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Prevalence of Hypertension in Pregnancy at Dr. Muhammad Zyn General Hospital, Sampang, in 2024

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Abstract
Hypertension in pregnancy remains a leading cause of maternal and fetal morbidity and mortality, particularly in developing countries. This study aims to determine the prevalence and determinant factors of hypertension in pregnancy at Dr. Muhammad Zyn Regional Hospital, Sampang, in the year 2024. A cross-sectional study design was employed, utilizing electronic medical records of pregnant women diagnosed with hypertension from January to December 2024. The variables analyzed included maternal age, body mass index (BMI), gestational age, type of antihypertensive therapy, postpartum visits, as well as the severity and reduction of hypertension. A total of 332 patients were included in the analysis. The majority were aged 20–35 years (60.8%) and had pregnancies beyond 37 weeks of gestation (72.0%). Most participants were categorized as obese (55.7%) with a mean BMI of 31.84 kg/m². Grade 2 hypertension was observed in 64.2% of cases, while 19.0% presented with hypertensive emergencies. Following treatment, 66.9% of patients achieved normal blood pressure levels. Magnesium sulfate was the most commonly administered therapy. Logistic regression analysis revealed that high BMI (OR: 1.073), high parity (OR: 1.733), and a history of hypertension (OR: 2.331) were significantly associated with hypertensive disorders in pregnancy. These findings underscore the critical importance of early detection and appropriate management in reducing the risk of hypertensive complications during pregnancy.

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Introduction

Hypertension is a condition characterized by chronically elevated blood pressure within the blood vessels. It is defined as a persistent increase in arterial pressure, with a systolic pressure ≥130 mmHg and a diastolic pressure ≥80 mmHg (Whelton et al., 2018). According to 2019 data from the World Health Organization (WHO), the global prevalence of hypertension reached approximately 22% of the total population. Of this number, less than one-fifth actively manage their blood pressure. In 2018, the prevalence had reached 972 million cases, or 26.4% of the global population (Luna-López et al., 2022). Based on the 2018 Basic Health Research Survey (Riskesdas), the prevalence of hypertension in Indonesia reached 34.11%, up from 25.8% in 2013. This condition is more common among women, with a prevalence of 36.85%. In the same year, the prevalence of hypertension based on measurements among individuals aged 18 years and older in Lampung Province was reported at 29.94%.

Maternal health is one of the key health priorities outlined in the Sustainable Development Goals (SDGs), which encompass 38 health-related targets. One of these targets is to reduce the Maternal Mortality Ratio (MMR) to less than 70 per 100,000 live births by 2030. (Kemenkes, 2022) reported in its 2021 Health Profile that maternal mortality rates have continued to rise each year. In 2020, Indonesia recorded 4,627 maternal deaths per 100,000 live births, increasing to 7,389 deaths per 100,000 live births in 2021 (Kemenkes, 2022). In developed countries, cardiovascular diseases are the leading causes of maternal mortality during pregnancy. Cardiovascular complications in pregnancy occur in approximately 0.2–0.4% of cases, with an average of 2 maternal deaths per 100,000 pregnancies. However, data on the prevalence and incidence of cardiovascular diseases associated with pregnancy remain limited in many parts of the world, including Indonesia. In developed nations, sudden cardiac death syndrome, peripartum cardiomyopathy, aortic dissection, and myocardial infarction are among the primary causes of maternal mortality (PERKI, 2021).

One of the leading causes of maternal death is Hypertensive Disorders in Pregnancy (HDP). HDP is the third leading cause of maternal death in Indonesia. This disorder is categorized as a non-communicable disease contributing to maternal mortality and includes gestational hypertension, preeclampsia, eclampsia, chronic hypertension, and unspecified hypertension (Syairaji et al., 2024). The WHO reported that in 2013, approximately 810 maternal deaths occurred daily due to hypertensive disorders during pregnancy (WHO, 2013). In Indonesia, HDP was the leading cause of maternal death in 2021, with 1,077 cases per 100,000 live births (Kemenkes, 2022). This aligns with the findings of Putriningtyas & Wiranto (2021), who identified several risk factors for hypertension during pregnancy, including pre-pregnancy nutritional status, maternal age, sodium intake, and calcium intake (Wiranto & Putriningtyas, 2021). A previous study conducted in the working area of the Padang Panyang Community Health Center, Kuala Pesisir District, indicated that the incidence of hypertension among pregnant women was associated with a history of hypertension, obesity, and frequent coffee consumption (Marlina et al., 2021).

Despite growing evidence on the risk factors for hypertension in pregnancy, local data particularly in rural or underserved areas such as Sampang Regency remains scarce. Dr. Muhammad Zyn General Hospital serves as the main maternal and child healthcare facility in the area, yet comprehensive data on the prevalence and determinants of hypertension in pregnancy are still limited. Therefore, this study aims to determine the prevalence of hypertensive disorders in pregnancy and to identify the associated factors at Dr. Muhammad Zyn General Hospital in Sampang.

Method

Ethical Approval and Participant Consent

This study was approved by the Medical and Health Research Ethics Committee of Dr. Mohammad Zyn Regional General Hospital, Sampang.

Study Design and Population

A retrospective cross-sectional study was conducted using electronic medical record (EMR) data of pregnant women diagnosed with hypertension at Dr. Mohammad Zyn Regional General Hospital in Sampang, Indonesia. Data were collected from patients who received antenatal care or were admitted to the maternity ward and obstetrics clinic between January 1, 2024, and December 31, 2024. The inclusion criteria were pregnant women with a recorded diagnosis of hypertension, either during antenatal visits or hospitalization, and complete data on age, body mass index (BMI), gestational age, antihypertensive medication, and hypertension classification. Exclusion criteria included incomplete or missing data related to these variables. All patient records that met the inclusion criteria were included in the final analysis.

Data Collection

Patient data were obtained through a manual review of medical records from the hospital's medical record unit. Demographic and clinical data collected included maternal age, BMI (based on weight and height during the first or early pregnancy visit), gestational age at the time of diagnosis recorded during pregnancy, and the antihypertensive drugs administered. Body Mass Index was classified according to the Asia-Pacific WHO guidelines as follows: underweight (<18.5 kg/m²), normal weight (18.5–22.9 kg/m²), overweight at risk (23.0–24.9 kg/m²), obese class I (25.0–29.9 kg/m²), and obese class II (≥30.0 kg/m²). Hypertension was categorized based on severity into Grade 1 (systolic 140–159 mmHg or diastolic 90–99 mmHg), Grade 2 (systolic 160–179 mmHg or diastolic 100–109 mmHg), and hypertensive emergency (systolic ≥180 mmHg or diastolic ≥110 mmHg with signs of acute target organ damage). Documented medications included those commonly prescribed and administered during clinical visits. Each record was also reviewed to determine the hypertension classification based on blood pressure measurements and clinical notes by the attending physician. All data were collected using a structured form and subsequently entered into a digital spreadsheet for analysis.

Outcome Measures

The primary outcome of interest in this study was the severity level of hypertension during pregnancy, categorized into three groups: mild, moderate, and severe. Classification was based on clinical diagnoses recorded in the medical records and aligned with the hospital’s standard protocols, which typically follow national obstetric

guidelines. Mild to moderate hypertension included patients with systolic blood pressure ranging from 140–159 mmHg or diastolic from 90–109 mmHg, while severe hypertension included those with systolic ≥160 mmHg or diastolic ≥110 mmHg. This classification was used to assess distribution and analyze associations with maternal and clinical characteristics.

Data Analysis

All collected data were entered and analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize demographic and clinical characteristics. Continuous variables such as age, BMI, and gestational age were presented as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on data distribution. Categorical variables, including hypertension severity, postpartum visits, and medication use, were presented as frequencies and percentages. Bivariate analysis was initially performed, followed by multivariate logistic regression to assess the independent associations between potential risk factors and the severity of gestational hypertension. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using logistic regression. A p-value < 0.05 was considered statistically significant.

Result and Discussion

1. Result

Profile of Research Subjects

Table 1
Profile of Research Subjects

Characteristics	Total N = 332 (%)
Age, mean ± SD (years)	31.59 ± 6.88
Age category, n (%)	
<20 years old	2 (0.6)
20-35 years old	202 (60.8)
≥35 years old	128 (38.6)
Age of pregnancy, mean ± SD (weeks)	37.45 ± 2.78
Age category, n (%)	
20-37 weeks	93 (28.0)
>37 weels	239 (72.0)
Body mass index, mean ± SD (kg)	31.84 ± 17.19
Body mass index category, n (%)	
<18.5	0 (0.0)
18.5-22.9	10 (3.0)
23-24.9	17 (5.1)
25.0-29.9	120 (36.1)
>30	185 (55.7)
Antihypertensive medication, n (%)	
MgSO4	64 (19.3)
Nifedipine	11 (3.3)
MgSO4+nifedipine	203 (61.1)
Metildopa+nifedipine	5 (1.5)
MgSO4+nifedipine+amlodipine	9 (2.7)
MgSO4+furosemide+nifedipine	34 (10.2)
Nifedipine	11 (3.3)
MgSO4+furosemide	4 (1.2)
Nifedipine+furosemide	2 (0.6)
Parity history, n (%)	
Nullipara	138 (41.6)
Primipara	126 (38.0)
Multipara	68 (20.5)
Gestational hypertension category before medication, n (%)	
Hypertension Emergency	63 (19.0)
Grade 2 Hypertension	213 (64.2)
Grade 1 Hypertension	56 (16.9)
Normal	0 (0.0)
Gestational hypertension category after medication, n (%)	
Grade 1 Hypertension	110 (33.1)
Normal	222 (66.9)
Previous history of gestational hypertension, n (%)	113 (34.0)
Postpartum visit, n (%)	175 (52.7)

The demographic and clinical characteristics of the patients are presented in Table 1. A total of 332 patients were included in this study. The mean age of the patients was 31.59 ± 6.88 years. The majority of participants were in the 20–35 year age group (60.8% of the sample), followed by those aged ≥35 years (38.6%) and <20 years (0.6%). The average gestational age was 37.45 weeks, with the majority (72.0%) at more than 37 weeks of gestation. The mean body mass index (BMI) was 31.84 kg/m². The highest BMI category was >30.0 kg/m² (55.7%), followed by 25.0–29.9 kg/m² (36.1%). Data on parity history indicated that 41.6% of patients were primiparous, 38.0% were

multiparous, and 20.5% were grand multiparous. At the time of hospital admission, 16.9% of patients had stage 1 hypertension, 64.2% had stage 2 hypertension, and 19.0% presented with hypertensive emergency. Following treatment, 33.1% remained with stage 1 hypertension, while 66.9% achieved normal blood pressure. In addition, 34.0% of patients had a history of previous gestational hypertension, and only 32.7% had attended postnatal clinical follow-up.

Pharmacological Treatment Profile in Pregnant Patients with Hypertension

Table 2
Medication Characteristics in Hypertensive Pregnant Patients

Medication	N (%)
$MgSO_4$	64 (19.3)
Methyldopa and furosemide	11 (3.3)
$MgSO_4$ and nifedipine	203 (61.1)
Methyldopa and nifedipine	5 (1.5)
$MgSO_4$, nifedipine, and amlodipine	9 (2.7)
$MgSO_4$, nifedipine, and furosemide	34 (10.2)
Nifedipine	11 (3.3)
$MgSO_4$ and furosemide	4 (1.2)
Nifedipine and furosemide	2 (0.6)

The characteristics of therapy for gestational hypertension are presented in Table 2. The researchers observed that 64 patients (19.3%) received magnesium sulfate ($MgSO_4$) alone, making it the most frequently administered therapeutic regimen. A combination of $MgSO_4$, furosemide, and nifedipine was given to 34 patients (10.2%). Nifedipine monotherapy was used in 3.3% of cases, while a combination of methyldopa and furosemide was also administered to 3.3% of patients. Methyldopa combined with nifedipine was given to 1.5% of patients. The regimen consisting of $MgSO_4$, nifedipine, and amlodipine accounted for 2.7%, whereas $MgSO_4$ with furosemide was used in 1.2% of patients. Lastly, the combination of nifedipine and furosemide was administered to 0.6% of patients.

Mean Arterial Blood Pressure in the Study Sample

Table 3
Mean Arterial Blood Pressure in the Study Sample

Blood pressure	Sistole	Diastole	MAP	Blood pressure
Before medication, mean±SD	167±14.4	103±10.2	125±9.6	Before medication, mean±SD
After medication, mean±SD	131±13.1	78±15.3	96±12.1	After medication, mean±SD

Abbreviations: SD: Standard Deviation

The average blood pressure values of the sample in this study are presented in Table 3. Prior to therapy, the mean systolic blood pressure was 167 mmHg, diastolic pressure was 103 mmHg, and the mean arterial pressure (MAP) was 125 mmHg. Following therapy, the mean systolic pressure decreased to 131 mmHg, diastolic pressure to 78 mmHg, and MAP to 96 mmHg.

Determinant Factors of Hypertension in Pregnant Women

Table 4
Determinant Factors of Hypertension in Pregnant Women in Sampang Regency

Variable	OR	95 % CI	*p*-value
Age	1.042	0.998-1.088	0.062
Age of pregnancy	0.961	0.859-1.075	0.487
Body mass index	1.073	1.006-1.145	0.033
Parity history	1.733	1.139-2.636	0.010
Previous history of gestational hypertension	2.331	1.153-4.715	0.019

Abbreviations: CI: Confidence Interval, OR: Odds Rasio

The determinants of hypertension in pregnant women in this study are presented in Table 4. The researchers observed that an increase in body mass index (BMI) was associated with a 1.073-fold increase in the risk of gestational hypertension (95% CI: 1.006–1.145). They also noted that a higher number of previous deliveries was linked to a 1.733-fold increase in gestational hypertension (95% CI: 1.139–2.636). Furthermore, a history of prior hypertension was associated with a 2.331-fold increase in the risk of developing gestational hypertension (95% CI: 1.155–4.715).

2. Discussion

This study provides important and novel evidence regarding the demographic characteristics, associated risk factors, and the effectiveness of antihypertensive medications in pregnant women with hypertension in pregnancy at the referral hospital RSUD Dr. Mohammad Zyn in Sampang Regency. Unlike many previous studies that focused solely on either risk factors or treatment outcomes, this study integrates both elements to offer a more comprehensive understanding. The findings indicate that increased BMI, higher parity, and a history of gestational hypertension are all significantly associated with an elevated risk of hypertension during pregnancy.

From a demographic perspective, most patients in this study were in their early 30s, with a mean age of 31.59 years, and the majority fell within the 20–35 age range. The average gestational age was 37.45 weeks, with over 70% of the patients reaching full-term pregnancy (>37 weeks). The average BMI was 31.84 kg/m², indicating a population that was largely overweight or obese, with more than half of the patients having a BMI >30.0 kg/m². These findings align with previous research highlighting the increasing trend of maternal obesity and advanced maternal age as significant risk factors for hypertensive disorders in pregnancy (Feng et al., 2024; Seo et al., 2023). Studies conducted in Malaysia and Nigeria have also identified maternal obesity as a major predictor of adverse pregnancy outcomes, including preeclampsia and gestational hypertension (Adeoye et al., 2025; Shahrir et al., 2021).

The high prevalence of obesity in this cohort may be attributed to urban lifestyle factors such as sedentary behavior, increased caloric intake, and limited awareness of nutritional health (Nurwanti et al., 2019). These factors could contribute to a higher cardiovascular burden during pregnancy, thereby increasing the risk of hypertension (Garovic et al., 2022). Furthermore, a significant proportion of patients (64.2%) were initially diagnosed with grade 2 hypertension, and 19.0% presented with a hypertensive emergency, underscoring the clinical severity at the time of admission. Although treatment successfully normalized blood pressure in two-thirds of the cases, the high initial burden highlights the importance of early detection and appropriate management.

Additionally, with 34.0% of patients reporting a history of gestational hypertension and only 32.7% attending postpartum follow-up visits, there remains a gap in preventive efforts and continuity of care. The observed medication usage patterns in this study highlight magnesium sulfate ($MgSO_4$) as the most frequently administered therapy for gestational hypertension, used alone in 19.3% of patients, reflecting its established role in preventing seizures in cases of severe hypertension (Euser & Cipolla, 2009). Combination regimens, such as $MgSO_4$ with furosemide and nifedipine (10.2%), reflect tailored approaches for patients with more severe or complex presentations, potentially involving fluid retention or resistant hypertension (Campbell et al., 2014). Nifedipine, whether used alone or in combination, was commonly prescribed, consistent with its status as a preferred antihypertensive during pregnancy due to its efficacy and safety (George et al., 2022). Methyldopa appeared less frequently, suggesting a possible shift in clinical preference toward better-tolerated agents (Podymow & August, 2008). The presence of multi-drug regimens, including less conventional combinations such as amlodipine with $MgSO_4$ and nifedipine, underscores the variability in therapeutic strategies and the need for individualized care based on clinical severity and treatment response.

The blood pressure trends observed in this study reflect the severity of gestational hypertension at initial presentation and the effectiveness of medical interventions. Prior to treatment, the mean systolic pressure was 167 mmHg and the mean diastolic pressure was 103 mmHg, with a mean arterial pressure (MAP) of 125 mmHg—values within the severe hypertension range and known to increase the risk of complications such as preeclampsia, placental abruption, and preterm birth (Khedagi & Bello, 2021). Following treatment, these values significantly decreased, with mean systolic and diastolic pressures falling to 131 mmHg and 78 mmHg respectively, and MAP decreasing to 96 mmHg. These results are consistent with previous studies demonstrating the effectiveness of antihypertensive therapy, including calcium channel blockers and magnesium sulfate, in rapidly achieving blood pressure control and improving maternal pregnancy outcomes (Duley et al., 2013). The degree of blood pressure reduction in this cohort highlights the critical role of early pharmacological intervention and supports current clinical guidelines advocating for aggressive management of severe gestational hypertension to prevent maternal morbidity and mortality.

Regarding determinant factors, the study found that higher BMI increased the risk of gestational hypertension by 1.073 times, while higher parity increased the risk by 1.733 times. A previous history of gestational hypertension more than doubled the likelihood, and antenatal visits also showed a significant association (Pavlidou et al., 2023). It is possible that women already at high risk or beginning to exhibit symptoms of hypertension were more frequently monitored, which could explain this positive association. This underscores the need for a nuanced interpretation, as increased use of antenatal care may reflect a response to, rather than a cause of, gestational hypertension (Garrison-Desany et al., 2023). These findings highlight key determinants in patients with gestational hypertension.

This study has several limitations. First, its retrospective design limits the ability to establish causality. Second, although the sample size was adequate for analysis, it was derived from a single center, which may affect the generalizability of the findings. Third, critical factors such as dietary patterns, physical activity, socioeconomic status, and precise subtypes of gestational hypertension were not available in the dataset.

Finally, associations between some variables and hypertension may have been influenced by selection bias or reverse causality, necessitating further prospective studies for clarification.

Conclusion

This study highlights the substantial burden of hypertension in pregnancy among pregnant women at Dr. Mohammad Zyn Regional Hospital in Sampang, Indonesia. The researchers found that a higher body mass index, greater parity, and a history of hypertension were independently associated with an increased risk of developing hypertension during pregnancy. Magnesium sulfate, either alone or in combination with other antihypertensive agents, was identified as the most commonly used and effective therapy for reducing blood pressure to safer levels. These findings underscore the importance of early risk assessment and effective pharmacological management in preventing adverse maternal outcomes.

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