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GENDER DIFFERENCES IN HYPERTENSION SEVERITY AND SOCIODEMOGRAPHIC CHARACTERISTICS AMONG STROKE PATIENTS IN THE ICU OF RSUD JAILOLO, INDONESIA

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ABSTRACT

Background: Hypertension is one of the leading modifiable risk factors for stroke and is influenced by sociodemographic and clinical factors. Understanding gender differences in hypertension severity is essential for improving targeted stroke management, particularly in intensive care settings. **Methods:** A cross-sectional study was conducted among 76 stroke patients admitted to the ICU of RSUD Jailolo, Indonesia, between July and August 2025. Sociodemographic characteristics, employment status, medical history, and hypertension severity were extracted from medical records. Hypertension was classified into mild, moderate, and severe based on documented blood pressure at admission. Bivariate associations between gender and clinical–sociodemographic variables were examined using chi-square tests. **Results:** Of the 76 patients, 39 (51.3%) were men and 37 (48.7%) were women. Significant gender differences were found in hypertension severity ($p = 0.022$) and occupational status ($p < 0.001$). Men were more likely to present with severe hypertension, whereas women more commonly exhibited mild hypertension. Age distribution, educational level, medical history, and ICU length of stay did not differ significantly by gender. **Conclusion:** Gender differences in hypertension severity and occupational status were identified among stroke patients in the ICU. These findings highlight the importance of gender-sensitive assessments and tailored hypertension management strategies to optimize stroke care in critical settings.

Keywords: gender differences, hypertension severity, ICU, Indonesia, stroke.

PERBEDAAN GENDER DALAM TINGKAT KEPARAHAN HIPERTENSI DAN KARAKTERISTIK SOSIODEMOGRAFIS PADA PASIEN STROKE DI ICU RSUD JAILOLO, INDONESIA

ABSTRAK

Latar Belakang: *Hipertensi merupakan salah satu faktor risiko yang dapat dimodifikasi dan berperan penting terhadap kejadian stroke, yang dipengaruhi oleh faktor sosiodemografi dan klinis. Pemahaman mengenai perbedaan berdasarkan jenis kelamin terhadap tingkat keparahan hipertensi sangat penting untuk meningkatkan strategi pengelolaan stroke yang lebih terarah, khususnya pada pasien yang dirawat di unit perawatan intensif.* ***Metode:*** *Penelitian cross-sectional dilakukan pada 76 pasien stroke yang dirawat di ICU RSUD Jailolo, Indonesia, selama periode Juli–Agustus 2025. Karakteristik sosiodemografi, status pekerjaan, riwayat penyakit, dan tingkat keparahan hipertensi diperoleh dari rekam medis. Hipertensi diklasifikasikan menjadi ringan, sedang, dan berat berdasarkan tekanan darah yang tercatat saat masuk rumah sakit. Hubungan bivariat antara jenis kelamin dengan variabel*

klinis dan sosiodemografi dianalisis menggunakan uji chi-square. ***Hasil:*** *Dari total 76 pasien, sebanyak 39 pasien (51,3%) berjenis kelamin laki-laki dan 37 pasien (48,7%) perempuan. Ditemukan perbedaan yang signifikan berdasarkan jenis kelamin pada tingkat keparahan hipertensi (p = 0,022) dan status pekerjaan (p < 0,001). Pasien laki-laki lebih sering menunjukkan hipertensi berat, sedangkan pasien perempuan lebih banyak mengalami hipertensi ringan. Distribusi usia, tingkat pendidikan, riwayat penyakit, dan lama perawatan di ICU tidak menunjukkan perbedaan yang signifikan berdasarkan jenis kelamin.* ***Kesimpulan:*** *Terdapat perbedaan berdasarkan jenis kelamin pada tingkat keparahan hipertensi dan status pekerjaan di antara pasien stroke yang dirawat di ICU. Temuan ini menekankan pentingnya penilaian yang sensitif terhadap aspek gender serta penerapan strategi pengelolaan hipertensi yang lebih spesifik guna mengoptimalkan perawatan stroke pada kondisi kritis.*

Kata Kunci: *ICU, Indonesia, perbedaan gender, stroke, tingkat keparahan hipertensi.*

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INTRODUCTION

Stroke remains a major global health burden and is consistently ranked among the leading causes of death and long-term disability worldwide. The World Health Organization reports that low- and middle-income countries bear more than 80% of global stroke mortality, primarily due to modifiable risk factors such as hypertension, diabetes, and lifestyle-related conditions (Katan & Luft, 2018). Among these, hypertension is the most significant contributor, increasing stroke risk through mechanisms involving vascular remodeling, endothelial dysfunction, arterial stiffness, and impaired cerebral autoregulation (Forouzanfar *et al.*, 2017).

Gender differences have been increasingly recognized as important determinants in the development, progression, and severity of hypertension. Men generally exhibit higher blood pressure and greater hypertension prevalence in early to mid-adulthood, whereas women experience a marked increase in blood pressure after menopause due to the decline in estrogen and changes in vascular physiology (Ji *et al*., 2020; Regitz-Zagrosek & Gebhard, 2023). Sociodemographic factors including education, occupation, income level, and health behaviors, further modify these patterns, as demonstrated in large epidemiological studies linking hypertension outcomes to socioeconomic disparities and gender roles within communities (Leng *et al*., 2015; Lindner *et al*., 2024).

In Indonesia, stroke continues to represent one of the top causes of morbidity

and mortality, with hypertension identified as a dominant risk factor across all age groups (Adityasiwi *et al.*, 2025). National health data indicate substantial variation in stroke prevalence associated with gender, socioeconomic status, and regional health disparities (B *et al*., 2023). However, most existing research focuses on general populations or outpatient settings. Evidence examining how gender differences manifest specifically among stroke patients admitted to intensive care units (ICUs) remains extremely limited.

ICU stroke patients represent a critical subgroup, typically presenting with severe neurological impairment, uncontrolled blood pressure, or life-threatening complications requiring advanced monitoring. Understanding gender-specific patterns within this population is essential, as differences in hypertension severity and sociodemographic context may influence prognosis, response to treatment, and risk of complications (Benjamin *et al*., 2019).

Despite the clinical importance, no prior study has comprehensively examined gender differences in hypertension severity and sociodemographic characteristics among stroke patients in ICU settings in Eastern Indonesia, particularly in regions with limited resources such as Jailolo. Addressing this gap is necessary to support gender-sensitive screening, tailored management strategies, and more equitable stroke care.

Therefore, this study aims to investigate gender differences in hypertension severity and sociodemographic characteristics among stroke patients admitted to the ICU of RSUD Jailolo, Indonesia. Identifying these patterns is expected to inform clinical decision-making and strengthen targeted strategies for hypertension and stroke management in critical care environments.

METHODS

Data Source and Study Design

This study employed a cross-sectional design and was conducted in the Intensive Care Unit (ICU) of RSUD Jailolo, Indonesia, between July and August 2025. All data were obtained retrospectively from hospital medical records, including admission notes, nursing assessments, blood pressure recordings, and physician progress reports. The study focused on identifying gender differences in hypertension severity and sociodemographic characteristics among stroke patients admitted to the ICU during the study period. No additional patient contact or follow-up was performed. All procedures adhered to ethical standards for research involving human subjects, and the

dataset was fully anonymized prior to analysis.

Study Population

The study population consisted of all patients diagnosed with stroke and admitted to the ICU during the study period. Stroke diagnosis followed the attending physician's assessment and supporting clinical imaging where available. A total of 76 patients met the inclusion criteria. Patients were eligible if they had a confirmed diagnosis of stroke, were admitted to the ICU, and had complete documentation of sociodemographic characteristics and blood pressure measurements at admission. Patients were excluded if their medical records lacked essential clinical variables, particularly blood pressure data required to classify hypertension severity. No additional sampling was performed, as all eligible cases within the study period were included (total sampling).

Variables and Measurements

The primary dependent variable was hypertension severity, classified based on systolic and diastolic blood pressure documented at ICU admission. Following the standard threshold used in clinical practice at RSUD Jailolo, hypertension severity was categorized as: Mild hypertension (Systolic 140-159 mmHg and/or Diastolic 90-99 mmHg), Moderate hypertension (Systolic 160-179 mmHg and/or Diastolic 100-109 mmHg), and Severe hypertension (Systolic ≥180 mmHg and/or Diastolic ≥110 mmHg). The highest recorded value at admission was used for classification.

The independent variables included gender, age group, education level, employment and occupational status, medical history, and length of ICU stay. Gender was coded as male or female. Age was grouped into three categories based on clinical relevance and common epidemiological practice: young adult (<45 years), middle-aged (45-59 years), and older adult (≥60 years). Education level was categorized into primary, secondary, and higher education. Employment status was recorded as employed or unemployed, while occupational status distinguished those actively working from those not engaged in formal employment. Medical history referred to documented comorbid conditions and was classified as having one illness or more than two illnesses. ICU length of stay was categorized into short duration (1-7 days) and prolonged stay (8-14 days), based on typical ICU management patterns in acute stroke care.

Statistical Analysis

All data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize patient

characteristics, presented as frequencies and percentages. Bivariate analysis was conducted using the chi-square test to assess the association between gender and each sociodemographic and clinical variable, including hypertension severity. A significance level of $p < 0.05$ was considered statistically meaningful. Data were checked for completeness, consistency, and accuracy prior to analysis, and all procedures complied with ethical standards for human subject research.

Ethics Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and adhered to all standards for human subject research. Ethical approval and research permission were obtained from RSUD Ir. Soekarno, Pulau Morotai Regency, through an official approval letter (No. 800/498/RSUD.IS-PM/X/2025). All data used in this study were extracted from hospital medical records and fully anonymized prior to analysis to ensure the confidentiality and privacy of patients. No personal identifiers were collected or disclosed, and the study involved no direct intervention with patients. All procedures were carried out with strict attention to data security and ethical research conduct.

RESULTS

A total of 76 stroke patients admitted to the ICU of RSUD Jailolo were included in this study, consisting of 39 males (51.3%) and 37 females (48.7%). Table 1 summarizes the sociodemographic and clinical characteristics of the study population. Elderly (≥60 years) represented the largest age group (50.0%), followed by middle-aged adults (31.6%) and younger adults (18.4%). Most patients had completed primary (43.4%) or secondary education (40.8%), and the majority were employed (98.7%). Regarding medical history, 52.6% of patients had one comorbid condition, while 47.4% had two or more comorbidities. More than half of the patients (53.9%) presented with moderate hypertension, followed by severe (30.3%) and mild hypertension (15.8%). Most patients (88.2%) stayed in the ICU for 1-7 days.

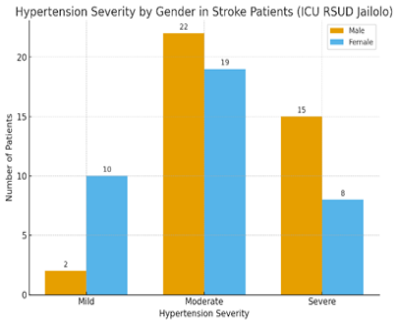

Figure 1A: Hypertension severity by gender.

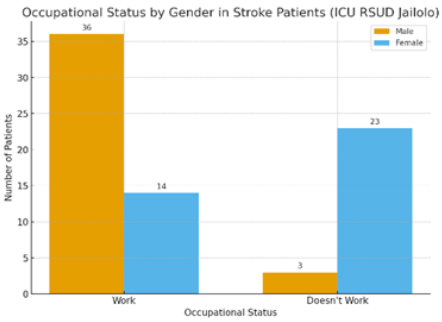

Figure 1B: Occupational status by gender.

Table 1. Distribution of Sociodemographic Characteristics, Gender, and Hypertension Level among Patients Diagnosed with Stroke in the ICU of RSUD Jailolo (n=76)

Variable	Frequency (n)	Percent (%)
Demographic Characteristics		
Gender		
Male	39	51.3
Famale	37	48.7
Age Group		
Young Age (<45 years)	14	18.4
Middle Age (45-59 years)	24	31.6
Older Adults (≥60 years)	38	50.0
Educational Level		
Primary Education	33	43.4
Secondary Education	31	40.8
Higher Education	12	15.8
Employment Status		
Unemployed	1	1.3
Employed	75	98.7
Job		
Working	50	65.8
Not Working	26	34.2
Clinical Characteristics		
Medical History		
1 History of illness	40	52.6
>2 History of illness	36	47.4
Clinical Outcome		
Hypertension		
Mild Hypertension	12	15.8
Moderate Hypertension	41	53.9
Severe Hypertension	23	30.3
Treatment Outcome		
ICU Length of Stay		
Short (1-7 days)	67	88.2
Long (8-14 days)	9	11.8

Figure 1. Gender differences in sociodemographic and clinical characteristics of stroke patients admitted to the ICU of RSUD Jailolo. (A) Distribution of hypertension severity by gender, showing that men were more likely to present with severe hypertension, whereas women more frequently exhibited mild hypertension. (B) Distribution of occupational status by gender, indicating that men were predominantly categorized as working and women were more often classified as not working.

Table 2 presents the bivariate analysis comparing gender with sociodemographic and clinical variables. No significant associations were found between gender and age group ($p = 0.890$), educational level ($p = 0.995$), employment status ($p = 0.327$), medical history ($p = 0.498$), or ICU length of stay ($p = 0.786$). However, two variables demonstrated significant gender differences. First, hypertension severity differed significantly between males and females ($p = 0.022$). Mild hypertension was more common in females, whereas males more frequently presented with severe hypertension. Second, occupational status also showed a significant association with gender ($p < 0.001$). A larger proportion of male patients were actively working compared with female patients, while more women were categorized as not engaged in formal employment.

DISCUSSION

This study examined gender differences in sociodemographic and clinical characteristics among stroke patients admitted to the ICU of RSUD Jailolo, with a specific focus on hypertension severity. Two variables demonstrated significant associations with gender: hypertension severity and occupational status.

Table 2. Bivariate analysis of gender differences in sociodemographic and clinical characteristics of stroke patients in the ICU of RSUD Jailolo (n = 76)

Variable	Gender				*p-Value*
	Male		Female		
	n= 39	51.3%	n= 37	48.7%	
Demographic Characteristics					
Age Group					0.890
Young Age (<45 years)	8	10.5%	6	7.9%	
Middle Age (45-49 years)	12	15.8%	12	15.8%	
Older Adults (≥ 60 years)	19	25.0%	19	25.0%	
Educational Level					.995
Primary Education	17	22.4%	16	21.1%	
Secondary Education	16	21.1%	15	19.7%	
Higher Education	6	7.9%	6	7.9%	
Employment Status					.327
Unemployed	1	1.3%	0	0.0%	
Employed	38	50.0%	37	48.7%	
Job					.000*
Work	36	47.4%	14	18.4%	
Doesn't Work	3	3.9%	23	30.3%	
Clinical Characteristics					
Medical History					.498
1 History of illness	22	28.9%	18	23.7%	
>2 History of illness	17	22.4%	19	25.0%	
Clinical Outcome					
Hypertension					.022*
Mild Hypertension	2	2.6 %	10	13.2%	
Moderate Hypertension	22	28.9%	19	25.0%	
Severe Hypertension	15	19.7%	8	10.5%	
Treatment Outcome					
ICU Length of Stay					.786
Short (1-7 days)	34	44.7%	33	43.4%	
Long (1-2 weeks)	5	6.6%	4	5.3%	

p = <0.05

The higher proportion of severe hypertension among male patients is consistent with previous studies indicating that men tend to develop hypertension earlier, exhibit higher blood pressure levels in mid-adulthood, and have poorer blood pressure control than women (Ji *et al.,* 2021; Niu *et al*., 2025). Biological mechanisms likely contribute to this pattern, particularly the cardioprotective role of estrogen in premenopausal women, which supports vascular function, blood pressure regulation, and endothelial integrity (Regitz-Zagrosek & Gebhard, 2023). Although women experience a marked increase in hypertension risk after menopause, similar to findings from Asian and Middle Eastern populations, males in this study still showed a greater tendency toward severe hypertension (Pengpid & Peltzer, 2024).

Occupational status also differed significantly by gender. More male patients were classified as actively working, whereas a greater proportion of female patients were not formally employed. This pattern aligns with broader socioeconomic and gender-role trends reported in Indonesia and other low- and middle-income countries, where women frequently engage in unpaid domestic or informal labor that is not recorded as formal employment (Patil *et al.*, 2025).

Occupational status is closely linked to stress, lifestyle behaviors, and access to healthcare, all of which may influence hypertension severity and stroke risk (Powell-Wiley *et al*., 2022).

No gender differences were observed in age group, education level, medical history, or ICU length of stay. These findings indicate that stroke affects both men and women across similar stages of life and with comparable comorbidity burdens. This is consistent with large-scale evidence demonstrating that, although stroke remains a major cause of morbidity for both sexes, gender-specific patterns are often more pronounced in risk factor severity rather than demographic distribution (Feigin *et al.*, 2017; Ku *et al*., 2019; Siˇ, 2025).

The findings of this study have important clinical implications for hypertension management in ICU stroke patients. The observed gender differences suggest the need for more gender-responsive monitoring strategies, where male patients may require stricter control of blood pressure, while midlife and post-menopausal women may benefit from targeted screening. In addition, differences in occupational status indicate the role of socioeconomic factors in shaping access to stroke prevention and follow-up care.

However, the limited sample size prevented the use of multivariable regression, which restricted the ability to adjust for potential confounders such as age, education, and comorbidities. Because regression analysis could not be performed, the implications of this study should be interpreted with caution, and the findings should be considered preliminary. Strengthening future research with adequate sample sizes would enable more comprehensive modeling and improve the strength of recommendations for clinical practice.

CONCLUSION

This study identified significant gender differences in hypertension severity and occupational status among stroke patients admitted to the ICU of RSUD Jailolo. Male patients were more likely to present with severe hypertension, while female patients more commonly exhibited milder forms of hypertension. Occupational disparities also emerged, with men predominantly engaged in formal work and women more frequently categorized as not working. Other sociodemographic and clinical variables including age group, education level, medical history, and ICU length of stay did not differ significantly between genders.

These findings highlight the importance of incorporating gender-sensitive approaches into hypertension assessment and acute stroke management in critical care settings. Strengthening blood pressure control strategies for men and enhancing early risk identification in women may contribute to improved clinical outcomes. Future studies with larger, multicenter samples and longitudinal designs are recommended to validate these findings and to explore additional behavioral, hormonal, and socioeconomic determinants that may underlie gender disparities in stroke severity and hypertension profiles.

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DATA AVAILABILITY

The dataset analyzed in this study was derived from patient medical records at RSUD Jailolo and is not publicly available because of privacy and ethical restrictions.

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