Effectiveness of Infrared Rays on Wound Healing among Caesarean Section Mothers at Puducherry

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Received October 28, 2013; Revised November 28, 2013; Accepted December 08, 2013

Abstract To evaluate the effectiveness of Infrared rays on wound healing and pain level in the experimental group comparison with control group mothers were conducted at Puducherry, India. **Methodology:** quantitative approach and pre- test/ post- test control group design adopted and 100 caesarean section mothers (50 experimental & 50 control group) were selected by simple random sampling technique. Pre-test was done to assess the existing wound healing & pain level for both group with standard scale (Modified Southampton wound assessment scale &Numeric pain rating scale). Experimental group received infrared therapy whereas the control group received routine dressing for twice a day for 3 days. Post-test assessment of wound healing & pain level was done on 5^{th} & 7^{th} post operative days with the same standard scales. **Result and findings:** Pre& post-test mean wound healing scores in experimental group was 2.1 ± 1.446 & 1.26 ± 0.828 respectively with 't' value 4.365(p<0.05), Similarly the mean pain level scores was 3.90 ± 0.303 & 1.94 ± 0.424 with the 't' value 28.100(p<0.05) and found statistically significant. There was a positive correlation between the wound healing and pain level score r = 0.22.

Keywords: infrared, wound healing, caesarean section

Cite This Article: Manju Bala Dash, and Sengathir Selvi, "Effectiveness of Infrared Rays on Wound Healing among Caesarean Section Mothers at Puducherry." *American Journal of Nursing Research* 1, no. 1 (2013): 43-46. doi: 10.12691/ajnr-1-1-7.

1. Introduction

Pregnancy and child birth are special events in women's lives. 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 Caesarean section (CS) cannot be avoided [1,2,3].

Caesarean birth is used most often as a prophylactic measures, to alleviate problem of birth such as cephalo pelvic disproportion, failure to progress in labour or fetal distress. A major concern in maternal and child health nursing is the increasing number of caesarean birth being performed annually [4,5].

In India, the incidence of primary caesarean birth is about 30.2% or one-third of births (National Vital Statistics System, 2008). The majority of the states are within the WHO specified range of 5 to 15% Caesarean section, among that, five states are above the range and 12 states below the specified range. This rate ranged between 26 % and 2%. The prevalence of Caesarean section is generally more in the southern states and in Pondicherry it is around 31.93% in rural and 39.92% in the urban area [6,7,8].

Post caesarean wound infection is not only a leading cause of prolonged hospital stay but a major cause of the widespread aversion to caesarean delivery in developing countries. [9]. Immediate management is essential to decrease the chance of infection, length of the hospital stay and to return for normal function. Infra red radiation is one of the modalities to treat the pain and wound.

Heat transmission with IR radiation is governed by inverse square law, it state that the intensity of radiation varies inversely with the square of the distance between the source of radiation &the skin. Intensity of the radiation is reduced; if the distance between the source & the target is increased & vice versa. The duration of the exposure should be 15 to 20 minutes once or twice a day. The treatment commence with the IR source placed at distance of 30" to 36" from the surface being treated [10,11,12,13].

Infrared Rays has therapeutic effect of increasing the blood supply and relieving the Pain. This will increase the supply of oxygen and nutrient available to the tissues accelerate the removal of the waste products and help to bring about the resolution of inflammation. When the heat is mild, the relief of pain is probably due to the sedative effect on the superficial sensory nerve endings. It is also helping achieve muscular relaxation and for the relief of muscle spasm associated with injury or inflammation [14,15,16]. Infrared rays also have the physiological effect on cutaneous vasodilation due to liberation of chemical vasodilators, histamine and similar substance, as well as possible direct effect on the blood vessels. [20] So the infra red radiation is considered as a choice of Electro Therapy Modality for the caesarean section mothers.

1.1. Objectives

- To evaluate the effectiveness of Infrared rays on wound healing and pain level in the experimental group comparison with control group.
- To correlate the level of pain with the Wound healing. **Assumption:** Infrared ray therapy may have an effect on wound healing and reduces the intensity of pain among the caesarean section mothers.

1.2. Hypothesis

H1: There will be a significant difference between the pre &post tests wound healing & pain level scores among the control and experimental group.

2. Methodology

2.1. Research Approach & Design

A Quantitative approach& True experimental - Pretest/post-test control group design was adopted to fulfill the aim of this study. The sample for the study comprises of all Caesarean Section mothers and the sample size was 100 subjects, who underwent caesarean section of which 50 in the control group and 50 in the experimental group.

2.2. Criteria for Sample Selection

2.2.1. Inclusion Criteria

- Mother who are willing to participate
- Mothers are in 3rdpost operative day

2.2.2. Exclusion Criteria

 Post operative mothers with any complication or complication to baby of the mother during the study period.(other than pregnancy induced hypertension and anemia).

Simple Random sampling technique and it is used for the present study. Hundred mothers (50 in experimental and 50 in control group) were selected randomly by even and odd numbers with the help of lot method. The tool has two section A & section B, further the section A has two parts for collecting demographic & obstetric variables of mothers. Section B has two parts for assessing the wound healing and pain level of caesarean section by Modified Southampton Wound Assessment & Numeric Pain Rating Scale [17,18,19].

Table 1. The wound grading was recorded and information about was regarded in four categories

Grade	Wound healing status		
A	Normal healing		
В	Minor complication		
С	Wound infection		
D	Major Hematoma		

The most common pain assessment tools are verbal self report instruments such as the 0-10 Numeric Pain Rating Scale. Patients were asked to indicate the intensity of current, best, and worst levels of pain using an 10-point scale ranging from 0 (none) to 10 (severe pain imaginable) The average of the 4 ratings was used to represent the patient's level of pain.

Table 2. The score will be as follows

SCORE	PAIN LEVEL	PERCENTAGE		
0	No Pain	100%		
1-3	Mild Pain (nagging, annoying, interfering little with ADLs)	90- 70%		
4-6	Moderate Pain (interferes significantly with ADLs)	60-40%		
7-10	-SeverePain (disabling; unable to perform ADLs)	30-0%		

The tool was standardized but it was validated by submitting to experts and the modifications were incorporated in the final preparation of the tool. Inter rater method was used to determine the reliability and the 'r' value is 0.8 considered reliability of the tool.

2.3. Data Collection Procedure

Infrared ray therapy for an Experimental group was started on 3rd postoperative day of caesarean section. The 3rdpost operative day wound assessment was considered as pre -test .Only the surgical site was exposed to the infrared rays and the other area was draped. A sterile dressing was done before the exposure. The mothers were made into side lying position at a 45 degree angle to the infrared rays. Eye pad was given to protect their eyes from retinal damage due to infrared rays. Infrared ray therapy was given over the caesarean wound for 30 minutes duration, twice a day, for 3 consecutive days (3rd, 4th&5thpost operative days). The irradiation distance was about 50 cm from the incision site. After exposure, the wound healing & pain level was assessed on 5th &7th post operative day with Southampton wound assessment and numeric pain rating scale respectively. The 5th and 7thpost operative day wound healing & pain level assessment was considered as post test.

Similarly the Control group was received sterile dressing on 3rd postoperative day of caesarean section. The sterile dressing was done twice a day for 3consecutive days (3rd, 4th &5thpost operative days). After dressing, the wound was assessed on 5th &7thpost operative days with Southampton Wound Assessment and Numeric Pain Rating Scale. The 5th and 7thpost operative day wound assessment was considered as post test. Schedule for data collection was shown in the Appendices.

2.4. Result and Findings

The demographic findings shows that majority 26(52%),28(56%) subjects were under the age group of 21-25 years in the control and experimental group respectively, 38(76%), subjects in control and experimental group had primary and secondary level of education, and 49(98%) subjects in control group & all subjects 50(100%) in experimental had less than Rs 5000 family income per month.

The 5th day post test mean wound healing scores were 2 \pm 1.4 & 1.38 \pm 0.987 for the control & experimental group respectively, the calculate 't' value is 2.559 shows that the 'p' value (0.12) was statistically not significant though the mean wound healing scores of the experimental group was less compare to control group.

On 7^{th} day post test mean wound healing scores were 1.86 ± 1.325 & 1.26 ± 0.828 for the control & experimental group respectively. The calculated 't' value is 2.715 shows that the 'p' value (0.008) was statistically

significant in the experimental group in compare to the control group (Figure 1).

Similarly the 5^{th} day post tests mean pain scores was $3.08 \pm 0.528 \& 2.68 \pm 0.551$ for control & experimental group respectively. The calculated 't' value 3.705 shows the (p<0.000) was statistically significant. Further the post test mean pain scores (7th day) $2.12 \pm 0.435 \& 1.94 \pm 0.424$ for control and experimental group respectively. The calculated 't' value is 2.094 with p value (0.39) is statistically significant (Figure 2).

Therefore it was inferred that the infrared therapy was effective in improving the wound healing as well as reducing the pain level among the subjects in experimental group.

Table 3. Highlights that there was highly significant difference found between the post tests wound healing scores of experimental group mothers, the calculated 'f' value shows 6.957 with 'p' value 0.001(p<0.001) ***.

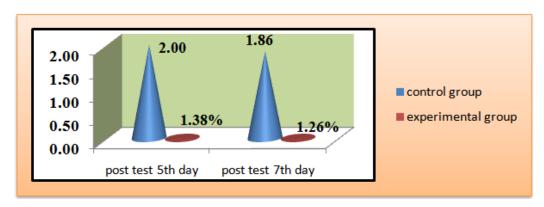


Figure 1. Effectiveness of Post tests (5th & 7th day) wound healing scores among the control & experimental group

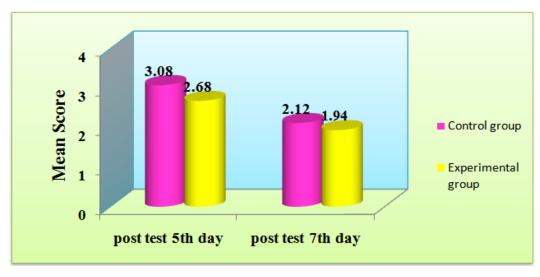


Figure 2. Effectiveness of Post tests (5th & 7th day) pain level scores among the control & experimental group

Table 3. ANOVA for effectiveness of the post tests wound healing scores in the experimental group

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Post test Wound healing scores	Mean	SD	Level of significance	
			'F' value &'p' value	
Pre- test 3 th day	2.10	1.446		H1 is accepted.
Post test on 5 th day	1.38	0.987	6.957 0.001*** S	
Post test on 7 th day	1.26	0.828		

^{***}p<0.001, S – significance.

Table 4. ANOVA for effectiveness of the post tests pain scores in the experimental group

Table 4: 1110 111 the checuveness of the post tests pain scores in the experimental group					
Post test pain scores	Maria	Mean SD	Level of significance		
	Mean		Mean SD	F value & 'p' value	
Pre- test on 3 th day	3.90	0.303		H1 is accepted.	
Post test on 5 th day	2.68	0.551	169.392 0.000*** S		
Post test on 7th day	1.94	0.424			

^{***}p<0.001, S - significance.

Table 4. Highlights that there was highly significant difference found between the post tests pain level scores of experimental group subjects, the calculated 'f' value shows 169.392 with 'p' value 0.000 (p<0.001)***

Table 5. Correlation between the wound healing & pain level scores of subjects among experimental group

VARIARIF	Mean	SD	'r' value
VAINIADLE	ivicali	SD	i value
Pain level	1.94	0.424	0.221
Wound healing	1.26	0.828	0.221

***p<0.05, S - significant

Table 5. Shows that there is positive correlation between the pain level and wound healing score r = 0.22, indicates there is reduction of pain as the wound healing occurs & vice versa.

3. Conclusion

The study result showed that infrared light application was effective in enhancing wound healing & relieving pain level among the caesarean mothers. All the subjects in the experimental group had healed caesarean wound and reduced pain level almost on 5th and 7thpost operative day. This is also the cheapest procedure & convenient measure. So this infrared light therapy can be administered as an adjunct therapy by health personnel in their day to day caring the mother in hospital setting.

4. Limitation

- Time consuming
- Man power and skilled person was needed to perform the procedure.

5. Recommendation

- Replication of the study may be done with large samples in different setting to validate and generalize the findings.
- A comparative study can be done between elective and emergency caesarean section mothers to find out differences of degree of wound healing.
- The findings can be used as evidence based for providing infrared therapy among caesarean section mothers.

6. Ethical Consideration

Permission was obtained from the concern authority. The subjects were selected based on the inclusion and exclusion criteria for the study. Written consent was taken from each subject before the intervention. Confidentiality and anonymity were assured.

Conflict of Interest

there is no conflict of interest to disclose.

Acknowledgement

The author acknowledge the PG student and other hospital staffs for co-operation during the period of study, also acknowledges all the mothers for their co-operation and consent for study.

References

- Adele Pillitteri. (2007). Maternal and child nursing. 5th ed. Philadelphia: Lippincott Williams and Wilkins Publication.Pp:655-654.
- Bobak, M.I. &Jenson, D.M. (1993).Maternity and Gynaecologic Care.5th ed. St.Louis: Mosby publishers.Pp:625.
- [3] Barber (2011). "Indications Contributing to the Increasing Caesarean Delivery Rate" Obstetrics & Gynecology, Wolters Lippincott Williams & Wilkin 118(1).
- [4] Charles E Denk, Kathryn P Aveni, 2009, Surveillance of Maternal Peripartum Complications Following Cesarean Section, Maternal and child health Epidemiology, November 2009.
- [5] Child birth connections, 2007, why caesarean section rate is high?
- [6] Chayan Roy Choudhury, 2008, Cesarean Births: The Indian Scenario, International Institute for Population Sciences (IIPS).
- [7] Vijayalakshmi. N, Prabakaran.J, 2012, Caesarean Section; A new disease, Nat.J.Res.Com.Med., 1(4), .178-241.
- [8] Blanchette, Howard MD, (2011). "The Rising Caesarean Delivery Rate in America: What Are the Consequences?" Obstetrics & Gynecology, 118(3): 687-690.
- [9] Oliver C Ezechi (2009). "Incidence and risk factors for caesarean wound infection in Lagos Nigeria.
- [10] Ann John Low and Reed, Electro therapy explain-, principles and practice 3rded.
- [11] ChaitaliBiswas. (2009) "A comparative study to assess the effectiveness of infrared radiation on episiotomy wound healing in selected hospitals, west Bengal".
- [12] Campbell, W.G. (1978). Form and style in the thesis writing. 2nd ed. Boston HongtonMiffin Company. Pp1132-1138.
- [13] Dutta D.C (2005). Text book of Gynaecology. 6th ed. Calcutta: New Central Book Agency (p) Ltd. Pp: 588-597.
- [14] Eastman, N.J. (1950). Williams Obstetrics. 13thed. New Delhi: Churchill Livingstone. Pp. 23.
- [15] Ezechi OC et al, (2009). "Incidence and risk factors for caesarean wound infection in Lagos Nigeria", BMCR 22; 2:186.
- [16] Danso, K. A. &Adu-Sarkodie, Y.1998, Abdominal wound infection complicating caesarean section" Ghana Medical Journal, vol. 32b.
- [17] Lon R. Horwitz, et al, 1999 "Wound Healing Using Infrared Energy", ADV WOUND CARE; 12:35-40.
- [18] Nancy Wells & et.al. 2008, "Improving the Quality of Care through Pain Assessment and Management".
- [19] C. Nice, et al, 1996, "A prospective audit of wound infection rates after caesarean section in five West Yorkshire hospitals", Journal of Hospital Infection, 33(1), Pp 55-61.
- [20] Thumma Ceciliamma. (2012). "Perineal care with and without infra red light application on episiotomy wound healing among postnatal mothers". The Nurse 4(1), Jan-feb.