

## Effects of SP6 Acupressure on Labor Pain and Length of Delivery Time in Women During Labor

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### ABSTRACT

**Objective:** The purpose of this study was to evaluate the effects of SP6 acupressure on labor pain and delivery time in women in labor.

**Design:** Randomized clinical trial

**Setting/location:** Delivery room in a university hospital

**Participants:** Seventy-five (75) women in labor were randomly assigned to either the SP6 acupressure ( $n = 36$ ) or SP6 touch control ( $n = 39$ ) group. The participants were matched according to parity, cervical dilation, labor stage, rupture of amniotic membrane, and husband's presence during labor. There were no additional oxytocin augmentation or administration of analgesics during the study period.

**Intervention:** The 30-minute acupressure or touch on SP6 acupoint was performed.

**Outcome measures:** Labor pain was measured four times using a structured questionnaire, a subjective labor pain scale (visual-analogue scale [VAS]): before intervention, immediately after the intervention, and 30 and 60 minutes after the intervention. Length of delivery time was calculated in two stages: from 3 cm cervical dilation to full cervical dilatation, and full cervical dilatation to the delivery.

**Results:** There were significant differences between the groups in subjective labor pain scores at all time points following the intervention: immediately after the intervention ( $p = 0.012$ ); 30 minutes after the intervention ( $p = 0.021$ ); and 60 minutes after the intervention ( $p = 0.012$ ). The total labor time (3 cm dilatation to delivery) was significantly shorter in the SP6 acupressure intervention group than in the control group ( $p = 0.006$ ).

**Conclusions:** These findings showed that SP6 acupressure was effective for decreasing labor pain and shortening the length of delivery time. SP6 acupressure can be an effective nursing management for women in labor.

### INTRODUCTION

Childbirth is one of the most joyous events in women's lives. In an effort to make childbirth a positive experience for women, there is an increasing emphasis on intrapartum pain management (Wildman et al., 1997). However, because of potential side-effects on mothers and fetuses, the use of analgesics and anesthetic agents may not be the first choice for pain management for women in labor. Rather, it

is important for nurses to use nonpharmacologic pain-relieving measures, such as touch, exercise, aromatherapy, and acupressure. Devoid of worry about even a small amount of drug reaching the fetus, such nonpharmacologic approaches may be particularly satisfactory to women in labor.

In Traditional Chinese Medicine (TCM), several techniques have been used effectively not only to facilitate labor but also to manage labor pain. The primary principle of TCM, which includes acupuncture, acupressure, and herbs,

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among others, is to balance and harmonize a person's two opposing energy entities, *yin* and *yang*, in order to maintain health. Furthermore, TCM explains that there are multiple channels of energy running through the body. These channels, sometimes called meridians, flow through the body like rivers, enhancing the blood flow, nourishing tissues, and facilitating normal bodily functions. Any obstructions in these energy flows can cause deficiencies or excesses of energy in different parts of the body, leading to various illnesses and diseases (Cook and Wilcox, 1997).

Labor pain is viewed as a consequence of imbalance between two energy entities. Thus, for a woman in labor, her labor experience may depend on how well her physical, psychological and spiritual energies are balanced and harmonized. There has been increasing interest in recent years in the clinical application of acupressure to manage various aspects of the labor (Beal, 1998, 1999; Lee et al., 2002).<sup>\*,†</sup> Acupressure is a variation of acupuncture and involves an application of constant pressure to specific acupoints of selective anatomic sites in contrast to the use of needles. Acupressure is a noninvasive technique and is believed to restore the levels of vital energy of the body, *qi*, thus harmonizing the free flow of *qi* in women in labor (Beal, 1998). Based on this belief, acupressure has been used frequently to enhance labor, manage labor pain, and shorten delivery time. Furthermore, acupressure is an appealing strategy, given that it is safe, cost effective, and easy to implement to use to manage labor pain.

Several acupoints have been used in induction of labor: BL67, SP6, LV3, LI4, BL31, BL32, GB21, and SP9. Acupressure on these acupoints is believed to stimulate the release of oxytocin from the pituitary gland, which, in turn, stimulates uterine contractions to enhance the labor process or to manage labor pain. When labor slows down and contractions become weak, acupressure of BL60, BL67, GB21, and SP6 restores the energy balance and subsequent uterine contractions (Cook and Wilcox, 1997).

In particular, the stimulation of the SP6 acupoint is found to have a strong influence on reproductive organs. Acupressure on SP6 may help to induce labor and manage various gynecological and obstetric dysfunctions (Lian et al., 2000). SP6 is located in the spleen meridian and is frequently used to resolve a host of problems, including problems of ovulation and menstruation, as well as to promote progression of labor and relieve pain during labor (Beal, 1999).

As can be seen in Figure 1, the spleen meridian (SP meridian) is one of 12 meridians that begins at the inner corner

of the big toenail, ascends through the mid-area between the sole and dorsum in front of the medial malleolus, and runs to the lower leg. From the lower leg the SP meridian runs along the posterior border of the tibia and crosses below the knee in front of the liver meridian. On the upper leg it runs across the anteromedial aspect of the inner thigh (Lian et al., 2000).

The spleen meridian is a tract that runs across the dermatomic areas of L5, L4, L2 and L1, and then upward toward T12 to T5. Because the sympathetic nerves controlling the uterus through the pelvic plexus receive the preganglionic fibers out of T5 to L4, it is highly likely that acupressure to SP meridian alters the physiologic functions of the uterus (Tsuei and Lai, 1977).

Although SP6 acupressure has been reported to significantly decrease labor pain and the length of labor in women (Beal, 1999; Jimenez, 1995; Lee et al., 2002),<sup>a,b</sup> researchers in these studies have not controlled for potential effects of confounding factors, such as emotional support from human touch or a concurrent use of uterine-contracting agents and analgesics. Therefore, the purpose of this study was to test the effects of SP6 acupressure on labor pain and duration of labor, controlling for the effects of anxiety, analgesics, and human touch in women in labor.

## MATERIALS AND METHODS

### *Recruitment of participants*

After the Institutional Review Board approved the proposal, we obtained informed consent from each study participant as procedure. Potential participants were recruited by direct announcements and poster at the outpatient department in a general hospital for pregnant women from May to September 2002. The questionnaire survey was done to select participants based on the criteria that they were more than 37 weeks of intrauterine pregnancy without any specific diagnosed disease. Once they agreed to participate in the study, they were assigned to either one of SP6 acupressure group or SP6 touch group using double-blinded method. There were 89 persons who initially agreed to participate, but only 75 completed the study. Five persons were excluded because of cesarean section, and 9 were excluded because of incomplete data or withdrawal. After the participants were thoroughly instructed in the aims and details of the study, an information sheet was provided and informed consent was obtained. Participants signed the consent form knowing that they could withdraw from the study at any time.

### *Inclusion criteria*

For inclusion in the study, pregnant women were required to be married, more than 37 weeks intrauterine pregnant, in good health, not diagnosed with any specific diseases, and planned have a vaginal delivery of a single fetus.

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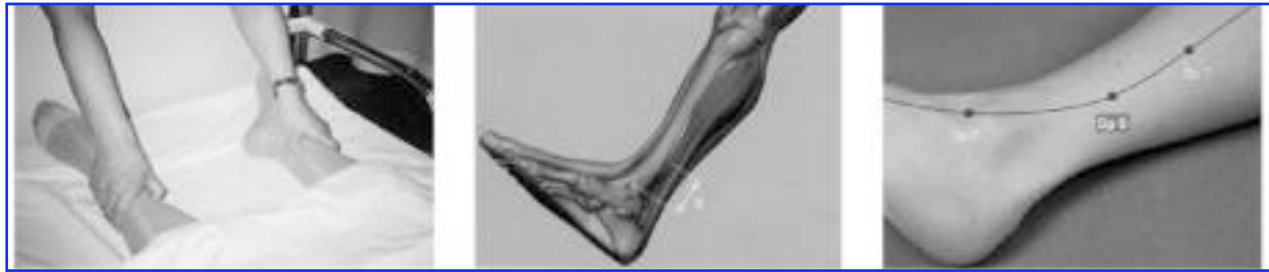


FIG. 1. SP6 acupoint.

### Exclusion criteria

Participants with a likely diagnosis of multiple fetuses, identifiable gynecologic conditions, such as inflammatory disease, uterine myoma, or precancerous lesions, and participants who were taking psychotherapeutic drugs were excluded.

### Experimental treatment assignment

At admission to the labor and delivery room with regular uterine contractions, women who agreed to participate in the study were randomly assigned to one of the two groups: SP6 acupressure (experimental group) or SP6 touch (control group). After matching for parity, cervical dilatation status, status of rupture of amniotic membrane, childbirth preparation, and husband's attendance during labor, participants were randomly assigned to either the experimental ( $n = 36$ ) or control group ( $n = 39$ ).

Study participants were blinded to the group assignment so that they were unaware of the expected effects of the two treatments. Each participant was told that either treatment could alleviate their pain.

### Interventions and measurement

**Measurements.** To control for any bias in data collection, all data were collected by nurses who were blinded to the patients' group assignment. Patients also were blinded to their group assignment during the study to control for placebo effects.

**Pain.** Subjective pain was measured using a horizontal visual analog scale (VAS) with the ratings from 0–10, the higher score indicating more pain. Pain was assessed four times: at baseline just before SP6 intervention at the time of 3-cm cervical dilatation, immediately after SP6 intervention, 30 minutes after the intervention, and 60 minutes after the intervention.

**Duration of labor to delivery.** The duration of labor to delivery was measured in two time periods from the participant's charts: from the 3-cm cervical dilatation to full cervical dilatation; and from full cervical dilatation to delivery.

The dilatation of the uterine cervix was measured by doctors.

To control for potential confounding effects on outcome measures of the study, we measured the level of maternal anxiety and maternal use of analgesics during labor. The anxiety level was measured at the time of admission prior to intervention and 30 minutes after intervention using a horizontal VAS (0–10). Higher scores indicated higher levels of anxiety. The maternal use of analgesics administered after the measurement was documented during labor. The type of delivery (cesarean section or vaginal delivery) was recorded. There was no oxytocin augmentation or patient-controlled analgesia (PCA) or analgesic use until the intervention and measurement was completed for the participants.

**Intervention.** The experimental group received SP6 acupressure, whereas the control group received touch at the SP6 acupoint. The touch group was designed as placebo group to explain if the pure SP6 acupressure effects were different from the emotional supportive effect of acupressure using human hands. For the experimental group, the research intervener stood at the feet of women in labor and applied acupressure at the SP6 acupoint to both sides during each uterine contraction during a 30-minute time period during each uterine contraction. The SP6 acupoint is located four-finger widths (patient's fingers) above the tip of the inner malleolus, just posterior to the border of tibia. That is the principle of accurate site to be measured by one's own finger's width. That measurement is based on meridian theory in which measurements are to be within one's body. The mean pressure applied was 2150 mm Hg for the right thumb and 1911 mm Hg for the left thumb during each uterine contraction. The pressure gravity of each thumb was calculated by a medical engineer who is familiar with this type of intervention. The thumb pressure was generated using the following procedure and formula. The interventionist applied the same force used in the acupressure intervention to an electronic weight scale, using one thumb at a time. The intensity of the force was read from the scale. Simultaneously, the surface area of the thumb touching the scale was measured. Then, the finger pressure was calculated using the following formula:  $P = F/A$ . Where,  $P$  (mm Hg) is the finger

pressure  $F$  (Kg) is the thumb force measured on an electronic weight scale, and  $A$  is the surface area of the thumb.

While in labor the women were encouraged to take deep breaths and relax. For the control group, the intervener provided exactly the same treatment except that thumbs were placed over the SP6 acupoints without applying pressure. Simple observers could not distinguish between the two techniques (Fig. 1).

**Intervener training.** One intervener, a nurse, had been trained in acupressure for 1½ years prior to the study by an Oriental doctor. An expert nurse determined if the intervener's thumb was placed accurately and to ensure that the pressure remained constant throughout the treatment. After initial training in both manipulative procedures, rehearsal and retraining was done three times before the main study with coresearchers and colleagues to maintain the reliability of intervention. The accuracy validation of the SP6 point finding for each subject was done using an electric acupoint detector which emits green light when the correct site is touched. The detector used is Pyun-Jac Electro Acupointer (Sung-Han & Kim, Inc., Korea) with the specifications of DC 9V, 1BAT and pulse wave, 12 mA, 1.8–12 Hz.

**SP6 acupressure procedure.** For all participants, on admission to the delivery room with confirmed uterine contractions, informed consent was obtained. Interviews were done to obtain characteristics of participants and data about pain during labor at the time of 3-cm dilatation of the cervix. As a treatment, SP6 acupressure was done for the experimental group, SP6 touch was done for the control group. For 30 minutes, the experimental group received SP6 acupressure and control group, SP6 touch for the duration of each uterine contraction, along with deep breathing and relaxation. Subjects in both groups were placed in a supine position with the legs straight during the application of SP6 acupressure or SP6 touch. Both treatments were done at the

3 Kun (approximate 4 cm; it varied by person) above the inner malleolus with each thumb placed bilaterally at the same time. Using SP6 touch as the control group was a placebo maneuver and was delivered to the exact same point of SP6. The rationale for administering the treatment for 30 minutes was based on the approximate mean time of 24 minutes of the circulating cycle of meridian energy stream in one's body (Hur, 1999) (Fig. 2).

### Analysis

Data were analyzed using the SPSS Window 10.0 program (SPSS Inc., Chicago, IL). Independent-sample  $t$  test or  $\chi^2$  test was used to compare the SP6 acupressure and SP6 touch groups in the different domains of the questionnaire. The pretreatment and post-treatment VAS and length of labor were compared between two groups using analysis of covariance (ANCOVA) or independent-sample  $t$  test.

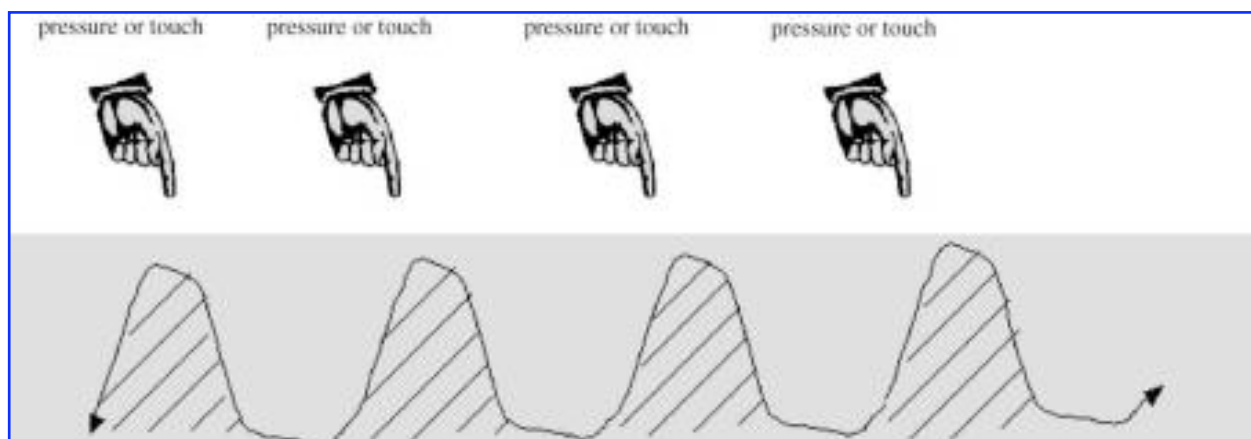
## RESULTS

### Characteristics of participants

Table 1 shows the demographic characteristics of the 75 women who completed the study. There were no significant differences between the two groups on the variables of parity, maternal age, gestational age, childbirth preparation, and husband's attendance during labor (Table 1).

### Anxiety level and use of analgesics

The anxiety levels did not differ between the two groups prior to the intervention. However, the anxiety levels were significantly lower in the SP6 acupressure group than in the SP6 touch group following the intervention ( $t = -2.214$ ,  $p = 0.030$ ). While the anxiety levels remained with minimal increase in the SP6 acupressure group (4.5 to 4.9), the



**FIG. 2.** SP6 acupressure or touch during each uterine contraction cycle. Note: Experimental group received SP6 acupressure and control group received SP6 touch.



TABLE 1. COMPARISON OF DEMOGRAPHICS BETWEEN GROUPS OF SP6 ACUPRESSURE AND SP6 TOUCH

Demographics	SP6 acupressure group (n = 36)	SP6 touch group (n = 39)	t or $\chi^2$	p
Parity				
Nulliparous	26 (72.2%)	31 (79.5%)	0.542	0.462
Multiparous	10 (27.8%)	8 (20.5%)		
Age (year)	29.5 $\pm$ 3.2	29.1 $\pm$ 3.6	0.465	0.643
Gestational age (wk)	39.6 $\pm$ 1.2	39.7 $\pm$ 1.2	-0.236	0.814
Childbirth preparation				
Yes	21 (58.3%)	19 (48.7%)	0.695	0.404
No	15 (41.7%)	20 (51.3%)		
Husband's attendance during labor				
Yes	20 (55.6%)	22 (56.4%)	0.006	0.941
No	16 (44.4%)	17 (43.6%)		

Data are presented as mean  $\pm$  standard deviation or n (%).

anxiety levels were increased considerably by 1.8 (4.5 to 6.3) from preintervention to postintervention time point in the SP6 touch control group. The SP6 acupressure for 30 minutes would be a moderately helpful intervention. There were no significant group differences between the two groups on the use of analgesics during labor ( $\chi^2 = 1.616$ ,  $p = 0.204$ ). Although there were no statistical differences between the groups on the use of analgesics, the proportion of women using analgesics was lower in the SP6 acupressure group (Table 2).

### Subjective labor pain

There were no significant differences between groups in the report of subjective labor pain at baseline ( $t = 0.282$ ,  $p = 0.313$ ). However, there were significant differences between the groups in subjective pain scores at all time points following the intervention: immediately after the intervention ( $F = 6.646$ ,  $p = 0.012$ ); 30 minutes after the intervention ( $F = 5.657$ ,  $p = 0.021$ ); and 60 minutes after the intervention ( $F = 6.783$ ,  $p = 0.012$ ). As can be seen in Table 3, the intervention group reported significantly lower subjective pain scores at all three time points following the intervention.

### Duration of labor to the delivery of a fetus

The duration of labor was measured from the time of 3-cm cervical dilatation to full dilatation and from full cervical dilatation to delivery. There was a significant difference between the groups in the duration of labor. The acupressure group had a significantly shorter duration from the time of 3-cm cervical dilatation to full dilatation than did the control group ( $t = -2.689$ ,  $p = 0.009$ ). However, the duration from full cervical dilatation to delivery of the fetus (second stage labor) did not differ significantly between the two groups ( $t = -1.780$ ,  $p = 0.082$ ). The total labor time (3-cm dilatation to fetus delivery) was significantly shorter in the SP6 acupressure intervention group than in the control group ( $t = -2.864$ ,  $p = 0.006$ ).

Findings showed that women in the SP6 acupressure group had a significantly shorter duration of the first stage of labor (from 3-cm cervical dilatation to full dilatation) and total labor time than did women in the SP6 touch group, although the duration of the second stage of labor (from full dilatation to delivery) did not differ between the two groups. Furthermore, use of SP6 acupressure for women in labor did not seem to have deleterious effects on women in labor (Table 4).

TABLE 2. DIFFERENCES IN ANXIETY LEVEL AND USE OF ANALGESICS BETWEEN THE TWO GROUPS

Items	SP6 acupressure group (n = 36)	SP6 touch group (n = 39)	t or $\chi^2$	p
Anxiety level				
Pretreatment	4.5 $\pm$ 2.3	4.5 $\pm$ 2.1	-0.002	0.999
Post-treatment	4.9 $\pm$ 2.3	6.3 $\pm$ 2.6	-2.214	0.030
Use of analgesics				
Yes	5 (13.9%)	10 (25.6%)	1.616	0.204
No	31 (86.1%)	29 (74.4%)		

Data are presented as mean  $\pm$  standard deviation or n (%).

Anxiety level range, 0-10, indicating the higher score, the higher anxiety.

TABLE 3. DIFFERENCES IN SCORES OF LABOR PAIN BETWEEN GROUPS OF SP6 ACUPRESSURE AND SP6 TOUCH

Criteria	SP6 acupressure group (n = 36)	SP6 touch group (n = 39)	ANCOVA F	p
Pretreatment	5.8 ± 1.8	6.3 ± 2.3		
Post-treatment	6.4 ± 1.8	7.6 ± 1.9	6.646	0.012
After 30 minute	7.0 ± 1.8	8.3 ± 1.8	5.657	0.021
After 60 minute	7.7 ± 1.5	8.9 ± 1.7	6.783	0.012

Data are presented as mean ± standard deviation of the difference in subjective labor pain scores. Subjective pain score range, 0–10, the higher score indicating the higher level of pain. ANCOVA, analysis of covariance.

## DISCUSSION

This study was conducted to examine the lasting effects of SP6 acupressure on labor pain and duration of labor for 60 minutes after the intervention. The results indicate that compared to SP6 touch, SP6 acupressure is an effective means of controlling labor pain and shortening the duration of labor in women. These results are similar to the reports by Lee<sup>b</sup> and Kim<sup>a</sup>, in which SP6 acupressure was found to significantly relieve labor pain. There is a paucity of studies in which acupressure is used to examine its effects on labor pain or length of labor. Zeisler et al. (1998) and Tempfer et al. (1998) reported that acupuncture also shortened the duration of the first stage of labor. Zeisler et al. (1998) suggested that acupuncture treatment could be recommended as a form of childbirth preparation because of its positive affect on the duration of labor, namely by shortening the first stage of labor. Tempfer et al. (1998) reported on a matched-pair study of the effects of prenatal acupuncture on length of labor and maternal blood levels of interleukin-s, prostaglandin F2- $\alpha$ , and  $\beta$ -endorphins, substances known to be involved in the process of cervical ripening and dilation.

With respect to pain control, Ternov et al. (1998) reported that 58% of women in the acupuncture group, compared to 14% of women in the control group, did not require anesthesia during labor. Jin et al. (1996) also reported that acupuncture induced some relief from labor pain in 97.5% of women without causing any neonatal complications. However, when Yanai et al. (1987) used electroacupuncture, the magnitude of benefits seemed to be somewhat lower. Among patients who received electroacupuncture to LI 4 and an auricular point, only 56% of patients reported mild to good pain relief. Furthermore, Hyodo et al. (1977) re-

ported that the percentage of women experienced pain relief differed between primiparous and multiparous women, suggesting differential pain relief based on parity. While 62.5% of primiparous women reported a relief from labor pain, 93.8% of multiparous women reported a relief from labor pain with electroacupuncture. Umeh (1986) reported on the use of sacral acupuncture: 19 of 30 women (63%) experienced adequate pain relief, and 20% of the total sample had received complete pain relief while 36.7% of the sample needed for further medication and received Demerol (Sanofi, Malvern, PA).

Tempfer et al. (1998) reported that weekly acupuncture treatments to GV20, HT7, and P6 during the 35th to 39th week of gestation had beneficial effects on the duration of labor by shortening the first stage of labor. They believed that acupuncture would have induced a more rapid maturing of the cervix prior to onset of true labor. In contrast, Lyrenas et al. (1987) found no beneficial effect on the maturation of the cervix. Repeated acupuncture treatments during the months prior to parturition were not effective in shortening the length of labor in 56 primiparous women. Furthermore, Wallis et al. (1974) reported that acupuncture to 17 acupoints relieved labor pain only in 2 of a total of 23 women. Therefore, it appears that multiple acupuncture treatments or acupuncture in multiple acupoints may not necessarily improve the outcomes of labor-related measures. Even though there is a tendency of pain relief or shortening length of labor, those were results from acupuncture and multiple stimulation.

In the previous studies, researchers used acupuncture rather than acupressure, furthermore, acupuncture was performed at multiple acupoints, whereas in this study, acupressure was directed at a single acupoint, such as SP6.

TABLE 4. DIFFERENCES OF LENGTH OF LABOR BETWEEN GROUPS OF SP6 ACUPRESSURE AND SP6 TOUCH (MINUTE)

Criteria	SP6 acupressure group (n = 36)	SP6 touch group (n = 39)	t	p
3 cm-full dilatation	108.3 ± 52.1	146.3 ± 60.7	-2.689	0.009
Full dilatation-fetus delivery	30.3 ± 22.6	44.8 ± 40.0	-1.780	0.082
3 cm dilatation-fetus delivery	138.6 ± 62.0	191.2 ± 83.7	-2.864	0.006

Data are presented as mean ± standard deviation of the difference in delivery time.

In a few studies in which acupressure was used, Kim<sup>a</sup> reported less labor pain in the SP6 acupressure group than the control group. The SP6 acupressure was applied for a total of 35 times during uterine contraction, actually, 15 times of SP6 acupressure was applied at 2–3 cm of cervical dilatation and each 10 times of SP6 acupressure at 5–6 cm and 9–10 cm of cervical dilatation. Consistent with Kim's report,<sup>a</sup> we also found that SP6 acupressure was effective in controlling labor pain. We found that the analgesic effects of acupressure on labor pain lasted for at least 60 minutes in the SP6 acupressure group in our study. It is unlikely that this is a placebo effect, because subjects in the control group who only received SP6 touch did not have a greater reduction in pain. Similarly, by using a double-blinded design, we also controlled for potential bias in data collection.

The precise mechanisms by which SP6 acupressure induces a relief in pain during labor are not clear. It is possible that a relief from labor pain is mediated by the lowered anxiety level. That was found to be significantly lower in the SP6 acupressure group than in the SP6 touch group after the intervention. Although we did not assess the levels of neurohormones associated with the lowered levels of anxiety, SP6 acupressure might have stimulated a release of endogenous opioids, which then mediated the relief from labor pain (Sher, 1996). Acupuncture has been used in some British maternity units for analgesia in labor approximately 10 years ago (Beal, 1999).

Findings of this study clearly indicate that 30 minutes of SP6 acupressure is an effective complementary means for inducing a relief from pain during labor and a shortening of the duration of first stage labor without undue harm to the mother. SP6 acupressure can be readily implemented in clinical situations. It was shown to be an effective measure and could be used in clinical practice in order to improve the quality of care in labor and delivery.

Further investigations are necessary to replicate the beneficial findings of SP6 acupressure in a larger population and to better elucidate physiologic mechanisms underlying pain relief and the shortening of the duration of labor. Future studies should obtain objective data about pain.

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