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The Effect of Back Massage with and without Ginger Oil on the Pain Intensity in the Active Phase of Labor in Primiparous Women

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ABSTRACT

Background & aim: The negative effect of labor pain on the tendency of mothers to choose vaginal delivery demands identifying effective and safe methods to reduce pain. Regarding the analgesic effect of ginger, the present study aimed to determine the effect of back massage with and without ginger oil on the pain intensity in the active phase of labor in primiparous women.

Methods: This randomized clinical trial was conducted on 90 primiparous women in Umm al-Banin Hospital, Mashhad, Iran, in 2017. The subjects were selected using convenient sampling and randomly assigned into three groups of namely massage with ginger oil, massage with placebo (i.e., paraffin), and control group. The intervention and placebo groups received 15-minutes back massage in the active phase of labor. The pain intensity was measured in three groups before and after intervention. The data were collected using questionnaires for demographic and obstetric data as well as Visual Analog Scale for pain measurement. The obtained data were analyzed in SPSS software (Version 16) through Kruskal-Wallis and the Chi-square tests.

Results: The mean values of pain intensity were obtained as 4.1±2.29, 6.8±1.73, and 7.6±1.43 in ginger, placebo, and control groups, respectively. The results showed that the ginger group reported the lowest level of pain during the active phase of labor ($P<0.001$).

Conclusion: Back Massage with ginger oil not only has effect on pain relief but also was completely safe in order to be administered to mothers during their first experience of childbirth.

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Introduction

Labor pain is one of the most severe types of pain (1). Despite using various pain relief methods, it remains as a major remedial health problem in many countries (2). The intensity of the labor pain is reported mild, moderate, severe, and very severe as well as intolerable in 15%, 35%, 30%, and 20% of the cases, respectively (3). According to the studies conducted by Melzack and Scaffelberg, 74% and 44% of the women reported lumbar and abdominal pain, respectively, due to uterine contractions during labor. Lumbar pain is one of the main complaints of women during childbirth (4). Labor pain differs from other kinds of pain and is caused by the contraction of the uterine muscle which is painful unlike other muscle contractions (5).

The painful myometrial contractions result

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from the hypoxia of the contracted myometrium, the pressure on the cervical nerve ganglions and the lower part of the uterus, the cervical stretching during the dilation, and the stretching of the peritoneum of the uterine fundus (5, 6). The prolongation of labor leads to an increasing level of fear, pain, request for cesarean delivery, and negative experience of delivery (7-10). Nowadays, various pharmaceutical methods are utilized to reduce labor pain (7). Although the medications have analgesic effects, they cause nausea, vomiting, drowsiness in mother, respiratory distress in the newborn immediately after birth, and difficulty in lactation (7). Regional anesthesia also reliefs pain; however, it leads to embolism, assisted delivery, and cesarean delivery (8).

Non-pharmaceutical methods of pain relief are superior to pharmaceutical ones due to being inexpensive and non-invasive as well as the simplicity of their implementation, creating self-confidence, and encouraging patient participation (9). Massage is one of the non-pharmaceutical methods of pain relief. There have been various theories regarding the massage process to reduce labor pain. Massage changes the physiological parameters through stimulation of the peripheral nervous system and the modulation of visceral functions. Moreover, massage stimulates the thick nervous fibers and endorphins leading to the prevention of pain transmission, increase in the sense of satisfaction, and adaptation to pain (10).

In a double-blind clinical trial conducted by Gallo et al. (2013), it was reported that 30-min back massage reduced the mean score of pain intensity in the massage group, compared to the control group (11). To the best of our knowledge, no similar studies evaluated the trend toward increasing pain after the massage as well as the duration of the massage effect. However, Kaviani et al. (2011) compared two different methods of back massage to reduce the labor pain among primiparous women. The results of the aforementioned study revealed that the pain level was reduced at each phase after a massage; nevertheless, it increased until the next phase. In total, the intensity level of the pain after the message was lower than that of the initial pain (12). Giving massages using special oils is more effective than those without the utilization of oils (13). The combination of massage with aromatic plants and flower extracts is the most common and sedative methods to relieve pain through the skin due to soothing properties and facilitating the massage process. According to Iranian's traditional medicine which is a complementary medicine, pregnant women can benefit from back, waist, abdomen, and thigh massages with oils, such as lavender, Ylang Ylang, and Sage to facilitate labor and adaptation to pain (14). Ginger has long been used in medicine. In addition, ginger massage has been effective in the treatment of dysmenorrhea as well as acute and chronic back pain relief in postmenopausal women (15, 16).

In the studies conducted by Rizak (2013), Hoor et al. (2012), and Kim et al. (2011), the massages were given using ginger essential oil which reduced the primary dysmenorrhea (19-17). Ginger polyphenols, such as 6-shogaol and 6-gingerol contain thermal properties and block nerve terminals (20), thereby relieving pain (21).

Labor pain is one of the most important reasons which causes worry about vaginal delivery in pregnant women. Nowadays the control and reduction of labor pain are among the fundamental and human rights of mothers. Despite using various methods to relieve pain, it is still one of the health issues in most countries. Therefore, the aim of the present study was to determine the effect of back massage with and without ginger oil on the reduction of labor pain in primiparous women referred to Umm Al-Banin Hospital in Mashhad, Iran.

Materials and Methods

The study protocol of this randomized clinical trial was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran, in 2017 (IR.MUMS.REC.1397.094). This study was conducted on 90 pregnant and eligible women referred to the Maternity Hospital of Umm Al-Banin in Mashhad, Iran. The inclusion criteria were: 1) primiparity, 2) low-risk pregnancies, 3) single birth, 4) live birth, 5) cephalic presentation, 6) estimated fetal weight between 2500 and 4000 g according to Johnson's law, 7) gestational age based on the first trimester ultrasonography, 8) maternal age within the

range of 18-35 weeks, 9) no drug and/or alcohol addiction, 10) no medical and psychological problems, 11) no history of eczema and allergies to medicinal herbs, and 12) no history of infertility and midwifery complications (i.e., placental abruption, hypertonic uterus).

On the other hand, the women with disturbance in labor process and symptoms regarding fetal distress and those who used pain relief medication during labor, and were unwilling to continue the cooperation were excluded from the study. The sampling was performed using the comparison of the dependent variables in the groups in terms of mean±SD. To determine the optimal sample size, the calculations were performed twice based on the findings of studies conducted by Hosseini et al. (22) and Abbasi et al. (23).

The sample size was determined 19 and 10 people based on the findings of studies conducted by Hosseini et al. and Abbasi et al., respectively. Moreover, the sample size was also estimated based on a pilot study. Finally, in order to increase the applicability of the results of the study and prediction of the sample attrition, data analysis was conducted on 30 women in each group at the confidence interval of 95% and test power of 80%. Demographic forms, obstetric and physical profiles, and a visual analog scale (VAS) for pain.

Content validity was used to determine the validity of the questionnaires. Data collection tools were developed based on the information obtained from the latest books and articles on the research topic under the guidance of supervisors and other experts in the field.

Subsequently, 10 faculty members of Mashhad University of Medical Sciences, Mashhad, Iran, were asked to evaluate the forms followed by considering the suggestions and making necessary revisions in the final version of the tool. The inter-rater reliability was employed to determine the reliability of the VAS. In this method, the pain intensity of 10 mothers in the active phase of labor was measured by a researcher and a fellow gynecologist. The kappa coefficient for quantifying the agreement between two sets of scores was obtained at 93%.

Moreover, face validity method was utilized to determine the validity of the VAS, and 10 experts were asked to express their opinions about the agreement between the tool and the aims of the present study. In this study, ginger extract was purchased from Zarband Daroo (Co., Ltd, Iran), and treated to inert base oil at a concentration of 2% in a specialized laboratory under the supervision of a pharmacist.

Paraffin (non-absorbent) was employed to prepare the placebo. At the first massage, the researcher considered the possibility of skin allergy, redness, or burning to exclude the participant after removing the placebo from the skin and washing the massage area. No cases of allergy were reported in this study.

After obtaining approval from the Ethics Committee and Mashhad Nursing and Midwifery Faculty, Mashhad, Iran, the researcher attended maternity ward of Umm Al-Banin Hospital in the morning and evening shifts. The participants were informed of the research objectives and procedures and written informed consents were obtained from them by the researcher.

The sampling was initially done using the convenient method so that all pregnant primiparous women entered into the study. Subsequently, the participants were assigned randomly using blocking method into three groups, namely massage with ginger oil (intervention 1), massage with placebo (i.e., paraffin oil, intervention 2) and control with no intervention. All three groups received routine care.

Before the intervention, the researcher performed a vaginal examination to confirm the dilation. Afterward, in order to determine the pain intensity of three groups at the beginning of the active phase (dilation 4-5 cm), the research team were provided with VAS Pain Scale Rulers. Then, the participants were asked to mark the level of pain they experienced on the ruler. The intensity levels of pain in the intervention and placebo groups were recorded six times before and after the interventions considering dilation 4-5, 6-7, and 8-10 cm.

Moreover, the intensity level of pain in the control group was recorded six times at the beginning and end of each phase regarding the aforementioned dilations. Intervention and placebo groups were subjected to effleurage massages using ginger or paraffin oil, respectively.

The messages were given continuously for

15 minutes during contractions and non-contractions periods on the back regarding the dilations 4-5, 6-7, and 8-10 cm. The participants stayed in the sitting or supine positions or lied on either their right or left side. Since the control group received no interventions, the researcher was present at these participants' bedsides at each stage of labor regarding the aforementioned dilation for 15 minutes.

Regarding the intervention, 10 to 15 drops of 2% ginger oil (code A) and paraffin oil (code B) kept in bottles were poured on the participants' back. The researcher and the participants were blinded to the content of the bottles since the bottle caps were tightly closed. The researcher began the massages at the bottom tip of the sacrum to the lumbar vertebrae using an upward direction. Subsequently, the researcher's hands moved in the downward direction so that both hands reached the starting point at the sacral vertebrae. The vital signs of the mother and fetal heart rate were checked and uterine contractions were controlled in all three groups. Moreover, labor progress was recorded in the partographs by the staff according to the delivery phase at correct times. Data were analyzed in SPSS software (Version 16) through Kruskal-Wallis and the Chi-square tests. P-value less than 0.05 was considered statistically significant.

Results

Kolmogorov-Smirnov and the Shapiro-Wilk tests were employed to determine the distribution of quantitative variables. Subsequently, based on the normal or non-normal distribution of each variable, the abovementioned tests were performed in this study. According to the test results, 53.3%, 55.6%, and 76.7% of mothers had secondary education, average income, and painful history of menstruation, respectively.

Moreover, regarding the occupation status, 80% of mothers were housewives (Table 1).

Table 1. The mean±SD of demographic and field variables of the primiparous women in three groups

Variables	Groups			Results
	Control (n=30)	Placebo (n=30)	Ginger (n=30)	
	mean±SD	mean±SD	mean±SD	
Age (year)	24.8±5.3	26.0±5.2	25.0±5.6	Kruskal-Wallis Chi=1.0 df=2 P=0.620
Occupation	Number- percent	Number- percent	Number-percent	The Chi-square
Housewife	26 (86.7)	24 (80.0)	24 (80.0)	Chi=0.6
Employed	4 (13.3)	6 (20.0)	6 (20.0)	df=2
Total	30 (100.0)	30 (100.0)	30 (100.0)	P=0.738
History of painful menstruation	Number-percent	Number-percent	Number-percent	The Chi-square
Yes	21(70.0)	25 (83.3)	23 (76.7)	Chi=1.5
No	9 (30.0)	5 (16.7)	7 (23.3)	df=2
Total	30 (100.0)	30 (100.0)	30 (100.0)	P=0.475

According to the results obtained from the Kruskal-Wallis test, all three groups obtained the same mean ±SD regarding labor pain intensity during dilation 4-5 cm, and there were no significant differences in the groups (P=0.183). However, significant differences were observed in three groups regarding the intensity of pain after the intervention (P=0.001). Moreover, there were significant differences in the three groups in terms of pain intensity in two phases (P=0.001).

Regarding the between-group comparison, the results of the Wilcoxon test indicated a significant decrease in terms of pain intensity in all three groups after the intervention phase. However, ginger and control groups obtained the highest (P=0.001) and lowest (P=0.008) levels of reduction in pain intensity, respectively (Table 2).

Furthermore, there were differences in three groups regarding the mean±SD of labor pain

intensity during dilation 6-7 cm before the intervention. The placebo and control groups reported more severe levels of pain, compared to that in the ginger group. The difference was significant according to Kruskal-Wallis test (P=0.001). Moreover, significant differences were observed in terms of pain intensity in three groups after the intervention (P<0.001).

Table 2. The mean±SD of pain intensity during dilations among primiparous women in three groups

Dilation	Groups			Results (between groups)*
	Control (n=30)	Placebo (n=30)	Ginger (n=30)	
	mean±SD	mean±SD	mean±SD	
Pain intensity during dilation 4-5cm				
Before intervention	6.5±1.6	7.1±1.7	7.2±2.2	Chi=3.4 df=2 P=0.183
After intervention	6.0±1.5	5.7±1.9	4.1±1.9	Chi=13.8 df=2 P=0.001
The difference between before and after intervention	-0.5±1.0	-1.4±1.4	-3.0±1.4	Chi=36.8 df=2 P<0.001
Wilcoxon test	Z=-2.6 P=0.008	Z=3.9 P<0.001	Z=-4.7 P<0.001	
Pain intensity during dilation 6-7cm				
Before intervention	7.5±1.2	7.5±1.1	6.4±1.1	Chi=14.5 df=2 P=0.001
After intervention	7.6±1.6	6.2±1.8	3.5±1.4	Chi=49.2 df=2 P<0.001
The difference between before and after intervention	0.2±1.1	-1.3±1.4	-2.9±1.3	Chi=46.2 df=2 P<0.001
Wilcoxon tests	Z=-0.5 P=0.558	Z=-3.9 P<0.001	Z=-4.8 P<0.001	
Pain intensity during dilation 8-10cm				
Before intervention	9.21±1.0	8.8±0.9	6.9±0.9	Chi=45.8 df=2 P<0.001
After intervention	9.3±1.2	8.5±1.5	4.7±1.3	Chi=58.9 df=2 P<0.001
The difference between before and after intervention	0.2±0.6	-0.3±1.3	-2.3±1.2	Chi=48.4 df=2 P<0.001
Wilcoxon test	Z=-1.4 P=0.166	Z=-1.1 P=0.275	Z=-4.8 P<0.001	

* Kruskal-Wallis

There were also significant differences in the three groups in terms of the pain intensity in two stages (P<0.001). Regarding between-group comparisons, the results of the Wilcoxon test indicated significant levels of pain reduction in ginger and placebo groups after the intervention (P<0.001); however, the control group did not report any pain reduction (P<0.588). In addition, the ginger group reported the highest level of pain reduction, compared to placebo and control groups (Table 2).

Regarding dilation 8-10 cm before the intervention, there were differences in terms of the mean±SD of labor pain intensity in three groups and the difference was significant according to Kruskal-Wallis test results

(P<0.001). Furthermore, there were significant differences regarding pain intensity in three groups after the intervention (P<0.001). Additionally, significant differences were observed regarding pain reduction in two phases in ginger and placebo groups. However, the control group did not report any pain reduction.

with regard to the between-group comparisons, the results of the Wilcoxon statistical test indicated significant levels of pain reduction in the ginger group after the intervention (P<0.001). Nevertheless, the placebo (P=0.276) and the control groups (P=0 .166) did not report any pain reduction (Table 2).

The findings of this study indicated that the mean values of pain intensity after three phases of the evaluation were 4.1±2.29, 6.8±1.73, and 7.6±1.43 in the ginger, placebo, and control groups, respectively. In addition, the ginger group obtained the lowest level of pain intensity during the active phase P<0.001.

Discussion

Massage stimulates nerve fibers, which itself inhibits the transmission of painful stimuli arising from the uterine contractions (gate control theory), thereby relieving pain. Massage increases the threshold of the pain; however, regarding the nervous system adaptation to pain, the massage has no effect on pain reliefthe unless it is given continuously (24).

Moreover, ginger relieves pain using several mechanisms. Ginger extract strengthens the central nervous system which inhibits pain. This is due to the inhibition of pain transmission in the posterior horn of the spinal cord resulting from inhibitory responses of GABA and glycine neurotransmitters in the brain.

The GABA receptors inhibit the transmission of both acute and chronic pain in the brain stem and spinal cord. Ginger consists of Gingerol and Gingerdiones which are potent inhibitors of Prostaglandin. Pain-relieving properties of ginger result from the inhibition of Cyclooxygenase and Lipoxygenase followed by a reduction in the Leukotriene and Prostaglandin levels (25).

Furthermore, ginger creates a sense of health and well-being through the effects it exerts on the limbic system. In the massage group with ginger oil, the pain relief in the active phase of labor was continued to the final part of the active phase. However, the placebo group did not report any pain relief during the transition phase.

Therefore, it can be noted that massage with ginger oil has been more effective than that with paraffin oil in the placebo group. Moreover, the mean score of pain in the control group increased with increasing pain in different stages of the active phase of labor. In addition, the presence of the researcher at the mother side had no effect on pain relief during labor.

Given the similarity between the labor pain and dysmenorrhea mechanism and lack of similar studies on the effect of ginger oil on labor pain relief, this study assessed the therapeutic effect of ginger on similar cases. The results of the study conducted by Ozgali et al. (2006) showed that ginger relieves primary dysmenorrhea due to its anti-prostaglandin properties (i.e., mefenamic acid and ibuprofen) (25).

In another study conducted by Rahnama et al. (2009), the effect of ginger was investigated on the primary dysmenorrhea. According to the results, the pain intensity of dysmenorrhea decreased which is consistent with the findings obtained from the present study (26). Furthermore, Khavindizadeh et al. (2014) revealed that labor massage from the bottom of the sacrum to the lumbar vertebrae reduced the intensity of labor pain. Therefore, the intervention group obtained the lowest level of pain intensity at the end of the first stage of labor, compared to the control group. The obtained results are consistent with the findings in the present study.

The reduction in the pain intensity on the first intervention revealed that the effect of massage with ginger oil was not limited to the time of the intervention. Moreover, the relaxing effect of the oil remained until the second and third stages of intervention in this study. In addition, the participants in the ginger group experienced lower levels of pain during the intervals between the two interventions.

On the other hand, paraffin oil had an effect during the massage and the pain intensity increased before the second and third interventions. Although this study paved the way regarding the effect of ginger oil on the intensity of labor pain, it suffers from some limitations. First, the participants were different in terms of the threshold of pain tolerance and

mental and psychological states; therefore, there was no possibility to control the discrepancies. However, to overcome this issue, random sampling was utilized to assign the participants into three groups. Accordingly, it is suggested that further studies be carried out to evaluate the intensity of pain in the second stage of the active phase of labor.

Conclusion

According to the results, massage with 2% ginger oil had an effect on reducing the active phase of labor pain in primiparous women. Therefore, considering the pain reduction and increased satisfaction of mothers with vaginal delivery, it is advisable to use this method in treatment centers.

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Conflicts of interest

The authors declare no conflicts of interest.

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