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The Effect of Warm Compress Bi-stage on Pain Strength in Labor Stages and After Delivery

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Abstract

Objectives: Perineal warm packs with an increase in subcutaneous temperature and the stimulation of cutaneous receptors are advocated in the belief of pain and probably increase comfort during labor and delivery. This study aimed to investigate the effectiveness of warm compress bi-stage on pain strength in the first two stages of labor and after delivery in primiparous women.

Materials and Methods: This study was a randomized clinical trial that was conducted in Shiraz hospitals from July 2012 to March 2013, in which 150 women participated and were separated into intervention (15-20-minute warm compress bi-stage in the first two stages of normal delivery at 7 and 10 cm dilations and zero position) and control (just usual hospital cares) groups. Then, pain strength was evaluated in both groups in the first two stages of normal delivery and after delivery similar to the frequency of episiotomy. The chi-square, *t* test, and odds ratio analysis were used for data analysis

Results: The results of the *t* test showed that the mean intensity of pain reduced significantly in intervention group in both first ($P<0.002$) and second stages ($P<0.001$) and on the day after delivery ($P<0.001$). Besides, the frequency of episiotomy meaningfully decreased in the intervention group in comparison with the control group ($P<0.001$).

Conclusions: The research participants experienced less pain through the labor and after delivery by using warm compress bi-stage at 7 and 10 cm dilatations. Thus, this method might be suitable for reducing perineal pain resulting from episiotomy.

Keywords: Warm compress, Pain, labor, Episiotomy

Introduction

Researchers have always considered the reduction of pain during labor and after delivery (1). Labor pain is a complicated phenomenon and a stressful experience accompanied by pain, fatigue, and fear. Fear from labor pain persuade women to cesarean delivery (2). Furthermore, the continuation of pain and its related fear through labor can affect other body systems such as respiratory, cardiovascular, and endocrine system and some bodily functions (3). Thus, efficient pain control in labor, similar to other severe pains, is an important social and medical issue (4).

The mechanism of labor usually occurs in three stages. In the first stage, the cervix starts to be dilated to 10 cm, which includes three phases of early, active, and transition in which painful contractions are stronger, longer, and closer together, progressively. The second stage is the pushing stage which starts with cervical full dilatation and finishes by childbirth. The third stage takes place from birth until the exclusion of the placenta (5). The effective control of labor pain is an important health issue (4). This complicated phenomenon can result in physical and psychological negative outcomes (3) and may persuade mothers to choose cesarean delivery (2). This pain can also increase the catecholamines level, cardiac output, blood pressure, as well as the number of breaths and the mother's oxygen consumption, eventually, resulting in fetal progressive metabolic acidosis (2,6-9).

Perineal pain is highly prevalent among primiparous women and is considered as the most prevalent complication after delivery. This pain can be accompanied by insomnia, anxiety, delay in maternal-fetal attachment, as well as the prevention of emotional relationships between the mother and her infant and an inability to take the correct position for breastfeeding (10). Perineal pain also prevents the mother from taking care of her neonate and its continuation may result in fear from the sexual relationship (11), painful intercourse, and disorders in relationship with one's husband (12). This pain is reported to last for eight weeks in 22% of women and up to one year in some others (13). Further, another research indicated that this pain continued for 18 months after delivery in 10% of women (14). The prevalence of perineal pain was reported to be 92% on the first day after delivery (15). Therefore, considering the physiological and psychological adverse effects of this phenomenon, its effective treatment

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is highly important from both patient and economic points of view (16). There are different pharmacological and non-pharmacological ways to prevent labor pain (17). Common pharmacological ways are muscular and venous injection of analgesics like pethidine, the use of anesthetic inhaler gas like Entonox (nitrous oxide and oxygen), and local anesthesia like epidural anesthesia. Furthermore, pharmacological treatments are usually effective, but have adverse effects on the mother and fetus (18,19). Evidence also indicates that using analgesic methods during labour could disrupt the labor process, decrease the mother's consciousness, the straining reflex, and the mothers' and fetuses' respiratory system function, along with having vast mental effects on both the mother and her fetus (20). In fact, pharmacological methods only eliminate the physical sense of pain while non-pharmacological methods improve the mental and emotional dimensions of labor, thereby reducing the mothers' suffering during labor (21,22).

On the other hand, non-pharmacological methods such as music therapy, ice massage (23), electro-acupuncture (24), yoga (25), pressure therapy (26), heat therapy (27), and aromatherapy (28) are simple and inexpensive and can be used either as replacement therapy or combined with medications. In these methods, women are the ones who make decisions and affect the progress of labor by feeling strong (29). A non-pharmacological way to reduce pain is thermotherapy and warm compress which, is accompanied by limited adverse effects, if applied correctly. Although only a few studies have focused on using heat and cold together during labor, their effects are proved on the pain resulting from other clinical conditions (30). Heat seems to stimulate the cutaneous and deeper tissues' thermoreceptors and thermo receptors might decrease pain according to the gate control theory (31). Thermotherapy is also effective in shortening the process of labor.

Considering the negative effects of labor pain on the mother and fetus, its reduction is of great importance (30). Since most non-pharmacological ways like transcutaneous electrical nerve stimulation, hypnotism, acupuncture, and massage require skilled specialist, bi-stage thermotherapy seems a simpler and more cost-effective method. However, only a few studies have addressed bi-stage thermotherapy and its effects on labour pain. Hence, the present study aimed to determine and compare the mean strength of pain in the first two stages of delivery and after delivery in two groups undergoing warm compress bi-stage intervention and routine care.

Materials and Methods

The study was a randomized clinical trial, which conducted in Women's Hospital of Hazrat Zainab, Mother and Child Shoushtari and Hafez hospitals affiliated to Shiraz University of Medical Sciences from July 2012 to March 2013. Based on the study design and objectives and considering $\alpha = 0.05$, power of 80%, and the effect size of 20%, 140 subjects were concluded for the study (70 subjects for every group) (Figure 1). Considering the longitudinal design of the study, repeated measurements, and the loss rate of 10%, the sample size was expanded to 150 subjects (75 in every group). In this study, 195 primiparous women were interviewed, 175 of whom were qualified for the study. After the losses in the first and second stages of labor, the data of 150 participants were analyzed, including 75 cases in each of the intervention and control groups.

The study samples were selected through purposive sampling among the mothers referring to three hospitals in Shiraz for vaginal delivery. The two groups of the study were classified into warm compress bi-stage (A) and control (B) groups. Thus, they were categorized into four blocks and randomly distributed as 1. AABB, 2. ABAB, 3. ABBA, 4. BBAA, 5. BABA, and 6. BAAB.

The inclusion criteria were primiparous women with the gestational age of 37-42 weeks, singleton pregnancy, cephalic presentation, the estimated fetus weight of 2000-3500 g, the lack of pelvic contraction and other clinical disorders, age between 18 and 35 years old, hemoglobin level $\geq$11 mg/dL, the lack of any perineal or vaginal lesions, and occiput anterior position. In addition, the other inclusion criteria included not using local anesthesia and analgesic methods such as Entonox gas and not having used methods such as perineal massage for making the perineum ready during pregnancy. On the other hand, the exclusion criteria were lengthening the second stage of labor to more than two hours, using forceps or vacuum, having any complication requiring expedite delivery or using cesarean section, and making use of any analgesic drugs or Entonox gas.

Data were gathered by using demographic, clinical, and pregnancy period data questionnaires and an observation form including the labor stages information, and visual analogue scale (VAS). The visual acuity scale was completed for both control and intervention groups before and after the intervention by self-reporting, which is a graded instrument ranging from 0 to 10 and is sorted as painless to the most severe pain (32).

After the mothers' admission to the delivery department, the samples were chosen and separated randomly into two groups and all of them filled the written informed consent. In the intervention group, warm compress was used once at 7 cm and once at 10 cm dilatation at zero position. The intervention was performed between and through the contractions and continued for 15-20 minutes in the first and second stages of labor. In the second stage, Valsalva maneuver was delayed until the occurrence of straining. From zero to lower positions, the mothers were vaginally examined to identify the location of the fetus's head.

To prepare the warm compresses, they were removed from their packages and put in a plastic bag. Then, they were put in a sterile dish containing 70°C water for 12

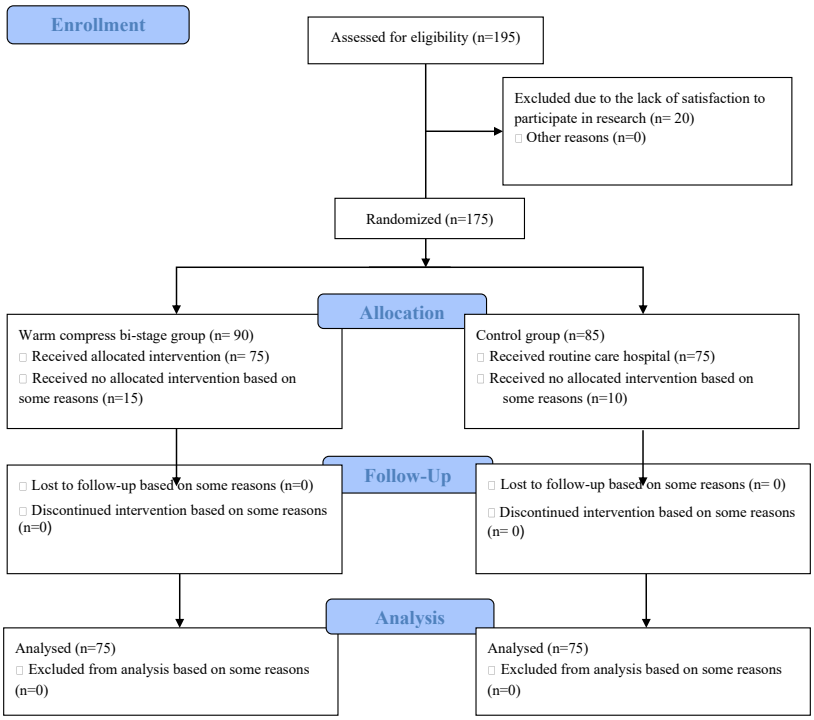

Figure 1. CONSORT Flow Diagram of the study.

minutes. Afterward, the compresses were wrapped in a sterile soft towel and after cleaning the perineal area, they were held on this area for 15-20 minutes (30). It should be noted that the perineal area was frequently checked with respect to erythema and the compresses were removed in this case.

As regards the control group, only the usual hospital care was done and all the samples gave birth to their children in lithotomic position with the help of the instructor of midwifery or the midwives working in the birthing room. Further, episiotomy was done as intended by the opinion stationed midwife in the delivery room.

In the first two stages of delivery and after it, the pain strength was measured using the McGill's VAS. After describing the VAS to the participants, they were required to mark their pain intensity on this instrument. VAS is a numerated ruler on which 0, 1-3, 4-6, 7-9, and 10 represent no, mild, average, severe, and most severe pain, respectively (33). It should be mentioned that the study could not be blinded since the intervention and delivery were carried out in the same location.

Data Analysis

Data were analyzed using SPSS software, version 16. Furthermore, *t* test was used to compare the pain strength in the first two stages of delivery and post-partum. Besides, $P<0.05$ was considered statistically significant.

Results

Based on the results, no meaningful differences were observed in intervention and control groups regarding age ($P=0.89$), level of education ($P=0.73$), and gestational age ($P=0.85$).

In the first stage of labor, the visual analogue scale (VAS) scores less than 4 was observed in the intervention group (25.7%) compared to the control group (14.9%), and for the scores greater than 8, we observed 0% and 58%, respectively, and the difference was significant ($P=0.001$). In the second stage of labor, the VAS score less than 4 was observed in the intervention group (75.7%) compared to the control group (0%), and for scores greater than 8, we found 0% and 68%, respectively, and the difference was significant as well ($P=0.001$). The VAS score after delivery was significantly different from the control group ($P=0.003$), the related data are provided in Table 1.

In accord with *t* test results (Table 2), the intensity of pain in the intervention group was significantly less than control group at the first two stages of delivery ($P<0.001$) and on the day after labor ($P<0.001$). Besides, a meaningful difference was observed between both groups with respect to the rate of episiotomy (45% vs. 68%, $P<0.001$).

Discussion

Our findings revealed that application of warm compress bi-stage reduced pains through the active phase of delivery. In contrast to other pains, labor pain increases gradually to improve labor progress. In this study, labor pain increased with progress in labor in both groups. However, the mean intensity of pain in the active phase of delivery (the first stage of labor) and the second stage of labor significantly

Table 1. Frequency and Percentage of VAS Score in the First, Second Stage of Labor and Postpartum in Both Intervention and Control Groups

Stage	VSA Score	Group		*P* Value
		Two-Stage Intervention No. (%)	Control No. (%)	
First stage	4<	19 (25.7)	0 (0)	0.001
	4-8	44 (59.5)	31 (41.3)	
	8>	11 (14.9)	44 (58.7)	
Second stage	4<	56 (75.7)	0 (0)	0.001
	4-8	18 (24.3)	24 (32)	
	8>	0 (0)	51 (68)	
Postpartum	0-1	67 (90.5)	51 (68)	0.003
	2-3	7 (9.5)	22 (29.3)	
	3>	0 (0)	2 (2.7)	

Note. VAS: visual analogue scale.

Table 2. Comparison of the Intensity of Pain in the First and Second Stages of Labor and After Delivery in the Two Groups

Stage	Group		*P* Value
	Two-stage intervention Mean ±SD	Control Mean ±SD	
First stage	5.35±1.59	8.61±1.05	<0.002
Second stage	3.32±1.18	7.40±1.29	<0.001
Postpartum	0.62±0.65	1.16±1.1	<0.001

Note. SD: Standard deviation.

reduced in the intervention group in comparison to the control group. Thus, thermotherapy in the form of warm compress reduced the intensity of labor pain.

Similarly, Geissbuehler et al indicated that delivery in warm water required less midwifery analgesic compared to routine delivery and decreased pain in 69% of the cases (34). Grodzka et al also reported that labor pain reduced in 76% of the women who gave birth in warm water (35). Considering the findings of the above-mentioned studies and the present one, thermotherapy persuaded the mother to cope with delivery more easily and feel less pain. Although these studies investigated the effect of moist thermotherapy, they dealt with heating the area or the environment, which is consistent with the results of the current study. Evidence also showed that warm water was effective in reducing the mother's pain while increasing her tranquility and comfort during labor (36). In other words, warm water reduces the pain and anxiety, increases the secretion of oxytocin and endorphins, and decreases the production of adrenalin, and eventually, results in the progress of labor (37). Smith et al in a systematic review found that massage, warm pack, and thermal manual methods have low and very low effects on reducing labor pain, which contradicts our results (7).

Batten et al reported that a warm bath reduced labour pain and improved the birth experience among women and one hundred percent of them desired to use it again in another birth, which is in line with the result of our study (38).

Moreover, massage can prevent the transfer of pain by the stimulation of thick nerve fibers and local stimulation of endorphins which, according to the gate control theory of pain, close the pain gate, prevent the transfer of pain, and increase satisfaction, optimism, and pain adaptability (39). These mechanisms are also true regarding the stimulation of cutaneous and deeper tissues' thermoreceptors by warm compress which enhances the individuals' pain adaptability (31,40).

In the current study, the frequency of episiotomy and pain intensity was lower in the intervention group compared to the control group on the day after delivery. Due to the shortness and rigidity of the perineum in the Asian race, almost 70% of natural deliveries require episiotomy (41) which is the most common cause of primiparous women's discomfort and shows the necessity of reducing damage to the perineum. Episiotomy is among the most common painful surgeries in young women (42) and pain after delivery has a highly negative effect on their first experience of motherhood (43,44). In the current study, warm compress relaxed the perineum and led to relief from pain and fatigue by reducing the sensitivity and rigidity of the muscles while improving blood circulation (45). In the research by Macarthur, the prevalence of perineal pain on the day after delivery was 97%, which reached 71% on the 10th day (12). In the present study, the control group's pain intensity was higher compared to the intervention group, revealing the effectiveness of warm compress.

Sedating the pain during labor is an important predictor of feeling control over one's body and behavior (46). Based on previous research, the memory of pain can be more dangerous than the experienced pain and might affect postpartum issues such as breastfeeding and mother's relationship with her infant and husband (47).

The reduction of perineal pain the day after delivery and earlier onset of sexual activities in the intervention group in this study indicated that warm compress had both immediate impacts in that stage and further effects. Besides, the significant reduction in the length of episiotomy incision in the intervention group revealed that these women's perinea were more flexible and expandable compared to the control group, and the midwives had to use smaller incisions. Small incisions are accompanied by lower bleeding and complications and, consequently, confirm the long-term effects of a warm compress. Moreover, the probability of pain, burn, and infection reduces after delivery by small incisions and sexual activities can be started earlier (48). The other studies also proved the long-term effects of warm compress affecting the infant's health, as well as familial relationships (49,50).

Additionally, evidence revealed that the women had a better attitude toward labor pain and duration on the rate of episiotomy and experienced less fear in the delivery room when they received the midwives' support through

non-pharmacological analgesic methods and underwent intervention and training during labor (51,52). The midwives' provision of psychological support for the mothers might be another effective factor regarding the impact of warm compress bi-stage on the labor pain in the current study. The application of warm compress bi-stage at identified time points during the labor (once at 7 cm and once at 10 cm dilatation) might have caused the women to feel that labor followed a natural and controlled process and that everything was under her midwife's control. Nonetheless, some researchers disclosed that caregivers do not spend sufficient time on supporting the mother in the delivery room (53). Therefore, midwives and other health staff are required to help the women in the process of labor by using non-pharmacological analgesic methods such as warm or cold compress, massage, and complementary medicine so that to decrease the labor pain while increasing the mothers' positive attitude toward labor pain and vaginal delivery.

One of the limitations of the present study was the difference in the midwives' opinions regarding the need for episiotomy and in perineal control, which was eliminated by holding a briefing session. In addition, the difference in women's tissue types and pain thresholds was another issue, which was eliminated by the random allocation of participants into two groups. Another limitation was the existence of lipid in the perineal area which might act as a barrier to the transfer of heat. Accordingly, the research results can be used as follows.

The evidence could be useful for midwives, nurses, obstetricians, gynecologist, and health care providers as an effective, safe, simple and cost-effective non-pharmacological method for controlling the labor and episiotomy pains during and after the labor. It also could train the mothers and their care-givers after delivery as a simple and safe way to reduce the perineal pain. Further studies in this area are recommended to achieve more evidence for executing this method in clinical and educational fields. Thus, future studies are recommended to evaluate the effect of warm compression on the perineal body in large fetuses, as well as women with short perineum.

Conclusions

The study findings revealed the effectiveness of warm compress bi-stage in reducing pain intensity in the first two stages of delivery and after it. Hence, this method can be used to decrease labor pains in addition to pain resulting from episiotomy after delivery.

Conflict of Interests

Authors declare that they have no conflict of interests.

Ethical Issues

The study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Ethic code: IR.sims.REC.1391.S6272) and registered in the Iranian Registry of Clinical Trials website (identifier: 2014051511706N7; https://www.irct.ir/).

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