

# Massage Therapy and Labor Outcomes: a Randomized Controlled Trial

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**Introduction:** Massage is a time-honored method by which women have received comfort throughout the millennia, yet it has not been rigorously evaluated in the modern day delivery suite. No study to date that we are aware of has evaluated the effect of massage therapy by a regulated massage therapist on labor pain.

The purpose of this study was to evaluate the effectiveness of massage therapy provided by registered massage therapists in managing pain among women in active labor.

**Methods:** BC Women's Hospital, Vancouver, BC. **Research Design:** a randomized controlled trial. **Participants:** 77 healthy nulliparous women presenting in spontaneous labor. **Intervention:** Swedish massage administered for up to five hours by a registered massage therapist during labor vs. standard care. **Main outcome measures include:** cervical dilation at the time of administration of epidural, compared using estimated marginal means in an analysis of covariance. We also compared perception of pain at three time periods during labor according to cervical dilation at 3–4 cm, 5–7 cm, and 8–10 cm using the McGill Present Pain Intensity Scale.

**Results:** The mean cervical dilation at the time of epidural insertion after adjustment for station of the presenting part, cervical dilation, and status of membranes on admission to hospital was 5.9 cm (95% CI 5.2–6.7) compared to 4.9 in the control group (95% CI 4.2–5.8). Scores on the McGill Pain Scale were consistently lower in the massage therapy group (13.3 vs. 16.9 at 3–4 cm, 13.3 vs. 15.8 at 5–6 cm, and 19.4 vs. 28.3 at 7–8 cm), although these differences were not statistically significant.

**Conclusions:** Our findings from this pilot study suggest that massage therapy by a registered massage therapist has the potential to be an effective means of pain management that may be associated with delayed use of epidural analgesia. It may therefore have the potential to reduce exposure to epidural analgesia during labor and decrease rates of associated sequelae.

**KEYWORDS:** epidural analgesia, labor pain, massage, randomized controlled trial

## INTRODUCTION

Massage is a time-honored method by which women have received comfort throughout the millennia, yet it has not been rigorously evaluated in the modern day delivery suite. Advocated by Hippocrates and practiced by the Romans, massage was reinvented in modern times in the late 1700s in Sweden<sup>(1)</sup>. Swedish massage, now one of the most commonly taught techniques, consists of five basic strokes based on kneading, rolling, vibration, percussive, and tapping movement, with the application of oil to reduce friction on the skin. Massage therapy has been theorized to create a stimulus that interferes with the transmission of pain to the brain, effectively “closing the gate” to the reception of pain<sup>(2)</sup>. It has also been suggested that massage stimulates the release of endorphins<sup>(3)</sup> and increases serotonin levels to inhibit the transmission of noxious nerve signals to the brain<sup>(4)</sup>.

Studies of massage therapy in childbirth to date have been limited. A Taiwanese trial randomized 60 nulliparous women to receive a 30-minute massage, first administered by the primary researcher, then by the woman's partner during each phase of labor<sup>(5)</sup>. A nurse-rated pain intensity scale consisting of five observed levels of pain (normal respiration, increased frequency or amplitude of respiration, intermittent gasping, persistent gasping, and agitation) was significantly lower in the massage group compared to the control group in all phases of labor. A randomized controlled trial from Turkey of 49 nulliparous and multiparous women reported that prenatal education followed by nurse-administered massage during labor reduced women's perception of pain<sup>(6)</sup>. A pilot controlled trial from the UK randomized 35 nulliparous and multiparous women to three arms: massage administered by a partner, a placebo consisting of music with relaxation techniques, and a usual care group<sup>(7)</sup>. The trial demonstrated a nonstatistically significant reduction in pain perception among women

receiving massage therapy. In the US, 28 nulliparous women randomized to receive massage administered by a partner vs. coaching without massage reported lower levels of stress and pain during labor<sup>(8)</sup>. In Iran, a randomized controlled trial among 60 laboring nulliparous women reported a decrease in pain severity during the first stage of labor among women receiving massage therapy by a midwife compared to usual care<sup>(9)</sup>.

No study to our knowledge has evaluated the effect of massage therapy by a regulated massage therapist on labor pain and outcomes. In British Columbia, registered massage therapists have completed a two-year training program and are regulated by the College of Massage Therapists. Their services are remunerated by third-party insurance companies for individuals who (or whose employers) have purchased extended medical health care benefits and have a referral from a physician. The reimbursement rate varies according to the private insurance plan. We undertook a randomized controlled pilot trial to evaluate the potential effectiveness of massage therapy provided by registered massage therapists in managing labor pain. We hypothesized that massage therapy would delay use of epidural analgesia.

## METHODS

The study took place at BC Women's Hospital in Vancouver, British Columbia, Canada. BC Women's is an academic teaching hospital. It provides primary care to women who are residents of the City of Vancouver, regional referral care to residents of the Lower Mainland, and tertiary referral care for the entire province. Approximately 7500 births take place annually at this hospital.

Our eligibility criteria included: nulliparity, singleton gestation, cephalic presentation, term gestation (37–41 completed weeks of pregnancy), maternal age between 18 and 35 years, spontaneous labor (defined for our purposes as painful contractions which have resulted in cervical change (cervix is 1 cm dilated or more with effacement (thinning) at 25% [0.5 cm] or more on admission to the labor unit), and ability to speak and read English. We excluded women with pre-existing medical conditions including: insulin dependent diabetes, renal, cardiac, or thyroid disease, hypertension, epilepsy, psychosis, use of illicit street drugs, or any other conditions arising during pregnancy which required nonroutine surveillance and/or intervention including gestational diabetes, gestational hypertension, 2nd or 3rd trimester hemorrhage, intrauterine growth restriction, presence of a fetal anomaly, or history of preterm prelabor rupture of membranes. A statement by women on admission that they had been in labor for more than 24 hours or those who presented with cervical dilation of 10 cm (full dilation) on admission were also exclusion factors.

To ensure that women had the opportunity to learn about the study prior to labor, information pamphlets were available in hospital prenatal education classes and at the desk where women obtained hospital pre-registration packages. On admission to the triage area of the delivery suite, nurses informed eligible women about the study then asked if they would like to speak to the massage therapist to learn more about the study. The massage therapist explained the study and completed an eligibility checklist. Willing and eligible women then provided informed written consent.

Randomization took place immediately after consent was obtained. The massage therapist opened a sequentially numbered envelope labeled with the treatment allocation: either massage during labor or massage during the first 24 hours postpartum. Allocation was assigned to sequential numbers using a random seed generated by PASW, version 18<sup>(10)</sup>.

Massage therapy began immediately for women who were randomized to receive massage therapy. The massage technique used was Swedish massage, but the exact location and nature of the massage was negotiated between the woman and the therapist. Women in either group continued to use other non-invasive pain management modalities as they wished (for example: walking, showering, listening to music, visualization exercises, and use of a birthing ball). Women's labor support persons were not restricted in any way from offering comfort and support. Women were permitted to request pharmacological methods of pain management, including epidural analgesia. This was a pragmatic trial in that massage therapy was intended as one choice for pain management in addition to routinely available choices. The protocol provided massage therapy for up to five hours per participant, but women were permitted to choose to have the massage intermittently during this time or to receive it for only part of the time. Massage ceased if and when the participant decided to have epidural analgesia. A limit of five hours was chosen as this was the maximum period that therapists could provide massage without becoming exhausted.

Our primary outcome was timing of epidural analgesia with respect to cervical dilation. This outcome was chosen because of the association of epidural use with intrapartum interventions, including need for augmentation of labor, prolonged first and second stage, need for assisted delivery, persistent occiput posterior position, postpartum hemorrhage, and delayed breastfeeding<sup>(11-14)</sup>. The role of epidural analgesia with respect to caesarean section remains controversial, in large part due to the inability thus far to offer an alternative analgesic in randomized controlled trials that is sufficiently effective to prevent crossover to the epidural arm. Crossover rates among studies reported in meta-analyses have ranged from 14%<sup>(12)</sup> to as high as 51%-62.1% in the opioid group<sup>(13,15)</sup>. Recent studies claiming that timing of epidural does not impact rates of caesarean section

have reported on protocols that are not representative of North American practice, in that epidural analgesia was implemented on average at 1.6 cm of cervical dilation<sup>(16)</sup>. As well, as many as 80% of participants in the delayed group<sup>(17,18)</sup> also received a narcotic which, in itself, may slow labor and increase the rate of caesarean section.

In addition to timing of epidural administration in labor, we compared the following factors among the healthy, nulliparous women admitted to hospital in spontaneous labor who were offered massage therapy vs. usual care:

- a) the severity of pain from contractions;
- b) length of first and second stage of labor;
- c) need for use of entonox, intravenous or intramuscular narcotics, and epidural analgesia;
- d) cervical dilation at the time of epidural insertion among those women who receive epidural analgesia; and
- e) mode of delivery: spontaneous vaginal, assisted (vacuum/forceps), or caesarean section.

Intensity of pain was also measured by the Short Form McGill Pain Questionnaire which utilizes 16 descriptors: throbbing, shooting, stabbing, sharp, cramping, gnawing, burning, aching, heavy, tender, splitting, sore, exhausting, sickening, fearful, punishing<sup>(19)</sup>. The pain descriptors were read aloud and participants were asked whether or not the word described their pain and, if it did, to rank it on an intensity scale of 0 = none, 1 = mild, 2 = moderate, and 3 = severe. Summary measures were calculated by simply summing the numerical values assigned to all of the selected words for each participant. The McGill Pain Questionnaire has been used in a number of studies to measure the pain of labor<sup>(19-21)</sup>. The sensory and affective measure of pain as measured by the McGill form have been shown to have good internal validity (Cronbach's alpha = 0.83) and adequate convergent validity ( $r = 0.48, p < .001$ ) with the PPI<sup>(19)</sup> and ( $r = 0.47, p < .001$ ) with a visual analogue scale<sup>(21)</sup>. We undertook these measures on admission and at three time periods during labor: cervical dilation at 3–4 cm, 5–6 cm, and 7–8 cm. As this was a pilot study, we did not undertake sample size calculations. Baseline measures not balanced by randomization were tested for their role as confounders in an analysis of covariance. A type one error of  $\leq 0.05$  was denoted as statistically significant.

## RESULTS

Among 131 women who were offered participation in the study, 77 (58.7%) agreed to participate. All participants gave written informed consent. Our study protocol was approved by the University of British Columbia Clinical Ethics Research Board and the

BC Women's Hospital Research Review Committee. Among participants, 37 were randomly allocated to receive massage during labor and 40 were allocated to receive massage postpartum (Figure 1).

In spite of random allocation, women in the massage group were younger, less likely to have a university education, or be employed (Table 1). Those in the standard care group in labor were more likely to speak English at home. With respect to pregnancy-related characteristics on admission to the study, women in the massage group were more likely to have had a doula in labor and less likely to have attended prenatal classes. None of the doula-attending study participants were qualified as massage therapists (Table 2). They were more likely to have vaginal cultures positive for Group B *Streptococcus*. They arrived at an earlier stage of labor, as evidenced by fewer centimeters of cervical dilation and higher station of the vertex (presenting part). They were more likely to have ruptured membranes on admission.

Women in the massage therapy group, although they were admitted on average at a less advanced stage of labor, received epidural analgesia at higher cervical dilation compared to the standard care group (5.7 vs. 5.3 cm) (Table 3). This difference was not statistically significant. In an analysis of covariance, the estimated marginal mean for cervical dilation at the time of epidural insertion after adjustment for station of the presenting part, cervical dilation, and status of membranes (ruptured or not) on admission, was 5.9 cm (95% CI 5.2–6.7) compared to 4.9 in the control group (95% CI 4.2–5.8).

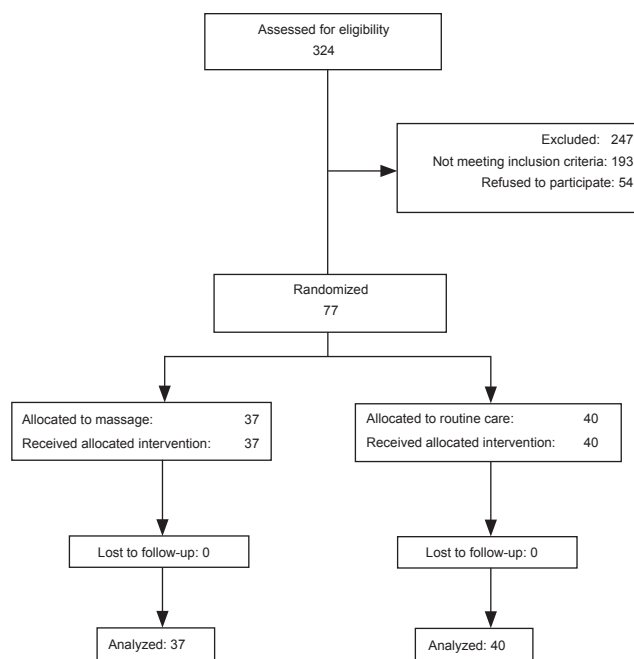


FIGURE 1. Flow Diagram for Study Participants.

TABLE 1. Sociodemographic Characteristics of Participants

	<i>Massage</i> <i>n =37</i>	<i>Usual Care</i> <i>n=40</i>	<i>P-value</i>
<i>Age</i>			
18 – 24	6 (16.7)	3 (8.8)	
25 – 29	11 (30.6)	7 (20.6)	
30 – 34	14 (38.9)	19 (55.9)	
35 +	5 (13.9)	5 (14.7)	0.46
Has partner	32 (97.0)	31 (93.9)	1.00
<i>Education</i>			
High school or less	7 (20.0)	3(8.8)	
Post secondary/trade	11 (31.9)	11 (32.4)	
University degree	17 (48.6)	20 (58.8)	0.40
<i>Employed</i>			
Full Time	26 (72.2)	30 (88.2)	
Part Time	2 (5.6)	1 (2.9)	
Unemployed	8 (22.2)	3 (8.8)	0.24
<i>Partner Employed</i>			
Full Time	31 (93.9)	30 (90.9)	
Part Time	0	1 (5.0)	
Unemployed	2 (6.1)	2 (6.1)	0.61
<i>Language spoken at Home</i>			
English	30 (81.1)	28 (70.0)	
Other	1 (18.9)	12 (30.0)	0.26
<i>Caucasian</i>	19 (51.4)	19 (47.5)	0.96
<i>East Asian</i>	13 (35.1)	15 (37.5)	
<i>Other</i>	5 (13.5)	6 (15.0)	
<i>Tobacco use during pregnancy</i>	3 (8.1)	1 (2.5)	0.47
<i>Illicit drugs</i>	1(2.7)	0	0.57
<i>Alcohol</i>	0	1(2.5)	0.50
Height (cm) Mean (sd)	163.5 (8.4)	164.3 (6.7)	0.69
Pre-pregnancy weight (g) Mean (sd)	58.7 (10.9)	61.1 (10.4)	0.34

There were no statistically significant differences in length of labor, type of analgesia used, or mode of delivery. Total scores on the Short Form McGill Pain Questionnaire were consistently lower in the massage group at all stages of labor, but these differences were not statistically significant (13.3 vs. 16.9 at 3–4 cm, 13.3 vs. 15.8 at 5–6 cm, 19.4 vs. 28.3 at 7–8 cm).

**DISCUSSION**

We report a delay in epidural insertion of one centimeter associated with massage therapy by a registered massage therapist, and a reduction in pain perception of up to 20 points on the McGill Pain Questionnaire

TABLE 2. Pregnancy Characteristics of Participants

	<i>Massage</i> <i>n=37</i>	<i>Usual Care</i> <i>n=40</i>	<i>P-value</i>
Doula present for Labour	5 (13.9)	3 (8.8)	0.71
Attended Prenatal Class	23 (63.9)	24 (70.5)	0.55
<i>Visits for assessment prior to admission</i>			
0	28 (75.7)	29 (72.5)	
1	9 (24.3)	8 (20.0)	
2	0	3 (7.5)	0.23
Discharged from assessment room after receiving analgesic	6 (16.2)	7 (17.5)	0.88
Gestational age (days) mean (sd)	280.3 (5.7)	278.4 (7.5)	0.22
<i>Admission status of labour</i>			
Dilation (cm) mean (sd)	3.3 (1.4)	3.4 (1.4)	0.74
Length(cm) mean (sd)	0.5 (0.5)	0.5 (0.5)	0.95
Station of vertex	-1.5 (0.9)	-1.1 (1.1)	0.10
Membranes ruptured	17 (45.9)	11 (27.5)	0.09

TABLE 3. Obstetrical Interventions and Labour Outcomes

	<i>Massage</i> <i>n=37</i>	<i>Usual Care</i> <i>n=40</i>	<i>P-value</i>
Cervical dilation at time of epidural	5.7 (2.1)	5.3 (2.0)	0.51
First stage of labour (min)	897.4 (507.4)	788.6 (336.8)	0.28
Second stage of labour (min)	136.0 (89.6)	125.0 (81.7)	0.36
<i>Augmentation of labor</i>			
Amniotomy	13 (35.1)	24 (60)	0.03
Oxytocin	24 (64.9)	21 (52.5)	0.27
Entonox	28 (75.7)	29 (72.5)	0.75
Narcotic analgesia intravenous or intramuscular	6 (16.2)	7 (17.5)	0.88
Epidural analgesia	30 (81.1)	26 (65.0)	0.11
<i>Mode of delivery</i>			
SVD	20 (54.1)	25 (62.5)	
Assisted vaginal	8 (21.6)	8 (20.0)	
Cesarean section	9 (24.3)	7 (17.5)	0.71
<i>Total score on McGill Present Pain Intensity Scale</i>			
3-4 cm	13.3 (8.3)	16.9 (6.5)	0.82
5-6 cm	13.3 (8.0)	15.8 (10.0)	0.48
7-8 cm	19.4 (16.0)	28.3 (10.4)	0.28

(Short Form) out of a total possible difference of 64. These results in our study were not statistically significant. However, 1 cm dilation can take up to

2 hours to achieve in a nulliparous woman<sup>(22)</sup>. Delayed epidural may be associated with a reduction in assisted vaginal delivery and a decreased length of first and second stage<sup>(11-14)</sup>.

Prior studies of massage therapy in labor have been extremely small, with the largest having 60 participants<sup>(5-9)</sup>. None utilized registered massage therapists. The massage administered in these studies was intermittent for 20–30 minute sessions<sup>(5,8)</sup> or the duration was unspecified<sup>(6,7,9)</sup>. All have reported reduced pain perception among women receiving massage. Our study has similarly demonstrated a reduction of pain using a complex measure of pain assessment, and is the first to report a trend towards delay in epidural use associated with massage therapy.

## CONCLUSION

Similar to other studies, ours is limited by its sample size. As well, participants and nursing staff could not be blinded. Our pilot study demonstrated that massage therapy is well accepted by women as evidenced by willingness of women to enroll in the trial (approximately 60% of eligible women). In no case was the massage therapist asked to discontinue treatment by either the woman or her support person(s) or the nursing or medical staff. We also demonstrated a delay in use of epidural that, if confirmed in larger studies, may impact labor outcomes. Our inability to demonstrate statistically significant results may have been a consequence of our need to limit the time period for massage to five hours due to fatigue on the part of the therapists. Future larger studies should be resourced to evaluate the ability of massage therapy to manage pain and minimize or delay use of epidural analgesia using shifts of therapists, as needed, to maintain the intervention as long as it is desired by the recipient.

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## CONFLICT OF INTEREST NOTIFICATION

The investigators have no conflicts of interest to disclose. The funding agencies had no role in the design of the study, in the collection, analysis and interpretation of the data, in the writing of the report or in the decision to submit the report for publication. The authors had full access to all of the data in this study, and take complete responsibility for the integrity of the data and the accuracy of the data analysis.

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