

# Effect of Ice Cold Massage and Acupressure on Labor Pain and Labor Duration: A Randomized Controlled Trial

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## Abstract

**Background:** Labor is one of the most painful experiences to women throughout life. This study aimed to compare the effect of ice cold massage and acupressure on reducing labor pain intensity and labor duration in primigravida women.

**Methods:** Design: Randomized controlled trial. Setting: This study was conducted at labor and delivery unit, maternity university hospital, Cairo University, Egypt. Sample: Three hundred laboring women were recruited randomly and allocated to the study and the control groups (ice massage group; acupressure group; and control group. Each group consisted of 100 women. Intervention was exerted in cervical dilatation of 3-4 cm on LI-4 acupoint and intervention period lasted for 20 minutes. Labor pain in the three groups was assessed by VAS and partograph. Labor pain intensity and labor duration were compared in the three groups.

**Results:** There was a significant decrease in pain intensity immediately and 30 minutes after intervention in ice massage and acupressure groups in comparison to the control group ( $P \leq 0/003$ ;  $p \leq 0/002$ ). Moreover the length of first and second stage of labor was significantly reduced ( $P \leq 0/003$ ;  $P \leq 0/04$ ) in comparison with the control group.

**Conclusion:** Both ice massage and acupressure reduced labor pain intensity and duration of labor in primigravida women, and the ice massage appeared to be more effective in pain reduction.

**Keywords:** Pain; Labor; Ice Massage; Acupressure

## Background

Labor is one of the most painful experiences to women throughout life (Kaviani et al., 2012). Severe labor pain has been implicated in contributing to long term emotional stress with potential adverse consequences on maternal mental health and family relationship (Charlton, 2005). A woman's dissatisfaction with the experience of labor and birth may affect her emotional well-being and willingness to have another baby (Waldenström, et al., 2004). Primiparous women tend to undergo more labor pain than multiparous women, and provision of pain relief is considerable significance (Rouhe et al., 2009). Therefore, it seems essential to obtain remedies for labor pain relief, especially in regard to non-invasive methods. Most women use nonpharmacologic approaches to manage labor pain, with or without pharmacologic approaches (Kozhimannil et al., 2013). The nonpharmacologic pain management approach includes a wide variety of techniques that address not only the physical sensations of pain, but also attempt to prevent suffering by enhancing the psycho-emotional and spiritual components of care. In this approach, pain is perceived as a normal accompaniment of most labors (Leifer, 2005). In addition, these methods are non-invasive, minimize complications for woman and fetus, provide support and enhance the cooperation among women and their health care providers (Charlton, 2005).

Acupressure is an example of a non-pharmacological method, which is a traditional Chinese medicine where acupuncture points are stimulated by hands, fingers, thumbs, or small beads (Heidari, et al., 2008) This method acts according to the gate control theory where burning, massaging, and scratching can stimulate the large fibers responsible for transmitting nerve impulses to the spinal cord. This stimulation closed the gates of pain transmission, which lead to pain reduction (Lee, Chang & Kang, 2004). On the other hand Borup et al., (2009) indicated that, the stimulation of acupressure points using heat, needles, or pressure causes the release of endorphins

A number of studies have evaluated the effects of non-pharmacological methods such as acupressure and/or ice massage to reduce labor pain. Some studies have suggested that ice message on the Hegu point on the

hand can reduce labor pain (Abbasi et al., 2009; Enjezab et al., 2008; Simkin & Bolding, 2004; Water & Raisler, 2003). According to traditional Chinese medicine, stimulating the LI4 will reduce labor pain and strengthen uterine contractions (Cho, 2010; Chao, Chao & Wang 2007). Moreover, Williams & Mitchell (2007) suggested that the process of labor could turn into a pleasant and enjoyable event through using modern and supportive pain reduction techniques such as massage.

A study done by Dehcheshmeh, et al., (2009) to determine the effect of Hoku point ice massage on pain intensity in primiparous women during labor found that, the severity of the pain in the ice massage group was significantly less than the control group in post intervention ( $P < 0.001$ ). Also mean duration of active phase in ice massage group was significantly less than the control group ( $P < 0.05$ ). Moreover, a meta-analysis of two randomized trials of acupressure for pain management in labor found that pain intensity was significantly reduced in the acupressure group compared with a placebo control (light touch) or compared with a combined control (light touch or no treatment) (Smith et al., 2006).

### **Significance**

It has been observed that nurses pay a little attention to manage labor pain and they go about their routine nursing care as hourly vital signs assessment and hourly fetal heart rate monitoring without attention to labor pain. They see labor pain as natural phenomena occur to each woman. Although previous studies have investigated individual noninvasive pain relief approaches, to date there is scattered studies have compared several non-pharmacological methods simultaneously. A review study by Cho (2010), investigating findings of other studies on effective non pharmacological methods for labor pain alleviation emphasized the need for further investigation in this field. Thus, the present study aimed to compare the effect of ice cold massage and acupressure on reducing labor pain intensity and labor duration in primigravida women.

### **Materials and Methods**

#### **Hypotheses**

- 1- Laboring woman who received ice cold massage will has less pain score and shorter labor duration than those who don't.
- 2- Laboring woman who received acupressure will has lower labor pain score and shorter labor duration than those who don't.
- 3- There is no difference between application of ice cold massage or acupressure on reducing labor pain score and labor duration.

#### **Design**

Randomized controlled trial was carried out over eight-month period, between September 2013 till April 2014, at labor and delivery unit, maternity university hospital, Cairo University, Egypt.

#### **Sample**

Three hundred laboring women were recruited randomly and allocated to the three groups (ice massage, acupressure and control group) 100 woman each. The inclusion criteria include 20-30 years of age, can read and write, primigravida, nulliparous women, had a singleton and term pregnancy ( $>37$  to  $<40$  weeks of gestation), normal fetal heart rate (120-160 b/min), intact membranes, in early active acceleration phase (cervical dilatation 3-4cm), had a natural pattern of uterine contractions. Women with chronic diseases as renal or cardiovascular disease, gestational diabetes, pre eclampsia, mental disorders, and history of any complications during labor which led to analgesic drugs use or any interventions to accelerate the labor were excluded. The sample size has been determined based on the daily numbers of admission into the labor and delivery unit. Attrition rates during the study were due to emergency obstetric intervention during delivery and/or the needs for pharmacological pain relieve or emergency delivery and these are acknowledged as a problem associated with this study.

#### **Ethical Consideration**

An official permission was granted from the director of the Maternity Hospital. The researcher introduced herself to the women who met the inclusion criteria and informed them about the purpose of this study in order to obtain their acceptance to share in this study. The researcher ensured that, the study posed no risk or hazards on their health and/or their babies. All laboring women were informed that, participation in the study is voluntary and all events that occurred during data collection were considered confidential and they are free to withdraw at any time from the study.

### **Tools and measurements**

Tools for data collection were 1) A structured interview questionnaire (developed by the researcher), 2) labor and delivery assessment tool (Partograph); 3) Visual Analogue Scale (VAS); and 4) Crashed ice bag.

1) **A structured interview questionnaire**, to collect socio-demographic data.

2) **Labor and delivery assessment sheet (Partograph)**. Partograph is a valid graphic representation of the event of labor progress plotted against time (World Health Organization, 1994). It includes three main sections; maternal condition, labor progress and fetal condition; **3) Visual Analogue Scale to assess pain intensity (VAS)** (Huskisson, 1974). The VAS is a 10-cm line marked from 0 (no pain) to 10 (pain as bad as can be). The woman was asked to mark between the two extremes that best described the degree of pain intensity being experienced at that moment. The VAS possesses both concurrent validity and discriminant validity (Gift, 1989). The test-retest reliability coefficient of the VAS has been demonstrated as  $r = 0.71$  (Reville, et al. 1976).

### **Implementation**

After official permission to conduct the study, data collection was carried out through three phases: assessment phase, implementation phase and evaluation phase. **Assessment phase:** In this phase, the researcher using the interviewing questionnaire schedule to collect data related to socio-demographic characteristics and obstetric profile. The interview consumed about 15 minutes for each woman. Assessment of maternal condition and labor progress before and after applying ice cold and acupressure massage was done using visual analogue scale (VAS) and modified WHO partograph.

**Implementation phase:** During active phase of labor, the ice cold bag was wrapped in cotton towel to avoid any discomfort and skin damage and applied bilaterally during the contraction on Hugo point (LI4), which is located between the thumb and index finger at the highest spot of the muscle when the thumb and index finger are brought close together where the large intestine energy (LI4 ) acupressure point. Before applying ice massage, the woman was encouraged to take a deep breath then a massage was applied for one minute (count slowly), she then received one minute rest, and massage was repeated. This continued for 20 minutes. In the acupressure group, the same massage procedure was performed by applying direct pressure with the index finger or thumb on both hands. For the third group who received the hospital routine care (control group), the researcher dealt with each woman during each routine hospital procedure as insertion of I.V. fluids, enema, and providing hygienic care. Answering any question and the same baselines and following up assessments were conducted as the other two groups.

**Evaluation phase:** Based on Chao et al., (2007); and Lee et al., (2004) studies, the effects of ice massage and acupressure on relieving labor pain were measured immediately, 30 min and 60 min after the intervention using VAS scale.

### **Results**

The collected data was coded, tabulated and analyzed using Statistical Package for the Social Science (SPSS) program version 18. Descriptive as well as parametric inferential statistics were utilized to analyze data pertinent to the study. Statistical significance was considered at  $p$ -value  $< 0.05$ .

**Table (1)**

**Demographic Characteristics of the Sample.**

Variable	Ice cold group (n=100)		Acupressure group (n=100)		Control group (n=100)		t	p
	Mean	SD	Mean	SD				
Age	25.16	2.62	24.92	3.07	24.93	2.29	0.42	0.67
Gestational age	38.6	1.08	38.92	1.15	38.4	0.83	1.42	0.18
Educational level	$\chi^2 = 1.40$		$P = 0.84$					

Regarding sample characteristics, present study denoted that there were no statistical differences between groups related to age, gestational age and educational level (table,1).

**Table (2)**  
**Comparison of the Mean Severity of Labor Pain before Intervention, Immediately, and 30 and 60 Minutes After Intervention**

Intensity of Pain	Ice cold group (n=100)		Acupressure group (n=100)		Control group (n=100)		p
	Mean	SD	Mean	SD	Mean	SD	
Before intervention	4.87	0.288	4.91	0.941	4.87	0.97	0.28
Immediately after intervention	4.66	0.288	4.70	0.64	5.01	0.15	0.003
30 minutes after intervention	4.71	0.64	4.91	0.85	5.14	0.31	0.002
60 minutes after intervention	4.86	0.87	5.08	0.347	6.01	0.43	0.002

The women in the three groups had moderate pain score before intervention with no statistical significant differences ( $p= 0.28$ ) (table, 2). When comparing the mean severity of labor pain before and after intervention, repeated measure AVOVA showed statistically significant differences between the three groups regarding pain intensity immediately after intervention ( $p< 0.003$ ), 30 minutes after intervention ( $p<0.002$ ), and 1hour after intervention ( $p<0.02$ ). However pain intensity was increased, ice massage had more persistent effects on pain reduction than acupressure group (table, 2).

**Table (3)**  
**Comparison of the Mean Labor Duration Among Study Groups**

Labor duration	Ice cold group (n=100)		Acupressure group (n=100)		Control group (n=100)		p
	Mean	SD	Mean	SD	Mean	SD	
1st stage of labor (hrs.)	6.72	1.31	6.28	1.08	8.49	2.01	0.003
2nd stage of labor (min.)	28.05	4.17	30.45	9.01	37.02	5.37	0.04
3rd stage of labor (min.)	6.87	1.85	6.69	1.74	6.92	1.89	0.28

Concerning duration of labor, it was noted that women in both ice cold massage and acupressure groups have had shorter duration of first and second stages of labor than women in the control group ( $p<0.003$ ) and ( $p<0.04$ ) respectively. On the other hand, there were no statistically differences among groups regarding the third stage duration ( $p= 0.28$ ) (Table, 3).

## **Discussion**

The main objective of this study was to compare the effect of ice cold massage and acupressure on reducing labor pain intensity and labor duration in primigravida women. The results indicated that the three groups were matched in terms of mean pain intensity before intervention. Cunningham, Bloom, and Leveno (2005) indicated that when laboring woman enters true labor pain, the intensity and duration of contractions increase over time. Increased intensity of uterine contractions causes pain to be felt more severely. The results of this study showed that ice massage and acupressure on Hugo point (LI-4) significantly reduced labor pain intensity immediately and at 30 min following the intervention. This finding was in accordance with previous studies which recommended ice massage and acupressure as a valuable, effective, non-invasive and cost-effective technique in labor pain relief (Dehcheshmeh, et al., 2009; Enjezab et al., 2008; Smikin & Bolding, 2004).

Also, other studies' results confirmed that, ice massage on Hugo point (LI4) during contractions help in reduction of labor pain at the beginning of labor (Fleoy, et al. 2012; Nunes & Vargens, 2007; Waters & Raisler, 2003). The mechanisms of pain relieve with ice massage including inhibition of nociceptors, a reduction in muscle spasm and/or via the analgesic descending pathway of the central nervous system such as endorphins (Arendt-Nielsen & Sumikura, 2002). Moreover, Marion (2007) mentioned that when acupressure point is pressed, muscle fibers elongate and relax, allowing blood to flow more freely and toxins to be released

eliminated. So, reduce muscle pain and tension, improve blood circulation and release endorphins. In the same context, Hajiamini et al., (2012) their study results had showed that ice massage on acupressure points significantly reduced labor pain intensity immediately, at 30 min and 1 h following the intervention.

Based on the study results, although pain intensity significantly decreased immediately and 30 min after intervention, the pain intensity was nearly the same before intervention in ice group and slightly increased in acupressure group and increased more in control group after 1 hr from the intervention. This indicated that ice cold is more effective methods in pain reduction than other methods. This contrast might be caused by the duration of massage application. Some studies continued the massage for a longer time, for instance Heidari et al (2008), implemented massage for 30 min, assessing pain intensity 30 min and 1 hr after the massage and then every 1 hr for 8 hrs. They found a significant difference only after 2 hrs. In the present study, massage time was limited to 20 min. Therefore, it may be possible that more prolonged massage might result in prolonged pain relief (Heidari et al. 2008; Chao et al., 2007). Considering these findings, it would appear that although acupressure seems to be acceptable as an effective labor pain reduction method, its efficiency depends on the duration of massaging.

Studies indicated that, complementary medicine as cold massage and acupressure causes physiologic, systemic, and local changes in the body and creates calmness and balance throughout body and mind and reduces the symptoms of stress. Increasing endorphin and oxytocin may lead to appropriate uterine contractions and shorter second stage duration. Also, feeling of security resulting from the presence of the researcher as one of the healthcare staff reduce women's anxiety level and give a sense of self control might reduce the duration of labor and enhance labor progress. Regarding duration of delivery, the present study's result revealed that, women in both ice cold and acupressure groups had shorter first and second stage duration than women in the control group This is in the same context of Hodnett et al., (2013), who stated that supportive companion during labor, who is neither a family member of the laboring woman, nor a member of the hospital staff, can help the woman cope with pain and anxiety and improve obstetrical outcomes. In addition, Lee et al., (2004) indicated that women in the acupressure group had a significantly shorter duration of the first stage of labor and total labor time than did women in the touch group. Moreover, Chung et al (2003) found that the duration of the first stage of delivery in the acupressure group was shorter than other groups. Also, Abdel Ghani (2014) indicated that, there were significant differences in duration of the first stages of labor as they were shorter in the heat and cold group than control group. On the other hand the result goes on the opposite line with Dabiri & Shahi (2014), who stated that the duration of labor did not differ between the three groups (acupressure group, touching group and the control group), suggesting that applying pressure on the L14 point reduces labor pain but does not disrupt the delivery process.

### **Conclusion**

Findings of this study clearly indicate that although ice massage and acupressure methods reduced labor pain intensity, and shortened the duration of first and stage of labor, the interventions should be repeated every 30 min. Ice massage was more effective than acupressure in pain reduction, and should be considered as a simple, inexpensive, available, method to reduce labor pain.

### **Recommendation**

Future studies can be done by giving ice cold massage and acupressure for more than 30 minutes interval and using multiple acupressure points. Finally increase sample size to generalize the findings and further studies in this area are recommended.

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