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Review Article

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Improving Pregnant Women's Knowledge of Preeclampsia: An Integrative Literature Review

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ABSTRACT

Background: Pre eclampsia (PE) is a serious pregnancy complication characterized by sudden hypertension, which, if unmanaged, can result in maternal and neonatal mortality. Evidence shows that many pregnant women have limited knowledge of PE and its complications, delaying timely intervention. Adequate education may enhance early treatment and reduce risks.

Aim: This structured literature review evaluated the impact of educational interventions on pregnant women's knowledge of PE. The review also explored associations between improved knowledge and outcomes such as self efficacy, health promotion, pregnancy outcomes, and anxiety levels.

Methods: The review question was developed using the PIO (Population, Intervention, Outcome) framework. Six databases (CENTRAL, CINAHL, MEDLINE, MIDRS, PubMed, ScienceDirect) were searched for randomized controlled trials (RCTs) meeting eligibility criteria. The Joanna Briggs Institute appraisal tool was used to assess methodological quality.

Results: Five RCTs met inclusion criteria, with quality scores ranging from moderate to high. Three studies reported significant improvements in maternal knowledge, enhanced health promotion, and reduced adverse pregnancy outcomes without increasing anxiety. One trial found no measurable improvement in knowledge or anxiety, while another showed no significant change in self efficacy.

Conclusion: Educational interventions on PE appear to strengthen maternal knowledge and promote healthier outcomes without elevating anxiety. However, self efficacy remains unaffected. Further research is needed to expand evaluation and confirm long term benefits.

Keywords: Anxiety levels, Educational Interventions, Health Promotion, Maternal Knowledge, Pre-Eclampsia, Pregnancy Outcomes

Introduction

Pre eclampsia (PE) is a multisystem hypertensive disorder of pregnancy, typically manifesting after 20 weeks with sudden onset hypertension and proteinuria, and is associated with significant maternal and neonatal morbidity and mortality. Globally, PE affects 2–8% of pregnancies, contributing to approximately 46,000 maternal deaths and 500,000 fetal or newborn deaths annually. Recent studies confirm that severe PE and eclampsia remain leading causes of maternal complications such as postpartum hemorrhage, placental abruption, caesarean section, and seizures [1].

Despite declining maternal mortality in some high income countries, disparities persist. For example, maternal deaths due to PE are rare in Western Europe, yet recent U.S. data report 54 deaths per million pregnancies. These differences are strongly linked to antenatal care attendance. In low resource settings, only about 13% of women attend four or more antenatal visits, compared to over 90% in developed countries. Limited access, socioeconomic barriers, and lack of awareness remain critical determinants of adverse outcomes [2].

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Currently, delivery of the baby and placenta remains the only definitive cure for PE, as placental dysfunction is central to its pathophysiology. Preventive strategies are therefore essential. Pharmacological interventions, particularly low dose aspirin, have shown modest benefit, reducing PE risk by about 18% when initiated between 12–16 weeks. Calcium supplementation has also been highlighted in recent umbrella reviews as effective in lowering PE incidence and improving maternal outcomes [3].

Non pharmacological approaches, especially educational interventions, are increasingly emphasized. Structured antenatal education equips women with knowledge to recognize warning signs, adhere to treatment, and seek timely care. The AJOG care plan stresses that combining patient education, surveillance, and behavioral modification can significantly reduce PE risk and improve outcomes [4].

In a study in Egypt found that most nurses at Minia Maternal and Child University Hospital had incorrect and incomplete knowledge about preeclamptic care, as reported by Mousa et al. [5]. In a study in Saudi Arabia, it was found that awareness and knowledge about preeclampsia among women in the western region was limited, with many unable to correctly identify its signs, risk factors, and complications, as reported by Alsabi et al. [6]. Also, women who experience preeclampsia are at increased risk of postpartum depression, a neglected issue in maternal health, as highlighted by Mousa, et al [7].

Thus, antenatal care for PE should integrate risk assessment, pharmacological prevention (aspirin, calcium), and structured education programs to empower women, particularly in low resource settings. Strengthening antenatal care access and awareness remains critical to reducing global disparities in PE outcomes.

Previous systematic reviews examining educational interventions in antenatal care have primarily addressed maternal health issues such as gestational diabetes and postpartum depression [8,9]. However, no comprehensive review has yet evaluated or quantified the specific effects of such interventions on pre eclampsia (PE). This study seeks to fill that gap by systematically analyzing available primary research, comparing and critiquing findings, and synthesizing evidence to highlight both the effectiveness and practical implications of educational strategies for pregnant women at risk of PE.

Aim

This structured literature review (SLR) evaluates the impact of educational interventions on pregnant women's knowledge of pre eclampsia (PE).

Objectives

- Assess whether education enhances women's knowledge of PE and recognition of its signs and risk factors.
- Examine links between improved PE knowledge, self efficacy, health promotion, and pregnancy outcomes.
- Determine if PE education increases knowledge without raising anxiety levels.

Methods

Research methods vary depending on the type of knowledge being explored. Qualitative approaches are often used to understand reasons behind observed phenomena through individuals' experiences, offering deeper insight into health issues [10]. However, qualitative findings rely heavily on researcher interpretation, which may limit accuracy and external validity, making generalization to wider populations more difficult [11,12].

In contrast, quantitative methods focus on measuring the effects of clinical interventions using surveys and statistical analysis [13]. These methods are considered more valid, as numerical data allow for greater accuracy and generalization compared to subjective qualitative findings [14,15]. For this reason, the quantitative approach was chosen to meet the aim of this structured literature review (SLR).

To guide the review process, frameworks such as PICO (Population, Intervention, Comparison, Outcome) are commonly recommended for quantitative studies [16]. PICO helps generate keywords and define inclusion criteria, but the Joanna Briggs Institute (JBI) suggests using PIO (Population, Intervention, Outcome) to allow broader inclusion of populations, intervention methods, and outcomes [17]. Accordingly, this SLR adopted the PIO framework to formulate the research question: What is the effect of educational interventions about preeclampsia on enhancing pregnant women's knowledge?

Study Design

Quantitative studies can employ experimental, non experimental, or quasi experimental designs [18]. Non experimental designs typically examine single variables without manipulating independent factors, making them unsuitable for the current review [19]. Quasi experimental studies assess relationships between variables but lack random assignment, which introduces bias [20]. In contrast, experimental designs are more rigorous, as they randomly allocate participants to groups and evaluate the effects of clinical interventions [21].

Randomized controlled trials (RCTs) are regarded as the gold standard for generating clinical evidence because randomization produces comparable groups and minimizes bias [22,23]. RCTs also allow large representative samples, enhancing external validity [16,24,25]. Blinding further reduces bias by ensuring anonymity in group allocation [26]. Given these strengths, only RCTs were included in this review to adequately address the research question.

Inclusion and Exclusion Criteria

This structured literature review (SLR) differs from narrative reviews by pre defining inclusion and exclusion criteria to guide study selection [21]. Following the PIO framework, eligibility was determined based on population, intervention, and outcomes, alongside secondary specifications such as study language, publication year, and design [17,27]. Given that PE incidence has declined in Western Europe, particularly the UK, but remains a major cause of maternal and perinatal morbidity elsewhere, this review focused on international studies outside Europe [28,29].

All pregnant women were considered eligible, as PE risk can occur in any pregnancy. High risk groups included women aged 18–45 with chronic conditions such as diabetes, lupus, renal disease, autoimmune disorders, or prior PE [30]. Moderate risk was defined for women over 40, those with obesity, multiple pregnancies, or family history of PE, while primiparas were classified as low risk. Women already diagnosed with PE were included since they receive similar preventive interventions in antenatal care [31]. Studies focusing on postpartum women with long term PE complications were excluded.

Intervention Types

This review included educational interventions delivered through oral, digital, or visual materials that aimed to improve pregnant women's knowledge of pre eclampsia (PE) [32]. Information provided by doctors, nurses, or midwives was acceptable, while studies involving medication education (e.g., aspirin) or combined with other pharmacological or non pharmacological treatments were excluded.

Outcome Types

The primary outcome assessed was the level of PE knowledge among pregnant women, as poor awareness is linked to adverse pregnancy outcomes [33-35]. Secondary outcomes included anxiety, self efficacy, health promotion, and pregnancy outcomes, since improved PE knowledge may positively influence these factors [36].

Search Strategy and Identifying Eligible Studies

An initial scoping review was conducted using CDSR, PROSPERO, and Google Scholar to confirm the availability of relevant publications and avoid duplication of existing reviews [37]. To minimize bias and ensure comprehensive coverage, multiple healthcare databases were searched, including CINAHL and MEDLINE via EBSCO, PubMed and ScienceDirect, the Cochrane Library/CENTRAL for RCTs, and MIDRS for midwifery specific topics [38,24,39]. All databases were accessed through the Glasgow Caledonian University library.

The search strategy was guided by the PIO framework to align with the review question and eligibility criteria [40]. Boolean operators (AND, OR), truncation (*), and MeSH terms were applied to refine searches [41,42]. Although reviews ideally include all languages to avoid bias [27], only English publications from 2017 onwards were included due to practical constraints, ensuring contemporary and high quality evidence [43-45]. Additional sources such as the Preeclampsia Foundation website, Google Scholar, and reference lists of eligible studies were also checked 46-48].

Study Selection

Articles retrieved from databases underwent a two-step screening: titles/abstracts first, then full texts. Eligibility disagreements were resolved with the supervisor. RefWorks managed duplicates and references, while a 2020 PRISMA flow diagram ensured transparent reporting of study selection.

Quality Assessment

Quality assessment ensures methodological rigor and reliable evidence. While RoB2 is the gold standard for RCTs, it requires multiple reviewers. Therefore, this review adopted the JBI RCT checklist to evaluate validity, bias, and reliability independently.

JBI Checklist Application

The JBI checklist, with 13 signalling questions, assessed selection, performance, detection, attrition bias, and statistical reliability. Studies were scored from 0–13, classified as high, moderate, or low quality. Inclusion decisions were based on cut off scores, completed independently.

Data Extraction

Data extraction captured relevant study information aligned with review questions. A structured table, piloted and refined, ensured consistency and minimized errors. The primary reviewer developed and applied the form, with minor modifications for one included study.

Data Synthesis

Data synthesis combined findings to answer the research question. Due to heterogeneity, narrative synthesis was used instead of meta analysis. Results were structured transparently using the PIO framework, presented in texts and tables for clarity and comparability.

Database Search

From 318 identified articles, 23 duplicates were removed, leaving 295 screened by titles/abstracts. After exclusions, 11 full texts were assessed, with six excluded. Five studies met inclusion criteria. A PRISMA 2020 flow chart documented the selection process.

Reasons for Exclusion

Six studies were excluded: two involved non pregnant women, one focused on aspirin education, one measured social support, one used a quasi experimental design, and one was a pilot study. These did not meet the predefined inclusion criteria.

Included Studies

Five RCTs published between 2019–2021 were included: conducted in the USA, Canada, Turkey, Jordan, and Iran. Four studies used two arms, while one employed three arms to evaluate different educational interventions for pregnant women.

Methodological Quality Results

Three studies scored high quality (9–10/13), while two scored moderate (7–8/13). None were low quality. Bias assessment covered randomization, allocation concealment, blinding, incomplete data, measurement bias, and other sources, ensuring methodological rigor across included studies.

Randomization and Allocation Concealment

Four large studies used computer generated randomization with sealed envelopes for allocation concealment. One small study applied block randomization to balance groups. These methods minimized selection bias and ensured comparable groups between intervention and control arms.

Blinding

Four studies lacked participant blinding, raising performance bias concerns. One claimed single blinding but lacked clarity.

Only one study blinded participants using coded cards. None blinded investigators, increasing risks of performance and detection bias in outcomes.

Incomplete Outcome Data

Four RCTs failed to achieve complete follow up, raising attrition bias risks. One study lost 24% of participants, mostly from experimental groups, while another lost 13 without clarifying missing data. Two studies minimized bias using sample size adjustment or intention to treat analysis, and one achieved full follow up.

Measurements

All five RCTs used self completed questionnaires, which risk self report bias. Three studies applied reliability methods, including test retest and alternate forms, while one relied on researcher developed tools with limited validation. Another lacked sufficient reliability information, undermining confidence in findings and raising concerns about measurement accuracy and consistency.

Other Potential Sources of Bias

Reporting bias and conflicts of interest may compromise conclusions. Four studies declared no conflicts, and funding sources were institutional or neutral. Statistical methods were appropriately applied using SPSS, ANOVA, and Wilcoxon tests. However, appraisal was conducted by a single reviewer, potentially overlooking bias in included studies.

Table 1: Characteristics of the Included Studies and Key Characteristics of Educational Interventions

Study	Participant Number	Intervention Types	Content of Education	Number of Educational Interventions	Duration	Intervention Provider
Gingras Charland et al. (2019 Canada	126	Pamphlet, video, graphic card, pictogram magnet	PE symptoms awareness	Single exposure	5–10 minutes	Obstetricians/ Gynaecologists
Strassberg et al. (2020) USA	179	Pamphlet, video, graphic card	PE symptoms awareness	Single exposure	5–10 minutes	Obstetricians/ Gynaecologists
Uğurlu, Yavan & Karaşahin (2021) Turkey	132	Face to face sessions + booklet	Lifestyle modifications & PE symptom monitoring	2–6 sessions	20–120 minutes	Obstetricians/ Gynaecologists
Alnuaimi, Abuidhail & Abuzaid (2020) Jordan	126	Face to face sessions + booklet	PE medical info & self monitoring	2–6 sessions	20–120 minutes	Registered Nurses
Abazarnejad et al. (2019) Iran	91	Face to face sessions + booklet	Anxiety management & PE medical info	2–6 sessions	20–120 minutes	Midwives (Master's in Counselling)

Narrative Synthesis of the Included Studies' Findings

Sample size

The five RCTs enrolled between 44 and 247 participants. All studies calculated sample sizes using power analysis to ensure reliable outcomes. Four studies applied 80% power at a 5% significance level, while one used 90% power to account for potential withdrawals, reducing statistical errors.

Effect on knowledge level

Two studies reported significant improvements in pregnant women's knowledge of PE ($p=0.001$). Cultural differences influenced attitudes toward reporting symptoms, with hesitancy noted in developing countries and proactive communication in developed settings. Misconceptions, such as attributing PE to spiritual causes, were also observed. One study found no significant knowledge gains, possibly due to weak measurement tools.

Effect on Anxiety Level

Two studies showed that PE education did not increase anxiety, while another reported mixed response, with some participants experiencing heightened anxiety due to content highlighting complications. Cultural and personal factors appeared to shape anxiety outcomes, limiting the generalizability of findings across different populations.

Effect on Self Efficacy and Health Promotion

One study demonstrated improvements in health promoting behaviors, particularly physical activity and breathing exercises, but no change in self efficacy. High baseline self efficacy scores may explain this result. However, the single center design limited broader applicability, suggesting the need for multi center investigations.

Effect on Pregnancy Outcomes

Two studies found that PE education reduced adverse maternal and neonatal outcomes, including gestational hypertension, postpartum bleeding, and neonatal complications. Improved awareness and compliance with antenatal care likely contributed. Yet, these findings were restricted to high risk pregnancies and may have been influenced by bias due to unsuccessful blinding.

Discussion

This review evaluated five RCTs on the impact of educational interventions about preeclampsia (PE) on pregnant women's knowledge. Findings suggest that education improved awareness of PE warning signs and risk factors, though knowledge gains among women with prior PE were less than expected. Importantly, interventions appeared to enhance knowledge retrieval even in those familiar with PE symptoms.

Cultural beliefs influenced outcomes, with some women attributing PE to spiritual causes and seeking non medical remedies. Such findings highlight the need for culturally sensitive education that respects beliefs while promoting evidence based care. Differences in healthcare systems also shaped attitudes toward reporting symptoms: women in developed settings were more likely to contact clinicians, while those in developing countries hesitated, reflecting barriers such as staff shortages, mistrust, and limited antenatal care access.

Contradictory evidence emerged, as one study found no significant improvement in knowledge, possibly due to methodological limitations like lack of blinding. Overall, education enhanced knowledge without increasing anxiety, though women expressed greater concern for fetal health than their own. Mixed anxiety responses in one study suggest that content and personal circumstances may influence outcomes, underscoring the importance of balanced, supportive communication.

Education was also linked to improved health promoting behaviors, such as self monitoring and timely reporting of symptoms, which contributed to reduced adverse pregnancy outcomes. However, no significant effect on self efficacy was observed, likely due to high baseline scores. Collectively, these findings indicate that educational interventions can strengthen PE knowledge, promote healthier behaviors, and potentially improve pregnancy outcomes, though cultural and systemic factors limit generalizability.

Methodological Limitations of the Included Studies

Although RCTs are considered the most rigorous design for evaluating interventions, several methodological shortcomings in the included studies may threaten internal validity and limit generalizability. Overall quality ranged from moderate to high, with randomization and allocation concealment generally well performed, reducing selection bias. However, most studies failed to implement blinding, increasing risks of performance and detection bias. Measurement reliability was inconsistently addressed, with three studies applying valid tools while two relied on less reliable instruments, raising concerns about measurement bias. Attrition bias was evident in studies with incomplete follow up, though some minimized this through intention to treat analysis or complete participant retention. Furthermore, heterogeneity in sample sizes, populations, cultural contexts, and intervention characteristics, combined with single institution settings, restricts the applicability of findings across diverse healthcare systems and populations. Collectively, while the studies provide useful insights, these limitations highlight the need for more robust, multi center trials with stronger methodological rigor to ensure reliable and generalizable conclusions.

Conclusion

This review evaluated the impact of educational interventions on pregnant women's knowledge of preeclampsia (PE) and their association with health promotion, self efficacy, pregnancy outcomes, and anxiety levels. Findings from five RCTs provide tentative evidence that education enhances awareness of PE warning signs and risk factors, supporting earlier detection and timely care. Importantly, interventions improved health behaviors and reduced adverse pregnancy outcomes without increasing anxiety, though they did not significantly strengthen self efficacy. Cultural beliefs, healthcare system differences, and single center study designs limit the generalizability of results, underscoring the need for culturally sensitive approaches when integrating education into antenatal care. Overall, these preliminary findings highlight the potential of PE education to improve maternal and neonatal outcomes, while emphasizing the necessity for larger, multi center studies to establish definitive evidence on its effectiveness and broader applicability.

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