

## Comparative evaluation of efficacy of infrared radiation to routine care on episiotomy wound healing among postnatal women

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### Abstract:

**Objectives:** The present study was designed with the primary aim to evaluate the effectiveness of addition of infrared radiation to routine care in comparison to only routine care on episiotomy wound healing among postnatal mothers. **Methods:** A total of 120 postnatal women complying with study inclusion criteria were included and randomly divided into two groups viz. routine care (Group A) and routine care with addition of infrared radiation (Group B). A detailed clinical history, including medical, surgical and obstetrical information were taken from all the subjects. Samples were collected for baseline laboratory tests. In group A, subjects received only routine care for episiotomy wound healing. Whereas in group B, study subjects received routine care with addition of infrared radiation. The data was collected in a proforma and analyzed using SPSS v 21.0 statistical software. **Results:** revealed that there was a statistically significant difference between the groups with regards to REEDA scale - Redness, Edema, Ecchymosis, Discharge, Approximation (closeness of skin edges) ( $p < 0.05$ ). **Conclusion:** Infrared therapy is effective in enhancing wound healing and relieving pain level among the postnatal mother's.

**Keywords:** Postnatal women, infrared radiation, routine care, episiotomy, REEDA scale.

Pregnancy and child birth is a natural process and most of the cases require no intervention except close monitoring and support the patient morally. Interventions such as medical or surgical are necessary when the natural process fails or changes its course. Postpartum complications mainly infections after normal vaginal delivery is a major concern for health care professionals due to its morbidity and prolonged hospital stay and increased healthcare costs.

Vaginal tears occur mostly at the time of delivery, more commonly at the opening of vagina because of the descent of the baby's head, mainly if the descent of the baby occurs rapidly. Vaginal tears can occur by two ways, one is spontaneously which occurs during birth of baby, or the obstetrician can make a surgical incision (episiotomy) by which the vaginal outlet diameter is increased to deliver the baby<sup>1</sup>. Episiotomy comprises of 4 types. These are: median, lateral, mediolateral and J - shaped. Among these medio-lateral episiotomy is the one used most commonly<sup>1</sup>. The advantages of episiotomy include: these are clean incisions, so reduce the incidence of perineal

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tears particularly third and fourth degree perineal tears. These are easy to suture and recovery is better compared to perineal tears. They also provide relaxation to the pelvic floor muscles and perineum which improves sexual role and decrease the incidence of urinary and fecal incontinence<sup>2,3</sup>.

Episiotomy is an incision which is surgically planned and is taken on perineum and posterior vaginal wall in the second stage of labour at the time of crowning<sup>4</sup>. Various measures are found to help in healing of episiotomy wound. These include cleanliness, topical application by dry heat (infra red therapy), applying icepack, sitz bath, perineal care and Kegel's exercise. Among all these, infra red therapy was found to be successful in pain relief caused by episiotomy and helps in wound healing process<sup>5</sup>. The healing of episiotomy wound was found to be rapid post infrared lamp therapy. Although the application of heat lamp on episiotomy wound accelerated the healing process, infra red light therapy is more effective than heat lamp in healing of the episiotomy wound. The heat emitted from infrared light penetrates up to 3 inches into the body. When it is applied on episiotomy wound there will be an increase in circulation of blood, it restricts the growth of micro organisms, relaxes tight muscles, helps in healing damaged tissues, reduces redness, edema, ecchymosis and discharge, helps in approximation of tissues, relieves pain, provides soothing and helps in fast wound healing. In a very recent study Sukala A et al<sup>6</sup> observed IFR therapy is an appropriate method of care which can be included in hospital routine care for better episiotomy wound healing and managing episiotomy pain level among women at puerperium period. Hence our present study was conducted at our tertiary care centre to evaluate the effectiveness of addition of infrared radiation to routine care in comparison to routine care on episiotomy wound healing among postnatal mothers.

## Methods

A randomized controlled study was undertaken at the Department of Obstetrics and Gynaecology, Dr. D.Y. Patil Medical College and Hospital, Pune, from October 2019 to September 2021 among postnatal women with episiotomy. A total of 120 postnatal women aged 21-30 were included in the study. The clearance from the institutional ethical committee was obtained before the initiation of the study in accordance with Helsinki Declaration. Informed consent was obtained from each study subject before giving infrared therapy. The inclusion and exclusion criteria were as follows -

### Inclusion criteria

- All postnatal mothers having episiotomy wound, forceps or vacuum delivery, right and left medio-lateral episiotomy, first 3 days in the postnatal period.

### Exclusion criteria

- Unconscious postnatal patients, postnatal mothers having defective sensation in perineal region, postnatal mothers having heart diseases, patients with psychiatric illness, severe anaemia.

A total of 120 study subjects were randomly allocated to routine care (Group A; n=60) and routine care plus infrared therapy (Group B; n=60) groups. A detailed clinical history, including medical, surgical and obstetrical information were taken from all the subjects. Samples were collected for baseline laboratory tests. Cases were selected for study who satisfied all inclusion and exclusion criteria. Group A included postnatal women who received routine care for episiotomy wound. Whereas, in group B, postnatal women received routine care with addition of infrared therapy.

Routine care of episiotomy included antibiotics (local and intravenous) cleaning the perineum with mildly antiseptic solution twice in a day, sitz bath, washing the area with soap and water. Infrared bulb used in the study consumes 150 watts and runs on 250 voltage. The duration of exposure to infrared light was 15 minutes twice a day. The treatment commenced with infrared source placed at a distance of approximately 30cm from the surface being treated. Wound healing was assessed by using check list as per Modified REEDA Scale (RS). It was used to assess the postpartum status of the perineum. REEDA has five components. These include: Redness, Edema, Ecchymosis, Discharge, Approximation (closeness of skin edges). Score of 0 – 3 were given for each parameters which indicate the severity of wound complications. It is a tool used to assess healing based on a scale of three points. If the score is 3, it suggests very poor wound healing. The entire score ranges from 0 to 15 points. Higher score indicates poor wound healing while lower score indicates good wound healing. Scores were assessed as: 0 to 2 - good; 3 to 5 - moderate; 6 to 8-mild and 9 to 15 - poor.

Statistical analysis: Quantitative data is presented with the help of standard deviation and mean. Comparisons between the study groups were done using unpaired t test as per results of normality test. Qualitative data is presented using frequency and percentage table. Association between the study groups is assessed with the help of student 't' test, fisher test and chi-square test. 'p' value less than 0.05 is taken as significant. Results were represented in graphical manner where necessary. Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 is used for statistical analysis. Graphical representation was done in MS Excel 2010.

## Results

The mean age in group A was  $23.88 \pm 2.47$  years. The mean age in group B was  $24.18 \pm 2.65$  years. As per student t-test, there was no significant difference between these groups ( $p > 0.05$ ). Group A had 15 (25%) patients with normal BMI while 17 (28.3%) and 28 (51.7%) patients were overweight and obese respectively. Group B had 13 (21.7%) patients with normal BMI while 21 (35%) and 26 (43.3%) patients were overweight and obese respectively. The mean BMI of patients in group A and group B was  $28.06 \pm 4.70 \text{ kg/m}^2$  and  $27.98 \pm 4.32 \text{ kg/m}^2$ . As per student t – test, there was no significant difference between the groups ( $p > 0.05$ ). In group A, 7 (11.6%) and 10 (16.7%) patients were educated upto primary level and SSC respectively while 15 (25%) and 18 (30%) patients studied till HSC and graduation respectively. 10 (16.7%) patients had no education. In group B, 8 (13.3%) and 11 (18.3%) patients were educated upto primary level and SSC respectively while 13 (21.7%) and 19 (31.7%) patients studied till HSC and graduation respectively. 9 (15%) patients had no education. As per chi-square test, there was no significant difference between the groups ( $p > 0.05$ ). In group A, majority of patients were from upper middle class (30%) followed by upper lower class (23.3%), lower middle class (18.3%), lower class (16.7%) and upper class (11.7%). In group B, majority of patients were from upper middle class (30%) followed by upper lower class (25%), lower middle class (16.7%), upper class (15%) and lower class (13.3%). As per chi-square test, there was no significant difference between the groups ( $p > 0.05$ ).

55 (91.7%) and 5 (8.3%) patients in group A were primigravida and multigravida respectively while 53 (88.3%) and 7 (11.7%) patients in group B were primigravida and multigravida respectively (table 1).

<b>Table 1: Distribution of patients according to parity</b>				
<b>Parity</b>	<b>Group A</b>		<b>Group B</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Primigravida	55	91.7%	53	88.3%
Multigravida	5	8.3%	7	11.7%
Total	60	100%	60	100%

2 (3.3%) and 1 (1.7%) patient in group A and group B respectively underwent LSCS in previous delivery. As per chi-square test, there was no significant difference between the groups ( $p > 0.05$ ) (table 2).

<b>Table 2: Distribution of patients according to previous LSCS</b>					
<b>Previous LSCS</b>	<b>Group A</b>		<b>Group B</b>		<b>P Value</b>
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	
Yes	2	3.3%	1	1.7%	>0.05
No	58	96.7%	59	98.3%	
Total	60	100%	60	100%	

Majority of the patients (96.7%) in group A delivered the newborn with the help of left medio-lateral and 2 (3.3%) patients delivered the newborn with the help of right episiotomy procedure. In group B, 57 (95%) and 3 (5%) patients delivered newborn with the help of left medio-lateral and right episiotomy procedure respectively. As per chi-square test, there was no significant difference between the groups ( $p > 0.05$ ) (figure 1).

The wound healing was assessed by REEDA scale. The mean pretreatment score on episiotomy wound healing was compared between group A and group B and statistically not significant as per student t-test ( $14.47 \pm 0.50$  vs.  $14.55 \pm 0.50$ ;  $p > 0.05$ ). The mean posttreatment score was significantly lower in group B compared to group A as per student t-test ( $5.45 \pm 1.02$  vs.  $0.92 \pm 0.83$ ;  $p < 0.05$ ) (table 3).

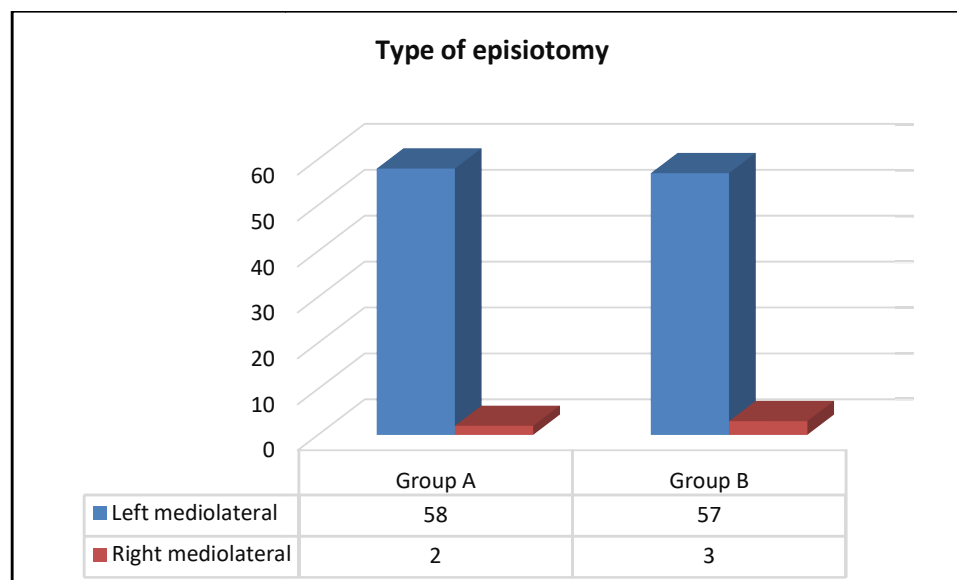


Figure 1: Distribution of patients according to type of episiotomy

Table 3: Comparison of pre and post-treatment scores on episiotomy wound healing					
Parameters	Group A		Group B		P Value
	Mean	SD	Mean	SD	
Pre-treatment scores	14.47	0.50	14.55	0.50	>0.05
Post-treatment scores	5.45	1.02	0.92	0.83	<0.05

During pre-treatment, all patients in both the groups had worst pain. There was no significant difference in pre-treatment VAS score as per chi-square test ( $p > 0.05$ ). Post-treatment, 6 (10%) patients in group A had no pain while 33 (55%) and 21 (35%) patients had moderate pain and most pain respectively. 25 (41.7%) patients in group B had no pain while 34 (56.6%) and 1 (1.7%) patient had moderate pain and most pain respectively. The pain relief in group B was significantly lower when compared to group A as per chi-square test ( $p < 0.05$ ) (table 4).

Table 4: Comparison of pre and post-treatment VAS scores among groups						
VAS Score		Group A		Group B		P Value
		Mean	SD	Mean	SD	
Pre-treatment	No pain (0-4)	0	-	0	-	>0.05
	Moderate pain (5-9)	0	-	0	-	
	Most pain (10)	60	100%	60	100%	
	Total	60	100%	60	100%	
Post-treatment	No pain (0-4)	6	10%	25	41.7%	<0.05
	Moderate pain (5-9)	33	55%	34	56.6%	
	Most pain (10)	21	35%	1	1.7%	
	Total	60	100%	60	100%	

## Discussion

In this study, the mean age in group A was  $23.88 \pm 2.47$  years. The mean age in group B was  $24.18 \pm 2.65$  years. This is found to be similar to the study of Sheoran P et al<sup>7</sup> where nearly three fourth of postnatal mothers (76.7 %) in the group 1 and two third of mother (66.7%) in group 2 were in the age group of 18-25 years. In our study, the mean BMI of patients in group A and group B was  $28.06 \pm 4.70 \text{ kg/m}^2$  and  $27.98 \pm 4.32 \text{ kg/m}^2$  respectively. It was observed in the present study that in group A, majority of patients were from upper middle class (30%) followed by upper lower class (23.3%), lower middle class (18.3%), lower class (16.7%) and upper class (11.7%). In Group B, majority of patients were from upper middle class (30%) followed by upper lower class (25%), lower middle class

(16.7%), upper class (15%) and lower class (13.3%). This is comparable to the study of Dewi VNL et al<sup>8</sup> in which, the last education is senior high school. Sheoran P et al<sup>7</sup> study found nearly half of the postnatal mothers had primary level of education. Nethravathi V et al<sup>10</sup> study were having similarities with respect to age, education level of patients and type of episiotomy performed.

It was observed in our study that 55 (91.7%) and 5 (8.3%) patients in group A were primigravida and multigravida respectively while 53 (88.3%) and 7 (11.7%) patients in group B were primigravida and multigravida respectively. This is concordant to the studies of Dewi VNL et al<sup>8</sup>, Sheoran P et al<sup>7</sup>, Gomathi M et al<sup>9</sup> and Nethravathi V et al<sup>10</sup>. In the present study, 2 (3.3%) and 1 (1.7%) patient in group A and group B respectively underwent LSCS in previous delivery. This finding was like the studies of Sheoran P et al<sup>8</sup> and Nethravathi V et al<sup>10</sup>.

In our study, majority of the patients (96.7%) in group A delivered the newborn with the help of left medio-lateral and 2 (3.3%) patients delivered the newborn with the help of right episiotomy procedure. In group B, 57 (95%) and 3 (5%) patients delivered newborn with the help of left medio-lateral and right episiotomy procedure respectively.

The wound healing was assessed by REEDA scale. Higher score indicates poor wound restoration while lower score indicates good wound restoration. The mean pre-treatment score on episiotomy wound healing was comparable between group A and group B and statistically not significant as per student t-test ( $14.47 \pm 0.50$  vs.  $14.55 \pm 0.50$ ;  $p > 0.05$ ). Similar observations were seen in the studies of Gomathi M et al<sup>9</sup>, Sheoran P et al<sup>7</sup> and Nethravathi V et al<sup>10</sup> reported in category of REEDA score in pre-treatment assessment of the patients, it is observed that more than 90% subjects of both control and the experimental group were included in poor category of wound healing and no one was included in good category of wound healing.

It was observed in the present study that the mean post-treatment score was significantly lower in group B compared to group A as per student t-test ( $5.45 \pm 1.02$  vs.  $0.92 \pm 0.83$ ;  $p < 0.05$ ). This is similar to the studies of Nethravathi V et al<sup>10</sup>, Gomathi M et al<sup>9</sup>, Dewi VNL et al<sup>8</sup> and Sheoran P et al<sup>7</sup>. Nethravathi V et al<sup>10</sup> study revealed 92.64% of postnatal mothers are found to have good amount of wound healing while no patients were having good amount of wound healing in the control group. Dewi VNL et al<sup>8</sup> in a study observed that the control group shows a raise from 50.44% to 77.78% and the intervention group from 30.78% to 73.11%. Sheoran P et al<sup>7</sup> study showed mean wound healing score (1.43) of postnatal mothers receiving infra red light therapy was higher than the mean wound healing score (1.13) of postnatal mothers receiving sitz bath therapy with a mean difference of 0.30 and was found to be statistically significant.

It was observed in our study that post-treatment, there was significant improvement in both the groups however the improvement in group A was significantly lower compared to group B. This is comparable to the studies of Gomathi M et al<sup>9</sup>, Shukla A et al<sup>6</sup>, Dewi VNL et al<sup>8</sup> and Nethravathi V et al<sup>10</sup>. This means that the relief of pain in experimental group is mostly due to infrared lamp therapy. Pain relief in episiotomy wound is better after application of infrared lamp therapy. Gomathi M et al<sup>9</sup> study showed that comparison post-treatment disclosed significantly good healing of wound in experimental group when compared with control group. Shukla A et al<sup>6</sup> study observed after giving IFR there was significant improvement in reduction of redness, ecchymosis and discharge from the episiotomy wound. Dewi VNL et al<sup>8</sup> study showed the control group shows a raise from 50.44% to 77.78% and the intervention group from 30.78% to 73.11%. This indicates that both the therapies are effective in postpartum wound healing of perineum. Nethravathi V et al<sup>10</sup> study showed as per components of REEDA scale patients were categorised for each of these component, and it was found that there are high proportion of post natal women with 'Good' category wound healing in experimental group with respect to control group.

In the present study, during pre-treatment, all patients in both the groups had worst pain. There was no significant difference in pre-treatment VAS score. Post-treatment, 6 (10%) patients in group A had no pain while 33 (55%) and 21 (35%) patients had moderate pain and most pain respectively. 25 (41.7%) patients in group B had no pain while 34 (56.6%) and 1 (1.7%) patient had moderate pain and most pain respectively. The pain relief was drastically lower in group B when compared with group A as per chi-square test ( $p < 0.05$ ). Same findings were seen in the studies of Gomathi M et al<sup>9</sup>, Nethravathi V et al<sup>10</sup>, Dewi VNL et al<sup>8</sup>, Shukla A et al<sup>6</sup> and Sheoran P et al<sup>7</sup>.

## Conclusion

Perineal injury occurring due to episiotomy can result in perineal discomfort, pain and disturbed normal activities and increased risk of infection in postnatal period. Infrared light therapy is in the wavelength of 700 nanometers to 1 millimeter is effective in enhancing wound healing and relieving pain level among the postnatal mothers. This is also the least expensive therapy and convenient measure. It can be given as an additional therapy by health worker in their day-to-day caring of the mother in hospitals. Infrared therapy is an effective modality of treatment for wound healing and pain relief of episiotomy wound.

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