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## Article

# The Relationship Between Hypertension and Incidence of Severe COVID-19 at PKU Muhammadiyah Yogyakarta Hospital in 2021

**[1]Hesty Yulianingsih, [1]Zainul Arifin*, [1]Evita Devi Noor Rahmawati, [1]Muhammad Yusuf Arrozhi**
[1]Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta, Indonesia
Email (Corresponding Author) : *ariefiesta@yahoo.com

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## ABSTRACT

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The severity of COVID-19 is influenced by the immune system, age, and various comorbidities, including diabetes mellitus and hypertension. Hypertension is the most common comorbidity observed in COVID-19 patients. The aim of this study is to determine the relationship between hypertension and the incidence of severe COVID-19 cases at PKU Muhammadiyah Yogyakarta Hospital in 2021. This study is a quantitative observational analytic research with a cross-sectional design and retrospective study. The data were collected through the use of secondary sources derived from medical records at PKU Muhammadiyah Yogyakarta Hospital. The research activities took place from November to December 2022 at PKU Muhammadiyah Yogyakarta Hospital. The study included a total of 267 patients diagnosed with COVID-19 at PKU Muhammadiyah Yogyakarta Hospital. This study reports the analysis of the relationship between hypertension and the incidence of severe COVID-19 cases. From 267 COVID-19 patients, 196 (73,4%) were aged ≥50 years with an average age of 58 years, 158 (59,2%) patients were male, and 135 (50,6%) had non-severe COVID-19. There was no association between hypertension and severe COVID-19 in patients at PKU Muhammadiyah Hospital Yogyakarta in 2021 with a p-value of 0,746. There is no relationship between hypertension and the severity of COVID- 19 cases at PKU Muhammadiyah Yogyakarta Hospital in 2021.

**Keywords:** Coronavirus Disease 2019 (COVID-19); Hypertension; incidence; severe COVID

## INTRODUCTION

At the end of 2019, the COVID-19 outbreak emerged for the first time in China and then developed into a pandemic, with cases reported worldwide. The COVID-19 outbreak initially appeared in the Wuhan area, Hubei, China. The initial cases were pneumonia caused by an unknown pathogen[1]. Within weeks, COVID-19 spread throughout China, and within a month, it had reached various countries[2]. Coronavirus Disease 2019 (COVID-19) is an RNA virus with a capsid and no segments[3]. COVID-19 belongs to the order Nidovirales, family Coronaviridae. It is

an infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and is considered a new betacoronavirus that infects humans [4].

The number of COVID-19 cases increased rapidly and spread to various countries. As of 16 May 2022, a total of 521.357.273 confirmed cases had been reported globally, with 6.288.652 deaths across 231 countries [5]. according to the World Health Organization (WHO) the spread of COVID-19 occurred very quickly in several regions, including Indonesia, making the virus very dangerous and not to be underestimated[6]. On 16 May 2022, Indonesia reported 6.050.958 confirmed COVID-19 cases and 156.464 deaths. In the Special Region of Yogyakarta, the number of positive COVID-19 cases reached 220.613, with 5.902 deaths[5]. The severity of COVID-19 is influenced by immune response, age, and several comorbidities, including diabetes mellitus and hypertension [6]. Hypertension is one of the most common comorbidities among COVID-19 patients, with approximately 15% of hypertension cases found in COVID-19 patients. Data from 20.982 COVID-19 patients indicates that hypertension accounts for about 12.6% [6]. Another study conducted in Wuhan showed that among 191 COVID-19 patients, those with hypertension were reported at a rate of 30% [7].

Several publications state that hypertension is related to COVID-19, where hypertension can exacerbate COVID-19 infections and may even contribute to the pathogenesis of COVID-19 [6]. Hypertension as a comorbidity in COVID-19 leads to higher mortality rates compared to those without hypertension. The mortality risk factor in hypertensive patients is 1,37 times higher than in non-hypertensive individuals. COVID-19 cases indicate that hypertension is the most prevalent comorbidity, accounting for 49.1%, and can worsen the condition of COVID-19 patients [5]. Based on the previous background description, the research problem can be formulated as "What is the relationship between hypertension and the incidence of severe COVID-19 at PKU Muhammadiyah Yogyakarta Hospital in 2021".

## METHODS

This study is an observational analytic quantitative research. In analytic research, the researcher seeks to find relationships between one variable and another. The study design used is cross-sectional and employs a retrospective study approach. Data collection is conducted only once, using secondary data obtained from medical records at PKU Muhammadiyah Yogyakarta Hospital. The population in this study consists of confirmed severe COVID-19 patients with hypertension at PKU Muhammadiyah Yogyakarta Hospital 2021. The sampel for this study is the

entire population obtained from medical records, specifically all severe COVID-19 patients at PKU Muhammadiyah Yogyakarta Hospital in 2021. The sample size is calculated using the yamane formula with a margin of error of 5%. Therefore, if the population is 802 and the sampling error is 5%, the required sample size is 267.

The sampling technique used in this study is purposive sampling. All subjects meeting the inclusion criteria are included as samples in the study. Data processing in this research is derived from secondary data in the form of medical records. This data will be analyzed using data processing applications, specifically the Statistical Package for the Social Sciences (SPSS) version 26. The data analysis techniques to be used include univariate analysis to examine the frequency distribution of hypertension at PKU Muhammadiyah Yogyakarta Hospital and the frequency distribution of severe COVID-19 at the same hospital, as well as bivariate analysis to test relationship between independent and dependent variables using computerized chi-square tests.

## RESULTS

The research was conducted from December 2022 to January 2023, using secondary data in the form of medical records of all patients diagnosed with COVID-19. A total of 267 subjects met the inclusion and exclusion criteria. The obtained samples were then processed to determine the frequency distribution based on gender, age, and severity of COVID-19. Bivariate analysis was conducted to assess the relationship between hypertension and the incidence of severe COVID-19.

***Table 1**. Frequency Distribution of Respondent Characteristics by Age Category, Gender, and Degree of COVID-19 at PKU Muhammadiyah Yogyakarta Hospital in 2021*

| ***Characteristics*** | ***n*** | ***%*** |
|---|---|---|
| ***Age (average) 58 Years*** | | |
| <50 | 71 | 26,6 |
| ε50 | 196 | 73,4 |
| ***Gender*** | | |
| Male | 158 | 59,2 |
| Famale | 109 | 40,8 |
| ***COVID-19 Degree*** | | |
| Heavy | 132 | 49,4 |
| Non Heavy | 135 | 50,6 |
| ***Hypertension*** | | |
| Yes | 65 | 24,3 |
| No | 202 | 75,7 |

From the 267 respondents in the sample, it was found that 71 patients (26.6%) with COVID-19 were <50 years old, while 196 patients (73.4%) were ε50 years and older. The average age of patients was 58 years. Regarding gender, there were 158 male patients (59.2%) and 109 famale patients (40.8%). Among the patients, 132 (49.4%) had severe COVID-19, while 135 (50.9%) had non-severe COVID-19. Additionally, it was found that 65 patients (24.3%) had a history of hypertension, while 202 patients (75.7%) did not have a history of hypertension.

***Table 2.*** *Relationship between Hypertension and Severe COVID-19 Cases at PKU Muhammadiyah Yogyakarta Hospital in 2021.*

| ***Hypertension*** | ***Degree COVID-19*** | | | | ***Total*** | | ***p-value*** |
|---|---|---|---|---|---|---|---|
| | ***Heavy*** | | ***Non Heavy*** | | | | |
| | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | |
| Yes | 31 | 47,7 | 34 | 52,3 | 65 | 100,0 | 0,746 |
| No | 101 | 50,0 | 101 | 50,0 | 202 | 100,0 | |
| **Amount** | 132 | 49,4 | 135 | 50,6 | 267 | 100,0 | |

Among hypertension patients, 31 (47,7%) experienced severe COVID-19, while the number of non-hypertension patients who experienced severe COVID-19 was 101 (50,0%). The number of hypertension patients with non-severe COVID-19 was 34 (52,3%, and the number of non-hypertension patients with non-severe COVID-19 was 101 950,0%).

Bivariate analysis in this study was conducted using the Chi-square test, yielding a p-value of 0,746. The results of the study indicate that there is no relationship between hypertension and the incidence of severe COVID-19 at PKU Muhammadiyah Yogyakarta Hospital in 2021.

Based on the research findings, the total number of patients with severe and non-severe COVID-19 was 267. The age distribution frequency table (Table 1) shows that 71 patients (26.6%) were under 50 years old, while 196 patients (73.4%) were aged 50 years and older. The gender distribution frequency data (Table 1) shows that 158 patients (59.2%) were male, while 109 patients (40.8%) were female. The frequency distribution table for COVID-19 severity (Table 1) shows that 135 patients (50.6%) had non-severe COVID-19, while 132 patients (49.4%) had severe COVID-19.

## DISCUSSION

The relationship between hypertension and the incidence of severe COVID-19 in this study involved 267 samples. Based on the analysis using the Chi-square test, a p-value of 0.746. This

study shows that there is no relationship between hypertension and the incidence of severe COVID-19 at PKU Muhammadiyah Yogyakarta Hospital in 2021.

These results are in line with the study conducted by Steven (2021)[8], which used a cross-sectional method with 41 samples, stating that among patients without hypertension, 34 patients (82.9%) were identified, while those with hypertension numbered 7 patients (17.1%). Among 20 COVID-19 patients, there were 4 patients (20%) with hypertension and 16 patients (80%) without hypertension. The statistical test results showed no significant relationship between a history of hypertension and vulnerability to COVID-19 (p-value = 0.697). Similarly, Rifiana (2020)[14] found in a study at Wisma Atlet Jakarta with 25 samples that among COVID-19 patients, 10 (40%) had hypertension, while 15 (60%) did not. The statistical analysis showed no significant relationship between a history of hypertension and susceptibility to COVID-19 (p-value = 0.697). In a study at RSUD Dr. H. Abdul Moeloek in Lampung Province, a p-value of 0.645 was obtained, indicating no significant relationship between a history of hypertension in COVID-19 patients and the likelihood of having a good prognosis [9].

These findings differ from the study by Negara (2022)[10], which found that at Sanjiwani Hospital Gianyar, the majority of subjects with hypertension experienced severe COVID-19 infection. Bivariate analysis revealed a significant relationship between hypertension and the degree of infection (p-value = 0.001; $p < 0.05$). Multivariate analysis yielded a prevalence ratio (PR) of 4.844 (95% CI: 1.796 - 13.064), indicating that hypertensive patients are 4.8 times more at risk compared to non-hypertensive patients. The study also found a significant relationship between hypertension and the severity of COVID-19 infection. This is supported by research conducted by Guan (2020) in China, which used a retrospective cohort design involving 1,590 COVID-19 patients. Guan (2020)[7] found that out of 1,590 confirmed COVID-19 cases, 269 patients (16.9%) had comorbid hypertension, and hypertension affected the clinical outcomes of COVID-19 patients, showing a relationship between hypertension and the degree of COVID-19 infection (HR = 1.58; 95% CI = 1.07-2.32; p-value = 0.022).

Several comorbid conditions such as chronic respiratory diseases, cardiovascular diseases, diabetes mellitus, and hypertension were observed more frequently in severe cases compared to mild COVID-19 patients. Symptoms such as dyspnea, anorexia, fatigue, increased respiratory rate, high systolic blood pressure, lower lymphocyte and hemoglobin levels, increased leukocyte counts, elevated aspartate aminotransferase, alanine aminotransferase, blood creatinine, blood urea nitrogen, troponin, creatine kinase, high-sensitivity C-reactive protein, and

high erythrocyte sedimentation rate are also associated with severe COVID-19[10]. Additionally, a literature review conducted by Hidayani (2020)[6] concluded that there is a significant relationship between hypertension and COVID-19.

## CONCLUSION

In this study conducted at PKU Muhammadiyah Hospital, Yogyakarta in 2021, it can be concluded that there is no significant relationship between hypertension and the incidence of severe COVID-19 (p-value of 0.746). It was observed that COVID-19 was more commonly experienced by patients aged 50 years and older, male patients, and those with non-severe COVID-19.

## ETHICAL APPROVAL

The study obtained ethical approval with approval number 00265/KT.7.4/XII/2022 from PKU Muhammadiyah Yogyakarta Hospital.

## CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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## REFERENCES

1. Mudatsir M, Fajar JK, Wulandari L, et al. Predictors of COVID-19 severity: a systematic review and meta-analysis. *F1000Research*. 2021;9(2):1-26.
2. Rifiana AJ, Suharyanto T. Hubungan diabetes mellitus dan hipertensi dengan kejadian corona virus deases-19 (Covid-19) di Wisma Atlit Jakarta Tahun 2020. *Universitas Nasional*. Published online 2020:1-15.
3. Yuliana Y. Corona virus diseases (Covid-19): Sebuah tinjauan literatur. *Wellness And Healthy Magazine*. 2020;2(1):187-192.
4. Satgas COVID-19. *Sebaran Kasus Penyakit COVID-19 Per Provinsi Di Indonesia*.; 2022.

5. Sawitri H, Maulina N. PERSEPSI DOKTER MUDA DALAM MENGHADAPI WABAH CORONAVIRUS DISEASE (COVID-19) DI BLUD RUMAH SAKIT CUT MEUTIA TAHUN 2020. *AVERROUS: Jurnal Kedokteran dan Kesehatan Malikussaleh*. 2021;7(1):1-11.
6. Hidayani WR. Faktor Faktor Risiko Yang Berhubungan Dengan COVID 19: Literature Review. *Jurnal untuk masyarakat sehat (JUKMAS)*. 2020;4(2):120-134.
7. Guan W jie, Liang W hua, Zhao Y, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *European Respiratory Journal*. 2020;55(5).
8. Steven. Hubungan Riwayat Penyakit Hipertensi, Jantung dan Diabetes dengan Kerentanan Menderita Covid-19 pada Rumah Sakit Mitra Sejati Medan Periode Maret 2020-Oktober 2020. Published online 2021.
9. Oktaviani HP, Yulyani V, Wulandari M, Prasetia T. Hubungan Diabetes Mellitus dan Hipertesni pada Paseien Suspek Covid-19 Gejala Ringan-Sedang di RSUD DR. H. Abdul Moeloek Provinsi Lampung Tahun 2020. In: *Jurnal Formil (Forum Ilmiah) Kesmas Respati*. Vol 6. ; 2021:145-153.
10. Negara INAK, Budhitresna AAG, Sari NLPEK. Hubungan Antara Komorbiditas Dengan Derajat Keparahan Infeksi Covid-19 Di Rumah Sakit Sanjiwani Gianyar. *Aesculapius Medical Journal*. 2022;2(1):13-20.