



Research Paper

## Effect of Infrared radiation on Pain and Wound healing among women who underwent Cesarean section.

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*An experimental study to determine the effectiveness of infrared radiation on pain and wound healing among women after Cesarean section in a Tertiary Hospital in Vellore, Tamil Nadu. About 60 post operative women who met the inclusion criteria were randomly selected to Experimental and Control group. The women in Experimental group received Infrared radiation morning and evening from third to fifth postoperative day. The women in Control group received only the routine pain medication and standard care. Pain was assessed using numerical pain scale every day morning and evening from 3<sup>rd</sup> to 5<sup>th</sup> day post operatively for both the groups. The wound was assessed using REEDA scale on the 3<sup>rd</sup> day morning and 5<sup>th</sup> day evening in both the groups. The study findings revealed that the mean pain scores in the women of the Experimental group is 5.63, 2, 2.2, 1.6, 1.53, 0.7 and the pain scores in the control group is 5.93, 4.5, 4.3, 3.37, 2.83, 2.03 respectively from day 3 to day 5 morning and evenings. This shows that the mean pain scores in the Experimental group is less compared to the control group. The difference in the wound healing score between the 3<sup>rd</sup> and the 5<sup>th</sup> day is 0.566 in the Control group and 1.33 in the Experimental group; there is a statistical significant difference in the wound healing score among women of Experimental group compared to the women in Control group with the p value of 0.003. Infrared radiation is found to be an effective non - pharmacological pain management and also helps in wound healing among post operative cesarean section women.*

*Received 10 Feb, 2021; Revised: 23 Feb, 2021; Accepted 25 Feb © The author(s) 2021.  
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### I. INTRODUCTION

Child birth is a powerful and life changing event with the lasting impact on women. Naturally, expectant mothers spend a lot of time thinking about how they will give birth. Although most people believe that a vaginal birth is the best way to deliver, sometimes a cesarean section cannot be avoided. Cesarean birth is a common delivery procedure in obstetric practice which can be performed as an emergency or elective procedure. Even though Cesarean section can be a life-saving procedure for both mother and baby, it does come with risk and can lead to complications such as sepsis, wound infection etc. Wound care is an expensive area of the treatment for health care services. Wound infection signifies a substantial burden to the health system. The prevention of such infections should be of main concern in developing countries, one such preventive measure is infra red radiation therapy for surgical site wound. Infrared light is delivered to site of injury or inflammation at certain wavelengths promoting cell repair.

### SIGNIFICANCE AND NEED FOR THE STUDY

Since 1985, the World Health Organization has considered the ideal rate of cesarean section to be between 10 and 15%. Nevertheless with medical justification, the cesarean rates have increased over the years. In at least 15 countries the caesarean rate exceeds 40%, including the Dominican Republic (58.1%), Brazil (55.5%), Egypt (55.5%), and Turkey (53.1%). In the UK, caesarean section deliveries have increased from 19.7% of births in 2000 to 26.2% in 2015.<sup>1</sup> According to National Family Health survey 2015-2016 conducted in 15 states and united territories, the rate of Cesarean section is as high as 87.1%. More than 34.1% of women were being cut open for deliveries in 2015- 2016, a jump around 14% from 2005 – 2006. During the post-operative period moderate to severe pain is the regularly reported problem. The management of postoperative pain after cesarean section is rather different from other surgeries mainly because of the women needing a faster recovery to take care of the newborn and restraint in using non-steroidal inflammatory drugs or opiates during breastfeeding. Also, surgical site infections are common complication after a cesarean section and mainly responsible for increased maternal mortality and morbidity. Infrared radiation is a new and innovative light

based method to treat pain and inflammation in various parts of the body. Unlike ultraviolet light which can damage the skin infrared light enhances cell regeneration. The key characteristic of infra-red light is its ability to penetrate even the deep layer of the skin providing better pain relief and promoting healing. It also protect against oxidative stress. Manju and Baladesh and SengathirSelvi did a study on effectiveness of infrared radiation on wound healing among mothers at Puducherry. The results of the study showed that infrared radiation was effective in enhancing wound healing and relieving pain among Cesarean section mothers.<sup>2</sup>

With the support of literature and by understanding the effect of infrared radiation on wound healing and pain the researcher would like to apply infrared radiation on cesarean wound for its effectiveness on wound healing and pain among mothers who underwent cesarean section.

### **OBJECTIVES OF THE STUDY**

1. To assess the wound healing among women who underwent cesarean section.
2. To assess the pain among women who underwent cesarean section.
3. To find the effect of Infrared radiation on wound healing and pain among women who underwent cesarean section.

### **HYPOTHESIS**

- There will be a significant difference in the wound healing of women who undergo cesarean section by the use of infra red radiation in the experimental group assessed by REEDA scale compared to the control group.
- There will be a significant reduction in post operative pain of women who undergo caesarean section by the use of infrared radiation in experimental group assessed by Numerical Pain Scale with level of significance 0.05 compared to control group.

## **II. METHODOLOGY**

The research approach used was a quantitative research approach. The design is Experimental design. The study was conducted in the post natal wards of a Tertiary care Hospital in Vellore. Sample consisted of 60 women who underwent Caesarean section and fulfilled the inclusion criteria. Out of four postnatal wards, 2 wards were selected randomly by lot method for Experimental and Control group. Samples were selected from these wards by simple random sampling method allotting 30 samples in Experimental and 30 samples in Control group.

### **CRITERIA FOR SAMPLE SELECTION**

#### *INCLUSION CRITERIA*

- Women who had cesarean section and get admitted to the ward within 24 hours.

#### *EXCLUSION CRITERIA*

- Women with classical cesarean section, laprotomy and re exploration.
- Women with oozing from the operated site.
- Women with infectious and communicable disease.
- Women with post partum hemorrhage.
- Women receiving antibiotics.

### **INSTRUMENTS**

- *NUMERICAL PAIN RATING SCALE:* – It is a Standardized free scale used for assessing the intensity of pain experienced by the patients.
- *DAVIDSONS REEDA WOUND ASSESSMENT SCALE:* - This scale was given by Nancy Davidson (1972) and it is used to assess the wound healing. It consists of 5 components Redness, Edeme, Ecchymosis, Discharge from the wound, Approximation of the wound edges. Each item is given a minimum score of 0 and a maximum score of 3. The score ranges from 0 to 15.

**DATA COLLECTION PROCEDURE:**

Women for the study were selected on the third postoperative day after the dressing is removed. Written consent was obtained from women in the experimental group and a verbal consent was obtained from women in control group. Experimental group women received infrared radiation for 15 minutes morning and evening on the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> post operative day. Control group received standard pain medication and advice on wound hygiene. Wound assessment was done with REEDA Scale on the third day before the intervention in the experimental group and on the fifth day post operatively after the intervention. In the control group the wound assessment was done on 3<sup>rd</sup> and 5<sup>th</sup> post operative day with standard care. Pain assessment was done in the Control group morning and evening on the 3<sup>rd</sup>, 4<sup>th</sup> and the 5<sup>th</sup> post operative day. In the Experimental group the pain assessment was done every day morning and evening on the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> post operative day after providing the infra red radiation for 15 minutes for the cesarean section wound.

**PILOT STUDY**

A pilot study was conducted over a period of 1 week by taking 6 samples, 3 in each arm to check the feasibility of the study.

**III. RESULTS**

**Table 1**  
**Distribution of subjects according to Demographic and clinical variables**

Demographic variables	Control Group (N = 30)		Experimental group (N = 30)	
	No	%	No	%
<i>Age (years)</i>				
21 – 30	25	83.3	22	73.3
31 – 40	5	16.7	8	26.6
<i>Educational Status</i>				
Higher secondary school	12	40.0	17	56.6
Graduate	13	43.3	4	13.3
Post Graduate	5	16.6	9	30
<i>Religion</i>				
Hindu	28	93.3	24	80
Muslim	2	6.7	6	20
<i>Economic Status(In Rupees)</i>				
< 2000	6	20.0	6	20.0
2001 – 5000	10	23.3	9	30
5001 – 10000	6	20	11	36.7
> 10001	8	26.7	4	13.3
<i>Parity</i>				
Primi	13	43.3	15	50
Multi	17	56.6	15	50

Majority of women 83.3% in control and 73.3% in experimental group fall between the age group of 21 – 30 years. About 43.3% women in control group had education up to graduate level. Majority of women in both the groups 93.3% in control group and 80% in Experimental group belong to Hindu faith. Most of the women in both Experimental (50%) and Control group (56.6%) are multipara.

**Table 2**  
**Mean Wound Healing Scores in the Experimental and Control group on day 3 and day 5 postoperative. (Pretest and post test).**

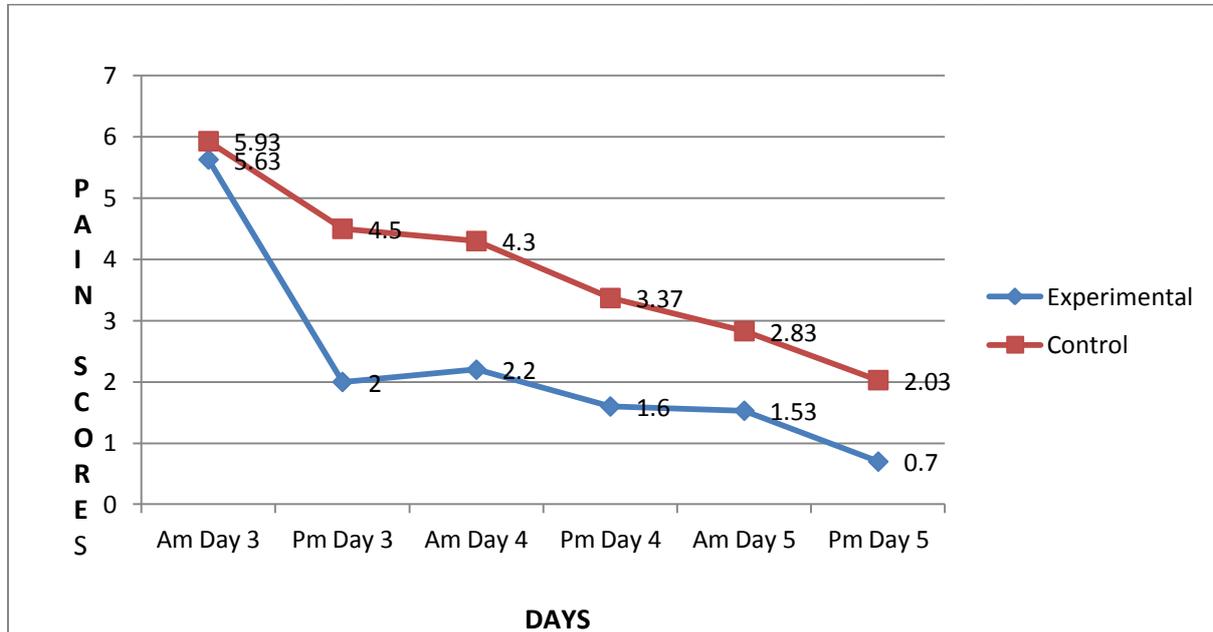
Group	Pre-test (3 <sup>rd</sup> day)		Post-test (5 <sup>th</sup> day)		Paired 't' value	P value
	Mean	SD	Mean	SD		
Experimental Group	5.20	1.064	3.87	0.776	6.679	0.000*
Control Group	4.87	1.042	4.30	1.055	3.798	0.001

\*P = < 0.050

**Inference:**

The mean wound healing scores on day 3 and day 5 were calculated for Experimental and Control group. A paired 't' test was done to find the difference in pre and post test in both the groups. The above table shows a significant improvement in the wound healing scores in both Experimental and control group. However there is a difference in the mean score of Experimental group compared to the control group on the 5<sup>th</sup> day, where the Experimental group has a mean score of 3.87 and the control group has 4.30.

**FIGURE 1  
MEAN PAIN SCORES OF THE EXPERIMENTAL AND CONTROL GROUP**



The above figure gives the mean pain scores of the experimental and control groups. There is decrease in pain scores of the experimental group compared to the control group. The mean pain scores are 2, 2.2, 1.6, 1.53 and 0.7 in the Experimental group after the intervention whereas the pain scores in the Control group is 4.5, 4.3, 3.37, 2.83 and 2.03 on 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> day at various time periods.

**Table 3  
Comparison of Wound Healing scores (Difference)\* in Experimental and Control group.**

Variables	Control group (N=30)		Experimental group (N=30)		't' value	P value
	Mean	S.D	Mean	S.D		
Difference of Wound Healing scores	-0.566	0.817	-1.33	1.093	-3.076	0.003*

\*Foot note: Difference in the pre and post wound healing scores was obtained from two groups.

\*\*\*P = <0.0001

**Inference:**

The difference in the pre and post wound healing scores was calculated and compared between groups. This shows significant difference in the Experimental group with a p value of 0.003.

**Table 4  
Comparison of pain score (summary measure)\* in Experimental and Control group**

Variables	Control group (N=30)		Experimental group (N=30)		't' value	P value
	Mean	S.D	Mean	S.D		
Numerical pain score	23.0	7.93	13.6	6.46	-4.99	0.000***

\*Foot note: Summary measure was computed by taking the pain scores of the women at various time periods.

\*\*\*P = <0.0001

**Inference:**

The mean pain score was calculated from the summary measures of numerical pain scores at different time periods (3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> day morning and evening post operatively) in both Experimental and Control group. The above table projects a significant reduction of pain scores in Experimental group compared to the pain scores in the Control group with p value of 0.000.

**IV. DISCUSSION**

The study result shows that there is a significant reduction of pain in the Experimental Group compared to the control group with the P value of 0.000. This is supported by a similar study by Dash & Selvi (2013), which reports that there is a statistically significant reduction in the pain score of postoperative Cesarean women in the Experimental group (n=50) who received Infra red therapy compared to the women in the Control group (n=50) who received regular dressing.<sup>4</sup>

The study also reports that there is significant change in the wound healing scores of the women in the Experiment group compared to the control group with p value <0.05. The pre and post test of both the groups have statistical significant difference. However the mean score for wound healing in the experimental group is 3.87 and the mean score for wound healing for the control group is 4.30, this signifies that the wound healing is better in the Experimental group compared to the control. To find the effectiveness of Infra red radiation on wound healing in the experimental group the difference in the wound healing scores were calculated and was compared between groups. This shows a statistical significant difference in the wound healing score with a p value of 0.003. This is supported by a study done by Dash and Selvi (2013), which states that there was good wound healing in the experimental group who received Infrared radiation compared to the control group who just received standard care.<sup>4</sup>

**V. RECOMMENDATIONS:**

- Nursing personnel should be knowledgeable and skillful about wound assessment and wound management.
- The nursing personnel should know the importance of pain assessment and pain management.
- The nurse should not only be skillful in assessing the wound of patients after cesarean section and but also should take measures in caring and educating the women on wound healing process.
- Nurses should not be satisfied by managing pain with pharmacological method, rather should be sensitive to use other methods for pain management.
- Infrared radiation can be routinely used for all post operative women in the wards to manage pain and wound healing as it is used for episiotomy wounds.
- The study can be replicated with large sample size.

**VI. CONCLUSION:**

The study findings support the hypothesis that there will be significant reduction in pain and improvement in wound healing in the experimental group compared with the control group by the use of infra red radiation. Nurses can use this method to reduce pain and promote wound healing. It is cost effective, improves comfort, and enhances psychological and physical well being.

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