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The Efficacy of Massage Therapy and Breathing Techniques on Pain Intensity and Physiological Responses to Labor Pain

Mahin Kamalifard[1*], Mahnaz Shahnazi[1], Manizheh Sayyah Melli[2], Shirin Allahverdizadeh[3], Shiva Toraby[4], Atefeh Ghahvechi[4]

[1] MSc, Instructor, Departement of Midwifery, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran
[2] MD, Professor, Departement of Obstetrics and Gynecology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
[3] MSc, Instructor, Departement of Midwifery, Tabriz Branch, Islamic Azad University, Tabriz, Iran
[4] BSc in Midwifery, Tabriz, Iran

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ABSTRACT

Introduction: There are many non-pharmacological methods for relieving labor pain. The preferable method is certainly the one that is effective and harmless. Therefore, we decided to compare the efficacy of massage therapy and breathing techniques on pain intensity, physiological responses to labor pain, labor type and the outcomes. ***Methods:*** A quasi-experimental study was conducted in Alzahra Hospital in Tabriz. At first, 4o primigravidas, satisfying the inclusion criteria, were selected and randomly divided into two groups of massage 1 (M1) and breathing 1 (B1). Then, another 42 mothers were selected based on the same criteria and randomly divided into two groups of massage 2 (M2) and breathing 2 (B2). An educated researcher assistant (ERA) provided practical training to (B1 and B2 groups) by holding one educational session. As the labor process started, the ERA, who was present at the labor room, repeated the breathing technique for B1 and B2 groups. The breathing groups employed the techniques during the first or second stage of labor at 4, 6, 8 and 10 centimeter of dilatation for 30 minutes. The intensity of pain was measured by a numerical rating scale (NRS) 30 minutes after determining dilatation. The physiological responses were evaluated at the same time intervals. The ERA performed massaging at the same dilatations for M1 and M2 groups. The data was collected similarly. Labor progression was evaluated by the partograph. ***Results:*** Massage at 4 and 6 cm dilatations and breathing at most dilatations decreased pain scores significantly. The mean difference of pain intensity and physiological responses to pain was not significant between the massaging and breathing groups at most dilatations. ***Conclusion:*** Based on the findings of this research, providing the possibility of choosing one or both methods for labor pain relief and decreasing cesarean section rate is suggested.

Introduction

Labor pain is among the most severe pains in the world.[1] Severe labor pain causes distress for mother and can impair her health. It might also have negative effects on child-mother and marital relationships.[2] According to previous studies, the fear of tolerating vaginal delivery pain has significantly increased the number of cesarean sections in Iran[3,4] although there are a number of non-pharmacological interventions to relieve pain.[5] Studies performed in 1988 on 4171 American women revealed that 84% of women tended to use non-pharmacological methods to decrease labor pain and the commonest methods were breathing techniques (55.2%) and massaging (17.3%).[6]

Implementation of different techniques is time-consuming and costly. On the other

*** Corresponding Author:** Mahin Kamalifard (MSc), E-mail: kamali_m2001@yahoo.com
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hand, a safe method to control pain should certainly be effective, affordable and accessible as well as less hazardous for both the mother and the fetus. Comparing the commonest methods seems necessary in order to determine the most effective method. Thus, we tried to compare the effects of massage therapy and breathing techniques on pain intensity and physiological responses to pain (pulse rate, blood pressure and fever), as well as on progression and labor results (type of delivery and Apgar score).

Materials and methods

This was a quasi-experimental study including primigravidae who referred to the clinic and delivery room of Alzahra Hospital in Tabriz. Considering the mean and standard deviation obtained by the study of Chang et al.[7] and using the formula related to determine sample size by analysis of variance (ANOVA), the sample size for each group was calculated as around 20 people.

First, after sufficient explanations about the study in an obstetrics and gynecology (OB/GYN) Clinic and also obtaining written consents from the mothers, forty 20 to 35-year-old mothers at 36th week of gestation were selected. More subjects were normal primiparous women in normal midwifery conditions without any physical diseases or types of paralysis. Using a table of random numbers, they were divided into two groups of massage therapy 1 (M1) and breathing technique 1 (B1). In order to provide control groups, another 42 people, selected with similar criteria, were divided into two groups of massage therapy 2 (M2) and breathing technique 2 (B2). Thus, if group B1 received breathing techniques at 4 and 8 cm dilatations, the subjects in the B2 group B2 were considered as controls at the same dilatations in order to determine the efficacy of the method on the required variables.

Demographic data was obtained through interviewing. The mothers in the breathing technique group were trained to do practical breathing in a class by an educated research-er assistant (ERA) on the same day. When mothers of the four groups referred for labor, the ERA was also present in the labor room and repeated the breathing training for breathing groups. Thereafter, each group implemented the required actions by the help of ERA. In the B1 group, mothers used the breathing techniques for 30 minutes at the first or second stage of labor at 4 and 8 cm dilatations. Subjects in the B2 group employed the same techniques at 6 and 10 cm dilatations. Thirty minutes after determination of dilatation, the pain intensity was assessed by a numerical rating scale (NRS) which was scored from zero to 10. The NRS could measure physiological responses to pain (pulse rate, blood pressure and fever). In the M1 and M2 groups, respectively at 4 and 8 cm dilatations and 6 and 10 cm dilatations, mothers underwent massage (hypogastric, upper thighs, sacral area, shoulders and foot) by an ERA for 30 minutes. Pain intensity and physiological responses to pain were measured by the same NRS 30 minutes after determination of dilatation. Mean differences of pain intensity between M1 and M2, as well as B1 and B2 were analyzed by independent t–test. The comparison between massage and breathing groups in terms of mean pain was performed by Wilcoxon test. Mean differences of physiological responses to labor pain between M1 and M2 groups and B1 and B2 groups were compared by paired t–test, while the massage and breathing were compared using independent t-test.

The process of labor progression was evaluated by the partograph. The progression and labor results including the type of delivery and first and fifth minute Apgar scores were analyzed by chi-square test.

Results

Some of the demographic characteristics are summarized and separated by the groups in Table 1. As it is seen, the educational level of most subjects in M1 and M2 groups (45%) and B2 group (36.4%) was elementary school

while high school diploma (30%) and academic degrees (30%) were the commonest in B1 group. The majority of the participants in M1 and 2 groups (70%), B1 (100%) and B2 (72.7%) resided in the city.

Wilcoxon test was used in order to determine the effect of massage and breathing on labor pain (shown in Table 2). As Table 2 indicates, differences in mean pain between the M1 and M2 groups at 4 and 6 cm dilatations were significant, i.e. massage could reduce pain in the mentioned dilatations. However, the differences at 8 and 10 cm dilatations were not significant.

Comparing mean pain in B1 and B2 groups showed significant differences at 4, 6 and 10 cm dilatations, i.e. breathing could reduce pain in the mentioned dilatations. However, no significant difference was observed at 8 cm dilatation.

Table 1. The frequency of demographic characteristics in the breathing and massage groups

Variables	Massage 1 (n = 20)	Massage 2 (n = 20)	Breathing 1 (n = 20)	Breathing 2 (n = 22)
Age (year)	22.57 (3.90)	22.15 (3.10)	23.37 (3.65)	23.43 (4.62)
Gestational age (month)	39.40 (0.99)	39.55 (0.75)	38.85 (1.59)	39 (1.41)
Height (cm)	160.82 (5.38)	159.82 (5.3)	160.33 (4.20)	161.16 (4.81)
Weight (kg)	68.63 (9.60)	70.28 (7.81)	70.21 (9.41)	71 (9.20)

Values are expressed as mean (SD)

Table 2. Comparing the intensity of labor pain in the Massage 1 and Massage 2 groups as well as between the Breathing 1 and Breathing 2 groups

Dilatation	Massage 1	Massage 2	Statistical indicators	Breathing 1	Breathing 2	Statistical indicators
4 cm	6.15 (2.25)	7.47 (1.43)	n = 19 z = 2.005 p = 0.045	6.2 (3.25)	8.32 (1.77)	n = 20 z = -0.417 p = 0.016
6 cm	8.73 (1.49)	6.37 (2.14)	n = 17 z = -2.459 p = 0.014	8.4 (1.76)	6.27 (2.14)	n = 16 p = -2.432 n = 0.015
8 cm	8 (1.52)	8.33 (2.06)	n = 16 z = -1.104 p = 0.27	7.71 (1.82)	8.77 (1.77)	n = 15 z = -1.71 p = 0.08
10 cm	9.77 (0.60)	7.27 (1.77)	n = 16 z = 0.915 p = 0.36	8.54 (1.51)	6.33 (1.75)	n = 14 z = -2.97 p = 0.003

Values are expressed as mean (SD)

The effects of massaging and breathing methods on labor pain were compared by Wilcoxon test (shown in Table 3). Moreover, t-test was used to determine the effects of massage therapy and breathing technique on physiological responses to labor pain and to compare the two methods.

The mean (SD) of systolic blood pressure at 6 cm dilatation in the M2 (who received massage) and M1 (who did not receive massage) groups were 104.68 (8.8) and 115.00 (10.8), respectively. The difference between the two groups was significant (t = 2.63; df = 15; p = 0.01). Therefore, massage reduced systolic blood pressure at 6 cm dilatation.

Systolic blood pressure at 10 cm dilatation was significantly different between the M2 and M1 groups (107.66 (8.63) vs. 113.66 (10.76); t = 2.16; df = 14; p = 0.04). Therefore, massage also reduced systolic blood pressure at 10 cm dilatation.

There were no statistically significant differences in diastolic blood pressure, pulse rate and body temperature between the two groups of massage (p > 0.05). In fact, in the present study, massage had no significant effects on pulse rate and body temperature.

There was no statistically significant difference in systolic and diastolic blood pressure, pulse rate and body temperature between the two groups of breathing at any dilatations (p > 0.05).

Comparing the effects of the two methods on physiological responses to labor pain in this study showed that although mean differences of systolic and diastolic blood pressure were not significant, body temperature and pulse rate were lower in the massage group than in the breathing group.

The mean (SD) of body temperature in M1 and B1 groups were 36.69 (0.28) and 36.93 (0.35), respectively. Moreover, the mean difference between these two values was significant (t = 2.2; df = 18; p = 0.04). On the other hand, the mean (SD) of pulse rate at 4 cm dilatation in M1 and B1 groups were significantly different (78.32 (7.45) vs. 85.79 (11.27); t = 2.5; df = 18; p = 0.02), i.e. pulse rate was higher in the breathing group.

Chi-square test and partogram were used to determine the effects of massage and breathing techniques on labor progression (Table 4). In addition, chi-square and Fisher's exact tests were used to compare the effects of massage and breathing on type of labor. The differences in the obtained proportions were not statistically significant. Calculating Apgar scores after birth revealed only one infant (5%) in the M1 group scored below 7. However, the difference of proportions was not significant. In addition, we found about 4.88% of all the studied mothers to deliver by cesarean section.

Table 3. Comparing the pain intensity between the massage and breathing groups at different dilatations

Dilatation	Massage 1	Breathing 1	Statistical indicators	Massage 2	Breathing 2	Statistical indicators
4 cm	6.15 (2.25)	8.4 (1.76)	n = 20 z = 0.02 p = 0.9	7.47 (1.43)	8.32 (1.77)	n = 19 z = -1.75 p = 0.08
6 cm	8.73 (1.49)	8.4 (1.76)	n = 14 z = -0.62 p = 0.54	2.14 (6.37)	6.05 (1.58)	n = 19 z = 0.63 p = 0.52
8 cm	8 (1.52)	7.71 (1.82)	n = 13 z = -0.16 p = 0.55	8.33 (2.06)	8.77 (1.77)	n = 18 z = -0.13 p = 0.19
10 cm	9.77 (0.60)	8.54 (1.51)	n = 13 z = 0.234 p = 0.019	7.27 (1.77)	6.33 (1.75)	n = 18 z = -1.70 p = 0.1

Values are expressed as mean (SD)

Table 4. Frequency of partogram curves

Labor curve location	Massage 1	Massage 2	Breathing 1	Breathing 2
On the left side of ALERT line	14 (70)	16 (80)	18 (90)	20 (99.9)
On the ALERT line	2 (10)	2 (10)	1 (5)	1 (4.5)
On the right side of the ALERT line	4 (20)	1 (5)	0 (0)	1 (4.5)
Reach or cross the ACTION line	0 (0)	1 (5)	1 (5)	0 (0)
Total	20 (100)	20 (100)	20 (100)	22 (100)

Values are expressed as number (percentage).

Discussion

The results of the present study showed that although massage significantly reduced labor pain at 4 and 6 cm dilatations, it did not have any significant effects at 8 and 10 dilatations. Inefficacy at higher dilatations might have been not only the increased intensity but also the source of pain since at these stages pain is mostly resulted from perineal stretching and pressure from the presenting fetal part on the pelvic viscera. However, perineal massaging was not implemented in this study and some cases refused to stay on their hands and knees to make all areas accessible for the massager.

While the studies of Pilevar Zadeh et al.,[8] Field et al.,[9] and Hashemi et al.[10] confirmed the effects of massage on pain reduction in the first stage of labor, no study was found to reject this effect.

Similar to Kamali Fard et al.[11] and Tafazoli et al.[12], the results of the present study showed that breathing technique at 4, 6 and 10 cm dilatations significantly reduced labor pain. No study was found to reject the effect of breathing on labor pain reduction. Comparing the effect of massaging and breathing on labor pain in the present study showed that although pain intensity was lower in all the dilatations in breathing, it was only significantly different from the groups receiving massage at 10 cm dilatation. The reason might have been the positioning of mothers in lithotomy position which made some areas, such as shoulders and sacral areas, unavailable for massaging at 10 cm dilatation. However, mothers were able to continue full implementation of breathing technique at this dilatation. No study was found to compare the two methods.

The results of the present study showed that massaging at 6 and 10 cm dilatations significantly reduced systolic blood pressure. Touching and massaging are methods to reduce pulse rate, blood pressure and respiratory rate.[1] In the present study, massaging had no significant impact on pulse rate and body temperature which could be justified by the nonstandard temperature and stressful environment of the labor room.

Comparing the effect of the two methods on physiological responses to labor pain in this study indicated that although the differences of mean systolic and diastolic blood pressures were not significant, body temperature and pulse rate were lower in the massage groups.

Generally, available studies have confirmed the effect of massaging and breathing on anxiety reduction among mothers. However, they did not investigate the vital signs of mothers. The present study showed that in the massage therapy group, only one woman (2.5%) had prolonged labor (curve reached the ACTION line), 2 subjects (5%) had cesarean section and one (2.5%) had an Apgar score lower than 7. Similarly to Field et al.,[9] the present study showed that in the group receiving breathing technique, 1 subject (2.27%) had prolonged labor (curve reached the ACTION line), 2 subjects (4.5%) had cesarean section and none of them had a low Apgar score. The results of Kamali Fard showed that breathing technique significantly reduced cesarean rate.[11] Tafazoli et al. also showed that breathing significantly shortened the first stage of labor and reduced the need for induction but had no significant effects on Apgar scores and cesarean section rate.[12]

A study by Nabb et al. assessed the effects of massaging, creative thinking and breathing on 35 mothers. The results showed that 21 subjects finished the labor without analgesia, 7 subjects inhaled Entonox and 2 subjects underwent epidural anesthesia. The limitation of their study was lack of a control group.[13]

As indicated in the present study, using both techniques reduced labor process, Apgar scores and cesarean section rate. In fact we reached levels below the objectives of the Special Committee at the American College of Obstetrics and Gynecology (they aimed to reduce cesarean rate to 15.5%).[14] According to the World Health Organization, cesarean sec

tion rate was 41.9% in Iran in 2008.[15]

Conclusion

The two methods were not significantly different in terms of pain intensity reduction, progression, labor type and Apgar scores. In addition, the effect of breathing on labor pain reduction was more at 10 cm dilatation. Thus, although implementation of breathing technique requires training during pregnancy, the simultaneous use of the two methods would provide better results. It is recommended to conduct a similar study on subjects who undergo labor with another position except lithotomy Furthermore, conducting a study to compare the effects of simultaneous use of both methods is suggested.

Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

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