte values, NT pro-BNP, CRP, and higher D-dimer, and lower lymphocyte values. Patients with high TnT scores were at risk for the onset of ARDS complications, malignant arrhythmias, acute renal injury, and acute coagulopathy<sup>13,14,16,17</sup>. This is relevant to the results of the study ,where the VALUE OR > 1, indicates that a risk factor for COVID-19 mortality rates in Sorong city were 7,794 times greater in patients with comorbidities compared to patients who do not have comorbidities. The age group 61-80 years infected with SARS CoV-2 can experience systemic manifestations and pneumonia that is more severe than patients aged ≤ 60 years and aggravated by the presence of comorbid cardiovascular disease. 7,15.

The results of the study conducted by Hunafa et.al affirm that Diabetes Mellitus disease can increase the risk of death in confirmed case of COVID-19. The mortality rate of confirmed case COVID-19 was especially higher in the group of patients with uncontrolled DM<sup>18</sup>. In addition, research

conducted by Nanda et.al stated that there is a comorbid influence of hypertension (p-value = 0.007 < 0.05) and there is an influence of diabetes mellitus (p-value = 0.000 < 0.05) on the incidence of COVID-19. Hypertension has a 2.109 times higher risk of being infected with COVID-19 than patients who do not have hypertension, while Diabetes Mellitus has a risk of 0.307 times. People with hypertension will experience an increase in Angiotensin Converting Enzyme 2 in the lungs, arteries, and heart as a good receptor for the coronavirus. High blood sugar will accelerate coronavirus replication, this factor will speed up the process of COVID-19 disease 19.

## CONCLUSION

Comorbidities are a risk factor for the death of COVID-19 patients in the Sorong City. COVID-19 patients who have comorbidities have a 7,794 times greater risk of death compared to patients who do not have comorbidities.

## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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## REFERENCES

- Susilo, Adityo, et al. "Coronavirus disease 2019: Tinjauan literatur terkini." *Jurnal Penyakit Dalam Indonesia* 7.1 (2020): 45-67. DOI : <http://dx.doi.org/10.7454/jpdi.v7i1.415>
- Nursofwa, Ray Faradillahisari, Moch Halim Sukur, and Bayu Kurniadi Kurniadi. "Penanganan Pelayanan Kesehatan Di Masa Pandemi COVID-19 Dalam Perspektif Hukum Kesehatan." *Inicio Legis* 1.1 (2020). DOI : <https://doi.org/10.21107/il.v1i1.8822>
- Dinas Kesehatan Papua Barat. "Situasi Terkini Perkembangan COVID-19 di Papua Barat tanggal 21 Mei 2021" *Url* : <https://dinkes.papuaratprov.go.id/artikel/situasi-terkini-perkembangan-COVID-19-di-papuarat-tanggal-21-mei-2021>. Diakses Juni 2021.
- Astuti, Sri. "Analisis Hubungan Penyakit Penyerta (Komorbid) Dengan Tingkat Keparahan Gejala COVID-19: Literature Review." *Url* : [http://repositori.uinalauddin.ac.id/19999/1/SRI%20ASTUTI\\_70300119004.pdf](http://repositori.uinalauddin.ac.id/19999/1/SRI%20ASTUTI_70300119004.pdf)
- RSUD Sele Be Solu. "Data Penyakit Komorbid/ Penyerta Kasus COVID-19 -19. 2021.
- Bikdeli, Behnood, et al. "COVID-19 and thrombotic or thromboembolic disease: implications for prevention, antithrombotic therapy, and follow-up: JACC state-of-the-art review." *Journal of the American college of cardiology* 75.23 (2020): 2950-2973.
- Dixon, Anne E., and Ubong Peters. "The effect of obesity on lung function." *Expert review of respiratory medicine* 12.9 (2018): 755-767. DOI: <https://doi.org/10.1080/17476348.2018.1506331>
- Bajgain, Kalpana Thapa, et al. "Prevalence of comorbidities among individuals with COVID-19: A rapid review of current literature." *American journal of infection control* 49.2 (2021): 238-246.
- Nanda, Cicilia. "Pengaruh Penyakit Komorbid Hipertensi Dan Diabetes Melitus Terhadap Kejadian COVID-19 Di RSI Siti Khadijah Palembang." *Diss. Universitas Katolik Musi Charitas, 2021. Url* : <http://eprints.ukmc.ac.id/id/eprint/6094/>
- Murti, Bhisma. *Prinsip dan Metode Riset Epidemiologi*. Jakarta: Gajah Mada University Press, 2003.
- LEMESHOW, Stanley et al. " *Besar Sampel Dalam Penelitian Kesehatan*." Yogyakarta : Gajah Mada University Press , 1997.
- William, Herick A., Infan Ketaren, and Alice I. Supit. "Dampak Coronavirus Disease 2019 terhadap Sistem Kardiovaskular." *e-Clinic* 8.2 (2020). DOI: <https://doi.org/10.35790/ecl.8.2.2020.30540>.
- Hasanah, Dian Yaniarti, et al. "Gangguan Kardiovaskular pada infeksi COVID-19 19." *Indones J Cardiol* 41.2 (2020): 59-68. DOI : 10.30701/ijc.994
- Yang, Xiaobo, et al. "Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study." *The Lancet Respiratory Medicine* 8.5 (2020): 475-481.
- Costa, Isabela Bispo Santos da Silva, et al. "The heart and COVID-19: what cardiologists need to know." *Arquivos brasileiros de cardiologia* 114 (2020): 805-816. DOI : <https://doi.org/10.36660/abc.20200279>.
- Clerkin, Kevin J., et al. "COVID-19, and cardiovascular disease." *Circulation* 141.20 (2020): 1648-1655. DOI: <https://doi.org/10.1161/CIRCULATIONAHA.120.046941>.
- Zheng, YY., Ma, YT., Zhang, JY., et al. COVID-19, and the cardiovascular system. *Nat Rev Cardiol* 17, 259–260 (2020). DOI: <https://doi.org/10.1038/s41569-020-0360-5>.
- Hunafa, Ahda Faza, et al. "Hubungan Diabetes Melitus dengan Kejadian Mortalitas pada Pasien Terkonfirmasi COVID-19 Tahun 2020: Systematic Review." *eJournal Kedokteran Indonesia* 9.1 (2021): 67-67.
- Nanda, Cicilia. *Pengaruh Penyakit Komorbid Hipertensi Dan Diabetes Melitus Terhadap Kejadian COVID-19 di RSI Siti Khadijah Palembang*. Diss. Universitas Katolik Musi Charitas, 2021. *Url* : <http://eprints.ukmc.ac.id/id/eprint/6094/>