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Medication Adherence and Lifestyle Modification in Pregnant Women with Hypertension

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ABSTRACT

Hypertension in pregnancy is a leading cause of maternal and fetal morbidity and mortality, contributing to 10% of global pregnancies and 412 maternal deaths in Indonesia in 2023. Proper management through medication and lifestyle changes is essential, but adherence remains low due to misinformation, fear of medication effects, and limited healthcare access. This study aimed to identify medication adherence and lifestyle modification in pregnant women with hypertension. A cross-sectional design was used with stratified random sampling. Data were collected through a validated questionnaire and analyzed descriptively. Results showed that 80.7% of respondents had high medication adherence and 77.2% had high lifestyle modifications. Significant association were found between parity (p=0.042), history of hypertension (p=0.01), and ANC frequency (p=0.008) with medication adherence. Similarly, lifestyle modification was significantly associated with parity (p=0.003), history of hypertension (p=0.000), and ANC frequency (p=0.001). Multivariate analysis showed that ANC frequency predicted medication adherence (p=0.028), while history of hypertension predicted lifestyle modification (p=0.035). In conclusion, most pregnant women demonstrated high adherence levels. However, continuous health education, counseling, and family support are essential to maintain optimal maternal outcomes and reduce the risks associated with hypertensive disorders during pregnancy.

INTRODUCTION

Maternal health during pregnancy is a critical determinant of both maternal well-being and fetal development. One of the prevalent health issues during pregnancy is hypertension. The incidence of hypertension among pregnant women in Indonesia is approximately 12.7% (Kemenkes RI, 2024). Hypertensive disorders in pregnancy are a leading cause of morbidity and mortality for mothers, fetuses, and newborns, affecting about 10% of pregnancies worldwide and posing substantial risks to both maternal and fetal health (Cífková, 2023).

In Indonesia, hypertensive disorders during pregnancy also represent a significant public health concern, contributing markedly to maternal and neonatal morbidity and mortality. According to the 2022 profile from the Ministry of Health of the Republic of Indonesia, hypertensive disorders were the leading cause of maternal mortality in the country, accounting for 801 reported deaths (Kemenkes RI, 2023). Similarly, the 2023 West Java Health Profile indicated that 23.61% of maternal deaths were attributed to hypertension in pregnancy, with Tasikmalaya City contributing 21% of all maternal deaths across cities and regencies in West Java (DinKes Provinsi Jawa Barat, 2023). This phenomenon underscores the urgent need for more intensive and integrated responses within regional and national health systems to address hypertensive disorders in pregnancy.

Effective management of hypertension in pregnant women involves not only pharmacological treatment but also comprehensive lifestyle modifications and adherence to prescribed medical therapies. Despite the availability of clear clinical guidelines and evidence supporting the effectiveness of these interventions, optimal management outcomes are often not achieved. This is primarily due to poor medication adherence and the inability of patients to implement or sustain necessary lifestyle changes (Burnier, 2024).

Medication adherence and lifestyle modifications are critical components in the management of hypertension during pregnancy, influencing the progression of the condition as well as the long-term health outcomes of both mother and child. In this context, medication adherence refers to the extent to which patients take their medications as prescribed by healthcare providers. Poor adherence to antihypertensive therapy has been associated with increased risks of complications such as preeclampsia, a condition that can result in severe or even fatal consequences for both mother and fetus (Wu, Green and Myers, 2023). Korte *et al.*, (2023), found that medication adherence among pregnant women with hypertension remains suboptimal, with only about 60% of subjects following their prescribed treatment plans. This highlights the importance of ongoing education and psychosocial support in improving medication adherence.

Lifestyle modification, including dietary changes, physical activity, and weight management, plays a pivotal role in controlling blood pressure levels and reducing the risk of complications during pregnancy (Horwitz, M., Brédy, G., & Tabani, 2023). These changes are recommended as part of a comprehensive approach to managing hypertension in

pregnant women (Blumenthal *et al.*, 2024). Research indicates that specific lifestyle interventions, particularly reducing salt intake and increasing physical activity, are effective in lowering blood pressure and improving pregnancy outcomes (Taher *et al.*, 2021). Amoah *et al.*, (2020), reported that lifestyle interventions, including low-sodium diets and regular exercise routines, can significantly reduce the need for antihypertensive medication among pregnant women. These findings suggest that lifestyle modification is not merely supplementary but may serve as a critical component of hypertension management.

Several factors influence medication adherence among pregnant women with hypertension, ranging from individual beliefs about medication and personal health behaviors to broader social, cultural, and healthcare system-related factors. Additionally, pregnant women may face unique challenges such as nausea, fatigue, and concerns about the safety of medications and physical activity for fetal health (Israfil, Yusuf and Efendi, 2024). Key barriers to adherence include inadequate information, negative perceptions of medication side effects, and difficulties in accessing adequate healthcare services. These findings underscore the need for more effective communication strategies and improved access to inclusive healthcare services. Support and education provided by nurses can play a vital role in enhancing medication adherence and lifestyle modification. This study found that empathetic approaches and clear information delivered by nursing professionals significantly improved patient adherence (Ruswati, 2024). The objective of the study was to identify medication adherence and lifestyle modification among pregnant women with hypertension.

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METHOD

This study employed a cross-sectional design to measure the prevalence of medication adherence and the level of lifestyle modification among pregnant women with hypertension. The study population was determined based on data from the Cibeureum Public Health Center in Tasikmalaya City in December 2024, which reported a total of 67 pregnant women with hypertension. A stratified random sampling technique was used, resulting in a sample of 57 participants, consisting of 23 women in the second trimester and 34 women in the third trimester of pregnancy.

The research instrument was a questionnaire that had been previously tested for validity and reliability. The questionnaire considered valid (the calculated r-value is greater than the table r-value) and reliable with Cronbach's alpha values of 0.785 for medication adherence and 0.816 for lifestyle modification. Data analysis was conducted using descriptive statistics, including univariate, bivariate (Chi-square), and multivariate analyses (logistic regression). Data analysis was performed using SPSS for Windows version 22.

RESULTS AND DISCUSSION

In this study, respondent characteristics included maternal age, gestational age, parity, history of hypertension in previous pregnancies, frequency of antenatal care (ANC) visits. The maternal age ranged from

a minimum of 25 years to a maximum of 36 years, with a mean age of 30 years. A detailed overview of the other respondent characteristics is presented in the table below.

Table 1. Characteristics of Respondents (n=57)

Characteristics	f	%
Age		
- 19-24 y.o	3	5.3
- 25-30 y.o	27	47.4
- > 30 y.o	27	47.4
Gestational Age		
- Trimester 2 (13-24 wk)	23	40.4
- Trimester 3 (35 wk – near term)	34	59.6
Parity		
- Primiparous	3	5.3
- Multiparous	54	94,7
History of hypertension in a previous pregnancy		
- No	12	21.1
- Yes	45	78.9
Number of antenatal visits in the current trimester		
- 1 time/month	5	8.8
- 2 times /month	43	75.4
- 3 times/month	9	15.8

The table above shows that the majority of respondents were within the age range of 25–30 years (47.4%) and over 30 years (47.4%), while only 5.3% were between 19–24 years of age. These findings are consistent with the study by Kumar et al. (2023), which reported that hypertension in pregnancy is more common among women aged ≥25 years compared to younger age groups. This is attributed to age-related physiological changes and reduced vascular elasticity, which contribute to increased blood pressure.

Most respondents were in the third trimester of pregnancy (59.6%), indicating that hypertensive disorders of pregnancy are more frequently diagnosed or tend to worsen in the later stages of gestation. This aligns with findings from (Brown *et al.*, 2018), who reported that gestational hypertension often manifests after 20 weeks of gestation.

In addition, the majority of respondents were multiparous (94.7%). This supports the findings of Kalafat *et al.*, (2020), who identified multiparity as a risk factor for hypertension in pregnancy, likely due to the cumulative cardiovascular burden associated with repeated pregnancies. Furthermore, 78.9% of participants had a history of hypertension in a previous pregnancy. This is consistent with Tyrmi *et al.*, (2023), who highlighted that a previous history of hypertensive disorders in pregnancy is a strong predictor for recurrence in subsequent pregnancies. Study found that the high percentage (75.4%) of women attending ANC twice monthly reflects strong adherence to both national and international antenatal care guidelines. WHO (2016), recommended standard of at least 8 ANC visits during pregnancy while Indonesia's Ministry of Health recommends a schedule of at least six ANC visits during pregnancy: once in the first trimester, twice in the second trimester, and three times in the third trimester (Kementrian Kesehatan RI, 2021).

Table 2. Levels of Medication Adherence and Lifestyle Modification

Levels of Medication Adherence and Lifestyle Modification	f	%
Levels of Medication Adherence		
- Low	3	5.3
- Medium	8	14.0
- High	46	80.7
Levels of Lifestyle Modification		
- Low	4	7.0
- Medium	9	15.8
- High	44	77.2

The results of the study indicated that 80.7% of respondents exhibited a high level of adherence to antihypertensive medication, while 14% demonstrated moderate adherence, and 5.3% showed low adherence. This high adherence rate may be influenced by maternal awareness of the risks associated with hypertension during pregnancy and the education provided by healthcare professionals. However, a portion of pregnant women still demonstrated non-adherence, which may be attributed to side effects of the medication, fear of potential harm to the fetus, and a lack of understanding regarding the importance of treatment. A study by de Korte *et al.*, (2023), reported that only about 60% of pregnant women fully adhered to their antihypertensive therapy, with the primary reason being uncertainty regarding the safety of the medications.

The findings also revealed that 77.2% of participants had a high level of adherence to lifestyle modifications, 15.8% had a moderate level, and 7% had a low level of adherence. Lifestyle modifications, including a low-sodium diet, regular physical activity, and weight management, are integral components in the control of hypertension during pregnancy (Blumenthal *et al.*, 2024). Nevertheless, despite the majority of women reporting high adherence, a subset remained non-adherent, which may be influenced by limited access to information, lack of social support, and the perception that lifestyle changes are difficult to implement during pregnancy (Amoah *et al.*, 2020).

The relationship between levels of medication adherence and lifestyle modification and the characteristics of the respondents is presented in the statistical analysis table below.

Table 3. Medication Adherence Levels Based on Respondent Characteristics

Characteristics	Medication Adherence Levels			P-value
	Low	Medium	High	
Age				0.489
- 19-24 y.o	0	0	3	
- 25-30 y.o	2	2	23	
- > 30 y.o	1	6	20	
Gestational Age				0.632
- Trimester 2 (13-24 wk)	2	3	18	
- Trimester 3 (35 wk – near term)	1	5	28	
Parity				
- Primiparous	0	0	3	0.042
- Multiparous	3	8	43	
History of hypertension in a previous pregnancy				
- No	1	1	10	0.01
- Yes	2	7	36	
Number of antenatal visits in the current trimester				
- 1 time/month	2	0	3	0.008
- 2 times /month	1	7	35	
- 3 times/month	0	1	8	

Bivariate analysis revealed a significant association between parity (p = 0.042), history of hypertension in a previous pregnancy (p = 0.01), and frequency of antenatal care (ANC) visits (p = 0.008) with medication adherence. The findings indicated that multiparous women exhibited higher levels of adherence compared to primiparous women. Greenwood, D. C., (2022), noted that multiparous mothers tend to have greater experience in managing pregnancy-related risks, making them more likely to comply with prescribed antihypertensive therapy. Furthermore, women with a history of hypertension in a previous pregnancy demonstrated higher adherence levels, likely due to prior experience in dealing with hypertensive complications during pregnancy (Cífková, 2023). Increased frequency of ANC visits was also associated with higher medication adherence, as more frequent contact with healthcare providers enhances education, support, and monitoring (Garcia *et al.*, 2023).

Table 4. Lifestyle Modification Levels Based on Respondent Characteristics

Characteristics	Lifestyle Modification Levels			*P-value*
	Low	Medium	High	
Age				
- 19-24 y.o	0	1	2	0.637
- 25-30 y.o	3	4	20	
- > 30 y.o	1	10	16	
Gestational Age				
- Trimester 2 (13-24 wk)	2	4	13	0.644
- Trimester 3 (35 wk – near term)	2	11	25	
Parity				
- Primiparous	0	1	2	0.003
- Multiparous	4	14	36	
History of hypertension in a previous pregnancy				
- No	2	5	10	0.000
- Yes	2	10	28	
Number of antenatal visits in the current trimester				
- 1 time/month	2	2	11	0.001
- 2 times /month	2	10	21	
- 3 times/month	0	3	6	

Bivariate analysis demonstrated a significant association between parity (p = 0.003), history of hypertension in a previous pregnancy (p = 0.000), and frequency of antenatal care (ANC) visits (p = 0.001) with lifestyle modification. Multiparous women exhibited higher adherence to lifestyle changes compared to primiparous women. Herzog-Petropaki, Derksen and Lippke (2022), reported that previous pregnancy experience enhances awareness of the importance of maintaining a healthy lifestyle. Women with a history of hypertension were more likely to adopt

lifestyle changes, such as a low-sodium diet and regular physical activity, due to prior exposure to the adverse effects of hypertension (Burnier, 2024). Increased frequency of ANC visits was also associated with a greater likelihood of following recommended lifestyle modifications. A study by Aremu *et al.*, (2022), found that regular education provided by healthcare professionals significantly contributes to positive behavioral changes.

Table 5. Results of the Multivariate Analysis of Factors Associated with Medication Adherence

Variable	p-value
History of hypertension in a previous pregnancy	0.430
Number of antenatal visits in the current trimester	0.028

The results of the regression analysis indicated that only the frequency of antenatal care (ANC) visits was significantly associated with medication adherence (p = 0.028). This finding underscores the importance of regular ANC visits in enabling pregnant women to receive more comprehensive education regarding the importance of antihypertensive therapy. Similarly, a study by Blumenthal *et al.*, (2024), reported that women who attended ANC more than twice per month demonstrated higher levels of medication adherence.

Table 6 Results of the Multivariate Analysis of Factors Associated with Lifestyle Modification

Variable	p-value
Parity	0.506
History of hypertension in a previous pregnancy	0.035
Number of antenatal visits in the current trimester	0.698

The regression analysis revealed that a history of hypertension in a previous pregnancy was significantly associated with adherence to lifestyle modification (p = 0.035). Women who had previously experienced hypertensive disorders during pregnancy tended to be more aware of the adverse consequences of an unhealthy lifestyle and were more likely to follow medical recommendations (Horwitz, M., Brédy, G., & Tabani, 2023). However, parity (p = 0.506) and frequency of antenatal care visits (p = 0.698) were not significantly associated with lifestyle modification adherence in the regression model. This suggests that other factors, such as social support and socioeconomic conditions, may play a more substantial role in influencing lifestyle behavior changes.

CONCLUSIONS

Based on the study findings, the levels of medication adherence and lifestyle modification among pregnant women with hypertension were relatively high, though variability was observed. The most influential factor associated with medication adherence was the frequency of antenatal care (ANC) visits, while adherence to lifestyle modification was more strongly influenced by a history of hypertension in a previous pregnancy.

RECOMMENDATIONS

Further efforts are necessary to enhance adherence through more intensive education, family support, and strengthening of healthcare systems. The integration of health technologies, such as blood pressure monitoring applications, may also serve as a promising strategy to

improve adherence among pregnant women with hypertension.

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