

ORIGINAL ARTICLE

Key Factors Influencing Anxiety in Pregnant Women With Hypertension: Insights for Maternal Health Interventions

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ABSTRACT

Introduction: Hypertensive disorders in pregnancy are a leading cause of maternal and perinatal morbidity and mortality, affecting approximately 10% of pregnancies. Anxiety frequently coexists with hypertension, intensifying risks to maternal and fetal health. However, evidence on factors influencing anxiety in hypertensive pregnancies, particularly in low-resource settings, remains limited. This study aimed to identify psychosocial, demographic, and obstetric factors associated with anxiety among hypertensive pregnant women. **Materials and Methods:** This cross-sectional study involved 135 hypertensive pregnant women in Kudus Regency, Indonesia. Anxiety levels were assessed using the Hamilton Rating Scale for Anxiety (HRS-A), and data on psychosocial, demographic, and obstetric factors were collected using validated questionnaires. Logistic regression was used to estimate the odds of experiencing moderate anxiety based on psychosocial and demographic characteristic. **Results:** The majority of participants were aged 20–35 years (86.7%), had low education levels (81.5%), and were employed (79.3%). Most respondents reported moderate anxiety (72.6%), while 27.4% experienced mild anxiety. Good knowledge (OR = 0.35; $p = 0.048$), positive attitudes (OR = 0.15; $p = 0.001$), good behaviors (OR = 0.28; $p = 0.023$), and higher education levels (OR = 0.29; $p = 0.048$) significantly reduced the likelihood of moderate anxiety. However, factors such as age, marital status, spousal support, midwife support, and a history of hypertension were not significantly associated with anxiety. **Conclusion:** Knowledge, attitudes, behaviors, and education levels were significantly associated with anxiety among hypertensive pregnant women. These findings highlight the importance of health education-based interventions to address maternal anxiety. Further longitudinal research is recommended to establish causal relationships and explore sociocultural factors influencing anxiety.

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INTRODUCTION

Hypertensive disorders in pregnancy are a significant global health challenge, affecting around 10% of pregnancies (1). These conditions, which include chronic hypertension, gestational hypertension, and preeclampsia, are leading causes of illness and death for both mothers and babies. The risks are particularly high in low-resource settings, where healthcare services may be limited, and access to timely diagnosis and effective management is often a challenge (2). Beyond the physical health risks, hypertension during pregnancy is closely linked to psychological distress, particularly

anxiety, which can worsen outcomes for both the mother and her child.

Anxiety during pregnancy is commonly triggered by fears of complications, uncertainty about pregnancy outcomes, and the stress of managing a high-risk condition (3). This anxiety does not only impact mental well-being but can also lead to poor health behaviors, such as inconsistent medication use, unhealthy dietary habits, and reduced physical activity. Over time, chronic anxiety may activate stress responses, such as elevated cortisol levels, which can cross the placenta and negatively affect the baby's development (4). The interplay between hypertension and anxiety creates a harmful cycle, where each condition amplifies the other, increasing risks for both mother and baby.

Several psychosocial and demographic factors

contribute to anxiety in pregnant women. Studies have shown that limited knowledge about their condition, negative attitudes toward treatment, and poor health-related behaviors are all significant predictors of anxiety (5). Support systems, including partners, midwives, and community networks, can play a critical role in reducing anxiety, though the extent of their influence varies across different populations (6). Demographic factors, such as education level, age, and number of pregnancies, also play a role, highlighting the complex and multifaceted nature of maternal anxiety.

In low-resource settings like Indonesia, these challenges are even more pronounced. Limited access to structured health education programs and psychosocial support often leaves pregnant women with hypertension feeling isolated and vulnerable. While research on maternal anxiety in Indonesia exists, it tends to focus on general populations, leaving a gap in understanding the specific experiences of women with hypertensive pregnancies (7). This lack of targeted data makes it difficult to design effective interventions tailored to their unique needs.

This study aims to address these gaps by exploring the psychosocial, demographic, and obstetric factors that contribute to anxiety among hypertensive pregnant women in Kudus Regency, Indonesia. By shedding light on these factors, this research seeks to provide valuable insights that can inform strategies to reduce anxiety and improve outcomes for both mothers and their babies.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study was conducted in Kudus Regency, Central Java, Indonesia, between January and February 2024. Participants were recruited from 19 health centers that provide antenatal care services to both urban and rural populations. The study focused on hypertensive pregnant women receiving antenatal care.

Participants

Inclusion Criteria

1. Pregnant women diagnosed with gestational hypertension.
2. Mild to moderate anxiety levels, as assessed by the Hamilton Rating Scale for Anxiety (HRS-A).
3. Attendance at least one antenatal care appointment.
4. Residency in Kudus Regency.

Exclusion Criteria

1. Diagnosed with severe hypertension, preeclampsia, or eclampsia.
2. Experiencing emergency medical conditions during the study period.
3. Failure to complete the study questionnaire.

A total of 135 participants were selected using proportional random sampling. The sample size was

determined using Hair's formula, which considers the number of indicators and latent variables: $(\text{Indicators} + \text{Latent Variables})^4 = 135$. The sample size was calculated using Hair's formula, based on observed indicators representing key psychosocial constructs (knowledge, attitudes, behaviors, spousal and midwife support). These indicators were derived from literature and refined through expert validation by three maternal health specialists

Variables and Measurements

Independent Variables

1. Sociodemographic factors: Age, education, occupation, and marital status.
2. Psychosocial factors: Knowledge, attitudes, behaviors, spousal support, and midwife support.
3. Obstetric history: Gravida status and history of hypertension.

Dependent Variable

Anxiety was measured using the Hamilton Rating Scale for Anxiety (HRS-A), a validated and widely used tool in clinical research. Anxiety levels were classified into mild and moderate categories.

Psychosocial Assessments

Knowledge, attitudes, and behaviors were evaluated using structured questionnaires adapted from prior research to suit the local context. Knowledge was assessed through multiple-choice questions, while attitudes and behaviors were measured using Likert-scale items.

The development of the questionnaire followed a two-stage process. First, a qualitative exploratory phase was conducted to identify relevant psychosocial constructs and develop contextually appropriate items. Interviews were held with key informants (hypertensive pregnant women with mild to moderate anxiety) and supporting informants (midwives, the Head of the Puskesmas, and a representative from the District Health Office in Kudus). Their input informed the clarity, cultural appropriateness, and structure of the instrument. Subsequently, a separate validity and reliability test was conducted in Rembang District with 30 pregnant women who shared similar demographic characteristics. Item-total correlations were used for validity testing, and Cronbach's alpha values for all subscales exceeded 0.7, confirming acceptable internal consistency."

Data Collection

Data were gathered through face-to-face interviews conducted by trained enumerators. Enumerators participated in a one-day training session to ensure consistency in questionnaire administration. A pilot test was conducted with 10 participants before the study began to refine the questionnaires and data collection procedures.

Statistical Analysis

Univariate analysis summarized participant characteristics using descriptive statistics with frequency distributions for categorical variables, bivariate analysis employed Wald tests to assess associations between independent variables and anxiety levels, and Logistic regression was used in multivariate analysis to assess associations between explanatory variables and anxiety, with results expressed as odds ratios (OR). Data were analyzed using SPSS software (version 22).

Ethical Consideration

This study was approved by the Research Ethics Committee, Faculty of Medicine, Universitas Sebelas Maret, with approval number 132/UN27.06.11/KEP/EC/2023. Written informed consent was obtained from all participants before data collection. Confidentiality was maintained throughout the study, and participation was entirely voluntary.

To maintain confidentiality, participants were assigned unique codes and all data were anonymized. Interviews were conducted in private rooms at the health facilities. Participation was voluntary, and respondents were informed they could withdraw at any time without consequences. Emotional safety was prioritized, and participants showing distress were referred to a midwife or counselor.

RESULTS

In this section, we present the findings of our study to address the psychosocial, demographic, and obstetric factors that contribute to anxiety among hypertensive pregnant women in Kudus Regency, Indonesia. To provide a comprehensive understanding, the results are organized into four main parts. First, we describe the distribution of sociodemographic and behavioral factors among different groups of participants. Next, we explore the correlation between these factors and anxiety levels, highlighting which elements significantly influence maternal anxiety. Following this, we present the logistic regression analysis to examine factors associated with

anxiety levels and their corresponding odds ratios, offering insights into the strength of these relationships. By exploring these aspects, we aim to shed light on the various factors that contribute to maternal anxiety in this population. This information is intended to support the development of targeted strategies to reduce anxiety and improve the health outcomes of both mothers and their babies. The following sections provide a detailed explanation of the findings, highlighting the relationships and patterns observed in the data.

Distribution of Sociodemographic and Behavioral Factors by Groups

The initial findings provide a demographic overview of the participants, highlighting key sociodemographic and behavioral patterns. This includes age, education, employment, marital status, obstetric history, and levels of psychosocial support, providing a descriptive overview of these factors among participants.

Table 1 provides a detailed visual representation of the participant characteristics, highlighting that the majority were aged 20–35 years (86.7%), had low education levels (81.5%), and were employed (79.3%). A significant proportion reported good marital conditions (97%), were multigravida (82.2%), and had no history of pregnancy hypertension (94.1%). However, several factors indicated areas of concern: 50.4% of respondents had good knowledge, while 49.6% had poor knowledge, 51.1% displayed positive attitudes, and 48.9% showed negative attitudes, and 49.6% demonstrated good behavior, while 50.4% exhibited poor behavior. In terms of support, 50.4% reported good support from husbands, while 49.6% experienced poor support, and 50.4% reported good midwife support, while 49.6% experienced poor support. Finally, anxiety levels were predominantly moderate (72.6%), with only 27.4% experiencing mild anxiety. These findings underscore the importance of addressing educational, behavioral, and support-related factors to improve maternal outcomes. This section outlines the characteristics of participants based on sociodemographic and behavioral factors, providing insights into group differences and patterns.

Table 1: Frequency Distribution of Respondents Based on Their Characteristics

Variable	F	%
Age		
< 20 years and > 35 years	18	13,3
20-35 years	117	86,7
Education Level		
Low ($\leq$ High School)	110	81,5
High ($>$ High School)	25	18,5
Employment		
Unemployed	28	20,7
Employed	107	79,3
Marital Status		
Good	131	97
Poor	4	3
Gravida		
Primigravida	24	17,8
Multigravida	111	82,2
History of Pregnancy-Induced Hypertension		
Yes	8	5,9
No	127	94,1
Knowledge		
Good	68	50,4
Poor	67	49,6
Attitude		
Positive	69	51,1
Negative	66	48,9
Behavior		
Good	67	49,6
Poor	68	50,4
Husband's Support		
Good	68	50,4
Poor	67	49,6
Midwife's Support		
Good	68	50,4
Poor	67	49,6
Anxiety		
Mild	37	27,4
Moderate	98	72,6

highlights the critical roles of knowledge, attitude, behavior, and education level in shaping anxiety outcomes, while other variables such as support systems and demographic factors did not show significant associations.

The findings presented in Table 2 illustrate the significant relationships between psychosocial, demographic, and obstetric factors and their impact on anxiety levels among hypertensive pregnant women. Knowledge, attitude, behavior, and education level emerged as critical elements influencing anxiety, demonstrating distinct patterns of association. Knowledge emerged as a critical factor, participants with good knowledge exhibited a slightly lower prevalence of moderate anxiety (34.8%) compared to those with poor knowledge (37.8%) (Wald = 3.905, $p = 0.048^*$). Attitude also played a significant role; women with a positive attitude were less likely to experience moderate anxiety (30.4%) compared to those with a negative attitude (42.2%) (Wald = 11.285, $p = 0.001^*$). Behavior was another influential factor, with participants demonstrating good behavior exhibited a lower prevalence of moderate anxiety (29.6%) compared to those with poor behavior (43.0%) (Wald = 5.134, $p = 0.023^*$). Education level further highlighted significant differences, as participants with education beyond high school reported much lower rates of moderate anxiety (8.1%) compared to those with lower education levels (64.4%) ($\chi^2 = 7.412$, $p = 0.006$). On the other hand, variables such as husband support ($p = 0.152$), midwife support ($p = 0.155$), age, occupation, marital status, gravida, and history of hypertension were not significantly associated with anxiety levels in this study.

Correlation of Factors Influencing Anxiety Levels

This section explores the relationships between various factors and anxiety levels among hypertensive pregnant women, focusing on identifying which elements significantly influence maternal anxiety. The analysis

Table II: Relationship Between Factors Influencing Anxiety in Pregnant Women with Hypertension

Variable	Anxiety Level						Wald Test	P-Value
	Mild		Moderate		Total			
	F	%	F	%	F	%		
Knowledge								
Good	21	15,5	47	34,8	68	100	3,905	0,048*
Poor	16	11,9	51	37,8	67	100		
Attitude								
Positive	28	20,7	41	30,4	69	100	11,285	0,001*
Negative	9	6,7	57	42,2	66	100		
Behavior								
Good	27	20	40	29,6	67	100	5,134	0,023*
Poor	10	7,4	58	43	68	100		
Husband's Support								
Good	17	12,6	51	37,8	68	100	0,147	0,702
Poor	20	14,8	47	34,8	67	100		
Midwife's Support								
Good	27	20	41	30,4	68	100	2,731	0,098
Poor	10	7,4	57	42,2	67	100		
Age								
< 20 years or > 35	0	0	18	13,3	18	100	<0.001	0,998
20–35 years	37	27,4	80	59,3	117	100		
Education Level								
Low (≤ High School)	23	17	87	64,4	110	100	3,92	0,048*
High (> High School)	14	10,4	11	8,1	25	100		
Employment								
Unemployed	14	10,4	14	10,4	28	100	0,211	0,646
Employed	23	17	84	62,2	107	100		
Marital Status								
Good	37	27,4	94	69,6	131	100	<0.001	0,999
Poor	0	0	4	3	4	100		
Gravida								
Primigravida	4	3	20	14,8	24	100	1,119	0,29
Multigravida	33	24,4	78	57,8	111	100		
History of Pregnancy-Induced Hypertension								
Yes	4	3	4	3	8	100	1,084	0,298
No	33	24,4	94	69,6	127	100		

Factors Associated with Anxiety Levels and Their Odds Ratios

To identify and evaluate key factors influencing anxiety levels among hypertensive pregnant women, a logistic regression analysis was conducted. This analysis highlighted significant factors associated with maternal anxiety and their respective odds ratios, providing insight into the strength and direction of these associations.

The model demonstrated a good fit, as indicated by the Hosmer and Lemeshow goodness-of-fit test ($\chi^2 = 6.292$, $p = 0.506$), showing no significant difference between the model and observed data. The -2 Log Likelihood value dropped significantly from 158.563 to 74.796,

while Nagelkerke's R^2 value of 0.669 indicated that the model explained 66.9% of the variation in anxiety levels.

The detailed results for each variable associated with anxiety are presented in Table 3. These include regression coefficients (B), standard errors (SE), p-values, and odds ratios (OR). Significant factors associated with maternal anxiety, as identified by their p-values, highlight areas that warrant further attention in designing supportive interventions. Odds Ratios (OR) were calculated using the formula $OR = e^B$, where B is the regression coefficient. An OR less than 1 indicates that the variable reduces the likelihood of moderate anxiety.

Table III: Logistic Regression Results: Factors Associated with Anxiety Levels and Their Odds Ratios

Variable	B	SE	p-value	OR	Explanation
Knowledge	-1,064	0,539	0,048	0,345073	Higher knowledge reduces anxiety by 65.5%.
Attitude	-1,893	0,564	0,001	0,150619	Higher attitude reduces anxiety by 84.9%.
Behavior	-1,262	0,557	0,023	0,283087	Higher behavior reduces anxiety by 71.7%.
Education Level	-1,255	0,634	0,048	0,285076	Higher education level reduces anxiety by 71.5%.

Analyzed using Logistic Regression in SPSS Software

Odds Ratios (OR) were calculated as the exponentiated values of logistic regression coefficients ($OR = \exp(B)$).

*Statistically significant at $p=0.05$

These findings indicate that better knowledge, attitudes, behaviors, and education levels are associated with significantly lower odds of moderate anxiety. The logistic regression analysis highlights the probability changes in moderate anxiety associated with each explanatory variable. Knowledge (X1) showed a significant effect, with an OR of 0.35 ($p = 0.048$). This indicates that women with higher knowledge are 65% less likely to experience moderate anxiety compared to those with lower knowledge levels. Similarly, Attitude (X2) had an OR of 0.15 ($p = 0.001$), meaning that women with positive attitudes are 85% less likely to experience moderate anxiety. For Behavior (X3), an OR of 0.28 ($p = 0.023$) reflects that those with better behaviors have a 72% lower chance of moderate anxiety. Lastly, Education Level (X7), with an OR of 0.29 ($p = 0.048$), suggests that women with higher education levels are 71% less likely to develop moderate anxiety compared to those with lower education. Each Odds Ratio below 1 signifies a reduction in the likelihood of moderate anxiety, in women with these characteristics. These associations suggest that women with better knowledge, attitudes, behaviors, and education levels tend to report lower anxiety.

DISCUSSION

The study revealed that knowledge, attitude, behavior, and education level were significantly associated with anxiety levels among hypertensive pregnant women. In contrast, demographic factors such as age, gravida, and spousal or midwife support did not show significant associations. These findings provide a contextual basis for interpretation and comparison with existing literature. Knowledge showed a significant effect, with an OR of 0.35 ($p = 0.048$). This indicates that women with higher knowledge are 65% less likely to experience moderate anxiety compared to those with lower knowledge levels. This suggests that other factors, such as attitude and behavior, may play a more significant role in moderating anxiety. This finding is consistent with research who demonstrated that low health literacy significantly contributes to increased maternal anxiety (8). Women with poor understanding of their condition may experience heightened uncertainty about complications and treatment, leading to increased anxiety. Similarly, another research found that higher health literacy in pregnant women reduced their

anxiety levels, as knowledge equips women with the confidence to make informed decisions and adhere to recommended health practices (9).

Behavior and attitude were also significantly associated with moderate anxiety significant predictors in this study. Positive attitudes had an OR of 0.15 ($p = 0.001$), meaning that women with positive attitudes are 85% less likely to experience moderate anxiety compared to those with negative attitudes. Good behavior was associated with a lower prevalence of moderate anxiety, with an OR of 0.28 ($p = 0.023$). This indicates that women with good behavior have a 72% lower likelihood of experiencing moderate anxiety. These findings align with the previous study who highlighted the impact of health education in fostering better attitudes and behaviors, resulting in decreased maternal anxiety (10). However, knowledge and attitudes alone did not reduce anxiety levels significantly when mothers faced barriers such as inadequate healthcare access (11). This underscores the importance of addressing structural barriers alongside behavioral interventions.

Education level also emerged as a key determinant of anxiety. Education Level had an OR of 0.29 ($p = 0.048$), meaning that women with higher education levels are 71% less likely to experience moderate anxiety compared to those with lower education levels. This finding aligns with previous studies, where educational attainment positively influenced maternal mental health by improving coping mechanisms and promoting better health-seeking behavior (10,12,13). However, in socioeconomically constrained settings, education alone may not suffice without corresponding improvements in healthcare accessibility and social support.

While most respondents were aged 20–35 years (86.7%), reported good marital conditions (97%), and were multigravida (82.2%), these demographic factors were not significantly associated with anxiety levels in this study. This highlights the potential buffering effects of sociocultural support systems in Kudus Regency. These findings diverge from previous studies, where age and gravida were linked to maternal anxiety (14,15). A possible explanation for this disparity may lie in the sociocultural context of Kudus Regency, where traditional familial support systems could buffer the impact of these demographic factors. Spousal and

midwife support showed nearly equal distribution (50.4% good vs. 49.6% poor), which may explain why their association with anxiety levels was non-significant in this study (16,17), suggesting that these supports may be implicit in Kudus Regency's communal structures and thus perceived differently.

A major strength of this study is its focus on hypertensive pregnant women in a low-resource setting, a population often underrepresented in research. The use of validated tools, such as the Hamilton Rating Scale for Anxiety (HRS-A), enhances the reliability of the findings. Furthermore, the study contributes valuable data to the limited body of knowledge on maternal mental health in Southeast Asia.

Nevertheless, several limitations warrant consideration. The cross-sectional design restricts causal inference, making it difficult to determine whether poor knowledge and negative attitudes are causes or consequences of anxiety. Future longitudinal studies could address this gap. Self-reported measures may also introduce bias, particularly in assessing attitudes and behaviors, as participants might provide socially desirable responses. Lastly, the regional scope of the study may limit the generalizability of findings to other populations with differing sociocultural dynamics.

The findings underscore the critical need for targeted health education programs to improve knowledge, attitudes, and behaviors among hypertensive pregnant women. Educational interventions, have successfully reduced maternal anxiety by bridging knowledge gaps and encouraging positive behavioral changes (18,19). Integrating routine anxiety screenings into antenatal care could facilitate early detection and intervention, particularly for women at higher risk due to poor knowledge or education. Policymakers should also prioritize equitable access to healthcare and develop culturally tailored programs to address anxiety in low-resource settings like Kudus Regency.

Based on these findings, we recommend the implementation of structured midwife-led antenatal classes and mobile health (mHealth) tools designed to improve health literacy and reduce anxiety among hypertensive pregnant women. Future interventions should also consider engaging local stakeholders such as midwives, community health workers, religious leaders, and trained traditional birth attendants to enhance cultural acceptability and sustainability.

Future studies should adopt longitudinal designs to establish causality and examine how changes in psychosocial and educational factors over time influence anxiety levels. Expanding research to diverse populations and incorporating qualitative methods could provide deeper insights into the sociocultural factors affecting maternal anxiety. Additionally, refining

predictive models to include variables such as social stigma, community support systems, and individual coping mechanisms would enhance their applicability in clinical practice.

CONCLUSION

This study effectively investigated the psychosocial, demographic, and obstetric factors contributing to anxiety among hypertensive pregnant women in Kudus Regency, Indonesia. The findings identified knowledge, attitude, behavior, and education level as significant factors associated with maternal anxiety, underscoring the relevance of targeted health education and behavioral interventions to address this issue. While demographic factors such as age, marital status, and occupation showed no significant associations, the study underscores the critical need for equitable access to healthcare and culturally tailored support systems. These insights address existing knowledge gaps and provide a foundation for developing strategies to improve maternal mental health outcomes in low-resource settings. We encourage local health planners to adopt structured education programs, such as group antenatal sessions led by midwives and culturally tailored mHealth tools, to support women with low health literacy and reduce anxiety. In parallel, we urge local health authorities to pilot and scale up targeted educational and behavioral interventions for pregnant women with heightened anxiety, supported by longitudinal research to assess long-term effectiveness and inform future policy adaptations.

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