Effects of acupuncture on labor pain in primipara mothers

To cite this article: D Permatasari et al 2018 J. Phys.: Conf. Ser. 1073 062035

View the article online for updates and enhancements.
Effects of acupuncture on labor pain in primipara mothers

D Permatasari, C Simadibrata* and S L Adiningsih

Department of Medical Acupuncture, Faculty of Medicine, Universitas Indonesia, Jakarta, 10430, Indonesia

*E-mail: christina.simadibrata@yahoo.com

Abstract. Pain is usually regarded as a pathological phenomenon, and during labor, prolonged intense pain can negatively impact both the mother and baby. Acupuncture is a potential pain relief method suitable during childbirth. This study aimed to evaluate the effects of acupuncture therapy on reducing pain during normal labor in primipara mothers. A randomized, single-blind, clinical trial was performed on 50 pregnant women. Twenty-five women were assigned to the acupuncture treatment group and 25 women to the control group. All women received the same care related to labor and delivery. The treatment group received acupuncture therapy at the time of phase I labor or when pain started to interrupt, whereas the control group did not. The numeric analog scale (NAS) score, amount of labor pain, duration and intensity of uterine contractions, and duration of phase II of delivery were calculated for each woman. After delivery, APGAR scores were recorded for the babies. Acupuncture significantly reduced pain associated with labor (p < 0.05). Acupuncture therapy is effective for reducing labor pain, strengthening uterine contractions, and speeding up phase II of delivery. Acupuncture had no side effects on mothers or babies.

1. Introduction
Pain is an integral process during labor and delivery that culminates from physiological and psychological factors. The pain level depends on the intensity and duration of uterine contractions, rate of cervical dilation, and perineal tearing. According to a study, the highest intensity of labor pain occurs in phase II. The stress of labor pain increases the release of maternal catecholamines, which decrease uterine blood flow. Increases in adrenaline and cortisol levels would cause a decrease in uterus activity, and contractions would be uncoordinated, making labor and delivery longer and increasing the risk of an irregular fetal heartbeat [1,2].

A 1986 questionnaire carried out in Jakarta [3] found that 67.92% of women expected labor without pain. In this survey, 95.83% of obstetricians and gynecologists provided medication for labor pain, including intrathecal labor analgesia with fentanyl or morphine. The combination of morphine, bupivacaine, and clonidine eliminated labor pain in 66% of spontaneous labor cases, but 28% of the cases had to undergo vacuum extraction and 6% had to undergo surgery. All babies in this study had APGAR scores of 7–10. In a previous study, the majority of mothers (52%) reported no complications after given medication for labor pain, whereas 34% reported nausea, 6% reported shivering, and 8% reported pruritus [4].

Acupuncture may be useful in giving birth without pain, because it has been shown to trigger labor and reduce the duration of labor and placenta release as well as to prevent excessive bleeding [5]. Analgesic
acupuncture is based on alleviating pain and controlling the physiological functions of the human body by inserting needles. It can reduce physiological disorders and promote healing and subjective collaboration with patients during labor. Analgesic acupuncture can also increase pain threshold and endurance [6]. Some studies have reported on women who have previously given birth; however, primipara mothers have been reported to experience the most intense labor pain, which may be associated to a longer phase II and anxiety.

2. Methods
This study was a single-blind, randomized clinical trial of women who gave birth at Maternity Clinic of Tebet Community Health Center, Jakarta. The inclusion criteria were as follows: > 37 weeks of pregnancy; primipara mothers expected to have normal labor; head presentation; numeric analog scale (NAS) score > 4; cervical dilation ≥ 4; aged 18–38 years; willing to provide informed consent; and not taking any medications to reduce labor pain, counted from the start of the labor. The exclusion criteria were as follows: uterus disorder; cephalopelvic disproportion; placenta previa, oligo or hydromania; twin pregnancy; fetus with hydrocephalus or known congenital disorders; hypertension (blood pressure > 150/100 mmHg); preeclampsia; diabetes mellitus (peripheral blood glucose >200 mg/dL at any time); known heart disturbance during pregnancy; peripartum cardiomyopathy; fever (temperature >38°C); and contraindications to acupuncture. Patients were excluded if they received any other pain-reducing treatments (pharmacological) other than acupuncture during the study.

The pregnant women were randomly assigned to the 2 groups: treatment and control. Details of the study were explained and informed consent was obtained from all women. Pain assessment using NAS was explained. Blood pressure, heart rate, random blood glucose level, and temperature were examined for each patient. Gynecological assessment was performed by a midwife. NAS assessment was performed before the acupuncture therapy started.

2.1. Treatment and control procedures
Patients in the treatment group reported their pain using NAS while positioned in bed. Significant pain was reported when they reached cervical dilation of >4 cm. The acupuncture sites were sterilized with antiseptic, and the needles measuring 0.30 × 40 mm were inserted. Needles were inserted at 4 points: Nei Ma–Wai Ma (Ex point), bilateral Ci Liao (BL 32) area, Shang Liao (BL 31), and ShenMen (ear acupoint 55). Acupuncture was performed for 20 min using a high-frequency stimulator, Dense Disperse wave, and Transcutaneous Electro Stimulator at an amplitude intensity tolerable to patients. Pain was assessed using NAS at 15 min, 30 min, and 1 h. The number and duration of uterine contractions and phase II duration were also noted. Patients in the control group also reported their pain using NAS, but did not receive any treatment for pain for 20 minutes. The NAS scores were then evaluated at 15 min, 30 min, and 1 h. The number and duration of uterine contractions and phase II duration were also noted.

2.2. Acupuncture points used
Nei Ma–Wai Ma
Location: Nei Ma is located in the middle of the internal malleolus and depression of the knee joint (Yin Lin Quan point), and Wai Ma is 8 inch above the external malleolus at the ST 38 (Tiao Kou) point.
Vascularization: A.V. tibialis superior and V. saphenous.
Innervation: N. cutaneous sural lateralis, N. cutaneous crus media, N. tibialis.
Shangliao (BL 31)
Location: Sacrum area, between os. iliaca post.sup and middle post. 1 inch post. for sacralis.
Vascularization: A.V. sacral lateralis posterior branch.
Innervation: N. first sacral posterior plexus.
Ciliao (BL 32)
Location: sacrum area, os illiaca post. sup. in the middle of the medial inf. second foramen sacral.
Vascularization: A.V. sacral lateralis posterior branch.
Innervation: N. second sacral posterior plexus.

Shen Men (auricular point 55)
Location: top of the ear fossa triangular.
Innervation: 3 cranial nerves innervating the ears: N. vagus auricularis plexus, N. auricularis magnus (posterior part and earlobe), N. trigeminal (biggest in the outer ear).

2.3. NAS pain scores
Patients reported their pain using NAS, as shown below. Zero (0) represented no pain, and scores to the right indicated worsening pain up to a maximum of “10,” which represented the worst pain.

|        |        |        |
|--------|--------|--------|
| 0      | 10     |        |
| No pain|        | Worst pain |

NAS scoring:
0–4: mild, > 4–7: moderate, > 7–10: severe

2.4. Analysis
Acupuncture was deemed effective if there was a significant difference between the controls and patients who received acupuncture.

Criteria for considering the acupuncture successful:
1. Good: if NAS score decreases
2. Moderate: if NAS score remains unchanged (did not increase or decrease)
3. Fail: if NAS score increases

\[
\text{Number of cases (Good or moderate)} \times 100\% = \text{percentage of successful rate}
\]

3. Results
This study was performed with 50 women who had entered the active phase I of labor, i.e., cervical dilation >4 and NAS score >4. Patient characteristics are presented in Table 1. The treatment and control groups did not significantly differ in terms of age or profession but differed in terms of education (p = 0.046).

The average initial NAS score in the treatment group was 8.200 with a standard deviation of 0.763, and in the control group, it was 7.840 with a standard deviation of 0.624. These values were not significantly different (t-test, p = 0.074) as seen in Table 2.

| Table 1. Patients’ characteristics. |
|-------------------------------------|
|                                  | Treatment | Control | Total | p-value |
| Age (years)                      | N         | %       | n     | %       | N       | %       |
|                                  |           |         |       |         |         |         |
### Table 2. Average NAS scores before acupuncture.

| Group    | Treatment (n = 25) | Control (n = 25) | p-value |
|----------|--------------------|------------------|---------|
|          | Mean   | SD    | Mean   | SD    |         |
| Initial NAS | 8.200  | 0.763 | 7.840  | 0.624 | 0.074   |

### Table 3. Comparison of NAS scores before and after acupuncture.

| Group    | Treatment (n = 25) | Control (n = 25) | p-value |
|----------|--------------------|------------------|---------|
|          | Mean   | SD    | Mean   | SD    |         |
| Initial NAS | 8.200  | 0.763 | 7.840  | 0.624 | 0.074   |
| 2nd NAS   | 7.080  | 0.909 | 8.280  | 0.678 | 0.000   |
| 3rd NAS   | 7.080  | 0.909 | 8.840  | 0.624 | 0.000   |
| 4th NAS   | 7.680  | 0.900 | 9.600  | 0.577 | 0.000   |

2nd NAS: after 15 min, 3rd NAS: after 30 min, 4th NAS: after 1 h

Fifteen minutes after acupuncture (2nd NAS), the mean NAS score was 7.080 in the treatment group and 8.280 in the control group. After 30 min (3rd NAS), the NAS score was stable at 7.080 in the treatment group and had increased to 8.840 in the control group. After 1 h (4th NAS), the NAS score was 7.680 in the treatment group and had further increased to 9.600 in the control group. A t-test indicated that the differences between the treatment and control groups were significant at all 3 time points (p < 0.05), as shown in Table 3.

### Table 4. Comparison of number of uterine contractions before and after acupuncture.

| Group    | Treatment (n = 25) | Control (n = 25) | p-value |
|----------|--------------------|------------------|---------|
|          | Mean   | SD    | Mean   | SD    |         |

Fifteen minutes after acupuncture (2nd NAS), the mean NAS score was 7.080 in the treatment group and 8.280 in the control group. After 30 min (3rd NAS), the NAS score was stable at 7.080 in the treatment group and had increased to 8.840 in the control group. After 1 h (4th NAS), the NAS score was 7.680 in the treatment group and had further increased to 9.600 in the control group. A t-test indicated that the differences between the treatment and control groups were significant at all 3 time points (p < 0.05), as shown in Table 3.
The 2nd Physics and Technologies in Medicine and Dentistry Symposium

IOP Conf. Series: Journal of Physics: Conf. Series 1073 (2018) 062035
doi:10.1088/1742-6596/1073/6/062035

Initial uterine contraction 3.120 0.525 3.160 0.374 0.758
2nd uterine contraction 3.400 0.577 3.240 0.4358 0.274
3rd uterine contraction 3.640 0.637 3.280 0.458 0.026
4th uterine contraction 3.960 0.538 3.480 0.509 0.002

2nd uterine contraction: 15 min after, 3rd uterine contraction: 30 min after, 4th uterine contraction: 1 h after acupuncture therapy

Before treatment, the 2 groups had similar rates of uterine contractions, as shown in Table 4. Fifteen minutes after acupuncture (2nd uterine contraction), the average number of uterine contractions had increased to 3.400 in the treatment group and 3.240 in the control group. After 30 min (3rd uterine contraction), the rate had increased to 3.640 in the treatment group but was relatively stable at 3.280 in the control group. After 1 h (4th uterine contraction), the rate had increased to 3.960 in the treatment group and 3.480 in the control group (p < 0.05).

Table 5. Comparison of duration of uterine contractions (in s) before and after acupuncture.

| Group         | Treatment (n = 25) | Control (n = 25) | p-value |
|---------------|-------------------|-----------------|---------|
|               | Mean       | SD             | Mean    | SD          |         |
| 1st duration  | 32.800     | 4.102          | 30.200  | 3.947       | 0.027   |
| 2nd duration  | 35.400     | 3.511          | 33.000  | 3.227       | 0.015   |
| 3rd duration  | 37.800     | 4.349          | 34.200  | 3.730       | 0.003   |
| 4th duration  | 39.600     | 3.796          | 35.600  | 3.628       | 0.000   |

The duration of uterine contractions was also measured every 10 min in each group. As shown in Table 5, the treatment group experienced significantly longer uterine contractions at all 4 time points (p < 0.05).

Table 6. Duration of phase II (in min).

| Group | Treatment (n = 30) | Control (n = 30) | p-value |
|-------|-------------------|-----------------|---------|
|       | Mean       | SD             | Mean    | SD          |         |
| Phase II | 27.240     | 9.042          | 65.400  | 7.205       | 0.000   |

Phase II of labor lasted for an average of 27.240 min in the treatment group and 65.400 min in the control group, as shown in Table 6. The difference in phase II duration between the 2 groups was statistically significant (t-test, p < 0.05).

Table 7. APGAR scores immediately after birth and at phase II.

| APGAR | Treatment (n = 25) | Control (n = 25) | p-value |
|-------|-------------------|-----------------|---------|
|       | Mean       | SD             | Mean    | SD          |         |
| Newborn | 8.920     | 0.2768         | 9.000   | 0.000       | 0.155   |
| II     | 9.920     | 0.276          | 10.000  | 0.000       | 0.155   |

APGAR scores for the babies were recorded immediately after birth and at II. As shown in Table 7, the initial APGAR score was 8.920 in the treatment group and 9.000 in the control group. The APGAR scores at II were 9.920 in the treatment group and 10.000 in the control group. APGAR scores did not differ significantly between the 2 groups at either time point.
Table 8. Success rate 15 min after acupuncture.

| Success rate | Group | Treatment | % | Control | % |
|--------------|-------|-----------|---|---------|---|
| Good         |       | 22        | 88| -       | - |
| Moderate     |       | 3         | 12| 14      | 56|
| Fail         |       | -         | - | 11      | 44|
| Total        |       | 25        | 100| 25      | 100|

As shown in Table 8, the results in the treatment group after 15 min were 88% good and 22% moderate. In the control group, the results were 56% moderate and 44% fail. The difference was statistically significant (chi-square test, p < 0.05).

Table 9. Success rate 30 min after acupuncture or no treatment.

| Success rate | Group | Treatment | % | Control | % |
|--------------|-------|-----------|---|---------|---|
| Good         |       | 23        | 92| -       | - |
| Moderate     |       | 2         | 8 | 2       | 8 |
| Fail         |       | -         | - | 23      | 92|
| Total        |       | 25        | 100| 25      | 100|

As shown in Table 9, after 30 min the results in the treatment group were 92% good and 8% moderate. In the control group, the results were 8% moderate and 92% fail. The difference was statistically significant (chi-square test, p < 0.000).

Table 10. Success rate 1 h after acupuncture.

| Success rate | Group | Treatment | % | Control | % |
|--------------|-------|-----------|---|---------|---|
| Good         |       | 17        | 68| -       | - |
| Moderate     |       | 4         | 16| 1       | 4 |
| Fail         |       | 4         | 16| 24      | 96|
| Total        |       | 25        | 100| 25      | 100|

As shown in Table 10, after 1 h, the results in the treatment group were 68% good, 16% moderate, and 16% fail. In the control group, the results were 4% moderate and 96% fail. The difference was statistically significant (chi-square test, p < 0.000).
Figure 1. NAS scores before and after acupuncture.

Figure 1 shows that acupuncture decreased pain scores from 8.2 (before) to 7 after 15 min, whereas pain scores increased from 7.8 to 8.2 in the control group. After 30 min, the pain score in the treatment group was stable at 7.8; in the control group, it increased from 8.28 to 8.48. At 1 h, NAS scores in the treatment group increased from 7.08 to 7.68, whereas in the control group, the scores increased from 8.48 to 9.6.

Figure 2. Number of uterine contractions before and after acupuncture.

As shown in Figure 2, the treatment group had significantly more uterine contractions at 60 min than the control group, specifically 3.960 in the treatment group and 3.480 in the control group.
There was a rapid increase in the uterine contraction intensity in the treatment group compared with the control group, especially at 60 min.

4. Discussion
In the current study, the success rate of acupuncture for treating labor pain varied and reached 92% depending on the contraction duration. These rates were somewhat higher than those reported in previous studies, Ternov and Neishem et al. reported success rate of 78% and 86.41%, respectively [5,7,8]. While Romnero et al. reported a slightly higher success rate, which was 95.6% [9]. In addition to successfully reducing pain, our results demonstrated that acupuncture significantly increased both the number and duration of uterine contractions during labor. This resulted in a significantly shorter duration of phase II of labor in the treatment group than in the control group. This suggested that acupuncture therapy can support uterine contractions to ease labor and increase comfort.

Additionally, the APGAR scores did not significantly differ between the treatment and control groups, suggesting that acupuncture has no negative effects on babies. This finding indicated that acupuncture may be a safer option for managing labor pain than pharmacological approaches. In this study, the acupuncture points used because Shen Men point (Shen Men Auricular point 55) was evidence-based reduced stress and played role as relaxation process. Shang Liao point (BL 31) and Ci Liao (BL 32) dermatomal innervated by L IV-V and SI-III segments were evidence-based stimulated sympathetic and improved blood flow to the uterus. Nei Ma-Wai Ma (Ex point) is an empiric or special point for labor pain that dermatomal innervated by LIII-SII segments.

5. Conclusion
Acupuncture therapy was effective for reducing labor pain. It strengthened uterine contractions, sped up phase II, and had no side effects on the mother or baby.
References

[1] Mander R 1998 *Pain in childbearing and its control* (Oxford: Blackwell Science Limited) p 74–97

[2] Sarwono P 2000 *Ilmu kebidanan* (Jakarta: Yayasan Bina Pustaka. Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Indonesia.) p 168–169

[3] Muhardi, Sembalangi H and Iskandar S 1986 *Perkembangan persalinan tanpa nyeri di Jakarta* (Jakarta: Balai Penerbit, Faculty of Medicine, Universitas Indonesia)

[4] Susilo 2000 Intrathecal labour analgesia (ILA) menggunakan kombinasi morfin+buficain+klonidin *Anesthesiologi Indonesia* 1 2

[5] Roemer A T 2011 Medical acupuncture in pregnancy *Thieme* 192 100–102

[6] Indonesia Pain Society National Scientific Meeting. Proceeding book. 2007.

[7] Ternov NK, Buchhave P, Svensson G and Akeson J 1998 Accupuncture During Childbirth Use of Confessional Analgesia Without Major Effect : A Retrospective Study. *Am J Acupunct.* 26(4) 233–9

[8] Neisheim BI, Kinge R and Berg B, et al. 2003 Acupuncture during labor can reduce the use of meperidine; A controlled clinical study *Clin J Pain* 19 187–191

[9] Romnero A, Hanson U and Kihlgren M. 2002 Acupuncture Treatment During Labour a randomized Controlled Trial *Int J of Abst gyn* 637–644.