

Effectiveness of intermittent heat and cold application on labour pain and duration of labour among the intranatal mothers

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ABSTRACT: Childbirth is a natural biological process and the pain associated with it is also perceived as normal and natural. The primigravida women experience more intense pain during labour compared to multigravida. Experience of severe labour pain affects women's attitudes about vaginal birth. Heat and cold application on Intranatal mothers are very cheap and simple method and no need previous experience and it will have no side effects. The objectives of this study is to evaluate the effectiveness of intermittent heat and cold application on labour pain and duration of labour among the experimental group mothers in comparison to control group mothers. This study was a quantitative approach and Quasi Experimental Design. The setting was in the Labour room and the sample size were 60 (30 in experimental group and 30 in control group) selected through Convenience Sampling Technique. The instruments used for data collection was a standardized Wong Baker FACES Pain Rating Scale and modified WHO Partograph and analysed by SPSS package 16.0 version. Results of research showed a significant decrease in the pain intensity in the intervention group during the first stage of labour and comparing two groups showed significantly difference ($p < 0.01$). The calculated unpaired "t" value of first and second stage of labour 5.409 and 8.927 were found to be statistically significant at $p < 0.05$ level. In conclusion, intermittent heat and cold application to the Intranatal mothers was found to be effective in reducing the level of labour pain and duration of first and second stage of labour among intranatal mothers.

Keywords: Duration of labour, effectiveness, intermittent heat and cold application, intranatal mothers, labour pain.

INTRODUCTION

Childbirth is a natural biological process and therefore the pain associated with it is also perceived as normal and natural. The primigravida women experience more intense pain during labour compared to multigravida (Pillitteri, 2007; Bobak and Jenson, 1993). Labour pain is a common phenomenon and an inevitable part of childbirth process. Experience of severe labour pain affects women's attitudes about vaginal birth. In addition, women tell their negative birth experiences to the other mothers, which may spread fear of labour and increase requests for caesarean (Cunningham, 2001).

Pain is an unpleasant sensory and emotional experience association with actual or potential tissue damage. Pain in labor is a nearly universal experience (Ricci, 2009). One

national survey found that 18% of almost 1000 new mothers (up to 18 months after childbirth) reported traumatic births, as assessed by the Post Traumatic Stress Disorder Symptom Scale. Half of these women (9% of the sample) diagnosed with Post Traumatic Stress Disorder after childbirth. Heat and cold application on intranatal mothers are very cheap and simple method and no need previous experience and it will have no side effects. This intervention also promotes the emotional support to the mother. Such Non-Pharmacological therapies help to break the fear-pain-tension cycle, which may reduce the physical sensations of and emotional responses to pain, as well as the need and demand for drugs (Dutta, 2005). Thus, the objectives of this study are to:

1. assess the existing level of Labour Pain among the Intranatal Mothers in the Experimental and Control group.
2. evaluate the effectiveness of intermittent heat and cold application on labour pain and duration of labour among the Experimental group mothers in comparison to Control group mothers.
3. associate the Post-test level of labour pain and duration of labour with the selected demographic and obstetrical variables in the experimental group mothers (Sharma, 2012; Burns, 2007).

Assumption

Intermittent Heat and Cold application may reduce labour pain and duration of labour (Sharma, 2012; Burns, 2007).

Hypotheses

H1: There will be a significant difference between the Pre and Post-test level of labour pain among intranatal mothers in experimental group.

H2: There will be a significant difference in the Post-test level of labour pain and duration of labour between experimental and control group.

H3: There will be significant association between the Post-test level of labour pain and duration of labour among the experimental group of mothers with their selected demographic and obstetric variables (Sharma, 2012; Burns, 2007),

METHODS AND MATERIALS

A study with 60 intranatal mothers were selected from selected hospital at Puducherry for the study. The research approach was quantitative approach, research design was Quasi Experimental Research Design – (Pre-test and Post-test with control group design) and simple random sampling technique was used to select the samples for this study. The instrument used for data collection was standardized Wong Baker FACES Pain Rating Scale to assess labour pain and Modified WHO Partograph for duration of labour. This pain scale used for assessing the intensity of pain experienced by the mothers. This scale consists of 6 faces with the score varies from 0 to 10. It is measured on six points as no hurts, hurts just a little bit, hurts a little more, hurts even more, hurts a whole lot, hurts worst and scored as 0, 2, 4, 6, 8, 10 respectively. The pain was assessed by using this scale for both experimental and control groups. The investigator showed the card with the faces to the subjects. She explained to the subjects that each one is for a person who feels happy because she has no pain (hurt) or sad because she has some or lot of pain. She asked them to

point or touch the most appropriate face with the index finger which is best to describe that how she is feeling the pain. Duration of labour assessed by Modified WHO Partograph. Marking is done on the partograph whenever patients are in active phase of labour from 5 cm of cervical dilatation. Cervical dilatation is plotted on vertical line on the left side of the graph in cms (5-10 cms) against elapsed time on the horizontal line in hours (Burns, 2007; Taylor, 2009; Brunner, 2010; Fereshteh et al., 2010).

Sampling criteria

Inclusion criteria include mothers who were, (1) Above 21 years of age group (2) In singleton pregnancy with cephalic presentation (3) On spontaneous onset of active phase (from 5cm of cervical dilatation) (4) Primiparous women and (5) Understand Tamil and English.

Exclusion criteria include mothers who, (1) Had history of chronic medical illness (2) Had dermatological problems in abdomen, lower abdomen and back (3) Had complications of pregnancy such as gestational hypertension, PROM, decrease of fetal movement, fetal growth restriction, fetal death and abnormal fetal heart rate and (4) Were not willing to participate in the study (Fahami et al., 2011; Al-Battawi et al., 2017).

Compliance of ethical standards

Informed consent was obtained from all the individual participants.

Data collection procedure

After the pilot study, the main study was conducted for 4 weeks in a selected Hospital, Puducherry. Formal permission was obtained from the concerned authority. The study samples were 60 intranatal mothers admitted in labour room and around 10 to 15 deliveries occurred in a day. Full out of that 2 samples (From 5 cm of cervical dilatation) were selected on each day. The samples were selected conveniently and assigned randomly, 30 in experimental and 30 in control group. The researcher introduced herself and rapport was established with the study participants. Informed oral and written consent was obtained from the mothers. Pre - interventional data regarding their demographic and obstetrical variables (age, religion, occupation, education, monthly family income, type of family, weeks of gestation and fetal hear rate) were obtained. Level of pain was assessed by using Wong Baker FACES Pain Rating Scale. Rubber hot water bag was used for heat application. The size of the hot water bag – 20 x15 cm. $\frac{3}{4}$ of the bag was filled with hot water and sealed with a stopper. The temperature of hot

water is maintained between 38 to 40°C which was measured by laboratory thermometer. Hot water bag was checked for any water leakage. Bag was covered with the towel and placed over the abdomen, lower abdomen and back. Plastic cold pack was used for cold application. The size of the cold pack – 18 x 12 cm. Ordinary tap water was poured upto the neck of cold pack and it was kept in the refrigerator. The temperature of cold pack is maintained between 15 to 18°C which was measured by laboratory thermometer. Cold pack was covered with the towel and placed over the abdomen, lower abdomen and back. The researcher administered intermittent heat and cold application for intranatal mothers. 30 minutes of heat application was applied on the abdomen (10 min), lower abdomen (10 min) and back (10 min). 10 minutes of cold application was applied on the abdomen (3 min), lower abdomen (3 min) and back (4 min). This intervention repeated at half an hour interval throughout the first stage of labour (from 5 to 10 cm of cervical dilatation) for the experimental group. Level of pain was assessed by Wong Baker FACES Pain Rating Scale immediate after the first, second and third times of intervention for experimental and control group (Control group received only routine care). Duration of first, second and third stage of labour was assessed with the help of Modified WHO Partograph for both the experimental and the control group (Fereshteh et al., 2010; Fahami et al., 2011; Al-Battawi et al., 2017).

RESULTS

The demographic variable of the subjects in the experimental group shows that, majority 23 (76.67%) subjects were in the age group of 20 to 25 years, 26 (86.67%) subjects were Hindus, 17 (56.67%) subjects had education up to graduates or post graduates, 22 (73.33%) subjects were homemakers, 14 (46.67%) subjects had monthly family income of Rs.5000 to 10,000, 16 (53.33%) subjects belonged to joint family, 16 (53.33%) subjects were from urban area, 15 (50%) subjects had a gestational week of >39 to 40 weeks and 28 (93.33%) subjects had fetal heart rate between 120 to 140 beats/minute.

The demographic variables in the control group shows that majority 20 (66.67%) subjects were in the age group of 20 to 25 years, 24 (80%) subjects were Hindus, 16 (53.34%) had education up to graduates or post graduates level, 24 (80%) subjects were homemakers, 15 (50%) subjects had monthly family income of Rs.5000 to 10,000, 17 (56.67%) subjects belonged to joint family, 16 (53.33%) subjects from urban area, 14 (46.67%) subjects had a gestational week of >39 to 40 weeks and 25 (83.33%) subjects fetal heart rate between 120 to 140 beats/minute (Polit and Hunger, 2007; Burns and Grove, 2010) (Table 1).

With regards to the duration of each stage of labour, it highlights that around 10 (33.3%) mothers had 3 to 3.30 hours of first stage of labour, 21 (70%) mothers had 1 to

1.30 hours of second stage of labour and 14 (46.67%) mothers had 10 minutes of third stage of labour in the experimental group. Whereas in the control group, 15 (50%) mothers had more than 4.30 to 5 hours of first stage of labour, 14 (46.67%) mothers had more than 1.30 to 2 hours and >2 hours of second stage of labour and 12 (40%) mothers had 15 minutes of third stage of labour (Table 2).

Further in the experimental group, the duration of first, second and third stage of labour mean score were 242 ± 41.35 , 76.50 ± 18.89 and 13.17 ± 3.35 respectively, whereas in the control group, duration of first, second and third stage of labour mean score were 288 ± 20.32 , 118.93 ± 17.90 and 15 ± 3.94 respectively. The calculated unpaired "t" value of first and second stage of labour, 5.409 and 8.927 respectively were found to be statistically significant at $p < 0.05$ level. This shows that heat and cold application was effective in reducing the duration of labour (Table 3)

With respect to pain level, it shows that during the pretest, almost all 30 (100%) mothers had severe level of labour pain while in the post-test I, 21 (70%) mothers and 9 (30%) mothers had moderate and mild level of labour pain. In post-test II, 20 (66.67%) mothers and 10 (33.3%) mothers had moderate and mild level of labour pain. In post-test III, 17 (56.67%) mothers and 13 (43.33%) mothers had moderate and mild level of labour pain respectively in the experimental group, whereas in control group all 30 (100%) mothers had severe level of labour pain during the pretest as well as during the post-test I, II and III.

Furthermore, the result on pain level also highlighted that there was significance difference between the post test I, II and III and the calculated 't' value was 11.95, 13.32 and 16.03 for post test I, II and III respectively. These found to be statistically significant at $p < 0.01$ level (Table 4).

The mean pre-test pain level was 8.73 ± 0.98 and the mean post-test pain level in the post test I, II and III were 4.53 ± 1.65 , 4.13 ± 1.57 & 3.80 ± 1.51 respectively. The calculated Repeated Measures ANOVA $F = 80.67$ was found to be statistically significant at $p < 0.0001$ level (Table 5).

The above result clearly indicates that intermittent heat and cold application on labour pain among the intranatal mothers was found to be effective in reducing the level of labour pain intensity among mothers in the experimental group.

The demographic variable occupation and obstetric variable weeks of gestation had shown statistically significant association with level of labour pain among intranatal mothers at $p < 0.05$ level.

DISCUSSION

In this present study, intermittent heat and cold application

Table 1. Distribution of Demographic and Obstetric Variables of Intranatal mothers in the experimental and control group [N=60 (30+30)].

Demographic and Neonatal variables	Experimental Group		Control Group	
	N	%	n	%
Age				
20 - 25 years	23	76.67	20	66.67
26 - 30 years	5	16.67	8	26.67
Above 30 years	2	6.67	2	6.67
Religion				
Hindu	26	86.67	24	80
Muslim	1	3.33	3	10
Christian	3	10	3	10
Education				
Graduate or post graduate	17	56.67	16	53.33
Higher secondary	11	36.67	8	26.67
High school certificate	1	3.33	4	13.33
Primary school certificate	1	3.33	2	6.67
Illiterate	-	-	-	-
Occupation				
Homemaker	22	73.33	24	80
Private employee	6	20	6	20
Government employee	-	-	-	-
Self-employee	2	6.67	-	-
Monthly family income				
<5000	2	6.67	4	13.33
5000 - 10,000	14	46.67	15	50
10,000 - 20,000	9	30	7	23.33
>20,000	5	16.67	4	13.33
Type of family				
Nuclear	14	46.67	13	43.33
Joint	16	53.33	17	56.67
Dwelling				
Urban	16	53.33	16	53.33
Rural	14	46.67	14	46.67
Gestational weeks (Weeks)				
37 - 38 weeks	5	16.67	3	10
>38 - 39 weeks	10	33.33	13	43.33
>39 - 40 weeks	15	50	14	46.67
Fetal heart rate				
>140 min	-	-	-	-
120 - 140 min	28	93.33	25	83.33
100 - 120 min	2	6.67	5	16.67
<100 min	-	-	-	-

Table 2. Distribution of duration of first, second and third stage of labour among intranatal mother in the experimental and control group [N=60 (30+30)].

Duration of labour	Experimental group		Control group	
	n	%	n	%
First stage (5 cm of cervical dilatation)				
3 – 3.30 hours	10	33.3	-	-
>3.30 – 4 hours	7	23.3	-	-
>4 – 4.30 hours	8	26.7	5	16.67
>4.30 – 5 hours	2	6.67	15	50
>5 hours	3	10	10	33.3
Second Stage				
<1 hour	4	13.33	-	-
1 – 1.30 hours	21	70	2	6.67
>1.30 – 2 hours	5	16/67	14	46.67
> 2 hours	-	-	14	46.67
Third stage				
10 min	14	46.67	9	30
15 min	13	43.33	12	40
20 min	3	10	9	30

Table 3. Comparison of duration of first, second and third stage of labour between experimental and control group [N= 60 (30+30)].

Duration of labour	Experimental Group		Control Group		Unpaired “t” test
	Mean	S. D	Mean	S. D	
First stage	242.50	41.35	288	20.32	t = 5.409, P = 0.028, S*
Second stage	76.50	18.89	118.93	17.90	t = 8.927, P = 0.041, S*
Third stage	13.17	3.35	15	3.94	t = 1.943, P = 0.933, N.S

*p<0.05, S – Significant, N.S- Not Significant.

Table 4. Comparison of Post-test level of labour pain between Experimental and Control group: N= 60 (30+30).

Labour Pain	Experimental Group		Control Group		Unpaired ‘t’ Value
	Mean	S. D	Mean	S. D	
Post-test 1	4.53	1.65	8.73	0.98	t = 11.958, P = 0.006, S**
Post-test 2	4.13	1.57	9.53	0.89	t = 13.320, P = 0.003, S**
Post-test 3	3.80	1.52	9.13	1.01	t = 16.033, P = 0.002, S**

**p<0.01, S – Significant.

Table 5. Comparison of Pretest and Post-test level of labour pain among the Intranatal mothers within Experimental group (N=30).

Labour Pain	Pretest		Post-test 1		Post-test 2		Post-test 3		Repeated Measures ANOVA
	Mean	S. D	Mean	S. D	Mean	S. D	Mean	S. D	
Experimental	8.73	0.98	4.53	1.65	4.13	0.57	3.80	1.51	F=80.675, P = 0.0001, S***

to intranatal mothers showed that there was statistically significant reduction of the labour pain and duration of first and second stage of labour among the experimental group

mothers compare to control group mothers. The calculated unpaired ‘t’ value of post-test 1, 2 and 3 were 11.95, 13.32 and 16.03 which shows that there is significant difference

($p < 0.01$) between the post-test level of pain score among control and experimental group. The calculated repeated measures ANOVA is $F = 83.675$ which shows that the highly significant difference ($p < 0.000$) between pre-test and post-test 1, 2 and 3 level of labour pain score in experimental group. The calculated unpaired "t" value of first and second stage duration of labour, 5.409 and 8.927 respectively were found to be statistically significant at $p < 0.05$ level (Tables 1 to 5). The present study result is consistent with various study conducted by Ganji et al. (2013) on the effect of intermittent local heat and cold on labour pain and child birth outcome for nulliparous women admitted in labour unit in Emam Ali and Shahid Rajai Hospital (north of Iran) showed that pain severity among the heat and cold group was significantly lower than the control group, comparison of labor outcomes between two group demonstrated a significant difference in duration of the first and third phases of delivery and evaluation of mothers's satisfaction revealed that a large number of mother among the heat and cold group had high satisfaction (43.8%) and 12.5% had very high satisfaction and none of them were dissatisfied (Ganji et al., 2013). Another study by Ghani (2014) on effect of heat and cold therapy during the first stage of labour on women perception of birth experience for parturient women admitted in labour unit in Qasral-Aini, Cairo University Maternity Hospital showed that there was a statistically significant differences between both groups after intervention. Mothers in the study group reported lower labour pain, lower anxiety level and higher satisfaction level than the mothers in the control group (Ghani, 2014).

Similarly study by Ahmad-Shirvani and Ganji (2016) on comparison of separate and intermittent heat and cold therapy in labour management for parturient women admitted in maternity unit in north of Iran highlighted that the pain intensity was slightly lower in the heat therapy group, duration of second stage was significantly lower in the cold therapy group and mother's satisfaction was high in the heat and the intermittent heat and cold therapy groups compared to cold therapy group.

Study by Behmanesh et al. (2009) on the effect of heat therapy on labour pain severity and delivery outcome in parturient women for Primiparous women admitted in maternity hospital of Babol Medical University showed that heat therapy affects the intensity of labour pain in first and second stages of labour and shortens the first and third stages of labour. Mothers in the intermittent heat and cold therapy group had decreased labour pain and duration of labour. This is consistent with other studies on heat and cold therapy who reported a decreased labour pain and duration of labour (Behmanesh et al., 2009)

Conclusion

The major conclusion drawn this study is that intermittent heat and cold therapy were effective in reducing the labour

pain and duration of first and second stage of labour. Heat and cold application is a growing trend to Non-Pharmacological pain relief methods because of low potential risks for mother and fetus. These methods also lead to higher satisfaction from the birth experience by increasing the sense of control and empowerment. Heat and cold application on intranatal mothers is very cheap and simple method and no need previous experience and it will have no side effects. This intervention also promotes the emotional support to the mother. Such Non-Pharmacological therapies help to break the fear-pain-tension cycle, which may reduce the physical sensations of and emotional responses to Pain, as well as the need and demand for drugs.

Recommendations

1. Replication of the study may be done with large sample in different setting to validate and generalize the findings.
2. A comparative study can be done among Primi and Multigravida.

CONFLICT OF INTEREST

All of the author declare that they have no conflict of interest or financial conflict.

REFERENCES

- Ahmad-Shirvani, M., & Ganji, J. (2016). Comparison of separate and intermittent heat and cold therapy in labour pain management. *Nursing Practice Today*, 3(4), 179-186.
- Al-Battawi, J. I., Mahmoud, N. M., & Essa, R. M. (2017). Effect of ice pack application on pain intensity during active phase of the first stage of labor among primiparous. *Journal of Nursing Education and Practice*, 8(2), 35-45.
- Behmanesh, F., Pasha, H., & Zeinalzadeh, M. (2009). The effect of heat therapy on labor pain severity and delivery outcome in parturient women. *Iranian Red Crescent Medical Journal*, 11(2), 188-192.
- Bobak, M. I., & Jenson, D. M. (1993). *Maternal and Gynaecologic Care*. 5th edition. St. Louis: Mosby publications.
- Brunner, L. S., & Suddarth, D. S. (2010). *Textbook of Medical Surgical Nursing*. 12th edition Philadelphia: Lippincott Williams and Wilkins Publication.
- Burns, N. (2007). *Understanding nursing Research*. 4th edition Philadelphia: W. B Saunders Company.
- Burns, N., & Grove, S. K. (2010). *Understanding Nursing Research-eBook: Building an Evidence-Based Practice*. Elsevier Health Sciences.
- Cunningham, F. G. (2001). *Williams Obstetrics*. 21st edition, East Norway: apealton.
- Dutta, D. C. (2005). *Text book of Gynaecology*. 6th edition Calcutta: New Central Book Agency.
- Fahami, F., Behmanesh, F., Valiani, M., & Ashouri, E. (2011). Effect of heat therapy on pain severity in primigravida

- women. *Iranian Journal of Nursing and Midwifery Research*, 16(1), 113.
- Ganji, Z., Shirvani, M. A., Rezaei-Abhari, F., & Danesh, M. (2013). The effect of intermittent local heat and cold on labor pain and child birth outcome. *Iranian Journal of Nursing and Midwifery Research*, 18(4), 298.
- Ghani, R. M. A. (2014). Effect of heat and cold therapy during the first stage of labor on women perception of birth experience: a randomized controlled trial. *Journal of Biology, Agriculture and Healthcare*, 4(26), 66-72.
- Pillitteri, A. (2007). *Maternal and child nursing*. 5th edition Philadelphia: Lippincott Williams and Wilkins Publication.
- Polit, D. F., & Beck, C. T. (2007). *Nursing Research*. 7th edition. New Delhi: Lippincott Williams and Wilkin.
- Ricci, S. S. (2009). *Essentials of maternity, newborn and womens health nursing* 2nd edition. Published by Wolters Kluwer, Lippincott Williams and Wilkins.
- Sharma, S. K. (2012). *Nursing research and statistics*. Published by Elsevier India pvt., New Delhi.
- Taylor, C. (2009). *Fundamentals of Nursing*. 6th edition Philadelphia: Lippincott Williams and Wilkins Publication.