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Effect of acupressure on childbirth outcomes in nulliparous women: A randomized clinical trial

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Abstract:

BACKGROUND: Non-pharmaceutical method is one of the conventional methods of reducing labor pain. Acupressure is suggested as an effective method for reducing labor pain with favorable effects on the outcome of childbirth. Different acupressure methods are suggested for this purpose; the most effective one has to be investigated. Therefore, the present study compared the effect of two of the most effective acupressure methods, namely lumbar rotation in a standing position and the 6th splenic point (SP6) acupressure, in the active phase of labor on pain intensity, duration of labor, and childbirth experience among nulliparous women.

MATERIALS AND METHODS: In this semi-experimental randomized clinical trial, 126 nulliparous women in Bint Al-Huda Hospital, Bojnourd, Iran, February–June 2021, were enrolled (by convenient sampling based on the inclusion criteria) and assigned to two interventions and a control group (no intervention). Baseline pain intensity was measured by VAS at a dilatation of 4 cm, immediately after intervention, and at dilation of 8 cm. Group "A" received lumbar rotation in standing position and group "B" received SP6 acupressure; once at 4 and once at 8 cm dilatation. The length of the active phase and the second stage of labor and the total duration of labor were calculated in minutes. The mothers completed the Walker Birth Experience Questionnaire within 2 h after the labor. Mean values were compared using the one-way analysis of variance (ANOVA, for three groups, with posthoc tests for significant differences) and independent samples *t*-test (for two groups) using SPSS v.16 and considered significant at P values < 0.05.

RESULTS: After the intervention, groups A and B had a lower mean pain intensity (5.80 ± 1.83 and 4.82 ± 2.14, respectively) than the control group (7.70 ± 1.91, $P < 0.001$) and after the second intervention (8.06 ± 1.55, 7.68 ± 1.60, 9.92 ± 0.36 in groups A, B, and control, respectively; $P < 0.001$). Labor duration was longer in the control group (228.11 ± 82.31 min active phase; 58.38 ± 23.86 min second stage, and 372.92 ± 114.41 min total) than group B (180.66 ± 60.68, 40.00 ± 18.56, and 310.39 ± 89.66 min, respectively, $P < 0.05$). The mean total birth experience scores were lower in the control group (63.59 ± 6.59), compared with those in groups A and B (73.14 ± 7.95 and 72.84 ± 8.29, respectively, $P < 0.001$), and in three dimensions of own capacity, perceived safety, and participation ($P < 0.05$).

CONCLUSION: Lumbar rotation in the standing position and SP6 acupressure had a positive effect on pain intensity, duration of labor, and birth experience.

Keywords:

Acupressure, labor, labor pain, labor stage, obstetric, parturition, second

Introduction

Childbirth is an important event in every woman's life. Fear of childbirth[1] and the memories she experiences during labor will not only influence the mother's physical and psychological health during labor,[2] but may also continue after labor and even result in post-traumatic stress

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disorder.[3] Pain, length of labor, and method of delivery can influence satisfaction from labor.[4,5]

Pain is an inseparable part of the natural delivery process; however, severe labor pain can cause stress, temporary impaired harmony, and paradoxical emotions in the mother that can reduce pain toleration and make the mother feel a higher level of pain, acting as a vicious cycle.[6,7] This will, in turn, increase epinephrine, cortisol, and catecholamine levels, which result in the contraction of pelvic muscles, prolong labor, and impair oxygenation to the fetus.[8,9] Optimized labor can reduce the mother's pain, fear, and stress and shorten the labor duration, which will, in turn, improve her well-being.[10]

Several strategies have been suggested for reducing labor pain; however, pharmaceutical agents (including medications and epidural analgesia) can have adverse effects,[11,12] cease labor,[13] or decrease the likelihood of breastfeeding; thus, it is not desired.[14] Some healthcare providers prefer not to do anything for the mother's labor pain because of the adverse effects of the pharmaceutical agents.[15,16] However, this will impose the negative effects of labor pain on the fetus and mother; therefore, recent literature has addressed non-pharmaceutical strategies that can reduce labor pain.[17,18] The most commonly known non-pharmaceutical strategies suggested for the management of labor pain include acupressure, acupuncture, electrical stimulation, and water injections, which have shown significant benefits to the mother and infant without additional harm.[19-22] Review of studies on acupuncture shows the benefit of this method in reducing labor pain and the use of medical painkillers, forceps, and vacuum-assisted birth, in addition to shortening labor duration.[23] Acupressure has also shown a significant effect on reducing labor pain and duration; however, no effects on cervical ripening or labor induction have been reported.[23]

Acupressure on the spleen 6 acupuncture point or Sanyinjiao point, known as SP6 acupressure, is an effective non-pharmaceutical method for pain relief with confirmed efficacy in reducing women's pain during menstruation (dysmenorrhea),[24,25] reducing mother's anxiety level and use of sedatives and analgesics during labor.[26] SP6 is one of the two most commonly used points for acupressure during labor, and it has been found effective for reducing labor pain and duration in comparative studies (compared with routine care or SP6 touch)[27-31] and in the meta-analysis on 1,100 subjects.[32]

Another non-pharmaceutical method of pain relief during labor is related to the mother's position during labor, which can also influence the labor process.[33,34] Standing in the upright position and dancing in the standing position with pelvic tilt around in a circle during the first phase of labor have been shown to have positive effects on labor progress and maternal satisfaction, in addition to improved neonatal outcomes.[35] Some have considered dancing in this position with their partner[36] or with music,[37] in which the associated intervention (partner's support and music) may confound the results. Therefore, it is necessary to evaluate the pure effect of this position on labor pain. Another point that needs to be considered is that previous studies have confirmed the efficacy of the two interventions mentioned above, namely SP6 acupressure and dancing position, on reducing labor pain and duration and making a more pleasant experience for the mother. Nevertheless, no study has compared the efficacy of these two interventions to date, and it is not yet known which one is better to choose for labor. Therefore, in this study, we aimed to compare the effect of lumbar rotation in the upright position and the SP6 acupressure during the active phase of labor on pain intensity, duration of labor, and childbirth experience among nulliparous women.

Materials and Methods

Study design and setting

In this semi-experimental randomized clinical trial, women who were referred to Bint Al-Huda Hospital, Bojnourd, Iran, from February to June 2021 were considered as the study population.

Ethical consideration

The trial was registered at the Iranian Registry of Clinical Trials https://www.irct.ir by the code IRCT20201213049699N1 and approved by the Ethics Committee of Tehran University of Medical Sciences (code: IR.TUMS.MEDICINE.REC.1399.889).

Study participants and sampling

Nulliparous mothers aged 18–35 years with singleton pregnancy at 38–42 weeks of gestation and cephalic presentation who had spontaneous labor pain and desired physiological delivery (without pain-reducing strategies) were considered for enrollment. Any mother with chronic diseases, including anatomic, skeletal, or psychological disorders, skin diseases such as eczema, inflammation at the pressure site, acute fever, phlebitis, or thrombosis, were not included in the study. Also, mothers who participated in preparation for delivery courses were not included in the study. The researcher selected the mothers according to the above-mentioned criteria, explained the research objectives and stages to the eligible mothers, and asked them to read and sign the written consent form. All mothers who had the criteria and gave consent for participation were included in the study using a convenient sampling method.

The sample size was calculated at 34 in each group, considering a confidence interval of 95% and the study

power of 80%. It was assumed that the effect of each intervention on pain was 0.5 units, compared with the control group, to achieve significant results. The assumed standard deviations (SD) were obtained from the study by Kordi *et al*.[38] Considering the chance of loss to follow-up, 126 patients were enrolled in the study (42 in each group). The following sample size equation was used for calculation: $n=\frac{(z_{1-\alpha/2}+z_{1-\alpha})^2\times(s_1^2+s_2^2)}{d^2}$, where:, $z_{0.975}$ = 1.96, $z_{0.8}$ = 0.84, d = 0.5, s_1 = 0.84 s_2 = 61, resulting in:

$$n=\frac{(1.96+0.84)^2\times(0.84^2+0.61^2)}{0.5^2}\approx 34$$

Study procedure

The mother's demographics, including age, educational level, job status, race/ethnicity, and body mass index (BMI), were recorded. The gestational age was calculated based on the ultrasound estimation before 20 weeks of gestation or the last menopause period, and the fetal weight was estimated based on Johnson's rule and included those weighing about 2500–4000 gr. The neonatal health was confirmed based on the ultrasound and prenatal examinations. The pain intensity was measured before the intervention at a dilatation of 4 cm using a 10-point visual analog scale (VAS); the scores 1–3 were considered mild pain, 4–7 moderate pain, and 8–10 severe pain. Before 4 cm dilatation, the mothers were educated about the way they should rate their pain on VAS and the interventions.

For evaluating fetal health, the fetal monitoring device TOCO (F9 Express model, EDAN, made in China) was used. Then, the vaginal examination was performed by the researcher, and dilatation, effacement, fetal position, amniotic sac, and fluid were evaluated. Also, the mother's vital signs, including blood pressure, heart rate, respiratory rate, and body temperature, were measured. The uterus height was measured using a meter, and the fetal weight was estimated by Johnson's rule. These measurements were recorded to estimate the fetal and mother's health during labor.

Then, the researcher categorized the patients into three groups. The groups were randomized by a statistician, who was not involved in the other stages of the study, using a simple randomization method (six blocks) and put them in sealed envelopes marked by A, B, and C. According to the envelopes, the patients were allocated to each group by another person, not the main researcher: group "A" received lumbar rotation in a standing position, group "B" received SP6 acupressure for 30 min during each contraction, and no intervention was implemented for the control group (group "C"), in addition to the routine care. The researcher gave the interventions to the patients and helped them in completing the questionnaires, but was not aware of the results of the tests until the end of the statistical analyses.

The interventions started when 4 cm dilatation was reached. In group "A", the mother was in the standing position. When the pain started, the mother was asked to lean forward and rotate her lumbar area to the right and left on the body axis for 30 min during each contraction. The mother could lay at whatever position she desired between the interventions, but to prevent the effect of other positions on the labor, the mothers were monitored continuously.

For group "B," acupressure on the 6th splenic point was performed. This point is three cuns higher than the internal ankle's tip and behind the posterior rim of the tibia. First, the four-finger width of the mother, which is equal to three cuns, was measured by a flexible thread, placed on the mother's legs, and marked with a marker. If the mother desired, she received a sample of this pressure before the intervention. At 4 cm dilatation, the intervention started. Simultaneous with the contraction, bilateral pressure was applied on the specified points with clockwise rotations for 1 min. The pressure was about 5 kg/m^2, which was applied so that the mother noticed pressure and minor pain without unpleasant feelings. For this intervention, the researcher was educated by an experienced supervisor and received a valid certificate for sufficient accuracy in performing this intervention. The researcher also received the certificate of "Safe Labor" after a 60-h course.

The mother was asked to mark her pain immediately before and 30 min after each intervention on the VAS scale. These steps were repeated at a dilation of 8 cm, and the pain was recorded again. Each mother was admitted to separate labor rooms and could not exchange information with other mothers. During the whole labor, the fetal heart sound was evaluated every 30 min using Sonokit TOITU (FD-390 model, made in China) and recorded. The length and duration of uterus contractions were also evaluated by palpation of the fundus by hand (at entry to the study, before the intervention, and immediately after the intervention at 4 cm and 8 cm dilatation). The duration of the active phase and the second stage and the total duration of labor were calculated in minutes.

The mothers completed the Childbirth Experience Questionnaire (CEQ) within 2 h after the labor. This questionnaire has 22 items in four dimensions: own capacity, professional support, perceived safety, and participation. Nineteen statements are scored by a 4-point Likert scale from 1 (totally agree) to 4 (totally disagree), and items 20–22 (about labor pain, sense of security, and control) using VAS. The VAS scores are coded as:

0-40 coded as 1, 41–60 coded as 2, 61–80 coded as 3, and 81–100 coded as 4. Higher scores indicate a better childbirth experience. This questionnaire was developed in Sweden in 2010 by Denker *et al.* in primiparous women[39] and validated in other countries, such as the UK.[40] The Persian version of this questionnaire, used in the present study, has been validated previously by test–retest reliability, favorable repeatability, validity of 95.7% for all dimensions (Cronbach's alpha of 0.826 for all dimensions and content validity of >0.62 (0.8-1) for all questions.[41]

Any mother complicated with fetal or maternal complications, such as decollement, umbilical cord prolapse, fetal distress, and hypertonic contractions of the uterus or any other reason that exempted the mother from the normal procedure of natural delivery, was excluded from the study. The mothers who used analgesics or any childbirth augmentation were also excluded from the study. The mothers who declined to continue the research were also excluded from the study at any stage they desired.

The main objective of this study was to compare the effect of the two interventions with each other and with the control group on the mother's pain intensity during labor and labor duration (primary outcome) and the childbirth experience (secondary outcome).

Statistical analysis

The data were analyzed using the statistical software SPSS for Windows, version 16.0 (SPSS Inc. Released 2007. Chicago). The categorical variables are described by frequency (percentage) and compared among the groups using the Chi-square and Fisher's exact test. For the numeric variables, after confirming the normal distribution by the one–sample Kolmogorov–Smirnov test, they were described using mean ± standard deviation (SD). Also, they compared using the one-way ANOVA among three groups (with pairwise comparisons by posthoc tests for significant values) and independent samples *t*-test between two intervention groups. *P* values < 0.05 were considered statistically significant.

Results

A total of 111 patients completed the study; the flow diagram is shown in Figure 1. The groups were not different in terms of demographics, including age, body mass index (BMI), educational level, job status, ethnicity, and gestational age [$P > 0.05$; Table 1]. Also, the pain toleration and painkiller use did not differ among the study groups [$P > 0.05$; Table 1].

The baseline pain intensity (before the intervention) was significantly different among the groups [$P = 0.012$; Table 2] and higher in the control group than group "A" [$P = 0.023$; Table 2]. Therefore, we mediated the effect of baseline pain in further analysis of pain intensity (using ANOVA). Immediately after the intervention, the pain intensity differed among the groups [$P < 0.001$; Table 2] and was higher in group C (7.70 ± 1.91), compared with groups A and B (5.80 ± 1.83 and 4.82 ± 2.14, respectively, both $P < 0.001$). No difference was observed between the two intervention groups [$P = 0.833$; Table 2].

Before the second course of intervention, the mean pain intensity was not different among the groups [$P = 0.098$; Table 2]; but after the second course, pain intensity was different among the three groups [$P < 0.001$; Table 2] and the control group had a higher mean pain intensity (9.92 ± 0.36) than groups A or B (8.06 ± 1.55 vs. 7.68 ± 1.60, respectively; both $P < 0.001$), while groups B and C were not different [$P = 0.992$, Table 2]. In addition to posthoc analysis, the results of the independent samples *t*-test for comparing the pain intensity between the two intervention groups also showed no difference in the mean pain scores at any intervals: before the first intervention ($P = 0.883$), after the first intervention ($P = 0.604$), before the second intervention ($P = 0.462$), and after the second intervention ($P = 0.313$).

The mean duration of the first phase of labor was different among the three study groups ($P = 0.014$); the control group had a significantly longer mean duration (228.11 ± 82.31 min), compared with group B (180.66 ± 60.68 min, $P = 0.01$), whereas other groups were not significantly different [$P > 0.05$; Table 3]. In the second phase of the labor, the mean duration of labor was longer in the control group (58.38 ± 23.86 min), compared with group B (40.00 ± 18.56 min, $P = 0.002$), whereas other groups were not significantly different [$P > 0.05$; Table 3]. The total mean duration of labor was also different among the three groups ($P = 0.026$), indicating higher values in the control group (372.92 ± 114.41 min) than in group B (310.39 ± 89.66 min, $P = 0.045$). The other groups had no difference in the mean duration of labor [$P > 0.05$; Table 3].

Considering the CEQ, the total mean scores of the three groups were different ($P < 0.001$) and lower in the control group (63.59 ± 6.59), compared with groups A and B (73.14 ± 7.95 and 72.84 ± 8.29, respectively; both $P < 0.001$). Also, the mean scores were different among the three study groups in all dimensions, except the "professional support" dimension [$P < 0.05$; Table 4]; the posthoc analysis showed that the control group had a lower mean score in "own capacity" dimension (both $P < 0.001$) and "perceived safety", compared with group A and B ($P = 0.003$ and $P = 0.002$, respectively). Considering the "participation" dimension, the control group had a lower mean value than group A ($P = 0.012$),

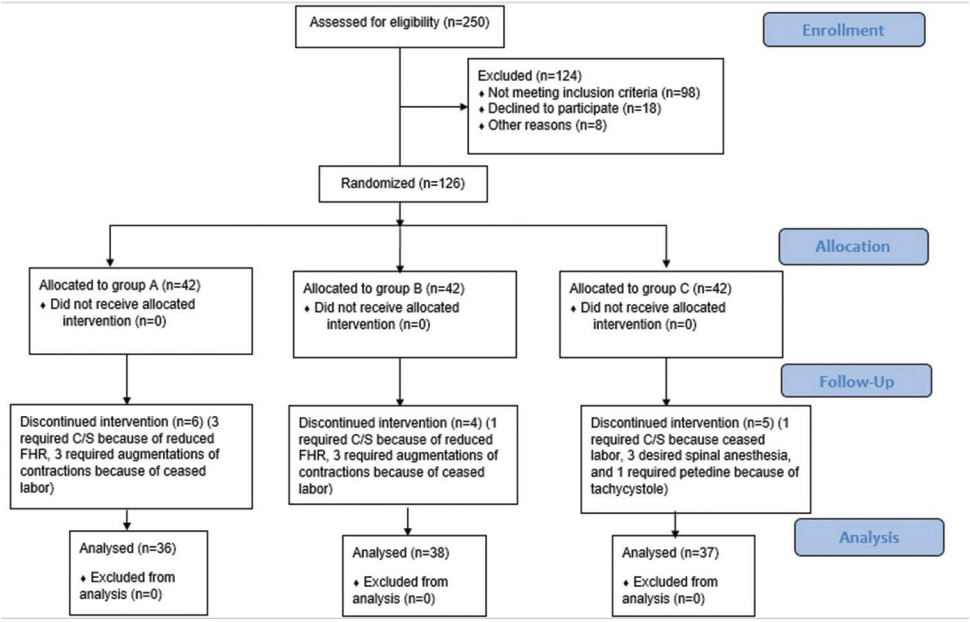

Figure 1: Flow diagram for patient enrollment to the study

Table 1: Comparing the baseline characteristics of the study groups

Variable	Categories	Group A	Group B	Group C	*P**
Age (years), mean±SD		22.75±3.57	23.11±3.99	22.62±4.37	0.862
Body mass index (kg/m^2), mean±SD		23.32±3.68	22.84±4.03	24.37±3.77	0.215
Educational level, *n* (%)	Below high school	17 (47.2)	26 (68.4)	25 (67.6)	0.181
	High school diploma	7 (19.6)	7 (18.4)	8 (21.6)	
	Academic degree	12 (33.3)	5 (13.2)	4 (10.8)	
Job status, *n* (%)	Housekeeper	30 (83.3)	34 (89.5)	34 (91.9)	0.307
	Employee	0	1 (2.6)	0	
	Student	6 (16.7)	2 (5.3)	2 (5.4)	
	Free job	0	1 (2.6)	1 (2.7)	
Ethnicity, *n* (%)	Turk	3 (8.3)	5 (13.3)	8 (21.7)	0.149
	Fars	9 (25)	4 (10.5)	4 (10.8)	
	Kord	19 (52.8)	14 (36.8)	15 (40.5)	
	Torkaman	5 (13.9)	14 (36.8)	9 (24.3)	
	Kermanj	0	1 (2.6)	1 (2.7)	
Gestational age (week), mean±SD		38.10±0.79	38.93±0.79	38.10±0.79	0.082
Pain toleration, mean±SD		6.25±2.28	5.82±2.55	6.03±2.55	0.286
Pain toleration, *n* (%)	Low	3 (8.3)	7 (18.4)	7 (18.9)	0.688†
	Moderate	19 (52.8)	16 (42.1)	16 (43.2)	
	High	14 (38.9)	15 (39.5)	14 (37.9)	
Painkiller use frequency, *n* (%)	Always	3 (8.3)	4 (10.5)	3 (8.1)	0.789†
	Sometimes	17 (47.3)	14 (36.9)	12 (32.4)	
	Never	16 (44.4)	20 (52.6)	22 (59.5)	

*The results of One-way ANOVA, †The result of the Chi-square test

while the results of the posthoc analysis showed no difference between other groups [$P > 0.05$; Table 4].

Discussion

In the present study, we hypothesized that both non-pharmaceutical interventions are effective in reducing labor pain and duration and making a more pleasant childbirth experience for the mother. To test this hypothesis, we compared the results with a control group and also compared the two interventions with each other to find which method is superior to the other in this regard. The results showed that both interventions reduced mothers' pain, compared to the control group, but neither of the interventions was superior to the other in this regard. Similar results were obtained for childbirth experience (both interventions increased the scores, compared to the control group,

Table 2: Comparing the pain-related factors among the study groups

Variable	Group A	Group B	Group C	*P**
Pain intensity before the first period of intervention, mean±SD	6.56±1.5	6.61±1.39	7.59±2.01	0.012
Pain intensity immediately after the first period of intervention, mean±SD	5.08±1.83	4.82±2.14	7.70±1.91	<0.001
Pain intensity before the second period of intervention, mean±SD	9.58±0.81	9.42±1.06	9.84±0.55	0.098
Pain intensity immediately after the second period of intervention, mean±SD	8.06±1.55	7.68±1.60	9.92±0.36	<0.001

*The results of One-way ANOVA

Table 3: Comparing the labor duration among the study groups

Variable	Group A	Group B	Group C	*P**
Labor duration (min) (first phase), mean±SD	202.78±60.93	180.66±60.68	228.11±82.31	0.014
Labor duration (min) (second phase), mean±SD	48.19±24.56	40.00±18.56	58.38±23.86	0.003
The total duration of labor, mean±SD	372.22±134.08	310.39±89.66	372.92±114.41	0.026

*The results of one-way ANOVA

Table 4: Comparing the mean scores of Childbirth Experience Questionnaire dimensions among the study groups

	Group A	Group B	Group C	*P*
Own capacity	24.17±3.40	24.37±3.96	19.03±3.27	<0.001
Professional support	18.33±2.16	18.5±2.37	17.62±2.81	0.464
Perceived safety	19.67±3.24	19.68±3.39	17.03±3.30	0.001
Participation	10.97±1.40	10.74±1.22	9.92±1.93	0.011
Birth experience	73.14±7.95	72.84±8.29	63.59±6.59	<0.001

and were as effective as each other), whereas for the labor duration, only SP6 acupressure had significant results on shortening the duration, compared to the control group; and the other intervention had no effects on this variable.

The literature review revealed no study comparing these two interventions; accordingly, we compared the results with those addressing each of these methods alone. Several studies have addressed the efficacy of acupressure on pain reduction[24] and labor pain,[23] among which SP6 is one of the most common points used.[24,42] In the present study, the mothers in group B had a lower pain intensity, shorter labor, and better childbirth experience compared with those in the control group, which showed the favorable effect of SP6 acupressure. In another study in Turkey, Türkmen and Çeber Turfan randomized 60 women to SP6 point acupressure (40–48 min in the active stage and 35–45 min in the transition stage) and touch (control group). The results of measuring labor pain by numeric rating scale (NRS) showed less labor pain in the intervention group.[30] These results are in line with the present study with the difference that they used a placebo effect in the control group, but we did not, which is related to the fact that we had two interventions whereas they had one. Also, the measurement tool in the present study for pain intensity was VAS, whereas they used NRS. Another study on 100 Turkish primigravida women, randomized to 35 times SP6 acupressure (15 times during initial contraction with cervical dilation of 2–3 cm, 10 times during cervical dilation of 5–6 cm, and 10 times at 9–10 cm dilation) vs. control (routine care), showed a significant effect of SP6 on reducing labor pain (measured by VAS score) and labor duration (both in phase one and two).[31] They reported a median VAS score of 3 in SP6 group and 4 in the control group in the latent phase and a median of 7 in SP6 group vs. 8 in the control group in the active phase. Although the general results of the study by Calik and Komurcu are in line with the results of the present study, the VAS scores seem different. This difference may be related to the stages of applying SP6 acupressure, as they have implemented the intervention at three stages, whereas we have used a bi-stage strategy. Akbarzadeh *et al.* have compared the results of SP6 acupressure in one and two stages (at 3–4 and 7–8 cm dilation) and showed that both groups reduced labor pain with a greater effect in the bi-stage group.[43] Some studies have also used uni-stage SP6 acupressure (for 30 min) and shown significant results.[27,44] Kashanian and Shahali randomized 120 nulliparous women to SP6 acupressure for 30 min during contractions and a control group (touch at the same point without massage). After 2 h, they performed a pelvic examination and compared it with the baseline values. The results showed a shorter active phase and less pain severity with less oxytocin needed in the intervention group.[44] These results are also consistent with the results of the present study, although they used a single-stage intervention. This difference can justify the shorter labor duration of the intervention group in our study (mean of 180 min vs. 252 min in their study). Nonetheless, the duration of labor in the control group of the study by Kashanian and Shahali was much longer than that in the present study (441 min vs. 228 min, respectively), which might be due to the difference in the other interventions applied as routine delivery care, between the studies. A review of 10 studies, evaluating the effect of SP6 acupressure on labor pain, reported that only three compared the results with the control group, meta-analysis of which showed 0.99 reduction of labor duration (0.91 reduction in active phase and 0.55 in the second stage), 0.56 reduction of

pain severity immediately and 0.45 reduction 30 min after intervention.[32] These results confirm the findings of the present study in aspects of labor pain and duration. They also separate the studies that compared the results with the control group, receiving routine care, such as our study, and the results showed −0.72 reduced pain and −0.95 reduced labor duration.[32] These effects are supposed to be the result of increased intensity of uterine contractions, induced by the acupressure.[45] Pressing the SP6 point promotes the flow of qi (bio-energy) and blood to the uterus and improves nourishment, resulting in pain relief and satisfaction from labor.[46] Owing to this effect and the fact that acupressure is an easy, inexpensive, and accessible method with no adverse effects, more attention should be paid to this intervention for labor management. Some have also rejected a significant effect for SP6 acupressure. In the study by Heidari *et al.*, 128 women were randomized to SP6 acupressure vs. touch, applied in one stage for 30 minutes and the results showed no significant difference between the groups.[47] This difference may be due to the expertise of the person who applies the intervention; in the present study, the researcher was completely educated and had valid certificate for the accuracy of his performance.

Another intervention used in the present study was lumbar rotation in the upright position, which was shown to reduce labor pain in both phases and improve the childbirth experience but had no effect on the duration of labor. Other studies have also shown that dancing during labor can reduce the intensity of labor pain and increase mother's satisfaction.[36,37,48] Abdollahian *et al.* described this dance as standing in the upright position with pelvic tilt and rocking the hips back and forth around a circle,[36] which resembles the movements given to group A in the present study. Nevertheless, they performed this intervention in company with the woman's partner. Thus, the results are not comparable to ours, as their results include the confounding results of the partner's psychological support and back massage on labor pain and duration. In another study, Gönenç and Dikmen investigated the effect of a 30-min labor dance with the circular movement of the pelvis and waist[37] that resembled the intervention applied in the present study, but they accompanied the dance with music and did not consider the effect of dance alone. Therefore, the results of this study are not comparable to ours, although the general conclusions are similar. Other studies have also considered free dance without specifying the movements or with different movements (such as belly dance) or pelvic rotation using a birth ball,[37,48,49] which makes them not comparable to ours, although they also have shown a positive effect for their intervention. Although different from our intervention, the mechanism of action may be the same, as these movements can distract the mother from the pain, reduce the pelvic floor contractions, and improve labor consequently. Also, the upright position helps the fetus descend into the pelvic cavity during the active phase of labor, which will not only shorten the labor duration but also reduce the ischemic pain by reducing the compression on the abdominal vessels.[48,50]

Apparently, the reduced labor pain and duration results in greater satisfaction of the mother from labor, but most of the previous studies have only evaluated labor pain and duration,[30,31,43] and the few evaluating mother's satisfaction have not used a standard tool,[46,51] such as CEQ used in the present study. The results of this study showed that both intervention groups had a higher score than the control group. Also, the intervention groups had a higher "own capacity" and "perceived safety" than the control group, and group A had higher participation. The "professional support" was not different among the groups, which is an expected finding, as this dimension, as well as the "perceived safety" dimension, is highly linked to the healthcare staff. Considering the significant role of the healthcare staff in the childbirth experience, it is important to educate the staff for better labor management. The other two dimensions of CEQ depend on mother's psychological status; therefore, mothers should receive adequate education to improve their psychometric performance.[52,53] However, we could not find any study addressing the effect of interventions aimed at alleviating labor pain and shortening its duration on CEQ dimensions to compare the results with the present study.

An issue raised in the literature for SP6 acupressure is the pain and inconvenience; comparing SP6 with other acupressure points has suggested SP6 is painful for the patients, whereas the adaptation of the pressure for each participant's threshold or measuring it by electronic weight scales can reduce this negative effect.[21] However, the results of evaluating CEQ scores of the mothers in the present study showed that women were not inconvenient because of the acupressure. It is important to note that this intervention is operator-based, and its safety and efficacy may vary based on the expertise of the operator; therefore, it is required that this intervention be performed by the hands of an expert operator.

Limitations and recommendation

The present study had the strength of evaluating two non-pharmaceutical strategies for the management of labor compared with each other and with the control group with a standard randomized trial design. However, it also had some limitations. One of the limitations was that the tools used in the present study were subjective and depended on mother's views and

estimations. Therefore, any bias in recording the data by the mothers could affect our results. Furthermore, pain is a comprehended feeling, and several factors can influence it, including toleration and the psychological state of the mother, which were out of the control of the researcher and not measured in the present study. Although we sought to reduce their effect by comparing the intervention group with a matched control group, the result of labor pain could be confounded by some factors not controlled in the present study. Women's stories and tailoring birth care to what women really care about are likely to make births much more likely. Considering that our country has different ethnic groups with different cultures and beliefs, qualitative studies in the field of birth experience are not without merit.

Conclusion

The results showed that lumbar rotation in the standing position and SP6 acupressure have a positive effect on pain intensity, duration of labor, and birth experience and can be used as simple, easy, accessible, and low-risk methods to achieve a pleasant labor experience. Further studies are required to reveal the mechanism of action of these interventions.

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Conflicts of interest

There are no conflicts of interest.

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