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Review Article

NON-PHARMACOLOGICAL NURSING INTERVENTIONS FOR THE MANAGEMENT OF PRE-CAESAREAN MATERNAL ANXIETY: A LITERATURE REVIEW

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Abstract

Background

Preoperative anxiety before caesarean delivery remains a major clinical concern, adversely affecting maternal and neonatal outcomes. This review synthesizes evidence on the effectiveness of non-pharmacological nursing interventions in reducing maternal preoperative anxiety before caesarean section.

Methods

Guided by the PRISMA 2020 framework, literature published between 2015 and 2025 was systematically searched in PubMed, ScienceDirect, and EBSCOhost. Eligible studies included randomized controlled trials, quasi-experimental, and cohort studies examining nursing-led, non-pharmacological interventions such as acupressure, aromatherapy, music therapy, guided imagery, relaxation, and structured education.

Results

Twelve studies met inclusion criteria. Interventions such as acupressure, aromatherapy, guided imagery, and preoperative education consistently reduced anxiety scores measured by validated instruments (e.g., STAI, HADS). Cultural adaptation enhanced intervention effectiveness, particularly in music-based therapies.

Conclusion

Non-pharmacological nursing interventions are effective, low-risk strategies for reducing maternal anxiety before caesarean delivery. Integrating culturally tailored, multimodal interventions into preoperative nursing care may optimize psychological and physiological outcomes.

Keywords: Pre-Caesarean Anxiety; Non-Pharmacological Intervention; Nursing Care; Maternal Outcomes

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INTRODUCTION

Preoperative anxiety is a frequent psychological response among obstetric patients, particularly those scheduled for caesarean section. Elevated preoperative anxiety has been empirically linked to adverse physiological and psychological outcomes, including tachycardia, hypertension, heightened pain perception, and prolonged recovery, collectively compromising maternal and neonatal well-being (Sanbirgan et al., 2023). This makes maternal anxiety an important clinical concern requiring effective and safe management strategies.

Pharmacological anxiolytics are often administered to reduce maternal anxiety. However, their use during pregnancy and prior to surgery carries potential fetal risks, including placental transfer and neonatal respiratory depression (Maghalian et al., 2024). These limitations have prompted increasing interest in non-pharmacological approaches that are safe, holistic, and feasible for implementation in obstetric nursing practice (Zhou et al., 2025; Feli et al., 2024).

Several non-pharmacological strategies have been investigated, including acupressure, aromatherapy, music therapy, guided imagery, relaxation, and structured education. Evidence shows that many of these interventions reduce preoperative anxiety, yet findings remain heterogeneous across studies due to variations in intervention types, cultural adaptations, study designs, and outcome measures (Hamranani et al., 2023). Such methodological and clinical diversity creates uncertainty regarding the most effective and generalizable approaches for caesarean patients.

To address this knowledge gap, the present review is conceptually underpinned by the Social Cognitive Theory (SCT) and the Health Belief Model (HBM), which provide complementary perspectives on behavioral regulation and cognitive appraisal influencing anxiety reduction. By applying these frameworks, this review aims to systematically synthesize current evidence on nursing-led non-pharmacological interventions to reduce maternal preoperative anxiety prior to caesarean section (Gillespie et al., 2024).

METHODS

Study Design

This review was conducted as a literature review, adhering to the PRISMA 2020 guidelines to ensure methodological transparency, reproducibility, and rigor (Page et al., 2021). A literature approach was chosen to identify, evaluate, and synthesize the available evidence regarding non-pharmacological nursing interventions aimed at reducing preoperative anxiety in women undergoing caesarean delivery. Literature reviews are recognized as a rigorous

method for synthesizing heterogeneous evidence, reducing bias, and enhancing the reliability of clinical recommendations (Higgins et al., 2020). The research question was framed using the PICOS framework, focusing on the population, intervention, comparison, outcomes, and study design.

Search Strategy

A comprehensive search strategy was applied across three electronic databases: PubMed, ScienceDirect, and EBSCOhost, covering the period from January 2015 to March 2025. These databases were selected because of their extensive coverage of peer-reviewed nursing and medical research. A systematic search strategy combined Medical Subject Headings (MeSH) and free-text terms *"pre-caesarean anxiety," "non-pharmacological intervention,"* and *"nursing care"* using Boolean operators (AND, OR). Filters were applied to limit results to peer-reviewed journal articles published in English with full-text availability. A supplementary manual search of reference lists from included studies was also conducted to identify additional relevant literature, a strategy recommended to ensure comprehensiveness and minimize publication bias (Xiao & Watson, 2019).

Eligibility Criteria

Predefined eligibility criteria were established to ensure consistency. Studies were eligible if they investigated non-pharmacological nursing or nursing-led interventions to reduce preoperative anxiety in women scheduled for elective caesarean delivery. Interventions included music therapy, guided imagery, mindfulness, relaxation training, cognitive-behavioral therapy, or structured preoperative education. Only studies reporting anxiety outcomes as primary or secondary measures, assessed with validated tools such as the State-Trait Anxiety Inventory (STAI), Visual Analogue Scale for Anxiety (VAS-A), or Hospital Anxiety and Depression Scale (HADS), were included. Eligible study designs comprised randomized controlled trials, quasi-experimental studies, and controlled cohort studies. Exclusion criteria encompassed pharmacological studies, reviews, conference abstracts, non-English publications, and qualitative-only studies.

Study Selection

The selection process involved two sequential stages. First, titles and abstracts of all retrieved articles were screened for relevance by two independent reviewers. Articles deemed potentially relevant were retrieved in full and assessed against the eligibility criteria. Disagreements were resolved through discussion, and a third reviewer was consulted when consensus could not be reached. This rigorous process narrowed the initial 270 identified

articles to five studies included in the final synthesis. The selection process followed the PRISMA framework, with results documented in a flow diagram to provide transparency of inclusion and exclusion decisions (Page et al., 2021). The review protocol was not registered in PROSPERO, as it synthesized only published data without meta-analytic pooling.

Data Extraction and Management

Data were extracted independently by two reviewers using a standardized extraction form to ensure accuracy and uniformity. Extracted variables included author details, year of publication, country of study, research design, sample size, type of non-pharmacological intervention, anxiety measurement instruments, outcomes, and statistical significance. Discrepancies in extraction were resolved by discussion and consensus. In cases of missing or unclear data, corresponding authors were contacted for clarification. This process enhanced the methodological reliability of the review and reduced the risk of bias.

Quality Appraisal

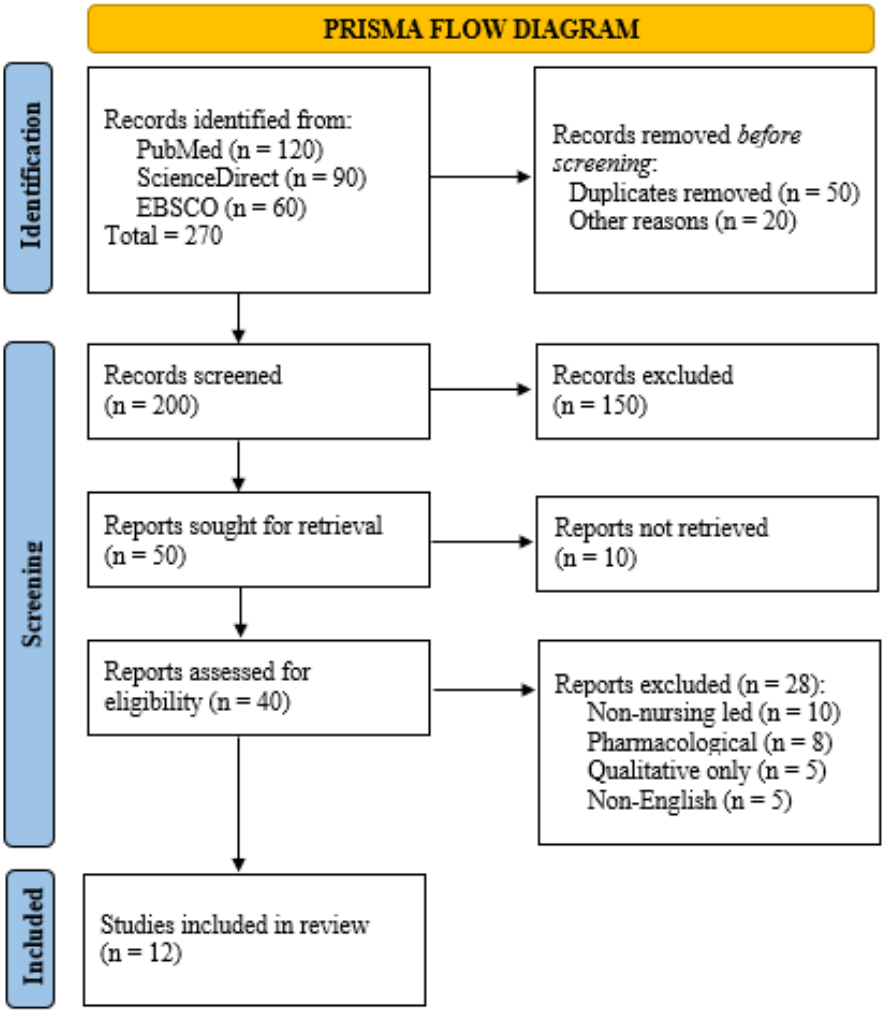
All studies were independently assessed by two reviewers, and any discrepancies were resolved through discussion to minimize subjectivity. Based on the evaluation, studies were categorized into high, moderate, or low quality, with only those meeting at least moderate quality standards included in the final synthesis. This rigorous quality appraisal ensured that the findings of the literature review were grounded in robust and credible evidence, thereby enhancing the reliability, transparency, and clinical relevance of the conclusions.

Data Synthesis

Due to substantial heterogeneity in intervention types, study designs, and outcome measures, statistical pooling via meta-analysis was not feasible. Instead, a narrative synthesis approach was employed, as recommended in cases of methodological and clinical diversity (Wilmsen et al., 2022). The synthesis involved grouping studies by intervention type, comparing findings across contexts, and identifying consistencies, differences, and gaps in the evidence. This approach provided a structured yet flexible framework to critically analyze the role of non-pharmacological nursing interventions in managing pre-caesarean maternal anxiety.

Ethical Considerations

As this review was based solely on analysis of previously published data, no ethical approval was required. However, the conduct of the review strictly adhered to ethical principles of academic integrity, including proper acknowledgment of original sources and accurate reporting of findings.



RESULT

A total of twelve studies met the eligibility criteria and were included in this review. The interventions investigated were diverse, ranging from acupressure, aromatherapy, music therapy, guided imagery, and relaxation training to educational strategies such as informational videos and familiarization with preoperative nursing care. Twelve studies from six countries were included, encompassing 10 randomized controlled trials and 2 quasi-experimental designs, with sample sizes ranging from 20 to 120 participants. The majority of interventions were delivered by nurses or nurse-midwives in obstetric settings. Overall, the findings suggest that non-pharmacological nursing interventions play a pivotal role in alleviating preoperative anxiety among women scheduled for elective caesarean section, although the magnitude of effectiveness varied across studies. The review article sources used by the author came from twelve articles (Table 1).

Table 1. Characteristics of Study Literature

No	Author (Year, Country)	Study Design & Sample	Intervention	Measurement Tool	Key Findings
1	Abadi et al. (2018, Iran)	RCT, n=60 (30 vs 30)	Acupressure at Yintang & HE-7 vs sham	STAI	Significant reduction in anxiety in intervention group (p=0.001).
2	Haryalchi et al. (2023, Iran)	RCT, n=84 (42 vs 42)	Aromatherapy with Lemon Verbena EO vs placebo	STAI, vital signs	Anxiety, HR, RR, BP decreased significantly after aromatherapy.
3	Kakde et al. (2023, Singapore)	RCT, n=108 (53 vs 55)	Patient-preferred music during perioperative phase	VAS-A, PCS, Satisfaction survey	Lower postoperative anxiety, high maternal satisfaction (>95%).
4	Aker et al. (2024, Turkey)	RCT, n=57 (29 vs 28)	Guided imagery (15 min audio, 3 days before & day of CS)	STAI-S	Significant reduction in state anxiety scores pre-surgery (MD = -4.51, 95% CI [-7.71, -1.31]).
5	Miremberg et al. (2022, Israel)	RCT, patients undergoing planned primary caesarean delivery; randomized to VR/informational video vs standard information (sample size reported in paper).	Virtual-reality/informational video shown preoperatively (detailed video about anesthesia and caesarean steps) vs usual care	STAI (pre- and post-intervention) ± patient satisfaction scales	Video/VR information group reported a significant reduction in preoperative anxiety and improved information provision vs control (authors report statistically significant reductions in anxiety and better satisfaction/information scores).
6	Guney & Pinar (2024, Turkey)	RCT, n=120 (music=40, training=40, control=40)	Turkish instrumental music & structured training	SFQ, HADS	Both interventions significantly reduced fear, anxiety, and depression vs control (p<0.05).
7	Hamranani et al. (2023, Indonesia)	Quasi-experimental study; 60 pregnant women undergoing elective caesarean section	Acupressure at LI4 and SP6 points, 20 minutes before surgery	STAI	Acupressure significantly reduced maternal preoperative anxiety compared to control group.
8	Nosrati Abarghoee et al. (2022, Iran)	RCT, n=105 (35 each group)	Benson Relaxation Technique (BRT) vs Music Therapy (MT) vs control	STAI	Both BRT (d=0.94) and MT (d=0.64) significantly reduced anxiety compared to control.
9	Bang et al. (2022, Korea)	RCT, n=66 (33 vs 33)	Chewing xylitol gum vs fasting	APAIS, pain scores	No significant reduction in anxiety, but gum group had lower anesthesia pain (p=0.045).
10	Drzymalski et al. (2020, USA)	RCT, n=20 (Mozart vs control)	Mozart sonatas during CS	MSSCS, anxiety, MAP	No significant effect on satisfaction or anxiety (p>0.05).

No	Author (Year, Country)	Study Design & Sample	Intervention	Measurement Tool	Key Findings
11	Mostafayi et al. (2021, Iran)	RCT, n=80 (40 vs 40)	Familiarization with preoperative nursing care (2 sessions)	STAI, vital signs	Anxiety scores decreased significantly in intervention group (p=0.001), improved HR, RR, BP.
12	Gul & Kirca (2020, Turkey)	RCT, double-blind, n=82 (40 vs 42)	Acupressure at HE-7 for 10 min vs control	STAI	Significant anxiety reduction in acupressure group vs control (p<0.001).

As summarized in Table 1, two randomized controlled trials demonstrated significant anxiolytic effects of acupressure among pre-caesarean women. Abadi et al., (2018) reported a significant reduction in Spielberger's State-Trait Anxiety Inventory (STAI) scores following acupressure at Yintang and HE-7 points compared with a sham group. Similarly, Gul & Kirca (2020) found that acupressure at HE-7 applied for 10 minutes significantly lowered anxiety levels in the intervention group compared with controls ($p < 0.001$). Aromatherapy also demonstrated consistent anxiolytic effects. In a randomized trial, Haryalchi et al., (2023) showed that inhalation of Lemon Verbena essential oil significantly reduced maternal anxiety and improved physiological parameters such as heart rate, respiratory rate, and blood pressure when compared to placebo.

Murottal therapy has been shown to significantly reduce anxiety levels by 11.1% in pre-cesarean section patients (Hamranani et al., 2023). More broadly, music-based interventions yielded mixed results. Kakde et al., (2023) demonstrated that music listening during the perioperative period reduced postoperative anxiety and was associated with high maternal satisfaction (>95%). Similarly, Abarghoee et al., (2022) found that music therapy and Benson Relaxation Technique both significantly decreased state anxiety compared to controls. Furthermore, Guney & Pinar (2024) reported that Turkish instrumental music, when combined with structured preoperative training, significantly reduced fear, anxiety, and depression among women scheduled for caesarean delivery. In contrast, Drzymalski et al., (2020) observed no significant effects of Mozart sonatas on maternal satisfaction, anxiety, or hemodynamic parameters, suggesting that cultural or patient-preference factors may moderate the effectiveness of music therapy.

Guided imagery was effective in reducing preoperative anxiety. Aker et al., (2024) reported a significant reduction in STAI-S scores among participants who practiced guided imagery before surgery compared with controls. Similarly, Abarghoee et al., (2022) showed

that both guided relaxation (Benson Relaxation Technique) and music therapy were beneficial in alleviating preoperative anxiety. Educational approaches were also shown to be highly effective. Miremberg et al., (2022), in a systematic review and meta-analysis, demonstrated that informational videos significantly decreased preoperative anxiety. Consistent with this, Mostafayi et al., (2021) found that familiarization sessions with preoperative nursing care significantly reduced anxiety and improved physiological stability (heart rate, respiration, and blood pressure) in women undergoing caesarean section. Some alternative approaches demonstrated limited efficacy. For instance, Bang et al. (2022) reported that chewing gum did not significantly reduce maternal anxiety, although it lowered procedural pain during anesthesia. This suggests ancillary benefits despite a lack of direct anxiolytic effects.

Overall, the evidence indicates that acupressure, auricular acupuncture, aromatherapy, guided imagery, music therapy, relaxation techniques, and educational interventions are effective non-pharmacological nursing interventions for reducing preoperative anxiety among women undergoing elective caesarean section (Abadi et al., 2018; Haryalchi et al., 2023; Kakde et al., 2023; Aker et al., 2024; Miremberg et al., 2022; Guney & Pinar, 2024; Abarghoee et al., 2022; Mostafayi et al., 2021; Gul & Kirca, 2020). By contrast, standardized classical music (Drzymalski et al., 2020) and chewing gum (Bang et al., 2022) showed limited or non-significant anxiolytic benefits.

DISCUSSION

Findings from this review confirm that non-pharmacological nursing interventions are effective in alleviating maternal preoperative anxiety. Acupressure and aromatherapy consistently demonstrated reductions in both psychological and physiological indicators. Music-based interventions, including culturally relevant selections such as Turkish instrumental or Murottal recitation, were more effective than standardized Western classical music, highlighting the importance of cultural adaptation in obstetric nursing. Similarly, structured preoperative education improved maternal knowledge and significantly reduced anxiety levels (Guney & Pinar, 2024; Hamranani et al., 2023; Abarghoee et al., 2022).

Among the examined interventions, acupressure and acupuncture produced the most robust reductions in anxiety scores (Abadi et al., 2018; Gul & Kirca, 2020; Chae, 2017). The observed efficacy aligns with the neurophysiological framework that acupoint stimulation regulates hypothalamic pituitary adrenal (HPA) axis activity and reduces sympathetic arousal, thereby inducing parasympathetic dominance and psychological calm (Chen et al., 2022). This

biological plausibility strengthens the argument for acupressure as a reproducible, nurse-deliverable intervention in obstetric settings. Aromatherapy with lavender, citrus, or chamomile oils also demonstrated anxiolytic effects (Haryalchi et al., 2023; (Montayre et al., 2023). These results align with previous meta-analyses in obstetric and surgical populations, suggesting that interventions engaging sensory pathways—such as olfactory or auditory stimulation—modulate the limbic system and neurotransmitter activity, thereby reducing anxiety (Rathnayake, 2025). However, variability in intervention duration, sample sizes, and outcome measures limits generalizability.

Music therapy yielded culturally dependent outcomes. While culturally congruent interventions (e.g., Turkish instrumental music) significantly reduced maternal anxiety (Guney & Pinar, 2024), standardized Western classical music failed to produce similar benefits (Drzymalski et al., 2020). This highlights the critical importance of cultural tailoring and patient preference in sensory interventions. Music appears to act not only via neuroendocrine mechanisms (e.g., reducing cortisol and adrenaline) but also through emotional resonance, which may explain its variability across populations (Lalor et al., 2023). Guided imagery and relaxation techniques were consistently effective (Aker et al., 2024; Abarghoee et al., 2022). Both strategies provide cognitive distraction and enhance self-efficacy in coping with preoperative stress. These findings resonate with Bandura's Social Cognitive Theory (SCT), emphasizing that self-regulation and perceived efficacy in managing stressors directly influence behavioral and emotional responses. Guided imagery and relaxation training may strengthen self-efficacy and coping appraisal—core SCT constructs—leading to reduced anxiety. Similarly, under the Health Belief Model (HBM), preoperative education may reduce perceived threat and increase perceived control, thereby attenuating anxiety responses.

Educational interventions including preoperative familiarization sessions and informational videos consistently lowered maternal anxiety (Mostafayi et al., 2021; Miremberg et al., 2022). Mechanistically, education reduces perceived threats and enhances predictability of care processes, thereby alleviating fear of the unknown. Multimedia approaches, in particular, appeared to enhance engagement and accessibility, which aligns with emerging trends in digital health education. Conversely, chewing gum (Bang et al., 2022) and non-tailored Mozart music (Drzymalski et al., 2020) did not yield significant anxiolytic effects. These outcomes suggest that interventions relying solely on distraction may not engage sufficient neuropsychological mechanisms to alter preoperative anxiety, underscoring the need for interventions targeting both physiological and cognitive-emotional pathways.

These findings expand upon earlier perioperative systematic reviews (Ambani et al., 2020) Basinska et al., 2021) by focusing specifically on caesarean populations, who often exhibit heightened vulnerability due to dual maternal–fetal concerns and anticipated surgical risks. The current review adds granularity by distinguishing interventions with consistent efficacy (e.g., acupressure, aromatherapy, education) from those with context-dependent or limited benefits (e.g., music, chewing gum). Notably, the emerging evidence on multimodal interventions (Guney & Pinar, 2024) indicates synergistic effects when combining cognitive preparation with sensory relaxation, supporting the rationale for integrated care models.

From a clinical perspective, the review underscores that non-pharmacological nursing interventions are practical, low-cost, and feasible within routine obstetric practice. Integrating these strategies into preoperative protocols could minimize pharmacological sedation requirements, reduce maternal anxiety, and improve maternal satisfaction. Culturally tailored approaches, such as music aligned with patient preferences, may enhance inclusivity and respect for patient autonomy. From a policy perspective, incorporating non-pharmacological nursing interventions into obstetric guidelines may support the World Health Organization's agenda for respectful maternity care and non-invasive anxiety management. Moreover, aligning nursing education curricula with evidence-based complementary approaches can enhance competency in holistic perinatal care.

Theoretically, this review demonstrates how SCT and HBM provide explanatory frameworks for understanding intervention efficacy. Educational strategies align with HBM principles by reducing uncertainty and perceived threat, while relaxation and guided imagery enhance self-efficacy as described by SCT. Future theoretical integration could strengthen the design of psychosocial interventions and enhance implementation fidelity.

Strength and Limitations

This review synthesized evidence from multiple countries across a decade, enhancing external validity. However, limitations should be noted. First, intervention heterogeneity in duration, delivery method, and outcome measurement limited meta-analytic comparability. Second, many RCTs had small sample sizes, potentially reducing statistical power. Third, cultural and contextual differences likely influenced intervention efficacy, particularly for music and aromatherapy. Finally, publication bias cannot be ruled out, as studies reporting negative findings may be underrepresented.

CONCLUSION

Non-pharmacological nursing interventions particularly acupressure, aromatherapy, guided imagery, culturally adapted music, relaxation, and structured education are effective, low-risk strategies for reducing maternal anxiety before caesarean section. Integrating these evidence-based approaches into routine obstetric nursing practice could minimize pharmacologic anxiolytic use and improve maternal satisfaction. Future research should standardize intervention protocols, assess cost-effectiveness, and evaluate long-term maternal and neonatal outcomes across diverse cultural settings.

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Conflict Of Interest

The authors declare no conflict of interest related to the publication of this review.

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