

# The Effect of Ice Massage Applied to SP6 Point on Labor Pain, Labor Comfort, Labor Duration, and Anxiety

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## Abstract

**Objective:** In the study, it was aimed to determine the effect of ice massage applied to SP6 point during labor on labor pain, labor comfort, labor duration, and anxiety. **Design:** A single blind, randomized controlled experimental trial **Setting and Participants:** 100 primiparas, 50 in the intervention group and 50 in the control group, with 4-5 cm cervical dilatations were included in the study. Ice massage was applied to the SP6 point of the pregnant women in the intervention group at 4-5 cm, 6-7 cm, and 8-9 cm dilatations during three contractions. **Measurement Tools:** The Pregnant Information Form, VAS, the Partograph Form, Childbirth Comfort Questionnaire (CCQ), and the State Anxiety Scale were used to collect data. **Result:** It was found that VAS scores of the pregnant women in the intervention group were significantly lower compared to the control group following the intervention at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatations ( $p=0.001$ ,  $p=0.003$ ,  $p<0.001$ , respectively). Total CCQ and comfort level scores of the pregnant women in the intervention group at 8-9 cm cervical dilatation were determined to be significantly higher compared to the control group ( $p=0.044$ ,  $p=0.027$ , respectively). In addition, it was determined that as the anxiety levels of the pregnant women increased, their total comfort score decreased ( $p<0.05$ ). **Conclusions:** It was found that ice application to SP6 point during stage 1 of childbirth decreased labor pain and provided positive comfort. Therefore, this method can be used as a safe and effective midwife intervention in childbirth.

## Introduction

Labor pain, anxiety, and fear can have negative effects on respiratory, circulation, and endocrine system, as well as other bodily functions. All these are associated with decreased level of comfort and increased surgical complications and risks for women. Managing labor pain, increasing comfort, and reducing anxiety are among the basic features of midwifery care, and they are the primary purpose of care in childbirth.<sup>1-6</sup> Pharmacological methods used in order to reduce labor pain have various side effects for fetal and maternal health.<sup>3,7</sup> Therefore, non-pharmacological methods, which have no side effects for the fetus and the mother and provide comfort, should be the primary choice in pain management. There are plenty of non-pharmacological methods that midwives can use in labor. Acupressure and cold application are among these methods. These techniques draw increasing attention in terms of decreasing childbirth-related complications such as reducing labor pain, shortening the duration of the labor, and alleviating anxiety.<sup>8,9</sup> According to the traditional Chinese medicine, vital energy of the body which regulates bodily functions flows through channels called meridians. By applying pressure to certain points on the body, the clogging of these channels can be eliminated. Arousing large intestinal (L14), spleen (SP6), and bladder 67 (BL67) points reduces labor pain and strengthens uterine contractions.<sup>7,10-13</sup> In studies conducted in the literature, it has been determined that acupressure applied to SP6 point, which is located 3-4 fingers above the posterior malleolus bone, reduced labor pain and shortened labor duration.<sup>7,11,14-18</sup> However, healthcare professionals have to obtain a certificate in order to apply acupressure. Therefore, it may not be possible for each midwife to use this method. Besides, it has been reported that acupressure application can be tiring for midwives.<sup>7</sup>

Thus, different methods that can be used by midwives without the need for a certificate in order for them to reduce labor pain perception by arousing acupressure points can be employed. Cold therapy is a harmless procedure for both the fetus and the mother, and it is under direct control of the mother. It does not affect childbirth negatively, and it does not have any side effects or allergy risks.<sup>19</sup> Cold pressure application on acupressure points have various effects such as facilitating energy flow at acupressure points and relieving pain perception and muscle tension by stimulating peripheral nerve receptors.<sup>3,20</sup> In the literature, there are studies in which ice massage was applied to Hegu point located on hands, which is one of the acupressure points, in order to reduce labor pain.<sup>12,13</sup> Only one study was encountered in the literature which examined the effect of cold application to SP6 point on labor pain. However, in the said study, labor comfort, labor duration, and anxiety level were not determined.<sup>3</sup> Hence, the purpose of the present study was to identify the effect of ice massage applied to SP6 point on labor pain, labor comfort, labor duration, and anxiety during labor.

## Materials and methods

### Research hypothesis

Primiparous women who receive SP6 acupoint massage with ice during the active phase of labor will experience less of of labor pain (H1), shorter duration of labor (H2), less anxiety (H3), and more comfort (H4) compared with those who receive standard routine care.

### Design and settings

The study was conducted as a randomized controlled trial in the Delivery Room of Ataturk City Hospital located in Balikesir province of Turkey between December 2021 and July 2022.

### Participants

The study sample size was calculated by using G\*Power 3 power calculations based on previous studies in which ice massage was applied to acupressure points during labor. Impact estimation was obtained from the findings of the study conducted by Hajiamini et al., who reported pain severity as  $5.90 \pm 1.84$  in the ice massage group and  $7.10 \pm 1.64$  in the control group 30 minutes after the ice massage application.<sup>12</sup> In the present study, it was aimed to determine a similar difference. The sample size for each group was determined to be at least 47 individuals. Accordingly, 50 primiparas were assigned to the intervention group and the control group each. The power analysis performed showed that the sample size of the study had a power as  $\alpha = 0.05$ , Power = 0.91, df = 98. The decrease observed in labor pain at 4-5 cm cervical dilatation compared to the control group had an impact size of 0.61.

The inclusion criteria for the primiparas were having a single healthy fetus, having a gestational age between 38 and 40 weeks, expecting vaginal delivery, having fetal cephalic presentation, having no chronic diseases, not having a high-risk pregnancy, being in stage 1 of childbirth, and having a 4-5 cm cervical dilatation. Pregnant women who were multiparous, had multiple pregnancies, had high-risk pregnancy, had delivery with complications, and came to the clinic after 4-5 cm dilatation were excluded from the study.

Single blind block randomization for pregnant women who met the inclusion criteria was achieved by using Sequence Generator method located under the subheading of Numbers at random.org website. In the program, two columns were created according to the sample size. The pregnant women were randomly assigned to Column 1 or Column 2 according to their registration number. The assignment of the columns to either the intervention group or the control group was done through a draw. Ice massage was applied to SP6 points of the pregnant women in the intervention group, while the pregnant women in the control group was provided with standard midwifery care.

### Data collection

The Pregnant Information Form (PIF), Visual Analog Scale (VAS-1), and Childbirth Comfort Questionnaire (CCQ) were administered to the pregnant women who were at stage 1 of delivery and 4-5 cm cervical dilatation. Each group was provided with standard midwifery care, and intervention was made to the

women in the intervention group at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatation during three contractions. Immediately after the interventions, VAS-2, VAS-3, and VAS-4 were applied. In addition, following the intervention made at 6-7 cm cervical dilatation, The State Anxiety Scale (STAI-I) was applied between the contractions. After the interventions were completed, CCQ was applied again at 8-9 cm cervical dilatation. The pregnant women in the control group were administered VAS-2, VAS-3, and VAS-4 at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatations, STAI-I at 6-7 cm cervical dilatation, and CCQ at 8-9 cm cervical dilatation (Figure 1).

## Measurement tools

The study data were collected through The Pregnant Information Form, VAS, Partograph Form, Childbirth Comfort Scale, and the State Anxiety Scale.

*The Pregnant Information Form (PIF)* : The form consists of 22 questions inquiring about the sociodemographic, gynecological, and obstetric characteristics of the pregnant women.

*Visual Analog Scale (VAS)*: The scale was used in order to measure labor pain. It is made up of a vertical line ranging from 0 to 10.<sup>21</sup> In the study, VAS was applied before the intervention at 4-5 cm cervical dilatation (VAS-I) and after the intervention at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatations (VAS-2, VAS-3, VAS-4, respectively).

*Childbirth Comfort Questionnaire (CCQ)*: The scale was developed by Kerri Durnell Schuling and Carolyn Sampsele in 2003 in order to determine comfort level in childbirth. The validity and reliability of the Turkish form of the scale was conducted by Potur et al. (2015).<sup>22,23</sup> As a result of the study by Potur et al., CCQ consisted of physical, environmental, and psychospiritual subdimensions and relaxation and superiority levels. The 9-item scale is a 5-point Likert type scale (1 = Absolutely Disagree, 5 = Absolutely Agree). The score to be obtained from the scale ranges between 9-45. A high score indicates a high level of comfort. Potur et al. found the Cronbach's alpha coefficient of the scale as 0.75.<sup>23</sup> In the present study, this value for the scale was determined to be 0.72. CCQ was applied two times in the study, once at 4-5 cm cervical dilatation before the intervention and once at 8-9 cm dilatation after the intervention.

*State Anxiety Scale (STAI-I)* : The scale was developed by Spielberger in 1970, and it was adapted to Turkish by Oner and Le Compte (1983), who also conducted the validity and reliability study of the scale.<sup>24,25</sup> The 4-point Likert type scale (1 = Almost Never, 4 = Almost Always) consists of 20 questions. There are two types of statements on the scale. Direct statements express negative emotions, while reverse statements express positive emotions. Weighted total score is calculated for both direct and reverse statements. The totals score obtained from negative statements is subtracted from the total score obtained from positive statements. A pre-determined constant number (50) is added to this number obtained. The final score obtained is the individual's anxiety score. The scores obtained from the scale varies between 20 and 80. A high score shows a high level of anxiety.

## Intervention

Ice massage was applied to the SP6 points (SP6 point is located 3-4 fingers above the posterior malleolus bone, that is, 4 fingers above the ankle) of the pregnant women in first stage of childbirth at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatations during 3 contractions. In order to prevent direct contact of ice with the skin, ice was applied as ice cubes wrapped in gauze. Standard midwifery care was provided to the women in both groups. In the hospital where the study was conducted, cervical dilatation and effacement follow-up, contraction and fetal heart rate follow-up, vital signs monitoring, and routine oxytocin induction are applied as standard midwifery care. In addition, pregnant women are provided with information on breathing and pushing techniques. 4 drop/min 10IU/ml oxytocin induction was applied to all pregnant women in both groups at 4-5 cm cervical dilatation. Oxytocin induction was increased by 4 drops at every 20 minutes. It was applied at a maximum dose of 40 drop/min.

## Outcome measures

The primary outcome included 1) severity of labor pain by VAS 2) state anxiety at labor 3) duration of active phase and transition phase of labour (4-10 cm cervical dilatation). The secondary outcome measures were the responses of the participants regarding 4) their comfort level at labor by CCQ

### **Ethical considerations**

Permission for the study was obtained from ... the Medical Faculty Clinical Research Ethics Committee (No:2021/32) and from Provincial Health Directorate (No: E-51829602-604.01.02). The participating pregnant women were informed about the purpose of the study and confidentiality of their identity information, and their written consent was taken through Volunteer Information Form. The study was recorded in the Clinical Trial Database (NCTXXXX).

### **Data analysis**

Independent samples t test, Fisher's Exact test, and Chi-square test were used in order to determine the differences between the intervention and the control group in terms of sociodemographic and obstetric characteristics. The Kolmogorov-Smirnov test was used to assess the normal distribution of the data. In addition, Mann-Whitney test was employed for the data that did not show normal distribution in order to identify the differences between the groups in terms of labor pain, labor comfort, and state anxiety. In order to determine the difference between the groups in terms of labor duration, Independent Sample t test was performed. Finally, Spearman's R Correlation test was used in order to determine the relationship between state anxiety level and comfort level in childbirth.

### **Findings**

No significant difference was found between the intervention group and the control group in terms of sociodemographic and obstetric characteristics ( $p > 0.05$ ) (Table 1). VAS-2 (4-5 cm cervical dilatation) ( $p = 0.001$ ), VAS-3 (6-7 cm cervical dilatation) ( $p = 0.003$ ), and VAS-4 (8-9 cm cervical dilatation) ( $p < 0.001$ ) scores of the intervention group were found to be significantly lower than those of the control group. No significant difference was found between the groups in terms of labor duration ( $p = 0.805$ ) (Table2).

Total comfort score ( $p = 0.044$ ) and relaxation ( $p = 0.027$ ) comfort levels of the intervention group at 8-9 cm cervical dilatation were determined to be significantly higher in comparison to the control group (Table 3).

It is seen in Table 4 that there is a negative correlation between state anxiety level and labor comfort in both groups. It was determined that as the state anxiety level found at 6-7 cm cervical dilatation increased, labor comfort level at 8-9 cm cervical dilatation decreased ( $p < 0.05$ ).

### **Discussion**

Most women can experience pain, anxiety, and fatigue in childbirth, and this situation negatively affects their comfort level and childbirth process. Midwifery care in childbirth aims to reduce perceived pain of the pregnant women and to provide physical and emotional comfort for them.<sup>1,2,13</sup> In the present study, it was determined that ice massage applied to SP6 point at 4-5 cm, 6-7 cm, and 8-9 cm cervical dilatations reduced perceived labor pain. Only one study was encountered in the literature in which the effects of ice massage applied to SP6 point in reducing labor pain were examined. Nehbandani et al. (2019) reported that labor pain level of the intervention group who were applied cold pressure to SP6 point was lower at minute 30 and 60 after the intervention compared to the warm massage group.<sup>3</sup> There are also other studies in which cold massage was applied to Hegu (LI4) point other than SP6 point.<sup>8,12,13,19,26,27</sup> In the studies conducted by Dehcheshmeh and Rafiei (2015), Indumathi (2018), and Afefy (2015), it was reported that ice massage applied to Hegu point for 29 minutes reduced labor pain more compared to the control group.<sup>13,26,28</sup> In the study they conducted, Hajiamimi et al. (2012) applied ice massage to Hegu point for 10 minutes in 2-minute rotations, followed by a 15-minute break. As a result, they found that ice massage applied decreased labor pain immediately after the intervention, 30 minutes later, and one hour later.<sup>12</sup> Mirzaee et al. (2021) and Kaviani et al. (2012) determined in their studies that acupressure and ice massage applied to Hegu (LI4)

point for 30 minutes reduced labor pain.<sup>8,27</sup> Yildirim et al. (2018) reported that ice massage applied to Hegu point decreased pain level at the 80<sup>th</sup> minute of the intervention with respect to the control group. Continuous arousal of acupressure points in labor can increase vital energy flow in the meridians and thus can provide more considerable therapeutic effects.<sup>19</sup> In similar studies to the present study, in which acupressure was applied to SP6 point, it was reported that labor pain level of the intervention group was lower compared to that of the control group.<sup>7,11,15-18</sup> Reduced labor pain will lead to positive childbirth emotion, mother's participation in labor, and natural childbirth. However, applying acupressure during labor can be tiring for midwives. Ice application does not affect labor negatively and has no risks such as side effects or allergy, as well as being harmless for the fetus and the mother. The effect of cold on pain is created by slowing down direct peripheral nerve transmission, decrease in mediators that lead to nociceptive stimulation related to indirect inflammatory response, or the loosening of the pressure on the nerves in the region applied by the edema.<sup>29</sup> Therefore, ice application to acupressure points can be used in labor as a safe midwifery intervention. Yet, more research is needed in order to confirm this proposition.

In the present study, ice massage applied to SP6 point was found to have no effect on labor duration. No study was encountered in the literature in which the effect of ice massage applied to SP6 point on labor duration was analyzed. However, in their studies in which they examined the effect of ice massage applied to different points (Hegu point) on labor duration, Yildirim et al. (2018), Fawaz and El-Sharkawy (2016), Afefy (2015), and Kaviani et al. (2012) found that ice massage shortened the duration of the first labor stage.<sup>19,27,28,30</sup> It is thought that as ice massage was applied to Hegu point in these studies differently from the present study, it may have had a shortening effect on labor duration. In the literature, it has been reported that acupressure application to SP6 point reduced the duration of labor.<sup>7,15,16,17,31</sup> Acupressure stimulates oxytocin secretion from the pituitary gland, and this regulates uterine contractions and shortens labor contraction.<sup>7,18,31</sup> It is thought that since pressure is not applied to SP6 point in ice massage as much as it is applied in acupressure, oxytocin secretion from the pituitary gland is not stimulated. In addition, oxytocin induction, which is routinely applied in the hospital, was applied to both groups in the study. Therefore, it is believed that ice application did not have any effect on labor duration.

Comfort ensures emotions such as relaxation, safety, welfare, hope, and expectation.<sup>2</sup> Pain relief has been defined as a significant comfort and support source for delivering women.<sup>32</sup> In the study, it was determined that the total level of comfort and relaxation achieved by ice massage applied to SP6 point at 8-9 cm cervical dilatation was higher compared to the control group. However, in the study, no difference was found between the groups in terms of physical, psychospiritual, and sociocultural comfort levels and state anxiety level. Similarly, in their study, Mirzaee et al. (2021) reported that acupressure and ice massage applied to Hegu (LI4) point for 30 minutes did not have an effect on anxiety level.<sup>8</sup> This situation can be explained by the placebo effect of the equal amount of interest and support provided to the pregnant women in both groups. As no study was encountered in the literature which examined the effect of ice massage applied to SP6 point on childbirth comfort, comparisons were made with studies that investigated the effects of various non-pharmacological methods on comfort in childbirth.<sup>1,2,33,34</sup> Turkmen and Oran (2021) reported that warm application to sacral region in childbirth had positive effects on the total comfort and relaxation levels determined at 8-9 cm cervical dilatation.<sup>2</sup> Akin et al. (2022) reported in their study that labor dance at 8 cm cervical dilatation had positive effects on the total comfort and relaxation levels.<sup>33</sup> Turkmen et al. (2021) determined that the pregnant women who focused on Maryam's flower during stage I of labor had higher total comfort levels at 8-9 cm cervical dilatation compared to the control group.<sup>1</sup> Bolanthakodi et al. (2018) found that practicing yoga in the prenatal period increased the pregnant women's labor comfort.<sup>34</sup> Non-pharmacological methods such as cold application, warm application, labor dance, yoga, and focusing can ensure active participation of pregnant women in labor and reduce perceived pain. It is thought that active participation of the pregnant women in labor and consequent decrease in their pain level evoked a positive childbirth emotion and thus positively affected comfort level and childbirth comfort.

## Limitations

One limitation of the study is that oxytocin induction was applied to all pregnant women in the early

period of childbirth. Another limitation is that only one study was found in the literature conducted on ice application to SP6 point. Hence, the findings of the study were compared against acupressure application and ice massage applied to various points. Yet another limitation is that anxiety levels of the pregnant women were not determined before the intervention. Finally, the findings obtained in the study cannot be generalized to different societies; therefore, comparative cultural studies on the effectiveness of this application may yield interesting results.

## Conclusions

The findings obtained in the study shows that ice massage applied to SP6 point decreases labor pain and affects comfort level in childbirth. However, it was also determined that this application did not have any effects on labor duration and anxiety level. Ice massage should be considered as a simple, affordable, and accessible instrument to help relieve labor pain. Ice massage applied in order to relieve labor pain and provide comfort can ensure active participation of mothers in childbirth process and increase their satisfaction with vaginal delivery. In addition, there exists a need for studies to be conducted on ice massage applied to SP6 point.

**Disclosure of interests :** None

## Author Contributions

**Study conception and design:** HT

**Data collection:** HT, SÇ, HK, SDT, MŞ, HM

**Data analysis and interpretation:** HT

**Drafting of the article:** HT, SÇ, HK, SDT, MŞ, HM

**Critical revision of the article:** HT, SÇ, HK, SDT, MŞ, HM

**Details of patient's consent:** Publication permission was obtained from pregnant women

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