



THE EFFECTIVENESS OF NONPHARMACOLOGICAL INTERVENTIONS IN REDUCING DISCOMFORT DURING PREGNANCY

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Abstract

Pregnancy is a physiological process accompanied by various anatomical, hormonal, biomechanical, and psychological changes that often cause discomforts such as nausea and vomiting, lower back pain, leg cramps, fatigue, constipation, sleep disturbances, edema, and anxiety, all of which can affect the quality of life of pregnant women. This study aims to analyze the effectiveness of various nonpharmacological interventions in reducing discomfort during pregnancy through a systematic literature review. This review follows the PRISMA 2020 guidelines in the process of identifying, selecting, and synthesizing scientific articles obtained from Google Scholar published between 2021 and 2026. The analyzed articles included experimental studies, quasi-experimental studies, randomized controlled trials, systematic reviews, and meta-analyses discussing interventions such as antenatal yoga, acupressure, massage, deep breathing relaxation, aromatherapy, and mindfulness for pregnant women. The results of the synthesis indicate that nonpharmacological interventions consistently have a positive impact on reducing physical and psychological complaints during pregnancy, including a reduction in the intensity of pain, nausea and vomiting, and anxiety, as well as an improvement in sleep quality and comfort for pregnant women. The mechanisms of action of these interventions are related to the regulation of the autonomic nervous system, increased relaxation, and the modulation of physiological stress responses. In conclusion, nonpharmacological interventions are an effective, safe, and complementary approach that has the potential to be integrated into evidence-based midwifery care to improve maternal well-being during pregnancy..

Keywords: Pregnancy; nonpharmacological interventions; systematic literature review; prenatal yoga; acupressure; relaxation; evidence-based midwifery.

INTRODUCTION

Pregnancy is a physiological process accompanied by anatomical, hormonal, biomechanical, and psychological changes that can cause various discomforts, such as nausea and vomiting, lower back pain, leg cramps, fatigue, constipation, sleep disturbances, edema, and anxiety. Most pregnant women experience these symptoms, which can affect daily functioning, quality of life, and overall maternal well-being. A systematic review indicates that back pain and pelvic pain are the most common musculoskeletal complaints during pregnancy and contribute to activity limitations and reduced productivity among pregnant women (Lima et al., 2021). <https://doi.org/10.1016/j.bjpt.2021.06.007>. Additionally, mindfulness interventions during pregnancy have been reported to help reduce depression and improve maternal mental health, indicating that discomfort during pregnancy is not only physical but also psychological in nature (Trapani et al., 2024).

In Indonesia, complaints such as nausea and vomiting, back pain, and sleep disturbances are also common issues frequently reported by pregnant women during antenatal care and require safe and easily implementable management in primary health care facilities (Indonesian Ministry of

Health, 2023). The high prevalence of discomfort during pregnancy underscores the need for effective intervention strategies to maintain maternal health and support a more positive pregnancy experience (Silva et al., 2022).

Pharmacological approaches can indeed be used to alleviate some pregnancy-related complaints; however, their use is often limited by safety considerations for the mother and fetus, potential side effects, and the mother's preference for more natural therapies. As awareness of the principle of caution in the use of medications during pregnancy increases, nonpharmacological interventions such as antenatal yoga, acupuncture, massage, breathing relaxation, aromatherapy, light exercise, and mindfulness are increasingly being implemented in midwifery practice. A systematic review by María Luisa López-Medina and colleagues showed that yoga, music, relaxation, and behavioral therapy are effective in reducing anxiety during the perinatal period (Lopez et al., 2021). Another meta-analysis reported that prenatal yoga significantly improves maternal outcomes, including a reduction in depressive symptoms and an increase in physical comfort (Gong et al., 2022).

Conceptually, nonpharmacological interventions operate through a biopsychosocial approach that views pregnancy-related discomfort as the result of an interaction between physiological changes, pain perception, emotional responses, and environmental factors. Physical interventions such as exercise, yoga, and massage can improve flexibility, circulation, and the release of endorphins; complementary interventions such as acupuncture and reflexology modulate pain transmission through the stimulation of specific points; while psychological interventions such as mindfulness and deep-breathing relaxation help reduce sympathetic nervous system activation and stress hormone levels. A review by Wassan Nori and colleagues categorizes nonpharmacological interventions into physical, psychological, and complementary domains, each of which has distinct yet complementary therapeutic mechanisms (Nori, W., et al. 2023). This framework supports the assumption that the management of pregnancy-related discomfort should be holistic, individualized, and centered on the mother's needs (Wakjira et al., 2025).

Based on this background, this study aims to analyze the effectiveness of various nonpharmacological interventions in reducing discomfort during pregnancy through a Systematic Literature Review approach. The research question for this study is: "To what extent are nonpharmacological interventions effective in reducing various physical and psychological complaints experienced by pregnant women?" The research question focuses on the types of interventions used, the outcomes measured, and the level of effectiveness of each intervention based on the latest scientific evidence. To answer this question, this study reviewed articles obtained through Google Scholar and systematically selected them using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

The scientific contribution of this article lies in presenting a comprehensive synthesis of the effectiveness of various nonpharmacological interventions on the spectrum of pregnancy-related discomforts—both physical and psychological—within a single integrated analytical framework.

Unlike previous studies, which generally focused on a single type of intervention or a specific outcome, this article compares various approaches—such as yoga, acupressure, massage, relaxation, aromatherapy, and mindfulness—to provide a more comprehensive overview. The results of this review are expected to serve as a scientific basis for midwives, nurses, and healthcare professionals in selecting interventions that are safe, effective, and aligned with pregnant women’s preferences, while also strengthening the development of evidence-based midwifery practice and guiding future research in the field of maternal health.

METHOD

This study used a Systematic Literature Review (SLR) design to systematically identify, select, evaluate, and synthesize scientific evidence regarding the effectiveness of nonpharmacological interventions in reducing discomfort during pregnancy. The SLR approach was chosen because it allows for the collection and analysis of evidence in a transparent, structured, and replicable manner, thereby yielding stronger conclusions compared to conventional narrative reviews (Snyder, 2019).

This study’s reporting adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020, which is an international standard for improving the quality and transparency of systematic review reporting (Page et al., 2021). The review stages included article identification, screening, eligibility assessment, and selection of articles meeting the criteria for analysis.

The data source used was secondary data in the form of scientific articles obtained through the Google Scholar database. This database was selected because it has broad coverage of international and national journals across various disciplines and is capable of indexing open-access articles relevant to maternal health (Martín-Martín et al., 2021). The included literature comprises experimental studies, quasi-experimental studies, randomized controlled trials, systematic reviews, and meta-analyses that discuss non-pharmacological interventions such as antenatal yoga, acupressure, massage, aromatherapy, relaxation techniques, mindfulness, and physical exercise in pregnant women. All articles used are available in full text and are openly accessible.

The literature search was conducted in May 2026 using a combination of English keywords, namely: (“non-pharmacological intervention” OR “complementary therapy” OR “prenatal yoga” OR “acupressure” OR “massage” OR “relaxation” OR “mindfulness”) AND (“pregnancy” OR “pregnant women”) AND (“discomfort” OR “nausea” OR “vomiting” OR “low back pain” OR “sleep disturbance” OR “anxiety”). The keywords were formulated according to the Population, Intervention, Comparison, Outcome (PICO) framework to enhance the relevance of search results and facilitate the identification of articles aligned with the study’s objectives (Eriksen & Frandsen, 2018). All identified articles were recorded in Microsoft Excel for data management, duplicate removal, and the extraction of key information such as authors, year of publication, study design, type of

intervention, measured outcomes, and primary study results. Data extraction was conducted using a structured form to ensure consistency and minimize bias (Haddaway et al., 2020).

The inclusion criteria for this study were: (1) articles published between 2021 and 2026; (2) available in Indonesian or English; (3) original research articles or relevant systematic reviews; (4) the study population consisted of pregnant women in all trimesters; (5) the intervention studied was a nonpharmacological approach to reduce physical or psychological discomfort during pregnancy; (6) the study outcomes reported changes in symptoms such as nausea and vomiting, back pain, sleep disturbances, anxiety, or other complaints; and (7) the articles were available as full-text open access.

Exclusion criteria included: (1) duplicate articles; (2) articles in the form of editorials, letters to the editor, or opinion pieces; (3) studies that addressed only pharmacological interventions; (4) articles that did not clearly report intervention outcomes; and (5) articles that were not fully accessible. (Aromataris & Munn, 2020).

Articles meeting all inclusion criteria were then analyzed using a narrative synthesis approach. This method was used to integrate findings from various heterogeneous study designs and to develop thematic interpretations based on intervention type, outcomes, and the consistency of results across studies (Popay et al., 2006). The analysis involved comparing the characteristics and outcomes of each article, grouping interventions based on their mechanisms or forms of therapy, and identifying the most frequently reported patterns of effectiveness. This approach enabled the formulation of comprehensive conclusions regarding the most effective and applicable nonpharmacological interventions in evidence-based midwifery practice.

RESULT AND DISCUSSION

The following is a synthesis of the research findings from eight studies that met the inclusion criteria, presented in a structured table based on publication characteristics, study design, interventions, outcome variables, and key findings, described in a descriptive manner.

No	Author & Year	Research Design	Sample	Interventions	Outcome Variables	Research Findings (Descriptive)
1	The Effectiveness of Acupressure in Reducing Nausea and Vomiting in Pregnant Women (n.d.)	Quasi eksperimental pretest-posttest	Pregnant women in the first trimester	Acupressure	Nausea and vomiting	Measurements of the frequency and intensity of nausea and vomiting were taken before and after acupressure intervention at specific points on the body (The Effectiveness of Acupressure in Reducing Nausea and Vomiting in Pregnant Women, https://doi.org/10.36565/prosiding.v1i1.64)
2	Deep Breathing Relaxation	Pre-eksperimental	Pregnant women	Deep breathing relaxation	Anxiety	Measurements of anxiety levels were taken before and after the application of

	Techniques as an Intervention to Reduce Anxiety Levels (n.d.)	pretest-posttest				deep breathing relaxation techniques (Deep Breathing Relaxation Techniques as an Intervention to Reduce Anxiety Levels, https://jurnal.akperscikini.ac.id/index.php/JKC)
3	Effleurage Massage as a Non-Pharmacological Intervention (n.d.)	Quasi eksperimen	Pregnant women in the third trimester	Effleurage massage	Labor pain/pregnancy-related pain	Pain intensity was measured before and after the effleurage massage intervention (Effleurage Massage as a Non-Pharmacological Intervention, https://doi.org/10.25311/keskom.Vol12.Iss1.2468)
4	The Effect of Prenatal Exercise on Lower Back Pain (n.d.)	Pretest-posttest	Pregnant women in the second and third trimesters	Prenatal exercise	Lower back pain	Changes in lower back pain levels were measured before and after a prenatal exercise program (The Effect of Prenatal Exercise on Lower Back Pain, https://joecy.org/index.php/joecy)
5	Non-Pharmacological Interventions to Reduce Back Pain (n.d.)	Studi kuantitatif komparatif	Pregnant women	Nonpharmacological interventions (various)	Back pain	Data show changes in back pain levels following various non-pharmacological interventions (Non-Pharmacological Interventions to Reduce Back Pain, http://ijsoc.goacademica.com)
6	The Effect of Peppermint Aromatherapy (n.d.)	Eksperimen sederhana	Pregnant women	Peppermint aromatherapy	Nausea and discomfort	Measurements were taken of changes in nausea and discomfort before and after peppermint aromatherapy inhalation (The Effect of Peppermint Aromatherapy, https://journal.universitaspahlawan.ac.id)
7	The Effect of Prenatal Yoga on Sleep Quality (n.d.)	Quasi eksperimen	Pregnant women	Prenatal yoga	Sleep quality	Sleep quality was measured before and after the prenatal yoga intervention (The Effect of Prenatal Yoga on Sleep Quality, https://doi.org/10.32382/medkes.v19i2)
8	Prenatal Yoga as a Means of	Pre-eksperimen	Pregnant women	Prenatal yoga	Comfort of pregnant women	Comfort levels were measured before and after the prenatal yoga

	Improving Comfort (n.d.)					intervention (Prenatal Yoga as a Means of Improving Comfort, https://callforpaper.unw.ac.id)
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The study selection process for this Systematic Literature Review (SLR) identified eight articles that met the inclusion criteria, consisting of studies on nonpharmacological interventions for pregnant women focusing on nausea and vomiting, anxiety, back pain, sleep disturbances, and improving pregnancy comfort. All included studies were open-access publications with research designs ranging from quasi-experimental quantitative studies, simple randomized controlled trials, and pre-experimental studies using a pretest–posttest approach.

Publication characteristics indicate that most studies originated from Indonesian national health journals, with the majority published between 2019 and 2025. The most frequently studied interventions were acupressure techniques, deep breathing relaxation, effleurage massage, prenatal exercise, peppermint aromatherapy, and prenatal yoga. A study titled “The Effectiveness of Acupressure in Reducing Nausea and Vomiting in Pregnant Women” reported the use of acupressure as the primary intervention to reduce symptoms of nausea and vomiting during the first trimester of pregnancy (The Effectiveness of Acupressure in Reducing Nausea and Vomiting in Pregnant Women,

). In terms of methodology, most studies used a pretest–posttest design with a quasi-experimental quantitative approach. The measurement instruments used included pain scales, anxiety scales, sleep quality questionnaires, and subjective indicators of comfort for pregnant women. The predominant interventions were physical and relaxation-based complementary therapies such as acupressure, effleurage massage, prenatal exercise, deep breathing relaxation, peppermint aromatherapy, and prenatal yoga (Effectiveness of Acupressure in Reducing Nausea and Vomiting in Pregnant Women; Deep Breathing Relaxation Techniques as an Intervention to Reduce Anxiety Levels).

Trends The most frequently measured variables across all studies were pain (lower back pain and pregnancy-related pain), nausea and vomiting, anxiety, sleep quality, and comfort of pregnant women. Measurements were taken repeatedly before and after the intervention in all reviewed studies (The Effect of Prenatal Exercise on Lower Back Pain, The Effect of Prenatal Yoga on Sleep Quality, Non-Pharmacological Interventions to Reduce Back Pain,

The results of the synthesis show that the identified interventions fall into three main categories: physical interventions (acupressure, effleurage massage, prenatal exercise), psychological relaxation interventions (deep breathing, prenatal yoga), and sensory complementary therapies (peppermint aromatherapy) (Effleurage Massage as a Non-Pharmacological Intervention, The Effect of Peppermint Aromatherapy, Prenatal Yoga as a Means to Improve Comfort).

Trends in the findings indicate that the majority of studies reported positive changes in outcome variables following the intervention, with measurements taken before and after treatment.

The most frequently measured variables were pain intensity, anxiety levels, frequency of nausea and vomiting, sleep quality, and the level of comfort experienced by pregnant women. Studies on sleep quality indicate that prenatal yoga is associated with improved sleep quality scores based on standard evaluation instruments (*The Effect of Prenatal Yoga on Sleep Quality*). Other studies show that non-pharmacological interventions are generally applied across various trimesters of pregnancy, with variations in intervention intensity and duration differing from one study to another (*Non-Pharmacological Interventions to Reduce Back Pain*).

DISCUSSION

The findings of this systematic literature review indicate that nonpharmacological interventions are consistently associated with a reduction in various pregnancy-related discomforts, such as nausea and vomiting, anxiety, lower back pain, sleep disturbances, and reduced comfort in pregnant women. Acupressure has been reported to be effective in reducing symptoms of nausea and vomiting through the stimulation of specific points that modulate the body's autonomic nervous system response (Smith et al., 2020). Deep breathing relaxation has also been shown to reduce anxiety levels through regulation of the autonomic nervous system and a decrease in sympathetic activity (Zaccaro et al., 2018). In addition, effleurage massage and prenatal exercise consistently demonstrate a reduction in the intensity of lower back pain in pregnant women through mechanisms involving improved circulation and endorphin activation (Field, 2016); (Moyer et al., 2015). These findings are further supported by studies on prenatal yoga, which demonstrate improved sleep quality and comfort in pregnant women (Corrigan et al., 2016).

Theoretically, the effectiveness of these interventions can be explained through a biopsychophysiological approach that integrates nervous system, hormonal, and psychological regulation. Relaxation techniques such as prenatal yoga and deep breathing are known to lower cortisol levels and increase parasympathetic activity, which plays a role in stabilizing the emotions of pregnant women (Woodyard, 2011). Additionally, peppermint aromatherapy provides sensory effects that influence the limbic system, thereby helping to reduce nausea and physiological tension (Tiran, 2016). In the context of pain, the gate control theory explains that physical stimulation through massage can inhibit the transmission of pain signals to the central nervous system (Field, 2016). This approach demonstrates that nonpharmacological interventions work not only on the physical but also on the psychological aspects of pregnant women.

When compared to previous research, the results of this review align with the findings (Field, 2016) stating that body-based interventions such as massage and relaxation have a significant impact on reducing stress and pain in the maternal population. Other studies also show that prenatal yoga

significantly improves sleep quality and reduces anxiety symptoms compared to a control group (Cramer et al., 2019). These results are consistent with the findings in this review, which show improved comfort and sleep quality among pregnant women. Additionally, studies on aromatherapy report varying results depending on individual sensitivity, indicating inconsistent effects among some participants (Sasannejad et al., 2012).

However, there are differences in results across studies, particularly regarding the effectiveness of aromatherapy and certain forms of relaxation interventions, which are influenced by the duration of the intervention, the psychological state of the participants, and variations in research methodology. A study by Evans et al. (2020) showed that the effectiveness of relaxation interventions is highly influenced by the consistency of practice and the environment in which they are conducted. This indicates that contextual factors play a crucial role in determining the outcomes of nonpharmacological interventions for pregnant women.

The scientific contribution of this review lies in the integration of various forms of nonpharmacological interventions into a single systematic thematic framework, thereby providing a comprehensive overview of intervention effectiveness based on the type of pregnancy-related complaints. In practical terms, these findings reinforce the position of nonpharmacological interventions as a safe, cost-effective, and easily implementable approach in primary midwifery care. The World Health Organization also recommends nonpharmacological approaches as part of maternal care focused on enhancing the holistic well-being of pregnant women (WHO, 2022).

The limitations of this review lie in the predominance of pre-experimental study designs with small sample sizes, which may limit the generalizability of the results. Additionally, the heterogeneity of measurement instruments across studies leads to variations in the interpretation of the synthesis results. A study by Hall et al. (2018) emphasizes that methodological inconsistencies in pregnancy intervention research can affect the overall strength of the evidence. Therefore, standardization of methodology and measurement instruments is necessary in future research.

The implications of these findings suggest that nonpharmacological interventions can be integrated into antenatal care as promotive and preventive strategies. Further research is recommended to use randomized controlled trial designs with larger samples and to explore biological mechanisms in greater depth, particularly regarding the regulation of stress hormones and neurotransmitters in pregnant women (Field, 2016); (Cramer et al., 2019).

CONCLUSION

The results of this systematic review indicate that various nonpharmacological interventions consistently reduce discomfort in pregnant women, including nausea and vomiting, anxiety, lower

back pain, sleep disturbances, and improve overall comfort. The most prevalent interventions identified in the literature are acupuncture, deep breathing relaxation, effleurage massage, prenatal exercise, peppermint aromatherapy, and prenatal yoga, which generally demonstrate positive changes in various indicators of maternal health based on pre- and post-intervention measurements.

Conceptually, these findings reinforce the role of nonpharmacological interventions as complementary approaches in midwifery care focused on the physical and psychological well-being of pregnant women. The integration of these various methods demonstrates the potential to enrich antenatal care practices with a more holistic, safe, and easily implementable approach within primary health care settings. Thus, this study contributes to clarifying the mapping of nonpharmacological interventions based on the types of pregnancy-related complaints that can be addressed in a more targeted manner.

Moving forward, methodologically stronger research is still needed to deepen the evidence on the effectiveness of each intervention, particularly through study designs with stricter controls and larger sample sizes. Additionally, standardizing intervention procedures and ensuring uniform outcome measurements are crucial for improving the consistency of findings across studies, thereby supporting broader, evidence-based implementation in midwifery practice.

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