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Original Article

The Effect of Two-Staged Warm Compress on the Pain Duration of First and Second Labor Stages and Apgar Score in Prim Gravida Women: a Randomized Clinical Trial

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ABSTRACT

Introduction: The aim of this study was to assess the effect of two-stage warm compress technique on the pain duration of the first and second labor stages and neonatal outcomes.

Methods: The clinical trial was done on 150 women (75 subjects in each groups) in Shiraz-affiliated hospitals in 2012 A two-staged warm compress was done for 15-20 minutes in the first and second labor phase (cervical dilatation of 7 and 10 cm with zero status) while the control group received hospital routine care. The duration of labor and Apgar score were evaluated.

Results: According to t-test, the average of labor duration was lower in the intervention group compared to the control group at the second stage. However, there was no significant difference for labor duration at the first stage and the first and fifth minute Apgar score.

Conclusion: According to the result, this intervention seems a good method for decreasing labor duration at the second stage of parturition.

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Introduction

Prolonged labor causes anxiety, fear and fatigue, as well as the risk of injury, death, and perinatal mortality, more use of oxytocin, the prevalence of cesarean section and device use in vaginal delivery (vacuum or forceps), post-partum fever and reduced umbilical PH.[1,2] It is also reported that the anxiety induced by labor pain contributes to the decreased level of oxytocin and prolonged labor.[3] According to studies, fear of labor pain is the main reason for increased maternal desire for cesarean section.[4,5] In Iran, the report of C/S is 40% and about two-thirds of them (50-60%) choose it as the call for less pain.[6] According to Slone and colleagues in 2005, more catecholamine is released along with pain, which leads to less uterine blood perfusion, contractions and consequently prolonged labor.[7] Prolonged labor at the second phase is along with increased fetal and maternal complications such as atonic uterus, post-partum bleeding, perineal trauma, increased infections, hypoxia, asphyxia and fetus injuries in this regard.[8,9] So far, various techniques have been used as pain relief during labor, which provides less emotional stress, more calmness, and physical contact during labor besides pain relief.[10-12] Heat therapy is one of the non-pharmacological methods to relieve pain. Heat therapy is applicable with various, on hand, easy and cheap devices without the need for previous skills. It has few side effects if used properly. Although few studies have been done on the application of heat and cold on labor, its effect was examined on other clinical conditions.[12] It seems that heat stimulates the thermal skin receptors and deep tissues to suppress pain through gate control theory.[13] Shorter labor course is the other possible effect of heat therapy[13.14]. Ganji et al., studied the effect of local heat and cold on labor pain and child birth outcome in Iran. It revealed that heat causes a significant increase in uterine activity without showing any abnormal changes in the fetus heart. Researchers described thermotherapy as a new non-pharmacological approach to stimulate uterine contractions with shorter labor course.[15]

Sanders et al., did a study on 210 midwifery centers in the UK. He found that midwives had used hot packs for reduction of labor pain during the second phase of labor in 33% of the parturient women. It is effective on perineum damage and labor course.[16] Dahlen et al., did a study to investigate the effect of warm compress on labor pain at the second phase from women and midwives' point of view. The effect of thermotherapy on labor pain was approved by 80.4% of midwives and 79.7% of the parturients. Most midwives state the future use of heat therapy for other parturients.[17] No study was done about the use of thermotherapy as the heat compress on labor pain. Fear of labor pain is one of the most important

reasons that make women opt for cesarean section. Its complications and high costs prompted us to design this study. The aim of this study was to assess the effect of two-staged warm compress on the pain length during the first and second phases of labor besides neonatal outcomes.

Materials and methods

This study is a randomized clinical trial (IRCT: 2014051511706N7), (Proposal No. 6272) which was approved by Ethics committee of Shiraz University of Medical Sciences. It consists of two independent variables including two-stage heat compress therapy and routine care besides four dependent variables including the course of the first and second phases of labor, and the first and fifth minute Apgar score. The study environment was the labor room in Shiraz affiliated hospitals (such as Zainabiyeh, Shushtari, and Hafez) since is convenient and in good condition to yield the desired objectives. Sampling was done from July to March 2012. A sample size of 70 in each group was calculated regarding the study objective, study power of 80% at a significance level (alpha) of 0.05 and effect size of 20% by applying the following formula: Since it was a longitudinal study by considering a drop-out rate of 10%, the total sample size required is 150 (75 in each group)(Fig1).

Simple purposive sampling was done among mothers with normal vaginal delivery referring to the mentionedhospitals. Random allocation was done to divide them into case and control groups. Randomization was done by applying a table of random numbers assigning each subject into A or B groups. The numbers 0–4 correspond to treatment A and 5–9 to treatment B, with digit 3 specified as the imbalance. The inclusion criteria included nulliparous women with gestational age of 37-42 weeks, aged between 18 to 35 years, live singleton pregnancy, cephalic presentation, estimated fetal weight of 2,000 to 3,500 grams, no shortness of the hip, no medical history, the hemoglobin level above 11 mg/dl, no sign of any perineal and vaginal lesions, anterior oxypot status, not using local anesthesia and analgesia techniques such as Entonox gas, not using any technique of perineal preparation such as perineal massage during pregnancy. The exclusion criteria included prolonged second stage of more than 2 hours, use of forceps or vacuum, any conditions that need to expedite delivery or cesarean section, such as placental abruption, meconium, or the use of any anesthetic gas such as Entonox.

The instrument used in this study included a questionnaire (including demographic characteristics, medical and pregnancy related information), observational forum (comprising the length of labor

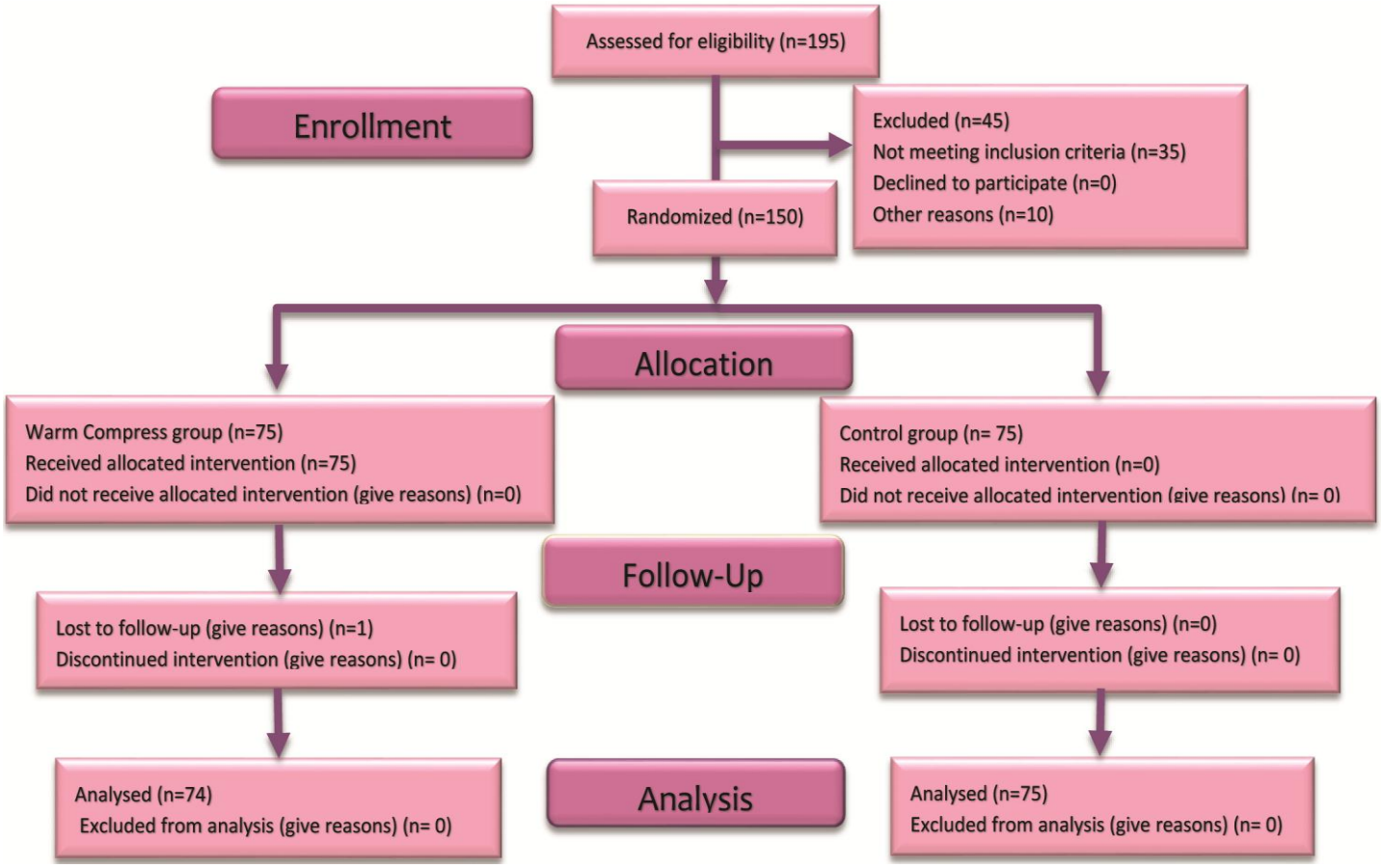

Figure1. Consort diagram for sampling

process was to apply warm compress at 7 cm and finally 10cm cervical dilation once the position was zero. The the participants beforehand and the aim of the study was thoroughly explained and clarified. The intervention phases and visual analogue scale (VAS) to assess pain). Randomized sampling was done after the mothers' hospitalization in the maternity ward if they met the inclusion criteria. Informed consents were obtained from application of a warm compress was both between and during contractions for at least 15 minutes and at most 20 minutes in two stages. In the second phase, the Valsalva maneuver was delayed until she felt spontaneous strain. Vaginal examination was done at zero position and lower to identify the fetus head status. After removing the packages wrapped in a plastic nylon, they were put in a sterile container containing hot water 70 degrees Celsius (C) for 12 minutes, and then they were packed into a sterile soft towel. After the perineum was cleaned, the package was put aside for 15 minutes minimum, or 20 minutes maximum.[18] The perineum was checked intermittently for erythema and it was removed in the case of severe erythema. To check the temperature, it was placed in front of the arm before its application. A thermometer was put between the warm package and towel to measure the temperature which had to stay at 38 to 40 degrees. The control group received only the routine hospitals care. All the participants were delivered in lithotomy position. The labor agent could be the obstetrics instructors or midwives in the delivery room.

An episiotomy was performed according to the delivery agent. The questionnaire was applied in postpartum (fourth stage) in both groups to determine the necessity of episiotomy, intact perineum, location, degree and length of laceration, and first and fifth minute Apgar score. To reduce the researcher bias, we asked an expert midwife to assess the postpartum perinea. It was not possible to blind the study since both delivery and intervention were conducted in the same environment.

Results

The age of the participants ranged from 18 to 34 years, with an average and median of 22.57 (3.24), and 22 years, respectively. Most of them were 20 years old. Both groups were matched for age (P= 0.89), gestational age (P= 0.85) and education (P=0.73), in which areas there were no significant differences between them. According to Chi-square result, there was a significant difference in the average labor course at the second phase between both groups (P= 0.05), but not in the first phase (P= 0.26) (Table 1).

Table 1. Comparison of the duration of the first stage and second stage in both groups experienced a two-step and control

Variable	Two stage experimental€	Control€	P
First stage duration¥	169.89 (34.74)	196.58 (42.53)	0.267
Second stage duration¥	38.05 (10.42)	39.84 (17.2)	0.05

¥ Reported minute, € Mean (Standard division)

In the intervention group, the frequency of pain length at the first phase of labor was less than that of the control group (P=0.38) as well as the second phase (P=0.29), but it was not statistically significant (Tables 2, 3). T-test was used to compare the Apgar score at the first (P= 0.35) and fifth minutes (P=0.98). There was no significant difference between the two groups (Table 4).

Table 2. Comparison of duration in the first stage of labor in both intervention and control groups

Duration of the first stage (minute)	Two stage experimental N (%)	Control N (%)	P 0.38
60-120	4 (5.4)	2 (2.66)	
121-180	43 (58.1)	32 (42.66)	
More than 181	27 (36.4)	41 (54.66)	

Table 3. Comparison of duration in the second stage of labor in both intervention and control groups

Duration of the second stage (minute)	Two stage experimental N (%)	Control N (%)	P
Less than 30	28 (37.8)	31 (41.3)	0.29
30-60	43 (58.1)	38 (50.7)	
More than 60	3 (4)	6 (8)	

Table 4. Compare the first and fifth Apgar scores in both groups experienced a two-step and control

Variable	Two stage experimental€	Control€	P
First minute Apgar	8.95 (0.19)	8.97 (0.162)	0.35
Fifth minute Apgar	9.9 (0.11)	98.9 (0.115)	0.985

€ Mean (Standard division)

Discussion

Labor course was shorter in the intervention group compared to the control. This was consistent with Malarewicz and Taavoni's et al., study, which proved the efficacy of warm water on labor course in nulliparous women.[14,19,20] Another related study entitled "Effects of warm water on the length of labor" was done by Moneta et al., in 2001, which proved the efficacy of warm water on labor course in multiparous women.[21] In the studies mentioned above, the intervention was effective on both phases of labor while in the present study it was found to be significant just at the second phase. Bodner-Alder and Labrecque also proved the same influence possible through massage.[22,23] Massage therapy leads to the generation of heat, reduction of sensitivity and muscle stiffness, which improves the blood flow to release pain and fatigue.[24,25] It also blocks the transmition of impulses to the brain through the release of endorphins to decrease the pain.[26] Its mechanism is similar to a warm compressin pain relief. Heat can be used either superficially (infrared or hot bag) or deeply (ultrasound or diathermy with short waves) by increasing the blood flow to the damaged or inflamed areas, which, in turn, facilitates the removal of toxic metabolites and oxygenation. It can increase the elasticity of the collagen, which helps increase tissue flexibility. Other studies have shown that infrared heat therapy reduces the severity of back pain and lumbar chronic pains and disability.[27,28] Warm bag

increases subcutanous temperature and stimulates the skin surface receptors to arouse the pain gate mechanism.[29] Since the ischemic area releases bradykinin, histamine, and potassium, it can stimulate the pain receptors. However, warm bag can release the pain by increasing the blood circulation in the affected area.[13] On the other hand, since it is a moist warm condition, it provides a good feeling and psychological convenience, which reduces the pain and labor length, respectively.

However, it was not consistent with the studies done by Ohlsson et al., (entitled: "effects of giving birth in warm water") [30] and Cluett et al., (entitled "Immersion in water in labour and birth").[31] The above studies did not report a significant difference in the first phase of labor in nulliparous women between the case and control groups.

Behmanesh et al., did a study on 64 nulliparous women with low risk pregnancy; the subjects were randomly divided into two groups (heat therapy and usual care) to investigate the effect of heat therapy on pain and delivery outcome. The protocol for performing warm compress was as follows: The warm bags were first placed on the lower back of the mother and then were replaced in the perineum area. The temperature of warm bag was 38-40 Celsius degrees. The results showed that pain severity was reduced in both stages, but no significant difference was reported in the labor course at different stages.[32] According to the study done by Taavoni et al., the use of local warm towel on the sacral and perineal regions did not cause any significant difference on the uterus contractions and labor duration in the active phase.[33]

The contradictory results in the above studies can be due to the following reasons:

- Applying different types of heat treatment; for example, Ohlsson et al., and Cluett studied the influence of water immersion, which is a moist-warm environment. Taavoni applied heat towel while we used local heat by silicon packages.[30,31]
- There may be a difference in water temperature (about 70 ° C in the present study and 38-40 ° C in Behmanesh's research).
- So, It may be difference in the interval, frequency, and course of the intervention. We applied warm compress at 7cm and finally 10cm cervical dilation. The application of a warm compress was both between and during contractions for 15-20 minutes in two stages while Taavoni applied heat towel in the sacral and perineal regions. Also, There are some interventional factors that provide maternal stress which will be effective on the severity and duration of labor. For example; type of communication and interactions with mothers, A large number of mothers in the labor room, noise and bustle, the presence of midwifery indications (premature rupture of ammonic membrane, fetal distress, etc), Which has not been studied in our study .Besides, In studies in which mothers are placed in water during labor, the results may not be comparable to the local effects of heat in our study.

It is notable that the result of studies with water immersion intervention is not comparable with the effect of local heat in this study. Based on t-test results, there was no significant difference in the Apgar score at the first (P= 0.35) and fifth minutes (P<0.98) between the two groups.

Vähä-Eskeli et al., did a study in Fanland entitled "Effects of heat therapy on uterine contractions, fetal heart rate, and fetal movement." It revealed that heat increased the fetal heart rate from 146 to 157 beats per minutes; also, all the newborns were in good condition.[34]

The results of the present study also showed a neutral effect of thermotherapy on the Apgar score. A study done on 612 parturient about the maternal and neonatal effects of hot bath showed that it is effective in pain relief. Regarding the infant, no significant difference was reported on the Apgar score at the fifth minute (less than 7), tachypnea, fetal distress, and referral to intensive care. Hence, the results of the present study did not reveal any unknown complications in the use of hot bath on the mother and baby.[30] Nor did other studies report any abnormal changes in the fetal heart rate and Apgar score after non-pharmacological methods for pain relief[14,30,34-36]

The present study has some limitations including:

- Blinding (or masking) of the study participants was not possible by labor agents.
- Differences in parturient pain threshold were controlled by random allocation division.
- Heat compress may arouse the attention of caregivers, so the parturient feels more convenient; this seems satisfying and impressive on pain reduction and labor course.
- The last but not least can be the presence of fatty tissue in the perineal area, which can be considered as heat insulation.

Conclusion

The findings showed that two-staged local heat compress is an impressive intervention to reduce labor course at the second phase. In addition, this method has no negative effect on the neonatal outcome. The length of the first phase was reduced, not quite significantly, though. Better results might be achieved by applying the intervention from the lower dilation. Therefore, it is expected that this method might make the mother more inclined to opt for vaginal delivery. Moreover, warm compress is a non-pharmacological, cheap, simple, safe, and effective pain relief, which can be used without special skills even by midwifery staff.

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Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

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