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The effect of acupressure at the Sanyinjiao point on the labor pain relief and duration of labor in Turkish nulliparous women

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ABSTRACT

Aim of this study was to determine the effects of acupressure Sanyinjiao (Sp-6) point on the labour pain relief and duration of labor in Turkish nulliparous women. It was conducted at a private hospital from the Medipol Healthcare Group between April and September of 2014. Nulliparous women were randomly assigned either to the acupressure group (AG) or placebo groups (PG). In the initial session, a total of 100 of the participants were included, with 50 allocated to the AG and 50 to the PG. The Visual Analog Scale (VAS) was used to measure the intensity of the nulliparous' labor pain. Differences between groups after interventions were analysed using IBM SPSS Statistics 21.0., which were compared by t-test or Mann-Whitney U-test according to the distribution of the variables. The mean age of the participants was 28.2±4.1 years. This study showed that acupressure at the Sp-6 point could reduce the pain intensity and shorten the duration of the active phase of labour when compared to PG. The duration of the second stage of labor and the rate of caesarean section did not show a significant difference between the groups. Findings from this study suggest that if acupressure is practiced by midwives, the experience of childbirth is facilitated.

1. Introduction

Childbirth is one of the most important experiences in the mothers' lives, and this experience has been associated with severe pain (Bjelland et al., 2016). Labor pain is defined as a form of acute pain but it is a physiological part of childbirth while other acute pains develop due to certain pathologies (Whitburn et al., 2019). Labor pain causes women to experience anxiety and fatigue. Anxiety and fear are related to increased excretion of stress hormones and weakened uterin contractility during labour, which results in prolonged labour (Tzeng et al., 2017). Prolonged labour is related to increased adverse perinatal outcomes (Abalos et al., 2018). Therefore, using of the intrapartum pain relief techniques is one of the significant aspects of midwifery care.

Intrapartum pain relief techniques include many different aspects such as religious, cultural, and maternity care systems (Van der Gucht and Lewis, 2015). In the light of these critical aspects, the subject of coping with labor pain for women is a phenomenon. For example, Koyyalamudi et al. stated that labor pain is a significant action that determines how childbirth experience is for women (Koyyalamudi et

al., 2016). In addition, there are pharmacological and non-pharmacological methods in dealing with labor pain during childbirth, which effects the experiences of birth positively. The neuraxial blocade, which uses spinal, epidural or combined spinal-epidural techniques as a pharmacological method to reduce labor pain, is considered the foremost standard. Pharmacological analgesic agents used in combination with these techniques are patient controlled analgesia, nitrous oxide, opioids and non-opioids (Jones, 2012). Although the use of pharmacological agents for labor pain reduces pain, they increase the rates of instrumental vaginal delivery due to fetal distress (Jones, 2012; Hasegawa et al., 2013). In addition, pharmacological agents cause side effects such as nausea, vomiting, hypotension (Jones, 2012), itching, somnolence and pruritis (Hein, 2018). Therefore, eliminating or minimizing the known side effects of analgesic methods used in coping with labor pain may be essential to positively increase the birth experience.

On the other hand, non-pharmacological methods such as exercise during pregnancy, acupuncture, hypnosis, yoga, hydrotherapy, massage, music, subcutaneous electronic stimulation, and relaxation techniques are used to reduce pain at birth (Koyyalamudi et al., 2016; Smith et al., 2018). Acupressure is a non-pharmacological method with the same basic principle as acupuncture. Acupuncture and acupressure, the components of traditional Chinese medicine, are based on the stimulation of the energy pathways called meridian which run along the whole body (Gregson et al., 2015). Although traditional Chinese medicine uses the meridian system in treatment protocols, scientists are avoiding using these methods since they have not been scientifically proven. According to Western medicine, meridians have no anatomical basis. The effects of the meridian system on treatments were studied through several theories such as opioid peptide theory or gate control theory (Kang et al., 2016).

Acupressure as a non-invasive technique which is applied through physical pressure to specific meridian points (Smith et al., 2017). A variety of acupoints are reported in obstetric studies (Akbarzadeh et al., 2013; Asadi et al., 2015; Dong et al., 2015) to reduce labor pain. The most cited of these acupoints are SP6, LI4, BL32, and GB21 which are believed to stimulate uterine contractions through oxytocin release and to reduce labor pain by decreasing catecholamines and increasing endorphins from the pituitary gland (Yesilcicek Calik and Komurcu, 2014; Mollart et al., 2015; Hamlacı and Yazici, 2017; Gönenç and Terzioğlu, 2019; Türkmen and Çeber Turfan, 2019). The other common acupoint is Sanyinjiao (Sp-6) point or sanyinjiao that is at the junction of three meridians of liver, spleen and kidney and has a strong influence on the physiological function of the uterus (Lingling et al., 2017).

There is no enough research to show the relation of Sp-6 acupressure and the labor pain and duration of labor. The aim of this study was to investigate the effects of Sp-6 point acupressure on the labor pain and duration of labor in Turkish nulliparous women.

2. Materials and methods

Study sample

This study designed as single-blinded, prospective, placebo controlled. It was conducted at Bahcelievler Nisa Hospital in Istanbul which is a private hospital from the Medipol Healthcare Group between April and September of 2014. Nulliparous women were randomly assigned either to the acupressure on Sp-6 point (AG) or touch on Sp-6-point placebo (PG) groups. The criteria for participating in the study were: 1) 18-49 years of maternal age; 2) nulliparous women who had at least three uterin contractions lasting >30 seconds within 10 minutes; 3) literate in the Turkish language; 4) 37–42 gestational weeks; 5) singleton, cephalic presentation 6) fetus in an anterior position; 7) spontaneous onset of labour and a cervical dilation of 4–5 cm; 8) intact membrane 9) normal foetal heart rate (FHR) 10) Bishop score ≥ 6. Women were excluded from the trial if they had any systemic disease and any mental health problems, damage and injury at the Sp-6 acupoint, required any sedation or analgesic drugs during labor or if they chose to withdraw.

Following assessment and allocation 130 nulliparous women were recruited. The women with regular uterine contractions (at least three uterin contractions lasting >30 seconds within 10 minutes) were randomly assigned to the AG or PG groups.

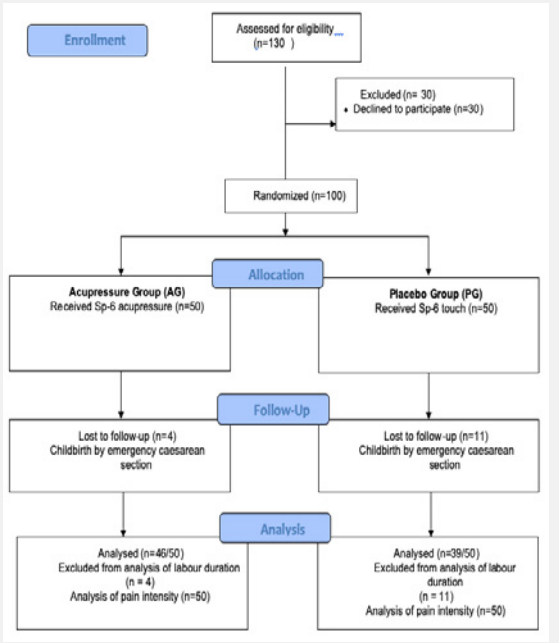

Fig. 1. Consort flow diagram.

Simple randomization was used based on their hospital admission code. Participant admission codes ending with odd or even numbers were allocated to AG and PG groups, respectively. The sample size was predetermined at the percentage differences in the pain using the Visual Analogue Scale (VAS) before and after the intervention in the study of Lee et al., Mafetoni and Shimo using power analysis based on a medium effect size, an alpha of 0.05 and power=0.92 (Lee et al., 2004; Mafetoni and Shimo, 2016). In the initial session, a total of 100 of the participants were included, with 50 allocated to the AG and 50 to the PG. In the treatment follow-up session, a total of 85 nulliparous women were included in the analysis, of whom 46 were assigned to the AG and 39 to the PG (Fig. 1).

Ethical considerations

The study protocol was approved by institutional review board of Istanbul Medipol University. Recruired participants in the two groups received a written description of the research purposes, and asked to give written consent. Moreover, they were kept informed about they could withdraw themselves from the study at any stage without giving any explanation.

Outcome measurements

VAS was used to measure the intensity of the nulliparous' labor pain. This scale consisted of a 10 cm horizontal descriptor (no pain on the left - worst possible pain on the right). Participants were asked to evaluate pain level of labor pain from 1 to 10. For each group, VAS evaluated four times: before the intervention (T0), immediately after the intervention (T1), thirty minutes after intervention (T2) and sixty minutes after intervention (T3). At every stage of the trial, the participants were requested to asses their pain level on a VAS. Some participant in both groups underwent cesarean section after pain intensity at all time points was measured.

The primary outcomes were the Sp-6 acupressure would increase the duration of the active phase, the duration of the second stage and labor pain. Secondary outcome measure included the type of birth and Apgar scores of the newborns. The two groups were compared for factors that could potentially affect the labour process such as maternal age, neonatal birth weight, the pattern of uterus contraction, cervical dilation, cervical effacement and foetal station at the start of the study. For all the subjects, vaginal exam, measurement of newborn's birth weight, Apgar score assessment and administration of research tools were performed by the researcher. The number of contractions in ten minutes was calculated to determine the contraction frequency. The duration of contraction was calculated from the beginning to the end of the contraction (as second).

The duration of the first labour stage was calculated as the period from 4 cm cervical dilation to full cervical dilation. The duration of the second stage was calculated as full dilation to the time of birth. Neonatal Apgar score was assessed at the first- and fifth-minutes afterbirth.

Interventions

Interventions were started after 4 cm vaginal dilatation. These interventions (acupressure on Sp-6 and touch on Sp-6) underwent between contractions. The Sp6 acupressure was performed by primer researcher, who was certified for acupressure. The vaginal examination, acupressure (true and placebo) and VAS were administered by the same researcher. The study was carried out the both of AG and PG were included the same conditions. The pressure was applied when the participant was laid down by the semi-fowler position with the legs straight. Sp-6 was located four finger's width, measured with the woman's own fingers, above the tip of the medial malleolus at the posterior border of the tibia. Proper location of the acupoint was approved when the participant felt heaviness, pressure, tingling, or numbness in the area or a gratifying feeling (Hjelmstedt et al., 2010). The pressure contained rotational and vibratory pressure. When the participant felt as a severe pain at the point of pressure, the pressure was ended immediately and continued after a few minutes.

In the AG, acupressure was applied with vertical pressure by the thumb of the researcher at the onset of the active phase of labour (cervical dilation of 4 cm). This process continued for 30 minutes in total. Five pressures on the Sp-6 acupoints were applied every ten minutes during the contractions. Each period included 60 seconds of pressure and 60 seconds of rest. The intensity of the pressure was determined by the researcher's thumb-nail color. The pressure was considered enough when the nail bed was partially white (Sehhatie-Shafaie et al., 2013; Torkzahrani et al., 2015). The 30-minutes intervention time was based on previous studies (Hjelmstedt et al., 2010; Shahali and Kashanian, 2010; Cui et al., 2011).

In the PG, a placebo intervention was performed by touching the Sp-6 point with the palm of the hand by the same researcher. The time and duration of applications were the same as the AG.

Data analysis

Differences between groups after interventions were analized using IBM SPSS Statistics 21.0., which were compared by t-test or Mann-Whitney U-test according to the distribution of the variables. Chi-square tests were used for categorical variables and statistically significant for the measurements means were calculated using an alpha value of 0.05. The normally distributed variables were shown as mean±standard deviation (SD), while non-normally distributed variables and

categorical variables were presented by median (min-max) and n (%), respectively.

The retrospective power analysis of the study was carried out fort he duration of labor (hours) and VAS. The power was 99.99% when alfa=0.05, n1=46, n2=39 for the effect size for the active phase of the labour of 1.338. The power of pain intensity analyses was 100%, when effect size f=0.659, alfa=0.05, total sample size=100, number of groups=2, number of measurements=4, nonsphericity correction=0.582 and correlation among repeated measures=0.755. Power analysis was performed with G Power 3.1.9.2 software.

3. Results

Baseline demographic and clinical characteristics

The baseline characteristics of 100 women who participated in this study was summarized in Table 1. The mean age of the participants was 28.2±4.1 years, and ages ranged from 20 to 37 years. There were not any statistically significant differences compared the AG and PG groups in demographic and obstetric characteristic and the groups were homogeneous (p>0.05) (Table 1).

Table 1. Baseline demographic characteristics.

	Acupressure group (n=50)	Touch group (n=50)	Total (n=100)	*p*
Age in years (Range:20-37) [Mean±SD]	28.8±4.4	27.5±3.8	28.2±4.1	0.120
Number of prenatal cares [Median (min-max)]	12 (6-17)	12 (5-18)	12 (5-18)	0.546
Education [n (%)]				0.184
Elementary school	11 (22%)	6 (12%)	17 (17%)	
Secondary school	9 (18%)	4 (8%)	13 (13%)	
High school	16 (32%)	22 (44%)	38 (38%)	
University	14 (28%)	18(36%)	32 (32%)	
Occupation [n (%)]				0.679
Employed	17 (34%)	20 (40%)	37 (37%)	
Housewife	33 (36%)	30 (60%)	63 (63%)	
Income [n (%)]				1.000
Earn more than spend	5 (10%)	5 (10%)	10 (10%)	
Earn equal to spend	40 (80%)	40 (80%)	80 (80%)	
Earn less than spend	5 (10%)	5 (10%)	10 (10%)	
History of abortion [n (%)]				0.054
Yes	21 (42%)	11 (22%)	32 (32%)	
No	29 (58%)	39 (78%)	68 (68%)	
Type of pregnancy [n (%)]				0.362
Planned	49 (98%)	46 (92%)	95 (95%)	
Unplanned	1 (2%)	4 (8%)	5 (5%)	

Before the using interventions on Sp-6, details of maternal obstetric-exam were compared amongst groups and there could not be found significant difference in respect of the pattern of contraction, cervical dilatation and effacement and foetal station at the start of the study (p>0.05) (Table 2).

Table 2. Baseline clinical characteristics.

	Acupressure group (n=50) Median (min-max)	Touch group (n=50) Median (min-max)	*p*
Frequency of contraction	3.0 (2-5)	4.0 (2-5)	0.005
Duration of contraction (sec.)	30.0 (20-40)	30.0 (20-40)	0.910
Cervical dilatation	4.0 (4.0-4.0)	4.0 (4.0-4.0)	1.000
Cervical effacement, %	60.0 (50.0-80.0)	60.0 (40.0-80.0)	0.084
Foetal station	-2 [(-3)-(-1)]	-2 [(-3)-(-1)]	0.898

Subjective labour pain

The mean baseline pain scores were 6.08±1.54 in the AG (Table 3). Immediately after the intervention, the mean pain scores were reduced to 5.36±1.24 (p<0.001 for T1 vs. T0). Half an hour after the intervention, the pain scores of the AG increased to the same level as those immediately after intervention (p=1.000 for T2 vs. T0), then the mean pain scores reached the highest level, 7.16±1.33, at 60 minutes (p<0.001 for T3 vs. T2, T1, T0). The effect size for the differences in pain score was moderate with 0.590 (95% CI:0.439-0.659).

Table 3. Distribution of VAS scores and their changes in the groups.

Stage↓ Group→	Acupressure group (n=50) Mean±SD	Touch group (n=50) Mean±SD	*p*	*dH (95% CI)*
T0 (Before)	6.08±1.54	4.96±1.23	<0.001	0.797 (0.388-1.207)
T1 (Immediately)	5.36±1.24	5.82±1.04	0.048	0.399 (0.001-0.797)
T2 (30th minute)	6.30±1.13	7.06±1.35	0.003	0.606 (0.203-1.009)
T3 (60th minute)	7.16±1.33	8.82±1.16	<0.001	1.320 (0.885-1.755)
p-value	<0.001	<0.001		
$p\eta^2$(95% CI)	0.590 (0.439-0.659)	0.749 (0.642-0.791)		

The mean baseline pain scores were 4.96±1.23 in the PG, which was considerably less than those in AG (p<0.001) (Table 3). The mean intensity of pain at T1, T2 and T3 were 5.82±1.04, 7.06±1.04 and 8.82±1.16, respectively, showing a permanent increase (p<0.001 for all pairwise comparisons of time points) with an effect size of 0.749 (95% CI:0.642-0.791).

There were significant differences between the subjective pain scores of AG and PG at all-time points with effect sizes ranging from 0.399 to 1.320 (p<0.05).

The change of pain levels across time points was significantly different between the groups (p<0.001, pη2=0.303, 95% CI:0.280-0.523) (Fig. 2).

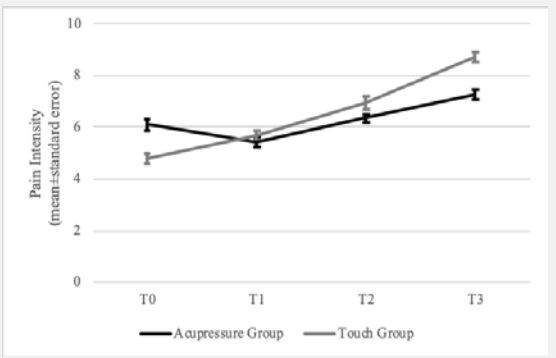

Fig. 2. Change in VAS mean scores from baseline (T0) to immediately stage (T1), after thirty min stage (T2), and after sixty min stage (T3) in the groups.

Duration of labour

Although 85 volenteer participants were completed at end of the study, 15 partcipants had to excluded from the duration of labor as a study outcome, because they became emergency caesarean section. Therefore, AG contained 46 women and PG included 39 women in this part.

The duration of active phase of labour was 3.0 (min:1-max:6) in the AG and 4.0 (min:2-max:10) hours in the PG. The duration of the labor was significantly shorter in the AG (p<0.001) (Table 4). The effect size for the differences was large with 1.292 (95% CI: 0.859-1.726). The median duration of the second stage of labor was 20.0 minutes (min:7-max:62) in the AG and 20.0 minutes (min:8-max:62) in the PG (p=0.784) (Table 4).

Table 4. Distribution of duration of labor in the groups

	Acupressure group (n=46) Median (min-max)	Touch group (n=39) Median (min-max)	*p*	*dH (95% CI)*
Duration of first labour stage, h, 4 cm-full dilatation	3.0 (1-6)	4.0 (2-10)	<0.001	1.292 (0.859-1.726)
Duration second stage of labour, min, full dilatation-fetus delivery	20.0 (7-62)	20.0 (8-62)	0.784	0.072 (-0.322-0.466)

Delivery outcomes

Table 5 was summarized the delivery outcomes for each group. In both groups, 85% of the participants had a vaginal delivery. Four women (8%) in the AG and 11 (22%) in the PG had a caesarean section (CS) (p=0.093).

One-minute Apgar score was 8 (min-max:6-10) in the PG and 9 (min-max:6-10) in the AG (p<0.001). Five-minute Apgar score was 10 (min-max:7-10) and 9 (min-max:7-10) in the AG and PG, respectively (p<0.001) (Table 5). The effect size of the difference in one-minute Apgar scores was large (1.253, 95% CI:0.821-1.684), where the effect size of five minutes Apgar was 1.011 (95% CI:0.593-1.430). There was no significant difference between the groups in terms of newborns' mean birth weight (p=0.647).

Table 5. Delivery outcomes

	Acupressure group (n=50)	Touch group (n=50)	p	dH (95% CI)
Type of delivery [n (%)]			0.093	0.644 (-0.033–1.320)
Vaginal	46 (92%)	39 (78%)		
Caesarean section	4 (8%)	11 (22%)		
Sex of new-born [n (%)]			0.648	0.136 (-0.307–0.578)
Male	28 (56%)	31 (62%)		
Female	22 (44%)	19 (38%)		
Apgar score at 1 min. [Median (min-max)]	9 (6-10)	8 (6-10)	<0.001	1.253 (0.821-1.684)
Apgar score at 5 min. [Median (min-max)]	10 (7-10)	9 (7-10)	<0.001	1.011 (0.593-1.430)
Neonatal birth weight (g) [mean±SD]	3349.2±335.7	3317.8±347.2	0.647	0.091 (-0.303–0.485)

4. Discussion

The findings of this study, which was conducted to compare the effect of AG with the effects of PG, regarding the pain intensity of the first stage of labour, the duration of labour and delivery outcomes, demonstrated a complex interaction. These findings, which included dominant parameters such as the duration of labour, intension of pain are summarized on three themes: 1) The effect of acupressure on labor pain relief, 2) The effect of acupressure on duration of labor, 3) The effect of acupressure on delivery outcomes.

This study showed that acupressure at the Sp-6 point could reduce the pain intensity and shorten the duration of the active phase of labour when compared to PG. Some other studies have reported similar findings (Shahali and Kashanian, 2010; Cui et al., 2011; Akbarzadeh et al., 2013; Asadi et al., 2015; Mafetoni and Shimo, 2015). Although previous studies showed that the rate of cesarean section reduced (Shahali and Kashanian, 2010; Akbarzadeh et al., 2013) our study did not display a reduction in the rate of CS.

This study showed that acupressure at the Sp-6 point could reduce the pain intensity and shorten the duration of the active phase of labour when compared to PG. There was not any significant differences between the

two groups concerning the patterns of contraction, cervical dilatation, effacement and foetal station which were among the variables thought to affect the labor process. The duration of the second stage of labor and the rate of caesarean section did not show a significant difference between the groups.

The effect of acupressure on labour pain relief

Although the mean VAS scores were higher in the AG in the beginning of the study compared to the PG, it was seen that the mean VAS score in the acupressure group decreased immediately after the intervention. While the VAS scores continued to increase in the acupressure group at 30 and 60 minutes after the intervention, the mean VAS score in the placebo group continued to much more increase significant statistically. Even if the present findings showed that the pain gradually increased during the active phase of the labor, the reason for this might also be attributed to a physiological condition that occurs due to the increased oxytocin hormone secretion. Some cross-cultural studies have demonstrated that the risen in the pain of scores may be connected with the increased oxytocin hormone (Gregson et al., 2015; Smith et al., 2018). On the other hand, although this physiological condition may be related to the increased the frequency and duration of contractions, the findings of the study showed that there was no difference in both groups with the frequency and duration of contractions.

The study findings demonstrated that the use of Sp-6 acupressure can be considered an effective way to reduce labour pain in nulliparous women. A potential explanation for acupressure-related pain relief may based on the endorphin-release theory (Makvandi et al., 2016). Some international cross-cultural studies have showed that the effectiveness of Sp-6 acupressure for pain reduction during the first phase of the labour (Mafetoni and Shimo, 2015; Kang et al., 2016; Smith et al., 2017).

The effect of acupressure on duration of labour

According to the findings of most studies evaluating the duration of labor from the time of a dilation of 4 cm to full dilatation, the active phase of labor experienced by the participants was shortened in the Sp-6 group (Cui et al., 2011; Smith et al., 2017). In addition, the study stated that the AG of the present study exhibited a significantly shorter duration of the active phase of first stages of labour compared to the PG. However, participants, who were given birth with CS, were excluded from the analysis of the labor duration in this study. Moreover, it was showed that acupressure shortened the active phase of labor, but was not effective at the second stage of labor in this study. Okumus's study has demostrated that the primiparous women giving birth in Turkish hospitals had higher rates of induction, instrumental birth, fundal pressure and episiotomy rates (Okumus, 2017). The duration of second stage may be related to the increased the frequency of obstetric intervention using to shorten second stage of labor.

The effect of acupressure on delivery outcomes

Four women in the AG and 11 participants in the PG were given birth with CS, but there was not a significant difference between the groups in terms of the CS rates. The meta-analysis study of Makvandi et al. revealed that the application of acupressure reduced the rate of cesarean section (Makvandi et al., 2016). Turkey is one of the countries possesing the highest rates of the cesarean delivery. In addition, these rates were 69.5% in private hospitals and 35.5% in state hospitals in Turkey (MoH Turkey, 2014).

The Apgar scores after the one-minute and five-minute marks of birth showed that first- and fifth minute Apgar scores did not differ statistically in the AG and PG. Noting the results of the present study and the other studies, no significant differences were observed between the one-minute and five-minute Apgar scores of newborns in the selection groups (Akbarzadeh et al., 2013; Lingling et al., 2017; Smith et al., 2017). The study found that the use of acupressure during labour has no adverse effects on the newborns.

In this study, applying pressure to the Sp- 6 acupoints to reduce labor pain and duration of delivery for primiparous women seems effective. In addition, acupressure is one of the non-invasive methods that midwives can learn easily and apply in midwifery care. Findings from this study suggest that if acupressure is practiced by midwives, the experience of childbirth is enhanced.

Further studies should be included in the clinical trials to establish standard acupressure practice at childbirth and future research is needed regarding the effects of process of acupressure on all pregnant women. Further research is needed to understand the practice implications of the use of the acupressure during all childbirth process both of primiparous and multiparous women. The lack of standardization for acupressure should be investigated. In particular, strategies to identify and minimize the effect of acupressure applied at different durations must be investigated. Further, more research is needed to understand that the practice acupressure aimed at improving childbirth outcomes and to enhance midwifery care delivery in clinical settings. Acknowledgements This study was accepted as a master thesis by Istanbul Medipol University Health Sciences Institute on August 1st, 2016. The authors are grateful to the women and their babies who participated in the study. They also wish to thank the midwives and gynecologist staffs of the Medipol Health Group for their support.

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