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Effectiveness of Health Education on the Knowledge and Attitudes of Pregnant Women in the Prevention of Preeclampsia: Scoping Review

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ABSTRACT

Background: Preeclampsia remains one of the leading causes of high maternal morbidity and mortality rates globally. This scoping review aims to identify and map scientific evidence on the effect of health education on pregnant women's knowledge and attitudes regarding preeclampsia, particularly in increasing knowledge, changing positive attitudes, and efforts during pregnancy.
Method: This study used a scoping review design with reference to the Arksey and O'Malley framework as a guideline for conducting a scoping review. Literature searches were conducted through the PubMed, ScienceDirect, Wiley, and Google Scholar databases. The articles included were publications from 2016 to 2025 that discussed health education and the knowledge and attitudes of pregnant women regarding the prevention of preeclampsia. The article selection process followed the PRISMA-ScR guidelines. Data were extracted and mapped based on the research objectives, study design, respondent characteristics, type of health education, and main findings.
Result: Ten articles were included. A total of 80% of studies reported low baseline knowledge and attitudes toward preeclampsia among pregnant women. All studies (80%) showed an increase in knowledge following health education interventions (counseling, group education, leaflets,audiovisual media). Approximatelely 70% of studies reported improvements in attitudes, and 60% showed positive changes in preventive behaviors.
Conclusion: Health education is an effective and consistent intervention in improving pregnant women's knowledge and attitudes towards preeclampsia prevention. Its implementation must be standardized and integrated into antenatal care through structured and innovative media-based approaches, with an emphasis on not only knowledge improvement but also sustained behavioral change.

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INTRODUCTION

Pregnancy is a critical phase in a woman's life that involves complex physiological changes requiring careful monitoring and appropriate care. During this period, the maternal body undergoes significant adaptations to support fetal growth and development. However, pregnancy can also be accompanied by serious complications, one of the most concerning being preeclampsia. Preeclampsia is a pregnancy-specific disorder characterized by new-onset hypertension after 20 weeks of gestation, accompanied by proteinuria or evidence of organ dysfunction (Balayla & Tulandi, 2019) Hypertensive disorders of pregnancy, including preeclampsia, affect approximately 2-8% of pregnancies worldwide and remain a leading cause of maternal and perinatal morbidity and mortality. Furthermore, preeclampsia contributes significantly to maternal deaths globally, particularly in low and middle-income countries.

Despite its serious impact, the prevention and early detection of preeclampsia are still not optimal. One of the contributing factors is the limited knowledge and inadequate attitudes of pregnant women regarding the signs, risks, and prevention of preeclampsia. Several studies have shown that many pregnant women have insufficient knowledge about preeclampsia, which affects their ability to recognize early symptoms and seek timely care (Ayu, 2024; Mekie et al., 2021). Knowledge and attitudes play a crucial role in prevention efforts. Women who understand the risk and early signs of preeclampsia are more likely to attend routine antenatal care, recognize danger signs, and follow recommended preventive behaviors. However, evidence shows that many pregnant women still do not know what preeclampsia is or how it occurs, with factors such as education level and frequency of antenatal visits influencing this gap (Mekie et al., 2021).

Effort to address preeclampsia, various health education interventions have been developed and implemented within antenatal care. Previous studies demonstrate that educational programs can significantly improve pregnant women's knowledge and awareness, particularly when delivered through innovative approaches such as audiovisual media. Video-based education, for instance, has been shown to enhance not only knowledge but also attitudes and self-efficacy in preventing preeclampsia (Alnuaimi et al., 2020; Fondjo et al., 2019; Sarabi et al., 2024). However, the existing body of evidence remains fragmented and conceptually limited. Most studies focus on preeclampsia from a clinical perspective, emphasizing incidence, risk factors, and outcome, while the role of health education as a preventive strategy is less systematically explored. Moreover, available studies tend to assess knowledge and attitudes separately, without examining their combined influence as key determinants of preventive behavior.

Importantly, although several reviews on maternal health education have been published, none have comprehensively synthesized the types of educational interventions, modes of delivery (particularly audiovisual media), and their simultaneous effects on both knowledge and attitudes in the context of preeclampsia prevention. As a result, there is a lack of structured and integrative evidence to guide the design of effective, evidence-based educational interventions (Anjelika, 2025a; Mekie et al., 2021; Sarabi et al., 2024). Therefore, this scoping review addresses this critical gap by systematically mapping and synthesizing the available evidence in health education interventions for preeclampsia prevention, with a specific emphasis on their combined impact on knowledge and attitudes. This review provides a novel and comprehensive perspective that is expected to inform the development of more targeted and effective maternal health education strategies.

METHOD

This study applied the scoping review method as a methodological approach. This scoping review aimed to obtain a broad and comprehensive overview of the effect of health education on the knowledge and attitudes of pregnant women in preventing preeclampsia based on the latest evidence-based information. This approach was chosen because the characteristics of the literature

sources used were diverse and came from various research articles (Mun et al., 2018). To ensure transparency and accountability in the research process, this study protocol has been registered on the Open Science Framework (OSF) platform with DOI: (10.17605/OSF.IO/4EJSG). The methodology used refers to the Arksey and O'Malley framework, which consists of five stages.

Step 1: Identifying the research question

1. What types of health education are used in the prevention of preeclampsia?
2. How does health education affect the knowledge and attitudes of pregnant women?

Step 2: Identifying relevant studies

Before the database search stage, keywords/frameworks were searched using PCC (Population, Concept, Context) in accordance with the framework of the research question, "How does health education affect the knowledge and attitudes of pregnant women in the prevention of preeclampsia?"

Table 1. PCC (Population, Concept, Context)

Population	Concept	Context
Pregnant Women	Health education on knowledge and attitudes towards preeclampsia prevention	-

The reviewed articles exhibited considerable methodological variation, including cross-sectional, quasi-experimental, and randomized controlled trial designs. Notably, quasi-experimental approaches were the most frequently employed to evaluate the impact of health education interventions on knowledge and attitudes, whereas cross-sectional studies primarily focused on assessing baseline awareness. This variation in study designs provides a comprehensive understanding of both the effectiveness of interventions and the existing gaps in pregnant women's knowledge and attitudes toward preeclampsia prevention.

A systematic search was conducted using the PubMed, ScienceDirect, Wiley, and Google Scholar databases. The search strategy used Boolean operators ("AND" and "OR"), as well as wildcard and truncation techniques to cover various relevant terms. The keywords used included ("pregnant women" OR pregnancy) AND ("health education" OR "health promotion") AND ("preeclampsia prevention" OR preeclampsia) AND (knowledge OR attitude). Articles published between 2016 and 2025 were included.

Step 3: Study selection

Studies were based on inclusion and exclusion criteria. Articles included were primary studies with quantitative, qualitative, or mixed-method designs, while reviews, editorials, and conference abstracts were excluded. The selection process followed the PRISMA-ScR flow. The study selection process was conducted with reference to the Preferred Reporting items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. Data were collected and selected through the stages of identification, screening, eligibility assessment, and application of inclusion criteria. Reference management and organization were performed using Mendeley bibliographic software. Article searches were conducted independently by two researchers, and the results were then compared. Any differences in article selection were discussed until agreement was reached on the articles to be used.

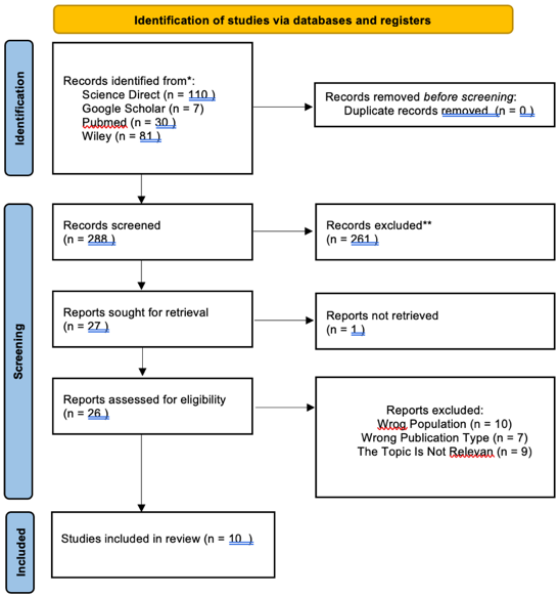

Figure 1. study identification and inclusion process- Selection reporting items (PRISMA) flow chart

Step 4: Data extraction and mapping

In this scoping review, the data charting process is a systematic step aimed at extracting and documenting key information from each article that is relevant to the focus of the study (Aromataris et al., 2024).This extraction includes the article title, author name, year of publication, country of origin, research objectives, research design or method, data collection techniques, respondent characteristics and sample size, main research results, and article code. The data charting process is carried out using structured tables or templates to maintain consistency in data recording and facilitate the thematic analysis process.

Step 5: Collating, summarizing, and reporting results

The findings were synthesized narratively to map the Education strategy and its impact on knowledge and attitudes.

RESULTS AND DISCUSSION

Results

The PRISMA diagram in Figure 1 shows the screening process for research articles. A total of 228 articles were found through several databases, including PubMed (30 articles), ScienceDirect (110 articles), Wiley (81 articles), and Google Scholar (7 articles). After the screening process, ten studies met the inclusion criteria and were included in the review. The included studies demonstrated methodological heterogeneity, with the majority using quantitative approaches (n=10). In terms of research design, most studies applied quasi-experimental or pretest-posttest designs (n=6), followed by cross-sectional studies (n=3), and one systematic review (n=1). The interventions across studies were also diverse, including structured health education programs (n=4), face-to-face counseling (n=2), and media-based interventions such as videos and leaflets (n=4). Overall, the findings consistently showed that health education interventions significantly improved pregnant women's knowledge, and in several studies also positively influenced attitudes and self-efficacy toward preeclampsia prevention ($p < 0.005$).

Table 2. Summary if articles included in the review

Author	Title	Objective	Country	Research design	Data collection methods and instruments	Sampling techniques and amount of data	Method Data analysis	Research results	Code
Mekie et al., 2021	Knowledge and attitude of pregnant women towards preeclampsia and its associated factors in South Gondar Zone, Northwest Ethiopia	To identify the level of knowledge and attitudes of pregnant women towards preeclampsia and to analyze the relationship between exposure to antenatal health education and maternal characteristics with the level of knowledge and attitudes in preeclampsia prevention efforts.	Ethiopia	quantitative	Structured questionnaire	Multistage sampling, 410 pregnant women	Logistic regression	The results of the study show that less than half of pregnant women have good knowledge and attitudes about preeclampsia. Pregnant women who have higher education and regularly attend antenatal visits have significantly better knowledge **(**$p < 0.05$**).**	A1
Alnuaimi et al., 2020	The effects of an educational program about preeclampsia on women's awareness	To assess the effect of a structured health education program on improving knowledge, awareness, and the formation of positive attitudes among pregnant women in recognizing the danger signs and preventing preeclampsia.	Iran	Quantitative	Structured questionnaire	Random sampling, 120 pregnant women	T-test and ANOVA,	The results showed that the average knowledge score of pregnant women in the intervention group increased significantly with s of the control group ($p < 0.001$**).**	A2

Fondjo et al., 2019	Knowledge of preeclampsia and its associated factors among pregnant women	To determine pregnant women's knowledge of preeclampsia and assess the role of health education in preventing preeclampsia complications.	Ethiopia	quantitative	Structured questionnaire	Systematic sampling, 385 pregnant women	Logistic regression	This study shows that only **38,6%** of respondents had adequate knowledge about preeclampsia. Higher education was significantly associated with increased knowledg**e (**$p < 0.01$**).**	A3
El-Said et al., 2023	Effect of Education for Preeclamptic Women on Their Preeclampsia Knowledge	Assessing the effect of health education sessions on increasing the knowledge of pregnant women with preeclampsia	Egypt	Quantitative	Structured questionnaire	Purposeful sampling, 60 pregnant women	Descriptive, paired t-test and Wilcoxon	The results of the study indicate that the knowledge scores of mothers with preeclampsia increased significantly after education, with a statistically significant difference **(**$p < 0.001$**).**	A4
Lee et al., 2024	Educational Tool to Improve Preeclampsia Knowledge in High-Risk Pregnancy	Evaluating the effectiveness of using **a structured educational tool** to improve knowledge of preeclampsia in high-risk pregnant women	United States	Quantitative	Questionnaires and video and booklet education	Consecutive sampling, 60 pregnant women	Descriptive statistics	The results of the study indicate that the use of educational tools significantly increases the knowledge of high-risk pregnant women about preeclampsia compared to standard education ($p < 0.05$).	A5
Dwi et al., 2021	The effect of health education using video and leaflets on pregnant women's knowledge about	To analyze the effectiveness of health education using video and leaflet media in increasing knowledge and forming positive attitudes among pregnant women towards the prevention of preeclampsia.	Indonesia	Quantitative	Questionnaire, video, leaflet	Purposeful sampling, 60 pregnant women	Paired t-test	The study shows that the video group experienced a higher increase in knowledge scores with a statistically significant difference **(**$p = 0.002$**).**	A6

	preeclampsia								
Gholami et al., 2022	Impact of Educational Interventions on Knowledge About Hypertensive Disorders of Pregnancy Among Pregnant Women	To assess the effect of health education on improving pregnant women's knowledge about hypertensive disorders of pregnancy (HDP), including preeclampsia.	Canada, Iran, Jordan, China	quantitative	PubMed, Scopus, Google Scholar, and central; instruments include data extraction sheets and study quality assessment	RCT, 910 pregnant women	Descriptive analysis and narrative synthesis	The results of the systematic review show that 100% of the studies analyzed reported an increase in the knowledge of pregnant women after receiving health education about hypertensive disorders of pregnancy. Knowledge scores increased significantly, with a meaningful difference between the intervention and control groups **(**$p < 0.001$**).**	A7
Haerani et al., 2019	The effect of health education in pregnant mothers against knowledge about preeclampsia	To determine the effect of health education on increasing knowledge and shaping attitudes among pregnant women in s of preventing preeclampsia.	Indonesia	Quantitative	Questionnaires and counseling	Purposive sampling, 60 pregnant women	Paired t-test	This study shows a significant increase in the knowledge scores of pregnant women after health education, namely **(**$p < 0.001$**).**	A8

Sarabi et al., 2024	The Effect of Video Education on Knowledge of Pregnancy Blood Pressure Disorders Pregnancy-Induced Preeclampsia	To determine the effect of video education on knowledge and attitudes	Iran	Quantitative	Structured questionnaire	Convenience sampling, 90 pregnant women	Paired t-test	The results showed that video-based education significantly increased pregnant women's knowledge about pregnancy-induced hypertension, with a **p-value** of **< 0.001.**	A9
Anjelika et al., 2025	The Effect of Preeclampsia Prevention Videos on Knowledge, Attitudes and Self-Efficacy of Pregnant Women	To determine the effect of education using **videos** about preeclampsia on **the knowledge, attitudes,** and **self-efficacy** of pregnant women.	Indonesia	Quantitative	Structured questionnaire	Purposeful sampling, 60 pregnant women	Wilcoxon and Mann – Whitney non-parametric tests	The results of the study show that the preeclampsia prevention video significantly increased the knowledge ($p < 0.001$)**,** attitude ($p = 0.002$), and self-efficacy ($p = 0.001$) of pregnant women compared to before the intervention.	A10

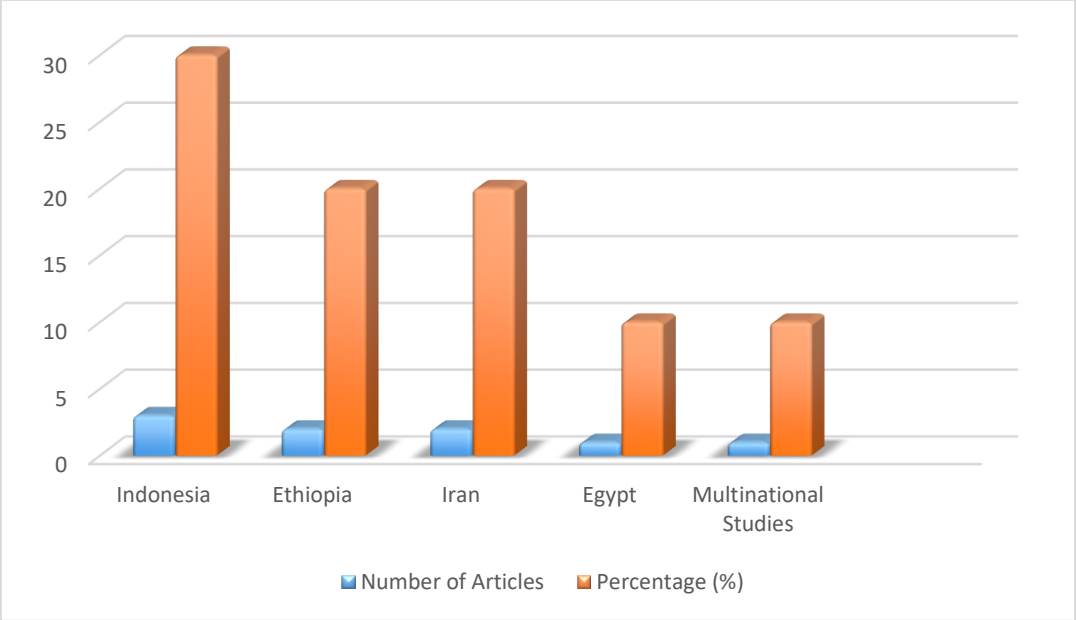

Figure 2. Article Analyisis Based on Country of Origin

Referring to the country income level classification established by the World Bank (2024), most of the studies analyzed in this scoping review came from low- and middle-income countries, with a total of eight publications (80%). The largest contribution came from Indonesia with 3 articles (30%), followed by Ethiopia with 2 articles (20%), and Iran with 2 articles (20%). In addition, 1 article (10%) came from Egypt. Then, studies originating from high-income countries numbered 2 articles (20%), originating from the United States and 1 multinational study involving Canada as one of the participating countries. This distribution shows that research on the effect of health education on the knowledge and attitudes of pregnant women in preventing preeclampsia is more prevalent in developing countries, in line with the high burden of preeclampsia and the need for educational interventions in antenatal care in these regions.

Table 3. Quality Assessment

Article	Kind	Grade
A1	Facility-based cross-sectional	A
A2	Quasi-experimental single-group pretest-posttest	B
A3	Cross-sectional	A
A4	Cross-sectional	A
A5	Randomized Controlled Trial (RCT)	B
A6	Quasi-experimental one group pretest-posttest	B
A7	Systematic Review	A
A8	Quasi-experimental one group pretest-posttest	B
A9	Quasi-experimental group control	A
A10	Quasi-experimental group control	A

Based on the research design, of the 10 articles in the scoping review, cross-sectional and quasi-experimental one group pretest-posttest studies each accounted for 30%, followed by quasi-experimental studies with control groups (20%), and RCTs and systematic reviews (10%).

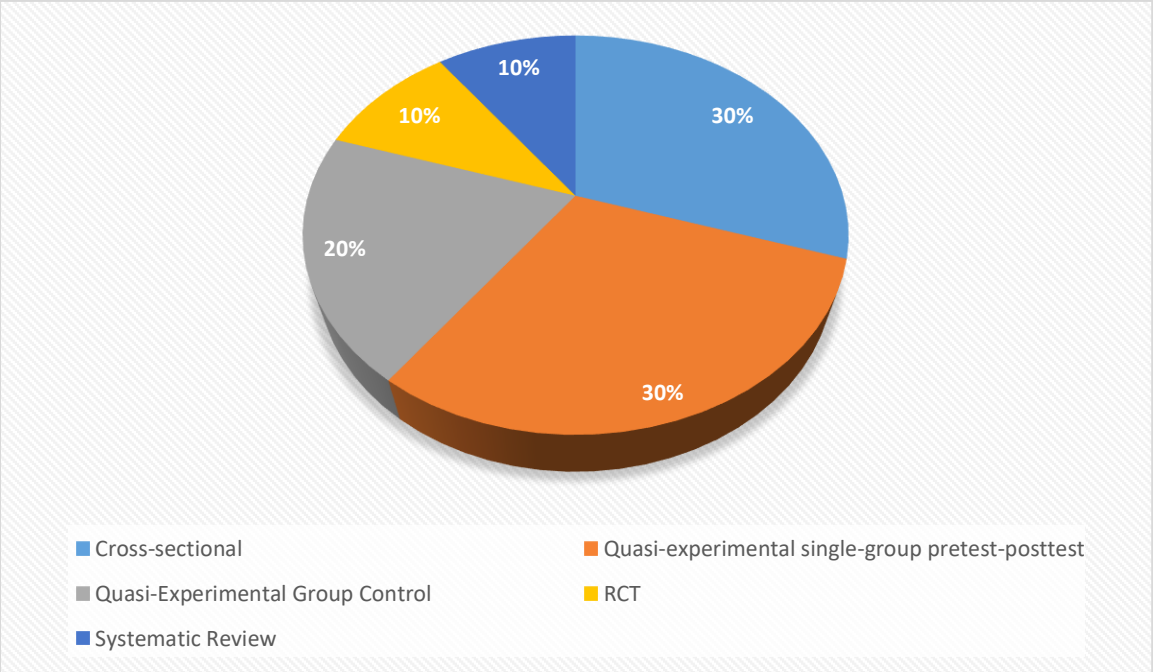

Figure 3. Analysis of Articles Based on Research Type

Based on the quality assessment of evidence sources, articles with grade A generally used cross-sectional designs, systematic reviews, and quasi-experiments with control groups, which had sufficient strength in describing the knowledge and attitudes of pregnant women and the impact of health education, although limitations in causal relationships were still found. Meanwhile, grade B articles, which were dominated by single-group pretest–posttest quasi-experimental designs and one RCT, still showed an increase in knowledge after the educational intervention, but had limitations in controlling for confounding variables. The distribution of articles based on year of publication shows that the majority of articles were published in the last 10 years, with the following percentages: 2016 (10%), 2018 (10%), 2019 (10%), 2020 (10%), 2021 (10%), 2022 (10%), 2023 (10%), 2024 (20%), and 2025 (10%). The following combined diagram presents the characteristics of article quality and the distribution of publications according to their year of publication.

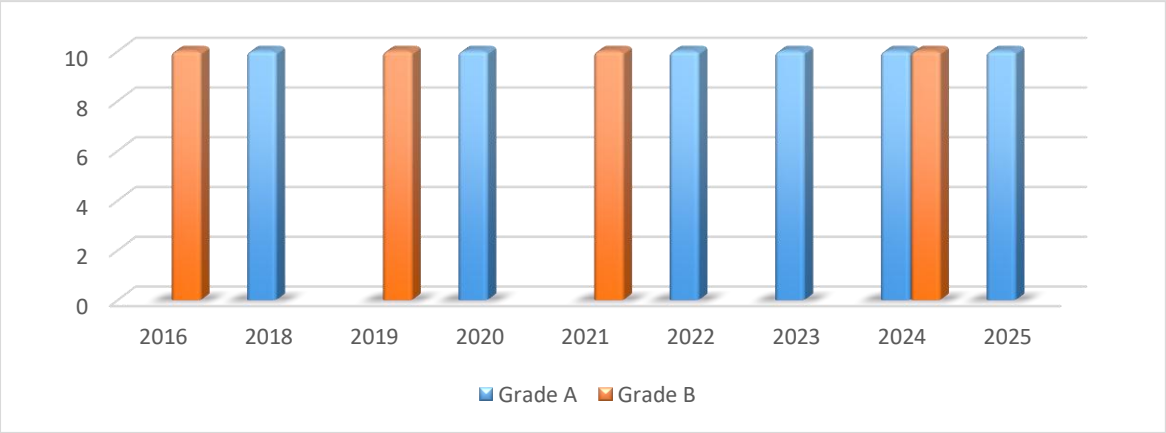

Figure 4. Article Analysis Based on Quality Assesment and Publication Year

In the analysis and mapping of research articles stage, the author mapped all selected articles based on key characteristics, such as health education focus, research context, and findings

related to pregnant women's knowledge and attitudes toward preeclampsia prevention. The mapping results were then presented in tabular form to facilitate understanding of the interrelationships between the research themes identified in this scoping review.

Table 3. Analysis and Mapping of Research Articles

No	Main Theme	Subtheme	Article (Code)
1	Pregnant women's knowledge and attitudes about preeclampsia	1. Level of knowledge of pregnant women about preeclampsia 2. Attitudes of pregnant women towards and early detection of preeclampsia 3. Factors influencing the knowledge and attitudes of pregnant women	A1, A3
2	The effect of health education on knowledge of preeclampsia	1. The effect of health education on increasing knowledge 2. Education for high-risk pregnant women 3. Education on Hypertensive Disorders in Pregnancy	A2, A4, A5, A7, A8
3	Educational media in the prevention of preeclampsia	1. Video media as a tool 2. Combination and leaflets 3. The impact of educational media on attitudes and self-efficacy	A6, A9, A10

Theme 1. Knowledge and Attitudes of Pregnant Women about Preeclampsia (A1, A3)

Based on the synthesis of articles A1 and A3, the level of knowledge of pregnant women regarding preeclampsia varies, with most categorized as low to moderate. Many pregnant women lack sufficient understanding of the definition, early signs, and importance of early detection of preeclampsia. This finding is consistent with previous studies showing that limited knowledge among pregnant women remains a major barrier to early detection and prevention (Fondjo et al., 2019; Mekie et al., 2021). The findings also indicate that knowledge is closely associated with attitudes toward prevention.

Pregnant women with better knowledge tend to demonstrate more positive attitudes, such as adherence to antenatal care and increased awareness of monitoring blood pressure. This in sin line with the Health Belief Model, which suggests that knowledge influences individual perceptions and health behaviors (Rosenstock, 1974). Furthermore, several factors such as education level, age, and access to health information were found to influence both knowledge and attitudes. Similar findings have been reported in other studies, where higher educational levels and better access to health services significantly improve maternal awareness and preventive behavior (Lee et al., 2025)

Theme 2. The Influence of Health Education on Knowledge of Preeclampsia (A2, A4, A5, A7, A8)

Based on articles A2, A4, A5, A7, and A8, health education has a significant effect on improving pregnant women's knowledge of preeclampsia. Educational interventions delivered through counseling, structured programs, and multimedia tools consistently increase understanding of risk factors, warning signs, and prevention strategies. These findings are supported by previous research demonstrating that structured maternal education significantly enhances knowledge and promotes preventive behaviors (Alnuaimi et al., 2020). Moreover, education tailored to the specific needs and conditions of pregnant women has been shown to produce better outcomes, particularly among high-risk groups. This is consistent with studies indicating that targeted and context-specific interventions are more effective in improving maternal health outcomes (Lee et al., 2025). In addition, education on hypertensive disorders of

pregnancy as a broader concept helps pregnant women understand preeclampsia as part of a continuum, thereby increasing awareness and compliance with antenatal care recommendations. Similar findings have been reported in systematic reviews showing that comprehensive educational approaches improve both knowledge and early detection practices among pregnant women (Gholami et al., 2022).

Theme 3. Effectiveness of Educational Media in Preeclampsia Prevention (A6, A9, A10)

Articles A6, A9, and A10 emphasize the important role of educational media, particularly audiovisual tools, in enhancing the effectiveness of health education interventions. Video-based education has been shown to significantly improve pregnant women's knowledge, as information is delivered in a more engaging, clear, and accessible format. These findings are consistent with studies demonstrating that audiovisual media enhances learning outcomes compared to conventional methods (Dwi Puteri & Trisyani Koeryaman, 2021; Sarabi et al., 2024). Additionally, video media allows pregnant women to review educational content independently, thereby reinforcing understanding. The combination of video and leaflet media, as reported in A6, produces better outcomes than the use of a single medium. Leaflets provide concise and practical information, while videos enhance comprehension through visual and auditory stimulation. Moreover, educational media not only improve knowledge but also positively influence attitudes. Increased attitudes encourage pregnant women to adopt preventive behaviors, such as regular blood pressure monitoring and early recognition of danger signs. This finding aligns with behavioral theories that emphasize the role of attitudes in shaping health behavior and decision-making.

Discussion Synthesis

The three themes show a strong relationship between knowledge, attitudes, health education, and the use of educational media in the prevention of preeclampsia. The limited knowledge and attitudes of pregnant women can be improved through planned health education supported by effective educational media. The integration of these three aspects is an important strategy in the prevention of preeclampsia and the improvement of midwifery service quality.

Strengths and Limitations of The Research

This scoping review has several strengths, namely its focus on the role of health education in improving the knowledge and attitudes of pregnant women towards the prevention of preeclampsia, which has not been discussed comprehensively in a single study. In addition to looking at the types of health education provided, this study also reviews the methods of delivery and educational media used, so that the results can provide a clear and easy-to-understand overview for antenatal care practices. The article selection and quality assessment processes were conducted in a responsible manner. However, several limitations in this scoping review include the fact that some of the articles used observational and quasi-experimental research designs, which cannot explain causal relationships conclusively. In addition, differences in educational methods, measurement tools, and respondent characteristics between studies may affect the results obtained, as well as limited access to some articles that are not available in full text, which may affect the completeness of the evidence mapping.

CONCLUSION

Based on the results of the scoping review, it is known that although health education has been proven to increase the knowledge and attitudes of pregnant women in preventing preeclampsia, there are still a number of research gaps. First, most existing studies emphasize increasing knowledge as the main outcome, while the effect of health education on changes in attitudes and behaviors to prevent preeclampsia has not been studied consistently and in depth. In fact, changes in attitudes and behavior are key factors in the success of preeclampsia prevention.

Second, the methods and media used for health education are very diverse, but there have not been many studies that directly compare the effectiveness of different methods, particularly between conventional education and audiovisual media-based education. In addition, most studies use observational or quasi-experimental one-control designs without long-term follow-up, so the effect of health education on the sustainability of pregnant women's knowledge and attitudes cannot be ascertained. Third, there is still limited research examining the structured and continuous implementation of health education in routine antenatal care, especially in primary health care facilities. Contextual aspects such as the characteristics of pregnant women, the role of health workers, and barriers to the implementation of health education in daily practice have not been widely explored. Therefore, further research with a stronger design is needed to evaluate the effectiveness of health education, particularly that based on innovative media, on the knowledge and attitudes of pregnant women towards preeclampsia prevention. This gap can form the basis for the development of thesis research focusing on effective, applicable, and sustainable health education models in midwifery services.

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AUTHOR CONTRIBUTION STATEMENT

The author actively contributed to all stages of this research, including planning and concept development, data collection and analysis, writing the initial draft, critical review, and final approval for publication of this manuscript.

AI DISCLOSURE STATEMENT

The authors declare that this research was prepared, researched, written, and edited without the aid of artificial intelligence (AI) techniques.

CONFLICTS OF INTERES

The authors declare that there are no conflicts of interest, either financial or non-financial, that could influence the research process, writing, or publication of this article.

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