

## Comparison of the effects of spleen 6 acupressure and foot reflexology on the intensity of pain in the first stage of labor

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### Abstract

#### Introduction:

Childbirth is one of the most painful phenomena that women experience during the course of their life. Acupressure and reflexology are simple, inexpensive and non-invasive techniques used to relieve pain. The present study was conducted to compare the effects of SP6 acupressure and foot reflexology on the intensity of pain and the duration of the first stage of labor

#### Materials and Methods:

The present clinical trial was conducted on 106 pregnant women at the labor department of Shahid Akbar Abadi Hospital in Tehran. Considering the exclusion criteria, 92 subjects were selected, including 28 women for the SP6 acupressure group, 30 for the reflexology group and 34 for the routine care group. The three groups were similar in terms of their demographic and obstetric characteristics. Data collection tools included a demographic questionnaire, an observation checklist, examinations and the visual analogue scale. The intensity of pain was evaluated in all three groups at the beginning of the study and then before and after the first intervention (4-5 cm dilations) as well as the second intervention (7-8 cm dilations).

#### Results:

The results showed no significant differences between the three groups in the intensity of pain at the beginning of the study and before the first intervention; however, after the first intervention, that is, before and after the second intervention, the three groups showed significant differences ( $P=0.001$ ). Although the mean score of pain was lower in the acupressure group compared to the reflexology group, the Mann-Whitney test showed no significant differences between the SP6 acupressure group and the foot reflexology group after the first and second interventions. The score of the intensity of pain did not significantly increase after the intervention compared to before in the acupressure group and the reflexology group; however, in the routine care group, the intensity of pain had increased ( $P=0.001$ ).

#### Conclusion:

SP6 acupressure and foot reflexology are effective methods for reducing labor pain. These techniques appear to be good alternatives to pain relief medications.

**Keywords:** Pain, Labor, Acupressure, Reflexology

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## Introduction

Pain is an unpleasant sensory and emotional experience described associated with actual or potential tissue damage (1). Childbirth is one of the most painful phenomena in women's lives. However, there is a difference in women's understanding about labor pain which is the result of mental and behavioral processes (2). Pain is not a simple reflection of physiological process of childbirth, but is the result of complicated and subjective reactions of different physical, emotional and psychological factors affecting women's interpretation of childbirth (3). Smith et al., quoted by Melzack, have described childbirth as a big physiological and psychological challenge for women (4). Using methods of reducing pain to ease labor pain is common in most countries. In general, there are two pharmacological and non-pharmacological approaches for labor pain relief. Non-pharmacological approaches are important elements of obstetric care for pain management and are the first choice of many women because they prefer to avoid complications of pharmacological approaches. The main advantages of using non-pharmacological methods include having no effect on labor process and also no adverse effects for the mother and fetus (5). Complementary and alternative medicine methods for labor pain management are welcomed in countries with high income levels and are considered as an alternative to pharmacological procedures such as epidural anesthesia (6). The most common classification for complementary and holistic medicine include physical interventions, complementary medicine training (homeopathy and traditional Chinese medicine), manual healing methods (reflexology and massage), pharmaceutical and biological therapies and herbal medicine (4). In recent years, a strong tendency has emerged for using acupressure to manage various aspects of labor (7,8). Acupressure is the application

of pressure through the skin and is an alternative noninvasive method for traditional Chinese medicine (9). According to meridians theory (a network of energy channels throughout the body), acupressure aims to stimulate the meridians which increases qi energy (life energy). Acupressure uses pressure on certain points with fingers, hands, ankles, feet, or a special bandage to stimulate meridians and enhance life energy (10). Acupuncture points that can reduce labor pain are located on hands, feet and ears (11). SP6 or SanYinJiao is the most important acupressure point for pain relief (12) and is widely used in gynecological disorders. The point is four fingers (3 cun) above medial malleolus and the posterior border of the tibia (13). Several studies have shown the effect of SP6 acupressure on reducing pain intensity and the duration of the first stage of labor (6,7,14,15,16).

Reflexology uses thumb and index finger to apply deep pressure on specific areas of the feet that correspond to the internal organs, glands and other parts of the body (4). Reflexologists believe that pressure can affect the body and cause physiological response and improvement. There are several theories about the mechanisms of reflexology effect including the release of calcium and uric acid crystals, improved blood circulation, soothing effect on the autonomic nervous system, the effects of energy or mental mechanisms (17), a gate control theory of pain, nerve impulse theory, increased secretion of endorphins and enkephalins and thus pain management (18). Some studies show the effects of reflexology on reducing pain intensity and the duration of the first stage of labor (4,19,20). Different studies across the world suggest the effectiveness of both methods (SP6 acupressure and foot reflexology) in reducing pain intensity and the duration of the first stage of labor and that these methods are inexpensive and non-invasive. Most reflexology points correspond to the known acupuncture points (20). For

example, kidney point 1 which is often used for relaxation in acupressure corresponds to the solar plexus area in reflexology maps (21, 22.) In fact, the first kidney meridian point located on the plantar centerline just below the foot plantar is K11 point or kidney point 1 in acupressure corresponds to the solar plexus area in reflexology (20). On the other hand, in acupressure SP6 is the crossing point of the spleen, kidney and liver meridians (14). In fact, the kidney meridian is one of the three meridians in SP6 which is the same meridian in reflexology called the solar plexus area. In this study it is assumed that SP6 can be more effective in reducing pain in reflexology due to having three energy pathways compared to the solar plexus area which is the only pathway to one energy channel. Thus, the mentioned points were selected to be reviewed and this study was conducted on pregnant women to determine and compare the effects of SP6 acupressure and foot reflexology on pain intensity and the duration of the first stage of labor.

### Materials and methods

This study was a randomized controlled clinical trial conducted on 106 pregnant women giving birth to the first or second child attending the labor department of Shahid Akbar Abadi Hospital in Tehran from January 2013 to May 2014. The ethics committee of Shahid Beheshti University of Medical Sciences approved the study, other necessary permits were obtained and the study was registered at the Clinical Trial Center (IRCT 201311136807). Inclusion criteria included the following: the first or second pregnancy, Iranian, age range 18-35 years, 37-42 weeks gestational age (based on the first day of the last menstrual period or 12th week ultrasound), single pregnancy, live fetus with cephalic presentation, women in the active phase of labor, the presence of regular uterine contractions (three contractions in 10 minutes), with no

history of infertility and indication for cesarean section, no more than 12 hours of membrane rupture, low-risk pregnancy (no bleeding in the third trimester, placenta previa, placental abruption, impaired fetal growth), and a lack of chronic diseases. Exclusion criteria included: cesarean delivery for any reason (abnormal fetal heart rate, a lack of labor progression, bleeding, and consecutive contractions), mother's unwillingness to continue acupressure or foot reflexology.

Considering the exclusion criteria, using classified permutation blocking, 92 women were randomly assigned into three groups including 28 women in acupressure group, 30 women in reflexology group and 34 women in the routine care group. The instruments used were demographic, observation and examination checklists and visual analogue scale (VAS) for pain, with zero representing no pain and 10 indicating intense and unbearable pain. All interventions were conducted by a researcher after passing a training course taught by an acupuncturist.

In this study, interventions were conducted in two 30-minute phases in cervical dilatations of 4-5 and 7-8 cm in three groups.

In acupressure group, SP6, four finger widths above the medial malleolus and at the posterior tibial border, was pressed for two minutes. Then a minute rest was given (regardless of uterine contractions), so that the total duration of pressures applied was 60 minutes.

In reflexology group, the clients after receiving a gentle massage on one foot to be prepared, received reflexology in two solar plexus areas (on the sole upper and middle one third boundary where plantar curvature is formed during foot plantar flexion along with the second and third toes) and the uterus area (groove area between the medial malleolus and heel) for the same period in acupressure and on the same foot. In the routine care group, to remove the effects of psychological support caused by the presence of the

researcher, pregnant women received touch on placebo point (on the point on the surface of foot along the third and fourth toes that are not the meridians in the acupressure) for 20 minutes in addition to receiving routine care at cervical dilatations of 4-5 and 7-8 cm.

In this study, pain intensity was measured five times before each intervention, twice before interventions in cervical dilatations of 4-5 and 7-8 cm and twice after 30 minutes of intervention in both groups and touch in the routine care group. Pain intensity score was recorded by numerical rating scale of pain intensity and visual analogue scale (VAS) of pain by the mother. Data were analyzed in SPSS version 19 and one-way ANOVA was used to compare women's age and cervical Bishop score, chi-square test was used to compare parity, the amniotic sac condition, the frequency of prenatal care, participating in childbirth preparation classes and painful menstrual history, Fisher's exact test was used to compare pregnant women and their husbands' occupation, Kruskal-Wallis test was used to compare women's education level and women's difference in terms of pain intensity in three groups, Wilcoxon test

was used to compare the pain intensity at different levels in each group, the Mann-Whitney test was used for pairwise comparison of groups in terms of pain intensity and satisfaction with acupressure and reflexology methods.

### Results

Demographic characteristics of the three groups are presented in Table 1 and their obstetric characteristics are shown in Table 2. The pain severity score after the first intervention using the Kruskal-Wallis test indicated a significant difference among the three groups ( $P=0.001$ ). Mann-Whitney test was used to assess differences among the groups and showed significant differences between acupressure group and routine care group ( $P=0.000$ ) and between reflexology group and routine care group ( $P=0.006$ ), but the Mann-Whitney test indicated no significant difference between acupressure group and reflexology group.

The comparison of pain intensity score by a cervical dilatation of 7-8 cm (the second intervention) and before intervention in women showed a significant difference in three groups ( $P=0.000$ ).

Table 1: Comparison of the demographic characteristics of women participating in the three groups

Group	Acupressure	Reflexology	Routine care	P value Statistics
Age	22.71±3.7	24.73±4.7	24.94±4.7	0.11 F=2.239
Education level				0.3
Primary school	(3.6%)1	(23.3%)7	(5.9%)2	Q=2.394
Middle school	(32.1%)9	(20%)6	(26.5%)9	
High school and college	(57.1%)16	(50.1%)15	(52.9%)18	
Associate degree, bachelor's degree and higher	(7.1%)2	(6.7%)2	(14.7%)5	
Occupation				
Housekeeper				
Employed	(100%)28	(100%)30	(97.1%)33	1
Husbands' occupation	(0)0	(0)0	(2.9%)1	
Employee	(10.7%)3	(3.3%)1	(2.9%)1	
Worker	(25%)7	(40%)12	(20.6%)7	0.21
Farmer	(3.6%)1	(0)0	(0)0	
Self-employed	(60.7%)17	(56.6%)17	(76.5%)26	

Table 2: Comparison of obstetric characteristics of the three groups

Group	Acupressure	Reflexology	Routine care	P value
<b>Parity</b>				
First	(78.6%)22	(66.7%)20	(52.9%)18	P=0.106 $\chi^2 = 488.4$
Second	(21.4%)6	(33.3%)10	(47.1%)16	
<b>Cervical Bishop score</b>				
(4-0)	(3.6%)1	(13.3%)4	(14.7%)5	P=0.51 F = 0.669
(9-4)	(89.3%)25	(80%)24	(82.4%)28	
(13-9)	(7.1%)2	(6.7%)2	(2.9%)1	
<b>Amniotic sac condition</b>				
Normal	(50%)14	(53.3%)16	(41.2%)14	P=0.486 $\chi^2 = 3.450$
Raptured	(46.4%)13	(46.7%)14	(58.8%)20	
Suspicious	(3.6%)1	(0)0	(0)0	
<b>Number of prenatal care</b>				
Less than 7 times	(17.9%)5	(10%)3	(11.8%)4	P=0.67 $\chi^2 = 0.798$
7 times and more than 7 times	(82.1%)23	(90%)27	(88.2%)24	
<b>Participating in childbirth preparation classes</b>				
Yes	(0)0	(10%)3	(5.9%)2	P=0.24 $\chi^2 = 2.839$
No	(100%)28	(90%)27	(94.1%)32	
<b>Painful menstrual history</b>				
Yes	(28.6%)8	(36.7%)11	(35.3%)12	P=0.78 $\chi^2 = 1.750$
No	(35.7%)10	(33.3%)10	(23.5%)8	
To some extent	(35.7%)10	(30%)9	(41.2%)14	

Table 3: Comparison of pain intensity at baseline, before and after the first and second intervention among the three groups

Pain intensity / Group	Before intervention dilatation of 4-5 cm	After intervention dilatation of 4-5 cm	Wilcoxon test result	Before the second intervention dilatation of 7-8 cm	After the second intervention dilatation of 7-8 cm	Wilcoxon test result
	Mean and standard deviation	Mean and standard deviation		Mean and standard deviation	Mean and standard deviation	
Acupressure	5.86±2.25	6.07±2.10	Z=0.677 P-value=0.499	6.63±2.16	7.07±2.60	Z=-1.396 P-value=0.163
Reflexology	6.30±2.13	6.67±2.04	Z=-1.024 P-value=0.306	7.40±1.77	7.40±2.48	Z=0.066 P-value= 0.947
Routine care	6.79±2.21	8.03±1.73	Z=-3.186 P-value=0.001	8.64±1.36	9.33±1.02	Z=-2.470 P-value=0.014
Kruskal-Wallis test	P=0.305 Q=2.375	P=0.001 Q=14.936	————	P=0.000 Q=17.138	P=0.000 Q=21.452	————

Mann-Whitney test was used for pairwise comparison of groups and indicated a significant difference between acupressure group and routine care group (P=0.000) and between reflexology group and routine care group (P=0.004), but no significant difference was observed between acupressure group and reflexology group.

Wilcoxon signed ranks test results showed that pain intensity had no significant difference after intervention compared to before intervention in two dilatational phases of 4-5 and 7-8 cm indicating the effects of acupressure and reflexology methods, but it showed a significant increase in the routine care group in two

stages after touching the placebo point (Table 3).

With regard to satisfaction, 35.5% of participants were moderately satisfied with acupressure and 40% of women in the reflexology group were highly satisfied. Mann-Whitney test showed no statistically significant difference between the two groups in terms of satisfaction. Asking a question after childbirth about using the method again in next childbirth revealed that the two groups tended to reuse the method in their next childbirth, Mann-Whitney test did not show a significant difference between the two groups.

### Discussion

The findings of this study confirm the effects of SP6 acupressure and foot reflexology on reducing labor pain. The results of Hjelmstedt et al.'s study on the effects of pressure on the SP6 during uterine contractions are consistent with the results of this study (6). Chao et al. in their study in 2007 which aimed to evaluate the effects of TENS on the SP6 and LI4 points during the first stage on reducing labor pain showed a significant difference in pain intensity score compared to the placebo group (23), which is consistent with the results of this study in terms of identical points in acupressure in reducing pain intensity, but in this study, the acupressure point was stimulated by TENS instead of fingers. In this study, needle-like electrical stimulation was applied in acupuncture points which are the same points used in acupressure to reduce labor pain. In Valiani et al.'s study which aimed to investigate the effects of reflexology on pain intensity and childbirth outcomes, a significant difference was observed in pain intensity score between intervention group and control group before and after intervention in both stages suggesting the effect of reflexology on reducing pain intensity (20). This result is consistent with the results of this study, but there are some differences in the points used (solar plexus, abdominal and visceral areas,

pelvic region, sinuses, upper and lower limbs, spinal cord, lungs, surface of the thorax, around the legs, ovaries, uterus and fallopian tube in general reflexology, liver, spleen, kidney, pituitary gland, solar plexus and uterus in specific reflexology) and the time of intervention. Reflexologists believe that the dysfunction of organs or body systems leads to the deposition of uric acid or calcium crystals in the body, and block lymph flow through circulation and contact with foot plantar nerve endings. Massage in these areas will break down the deposited crystals so that they can be reabsorbed or eliminated. Reflection points are neuronal receptors whose stimulation can reduce psychological stress and muscle tension (22).

The exact mechanism of acupressure is still unclear. One of the proposed mechanisms is gate control theory of pain. According to this theory, the mechanoreceptors that innervate sensory nerve fibers, A-beta and A-delta fibers, are strongly dependent on pressure, an acupressure inhibits pain transmission from these receptors to the spinal cord. Acupressure can also inhibit pain inhibitory center. Thus, stimulating the acupuncture points with pressure or needles leads to activation of sensory receptors and transmission of stimulations to the spinal cord and affects through the spinal cord, the hypothalamic-pituitary axis and midbrain by secretion of endorphins and enkephalins and reduces pain (6).

Kim et al. compared the effects of SP6 acupressure and Hegu point (LI4) and their results are consistent with the results of this study suggesting a significant difference in reducing labor pain intensity in the acupressure group compared to the control group, however, no significant difference was observed in pain intensity reduction between SP6 and Hegu point groups which is similar to our result of no difference between acupressure and reflexology groups (24).

In a study which aimed to assess the views of pregnant women in terms of labor pain and using SP6 acupressure, the results showed women's increased satisfaction with pain reduction (25), which is consistent with the results of this study. In other words, women were satisfied with acupressure and reflexology and there was a tendency to reuse both methods.

### Conclusion

SP6 acupressure and foot reflexology in different dilatations will lead to the reduction of labor pain. It seems that as

these methods are inexpensive, simple and safe, they can be used as nonpharmacological methods to reduce labor pain.

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