



Original Article

Do Breathing Techniques Enhance the Effect of Massage Therapy in Reducing the Length of Labor or not? a Randomized Clinical Trial

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ABSTRACT

Introduction: Prolonged labor is a common birth complication that is associated with some negative maternal and fetal effects. The aims of this study were 1) to evaluate the effect of effleurage abdominal massage and 2) to assess the effects size of breathing techniques with massage on the length of labor.**Methods:** This study was a randomized trial with concealed allocation, assessor blinding for some outcomes and intent-to-treat analysis. Primiparous women (n=117) age 18-35 years who were randomly assigned to three groups; abdominal massage (n=37), abdominal massage with breathing technique (n=38) and control (n=42). Although it was randomized block design with the allocation ratio 1:1:1 but soon after the sample was withdrawn in labor, another was replaced. Experimental groups' participants received a 30-min effleurage abdominal massage during the active and transitional phases of labor. Particular breathing techniques in each stage of labor were done. Data were analyzed using SPSS ver.13.**Results:** Duration of the active phase was 244.89(83.30) min in the massage, 254(68.55) min in massage with breathing and 312.07(67.17) min in control group, which was significantly different between the massage and control groups (P<0.001, Min Diff; -67.18), as well as massage with breathing and control groups (P=0.003, Min Diff; -9.63). The Scheffe test showed no significant difference between the two experimental groups.**Conclusion:** Effleurage abdominal massages decrease length of active phase on labor, but the learning of breathing techniques in labor couldn't enhance this effect of massage, so it is likely that breathing exercises may be considered during pregnancy.**Citation:** Haseli A, Ghiasi A, Hashemzadeh M. Do Breathing Techniques Enhance the effect of massage therapy in reducing the length of labor or not? a randomized clinical trial. J Caring Sci 2019; 8 (4): 257-63. doi:10.15171/jcs.2019.036

Introduction

Prolonged labor is a common birth complication that is associated with risk of uterine rupture, vesicovaginal or vesicocervical fistulas, severe laceration of the genital area, cystocels, rectocele and infertility^{1,2} Additionally, it constitutes a significant sign of instrumental deliveries and delivery by emergency Caesarean section.^{3,4} Millions of neonate suffer from suffocation, seizures and cerebral palsy due to prolonged labor, enduring physical and mental disorders throughout their lifetime.⁵ Several factors, including medical interventions, fatigue, drugs, hyperdistention of uterus, malpresentation of the fetus and the mother's anxiety can change the labor duration.⁶

Anxiety and stress during labor are known to increase adrenaline and adrenocorticotropins, which have anti-oxytocin effects on uterine contractors and lead to delays in the progress of the labor.⁷ Massage increases uterine contractions and muscle activity and can affect the duration of delivery by reducing levels of adrenaline and noradrenaline and increasing endorphins and oxytocin⁸ Massage therapy is the most common alternative therapy recommended during childbirth^{9,10} Meanwhile, breathing techniques are also among common ways that researchers employ to manage or to facilitate labor in pregnant women during childbirth but the current method usually is used with other methods (e.g., massage therapy) rather than

lonely. Comparing the commonest methods appears to be important so as to determine the most effective method.

Thus, the aims of this study were 1) to evaluate the effect of effleurage abdominal massage on the duration of labor and 2) to assess effects size the breathing techniques with massage on the length of labor.

Materials and methods

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional Tehran University of Medical Sciences No. 1744284 on July 19, 2010 and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article has been recorded in Iranian Registry of Clinical Trials (No.138807192248N4). This study was a parallel design randomized control trial with concealed allocation, assessor blinding of some outcomes and intent-to-treat analysis.

The randomization schedule was created by a midwife; allocation was centrally generated and concealed.

Participants were randomly allocated in a 1:1:1 ratio to receive the abdominal massage, abdominal massage with breathing techniques, and usual care. The researcher (therapist) was not blinded to the type of intervention that she provided. Participants knew whether they

received massage or massage breathing techniques; usual care recipients were aware that they had enrolled in a trial of massage. The assistant of the researcher assessing trial outcomes was blinded to study assignment.

Women who had been admitted to Lolagar hospital in Tehran, entered the study after their informed consents were obtained. After meeting the eligibility criteria for the study, the participants were randomly allocated to two experimental groups or a control group according to an opaque bag that contained six alphabetical balls (two balls for each group). Although it was randomized block design but soon after the sample was withdrawn in labor, another was replaced. During the periods of 4 cm and 8 cm of cervical dilation with uterine contractions, the participants in both of interventional groups received abdominal effleurage massage for 30 min by the researcher and the participants in the massage with breathing group conducted breathing techniques, additionally. The assistant of researcher stayed blind to group allocations and was never present while the interventional or control procedures were performed by the researcher. The assistant recorded length of every phase of labor, characteristics of uterine contractions and imaged labor progress based on partograph before and immediately after the intervention. Blinding was kept up by the assistant, leaving the room after evaluating the time-related outcomes at baseline, and returning to reevaluate similar outcomes after the intervention. After labor and before hospital discharge, the assistant of researcher gathered the data regarding obstetric and neonatal outcomes.

The inclusion criteria were: Iranian women in Tehran, aged between 18 and 35 years with gestational age of 37 to 42 weeks, primigrara, a single fetus in cephalic position, low-risk pregnancy, not attending preparatory childbirth classes during pregnancy, the spontaneous onset of labor and not having PROM (prolonged rupture of membranes) for more than 12 hours, cervical dilation of 4 cm with appropriate uterine dynamics for this phase, estimated fetal weight, by clinical methods, (including palpation method, Symphysis Fundal Height measurement (SFH)) between 2500 and 4000 grams, not having used medication since admission to hospital until randomization, confirmation of the fetal health according to ultrasound findings or triple test on pregnancy, no drug addiction, the absence of cognitive or psychiatric problems and skin diseases such as eczema, swelling of massage area, high fever, superficial phlebitis, thrombosis and jaundice, all of which were diagnosed through physical examination by the researcher and report of the physicians in the history sheet.

The main exclusion criteria were the presence of dermatologic conditions that would contraindicate the use of abdominal massage, the use of drugs stimulating

uterine contraction such as oxytocin and the performance of incorrect breathing techniques. The participants were allowed to withdraw from the study if they were endured of the allocated intervention or if they declined more participation at any stage.

The statistical population included all 18-35-year-old primiparous women who had been admitted to Lolagar hospital, province of Tehran, Iran between in July and December 2010. The study was designed to detect a reduction in duration of labor from the baseline to the final assessment of 20% in the interventional groups as compared with the control group (alpha2-sided = 5%; power = 80%). Based on this information, considering the previous studies ^{11, 12}, the sample size was determined to be 32 in each group (Figure 1), and the final sample size became 96 due to the given loss of 10%.

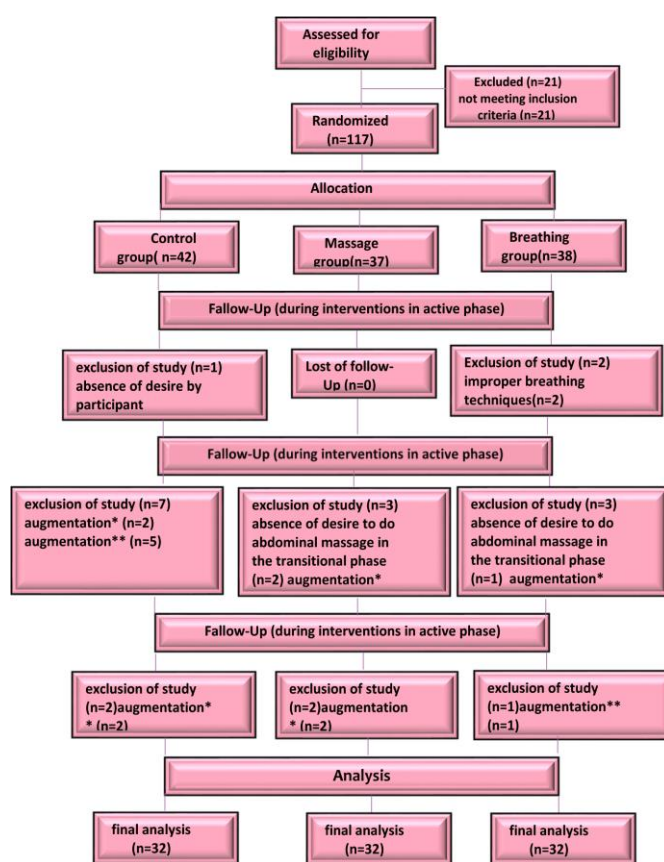


Figure 1. Flow chart of study

The flow of participants through the trial is shown in Figure 1. In total, 196 parturients were screened and 79 were excluded for not meeting the inclusion criteria.

About 117 participants were included in the study and were randomly allocated to the experimental group 1

(massage group) (n = 37), the experimental group 2 (breathing group) (n = 38), or the control group (n = 42).

Two persons were involved in the intervention and data collection. The researcher conducted randomization and the application of the study interventions (massage, massage with breathing techniques or routine care) while the assistant conducted the measurement of outcomes.

In order to intervene, the researcher in the experimental group 1 (massage group), had their hands greased with olive oil at a rate of 2 cc (manufactured by pharmaceutical and food laboratory Balak Company) and would do abdominal massage at the beginning of the active and transitional phases of labor and during the period of 4 and 8 cm of cervical dilations, respectively.

Effleurage abdominal massage during uterine contractions for 30 minutes was extended from the lower abdomen to the upper sides of the uterus at the foci of the pain by smooth strokes with the finger tips and then, fingers were scrolled down toward the midline of abdomen until both hands reached the starting point of the massage i.e. the lower abdomen simultaneously.¹³

The experimental group 2 (breathing group) received massage from a researcher (in the same way as described for the experimental group 1) and were encouraged to perform breathing exercises so that modified-paced breathing was encouraged in the active phase and pattern-paced breathing was encouraged in the transitional phase. Finally, the pant-blow abdominal breathing technique was applied in the second stage of labor.¹⁴ meanwhile, the women in the current group were trained to do practical breathing by educated researcher after randomized allocation in the same day. Both experimental groups also received other routine maternity ward care, discussed further below.

The control group received a similar routine maternity ward care. Additionally, the same researcher accompanied the participants in the control group for 30 minutes during the period of 4 and 8 cm of cervical dilation, as done for the experimental groups although the researcher was there just for observation and to answer questions.

The routine care of the maternity ward during the period of dilation is determined by the recommendations of the World Health Organization¹⁵ for more humanized childbirth. After admission to the hospital, the participants were offered a meal and the resources for pain relief were allowed, if asked by the participant. Such resources include labor analgesia and oxytocin when necessary. The parturient was permitted to choose the most comfortable position. The presence of an accompanying person was permitted during labor and childbirth, as well as, during some other medical procedures. Partograph, which be used to labor progress,

is a graphic recording of progress of labor and salient features in the mother and fetus. Uterine contractions (intensity, duration and frequency in 10 minutes) and maternal vital signs are also assessed. The fetus is also monitored closely on the Partograph by regular observation of the fetal heart rate and color of liquor.¹⁶

It recognizes labor that isn't progressing normally, demonstrates when augmentation of labor is proper and detects cephalo-pelvic disproportion long before labor becomes "obstructed". It detects as an early warning system and aids in early decision making on transfer, augmentation and termination of labor.¹⁷ the part of partograph has as its central component a graph of cervical dilatation against time. It is likewise called cervicogram area of the partograph that is separated into latent and active phase.¹⁸ in the present study, recruitment of the participants was in active phase (cervical dilatation from 4 to 10 cm). It is accepted that a primipara should dilate at 1 cm per hour in active stage and more than that is consider as prolonged labor.¹⁹ in the normal active phase of labor, a dilatation tempo of 1 cm for each hour is considered normal. In the active phase, the alert line, drawn from 3 cm to 10 cm dilatation, indicates the rare of dilatation. Therefore, if the dilatation moved to the right of the line it's slow and an addiction of delay in labor and the woman ought to be observed all the more much of the time. The action line is drawn four hours to the right of the alert line. If cervical dilatation crossed this line, there should be considered a critical evaluation of reason of delay (for whether labor be prolonged) and a choice about the proper management to overcome this delay should be taken. The further management of the woman in labor should be under a doctor's supervision and direction. Progress of labor recorded by researcher's assistant in partograph form.

Obstetric and neonatal outcomes were also collected by the blinded assistant researcher with partograph as well as the collection form. Primary outcomes included the duration of labor (active phase, second and third stage of labor) and number of uterine contractions during interventions in active and transitional phase. Secondary outcomes were augmentation use, frequency of partograph curves, postpartum haemorrhage, episiotomy, path of delivery and neonatal weight, length and APGAR score. Content validity method was used in order to determine scientific validation of instruments and, equivalence test was used for reliability of the questionnaire. In addition, an intent-to-treat analysis including all randomized patients was performed. The data were analyzed using the tests of ANOVA, Scheffe, Kruskal-Wallis and chi-square. Data were analyzed using the Statistical Package for the social science SPSS (version 13.0, Chicago, IL, USA). A P-value less than 0.05 was

considered as statistically significant.

Results

The samples in the three groups were compared with

each other, using One Way ANOVA test. No significant differences were observed among the three groups in terms of maternal age, gestational age, BMI, neonate's weight and length and bishop score (Table1).

Table 1. Comparison of individual and obstetrics criteria (mean (SD), P- value; intent-to-treat analysis)

Characteristic	Message group	Breathing group	Control group	P
	(N=37) Mean (SD)	(N=38) Mean (SD)	(N=42) Mean (SD)	
Maternal age (year)	23.70(4.5)	25(4.37)	24.28(4.18)	0.458
BMI (Kg/m ²)	27.28(3.05)	27.72(2.37)	27.07(3.07)	0.294
Gestational age (day)	276.4(5.72)	275.92(4.92)	275.14(5.37)	0.503
Bishop score	8.44(1.02)	8.89(0.89)	8.78(0.92)	0.594
Newborn weight (gram)	3253(243)	3416(373)	3262(405)	0.609
Newborn length (cm)	49.81(1.71)	49.37(2.24)	50.07(1.34)	0.890
No. of participant withdrawn due to:				
Absence of desire by participant	-	-	1	
Improper breathing techniques	-	2	-	
Absence of desire to do massage in the transitional phase	2	1	-	
Augmentation	3	3	9	

Partograph were used to determine the effects of massage alone or with breathing techniques on labor progression. Intent-to-treat analysis, including all randomized patients was performed. Two people in the berating group and seven people in the control group had curve reached the action line related to partograph form (Table 2).

Table 2. Frequency of partograph curves (mean (SD); intent-to-treat analysis)

Labor curve location [€]	Message	Breathing	Control
	(N= 37) Mean (SD)	(N= 38) Mean (SD)	(N= 42) Mean(SD)
On the left side of alert line	28 (75.67)	25 (65.79)	24 (57.14)
On the alert line	5 (13.51)	6 (15.79)	5 (11.90)
On the right side of the alert line	4 (10.81)	5(13.16)	6 (14.28)
Reach or cross the action line	0 (0)	2 ^{€€} (5.26)	7 (16.66)
Total	37 (100)	38 (100)	42 (100)

[€]Values are expressed as number (percentage); ^{€€}one participant was augmented and the other participant only was observed

Mean duration of labor in the first stage (active phase) was shorter in both experimental groups. Post Hoc Multiple Comparison (Scheffe test) did not show significant difference between the two experimental groups (P=0.1) but there was a significant difference between the massage and control groups (P<0.001, Min Diff; -67.18), as well as massage with breathing and control groups (P=0.003, Min Diff; -9.63).

Also, frequency of contractions during interventions in 4 and 8 cm cervix dilatation in both experimental groups was more than that in the control group. Scheffe test indicated significant differences between the control group and each of the experimental groups (P<0.001) but it did not reveal significant differences between the two experimental groups (P=0.952). Regarding duration of second and third stages of labor, there was no significant

difference among the three groups. The result of intent-to-treat analysis showed that path of delivery was unaffected by the interventions, with three Caesarean deliveries in each experimental groups and eight in the control group (P=0.214). Around 95% of the newborns in the three groups had normal APGAR scores by the first minute after delivery, and just 2 newborns (1.7%) had APGAR scores less than 7 by the fifth minute after delivery, overall. The other obstetric outcomes such as rate of augmentation, postpartum hemorrhage, fetal distress and rate of episiotomy were also similar among the three groups. All these data are presented in (Table 3).

Of course, once again we explanatory analyzed with participants who reminded to final analyses (32 people in each study) for all of obstetric and neonatal outcome. Results of all them were also similar with both analyses except path of delivery, which was 1 (3.25%), 1 (3.25%) and 6 (18.75%) people in the massage, breathing and control groups, respectively (P=0.04).

Conclusion

Several studies have been conducted on the effects of massage on labor, but the findings of our study have investigated the effect of abdominal massage either with breathing techniques or alone on the duration of labor which indicated the decreased duration of active phase following the interventions (P<0.001). There may be further increase in the number of uterine contractions in the present study due to massage in the foci of the pain in the abdominal area.²⁰ Effleurage abdominal massage reduce the amount of adrenaline and remove the inhibitory effect of adrenaline on the oxytocin so that it increases the number of contractions by increasing the secretion of internal oxytocin.²¹ Moreover, it seems that

Table 3. Comparison of labor outcomes (intent-to-treat analysis)

Characteristic	Group 1 ^a (N=37)	Group 2 ^b (N=38)	Group3 ^c (N=42)	P –value	P –value; Min Diff		
					Groups 1&2	Groups 1&3	Groups 2&3
Duration of active phase (from 4 to 10 cm cervical dilatation) (min)	244.89(83.30)	254(68.55)	312.07(67.17)	P<0.001	P=0.1, -9.63	P<0.001 -67.18	P=0.003 -9.63
Duration of the second stage (min)	42.24(18.87)	44.47(23.28)	42.95(21.30)	P=0.897	-	-	-
Duration of the third stage (min)	4.27 (1.9)	4.65(2.12)	3.83(1.87)	P=0.177	-	-	-
number of uterine contractions in active phase (during 30 min)	9.29(1.63)	9.21(1.27)	7.16(1.14)	P<0.001	P=0.253 0.70	P<0.001 2.58	P<0.001 1.89
number of uterine contractions in transitional phase (during 30 min)	13.51(1.75)	12.81(2.00)	10.92(1.67)	P<0.001	P=0.962 0.09	P<0.001 2.13	P=0.008 2.04
rate of augmentation	3(8.1)	3(7.89)	9(21.42)	P=0.12 ^e	-	-	-
Path of delivery					-	-	-
Vaginal delivery	34(91.9)	35(92.1)	34(81)		-	-	-
Caesarean delivery	3(8.1)	3(7.9)	8(19)	P=0.21 ^e	-	-	-
Postpartum haemorrhage	2(5.40)	3(7.9)	2(4.8)	P=0.101 ^e	-	-	-
Fatal distress	3(8.1)	2(5.3)	4(9.5)	P=0.18 ^e	-	-	-
Episiotomy	31(83.8)	36(94.7)	37(88.1)	P=0.23 ^e	-	-	-
APGAR score <7 at 1 min	1(2.7)	1(2.63)	2(4.8)	P=0.23 ^d	-	-	-
APGAR score <7 at 5 min	1(2.7)	0	1(2.38)	P=0.12 ^d	-	-	-

^aMassage group; ^bBreathing group; ^cControl group; ^dKruskal-Wallis test; ^eChi-squared-test

abdominal massage was stimulated exactly in the centres of the pain of uterine contractions, it increased the number of contractions. Although the increase in the number of uterine contractions during two active and transitional phases was observed, the results of present study didn't show fetal distress and atonic uterus in postpartum. Therefore, the use of this methods can be suggested as a supplement non-pharmacological method alternative for augmenting uterine contractions instead of oxytocin because, it does not have the side effects of oxytocin.

The findings of this study indicated reduced duration of the active labor phase in the experimental groups compared to the control group (P=0.001). It was consistent with the findings of Field et al., where the duration of the active phase in the intervention groups was lower than that in the control groups.²²

The results in our study are in contrast to the finding of Chang et al.,¹¹ that is associated with the effect of abdominal massage compared to massage of other parts massage because, level of oxytocin-LI increases after abdominal massage.²⁰ Although length of active phase in experimental groups is lower than that of the control group, by Post Hoc Multiple Comparison (Scheffe test), it doesn't show significant difference between the two interventional groups (P=0.1). The results of a study which were related to the effect of Lamaze training and the use of breathing techniques and massage on the outcome of pregnancy and labor contradicted those of the present study.²³ Controlled breathing, which is learned in Lamaze Class; decreases perception of pain, increases oxygenation, relaxation and have shorter labor.²⁴ Probably, teaching breathing techniques to pregnant women from week 24-26 until the end of their pregnancy is a reason for having enough time for learning and making proper use of breathing techniques during labor

and childbirth, while in present study, breathing techniques were taught at the same time as women were admitted into the investigation.

In relation to the effect of abdominal massage and breathing techniques on the duration of the second stage of labor in this study, no significant difference was observed among the three groups. The results of Khodakarami and Janssen studies do not show significant differences with regard to the duration of the second stage of labor followed by massage of different parts of the body between the two groups of massage and control,¹² a systematic review by Gentz demonstrated that the most of benefits of complementary therapies such as massage therapy and breathing techniques is in the first stage of labor and about the benefits of these methods during the second stage of labor there is disagreements among different studies which is probably due to differences in sample size, parity and race.²⁵

The results of the present study indicated that there is no statistically significant difference in the mean duration of third stage of labor among three groups.

In a study it is mentioned the average duration of third stage of labor is between 1 to 5 minutes,¹⁹ it can be concluded that the use of this method in this study does not have negative impact on the duration of this stage. The results obtained by Kashanian et al., determining the effect of massage, breathing techniques, and psychosocial support on 100 primiparous women are also consistent with the findings of this study.²⁶

The present study showed that two people in the berating techniques group and seven people in the control group had prolonged labor (curve reached the ACTION line). Although this variable was not significantly different among the three groups, its rate was different among them. Prolonged labor in first stage is the main cause of caesarean section and instrumental

vaginal delivery. If duration of labor is prolonged, it may cause fetal hypoxia.²⁷ Similar to Kamalifard *et al.*, the present study also showed that in the group receiving breathing technique, 1 subject (2.5%) had prolonged labor (curve reached the ACTION line) and 2 subjects (5%) had cesarean section.²⁸ However, three women in each experimental groups and 9 subjects in the control group were cesarean section ($P=0.214$). Although there were no significant differences among the groups, we should be considering that we analyze by intention-to-treat. All participants entered these analyses after randomization while the excluded participants, didn't receive any intervention after that even they were manipulated by personal shift for example, augmentation, amniotomy, pain relief with narcotic etc. Not surprisingly, these manipulations by personal shift affected path of delivery and that is limitation of intention-to-treat analyses. For this reason, once again we analyzed with participants who reminded to final analyses (32 people in each study) for all of obstetric and neonatal outcome. Results of all them were also similar with both analyses except path of delivery, which was 3.25%, 3.25% and 18.75% in the massage, breathing and control groups, respectively ($P=0.041$).

Of course this result can be somewhat unreliable information because some gynecologists began augmentation in some participants regardless of partograph and scientific criteria for the diagnosis of prolonged labor when the researcher inevitably excluded these samples from the study (Figure 1).

Considering the fact that the findings of this study regarding the effect of abdominal massage, represented some reduction on the duration of the first stage of labor, it is recommended that further studies should be conducted with to compare the effect of abdominal massage on blood oxytocin levels. If it's confirmed, this method will be used as an alternative as a non-medical affordable method almost without maternal and fetal complications for medical methods for stimulating the uterus such as oxytocin.

Breathing techniques were taught simultaneously with patient admission that it was one of limitations of this study. It's better to be considered during pregnancy because, women have ample time to practice it during childbirth, properly. Another limitation was related to randomize block design that sample has been replaced if each one sample was withdrawn in labor.

Conclusion

It seems that abdominal massages, i.e. the massage of the uterus stimulates the focal points of uterine contractions in uterine horns, and it increases the number of contractions and ultimately faster labor. While, the

learning of breathing techniques in labor couldn't enhance this effect of massage, because of its powerful benefits on labor, the training of breathing techniques should be considered during pregnancy. This statement is hypothetical and we should exercise caution in the interpretation of it.

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Ethical issues

None to be declared

Conflict of interest

The authors declare that there are no conflicts of interest.

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