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## Perineal massage during labor: a systematic review and meta-analysis of randomized controlled trials

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### ABSTRACT

**Background:** Different techniques have been analyzed to reduce the risk of perineal trauma during labor.

**Objective:** To evaluate whether perineal massage techniques during vaginal delivery decreases the risk of perineal trauma.

**Search strategy:** Electronic databases (Medline, Prospero, Scopus, ClinicalTrials.gov, Embase, ScienceDirect, the Cochrane Library, SciELO) were searched from their inception until February 2018. No restrictions for language or geographic location were applied.

**Selection criteria:** We included all randomized controlled trials (RCTs) comparing the use of perineal massage during labor (i.e. intervention group) with a control group (i.e. no perineal massage) in women with singleton gestation and cephalic presentation at  $\geq 36$  weeks. Perineal massage was defined as massage of the posterior perineum by the clinician’s fingers (with or without lubricant). Trials on perineal massage during antenatal care, before the onset of labor, or only in the early part of the first stage, were not included.

**Data collection and analysis:** All analyses were done using an intention-to-treat approach. The primary outcome was severe perineal trauma, defined as third and fourth degree perineal lacerations. Meta-analysis was performed using the random-effects model of DerSimonian and Laird to produce summary treatment effects in terms of either a relative risk (RR) with 95% confidence interval (CI).

**Main results:** Nine trials including 3374 women were analyzed. All studies included women with singleton pregnancy in cephalic presentation at  $\geq 36$  weeks undergoing spontaneous vaginal delivery. Perineal massage was usually done by a midwife in the second stage, during or between and during pushing time, with the index and middle fingers, using a water-soluble lubricant. Women randomized to receive perineal massage during labor had a significantly lower incidence of severe perineal trauma, compared to those who did not (RR 0.49, 95% CI 0.25–0.94). All the secondary outcomes were not significant, except for the incidence of intact perineum, which was significantly higher in the perineal massage group (RR 1.40, 95% CI 1.01–1.93), and for the incidence of episiotomy, which was significantly lower in the perineal massage group (RR 0.56, 95% CI 0.38–0.82).

**Conclusions:** Perineal massage during labor is associated with significant lower risk of severe perineal trauma, such as third and fourth degree lacerations. Perineal massage was usually done by a midwife in the second stage, during or between and during pushing time, with the index and middle fingers, using a water-soluble lubricant.

### ARTICLE HISTORY

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### KEYWORDS



Cesarean; incontinence; operative delivery; prolapse; vaginal delivery


## Introduction

Perineal trauma is any injury in the genital area that occurs from lacerations during labor; it can be associated with both short or long-term morbidities [1,2]. Short-term complications are related to bleeding, prolonged recovery, slowed mother-newborn bond, and perineal pain [1]. The most reported long-term

morbidities concern urinary and fecal incontinence, dyspareunia, and perineal pain [3]. The incidence of any perineal trauma with labor is up to 85% [1]. Fear of pelvic trauma drives many patients to consider a planned cesarean delivery [4].

Different techniques have been analyzed to reduce the risk of perineal trauma, including perineal massage,

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hands-on [3,5], warm compresses [3], and the Ritgen maneuver [5]. There is conflicting evidence regarding the possible effect of perineal massage performed in labor, and different techniques have been reported [1,3,5–11].

A prior Cochrane [12] has analyzed the effects of several perineal techniques during labor, including perineal massage. Perineal massage in late labor was associated with a significant reduction in third- and fourth-degree tears. The aim of our systematic review and meta-analysis of randomized controlled trials (RCTs) was to evaluate whether perineal massage during vaginal delivery decreases the risk of perineal trauma, with particular attention for demographic and labor patients' characteristics.

## Materials and methods

### Search strategy

This review was performed according to a protocol designed *a priori* and recommended for systematic review [13]. Electronic databases (i.e. Medline, Prospero, Scopus, ClinicalTrials.gov, Embase, ScienceDirect, the Cochrane Library, SciELO) were searched from their inception until February 2018. Search terms used were the following text words: "perineal massage," "vaginal," "perineal," "support," "trauma," "review," "randomized-controlled-trials," "randomized," "clinical trial," "randomized," and "clinical trial." No restrictions for language or geographic location were applied. In addition, the reference lists of all identified articles were examined to identify studies not captured by electronic searches. The electronic search and the eligibility of the studies were independently assessed by two authors (CIA, GS). Differences were discussed, and consensus reached.

### Study selection

We included all RCTs comparing the use of perineal massage during labor (i.e. intervention group) with a control group (i.e. no perineal massage) in women with singleton gestation and cephalic presentation at or near term undergoing an attempt at spontaneous vaginal delivery. Perineal massage was defined as massage of the posterior perineum by the clinician's fingers (with or without lubricant). Trials on perineal massage during antenatal care, before the onset of labor, or only in the early part of the first stage (<5 cm), were not included. We also excluded trials where another intervention (e.g. warm compresses, hands-on, Ritgen maneuver, perineal devices) aimed at possibly decreasing perineal tears was studied together with perineal massage. RCTs including

multiple gestations and quasi-randomized trials (i.e. trials in which allocation was done on the basis of a pseudorandom sequence, e.g. odd/even hospital number or date of birth, alternation) were excluded.

### Risk of bias

The risk of bias in each included study was assessed by using the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions. Seven domains related to risk of bias were assessed in each included trial since there is evidence that these issues are associated with biased estimates of treatment effect: (1) random sequence generation; (2) allocation concealment; (3) blinding of participants and personnel; (4) blinding of outcome assessment; (5) incomplete outcome data; (6) selective reporting; and (7) other bias. Review authors' judgments were categorized as "low risk," "high risk," or "unclear risk" of bias [13].

Two authors (CIA, VB) independently assessed inclusion criteria, risk of bias and data extraction. Disagreements were resolved by discussion. Data from each eligible study were extracted without modification of original data onto custom-made data collection forms. Differences were reviewed, and further resolved by common review of the entire process. Data not presented in the original publications were requested from the principal investigators, if possible.

All analyses were done using an intention-to-treat approach, evaluating women according to the treatment group to which they were randomly allocated in the original trials.

### Outcomes

Primary and secondary outcomes were defined before data extraction.

The primary outcome was severe perineal trauma, defined as third and fourth degree perineal lacerations. Secondary outcomes were intact perineum, first-, second-, third-, and fourth-degree lacerations, incidence of episiotomy, and localization of other perineal lacerations. We planned subgroup analyses based on parity (nulliparous, versus multiparous women), and on perineal massage done exclusively during the second stage (as opposed to massage done both in the late first and in the second stage).

### Statistical analysis

The data analysis was completed independently by two authors (CIA, GS) using Review Manager v. 5.3 (The

Nordic Cochrane Centre, Cochrane Collaboration, 2014, Copenhagen, Denmark). The completed analyses were then compared, and any difference was resolved by discussion. Statistical heterogeneity across studies was assessed using the Higgins  $I^2$  test. Meta-analysis was performed using the random-effects model of DerSimonian and Laird to produce summary treatment effects in terms of either a relative risk (RR) or a mean difference (MD) with 95% confidence interval (CI).

Potential publication biases were assessed statistically by using Begg's and Egger's tests.  $p$  value < .05 was considered statistically significant.

The meta-analysis was reported following the Preferred Reporting Item for Systematic Reviews and Meta-analyses (PRISMA) statement.

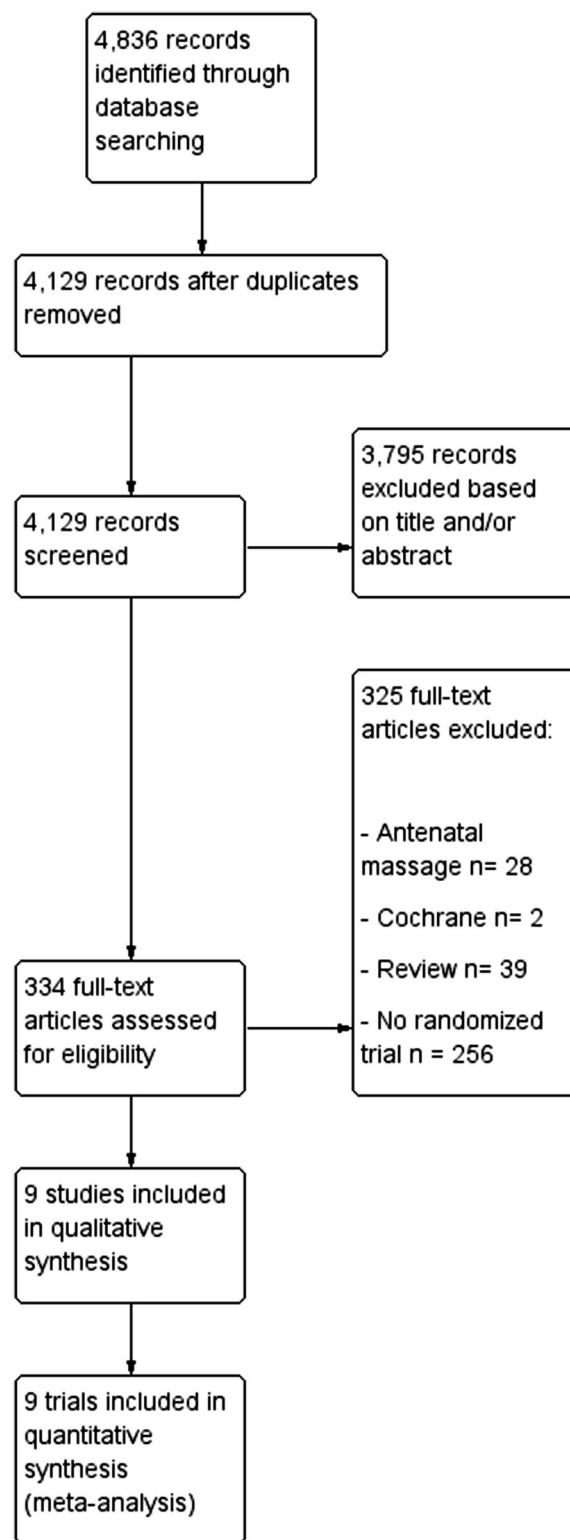
## Results

### Study selection and characteristics

From 4836 records identified through database searching, nine RCTs including 3374 women evaluating perineal massage ( $n = 1725$ ) versus no perineal massage ( $n = 1649$ ) in the late first stage or in the second stage of labor were included in the review (Figure 1). Publication bias, assessed using Begg's and Egger's test, was not significant ( $p = .34$ , and  $= .51$ , respectively).

Most of the included studies had low risk of bias in random sequence generation. Adequate methods for allocation of women were used in all the included trials, except three, in which details on methods used to conceal allocation were unclear. Blinding of participants, personnel and outcomes assessment was not possible in most cases (Figure 2).

All studies included women with singleton gestations in cephalic presentation at 36–42 weeks (Table 1). Usually, perineal massage was performed starting in the second stage (5/9, 55.6%) [3,5,6,9,10], or starting in the first (usually late) stage (4/9, 44.4%) [1,7,8,11], and was done by a midwife (6/9, 66.7%) [1,3,5,6,9,11], during the pushing time in three studies [6,9,11], between and during pushing time in three studies [1,3,5], and between pushing time in one study [7] (Table 2). Perineal massage was usually performed introducing two fingers (i.e. middle and index fingers [1,5,8] or thumbs [7]) into the patient's vagina. The purpose of this technique is to gently stretch the perineum from side to side. The frequency of perineal massage was not reported in most studies (6/9, 66.7%). When it was reported, the total length of massage lasted for 5–15 minutes [1,5,7]. When reported, the most used (5/6 83.3%) lubricant was a water-soluble lubricant [3,5,7,8,11]. None of the included RCTs studied other perineal techniques (eg warm



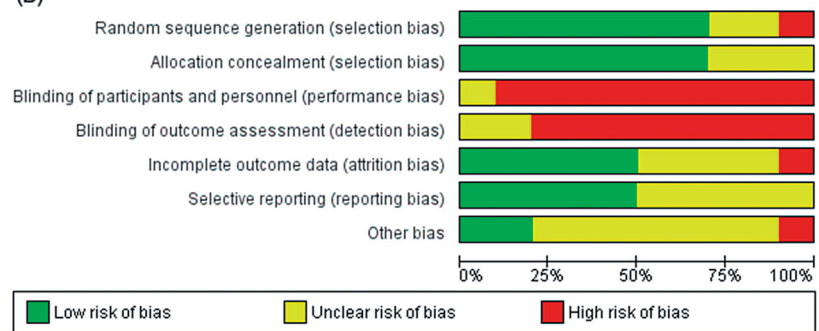
**Figure 1.** Flow diagram of studies identified in the systematic review. (Prisma template [Preferred Reporting Item for Systematic Reviews and Meta-analyses])

compresses, hands-on, Ritgen maneuver, perineal devices) aimed at possibly decreasing perineal tears in either the intervention group (perineal massage) or the control group (no perineal massage). Six trials included only

(A)

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Albers 2005	+	+	-	?	+	+	?
Attarha 2009	?	+	-	-	?	+	-
Demirel 2015	+	+	-	-	+	?	?
Fahami 2012	-	?	-	-	?	?	?
Galledar 2010	+	?	?	?	?	?	?
Geranmayer 2011	+	?	-	-	-	?	?
Karacam 2012	+	+	-	-	+	+	?
Low 2013	+	+	-	-	+	+	?
Sohrabi 2012	?	+	-	-	?	?	+
Stamp 2001	+	+	-	-	+	+	+

(B)



**Figure 2.** Assessment of risk of bias. (A) Summary of risk of bias for each trial; Plus sign: low risk of bias; minus sign: high risk of bias; question mark: unclear risk of bias. (B) Risk of bias graph about each risk of bias item presented as percentages across all included studies.

nulliparous women (Table 1), and overall out of the 3374 women included, 2079 (61.6%) were nulliparous. Mean age (about 23 years old) and BMI (about 23 m<sup>2</sup>/kg) were similar in the two groups. Use of oxytocin was reported only in three trials [1,3,9], and was equal in both groups, as was the length of the second stage [1,3,5–7,9] (Table 3). Fetal position (e.g. occiput anterior versus transverse versus posterior) was not reported in any RCTs. Two RCTs described in the text the different degrees of perineal lacerations, and both defined them as: First degree: involving skin of the perineum and vaginal mucosa; Second degree: involving deeper layer of perineal muscles; Third degree: involving the anus; Fourth degree: involving the anus and rectal mucosa [1,11].

### Syntheses of results

Primary and secondary lacerations outcomes are reported in Tables 4 and 5. Women randomized to receive perineal massage during labor had a significantly lower incidence of severe perineal trauma (third and fourth degree lacerations), compared to those who did not (RR 0.49, 95% CI 0.25–0.94; Figure 3). The incidence for intact perineum was significantly higher in

the perineal massage group, compared to no perineal massage (RR 1.40, 95% 1.01–1.93). All other secondary outcomes were not significant, except for the incidence of episiotomy, which was significant lower in the perineal massage group (RR 0.56, 95% CI 0.38–0.82). Statistical heterogeneity between the trials ranged from low to high, with no inconsistency ( $I^2 = 0\%$ ) in the primary outcome (Table 4). Maternal position at delivery, when described, was at the woman's preference in two studies [3,5] and lithotomy in another two [1,7]. Perineal pain was similar when evaluated [1,5,11], while dyspareunia is considered in only two studies [1,11] (Table 6). Patients' satisfaction was evaluated in one study by questionnaire: the majority answered that they would participate in such a trial again (62%).

The occurrence of labial, vaginal, clitorideal, periurethral, anterior, and posterior lacerations was not always reported in the RCTs and appears to be not significant when described (Table 5).

Almost all women delivered vaginally (Table 6). One RCT reported blood loss >500 ml, which was not significantly different between the groups (RR 0.91, 95% CI 0.61–1.36). Neonatal outcomes such as birth weight and Apgar scores were similar, too (Table 6). Low cord

**Table 1.** Characteristics of the included studies.

	Study location	Number of participants <sup>a</sup>	Parity included	Maternal age (years)	Gestational age at enrollment (weeks)	Exclusion criteria
Stamp et al. [11]	Australia	1,340 (708 versus 632)	Nulliparous and Multiparous	Not reported	≥36	Complicated labor, no-English speakers, indications for cesarean delivery
Albers et al. [3]	USA	807 (403 versus 404)	Nulliparous and Multiparous	≥18	≥37	Preterm delivery, medical complications, <18 years, other languages (not English or Spanish)
Attarfa et al. [6]	Iran	170 (85 versus 85)	Nulliparous only	Not reported	38–42	Multiple gestations, medical complications, lack of labor progress, the occurrence of fetal distress, opioids prescription (pethidine), birth with forceps and vacuum, rash, erythema and perineal edema, withdrawal of mothers from massage
Galleddar [8]	Iran	141 (71 versus 70)	Nulliparous only	18–35	Full term	Prolonged second stage of labor, rapid birth, cesarean birth, shoulder dystocia, posterior position of fetal head, fetal distress, failure to fit over the hips, birthweight >4000 g or <2500 g and the change of address or telephone of participants
Fahami et al. [5]	Iran	66 (33 versus 33)	Nulliparous only	18–35	37–41	Lack of progress in labor, fetal distress in the second stage of labor in each group, using vacuum or forceps in birth, perineal edema or rash occurrence, the mothers' withdrawal from partnership in the study
Geranmayeh et al. [9]	Iran	90 (45 versus 45)	Nulliparous only	18–30	38–42	Fetal distress during delivery, instrumented assisted delivery, indications for cesarean section
Karacam et al. [1]	Turkey	396 (198 versus 198)	Nulliparous only	18–35	37–42	Multiple pregnancies, macrosomic fetuses, breech presentation, occipito-posterior position, polyhydramnios, fetal distress, intrauterine deaths, prematurity, postmaturity, and vacuum-assisted delivery
Sohrabi and Shirinkam [10]	Iran	80 (40 versus 40)	Nulliparous only	18–35	37–42	Unwillingness of women to continue to co-operate, prolonged second stage of labor, fetal distress, meconium discharge, dystocia, detachment, attempting to use vacuum, induction and accelerate birth
Demirel and Golbasi [7]	Turkey	284 (142 versus 142)	Nulliparous and multiparous	Not reported	37–42	>2 gestations, pregnancy-related complications, systemic conditions, indications for cesarean delivery

Intervention group versus control group.

<sup>a</sup>Data are presented as total number (number in the intervention group versus number in the control group).

Table 2. Details of perineal massage.

	When started	Executor	When done	Technique	Frequency	Type of lubricant	Control
Stamp et al. [11]	First stage and Second Stage ( $\geq 5$ cm if multiparous and $\geq 8$ cm if nulliparous)	Midwife	During pushing time, stopping when uncomfortable	Two fingers inside the vagina with a sweeping motion, gently stretched the perineum	Not reported	Water-soluble jelly	Routine care
Albers et al. [3]	Second stage	Midwife	During and between pushes, stopping when uncomfortable	Gentle and slow massage with two fingers from side to side inside patient's vagina, with a downward pressure toward the rectum	For 1 s in each direction until crowning	Water-soluble lubricant	No touching of the perineum until crowning
Attarha et al. [6]	Second stage	Midwife	During pushing time	Two fingers inside the vagina using a sweeping motion gently to stretch the perineum	Not reported	Not reported	Routine care
Galledar [8]	First ( $\geq 6-7$ cm) and Second Stage	Researcher	Not reported	Finger and middle fingers were placed in the vagina and slid over to the size of fingers 5-4 cm between 3 to 9 o'clock alternatively	Not reported	Key jell (water soluble)	Routine care
Fahami et al. [5]	Second stage	Midwife	During and between pushes	The middle finger and index finger were used for a slow massage of the vagina (in a reciprocating U-shaped motion) with gentle pressure toward the rectum from one wall to another	1 minute for each side (for a total length of 5-10 minutes)	Water-soluble lubricant	No touching the perineum until crowning
Geranmayer 2012 [9]	Second stage (after crowning)	Midwife	During uterine contractions and continued until baby's head was out	Sweeping and rotating perineal massage	Not reported	Vaseline	Routine care
Karacam et al. [1]	First stage ( $\geq 8$ cm) and Second Stage	Midwife	During and between pushes, discontinued if the women felt uncomfortable	The index and the middle finger in the vagina, with lateral movements in aspect of half circle pressing perineum downward toward the rectum	For about 1 second, for a maximum of 10-15 minutes.	No lubricant. In cases of dryness, water soluble lubricant	Routine care
Sohrabi and Shirinkam [10]	Second stage	Researcher	Not reported	Not reported	Not reported	Not reported	Routine care
Demirel and Golbasi [7]	First and Second stage	Researcher	Between contractions, stopping when uncomfortable	Thumbs 2-3 cm into the vagina for the massage. The patient was also asked to contract and relax the muscles of the perineal area	First stage: four times, pressurizing action continued for 2 minutes for each vaginal side. Second stage: massage continued for 10 minutes, with a rest of a minimum of 30 minutes before repeating the massage	Glycerol (water soluble)	Routine care

**Table 3.** Maternal and labor characteristics.

	Age (year)	Nulliparous	BMI	Use of oxytocin	Length of the second stage (min)
Stamp et al. [11]	Not reported	353/708 (49.9%) versus 332/632 (52.5%)	Not reported	Not reported	Not reported
Albers et al. [3]	24.5 ± 5.2 versus 24.5 ± 5.1	154/403 (38.2%) versus 155/404 (38.4%)	25.0 ± 5.3 versus 25.5 ± 5.8	129/403 (32.0%) versus 141/404 (34.9%)	33 ± 38 versus 36 ± 44
Attarha et al. [6]	Not reported	85/85 (100%) versus 85/85 (100%)	Not reported	Not reported	40.1 ± 20.7 versus 51.1 ± 21.2
Galledar [8]	Not reported	71/71 (100%) versus 70/70 (100%)	Not reported	Not reported	Not reported
Fahami et al. [5]	22.5 ± 3.7 versus 23.7 ± 4.2	33/33 (100%) versus 33/33 (100%)	22.2 ± 2.3 versus 22.0 ± 3.0	Not reported	49.1 ± 29.3 versus 38.5 ± 20.3
Geranmayeh et al. [9]	21.0 ± 3.0 versus 22.0 ± 3.0	45/45 (100%) versus 45/45 (100%)	Not reported	33/45 (73%) versus 30/45 (67%)	37 ± 20 versus 46 ± 20
Karacam et al. [1]	22.9 ± 3.7 versus 23.0 ± 3.6	198/198 (100%) versus 198/198 (100%)	21.6 ± 3.4 versus 22.8 ± 9.6	193/198 (97.5%) versus 188/198 (94.9%)	34.1 ± 17.7 versus 33.8 ± 18.9
Sohrabi and Shirinkam [10]	Not reported	40/40 (100%) versus 40/40 (100%)	Not reported	Not reported	Not reported
Demirel and Golbasi [7]	24.3 ± 4.1 versus 23.4 ± 3.7	71/142 (50.0%) versus 71/142 (50.0%)	Not reported	Not reported	25.3 ± 5.5 versus 28.2 ± 6.6
Totals	23.0 versus 23.3	1050/1725 (60.9%) versus 1028/1649 (62.3%)	22.9 versus 23.4	355/646 (54.9%) versus 359/647 (55.3%)	36.4 versus 38.9 <sup>a</sup>

Data are presented as number in the intervention versus number in control group with percentage.

<sup>a</sup>Standard Deviation not reported.

pH, neonatal intensive care admission, and need for intubation were not reported in any RCTs.

In nulliparous women, perineal massage was associated with significantly increased incidence of intact perineum, and with decreased incidence of episiotomy (Table 7). In multiparous women, no significant differences were seen in the perineal massage versus no perineal massage subgroups (Table 8). In the perineal massage only in the second stage group, perineal massage was associated with a significant increase in the incidence of intact perineum (Table 9).

## Discussion

### Main findings

This meta-analysis of nine RCTs, including 3374 women with singleton gestations in cephalic presentation at or near term showed that perineal massage during the late first stage or usually in the second stage of labor was associated with less severe perineal trauma, defined as third or fourth degree lacerations, and less incidence of episiotomy. In most of the included trials, massage was done by a midwife, during the pushing time or between and during pushing time, and usually performed introducing the middle and index fingers into the patient's vagina to gently stretch the perineum from side to side, using a water-soluble lubricant.

Of a total of nine RCTs, five of them described the eventual occurrence of lacerations of third or fourth degree, and two RCTs registered these events. A previous Cochrane [12] has analyzed the effects of several perineal techniques during labor, including perineal massage. They also showed that perineal massage in

late labor was associated with a significant reduction in third- and fourth-degree tears. They included seven RCTs [3,5,6,8–11]. While they excluded two RCTs (which we included) because perineal massage started in the first stage [1,7], they included two RCTs which also included perineal massage started in the first stage [8,11]. Furthermore, our review considered not only severe perineal lacerations (Table 4), but also other statistical results about: localizations of lacerations (Table 5), birth weight, Apgar score, perineal pain and dyspareunia (Table 6), with particular attention for subgroups' outcomes as in nulliparous and multiparous patients and as in cases of massage performed by second stage. The Cochrane Review did not report specific demographic and labor characteristics, as well as the details of how and when perineal massage was performed (Tables 1–3) [12].

Our study has several strengths. To our knowledge, no prior meta-analysis on this issue is as large, up-to-date or comprehensive. None of the included RCTs studied other perineal techniques (eg warm compresses, hands-on, Ritgen maneuver, perineal devices) aimed at possibly decreasing perineal tears in either the intervention group (perineal massage) or the control group (no perineal massage), so that our results involve only the effect of perineal massage. We also were able to describe in detail how to perform perineal massage as studied in most RCTs, so to make implementation easier for the practitioner. We were also able to look at subgroup analyses, showing that the best evidence for effectiveness for perineal massage is for nulliparous women, and for performing it in the second stage. The statistical heterogeneity



**Table 4.** Primary and secondary outcomes.

	Stamp et al. [11]	Albers et al. [3]	Attarha et al. [6]	Galleddar [8]	Fahami et al. [5]	Geranmayeh et al. [9]	Karacam 2012 [1]	Sohrabi and Shirinkam [10]	Demirel and Golbasi 2015 [7]	Total	RR (95% CI)	I <sup>2</sup>
Severe perineal trauma <sup>a</sup>	12/708 (1.7%) versus 24/632 (3.8%)	5/403 (1.2%) versus 6/404 (1.5%)	0/85 (0%) versus 5/85 (5.9%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	Not reported	17/1281 (1.3%) versus 35/35/	<b>0.49</b> (0.25–0.94)	10%
Intact perineum	198/708 (28.0%) versus 171/632 (27%)	94/403 (23.3%) versus 90/404 (22.3%)	37/85 (43.5%) versus 2/85 (2.3%)	21/71 (29.6%) versus 8/70 (11.4%)	7/33 (21.2%) versus 6/33 (18.2%)	12/45 (26.7%) versus 2/45 (4.4%)	7/198 (3.5%) versus 7/198 (3.5%)	20/40 (50.0%) versus 16/40 (40.0%)	129/142 (90.8%) versus 136/142 (95.8%)	<b>1206 (2.9%)</b> <b>525/1725 (30.4%)</b> versus <b>438/1649 (26.6%)</b>	<b>1.40</b> (1.01–1.93)	87%
Intact perineum, excluding episiotomy	Not reported	Not reported	Not reported	Not reported	7/33 (21.2%) versus 6/33 (18.2%)	Not reported	Not reported	20/40 (50.0%) versus 16/40 (40.0%)	Not reported	27/73 (37.0%) versus 22/73 (30.1%)	1.23 (0.80–1.91)	0%
First-degree laceration	122/708 (17.2%) versus 106/632 (16.8%)	91/403 (22.6%) versus 89/404 (22.0%)	24/85 (28.2%) versus 4/85 (4.7%)	50/71 (70.4%) versus 32/70 (45.7%)	13/33 (39.4%) versus 19/33 (57.6%)	15/45 (33.3%) versus 4/45 (8.9%)	85/198 (42.9%) versus 71/198 (35.9%)	12/40 (30.0%) versus 18/40 (45.0%)	Not reported	412/1583 (26.0%) versus 343/1507 (22.8%)	1.21 (0.92–1.59)	75%
Second-degree laceration	190/708 (26.8%) versus 164/632 (25.9%)	73/403 (18.1%) versus 74/404 (18.3%)	10/85 (11.8%) versus 6/85 (7.1%)	21/71 (29.6%) versus 38/70 (54.3%)	13/33 (39.4%) versus 8/33 (24.2%)	3/45 (6.7%) versus 1/45 (2.2%)	9/198 (4.5%) versus 7/198 (3.5%)	3/40 (7.5%) versus 4/40 (10.0%)	Not reported	322/1583 (20.3%) versus 302/1507 (20.0%)	0.99 (0.77–1.27)	43%
First and Second-degree laceration	312/708 (44.1%) versus 270/632 (42.7%)	164/403 (40.7%) versus 163/404 (40.3%)	34/85 (40%) versus 10/85 (11.8%)	71/71 (100%) versus 70/70 (100%)	26/33 (78.8%) versus 27/33 (81.8%)	18/45 (40.0%) versus 5/45 (11.1%)	94/198 (47.5%) versus 78/198 (39.4%)	15/40 (37.5%) versus 22/40 (55.0%)	Not reported	734/1583 (46.4%) versus 645/1507 (42.8%)	1.12 (0.93–1.36)	88%
Third degree laceration	12/708 (1.7%) versus 23/632 (3.6%)	4/403 (1.0%) versus 2/404 (0.5%)	0/85 (0%) versus 5/85 (5.9%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	Not reported	16/1281 (1.2%) versus 30/1206 (2.5%)	0.57 (0.16–2.02)	50%
Fourth-degree laceration	0/708 (0%) versus 1/632 (0.2%)	1/403 (0.2%) versus 4/404 (1.0%)	0/85 (0%) versus 0/85 (0%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	Not reported	1/1281 (0.1%) versus 5/1206 (0.4%)	0.26 (0.04–1.61)	0%
Major perineal trauma <sup>b</sup>	378/708 (53.4%) versus 358/632 (56.6%)	85/403 (21.1%) versus 82/404 (20.3%)	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	472/1111 (42.5%) versus 440/1036 (42.5%)	0.97 (0.89–1.06)	0%
Episiotomy	176/708 (24.9%) versus 170/632 (26.9%)	7/403 (1.7%) versus 2/404 (0.5%)	14/85 (16.5%) versus 68/85 (80.0%)	23/71 (32.4%) versus 47/70 (67.1%)	0/33 (0%) versus 0/33 (0%)	15/45 (33.3%) versus 38/45 (84.4%)	103/198 (52.0%) versus 120/198 (60.6%)	0/40 (0%) versus 0/40 (0%)	44/142 (31.0%) versus 99/142 (69.7%)	<b>382/1725 (22.1%)</b> versus <b>544/1649 (33.0%)</b>	<b>0.56</b> (0.38–0.82)	91%

Data are presented as number in the intervention versus number in control group with percentage.  
 RR: relative risk; CI: confidence interval. Boldface data, statistically significant.  
<sup>a</sup>Third or fourth degree lacerations.  
<sup>b</sup>Second, third, fourth lacerations or episiotomy.

**Table 5.** Other obstetric lacerations.

	Stamp 2001 [11]	Albers 2005 [3]	Attarha et al. 2009 [6]	Galledar 2010 [8]	Fahami et al. [5]	Geranmayer 2012 [9]	Karacam 2012 [1]	Sohrabi and Shirinkam [10]	Demirel and Golbasi 2015 [7]	Total	RR	<i>I</i> <sup>2</sup>
Labial lacerations	Not reported	198/403 (49.1%) versus 191/ 404 (47.3%)	Not reported	Not reported	Not reported	Not reported	31/198 (15.7%) versus 19/ 198 (9.6%)	Not reported	Not reported	229/601 (38.1%) versus 210/ 602 (34.9%)	1.21 (0.79–1.85)	62%
Vaginal lacerations	Not reported	165/403 (40.9%) versus 160/ 404 (39.6%)	Not reported	Not reported	Not reported	Not reported	15/198 (7.6%) versus 17/ 198 (8.6%)	Not reported	Not reported	180/601 (29.9%) versus 177/ 602 (29.4%)	1.02 (0.87–1.21)	0%
Clitoridean lacerations	Not reported	13/403 (3.2%) versus 20/ 404 (4.9%)	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	13/403 (3.2%) versus 20/ 404 (4.9%)	0.65 (0.33–1.29)	Not applicable
Periurethral lacerations	Not reported	40/403 (9.9%) versus 53/ 404 (13.1%)	Not reported	Not reported	Not reported	Not reported	31/198 (15.7%) versus 19/ 198 (9.6%)	Not reported	Not reported	71/601 (11.8%) versus 72/ 602 (12.0%)	1.09 (0.51–2.30)	81%
Anterior lacerations	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	31/198 (15.7%) versus 19/ 198 (9.6%)	Not reported	Not reported	31/198 (15.7%) versus 19/ 198 (9.6%)	1.63 (0.95–2.79)	Not applicable
Posterior lacerations	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	33/198 (16.7%) versus 29/ 198 (14.6%)	Not reported	Not reported	33/198 (16.7%) versus 29/ 198 (14.6%)	1.14 (0.72–1.80)	Not applicable

Data are presented as number in the intervention versus number in control group with percentage.

CI: confidence interval; RR: relative risk.

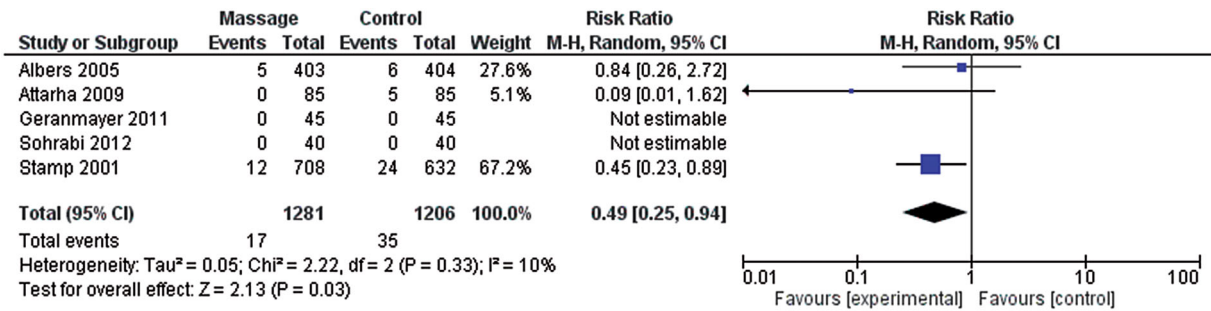


Figure 3. Forest plot for the risk of severe perineal trauma.

Table 6. Mode of delivery and neonatal outcomes.

	Vaginal delivery	Cesarean delivery	Birth weight	Apgar Score < 7 at 5 min	Perineal pain	Dyspareunia
Stamp et al. [11]	684/708 (96.6%) versus 609/632 (96.4%)	24/708 (3.4%) versus 23/632 (3.6%)	Not reported	9/708 (1.3%) versus 9/632 (1.4%)	416/708 (58.8%) versus 359/632 (56.8%)	78/708 (11.0%) versus 68/632 (10.8%)
Albers et al. [3]	400/403 (99.3%) versus 398/404 (98.5%)	3/403 (0.7%) versus 6/404 (1.5%)	3349 ± 462 versus 3345 ± 440	1/403 (0.2%) versus 2/404 (0.5%)	Not reported	Not reported
Attarha et al. [6]	85/85 (100%) versus 85/85 (100%)	0/85 (0%) versus 0/85 (0%)	Not reported	Not reported	Not reported	Not reported
Galledar [8]	71/71 (100%) versus 70/70 (100%)	0/71 (0%) versus 0/70 (0%)	Not reported	Not reported	Not reported	Not reported
Fahami et al. 2012 [5]	33/33 (100%) versus 33/33 (100%)	0/33 (0%) versus 0/33 (0%)	3337.9 ± 293.5 versus 3239.4 ± 267.1	Not reported	14/33 (42.4%) versus 15/33 (45.5%)	Not reported
Geranmayeh et al. [9]	45/45 (100%) versus 45/45 (100%)	0/45 (0%) versus 0/45 (0%)	3200 ± 400 versus 3300 ± 400	0/45 (0%) versus 0/45 (0%)	Not reported	Not reported
Karacam et al. [1]	198/198 (100%) versus 198/198 (100%)	0/198 (0%) versus 0/198 (0%)	3188.7 ± 390.6 versus 3164.5 ± 389.3	1/198 (0.5%) versus 0/198 (0%)	138/198 (69.7%) versus 144/198 (72.7%)	45/135 (33.6%) versus 34/144 (24.5%)
Sohrabi and Shirinkam [10]	40/40 (100%) versus 40/40 (100%)	0/40 (0%) versus 0/40 (0%)	Not reported	Not reported	Not reported	Not reported
Demirel and Golbasi [7]	142/142 (100%) versus 142/142 (100%)	0/142 (0%) versus 0/142 (0%)	Not reported	Not reported	Not reported	Not reported
Total	1698/1725 (98.4%) versus 1620/1649 (98.2%)	27/1725 (1.6%) versus 29/1649 (1.8%)	3268.9 versus 3262.2	11/1725 (0.6%) versus 11/1649 (0.7%)	568/939 (60.5%) versus 518/863 (60.0%)	123/843 (14.6%) versus 102/776 (13.1%)
RR (95% CI)	1.00 (1.00, 1.00)	0.85 (0.51, 1.43)	13.56 (-36.04, 63.17)	0.89 (0.36, 2.23)	1.01 (0.93, 1.08)	1.15 (0.90, 1.45)
I <sup>2</sup>	0%	0%	14%	Not applicable	0%	41%

Data are presented as number in the intervention versus number in control group with percentage. CI: confidence interval; RR: relative risk.

within the studies in the primary outcome and in most of the secondary outcomes was low, particularly in relation of selection, attrition and reporting bias. Limitations of our study are inherent to the limitations of the included RCTs. Several RCTs did not report many of our outcomes of interest (Tables 4–6). The primary outcome was reported by only five RCTs [3,6,9–11]; third and fourth degree lacerations were also reported separately by only five RCTs [3,6,9–11] (Table 4). Given the intervention, none of the included trials were double-blind. Despite the large number of RCTs and women included, there could still remain the possibility of type II errors, for example for some secondary outcomes such as third or fourth degree lacerations, which trended for benefit for perineal massage, but were not significant (Table 4). Episiotomies should seldom be performed [14], so the incidence of 20–30% (Table 4) in the included RCTs is probably higher than current recommended practice.

The associated decreased incidence of episiotomy in the perineal massage group is therefore of unclear clinical significance with current labor management.

Trauma to the perineum during childbirth can cause women other morbidities such as pain and long-term problems. Therefore, different technique have been studied to reduce the risk of perineal trauma and to reduce the length of labor improving obstetric outcomes [14–20]. Adverse obstetric outcomes may be associated with both maternal factors [21–27], and fetal factors, including macrosomia [27–29]. Asian race, for example, has been shown to be an independent risk factor for severe perineal lacerations in the USA [30]. The risk of severe perineal lacerations increases with duration past the third hour of the second stage of labor, with instrumental delivery being the most significant risk factors [31].

Reducing perineal lacerations has been deemed very important to improve women’s health by the

**Table 7.** Outcomes in subgroup analysis of nulliparous woman only.

	Attarha et al. [6]	Galledar [8]	Fahami et al. 2012 [5]	Geranmayer et al. [9]	Karacam et al. [1]	Sohrabi and Shirinkam [10]	Total	RR (95% CI)	I <sup>2</sup>
Severe perineal trauma <sup>a</sup>	0/85 (0%) versus 5/85 (5.9%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	0/170 (0%) versus 5/170 (2.9%)	0.09 (0.01–1.62)	Not applicable
Intact perineum	37/85 (43.5%) versus 2/85 (2.3%)	21/71 (29.6%) versus 8/70 (11.4%)	7/33 (21.2%) versus 6/33 (18.2%)	12/45 (26.7%) versus 2/45 (4.4%)	7/198 (3.5%) versus 7/198 (3.5%)	20/40 (50%) versus 16/40 (40.0%)	<b>104/472 (22.0%) versus 41/471 (8.7%)</b>	<b>2.41 (1.09–5.35)</b>	78%
Intact perineum, excluding episiotomy	Not reported	Not reported	7/33 (21.2%) versus 6/33 (18.2%)	Not reported	Not reported	20/40 (50.0%) versus 16/40 (40.0%)	46/73 (63.0%) versus 43/73 (58.9%)	1.02 (0.80–1.30)	12%
First-degree laceration	24/85 (28.2%) versus 4/85 (4.7%)	50/71 (70.4%) versus 32/70 (45.7%)	13/33 (39.4%) versus 19/33 (57.6%)	15/45 (33.3%) versus 4/45 (8.9%)	85/198 (42.9%) versus 71/198 (35.9%)	12/40 (30.0%) versus 18/40 (45.0%)	199/472 (42.2%) versus 148/471 (31.4%)	1.39 (0.89–2.17)	81%
Second-degree laceration	10/85 (11.8%) versus 6/85 (7.1%)	21/71 (29.6%) versus 38/70 (54.3%)	13/33 (39.4%) versus 8/33 (24.2%)	3/45 (6.7%) versus 1/45 (2.20%)	9/198 (4.5%) versus 7/198 (3.5%)	3/40 (7.5%) versus 4/40 (10.0%)	59/472 (12.5%) versus 64/471 (31.4%)	1.09 (0.62–1.93)	56%
First and second-degree laceration	34/85 (40.0%) versus 10/85 (11.8%)	71/71 (100%) versus 70/70 (100%)	26/33 (78.8%) versus 27/33 (81.8%)	18/45 (40%) versus 5/45 (11.1%)	94/198 (47.5%) versus 78/198 (39.4%)	15/40 (37.5%) versus 22/40 (55.0%)	258/472 (54.7%) versus 212/471 (45.0%)	1.39 (0.72–2.68)	98%
Third-degree laceration	0/85 (0%) versus 5/85 (5.9%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	0/170 (0%) versus 5/170 (2.9%)	0.09 (0.01–1.62)	Not applicable
Fourth-degree laceration	0/85 (0%) versus 0/85 (0%)	Not reported	Not reported	0/45 (0%) versus 0/45 (0%)	Not reported	0/40 (0%) versus 0/40 (0%)	0/170 (0%) versus 0/170 (0%)	Not applicable	Not applicable
Major perineal trauma <sup>b</sup>	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	0/0 (0%) versus 0/0 (0%)	Not applicable	Not applicable
Episiotomy	14/85 (16.5%) versus 68/85 (80.0%)	23/71 (32.4%) versus 47/70 (67.1%)	0/33 (0%) versus 0/33 (0%)	15/45 (33.3%) versus 38/45 (84.4%)	103/198 (52.0%) versus 120/198 (60.6%)	0/40 (0%) versus 0/40 (0%)	<b>155/472 (32.8%) versus 273/471 (58.1%)</b>	<b>0.44 (0.23–0.83)</b>	93%

Data are presented as number in the intervention versus number in control group with percentage.

CI: confidence interval; RR: relative risk. Boldface data, statistically significant.

<sup>a</sup>Third or fourth degree lacerations.

<sup>b</sup>Second, third, fourth lacerations or episiotomy.

**Table 8.** Outcomes in subgroup analysis of multiparous woman only.

	Stamp et al. [11]	Albers et al. [3]	Demirel and Golbasi 2015 [7]	Total	RR (95% CI)	I <sup>2</sup>
Severe perineal trauma <sup>a</sup>	12/708 (1.7%) versus 24/632 (3.8%)	5/403 (1.2%) versus 6/404 (1.5%)	Not reported	17/1111 (1.5%) versus 30/2036 (1.5%)	1.06 (0.59–1.92)	0%
Intact perineum	198/708 (28.0%) versus 171/632 (27.0%)	94/403 (23.3%) versus 90/404 (22.3%)	129/142 (90.8%) versus 136/142 (95.8%)	421/1253 (33.6%) versus 397/1178 (33.7%)	0.99 (0.88–1.11)	47%
Intact perineum, excluding episiotomy	Not reported	Not reported	Not reported	0/0 (0%) versus 0/0 (0%)	Not applicable	Not applicable
First-degree laceration	122/708 (17.2%) versus 106/632 (16.8%)	91/403 (22.6%) versus 89/404 (22.0%)	Not reported	213/1111 (19.2%) versus 195/1036 (18.8%)	1.03 (0.86–1.22)	0%
Second-degree laceration	190/708 (26.8%) versus 164/632 (25.9%)	73/403 (18.1%) versus 74/404 (18.3%)	Not reported	263/1111 (23.7%) versus 238/1036 (23.0%)	1.02 (0.88–1.19)	0%
First and second-degree laceration	312/708 (44.1%) versus 270/632 (42.7%)	164/403 (40.7%) versus 163/404 (40.3%)	Not reported	476/1111 (42.8%) versus 433/1036 (41.8%)	1.02 (0.93–1.13)	0%
Third degree laceration	12/708 (1.7%) versus 23/632 (3.6%)	4/403 (1.0%) versus 2/404 (0.5%)	Not reported	16/1111 (1.4%) versus 25/1036 (2.4%)	0.78 (0.20–3.07)	59%
Fourth-degree laceration	0/708 versus 1/632 (0.2%)	1/403 (0.2%) versus 4/404 (1.0%)	Not reported	1/1111 (0.1%) versus 5/1036 (0.5%)	0.26 (0.04–1.61)	0%
Major perineal trauma <sup>b</sup>	378/708 (53.4%) versus 358/632 (56.6%)	85/403 (21.1%) versus 82/404 (20.3%)	Not reported	463/1111 (41.7%) versus 440/1036 (42.5%)	0.95 (0.87–1.04)	0%
Episiotomy	176/708 (24.9%) versus 170/632 (26.9%)	7/403 (1.7%) versus 2/404 (0.5%)	44/142 (31.0%) versus 99/142 (69.7%)	227/1253 (18.1%) versus 271/1178 (23.0%)	0.82 (0.40–1.65)	92%

Data are presented as number in the intervention versus number in control group with percentage.

RR: relative risk; CI: confidence interval. Boldface data, statistically significant.

<sup>a</sup>Third or fourth-degree lacerations.

<sup>b</sup>Second, third, fourth lacerations or episiotomy.

**Table 9.** Outcomes in subgroup analysis of women randomized in the second stage of labor.

	Albers 2005 [3]	Attarha 2009 [6]	Fahami et al. 2012 [5]	Geranmayer 2012 [9]	Sohrabi 2012 [10]	Total	RR (95% CI)	I <sup>2</sup>
Severe perineal trauma <sup>a</sup>	5/403 (1.2%) versus 6/404 (1.5%)	0/85 (0%) versus 5/85 (5.9%)	Not reported	0/45 (0%) versus 0/45 (0%)	0/40 (0%) versus 0/40 (0%)	<b>5/573 (0.9%) versus 11/574 (1.9%)</b>	<b>0.40 (0.05–3.40)</b>	53%
Intact perineum	94/403 (23.3%) versus 90/404 (22.3%)	37/85 (43.5%) versus 2/85 (2.3%)	7/33 (21.2%) versus 6/33 (18.2%)	12/45 (26.7%) versus 2/45 (4.4%)	20/40 (50.0%) versus 16/40 (40.0%)	<b>170/606 (28.1%) versus 116/607 (19.1%)</b>	<b>2.16 (1.01–4.60)</b>	83%
Intact perineum, excluding episiotomy	Not reported	Not reported	7/33 (21.2%) versus 6/33 (18.2%)	Not reported	Not reported	7/33 (21.2%) versus 6/33 (18.2%)	0.86 (0.32–2.28)	Not applicable
First-degree laceration	91/403 (22.6%) versus 89/404 (22.0%)	24/85 (28.2%) versus 4/85 (4.7%)	13/33 (39.4%) versus 19/33 (57.6%)	15/45 (33.3%) versus 4/45 (8.9%)	12/40 (30.0%) versus 18/40 (45.0%)	155/606 (25.6%) versus 134/607 (22.1%)	1.37 (0.73–2.57)	83%
Second-degree laceration	73/403 (18.1%) versus 74/404 (18.3%)	10/85 (11.8%) versus 6/85 (7.1%)	13/33 (39.4%) versus 8/33 (24.2%)	3/45 (6.7%) versus 1/45 (2.2%)	3/40 (7.5%) versus 4/40 (10.0%)	102/606 (16.8%) versus 93/607 (15.3%)	1.10 (0.85–1.41)	0%
First and Second-degree laceration	164/403 (40.7%) versus 163/404 (40.3%)	34/85 (40.0%) versus 10/85 (11.8%)	26/33 (78.8%) versus 27/33 (81.8%)	18/45 (40%) versus 5/45 (11.1%)	15/40 (37.5%) versus 22/40 (55.0%)	257/606 (42.4%) versus 227/607 (37.4%)	1.31 (0.87–1.99)	84%
Third degree laceration	4/403 (1.0%) versus 2/404 (0.5%)	0/85 (0%) versus 5/85 (5.9%)	Not reported	0/45 (0%) versus 0/45 (0%)	0/40 (0%) versus 0/40 (0%)	4/573 (0.7%) versus 7/574 (1.2%)	0.53 (0.02–12.16)	72%
Fourth-degree laceration	1/403 (0.2%) versus 4/404 (1.0%)	0/85 (0%) versus 0/85 (0%)	Not reported	0/45 (0%) versus 0/45 (0%)	0/40 (0%) versus 0/40 (0%)	1/573 (0.2%) versus 4/574 (0.7%)	0.25 (0.03–2.23)	Not applicable
Major perineal trauma <sup>b</sup>	85/403 (21.1%) versus 82/404 (20.3%)	Not reported	Not reported	Not reported	Not reported	85/403 (21.1%) versus 82/404 (20.3%)	1.04 (0.79–1.36)	Not applicable
Episiotomy	7/403 (1.7%) versus 2/404 (0.5%)	14/85 (16.5%) versus 68/85 (80.0%)	0/33 (0%) versus 0/33 (0%)	15/45 (33.3%) versus 38/45 (84.4%)	0/40 (0%) versus 0/40 (0%)	36/606 (5.9%) versus 108/607 (17.8%)	0.47 (0.18–1.24)	85%

Data are presented as number in the intervention versus number in control group with percentage.

CI: confidence interval; RR: relative risk. Boldface data, statistically significant.

<sup>a</sup>Third or fourth degree lacerations.

<sup>b</sup>Second, third, fourth lacerations, or episiotomy.

American College of Obstetricians and Gynecologists [16]. Our meta-analysis confirms that perineal massage in labor prevents third and fourth degree lacerations, which are the ones associated with the most harm for women. In addition, we found that perineal massage was usually done by a midwife, during the pushing time or between and during pushing time, and usually performed introducing the middle and index fingers into the patient's vagina to gently stretch the perineum from side to side, using a water-soluble lubricant. Given the benefit, and lack of harm, we believe perineal massage in late labor, in particular in the second stage, and in nulliparous women, should become routine. More research is need to see if the addition of other techniques, such as for example warm compresses [12], would further decrease the 1% incidence of severe perineal lacerations if perineal massage is performed (Table 4).

## Conclusions

In summary, perineal massage during late labor is associated with significantly lower risk of severe perineal trauma, such as third and fourth degree

lacerations, and therefore a significantly higher incidence of intact perineum (no lacerations). Perineal massage was usually done by a midwife in the second stage, during or between and during pushing time, with the index and middle fingers, using a water-soluble lubricant.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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