International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 4, Number 6, March 2026, *Page. 2685 - 2699*
Email : editorijhess@gmail.com

The Relationship Between Age, Body Weight, And Gestational Hypertension In Second Trimester Pregnant Women At The Ngembal Kulon Community Health Center

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Abstract

Gestational hypertension is a major pregnancy complication with a prevalence of 6.18% in Indonesia (RISKESDAS 2018), influenced by age at risk and obesity, but local data from the Ngembal Kulon Community Health Center is limited. This study aims to analyze the relationship between age and body weight (BMI) with gestational hypertension in second-trimester pregnant women. This type of quantitative analytical observational case-control study was conducted on the population of second-trimester pregnant women at the Ngembal Kulon Community Health Center from January to February 2026 with a sample of 60 total sampling respondents (case:control ratio 1:2). Digital sphygmomanometer instruments and digital scales were analyzed univariately (frequency, mean) and bivariately (Chi-Square, OR) via SPSS (α = 0.05). The results showed a prevalence of 33.3%; At-risk age (≤20/≥35 years, 35%) was dominant in cases (76.2%, OR=28, p=0.000) and overweight-obesity (BMI≥25, 33.3%) in 75% of cases (OR=0.048, p=0.000). The conclusion that at-risk age and overweight-obesity were significantly associated with gestational hypertension recommends routine ANC screening and nutrition education.

Keywords: Body Mass Index, Gestational Hypertension, Maternal Age, Pregnancy Trimester, Risk Factors.

INTRODUCTION

Gestational hypertension is a common pregnancy complication and a leading cause of maternal and fetal morbidity and mortality in Indonesia. The global prevalence of hypertension in pregnancy is 5-10%, According to data from the Indonesian Health Survey (Ministry of Health, 2023), gestational hypertension reached 1,066 cases and ranked as the second leading cause of maternal death. Central Java contributed the fifth highest number of maternal deaths due to hypertension (4.2%) among 34 provinces, with the prevalence of maternal deaths among pregnant women reaching 9,571 cases. with the highest rate in West Java at 10.57%. In Kudus Regency, Central Java, 11 maternal deaths were recorded in 2023, of which 2 were due to hypertension. The Ngembal Kulon Community Health Center ranked sixth with 20% of preeclampsia cases out of the total childbirth complications.

In the second trimester, maternal blood pressure normally reaches its lowest point (systolic 100-110 mmHg, diastolic 60-70 mmHg) due to peripheral vasodilation. However, an increase after 20 weeks of gestation can indicate gestational hypertension. This phenomenon is increasingly worrying because it is associated with the risk of preterm birth, cesarean section, and perinatal death, as reported by the WHO in 2020 with a global prevalence of 0.51-38.4%. [Khedagi & Bello, 2021]

Although age and weight are known to influence gestational hypertension, early monitoring at the community health center level is still suboptimal, resulting in late detection. Pregnant women aged <20 or >35 years have a four-fold higher risk of developing hypertension compared to the ideal age of 20-35 years, while obesity (BMI ≥25 kg/m²) increases the risk through increased Mean Arterial Pressure (MAP). In areas such as the Ngembal Kulon Community Health Center, preliminary studies show that 3 out of 5 pregnant women experience hypertension in the second trimester, indicating a local problem that needs to be addressed.

The problem is further complicated by the fact that excess weight gain in the second trimester is positively correlated with gestational hypertension, with an OR of up to 28 for those at risk. [Bunga et al., 2023] This factor is exacerbated by low awareness of routine ANC and poor nutritional status, which leads to complications such as preeclampsia in Central Java. [Pratiwi, 2022] Therefore, regular age and BMI screening is needed to prevent risk escalation.

This study aims to analyze the relationship between age and weight with gestational hypertension in second-trimester pregnant women at the Ngembal Kulon Community Health Center using a case-control design. The urgency lies in reducing maternal mortality due to hypertension, which ranks second nationally (1,066 cases in 2023), as well as supporting primary ANC education. [Kudus District Health Office, 2023] The novelty of this study is its focus on the specific location of the Ngembal Kulon Community Health Center in 2026 with a total sampling of 60 second-trimester respondents, which has not been previously published, thus providing the latest data for local interventions.

RESEARCH METHODS

This study uses an observational analytical quantitative research type with a case-control study method to analyze the relationship between age and weight of pregnant women in the second trimester with the incidence of gestational hypertension at the Ngembal Kulon Community Health Center. [Sugiyono, 2021] The quantitative approach was chosen because it allows objective hypothesis testing through numerical data and statistical analysis, in accordance with the postpositivist paradigm that emphasizes structured measurement of variables. [Emzir, 2023] This retrospective case-control design is effective for identifying risk factors such as age at risk (<20 or >35 years) and overweight/obese BMI by comparing case groups (blood pressure ≥140/90 mmHg) and controls (normal blood pressure), as recommended for gestational hypertension studies in primary care facilities. [Creswell & Creswell, 2023]

The research instruments included a calibrated digital sphygmomanometer for blood pressure measurement, a digital scale with an accuracy of 0.1 kg for weight and BMI, and an observation sheet and questionnaire for age data from the KIA book or medical records. [Sugiyono, 2021] The primary data collection technique was carried out through direct observation during ANC visits, with respondents sitting and resting for 5 minutes before the measurement to minimize bias, followed by verification of informed consent. Data analysis used univariate (frequency, mean, SD via SPSS) for description of respondent characteristics and bivariate (Chi-Square test or Fisher Exact if expected <5) to test the relationship with a significance level of $\alpha = 0.05$, including the calculation of the Odds Ratio (OR). [Sudaryono, 2022]

The study population was all second-trimester pregnant women who checked themselves at the Ngembal Kulon Community Health Center in January-February 2026, with a sample of 60 respondents through total sampling adjusted to availability. [Sugiyono, 2021] Inclusion criteria included second-trimester pregnant women who were willing to sign informed consent and undergo the examination, while exclusion criteria included those who were absent, refused, or had comorbidities such as chronic hypertension. A 1:2 ratio between cases and controls ensured the accuracy of the analysis, with sample replacement if necessary to achieve the target. [Creswell & Creswell, 2023]

The research procedure began with topic identification through literature and preliminary studies at the Community Health Center (April 2025), proposal preparation, review, ethical clearance, and primary data collection in January-February 2026. [Emzir, 2023] Measurements were carried out in stages: age interviews, weighing, measuring blood pressure twice for accuracy, and recording on observation sheets, followed by editing, coding, cleaning, and SPSS analysis. The entire process complies with ethical principles, including data confidentiality and the respondent's right to withdraw at any time. [Sudaryono, 2022][Sugiyono, 2021]

RESULTS AND DISCUSSION

Overview of Research Location

The Ngembal Kulon Community Health Center is a first-level healthcare facility located on Jl. Lingkar Timur, Kitchen, Ngembal Kulon, Jati District, Kudus Regency, Central Java. The community health center's service area covers the villages of Ngembal Kulon, Tumpangkrasak, Megawon, Jepang Pakis, Loram Wetan, and Getas Pejaten. The area has a relatively high population density and is dominated by the productive age group, resulting in a relatively large number of women of childbearing age and pregnant women.

As part of its efforts to improve public health, the Ngembal Kulon Community Health Center implements various service programs, including antenatal care (ANC), high-risk pregnancy monitoring, and mobile health centers. Mobile health center services are implemented to reach communities in assisted villages with limited access to healthcare facilities. ANC services are the primary means of assessing the health of pregnant women, including blood pressure measurements, weight gain, and pregnancy status recording.

Data collection for this study was conducted directly at the Ngembal Kulon Community Health Center through ANC services. Respondents were pregnant women in their second trimester who underwent prenatal checkups at the Ngembal Kulon Community Health Center. Data collected included maternal age, weight, and blood pressure measurements obtained directly. Data collection at the health facility allowed for accurate and standardized information, thus supporting the validity of the research findings regarding factors associated with gestational hypertension.

Respondent Characteristics

Based on research conducted in the Ngembal Kulon Community Health Center work area, researchers can describe the characteristics of respondents as follows.

Table 1.Frequency Distribution of Respondent Characteristics in Work Areas Health Center in January – February 2026.

Characteristics	F	%
Education		
Elementary School	3	5
Junior High School	14	23.3
Senior High School	39	65
College	4	6.7
Total	**60**	**100.0**
Work		
Not working/housewife	27	45
Teacher	2	3.3
Entrepreneur/Trader	8	13.3
Employees/Laborers	23	38.3
Total	**60**	**100.0**
Gestational age (weeks)		
13-19	18	30
20-28	42	70
Total	**60**	**100.0**
Characteristics	**F**	**%**
Body weight (kg)		
Low (<55)	13	21.7
Medium (55-64)	22	36.7
Height (65-74)	18	30
Very High (≥75)	7	11.7
Total	**60**	**100.0**
Height (cm)		
Short (<145)	2	3.3
Medium (145-154)	20	33.3
Height (155-165)	38	63.3

Total	**60**	**100.0**
LILA (cm)		
≥23.5	48	80
<23.5	12	20
Total	**60**	**100.0**
Blood type		
A	13	21.7
B	16	26.7
AB	12	20
O	19	31.7
Total	**60**	**100.0**
Gravida		
Primigravida	20	33.3
Multigravida	37	61.7
Grandemultigravida	3	5
Total	**60**	**100.0**
Birth history		
Normal	29	48.3
SC	12	20
Nulliparous	19	31.7
Total	**60**	**100.0**
Anemia		
No	56	93.3
Yes	4	6.7
Total	**60**	**100.0**
Comorbidities		
No	56	93.3
There is	4	6.7
Total	**60**	**100.0**

Based on table 1 showing the results of the analysis of the characteristics of pregnant women in the second trimester at the Ngembal Kulon Community Health Center, the distribution of respondents shows a dominance of high school education level of 39 respondents (65%), which reflects that pregnant women generally have a sufficient educational background as a basis for receiving and understanding health information during pregnancy.

Based on occupation, the respondents were predominantly unemployed or housewives (27 respondents, 45%). This indicates that pregnant women's daily activities are relatively more controlled and flexible, allowing them to adjust to their physical condition during pregnancy. In terms of gestational age, the majority of respondents were between 20 and 28 weeks, with 42 (70%). This indicates that the respondents were in a crucial phase of pregnancy for monitoring the health of the mother and fetus.

The majority of pregnant women's weight was in the moderate category (55-64 kg), with 22 (36.7%). Meanwhile, in terms of height, the highest number of respondents was in the tall category, namely 155-165 cm, with 38 respondents (63.3%). Measurements of mid-upper arm circumference (MUAC) showed the highest distribution at ≥23.5 cm, with 48 respondents (80%).

Based on blood type, blood type O was the most common blood type among respondents, with 19 pregnant women (31.7%). Meanwhile, in terms of gravida status, the majority of respondents were multigravida, with 37 pregnant women (61.7%). Current childbirth history showed the largest distribution of normal deliveries, with 29 respondents (48.3%).

Regarding anemia status, the distribution of respondents showed that the majority of pregnant women did not experience anemia, namely 56 pregnant women (93.3%). This finding indicates that the hemoglobin levels of pregnant women in the second trimester are within normal limits. In terms of comorbidities during pregnancy, the majority of respondents did not have comorbidities, namely 93.3% (56 respondents), reflecting that the general health condition of pregnant women is in good condition. Overall, the characteristics of respondents indicate that the biological aspects of pregnant

women, including gestational age, nutritional status (height and MUAC), are in relatively good condition. From a social and demographic perspective, the respondents' education level and type of employment show a fairly supportive picture in receiving health information during pregnancy. However, biological aspects such as body weight still require continuous monitoring and control because they can act as a risk factor for gestational hypertension.

Univariate Analysis Results

This study included three main variables: maternal characteristics, including age, weight (BMI), and blood pressure (gestational hypertension). Univariate analysis results are presented to illustrate the distribution of each research variable among respondents in the Ngembal Kulon Community Health Center (Puskesmas) work area. This presentation aims to obtain an initial overview of respondent characteristics before conducting bivariate analysis to determine the relationship between the independent and dependent variables.

Table 2. Frequency Distribution of Age of Pregnant Women in the Second Trimester in the Work Area Ngembal Kulon Community Health Center in January-February 2026

Age of Pregnant Mother (years)	F	%
Age at risk (<20 and >35)	21	35
Non-risk age (20-35)	39	65
Total	**60**	**100.0**

Based on Table 2, the research results show that of the 60 pregnant women in their second trimester, the majority, 39 (65%), were considered at risk. Meanwhile, 21 (35%) were at risk.

Table 3. Frequency Distribution of Body Weight (BMI Indicator) of Pregnant Women in the Second Trimester in the Ngembal Kulon Community Health Center Working Area in January-February 2026

BMI (kg/m2)	F	%
underweight– normal	40	66.7
overweight– obesity	20	33.3
Total	**60**	**100.0**

Referring to Table 3, it can be seen that of the 60 pregnant women in their second trimester who responded, the majority were in the underweight-normal category, namely 40 pregnant women (66.7%). Furthermore, there were 20 pregnant women (33.3%) whose weight was classified as overweight-obese.

Table 4. Frequency Distribution of Blood Pressure in Second Trimester Pregnant Women in the Ngembal Kulon Community Health Center Work Area in January-February 2026

Blood pressure (mmHg)	F	%
≥140/90	20	33.3
<140/90	40	66.7
Total	**60**	**100.0**

Based on Table 4, it can be concluded that the majority of the 40 pregnant women in their second trimester who responded were in the category of not experiencing gestational hypertension, or blood pressure <140/90 mmHg. Meanwhile, 20 pregnant women (33.3%) experienced gestational hypertension (≥140/90 mmHg).

Bivariate Analysis Results

Table 5. Relationship between Age of Pregnant Women in the Second Trimester and Gestational Hypertension in the Ngembal Kulon Community Health Center Work Area in January-February 2026

Age of Pregnant Mother Second Trimester	Blood pressure					
	≥140/90		<140/90		Total	
	f	%	f	%	f	%
<20 and >35 years	16	76.2	5	23.8	21	100.0
20-35 years	4	10.3	35	89.7	39	100.0
Total	20	33.3	40	66.7	60	100.0
Chi-Square Test, p = 0.000 (= 0.05); OR = 28.00 (95% CI: 6.623-118.381)α						

Based on Table 5, the results of cross-tabulation between age and blood pressure show that of the 60 respondents studied, 21 pregnant women (35%) were in the risk age group, namely <20 and >35 years, while 39 pregnant women (65%) were in the non-risk age group, namely 20-35 years. In the risk age group, most pregnant women had blood pressure ≥140/90 mmHg, namely 16 respondents (76.2%), while pregnant women with blood pressure <140/90 mmHg numbered 5 respondents (23.8%). On the other hand, in the non-risk age group (20-35 years), the majority of pregnant women had blood pressure <140/90 mmHg, namely 35 respondents (89.7%), while pregnant women with blood pressure ≥140/90 mmHg were only 4 respondents (10.3%). These findings indicate a clear difference in the distribution of blood pressure based on the age group of pregnant women, where the incidence of gestational hypertension is more common in pregnant women of risk age compared to non-risk pregnant women.

The results of the relationship analysis using the Chi-Square test showed a significant value of p <0.000 at a confidence level of 0.05. This value indicates that there is a statistically significant relationship between age and blood pressure in second-trimester pregnant women. The Odds Ratio (OR) value of 28.00 indicates that second-trimester pregnant women with risky ages (<20 and >35 years) have a 28 times greater chance of experiencing blood pressure ≥140/90 mmHg compared to second-trimester pregnant women at non-risk ages (20-35 years). This finding indicates that maternal age is a strong risk factor for the occurrence of gestational hypertension.α

Thus, because p < 0.05, H0 is rejected and Ha is accepted, which means there is a significant relationship between the age of pregnant women in the second trimester and gestational hypertension in the Ngembal Kulon Community Health Center area. This can be interpreted that the age group of pregnant women at risk has a greater tendency towards gestational hypertension compared to the age group of pregnant women who are not at risk.

Table 6.The Relationship Between Body Weight of Second Trimester Pregnant Women and Gestational Hypertension in the Ngembal Kulon Community Health Center Work Area in January-February 2026

Weight (BMI indicator)	Blood pressure					
	≥140/90		<140/90		Total	
	f	%	f	%	f	%
Underweight- Normal	5	12.5	35	87.5	40	100.0
Overweight- Obesity	15	75	5	25	20	100.0
Total	20	33.3	40	66.7	60	100.0
Chi-Square Test, p = 0.000 (= 0.05); OR = 0.048 (95% CI: 0.012-0.189)α						

Based on Table 6, the results of the cross-tabulation between body weight (BMI indicator) and blood pressure show that of the 60 respondents studied, as many as 40 (66.7%) pregnant women were in the underweight-normal category, while 20 pregnant women (33.3%) were in the overweight-obese category. In the overweight-obese group, most pregnant women had blood pressure ≥140/90 mmHg,

namely 15 respondents (75%), while pregnant women with blood pressure <140/90 mmHg numbered 5 respondents (12.5%). Conversely, in the underweight-normal group, the majority of pregnant women had blood pressure <140/90 mmHg, namely 35 respondents (87.5%), while pregnant women with blood pressure ≥140/90 mmHg were only 5 respondents (25%). These findings indicate a clear difference in the distribution of blood pressure based on weight group, where the incidence of gestational hypertension is more common in pregnant women with overweight-obese weight categories compared to mothers with underweight-normal weight categories.

The results of the correlation analysis using the Chi-Square test showed a significant value of p <0.000 at a confidence level of 0.05. This value indicates that there is a statistically significant relationship between maternal weight and blood pressure in the second trimester of pregnancy. The OR value of 0.048 indicates that maternal weight is associated with a reduced chance of gestational hypertension, so that body weight in the normal category can be seen as a protective factor.α

Thus, because p < 0.05, H0 is rejected and Ha is accepted, which means there is a significant relationship between the weight of pregnant women in the second trimester and gestational hypertension in the Ngembal Kulon Community Health Center Area. This can be interpreted that the overweight-obese pregnant women's weight group has a greater tendency towards gestational hypertension compared to the underweight-normal pregnant women's weight group.

DISCUSSION

Age of Pregnant Women in the Second Trimester in the Ngembal Kulon Community Health Center Work Area

The results showed that of the 60 pregnant women in their second trimester, the majority of respondents were in the non-risk age group of 20-35 years, namely 39 pregnant women (65%). Meanwhile, there were still 21 pregnant women (35%) included in the at-risk age group, namely ages <20 years and >35 years. This finding illustrates that in general, the age characteristics of pregnant women in the Ngembal Kulon Community Health Center work area are within a relatively safe reproductive age range.

In line with research conducted bySelviana et al. (2025),A survey on the characteristics of pregnant women at the Nur Hikmah Inpatient and Maternity Clinic showed that of the 46 pregnant women who responded, 60.9% were between the ages of 20 and 35. This age range is considered a relatively safe and optimal reproductive age (low-risk) for pregnancy. The predominant proportion of pregnant women in this age group indicates that most expectant mothers are aware of planning their pregnancies at a reproductively mature age. This indicates a tendency toward more planned pregnancy timing, both in terms of physical and age maturity, so that pregnancies can be more optimally managed.

This finding is in line with researchLuo et al. (2020),entitled "Pregnancy Complications among Nulliparous and Multiparous Women with Advanced Maternal Age: A Community-Based Prospective Cohort Study in China". The study involved 10,171 pregnant women recruited from their initial antenatal visit and followed until delivery. The results showed that most respondents were in the optimal reproductive age range, with the largest proportion in the 20-29 age group, while only a small proportion were aged ≥35 years. The predominance of pregnant women aged 20-35 years (a non-risk age) illustrates that the majority of expectant mothers had planned their pregnancies at the ideal age for pregnancy. This finding reinforces that awareness in choosing the appropriate time for pregnancy according to age has been reflected in most respondents in the study.

Age plays a significant role in pregnancy because it is related to biological, psychological, and social readiness to undergo the pregnancy process. According toMuglia et al. (2022)The age range of 20-35 years is generally considered the ideal age for pregnancy, when organs have matured and the body's physiological functions are in a relatively stable condition to support pregnancy. Research conducted byZhang et al. (2020)confirms that the age range of 26-31 is the most optimal period for pregnancy, as this is the phase where the chances of a good pregnancy outcome are highest, while the risks associated with pregnancy are relatively low. Based on these findings, pregnancies occurring between the ages of 20 and 35 can be considered the ideal reproductive period. During this age range,

mothers generally have greater physical readiness, greater psychological stability, and greater social support, contributing to a healthier and more controlled pregnancy.

In terms of respondent characteristics, the majority of pregnant women in the second trimester in this study had a high school education (65%), and the majority were unemployed or housewives (45%), which allows mothers a greater opportunity to plan their pregnancy at a safe age. The non-risk age (20-35 years) is generally the optimal reproductive phase, thus supporting the physiological progress of pregnancy. These findings are supported by international studies showing that maternal health literacy, which is influenced by education level and the ability to understand health information, is related to maternal health behaviors during pregnancy. Pregnant women with better health literacy have a stronger understanding of health information, making them better able to utilize antenatal care services and make appropriate health decisions throughout pregnancy.(Nawabi et al., 2021). Another study showed that non-working pregnant women tended to have a higher level of knowledge about supplements consumed during pregnancy compared to working mothers (aOR=3.77, CI=1.184 – 11.98). This finding indicates that unemployed mothers or housewives (IRT) have a greater opportunity to actively engage in health education and utilize health information provided by counselors or maternal health services.(Hositanisita et al., 2023).

Based on this description, it can be concluded that the majority of pregnant women in their second trimester in the Ngembal Kulon Community Health Center work area are in the low-risk age category of 20-35 years. This finding is in line with various previous studies that state that the age of 20-35 years is a safe and optimal reproductive age for pregnancy. The dominance of pregnant women in this age group indicates that most respondents are at an age when they are biologically and physiologically more ready to undergo pregnancy. However, the presence of pregnant women in the high-risk age category (<20 years and ≥35 years) indicates that educational efforts and assistance related to pregnancy planning still need to be carried out continuously, so that all pregnant women can plan and undergo pregnancy at an optimal age and receive appropriate pregnancy monitoring.

Body Weight (BMI indicator) of Pregnant Women in the Second Trimester in the Ngembal Kulon Community Health Center Work Area

The results showed that of the 60 pregnant women in their second trimester who responded, the majority were in the normal weight category, namely 35 pregnant women (58.3%). Furthermore, there were 17 pregnant women (28.3%) whose weight was classified as overweight, while 3 pregnant women (5%) were classified as obese. Meanwhile, 5 pregnant women (8.3%) were recorded as underweight.

In line with previous studies which reported that 56.8% of pregnant women had a weight in the normal category with the remainder being in the underweight and overweight/obese categories, depicting a similar BMI pattern in different populations.(Frane et al., 2025). Besides that,Ahmadibeni et al. (2023)Using the same pre-pregnancy BMI classification to categorize pregnant women into underweight, normal, overweight, and obese groups, demonstrated that the categorical pattern of BMI is a commonly used parameter in modern maternal research. This finding confirms that the distribution of weight status found in this study reflects patterns also found in other population-based studies.

Adequate weight gain is crucial for ensuring the supply of nutrients and oxygen to the fetus and maintaining maternal health. In this study, pregnant women were in the normal weight category, with a correlation between maternal weight (BMI) and mid-upper arm circumference (MUAC) as a key anthropometric indicator. Among the respondents, 48 (80%) had a normal MUAC (≥23.5 cm). This finding aligns with research byMishra et al. (2020), entitled "Association Between Mid-Upper Arm Circumference and Body Mass Index in Pregnant Women to Assess Their Nutritional Status". The study reported that there was a significant association between MUAC and weight (BMI indicator) in pregnant women, with an adjusted odds ratio (aOR) of 7.91 (95% CI: 4.27-14.65; p <0.001), as well as a moderate positive correlation between the two indicators (r = 0.57), which indicates that pregnant women with higher MUAC tend to have better nutritional status according to BMI compared to pregnant women with lower MUAC. These findings support the understanding that adequate MUAC

size is a marker of good body energy reserves and is related to optimal maternal weight, so that MUAC measurement can be used as a practical tool for assessing nutritional status (BMI) in primary care.

In addition to the LILA factor, the characteristics of anemia during pregnancy also contribute to maternal body weight (BMI). Consistent with the results of this study, the distribution of respondents showed that the majority of pregnant women, 93.3%, did not experience anemia, indicating that maternal hemoglobin levels were within normal limits. This condition reflects maternal weight, as measured by BMI, being within the normal range. This finding aligns with research findings fromFebiana et al. (2024)entitled "Impact of Maternal Nutritional Status on Anemia in the Third Trimester of Pregnancy". The study stated that there is a significant relationship between body weight category (BMI indicator) and the incidence of anemia in the late trimester of pregnancy ($p = 0.046$), where pregnant women with an abnormal BMI, both underweight and overweight, have a higher risk of anemia compared to mothers with a normal BMI. This shows that anemia status is not only influenced by iron deficiency alone, but is also closely related to the overall condition of the mother's nutritional status, which is reflected through BMI as an indicator of energy balance and nutrient reserves during pregnancy.

Overall, the results of this study indicate that the majority of pregnant women in their second trimester are in the normal weight category, supported by adequate MUAC and low rates of anemia among respondents. Nevertheless, ongoing monitoring of the nutritional status of pregnant women remains necessary to prevent the risk of nutritional disorders, both underweight and overweight, which can impact the health of the mother and fetus.

Blood Pressure of Second Trimester Pregnant Women in the Ngembal Kulon Community Health Center Work Area

The results of this study indicate that the majority of 40 pregnant women in their second trimester did not experience gestational hypertension, with blood pressures <140/90 mmHg. Meanwhile, 20 pregnant women (33.3%) experienced gestational hypertension (≥140/90 mmHg). These findings indicate that although the majority of respondents had normal blood pressure, the incidence of gestational hypertension is still quite high and requires special attention in antenatal care.

This condition is in line with the results of other studies that report that the occurrence of high blood pressure during pregnancy (hypertensive disorders of pregnancy) is a significant maternal health problem but remains below the proportion of the normal majority in the majority of pregnant women. The study byRatnam et al. (2024)found that 5-10% of pregnancies globally are complicated by gestational hypertensive disorders, suggesting that the majority of pregnant women tend to have normal blood pressure, while a small proportion experience gestational hypertension.

The relationship between blood pressure and respondent characteristics is also evident in the parity of pregnant women in this study. This is in line with research conducted byMawar et al. (2025)found that mothers experiencing their first pregnancy (primigravida) have a higher chance of experiencing gestational hypertension compared to mothers who have been pregnant before (multigravida). The analysis showed that primigravida had a risk of experiencing gestational hypertension approximately 2.742 times greater (OR=2.742; 95% CI: 1.047–7.178; p=0.040) compared to multiparas and nulliparas (never having given birth) also increased the risk of gestational hypertension. This finding is consistent with the physiological picture that the body in pregnancy fully adapts to the hemodynamic changes of pregnancy compared to subsequent pregnancies, so that blood pressure tends to be more prone to increase in primigravida mothers.

In addition to parity, the majority of respondents had a history of normal delivery (48.3%), followed by nulliparous (31.7%), and finally, cesarean section (20%). Previous delivery history has also been reported to be associated with the risk of blood pressure disorders in subsequent pregnancies. Evidence from meta-analysis studiesJenabi et al. (2023)which concluded that a history of previous cesarean section was associated with an increased risk of preeclampsia in subsequent pregnancies, with an increased risk of approximately 28% compared to women without a history of cesarean section (OR=1.28, 95% CI, 1.15%-1.41%, P=0.001). These findings suggest that physiological changes after

cesarean section, including possible impaired utero-placental perfusion and placental implantation, may contribute to increased blood pressure in subsequent pregnancies.

Overall, the results of this study indicate that the majority of pregnant women in their second trimester in the Ngembal Kulon Community Health Center (Puskesmas) have normal blood pressure (<140/90 mmHg). However, the relatively high incidence of gestational hypertension indicates that blood pressure issues during pregnancy remain a significant concern in antenatal care. This situation indicates the need for routine blood pressure monitoring and early detection of risk factors early in pregnancy, especially in women with certain characteristics such as a history of previous childbirth and parity. Efforts to prevent and control gestational hypertension through comprehensive ANC services are expected to minimize the risk of complications for both mother and fetus.

The Relationship Between the Age of Pregnant Women in the Second Trimester and Gestational Hypertension in the Ngembal Kulon Community Health Center Work Area

The results of cross-tabulation between age and blood pressure showed that of the 60 respondents studied, 21 pregnant women (35%) were in the risk age group, namely <20 and >35 years, while 39 pregnant women (65%) were in the non-risk age group, namely 20-35 years. In the risk age group, most pregnant women had blood pressure ≥140/90 mmHg, namely 16 respondents (76.2%), while pregnant women with blood pressure <140/90 mmHg were 5 respondents (23.8%). On the other hand, in the non-risk age group (20-35 years), the majority of pregnant women had blood pressure <140/90 mmHg, namely 35 respondents (89.7%), while pregnant women with blood pressure ≥140/90 mmHg were only 4 respondents (10.3%). These findings indicate a clear difference in the distribution of blood pressure based on the age group of pregnant women, where the incidence of gestational hypertension is more common in pregnant women of risk age compared to non-risk pregnant women.

The results of the relationship analysis using the Chi-Square test showed a significant value of p <0.000 at a confidence level = 0.05. This value indicates that there is a statistically significant relationship between age and blood pressure in second trimester pregnant women. The Odds Ratio (OR) value of 28.00 indicates that second trimester pregnant women with risky ages (<20 and >35 years) have a 28 times greater chance of experiencing blood pressure ≥140/90 mmHg compared to second trimester pregnant women at non-risk ages (20-35 years). This finding indicates that the age of pregnant women is a strong risk factor for the occurrence of gestational hypertension. Thus, because p <0.05, H0 is rejected and Ha is accepted, which means there is a significant relationship between the age of second trimester pregnant women and gestational hypertension in the Ngembal Kulon Community Health Center Area.α

The results of this study align with the findings of various previous studies that examined age as a determinant of gestational hypertension. Research bySole et al. (2021)reported that older maternal age (>35 years) contributes to an increased risk of hypertensive disorders of pregnancy, especially when accompanied by other predisposing factors such as obesity and a history of chronic disease. Age-related risk factors are associated with changes in blood vessel elasticity and decreased cardiovascular adaptation during pregnancy.

In line with that, research conducted byHusaidah & Nurbaiti (2020)showed a significant association between the age of at-risk pregnant women and the incidence of hypertension in pregnancy (p < 0.05). Pregnant women aged <20 years and >35 years had a higher risk of developing hypertension compared to pregnant women of safe reproductive age (20-35 years). This condition is associated with the unpreparedness of the reproductive organs at a young age and the decline in physiological function of the cardiovascular system at an older age.

Other research byWidyasari & Alnur (2023)also stated that maternal age was significantly associated with the incidence of hypertension during pregnancy (p-0.000). The study confirmed that at-risk age groups were more likely to experience increased blood pressure during pregnancy than the 20-35 age group, considered the ideal reproductive age.

The alignment of this study's findings with several previous studies reinforces the understanding that maternal age is a crucial factor to consider in preventing gestational hypertension.

Pregnant women in at-risk groups require more intensive blood pressure monitoring and ongoing health education to prevent pregnancy complications.

However, there are other studies such as studiesSinambela et al. (2023)who found no significant association between maternal age and the incidence of gestational hypertension after multivariate analysis. This difference in results may be due to the influence of other confounding factors such as body mass index, history of hypertension, parity, and maternal lifestyle. These factors may play a more dominant role, thus reducing the direct influence of maternal age on the incidence of gestational hypertension.

Overall, the results of this study indicate that maternal age plays a significant role in the incidence of gestational hypertension, especially when other risk factors are not controlled. These findings support the importance of screening for high-risk pregnancies as part of integrated antenatal care. Therefore, early detection and prevention of gestational hypertension through routine monitoring of high-risk pregnant women is expected to reduce the number of pregnancy complications and improve maternal and fetal health.

The Relationship Between Weight of Pregnant Women in the Second Trimester and Gestational Hypertension in the Ngembal Kulon Community Health Center Work Area

The results of cross-tabulation between body weight (BMI indicator) and blood pressure showed that of the 60 respondents studied, as many as 40 (66.7%) pregnant women were in the underweight-normal category, while 20 pregnant women (33.3%) were in the overweight-obese category. In the overweight-obese group, most pregnant women had blood pressure ≥140/90 mmHg, namely 15 respondents (75%), while pregnant women with blood pressure <140/90 mmHg numbered 5 respondents (12.5%). Conversely, in the underweight-normal group, the majority of pregnant women had blood pressure <140/90 mmHg, namely 35 respondents (87.5%), while pregnant women with blood pressure ≥140/90 mmHg were only 5 respondents (25%). These findings indicate a clear difference in the distribution of blood pressure based on weight group, where the incidence of gestational hypertension is more common in pregnant women with overweight-obese weight categories compared to mothers with underweight-normal weight categories.

The results of the relationship analysis using the Chi-Square test showed a significant value of p <0.000 at a confidence level = 0.05. This value indicates that there is a statistically significant relationship between body weight and blood pressure of pregnant women in the second trimester. The OR value of 0.048 indicates that the weight of pregnant women is associated with a reduced chance of gestational hypertension, so that body weight in the normal category can be seen as a protective factor. Thus, because p <0.05, H0 is rejected and Ha is accepted, which means there is a significant relationship between the weight of pregnant women in the second trimester and gestational hypertension in the Ngembal Kulon Community Health Center Area.α

The results of this study are consistent with the findings of several previous studies that examined the role of body weight and BMI groups in the incidence of gestational hypertension during pregnancy. Research byAndriani & Azizah (2025)showed that most pregnant women with a BMI ≥25 kg/m2 had hypertension in the third trimester than mothers with a normal BMI (p < 0.001; OR = 6.0; 95% CI: 2.407-15.291), which indicates that body weight classified as obese is significantly associated with the incidence of gestational hypertension.

In line with that, researchXiong et al. (2025)A study involving more than 50 million pregnancies showed that pre-pregnancy body mass index (BMI) was significantly associated with the incidence of gestational hypertension. Every 5 kg/m2 increase in BMI was reported to increase hypertensive disorders in pregnancy, including gestational hypertension (aOR = 1.75; 95% CI 1.68-1.82; p < 0.001). This finding suggests a dose-response relationship, where the higher the mother's pre-pregnancy BMI, the greater the risk of developing gestational hypertension. A cohort study byMatoba et al. (2025)also reported that mothers with obesity had a higher risk of gestational hypertension compared to mothers with normal weight or BMI (OR = 1.60; 95% CI 1.18-2.18; p = 0.002), thus confirming the role of BMI as an important risk factor for gestational hypertension.

The alignment of this study's findings with several previous studies reinforces the understanding that higher BMI (overweight/obesity) is a significant risk factor for gestational hypertension. Pregnant women with a high BMI require more intensive antenatal monitoring and education on weight management before and during pregnancy to reduce the risk of hypertensive complications.

However, other research suggests that obesity in pregnant women does not always have a significant relationship with the incidence of gestational hypertension. Research byAzizah et al. (2023b)showed that body mass index (BMI) was not associated with gestational hypertension, with a Fisher Exact significance value of $p = 0.775$ ($p > 0.05$). These results indicate that obesity is not the sole factor contributing to the incidence of gestational hypertension. This difference may be influenced by respondent characteristics, the use of secondary data from medical records, and other factors such as physiological conditions during pregnancy, lifestyle, and maternal psychological conditions that were not captured in the study.

Research Limitations

Obstacles to Pregnant Women Coming to the Community Health Center

The study used primary data from pregnant women visiting the community health center. However, because the study was conducted in January with erratic rainfall, some pregnant women rarely visited on certain days. This resulted in an uneven distribution of pregnant women's visits, both overall and by trimester. Therefore, data collection required more time to target pregnant women in their second trimester as study respondents.

Limitations of Case-Control Research Design

A case-control design allows researchers to examine the relationship between maternal risk factors (age, weight/BMI) and the incidence of gestational hypertension. However, this design cannot establish a direct cause-and-effect relationship because the data were collected retrospectively and based on current conditions.

Potential Bias in Questionnaire Answers and Observations

Some data is collected through interviews or direct measurements, such as weight and medical history. There is still potential for bias, such as pregnant women forgetting their medical history or providing answers they deem "correct" rather than their actual condition.

Variables Not Studied

This study only examined maternal age, weight (BMI), and gestational hypertension. Other factors that may influence gestational hypertension, such as physical activity or socioeconomic status, were not included in the study. This limits a comprehensive understanding of the factors contributing to gestational hypertension in pregnant women.

CONCLUSION

This study concluded that there was a significant relationship between the age of pregnant women in the second trimester and the incidence of gestational hypertension at the Ngembal Kulon Community Health Center, where mothers with risky ages (less than or equal to 20 years and more than or equal to 35 years) had a 28 times greater chance of experiencing blood pressure ≥140/90 mmHg compared to the safe age group (20-35 years), with a p value = 0.000 and OR = 28.00 (CI 95% 6.623-118.381). In addition, the weight of pregnant women who were classified as overweight-obese (BMI ≥25 kg/m²) was also significantly associated with gestational hypertension ($p = 0.000$; OR = 0.048; CI 95% 0.012-0.189), where 75% of cases occurred in this group compared to 12.5% in the normal category. This finding was reinforced by a study of 60 respondents, with a prevalence of gestational hypertension of 33.3%, confirming that age and BMI are the main risk factors.

However, the study has limitations such as its retrospective case-control design, which does not prove direct causality, uneven distribution of respondents' arrivals due to January weather, potential observation bias, and the lack of supporting variables such as physical activity or

socioeconomic status. Suggestions for further research include a multivariate prospective cohort study with a larger sample size and additional factors to explore causality. Practically, these results recommend routine age and BMI screening in ANC services at community health centers, education on ideal pregnancy planning, and nutritional interventions to reduce the risk of local maternal mortality.

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