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The effectiveness of effleurage and counter-pressure massage in reducing labor pain intensity during the first stage of labor: A literature review

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Abstract

Background: Labor pain during the first stage of labor is a physiological condition caused primarily by uterine contractions, cervical dilatation, and pressure on the pelvic structures. Although pharmacological methods are available, nonpharmacological interventions such as effleurage and counter-pressure massage are increasingly used because they are simple, inexpensive, and have minimal adverse effects. However, evidence regarding the comparative effectiveness of these techniques remains variable.

Purpose: To review and synthesize the available evidence regarding the effectiveness of effleurage and counter-pressure massage in reducing labor pain intensity during the first stage of labor.

Method: A literature review was conducted through searches of PubMed, ScienceDirect, and Google Scholar for articles published between January 2021 and June 2026. Articles were selected according to predefined inclusion and exclusion criteria. Eligible studies included original research articles, randomized controlled trials, quasi-experimental studies, and clinical trials involving women in the first stage of labor and evaluating effleurage, counter-pressure, or related massage interventions. Nine articles were included in the review.

Results: The reviewed studies generally demonstrated that massage-based nonpharmacological interventions reduced labor pain intensity and improved maternal comfort. Effleurage massage was associated with reduced pain through tactile stimulation, relaxation, and distraction, whereas counter-pressure appeared particularly beneficial for women experiencing lower back pain during contractions. Direct comparative evidence indicated that both techniques were effective, although some studies reported greater pain reduction with counter-pressure. Other benefits included reduced anxiety, increased comfort, and improved childbirth satisfaction.

Conclusion: Effleurage and counter-pressure massage are promising nonpharmacological interventions for managing pain during the first stage of labor. Effleurage may be particularly useful for promoting relaxation and reducing generalized pain perception, whereas counter-pressure may be more appropriate for women experiencing predominant lower back pain. The choice of technique should consider maternal preference, pain location, labor progression, and practitioner skill.

Keywords: Effleurage Massage; Counter-Pressure Massage; First Stage of Labor; Labor Pain; Nonpharmacological Intervention.

INTRODUCTION

Childbirth is a physiological process involving uterine contractions, cervical dilation, and the descent of the fetus until the baby is born. Although it is a natural process, nearly all mothers experience pain during labor, especially during the active phase of the

first stage. This pain stems from uterine contractions, cervical dilation, stretching of the lower uterine segment, and pressure from the fetal head against the pelvic structures and the lumbosacral plexus. If not adequately managed, labor pain can increase the

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release of stress hormones such as catecholamines and cortisol, leading to uteroplacental vasoconstriction, reduced effectiveness of uterine contractions, increased maternal anxiety, and the potential for a prolonged labor process (Beyable et al., 2022; Nori et al., 2023).

Maternal health remains one of the key indicators of global health development. The World Health Organization (WHO) reports that approximately 287,000 women died from pregnancy and childbirth complications in 2020, with about 95% of these deaths occurring in low- and middle-income countries. In addition to reducing maternal mortality rates, the WHO also emphasizes the importance of providing high-quality maternity care through respectful maternity care, including pain management during labor, so that mothers can have a safe, comfortable, and dignified childbirth experience.

Efforts to improve the quality of childbirth services are a national priority. According to the 2024 Indonesia Health Profile, the majority of births are attended by health workers in health care facilities. However, improving the quality of care is not only focused on the safety of mothers and babies but also on the quality of care that can reduce pain, anxiety, and trauma during childbirth, thereby ensuring mothers have a positive childbirth experience.

Labor pain management can be achieved through both pharmacological and nonpharmacological methods. Pharmacological methods, such as opioid analgesics and epidural anesthesia, have been proven effective but can cause side effects in both the mother and the baby and require adequate facilities. Therefore, nonpharmacological methods are increasingly recommended because they are relatively safe, inexpensive, easy to implement, and have minimal side effects. Various nonpharmacological techniques that have been used include relaxation techniques, hydrotherapy, aromatherapy, acupressure, massage, warm compresses, breathing techniques, music therapy, and birth balls (Beyable et al., 2022; Nori et al., 2023).

The latest scientific evidence indicates that nonpharmacological interventions are effective in reducing labor pain. Systematic reviews and network meta-analyses show that various nonpharmacological interventions can reduce the intensity of labor pain compared to standard care,

with massage therapy being one of the interventions that provides clinically meaningful benefits in terms of pain reduction and improved maternal comfort (Hu et al., 2021). Furthermore, a systematic review published in 2024 also concluded that effleurage massage, endorphin massage, deep back massage, music therapy, and combinations of several nonpharmacological interventions consistently produce positive effects in reducing pain during the first stage of labor.

One widely used technique is effleurage massage, which involves light massage using longitudinal or circular movements on the abdomen or back during contractions. This technique operates based on the Gate Control Theory, whereby stimulation of A-beta nerve fibers inhibits the transmission of pain impulses to the central nervous system while simultaneously stimulating the release of endorphins the body's natural analgesics. Various studies have reported that effleurage massage can reduce pain intensity, promote relaxation, improve comfort, and increase maternal satisfaction during the labor process. The counter-pressure technique is also a widely used nonpharmacological method, particularly for mothers experiencing back pain during the first stage of labor. This technique involves applying firm pressure to the sacral region during contractions, thereby reducing pressure on the lumbosacral plexus, improving local blood circulation, and reducing pain perception through the stimulation of mechanoreceptors. Several studies have shown that counter pressure can significantly reduce pain intensity and improve maternal comfort during labor (Nori et al., 2023; Rabello, 2023).

Although research on effleurage massage and counter pressure has advanced rapidly in recent years, study results remain inconsistent due to differences in participant characteristics, intervention methods, duration of therapy, and the pain measurement instruments used. Furthermore, few studies have specifically integrated the latest scientific evidence regarding the effectiveness of these two techniques into a single comprehensive synthesis. Therefore, a literature review is needed to identify, evaluate, and synthesize the latest scientific evidence regarding the effectiveness of effleurage and counter-pressure massage in reducing pain intensity during the first stage of labor. The results of

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this review are expected to serve as a scientific basis for midwives and healthcare professionals in implementing evidence-based nonpharmacological interventions to improve the quality of safe, comfortable, and mother-centered labor care. This article is a literature review aimed at identifying, evaluating, and synthesizing scientific evidence regarding the effectiveness of effleurage and counter-pressure massage in reducing pain intensity during the first stage of labor.

RESEARCH METHOD

This study used a literature review design to identify and synthesize research evidence regarding the effectiveness of effleurage and counter-pressure massage in reducing labor pain during the first stage of labor. The literature search was conducted in July 2026 using three electronic databases: PubMed, ScienceDirect, and Google Scholar.

The search was limited to articles published between January 2021 and June 2026. The search strategy used combinations of keywords related to the population, intervention, and outcome, including "effleurage massage," "counter-pressure massage," "labor pain," "labour pain," "first stage of labor,"

"childbirth," and "nonpharmacological pain management." Boolean operators such as AND and OR were used to broaden or narrow the search.

The inclusion criteria were: (1) original research articles; (2) randomized controlled trials, quasi-experimental studies, or clinical trials; (3) studies involving women during the first stage of labor; (4) studies evaluating effleurage massage, counter-pressure massage, or closely related massage interventions; (5) articles published between 2021 and 2026; and (6) full-text articles available for review. Articles were excluded if they were duplicates, had incomplete data, were not original research, or did not assess massage-based interventions relevant to labor pain management.

The article selection process consisted of identification, screening, eligibility assessment, and inclusion. Duplicate records were removed before title and abstract screening. Potentially relevant articles were subsequently assessed through full-text review based on the predefined eligibility criteria. The final studies were analyzed descriptively based on author and year, country, study design, sample, intervention, pain measurement instrument, and principal findings. The reporting of the study selection process was presented using a PRISMA-based flow diagram.

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RESEARCH RESULTS

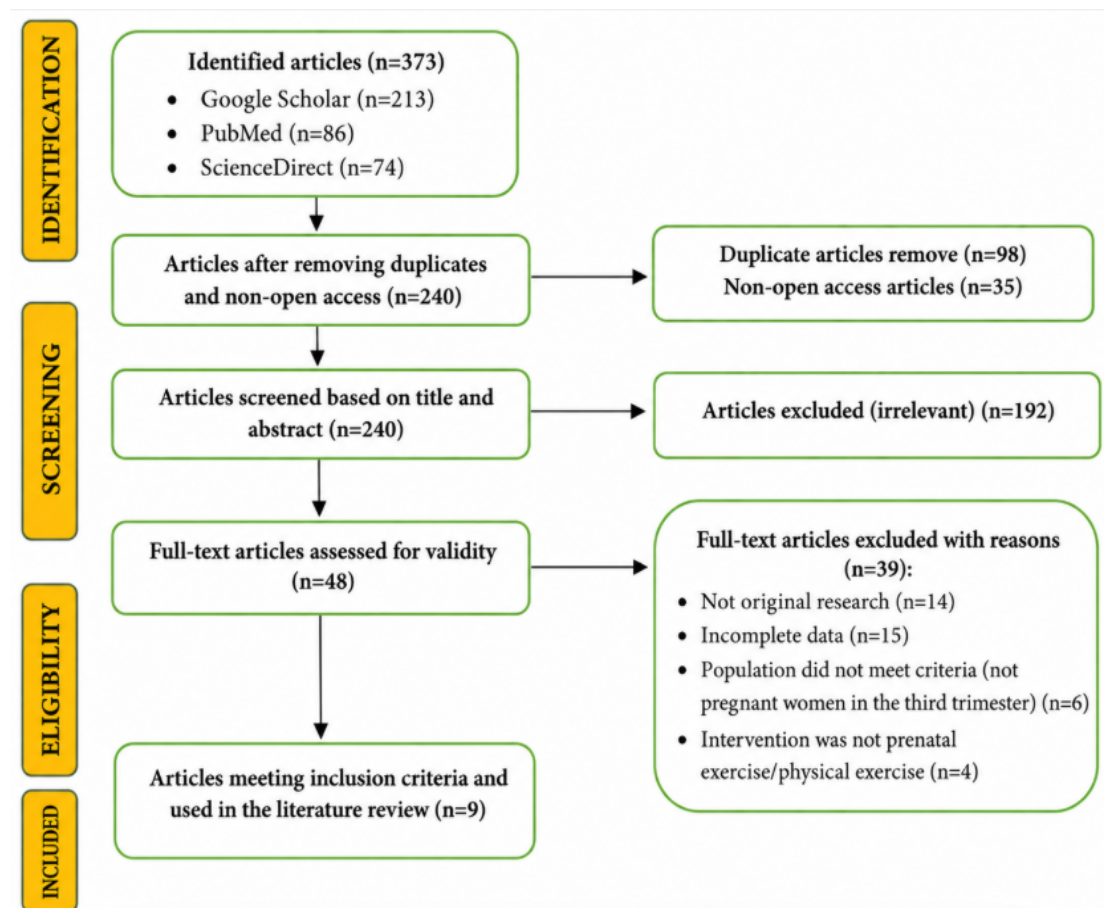


Figure 1. Study identification and inclusion process (PRISMA flow chart)

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Table Summary of Selected Articles

(Author, Year)(Country)	Purpose	Design & Method	Results
(Türkmen & Oran, 2021) (Turkey)	To determine the effects of sacral massage and heat application on the perceptions of labor pain and comfort level in pregnant women.	This was a quasi-randomized controlled experimental study. The data were collected under three groups in 2016: the heat application group (HAG), the massage group (MG), and the control group (CG). Each group included 30 primiparous pregnant women (range of age: 17–35) whose cervix was dilated to 4–5 cm. At 4–5 cm, 6–7 cm, and 8–9 cm cervical dilation, sacral massage was applied to MG, and sacral heat application was applied to HAG. Each group received standard midwifery care during labor. The data were collected using the Childbirth Comfort Questionnaire (CCQ) and the Numerical Rating Scale (NRS). The data were analyzed by using the Chi-square test, the Friedman test, Paired sample t-test, ANOVA, the Kruskal-Wallis test, and Wilcoxon signed-ranks test.	Heat application and massage can be used as a safe and effective midwifery intervention to reduce the perception of pain in pregnant women and provide comfort during labor.
(Kaçar & Keser, 2021) (Turkey)	To compare the effects of mechanical and warm mechanical massage application in reducing labor pain and enhancing childbirth satisfaction in primipara women.	A randomized-controlled trial was conducted on 210 primipara women. Subjects were randomly divided into three groups (each group comprised 70 women) to receive either a mechanical massage, warm mechanical massage, or routine care (control). The intervention was applied twice on the lumbosacral section (relating to the back part of the pelvis between the hips) and pain level was assessed by using the visual analogue scale (VAS) before the intervention, immediately, half an hour and at 1 hour after intervention. The labor satisfaction level was	Comparing the intervention groups, there were no significant differences in terms of VAS scores in admission to hospital and immediately after the first intervention, but there were significant differences in terms of VAS scores at half an hour and an hour after the first intervention, and immediately, half an hour and 1 hour after the second intervention, and at 30th min postpartum. The pain level and mean duration of labor for each intervention group were found to be lower than the control

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(Goh et al., 2021) (Malaysia)	To evaluate the combined effect of massage and warm compress to the perineum (MassComp) compared with standard "hands-off" in the second stage of labor.	assessed by using the childbirth experience questionnaire (CEQ) at 30 minutes postpartum. A randomized trial was conducted in a University hospital in Malaysia. Nulliparous women at term who were about to start pushing were randomized to massage during pushing and warm compress to the perineum in between pushes or to standard "hands-off" care. Primary outcome was suturing for perineal injury (episiotomy or tear).	group, and childbirth satisfaction score points were higher than the control group. Massage and warm compress during pushing decreased the perineal suturing, major perineal injury, and episiotomy rates and improved maternal satisfaction
(Taşkın & Ergin, 2022) (Turkey)	To determine the effect of warm water bathing on pain, anxiety, and comfort during the first stage of labor.	Kami melakukan studi terkontrol secara acak mengenai efek mandi air hangat terhadap nyeri, kecemasan, dan kenyamanan selama tahap pertama persalinan. Sampel kami mencakup 104 wanita primigravida.	The use of a warm shower during the first stage of labor can reduce pain and anxiety, positively impact comfort during labor, and shorten the duration of the transition phase.
(Karatopuk & Yarıcı, 2023) (Turkey)	To reveal the effect of lavender essence inhalation and the massage therapy applied with lavender oil on the severity of labor pain of primiparous women.	This randomized controlled trial was conducted with three groups. Pregnant women participating in the study were randomly divided into control group (n=40), lavender essence inhalation group (n=44) and lavender essence massage (n=37) groups. The applications were divided in three for each phase in the first stage of labor (early, active and transition). Thereafter sacral compression and circular massage were applied for 15 minutes on the lower back (waist) region of the participants by using 2 drops of lavender oil in each phase of labor; 2 drops of lavender oil were dripped onto the palms of the participants in the inhalation group by the researcher and they were asked to inhale it for 3 minutes. Research data were collected using Personal Information Form (PIF), Visual Analogue Scale (VAS) and Postpartum Assessment of Women Survey (PAWS).	The results of the research revealed that the labor pain perceived by the women who were applied inhalation and massage therapy using lavender essential oil were milder compared to the control group (p<0.05). Another finding of the research revealed that the lavender oil inhalation gave the best results in the latent phase, however the massage therapy with lavender oil was more effective in the active and transition phases.

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(Ahmed et al., 2021) (Saudi Arabia)	To examine the effect of counter-pressure versus effleurage massages on labor pain intensity among parturient women.	A quasi-experimental design (nonequivalent control group pretest/posttest) was adopted. A purposive sample of 96 parturient women was recruited and allocated to either control, counter-pressure, or effleurage massage group. This study was conducted at inpatient obstetrics and gynecology department of Kafrelsheikh general hospital, Kafrelsheikh governorate, Egypt. Data were collected using two tools: structured interviewing questionnaire schedule and Numeric Pain Rating Scale (NPRS).	The mean pain scores at baseline assessment did not show a significant difference between the control group and interventions groups ($p > 0.05$). However, at 30 minutes, 1 hour, and 2 hours after intervention the differences in mean pain scores between the control group and interventions groups were highly statistically significant ($p < 0.001$). When comparing mean pain scores between counter-pressure and effleurage groups the differences were not statistically significant either at baseline assessment or after intervention ($p > 0.05$).
(Azima et al., 2026) (Iran)	to compare the effects of two massage methods rotational effleurage massage and connective tissue massage (CTM) on pain intensity and labor outcomes. The study subjects in the two intervention groups received effleurage massage and connective tissue massage, but the control group did not receive any intervention and only routine labor care was provided to them.	This quasi-experimental, multicenter study was conducted on 90 pregnant women (gestational age 38-40 weeks) admitted in labor at three hospitals. Participants were selected through convenience sampling and randomly allocated into three groups of 30 using permuted block randomization within each center. Although random allocation was performed, due to the multicenter design and non-probability sampling, the study is more accurately classified as quasi-experimental. Written informed consent was obtained from all participants	Pain intensity significantly decreased in both intervention groups compared to the control group at all stages of the active phase of labor ($p < 0.001$). At 7–8 cm dilation, the mean pain scores were 6.13 ± 0.94 in the effleurage group, 6.23 ± 0.77 in the connective tissue massage group, and 7.87 ± 0.86 in the control group ($p < 0.001$). Effleurage massage demonstrated greater efficacy than connective tissue massage in reducing pain during the later stages of active labor ($p < 0.05$).

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(Pratiwi et al., 2021) (Indonesia)	To analyze the effectiveness of abdominal lifting, effleurage and deep back massage techniques in reducing pain during active phase of first stage labor.	This study used one-group pretest-posttest design method with a total sample of 30 Participants mother in labor. There were 3 groups that were given treatment, each group was given one massage technique. Change in pain was measured by a numerical pain scale. Testing variables using the Wilcoxon test, comparison of each intervention test performed using Kruskal Wallis.	There is a significant difference in pain scores before and after giving abdominal lifting massage with a value of $p = 0.005$ ($p < 0.05$). There was a significant difference in pain scores before and after giving effleurage massage with a value of $p = 0.011$ ($p < 0.05$). There is a significant difference in pain scores before and after giving Deep Back Masaage with a value of $p = 0.004$ ($p < 0.005$). There was no significant difference in pain scores after treatment between the three groups with a value of $p = 0.080$ ($p > 0.05$).
(Doloksaribu et al., 2025) (Indonesia)	To find out the difference in the effectiveness of massage counterpressure and massage effleurage on labor pain	This research was carried out at the Longkib Health Center which used the Quasi Experiment research method with a pre-test post-test control design approach. Sample selection was carried out by consecutive sampling technique, the sample number was 20 respondents (10 respondents for counterpressure massage and 10 respondents for massage effleurage). The pain measurement used, namely the Numeric Rating Scale (NRS), was then processed in the SPSS computer program version 22.	Data were processed using the Mann-Whitney test with the result p value = 0.009. This shows that the value of $p < ?$, then the null (H_0) hypothesis is rejected and the alternative hypothesis (H_a) is accepted.

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DISCUSSION

A total of 9 articles met the inclusion criteria following a process of identification, screening, and selection based on the PRISMA 2020 guidelines. The analyzed articles were published between 2021 and 2025 and consisted of 5 randomized controlled trials (RCTs), 3 quasi-experimental studies, and 1 multicenter quasi-experimental trial. All studies evaluated the effectiveness of effleurage massage, counter-pressure massage, or variations of massage on labor pain intensity during the first stage of labor. Most studies used the Visual Analog Scale (VAS) and the Numeric Rating Scale (NRS) as pain measurement instruments. Eight studies compared pain scores before and after the intervention, while one study compared two types of massage.

A synthesis of the results showed that all articles reported a reduction in labor pain intensity following the administration of nonpharmacological interventions. Effleurage massage was shown to increase maternal relaxation, thereby reducing pain perception (Pratiwi et al., 2021; Ahmed et al., 2021; Azima et al., 2025). Counter-pressure also demonstrated high effectiveness, particularly in mothers experiencing back pain due to fetal head pressure on the sacrum (Ahmed et al., 2021; Doloksaribu et al., 2025). In addition to reducing pain intensity, several studies have also reported additional benefits, including increased comfort for mothers during labor reduced anxiety a more positive labor experience and increased maternal satisfaction with the labor process (Türkmen & Oran, 2021; Taşkın & Ergin, 2022; Kaçar & Keser, 2021; Goh et al., 2021). These findings indicate that the benefits of massage are not only physiological but also psychological.

Effleurage massage consistently reduces pain intensity during the first stage of labor. All studies evaluating this technique showed a decrease in pain scores after the intervention compared to before the intervention and compared to the control group. Physiologically, effleurage massage works based on the Gate Control Theory proposed by Melzack and Wall. Light stroking movements on the abdomen or back stimulate A-beta nerve fibers, causing the "pain gate" in the spinal cord to close and reducing the transmission of pain impulses to the brain. Additionally, tactile stimulation increases the

secretion of endorphins and enkephalins endogenous opioids that function as the body's natural analgesics. As a result, the mother becomes more relaxed, muscle tension decreases, blood circulation improves, and pain perception is reduced.

These findings align with another study, which reported that effleurage massage significantly reduced pain during the active phase of the first stage of labor. The study explained that rhythmic massage movements help the mother divert her attention from contractions, thereby increasing her pain tolerance (Pratiwi et al., 2021). Similar results were also found who demonstrated that effleurage massage can significantly reduce pain intensity, although its effect is slightly less pronounced than that of counter-pressure massage (Ahmed et al., 2021). The study noted that effleurage massage provides a more pronounced relaxing effect, making it particularly beneficial for mothers experiencing anxiety during labor.

Rotational effleurage massage produces consistent pain reduction across all active phases of labor and enhances maternal comfort compared to connective tissue massage. The findings in this literature review are further supported another study which combined massage with lavender oil. This combination provided greater pain relief compared to the control group because tactile stimulation, combined with the relaxing effects of aromatherapy, resulted in a reduction in sympathetic nervous system activity (Karatopuk & Yarıcı, 2023).

The findings of this synthesis are consistent with a systematic review, which concluded that various massage techniques, including effleurage, are effective nonpharmacological interventions for reducing labor pain, improving maternal comfort, and enhancing the childbirth experience. The review also states that massage carries a very low risk of side effects and is therefore recommended as part of evidence-based maternity care (Nori et al., 2023). These findings are further supported through a systematic review and network meta-analysis, which concluded that all nonpharmacological interventions including massage significantly reduce labor pain compared to standard care (Chang et al., 2022).

These differing results are likely influenced by several factors, including the location of pain, parity,

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fetal position, duration of labor, the skill of the practitioner, massage duration, and respondent characteristics. Therefore, it cannot be concluded that one technique is absolutely superior to another. Clinically, effleurage massage is more suitable for mothers with predominant abdominal pain and high anxiety levels, while counter-pressure is more appropriate for mothers experiencing lower back pain due to posterior occipital pressure. A combination of both techniques has the potential to produce more optimal effects.

This literature review indicates that effleurage and counter-pressure massage are interventions that are easy to perform, inexpensive, require no special equipment, and cause virtually no side effects. These findings support the recommendation that nonpharmacological interventions should be a routine part of maternity care because they can enhance positive childbirth experiences, reduce anxiety, and increase maternal satisfaction (Nori et al., 2023). Furthermore, concluded that nonpharmacological interventions are generally effective at reducing labor pain and improving the childbirth experience without increasing risks to either the mother or the baby (Chang et al., 2022).

CONCLUSION

Effleurage massage and counterpressure are effective at reducing the intensity of labor pain during the first stage of labor. Both of these nonpharmacological interventions work through a mechanism of nerve stimulation that promotes relaxation and reduces pain perception. Although both techniques are equally effective, some studies indicate that counter pressure provides greater pain relief compared to effleurage massage, particularly in mothers experiencing back pain during labor. In addition to reducing pain, both techniques also enhance maternal comfort and the labor experience. Therefore, effleurage massage and counter pressure can be recommended as evidence-based nonpharmacological interventions in midwifery practice to support safe, comfortable, and mother-centered labor care.

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