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# The Relationship of Hypertension with Death in Covid-19 Patients Treated at Tugurejo Hospital Semarang

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**KEYWORDS**
Covid-19; Hipertensi; Daeth

**ABSTRACT**
Covid-19 is a disease caused by SARS-CoV-2. Hypertension is a comorbidity that can be experienced by COVID-19 patients and is associated with an increased risk of severity and death. The purpose of this study is to look at the relationship between hypertension and death in COVID-19 patients treated at Tugurejo Hospital Semarang. This study is a quantitative study that uses an analytical observational design and a cross-sectional approach. The sampling technique was purposive sampling (judgment sampling) on 84 COVID-19 patients treated at Tugurejo Hospital Semarang for the May-November 2021 period. Data were obtained from medical records and analyzed univariately and bivariately with the Chi-Square test. Most patients were aged ≥50 years (40.5%), male (53.6%), high school educated (51.2%), employed as private employees (42.9%), suffered from hypertension (53.6%) and did not experience death (51.2%). The Chi-Square test resulted in a significant association between hypertension and death of COVID-19 patients (p = 0.031). There is an essential relationship between hypertension and death in COVID-19 patients at Tugurejo Hospital Semarang.



## 1. Introduction

*Covid-19* is a disease caused by SARS-CoV-2, which infects the respiratory tract. The first case was discovered in December 2019 in China, specifically in Wuhan, with 41 cases. This virus has a growing spread and reaches almost all countries globally, thus, *WHO* announced on March 11, 2020, that COVID-19 is a pandemic (Alkautsar, 2021; Fathoni, 2019). Indonesia itself reported this case for the first time on March 2, 2020 (Aeni, 2021). There were 2 cases, and it continued to grow until June 20, 2023, when there were 6,811,429 confirmed cases with 161,918 deaths (Putra & Fenty, 2022).

Meanwhile, in Semarang, the total confirmed cases from 2020 to January 1, 2023, recorded 108,396 confirmed cases with 1,652 deaths (Levani et al., 2021).

Hypertension is a disease that is found in many people with Covid-19. This disease places a relatively high risk in the COVID-19 infection process (Putra & Fenty, 2022; Susilo et al., 2022; Yuliana, 2020). Hypertension itself is a condition of increased diastolic blood pressure >90mmHg and systolic >140mmHg with a number of two measurements for five minutes when in calm conditions. Hypertension is a comorbidity, where COVID-19 patients are the most likely to experience this case, reaching a percentage of 52.1% with 13.2% death. Hypertension is also an inflammatory disease that has characteristics in the form of endothelial dysfunction. There is a higher expression of angiotensin two syndromes (ACE 2) in people with hypertension. Therefore, this can make the risk of severity increase to cause mortality in COVID-19 patients (Choirunnisa & Helda, 2021).

The hadith narrated by Imam Bukhari and Muslim No.5288 conveys that the Prophet (peace be upon him) said:

قَالَ رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ الطَّاعُونُ آيَةُ الرِّجْزِ ابْتَلَى اللَّهُ عَزَّ وَجَلَّ بِهِ نَاسًا مِنْ عِبَادِهِ فَإِذَا سَمِعْتُمْ بِهِ فَلَا تَدْخُلُوا عَلَيْهِ وَإِذَا وَقَعَ بِأَرْضٍ وَأَنْتُمْ بِهَا فَلَا تَفِرُّوا مِنْه

"Infectious disease outbreaks or commonly called tha'un, are warnings originating from Allah SWT to give tests to His servants. So, when you hear that a country has a contagious disease, don't enter it. And if this is in your land, do not flee from it." (Hadith Narrated Muslim and Bukhari from Osama bin Zayd).

Referring to the high number of COVID-19 cases and deaths cases, especially experienced by COVID-19 patients with hypertension, this matter triggered the author's interest in researching the title "The Relationship of Hypertension with Death in Covid-19 Patients at Tugurejo Hospital Semarang." Due to the need for knowledge to patients with hypertension related to the relationship between hypertension and death in COVID-19 patients, therefore people with hypertension will be able to carry out hypertension control or action preventive so that the risk of death if contracting COVID-19 can decrease.

## 2. Materials and Methods

The research was held at Tugurejo Hospital Semarang and implemented from October 2023 to March 2024. It is related to the discipline of Internal Medicine. Quantitative methods using an analytical observational research design and a cross-sectional approach were used in this study. The population involved in the study was COVID-19 patients at Tugurejo Hospital Semarang from May 2021 to November 2021. The data obtained was then analyzed using the SPSS Statistical data processing application version 27 for Windows.

## 3. Result and Discussion

**Table 1 Overview of Respondent Characteristics**

| Characteristic | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 21-30 years | 7 | 8.3 |

| | | |
|---|---|---|
| 31-40 years | 17 | 20.2 |
| 41-50 years | 26 | 31.0 |
| ≥ 50 years | 34 | 40.5 |
| **Gender** | | |
| Male | 45 | 53.6 |
| Female | 39 | 46.4 |
| **Educator** | | |
| Bachelor / Associate's Degree | 19 | 22.6 |
| Senior High School | 43 | 51.2 |
| Junior High School | 12 | 14.3 |
| Elementary School | 5 | 6.0 |
| No School | 5 | 6.0 |
| **Work** | | |
| Civil Servants | 7 | 8.3 |
| Self-employed | 12 | 14.3 |
| Private employees | 36 | 42.9 |
| Merchant | 6 | 7.1 |
| Farmer | 3 | 3.6 |
| Does not work | 9 | 10.7 |
| Other | 11 | 13.1 |
| **Hypertensive** | | |
| Hypertensive | 45 | 53.6 |
| No hypertension | 39 | 46.4 |
| **Death** | | |
| Experiencing death | 41 | 48.8 |
| No death | 43 | 51.2 |

Based on table 4.1 shows that the overwhelming majority of COVID-19 patients in this study (40.5%) were ≥ 50 years old. The gender of the majority of Covid-19 patients is male, with a percentage of 53.6%. Most Covid-19 patients had the last high school education (51.2%), with most working as private employees (42.9%). Covid-19 patients in this study had hypertension (53.6) and no deaths (51.2%).

**Table 2 Chi-Square test relationship of hypertension with death of COVID-19 patients**

| Hypertension | Death | | Total | p |
|---|---|---|---|---|
| | Experiencing death | No death | | |
| **Hypertension** | 27 (60.0%) | 18 (40.0%) | 45 (100.0%) | 0,031 |
| **Non Hypertension** | 14 (35.9%) | 25 (64.1%) | 39 (100.0%) | |

Based on Table 2, some covid patients who have hypertension experience 27 (60.0%) deaths. While most of the non-hypertensive Covid-19 patients did not die, 25 (64.1%). Chi-square produces p worth 0.031 < 0.05, which means that hypertension to the death of COVID-19 patients is significantly related.

**Discussion**

This study obtained results that hypertension is significantly related to the death of COVID-19 patients at Tugurejo Hospital Semarang, namely COVID patients experiencing hypertension experiencing death as much as 27 (60.0%). At the same time, most % of the non-hypertensive Covid-19 patients did not die, 25 (64.1%). The chi-square test obtained p with a value of 0.031 ($p < 0.05$), which means that hypertension against the death of Covid-19 patients is significantly related. This is in line with research from Zhang et al. in China in 2020, obtained the results of the analysis obtained statistical test results with a value = 0.04 ($p < 0.05$), meaning that hypertension is significantly related to COVID-19 death (Zhang et al., 2020).

Hypertension is an inflammatory disease that has characteristics in the form of endothelial dysfunction. There is more expression of ACE 2 in people with hypertension when infected with COVID-19 (Roeroe et al., 2021). How SARS-CoV-2 enters cells by binding to ACE2. Antihypertensive drugs, including angiotensin receptor blockers (ARBs) and ACE inhibitors, are associated with increased ACE2 expression on the cell surface, supplying SARS-CoV-2 in large quantities of cell infections. Some hypertensive patients undergoing RAAS, especially those using ACEis, will be susceptible to propagation to host cells and virus entry in hypertensive patients, which will ultimately increase the risk of progression to ARDS, which is due to negative COVID-19. These conditions can increase the severity risk and increase mortality (Rauf et al., 2020; Zhang et al., 2020).

This result is also in line with research from Choirunnisa & Helda in South Tangerang in 2021, obtained the results of statistical test analysis with a p-value of 0.000 ($p < 0.05$) or has meant that hypertension is significantly related to COVID-19 death (Choirunnisa & Helda, 2021).

SARS-CoV-2 infection can stimulate an immune response to the host, increasing cytokines and decreasing lymphocytes excessively in patients (Choirunnisa & Helda, 2021). There is an interaction between SARS-CoV-2 proteins and RNA with receptors that make the antivirus immune response active and regulate the spread and replication of the virus in the host in vivo. However, very active and excessive immune responses can damage immunity and cause tissue trafficking (Direktorat et al., 2020; Hidayati & Adnan, 2023).

In the SARS-CoV-2 pandemic, if proinflammatory cytokines or cytokine storms continue to be produced, it can make the prognosis and course of the disease worse, and patients infected with SARS-CoV-2 may die. These characteristics make proinflammatory cytokines accumulate, thus affecting the cellular system. Because of this condition, hypertension patients tend to have weak immunity (Choirunnisa & Helda, 2021). In this case, the RAAS system will also be affected; therefore, it will give rise to major physiological disorders, such as hemostatic, in the nervous system. The COVID-19 virus will then be bound by ACE2 spread receptors throughout the organs; therefore, it can support additional organ failure, which causes COVID-19 patients to have worse conditions that trigger death (Baskoro, 2023; Peng et al., 2021).

## 4. Conclusion

Referring to the data obtained and analyzed in this study, it can be concluded, namely: Covid-19 patients with hypertension as many as 45 people (53.6%) and non-hypertensive as many as 39 people (46.4%); Covid-19 patients who had hypertension experienced 27 deaths (60.0%), and 18 deaths (40.0%). Meanwhile, 14 nonhypertensive Covid-19 patients died (25.9%) and did not die, 25

(64.1%); There is a relationship between hypertension and death of Covid-19 patients at Tugurejo Hospital Semarang p = 0.031 (p < 0.05).

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