Effect of Perineal Massage on Episiotomy and Perineal Laceration Rates in Primiparous Women: A 10-Year Systematic Review with Meta-Analysis

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Abstract

Background: Perineal trauma, including episiotomy and spontaneous perineal lacerations, is a common concern in childbirth, particularly among primiparous women. Perineal massage during the second stage of labour has been proposed as a non-invasive strategy to improve perineal integrity and reduce the need for episiotomy and perineal lacerations. However, existing evidence remains inconsistent. This systematic review and meta-analysis synthesise ten years of research to evaluate the effect of perineal massage on perineal outcomes. **Methods**: A systematic search was conducted in PubMed, Scopus, and EBSCO, using predefined keywords. The review included randomised controlled trials (RCTs) published in English between 2015 and 2025, comparing perineal massage during the second stage of labour with a hands-off approach in primiparous women. Studies reporting outcomes on episiotomy and/or spontaneous perineal lacerations were included. Data extraction was performed using a standardised form, and the Cochrane Risk of Bias (RoB 2) tool was used for quality assessment. A meta-analysis was conducted using the Mantel-Haenszel method under a random-effects model, with risk ratios (RR) and 95% confidence intervals (CI) calculated. Heterogeneity was assessed using the I^2 statistic, and publication bias was evaluated using a funnel plot and Egger's test. **Results:** Four RCTs met the inclusion criteria, comprising 706 participants (357 in the perineal massage group and 349 in the hands-off group). Meta-analysis revealed no significant reduction in the need for episiotomy (RR: 0.74, 95% CI: 0.53–1.04) or spontaneous perineal lacerations (RR: 1.37, 95% CI: 0.71–2.63) with perineal massage. Significant heterogeneity was detected for both outcomes (I^2 = 90% and 80%, respectively, $p < 0.01$), suggesting variability in effect sizes among studies. The funnel plot and Egger's test did not indicate publication bias. **Conclusion**: This systematic review and meta-analysis found no significant evidence that perineal massage during the second stage of labour reduces the need for episiotomy or spontaneous perineal lacerations in primiparous women. The findings indicate substantial heterogeneity among studies, highlighting the need for further well-powered, standardised RCTs to establish definitive clinical recommendations.

Keywords: Perineal massage, episiotomy, perineal lacerations, primiparous women, second stage of labour, systematic review, meta-analysis

Introduction

Perineal trauma, including episiotomy and spontaneous perineal lacerations, remains a significant concern in childbirth, particularly among primiparous women (Okeahialam et al., 2024). While episiotomy was historically performed as a routine measure to prevent severe perineal lacerations, contemporary evidence supports a more restrictive approach (Schmidt & Fenner, 2024). Routine use of episiotomy has been linked to increased morbidity, prolonged recovery, and adverse maternal outcomes (Luxey et al., 2024). Given these concerns, there has been growing interest in non-invasive strategies, such as perineal massage, to enhance perineal integrity and reduce the need for episiotomy and spontaneous lacerations.

Perineal massage, particularly when performed during the second stage of labour, is hypothesised to improve tissue elasticity and reduce the likelihood of perineal trauma (Yin et al., 2024). Several randomised controlled trials (RCTs) have explored its effectiveness, but findings have been inconsistent (Metinoğlu & Beji, 2024; Shqara et al., 2025; Utami et al., 2024). While some studies like Akhlaghi et al. (2019) suggest that perineal massage significantly reduces the need for episiotomy, others studies like Raja et al. (2019) report minimal or no impact on the incidence of spontaneous perineal lacerations. These discrepancies highlight the need for a synthesis of the current existing evidence to inform clinical practice and midwifery-led interventions.

To address the gap, this review was guided by the following PICO (Population, Intervention, Comparison, Outcome; Hosseini et al., 2024) research question: In primiparous women (Population), does perineal massage during the second stage of labour (Intervention) compared to a hands-off approach (Comparison) reduce the rates of episiotomy and spontaneous perineal lacerations (Outcome)? This framework provided a structured approach to assessing the available evidence, ensuring a focused and clinically relevant synthesis of findings.

This systematic review and meta-analysis evaluated the effect of perineal massage during the second stage of labour on episiotomy and perineal laceration rates in primiparous women. By synthesising evidence from the past decade, this review clarified whether perineal massage is an effective intervention for reducing perineal trauma and provided midwives and obstetricians with evidence-based recommendations for optimising perineal care in labour.

Methods

Study Design

This study is a systematic review and meta-analysis conducted to evaluate the effect of perineal massage during the second stage of labour on the need for episiotomy and spontaneous perineal lacerations in primiparous women. The methodology was guided by

the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, Sarkis-Onofre et al., 2021) guidelines to ensure transparency, rigor, and reproducibility.

Search Strategy

Literature search was conducted across three major electronic databases: PubMed, Scopus, and ProQuest. The search strategy was developed to identify relevant studies examining the impact of perineal massage in the second stage of labour on perineal outcomes. The following Boolean search string was used: ((perineal massage) AND (Second stage of labour OR birth)) AND (episiotomy OR laceration OR tear) AND (primipara OR nullipara)). Search results were limited to studies published in English between 2015 and 2025 to ensure the inclusion of the most recent evidence spanning a 10-year period. Only randomised controlled trials (RCTs) were considered to maintain a high level of evidence.

Eligibility Criteria

Studies were included if they met the following criteria: (1) The population comprised primiparous women undergoing vaginal birth, (2) The intervention involved perineal massage during the second stage of labour, (3) The comparator was a hands-off approach (no perineal massage), (4) The study reported outcomes on the need for episiotomy and/or spontaneous perineal laceration rates, and (5) The full-text article was freely available for review. On the other hand, studies were excluded if they met any of the following criteria (1) Examined antenatal perineal massage rather than intrapartum perineal massage, (2) Used an observational study design (e.g., cohort, case-control, or cross-sectional studies), and (3) Required paid access to the full-text version of the article.

Study Selection

The study selection process followed three stages: title screening, abstract screening, and full-text eligibility assessment before inclusion. Duplicate records were removed, and titles were initially screened for relevance. Abstracts of potentially eligible studies were then reviewed to determine whether they met the inclusion criteria. Finally, full-text articles were assessed for eligibility, and only studies meeting all criteria were included in the review and meta-analysis.

Data Extraction

Relevant data were extracted from each included study using a standardised data extraction form. The extracted variables included: Study characteristics (author, year, country, study design), Sample size (total, intervention group, control group), Intervention details (perineal massage technique), Comparison details (hands-off

approach), Outcomes (incidence of episiotomy and spontaneous perineal laceration), and Statistical findings (p-values).

Risk of Bias Assessment

The risk of bias in the included studies was assessed using the Cochrane Risk of Bias (RoB 2) tool for randomised controlled trials (Nejadghaderi et al., 2024). Studies were evaluated across five domains: Randomisation process, Deviations from intended interventions, Missing outcome data, Outcome measurement, and Selective reporting. Each domain was graded as "low risk," "some concerns," or "high risk," and an overall risk of bias judgment was assigned accordingly. Only studies with low overall risk were included in the review.

Data Synthesis and Statistical Analysis

Meta-analysis was conducted using the Mantel-Haenszel method under a random-effects model to account for potential heterogeneity across studies (Fidler & Nagelkerke, 2013). The risk ratio (RR) and 95% confidence interval (CI) were calculated for the need of episiotomy and spontaneous perineal lacerations. Heterogeneity among studies was assessed using the I^2 statistic, where values above 50% were considered indicative of moderate to high heterogeneity. A p-value < 0.05 was considered statistically significant. Publication bias was evaluated using a funnel plot supported with Egger's test.

Ethical Considerations

As this review involved the analysis of published data, ethical approval was not required. However, all included studies were assessed for ethical compliance, ensuring that they had obtained ethical clearance from relevant institutional review boards.

Results

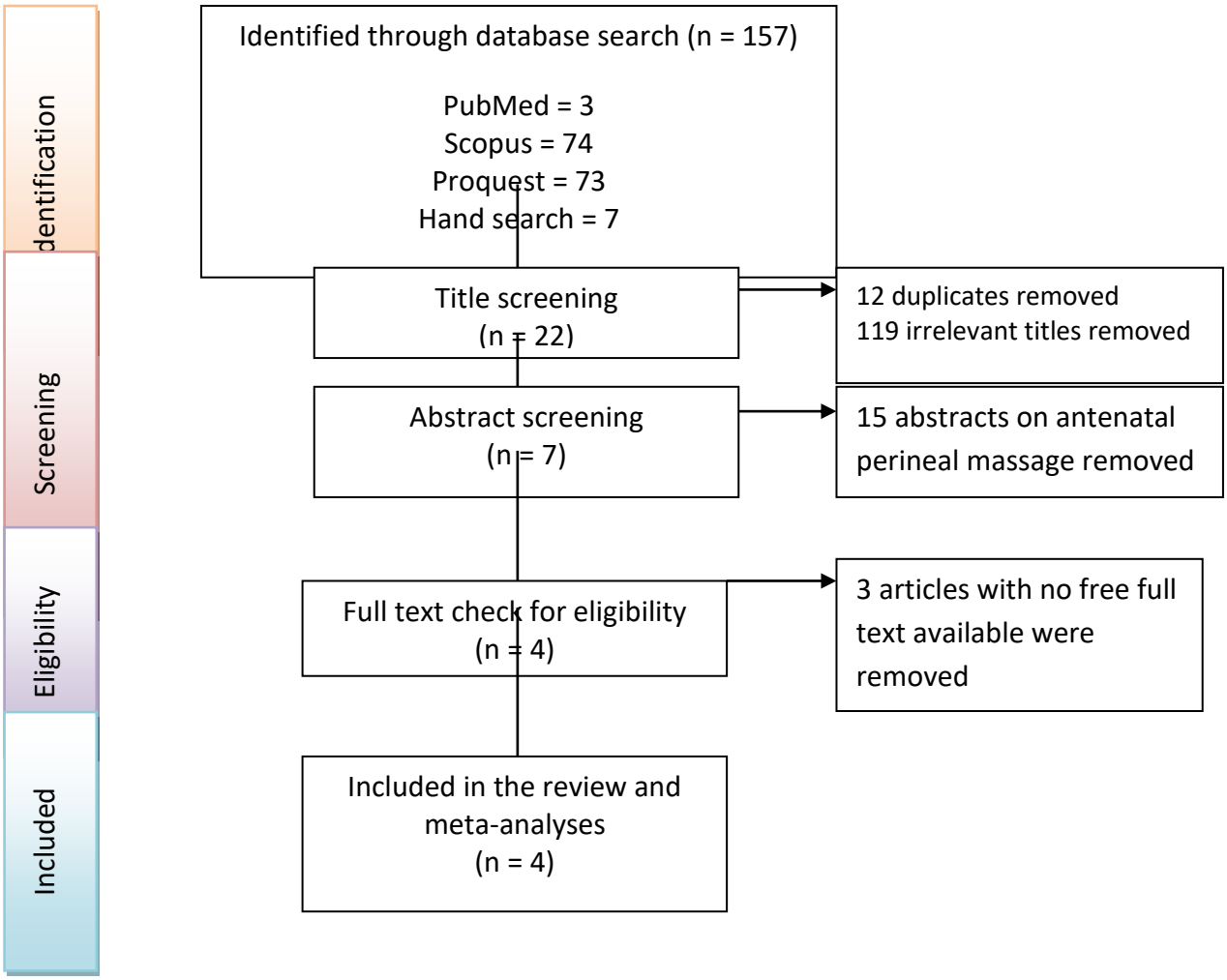

Figure 1: A PRISMA flow diagram of the study selection process

The study selection process for the systematic review and meta-analysis followed a structured and rigorous approach to ensure the inclusion of relevant and high-quality studies. Initially, a comprehensive database search was conducted, yielding a total of 157 records. These records were identified from multiple sources, including PubMed (3 records), Scopus (74 records), ProQuest (73 records), and a manual hand search, which contributed an additional 7 records. Following the identification phase, the title screening process commenced. At this stage, 12 duplicate records were removed to eliminate redundancy. Subsequently, titles were assessed for relevance based on predetermined eligibility criteria, leading to the exclusion of 119 studies that did not meet the inclusion criteria. As a result, 22 studies entered the abstract screening phase, during which abstracts were carefully reviewed to determine their suitability for full-text evaluation. During this process, 15 studies focusing on antenatal perineal massage, rather than

perineal massage during the second stage of labour, were excluded. This refinement reduced the number of eligible studies to seven. The remaining seven studies progressed to the full-text eligibility assessment. At this stage, each article was meticulously evaluated to confirm whether it met all inclusion criteria and provided full-text accessibility. Three articles were excluded due to the unavailability of full-text versions. Four studies met all eligibility criteria and were included in the systematic review and meta-analysis.

Table 1: Profile of included studies (n = 4)

Author	**Year**	**Country**	**Design**	**Total Sample size**	**Sample size in intervention group**	**Sample size in control group**	**Intervention**	**Control**	**Results on need for episiotomy**	**Results on spontaneous perineal laceration**	**Conclusion**
Akhlaghi et al.	2019	Iran	RCT	99	50	49	Perineal massage in 2nd stage of labour	Hands off approach	14 vs. 6 (p = 0.05)	36 vs. 43 (p = 0.05)	Perineal massage reduced need for episiotomy and spontaneous perineal lacerations
Demirel et al.	2015	Turkey	RCT	284	142	142	Perineal massage in 2nd stage of labo	Hands off approach	44 vs. 99 (p = 0.001)	13 vs. 6 (p = 0.096)	Perineal massage significantly reduced need for episiotomy

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Raja et al.	2019	India	RCT	150	75	75	Perineal massage in 2nd stage of labour	Hands off approach	60 vs. 70 (p = 0.016)	12 vs. 7 (p = 0.22)	Perineal massage significantly reduced need for episiotomy
Shahoei et al.	2017	Iran	RCT	173	90	83	Perineal massage in 2nd stage of labour	Hands off approach	62 vs. 83 (p < 0.05)	23 vs. 14 (p < 0.05)	Perineal massage can significantly reduce need for episiotomy, and perineal laceration.

Table 1 presents an overview of the four randomized controlled trials (RCTs) included in the systematic review and meta-analysis, summarizing key study characteristics, interventions, and outcomes related to perineal massage during the second stage of labour. The studies were conducted between 2015 and 2019 in Iran, Turkey, and India, involving 357 participants in the perineal massage group and 349 in the hands-off control group. In each study, the intervention group received perineal massage during the second stage of labour, while the control group followed a "hands-off" approach. The results indicated that perineal massage significantly reduced the need for episiotomy in three of the four studies (Akhlaghi et al., 2019; Demirel et al., 2015; Shahoei et al., 2017), with p-values demonstrating statistical significance. However, the impact on spontaneous perineal lacerations was less consistent, with only Shahoei et al. (2017) reporting a significant reduction. The conclusions across the studies generally supported the benefits of perineal massage in reducing the need for episiotomy, with some evidence suggesting it may also help decrease perineal lacerations.

Author	Year	Randomisation process	Deviations from intended interventions	Missing outcome data	Outcome measurement	Selective reporting	Overall Score
Akhlaghi et al.	2019						Low risk
Demirel et al.	2015						Low risk
Raja et al.	2019						Low risk
Shahoei et al.	2017						Low risk

Green = low risk, yellow = some concerns, Red = high risk

Figure 2: Risk of Bias assessment

Figure 2 demonstrated that all the four included studies had low risk of bias.

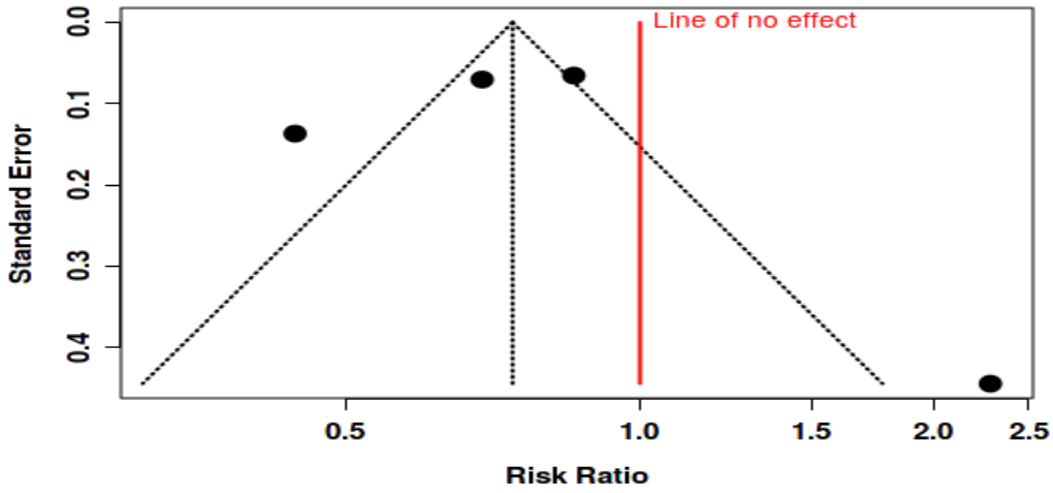

Figure 3: Funnel plot for publication bias among included studies

Figure 3 presents a Funnel Plot assessing publication bias among included studies. The funnel plot did not suggest the presence of publication bias. Additionally, Egger's test did not indicate significant funnel plot asymmetry (intercept: 0.18, 95% CI: -7.25 to 7.62, t = 0.049, p = 0.966).

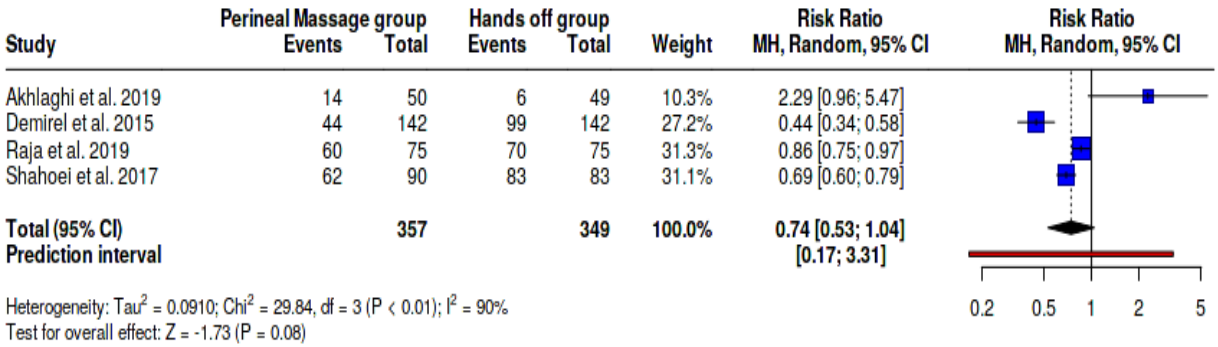

Figure 4: Forest plot showing the impact of perineal massage on need for episiotomy

Figure 4 presents a forest plot that synthesized evidence on the effect of perineal massage on the need for episiotomy. The overall risk ratio was 0.74, with a 95% confidence interval of 0.53 to 1.04, indicating no statistically significant difference between the two cohorts. The test for overall effect did not demonstrate a significant impact of perineal massage on episiotomy rates. However, substantial heterogeneity was detected ($p < 0.01$), suggesting considerable variation in effect sizes across the included studies. The I^2 statistic was 90%, indicating that most of the observed variability (90%) stemmed from heterogeneity among studies rather than random chance.

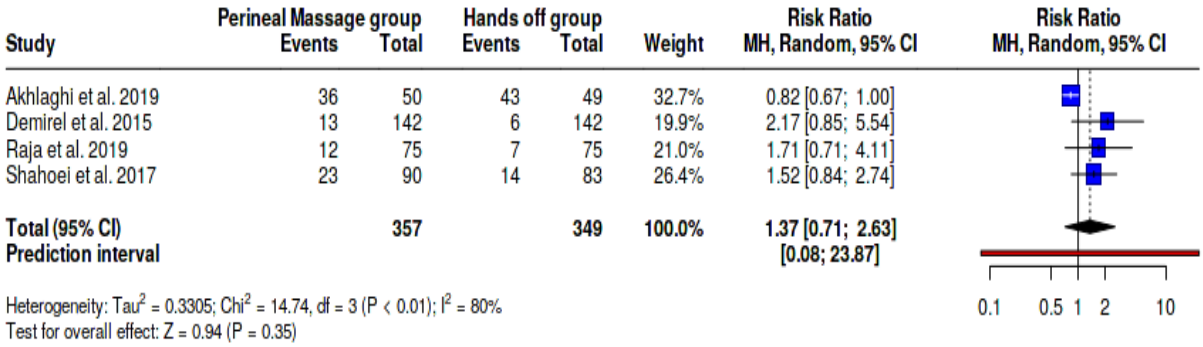

Figure 5: Forest plot showing the impact of perineal massage on the rate of perineal laceration

Figure 5 presents a forest plot summarizing the evidence on the effect of perineal massage on the occurrence of perineal laceration. The overall risk ratio was 1.37, with a 95% confidence interval of 0.71 to 2.63, indicating no statistically significant difference between the two cohorts. The test for overall effect did not demonstrate a significant association between perineal massage and the risk of perineal lacerations. However, substantial heterogeneity was observed ($p < 0.01$), suggesting considerable variability in effect sizes across studies. The I^2 statistic was 80%, indicating that a large proportion of

the observed variability (80%) was attributable to heterogeneity rather than random chance.

Discussion

This review and meta-analysis revealed that perineal massage may not have a consistent protective effect on perineal integrity during vaginal birth. These results contribute to the ongoing debate regarding the clinical benefits of intrapartum perineal massage and highlight the variability in findings across existing studies. The absence of a significant reduction in episiotomy rates contrasts with previous reviews such as Marcos-Rodríguez et al. (2023) and Yin et al. (2024) that found a protective effect of perineal massage. One possible explanation for this discrepancy is the variation in study protocols, including differences in the technique, duration, and intensity of perineal massage across trials. Additionally, episiotomy rates may be influenced by institutional policies and practitioner preferences rather than the intervention itself. In settings where episiotomy is performed selectively, the potential benefit of perineal massage may be more pronounced. Conversely, in environments where episiotomy is still widely practiced, the impact of perineal massage might be less evident.

Similarly, the findings on spontaneous perineal lacerations showed no significant difference between the intervention and control groups. This finding contrasted previous studies like Nnabuchi et al. (2025) and Shqara et al. (2025). This could be attributed to the multifactorial nature of perineal lacerationing, which is influenced by factors beyond perineal tissue elasticity, such as foetal head circumference, birth position, and maternal pushing techniques. Additionally, the significant heterogeneity detected in the meta-analysis suggests that differences in study populations, perineal massage application methods, and provider experience may have contributed to inconsistent results.

The presence of high heterogeneity in both outcomes underscores the need for caution when interpreting these findings. Variability among included studies may reflect differences in clinical practice, sample characteristics, or methodological quality.

Limitations

This study has few limitations that should be acknowledged. First, while the funnel plot and Egger's test did not indicate publication bias, the small number of included studies limits the robustness of this assessment and reduces the ability to perform subgroup analyses based on factors such as maternal age, foetal size, or delivery position. Second, significant heterogeneity was observed in both outcomes, indicating possible variability in study methodologies, participant characteristics, and intervention protocols. Differences in how perineal massage was performed including variations in technique, duration, and the timing of initiation may have influenced the results. Third, this review

only included studies published in English, potentially excluding relevant evidence from non-English sources. Additionally, studies requiring paid access to full-text articles were excluded, which may have introduced selection bias.

Implications for Policy and Practice

The findings of this review have important implications for maternity care policy and clinical practice. Given the lack of conclusive evidence supporting perineal massage as a protective strategy against episiotomy and perineal lacerations, policymakers should approach recommendations for its routine use with caution. While perineal massage is a low-cost, non-invasive intervention, its implementation should be based on high-quality evidence demonstrating clear benefits.

Future policy directives should prioritise further research to establish clear clinical recommendations. Standardising perineal massage protocols across maternity care settings could improve consistency in outcomes and provide stronger evidence for or against its use in practice.

Conclusion

This systematic review and meta-analysis found no significant evidence that perineal massage during the second stage of labour reduces the need for episiotomy or spontaneous perineal lacerations in primiparous women. High heterogeneity among included studies suggests that further well-designed, standardised RCTs are necessary to draw definitive conclusions. While perineal massage remains a safe and non-invasive intervention, its routine use should be carefully considered within the broader context of perineal care strategies. Future research and policy efforts should aim to refine perineal protection techniques to optimise maternal birth experiences and outcomes. Future research should aim to standardise perineal massage protocols and ensure consistency in outcome reporting to enhance comparability across studies.

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