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ORIGINAL ARTICLE

The effect of acupressure on labor pain and the duration of labor when applied to the SP6 point: Randomized clinical trial

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Abstract

Aim: This study aims to determine the effect of acupressure (SP6) on first stage of labor pain and duration.

Methods: A single blind, randomized controlled experimental trial was conducted with 60 pregnant women: 30 in the experimental group and 30 in the control group. At the active and transition stages of labor, acupressure was applied to the SP6 point of the experimental group, and the SP6 point of the control group was touched each contraction. The data were collected using the Pregnant Information Form. The Partograph Form was used to determine the duration of active stage and transition stage. The labor pain severity was measured using a numeric rating scale (NRS) immediately after each acupressure/touch SP6 in active and transition stages. A participant questionnaire on satisfaction was administered in the immediate postnatal period. The group difference was tested for statistical significance using the Chi-square test, Fisher's exact test, and the Mann–Whitney *U* test.

Results: As the primary outcome, labor pain was less and duration of labor was shorter for the experimental group. As the secondary outcome, satisfaction was increased that could be as a result of reduced pain in labor and/or shorter duration of labor. The perceived pain level in the active stage in the experimental group ($n = 30$) was less than the control group ($n = 30$) (labor pain: 7.17 + 0.89 vs. 7.66 + 0.71, $p = .002$). The mean duration of the first stage of labor in the experimental group was shorter than the control group (4.88 + 0.85 hr vs. 5.56 ± 0.66, $p = .001$). It was also found that pregnant women in the experimental group would recommend this method to other pregnant women (Chi-square = 5.711, $p = .017$).

Conclusions: Application of acupressure on SP6 was found to have a positive effect on pregnant women's labor experience and reducing the labor pain and shortening the duration of first stage of labor compared to touch on SP6. The women receiving acupressure had higher levels of satisfaction in acupressure application than women receiving only touch on SP6, which could be as a result of reduced pain in labor and/or shorter duration of labor.

KEYWORDS

acupressure, duration of labor, labor pain, satisfaction, SP6 acupoint

1 | INTRODUCTION

Labor pain arises from the uterine contractions, cervical dilatation, and tension of the vagina and pelvic floor (Smith, Collins, Crowther, & Levett, 2011). The severity of labor pain differs at the beginning and end of the active and transition stages of labor. Labor pain is a constantly increasing pain. It is important for woman to control labor pain in terms of progressing the labor process. The inability to control labor pain will cause stress, fear and negatively affect the health of the mother, fetus and newborn. As a result of stress and fear caused by excessive labor pain, peripheral vasoconstriction may occur, which reduces blood flow to the placenta and thus leads to negative fetal health. In addition, the fear and anxiety during birth may reduce the pregnant women's self-confidence, causing them to lose control, and causes tension in the pelvic muscles, and this tension causes a resistance to the pushing force applied by the uterus and the laboring woman. Thus, labor pain aggravates more, labor time is prolonged and health of the fetus is endangered (Deepak, Rana, & Chopra, 2013; Gönenç & Terzioğlu, 2012; Kulkarni & Sia, 2014; Smith et al., 2011).

The World Health Organization reports that mothers and infants experiencing normal birth benefit when there is minimal intervention, and pregnant women are supported physically and emotionally during labor and birth (World Health Organization, 2018). Non-pharmacologic methods used to relieve labor pain address psycho-emotional factors and physical aspects of pain. Acupressure applications during childbirth are among the nonpharmacologic methods used to relieve labor pain. Acupressure is the pressure applied on the acupuncture points, that is, acupuncture without needles. It is based on distributing the energy density on these points, and thereby relieves the organs which are connected to these points (Hjelmstedt et al., 2010; Mollart, Adam, & Foureur, 2015; Smith et al., 2011). In acupressure, pressure can be applied using hands, fingers, and varied objects such as combs or ice bags. Acupressure is non-invasive, natural, safe and easy to apply therapy which is low-cost and has not been shown to have any adverse effects (Tournaire & Theau-Yonneau, 2007).

According to Western theory, acupressure regulates blood flow by enabling vasodilatation, reduces the release of adrenaline and noradrenaline, and increases the secretion of oxytocin and endorphin by enabling vasodilatation (Akbarzadeh, Moradi, Hadianfard, Zare, & Jowkar, 2013; Mollart et al., 2015; Tournaire & Theau-Yonneau, 2007), thus increasing the efficiency of uterine contractions and shortening the duration of labor (Mollart et al., 2015). Acupressure has the potential to reduce pain and can be explained through the Western concept of gate control theory (acupressure blocks the pain stimulus from reaching the spinal cord or brain at various "gates" to these areas) and endorphin theory (acupressure stimulates the body to produce endorphins, which reduce pain) (Çalık & Kömürcü, 2014; Deepak et al., 2013; Gönenç & Terzioğlu, 2012; Hajiamini, Masoud, Ebadi, Mahboubh, & Matin, 2012; Levett, Smith, Dahlen, & Bensoussan, 2014; Smith et al., 2011). Specific acupressure points have been reported to reduced labor pain (Çalık & Kömürcü, 2014; Deepak et al., 2013; Hajiamini et al., 2012; Levett et al., 2014; Mollart et al., 2015; Smith et al., 2011). Levett et al. (2014) found that acupressure increased uterine contractions. Deepak et al. (2013) and Mollart et al. (2015) reported that acupressure shortens the duration of labor. Smith et al. (2011) reported that acupressure reduced the need for medical intervention. Spleen 6 (SP6), Large Intestinal 4 (LI4) and Bladder 67 (BL67) are acupressure points that have been found to be effective in reducing labor pain, either using a single acupoint or multiple acupoints (Hjelmstedt et al., 2010; Jian-Mei et al., 2011; Kashanian & Shahali, 2010; Kim, Chang, Lee, & Maeng, 2002; Lee, Chang, & Kang, 2004; Sehhatie-Shafaie, Kazemzadeh, Amani, & Heshmat, 2013).

Acupressure studies using SP6 alone have found that the pain intensity and duration of labor of pregnant women using acupressure applied on SP6 were less than that of the control group (Makvandi, Mirzaiinajmabadi, Sadeghi, Mahdavian, & Karimi, 2016; Nwanodi, 2016). Randomized controlled trials (RCT) conducted by Lee et al. (2004) and by Kashanian and Shahali (2010) reported reduced pain intensity and duration of labor when pressure was applied to SP6 compared to touch. It has the advantage that women, partners and midwives can be taught to use the acupressure safely and easily (Mollart et al., 2015). Previous studies have only used SP6 at one timeframe, that is, at 3–4 cm. More studies are needed to confirm if administering acupressure on SP6 at more frequent intervals during the first stage of labor has an impact on labor duration and pain (Mucuk & Baser, 2013).

This study aims to determine the effect of acupressure on labor pain and the duration of the first stage of labor, when applied to the SP6 point during the first stage of labor, as perceived by laboring women. This study will contribute to the areas of midwifery and delivery by examining how labor pain can be reduced, and how the duration of the first stage of labor can be shortened, thereby enabling a positive childbirth experience.

2 | METHODS

2.1 | Design and place of the study

This is a parallel, single blind, block RCT. The aim of this study was to determine the effect of acupressure on labor

pain perceived by pregnant women, and on the duration of labor, when it is applied to the SP6 point during labor. The study was conducted in the delivery room of a public hospital in Turkey between March 1 and December 31, 2015.

2.2 | Study sample

The sample size was determined using power calculations G*Power 3 with taking into account previous studies on acupressure for labor pain. Estimates of effects were derived from the findings of Akbarzadeh et al. (2013) who reported mean pain intensity Bi-stage SP6 group = 5.92 ± 1.74, Control group = 7.90 ± 1.84. We aimed at detecting a similar difference. The number of samples in each group was considered 30. The power analysis showed that the study sample size had 99% power with $\alpha = .05$. The observed reduction in labor pain after the intervention compared with the control had an effect size of 1.1.

Inclusion criteria were as follows: primiparous women at-term (greater than or equal to 37 weeks gestation), single healthy fetus, at 4 cm cervical dilatation, regular contractions, not receiving analgesia or anesthesia, without any risk, and who agreed to participate in the study after providing written informed consent. Four drops per minute of oxytocin infusion were routinely given to all women whose contractions spontaneously initiated. Then the infusion of oxytocin was increased by four drops/hr. Exclusion criteria were: multipara pregnancies, risk-associated pregnancy, multiple pregnancy, preterm labor and pharmacological interventions for labor pain.

The study sample was randomly allocated into two groups: acupressure was applied on the SP6 point in one group (experimental group), and the SP6 point was only touched slightly without applying pressure in the other group (control group). Single blind block randomization (researcher is not blind) was ensured by drawing sealed opaque envelopes. The randomization sequence was generated by a statistician not involved in the research program using a computerized research randomizer. Sixty envelopes with one piece of paper had 30 for the control group and 30 for the experimental group. Seven pregnancies were excluded from the study due to transfer to cesarean section. Then seven more pregnant women were included in the study (Figure 1).

2.3 | İntervention

SP6 point is 3–4 finger-widths above the medial malleolus bones, in other words, inner ankles in the soft tissue behind the bone. The experimental group received acupressure at the SP6 point, whereas the control group received touch at SP6 point. Acupressure and touch were applied using thumbs on the SP6 points on both legs by the first author who the midwife trained in acupressure. Acupressure was applied from the beginning to the end of each contraction in the active stage (cervical dilatation: 4–7 cm) and transition stage (cervical dilatation: 8–10 cm) of labor while the participants were in sitting or left-sided lying position. There were different numbers of contractions in each labor therefore acupressure was applied to each SP6 acupoint at a different number of times. Since acupressure and touch were applied to the SP6 point about 90 times (40–48 times in active stage and 35–45 times in transition stage), the measurement of labor pain was done 90 times. Both of the groups in the study received standard midwifery care that included vaginal examinations for cervical dilatation, recording of contractions, fetal heart rate and maternal vital signs. Cervical dilatation examinations were performed by the first author (Figure 1).

2.4 | Outcome measures

The primary outcome included: (a) severity of labor pain assessed by NRS (mean values of the perceived pain levels immediately after each acupressure/touch SP6 in active and transition stages were used); (b) duration of active stage of labor (4–8 cm cervical dilatation); and (c) duration of transition stage of labor (8–10 m cervical dilatation). The secondary outcome consisted of responses of participants about: (d) effectiveness of acupressure; (e) satisfaction with the intervention; and (f) whether they would recommend the same intervention to other pregnant women.

2.5 | Data collection method and process

The data were collected in two phases. The first phase (active stage and transition stage of labor) was carried out in the delivery room. The Pregnant Information Form, the Partograph Form, and the NRS were administered in the first phase of data collection. Pregnant Information Form includes questions such as age, educational status, working status, receiving sufficient antenatal care, fear of childbirth, reasons for fear of childbirth and to express the labor pain level they expected to have during the labor and birth. Before the interventions in 4 cm cervical dilatation, Pregnant Information Form and severity of labor pain were completed. The Partograph Form was used to determine the duration of first stage of labor (active stage and transition stage) and total duration of labor (first, second and third stages of labor). The NRS was used to determine the severity of labor pain. Pain is scored between 0 (no pain) and 10 (worst pain imaginable) in the NRS (Breivik et al., 2008). The perceived pain level was assessed after each contraction (i.e. after each application to SP6) in the active and transition stages of labor. The second phase was carried out nearly two

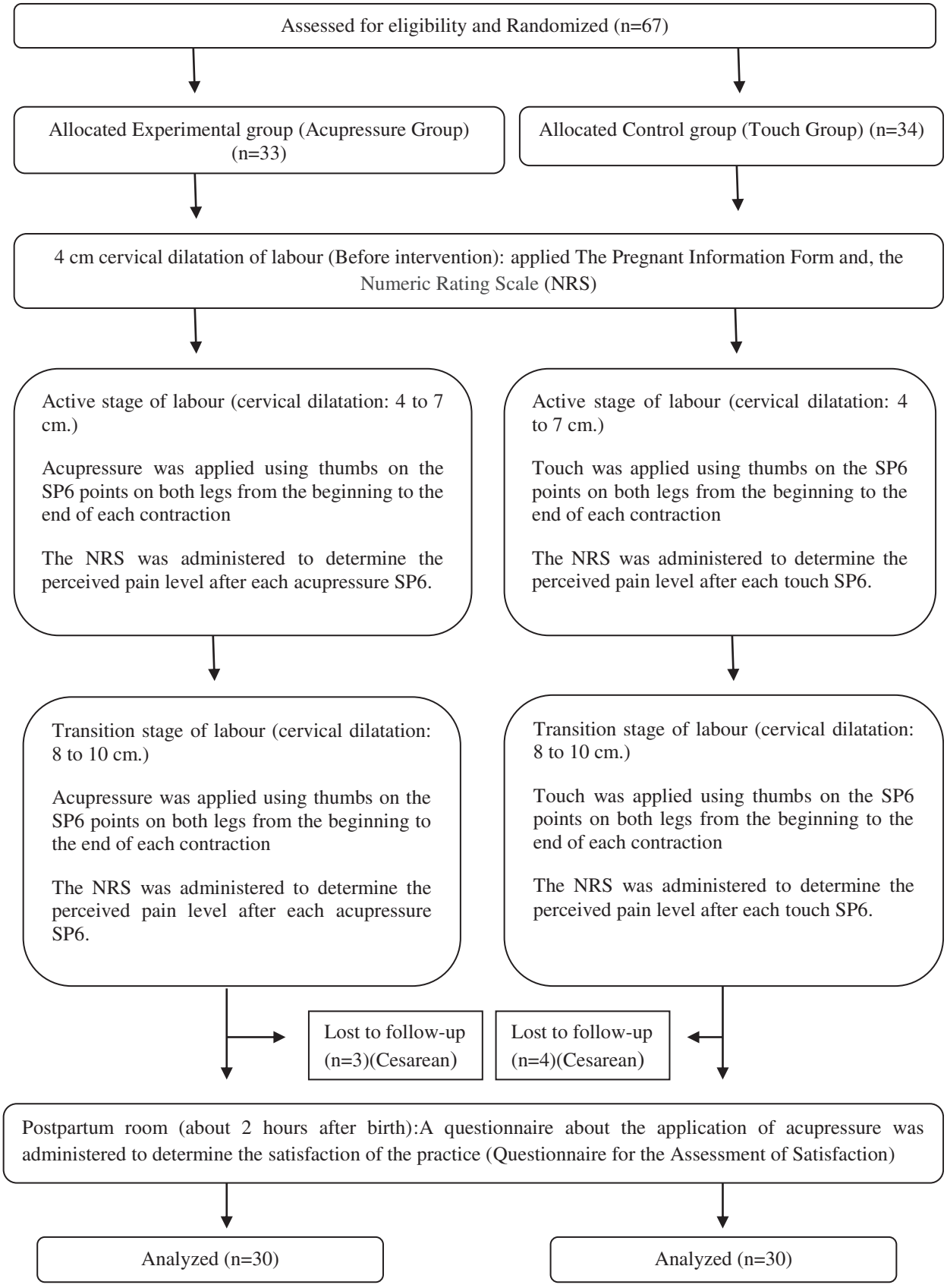

FIGURE 1 Flow Chart of Research

hours later after birthing in the postpartum room after postpartum care had been given. At the second phase, a questionnaire was administered to participants by the author with three questions: satisfaction of acupressure application, effectiveness of acupressure for pain relief, and whether they would recommend acupressure to other pregnant women. The author requested participating women to respond to the statements in the questionnaire for the assessment of satisfaction by rating not at all, slightly, moderately, very, extremely. Figure 1 shows a flow chart of the study.

2.6 | Ethical considerations

Written permission was obtained from the Clinical Studies Ethics Committee of Balıkesir University in Turkey, Faculty of Medicine (number: 2014/114) and from the General Secretariat of Public Hospitals Association.

2.7 | Data analysis

Data were analyzed using the mean values, standard deviations, minimum and maximum values and percentages. The Chi-square test and Fisher's exact test were used to determine the difference between the groups in terms of socio-demographic information, receiving antenatal care, and fear of childbirth. Mean values of the perceived pain levels in the active and transition stage were used. The Mann–Whitney *U* test (data were skewed) was used to determine the difference between the groups in terms of the average perceived pain level, and duration of the labor. A *p* value of .05 was accepted for all comparisons.

3 | RESULTS

A total of 67 primiparous women were included in this study: 30 in the experimental group and 30 in the control group. Seven were excluded because of delivery by cesarean section. No pregnant women declined to participate in this research.

Table 1 shows the socio-demographic information of 60 women in the experimental and control groups. The mean age of the women in the experimental group was 23.83 years (±4.05) (min. 17, max. 32), and in the control group was

TABLE 1 The socio-demographic information of the pregnant women

	Experimental group		Control group			
Personal characteristics	***n***	**%**	***n***	**%**	**χ^2f**	***p***
Age range						
29 and below	27	90	26	86.7	0.162	1.000[a]
30 and above	3	10	4	13.3		
Educational status						
Primary/secondary school graduate	12	40.0	11	36.7	0.071	.791
High school and or a higher educational institute graduate	18	60.0	19	63.3		
Working status						
Employed	8	26.7	10	33.3	0.317	.573
Unemployed	22	73.3	20	66.7		
Receiving sufficient antenatal care						
Yes (6 and more times)	25	83.3	28	93.3	1.456	.424[a]
No	5	16.7	2	6.7		
Fear of childbirth						
Yes	22	73.3	28	93.3	4.320	.080[a]
No	8	26.7	2	6.7		
Reasons for fear of childbirth[b]						
Fear of pain	18	81.8	22	75.9	0.262	.737[a]
Fear of complications (in their baby or in themselves) or episiotomy	4	18.2	7	24.1		
Total	30	100	30	100		

[a]Fisher's exact test.
[b]Implemented for 22 pregnant women who had fear of childbirth.

25.03 years (±3.72) (min. 19, max. 32). The statistical assessment indicated that the pregnant women were demographically similar ($p > .05$). Both groups had a similar status of receiving antenatal care and fear of childbirth scores ($p > .05$).

The participants were asked to express the labor pain level they expected to have during the labor and birth. Of the women in the experimental group, 46.7% expected very severe pain, 40% expected severe pain, 10% expected unbearable pain, and 3.3% expected disturbing pain. Of those in the control group, 60% expected very severe pain, 23.3% expected unbearable pain, and 16.7% expected disturbing pain. No statistically significant difference regarding the perceived labor pain was found between the women in the experimental and control groups ($p > .05$).

Table 2 shows the mean perceived pain levels in the active and transition stages of labor, duration of the first stage of labor (4–10 cm) and total duration of labor (first, second and third stages of labor). A statistically significant difference was found between the experimental and control groups in terms of perceived pain level in the active stage of labor ($p = .002$), duration of the first stage of labor ($p = .001$), and total duration of labor ($p = .002$). There was no statistical significance between groups in mean pain level during the transition stage.

Table 3 displays the findings of the participants regarding questions on satisfaction. There were 75% of women in the experimental group who were highly/very satisfied with acupressure application compared to 50% of women in the control touch group.

4 | DISCUSSION

This study investigated the effect of the acupressure on labor pain and the duration of the labor, when applied to the SP6 point during labor. This study showed that acupressure applied on the SP6 point effectively reduced the participants' pain during the contractions in the active stage of labor compared to touch (control group). Therefore, the results of the study support the hypothesis that the acupressure group experienced a greater decrease in labor pain than those in the control groups during the active stage of labor. Our study findings are supported by Smith et al. (2011) and by Levett et al. (2014). They found that acupressure is effective in reducing labor pain. Dong, Hu, and Liang (2015), Çalık and Kömürcü (2014), Deepak et al. (2013), Akbarzadeh et al. (2013), Sehhatie-Shafaie et al. (2013), Jian-Mei et al. (2011), Salehian, Safdari-Dehcheshmehi, Alavi, and Rahimi-Madiseh (2011), Kashanian and Shahali (2010), Hjelmstedt et al. (2010) and Lee et al. (2004) reported that the pain level of the group that received acupressure on the SP6 point was significantly lower than that of the control group in the active stage of labor. Reduction of labor pain

TABLE 2 Comparison of the mean perceived pain level scores of the pregnant women during labor and the duration of labor

Characteristics	Experimental group ($n = 30$)	Control group ($n = 30$)	U	p
Perceived pain level in the active stage				
Median (min.– max.)	7.24 (5–9)	7.86 (5–9)	245.00	.002*
Mean rank	23.67	37.33		
Total rank	710.00	1,120.00		
Perceived pain level in the transition stage				
Median (min.– max.)	10 (9–10)	10 (8.85–10)	408.00	.478
Mean rank	29.10	31.90		
Total rank	873.00	957.00		
Duration of the 1st stage of the labor (hr) (dilatation: 4–10 cm)				
Median (min.– max.)	5 (3.5–7)	5.5 (4–6.5)	228.00	.001*
Mean rank	23.10	37.90		
Total rank	693.00	1,137.00		
Total duration of labor and birth (total minutes) (active phase-postnatal)				
Median (min.– max.)	315(200–465)	365(270–420)	240.50	.002*
Mean rank	23.52	37.48		
Total rank	705.50	11.24		

*$p < .05$ (Mann–Whitney U test).

TABLE 3 Participants postnatal questionnaire ($n = 30$)

Characteristics	Experimental group		Control group		χ^2	p
	n	%	*n*	%		
Satisfaction with acupressure application						
Moderately satisfied	8	26.7	15	50	3.455	.063
Highly/very satisfied	22	73.3	15	50		
Finding acupressure effective in pain relief						
Moderately effective	16	53.3	23	76.7	3.590	.058
Highly/very effective	14	46.7	7	23.3		
Recommending to other pregnant women						
To some extent	7	23.3	16	53.3	5.711	.017*
To a large extent	23	76.7	14	46.7		
Total	30	100	30	100		

*$p < .05$ (Chi-square test).

will contribute to a positive birth sensation, natural birth and their effect on birth support. It also indicates that acupressure can be used as a midwifery intervention, and reduction of routine interventions. Also providing individual support and applying continuous acupressure during the first phase of labor by the midwife will reduce the feeling of loneliness of the pregnant woman. The application of acupressure during labor can be exhausting for midwives. For this reason, midwives can teach this practice to the partner of the pregnant woman.

No statistically significant difference was found between the experimental and control groups in terms of their perceived pain in the transition stage of labor. The results of the study fail to support the hypothesis that the acupressure group experienced a greater decrease in labor pain than those in the control groups during the transitional stages of labor. This could be due to the higher pain level. The perceived pain level is higher in the transition stage of labor compared to the active stage. During the transition stage there is increased severity of uterine contractions, and decrease in the time between the contractions, which reduces the blood flow to the uterus, and increases the perceived pain levels. Similarly, Çalık and Kömürcü (2014) found no significant difference between the pain levels of the group who received acupressure on the SP6 point, and the control group in the transition stage of labor. Sehhatie-Shafaie et al. (2013) studied acupressure on SP6 and LI4 and found a significance difference between the pain levels of the experimental and control groups during the transition stage of labor. The number of studies examining the effects of acupressure on the perceived pain level in the transition stage of labor is very limited in the literature (Çalık & Kömürcü, 2014; Sehhatie-Shafaie et al., 2013; Yesilçiçek Çalik & Kömürcü, 2014). Acupressure on SP6 and LI4 acupoints can be applied for pain management at the transition stage of labor. For this reason more studies are needed to analyze the effectiveness of this method when applied during the transition stage of labor (Çalık & Kömürcü, 2014; Sehhatie-Shafaie et al., 2013; Yesilçiçek Çalik & Kömürcü, 2014).

The duration of the acupressure application (20 or 30 min) varies between studies. Most studies found acupressure administered during contractions (for total of 20 to 30 min) reduced labor pain at 30 and 60 min after intervention (Akbarzadeh et al., 2013; Dong et al., 2015; Hajiamini et al., 2012; Hjelmstedt et al., 2010; Lee et al., 2004). The severity of labor pain constantly increases and differs at the beginning and end of the active and transition stages of labor. That is, the effectiveness of the intermittent acupressure on labor pain is gradually decreasing. Therefore, acupressure should be applied consistently for pain management at birth.

Effective uterine contractions can shorten the duration of labor and birth, which, in turn, could provide a positive birth experience for the woman (Çalık & Kömürcü, 2014; Mafetoni & Shimo, 2015). The total duration of labor and duration of the active stage of labor (cervical dilatation: 4–10 cm) was found to be significantly shorter for the experimental group compared to the control group. Therefore, the results of the study support the hypothesis that the acupressure group experienced a shorter duration of the active stage of labor than those in the control groups. Our findings are supported by previous studies that reported a significantly shorter duration of labor for the group which received acupressure on the SP6 point, compared to the control group (Çalık & Kömürcü, 2014; Deepak et al., 2013; Dong et al., 2015; Jian-Mei et al., 2011; Kashanian & Shahali, 2010; Kim et al., 2002; Lee, 2003; Lee et al., 2004; Mafetoni & Shimo, 2015; Salehian et al., 2011). Acupressure may also

stimulate oxytocin release from the pituitary gland, which in turn regulates uterine contractions, thus shortening the duration of labor (Mafetoni & Shimo, 2015). The meta-analysis by Makvandi et al. (2016) found that the use of acupressure increased chances of vaginal birth. Because the duration of the first labor stage accounts for the longest part of the total duration of labor, its management decides the capability of having vaginal birth.

Application of acupressure on the SP6 point also has a positive effect on the perceived pain level and satisfaction levels. Satisfaction of the pregnant women in the present study was assessed after they were taken to the postpartum room (2 hr after birth). The reason for including a group of pregnant women who received touch without pressure was to control for the possible effects of the presence of a person paying particular attention to the pregnant woman. Because of the possible placebo effect of interest and support given to pregnant women, equal interest and support was given to pregnant women in both groups (Çalık & Kömürcü, 2014). Although not statistically significant, participants in the experimental group were more satisfied with the acupressure application; this could be because they found the acupressure more effective in pain relief. Acupressure thereby increases satisfaction and mothers' self-confidence, decreases their anxiety by strengthening their self-esteem and sense of accomplishment, enabling women to have a positive birth experience (Çalık & Kömürcü, 2014). There are limited studies on women's viewpoints and levels of satisfaction in the use of acupressure for labor pain and duration and this is an area that warrants further investigation.

The authors recognize that one person administering the acupressure and touch to all participants during the study can be exhausting. Therefore any future studies need to take this into consideration.

5 | LIMITATIONS

This present study has limitations in that the sample size was small. Pregnant women moved to the birth table in the transition stage (8–10 cm) and during the transition stage acupressure was applied to women lying on the birth table. Women lying on the birth table during transition can experience severe labor pain which may have affected the effectiveness of acupressure. This may affect the effectiveness of acupressure administration. Another limitation identified was all women received oxytocin infusion in early labor compared to other acupressure studies where participants were required to have spontaneous onset of labor. These findings may not be generalizable to different populations.

6 | CONCLUSION

This study revealed that pressure applied on the SP6 point reduces labor pain perceived by laboring women, and reduces the duration of the active stage of the first stage of labor and the total length of labor. In addition, the study suggests that pregnant women were satisfied with the application of pressure on the SP6 point during labor, and that they found this method effective in pain relief compared to the control group with only touch on SP6. The women in the experimental group were more likely to recommend this method to other pregnant women. More studies are needed to assess women's views on receiving acupressure in labor in relation to pain relief and positive effects.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. There is absence of any interest to disclose.

AUTHOR CONTRIBUTIONS

H.T. undertook the data collection, data analysis, and prepared the manuscript; E.Ç.T. prepared the manuscript. Both authors read and approved the final manuscript.

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