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## Original Article

## Effect of far-infrared radiation on perineal wound pain and sexual function in primiparous women undergoing an episiotomy

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## ABSTRACT

**Objective:** To evaluate the effect of far-infrared radiation on postpartum perineal pain and sexual function in primiparous women undergoing an episiotomy and 2nd degree perineal laceration.**Materials and methods:** From May 2016 to May 2017, primiparous women with term pregnancies and vaginal deliveries with an episiotomy due to obstetric indications and 2nd degree perineal lacerations were invited to participate in this study. Women were randomly assigned into a far-infrared (FIR) group and a control group. Visual Analogue Scale (VAS) was used to evaluate the perineal pain immediately postpartum, and at 1 week and 6 weeks postpartum. Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaire (PISQ-12) was used to evaluate sexual function at 6 weeks, 3 months and 6 months postpartum.**Results:** The data of the control group (n = 22) and FIR group (n = 18) were analyzed. Most of the women had minor perineal pain one week after delivery ( $1.1 \pm 0.9$  in control group vs  $1.4 \pm 1.5$  in FIR group) and there was no significant difference between groups. The FIR group had a higher PISQ-12 total score at 3 months ( $35.4 \pm 6.4$  vs  $34.7 \pm 5.7$ ) and 6 months ( $36.4 \pm 5.6$  vs  $35.6 \pm 5.7$ ) postpartum compared with the control group but there was no statistically significant difference.**Conclusion:** Our study did not show any additional benefit of postpartum far-infrared radiation on primiparous women undergoing an episiotomy and 2nd degree perineal lacerations.© 2018 Taiwan Association of Obstetrics & Gynecology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Perineal trauma or laceration during spontaneous vaginal delivery or instrument assisted delivery is a principal cause for postpartum perineal pain which can be transient or persistent. It has been estimated that about 85% of women will experience at least minor perineal trauma after vaginal delivery [1]. About 3% of primiparous women and 0.8% of multiparous women experience 3rd to 4th degree perineal lacerations and the incidence might be higher [2]. Post-partum perineal pain due to perineal tears is an important cause of sexual dysfunction after delivery [3]. Deeper or a higher

degree of perineal injury might negatively affect sexual function up to one year. Women undergoing an episiotomy and perineal lacerations during delivery were more likely to delay the resumption of their sexual life and might have more sexual dysfunction compared to women who did not [4,5]. A cross-sectional study reported that 67% of the women experienced dyspareunia 6 weeks to 6 months after giving birth and 72% of the women did not seek special care [6]. This study also reported that primiparous women were more prone to encounter postpartum dyspareunia.

Effective and high quality postpartum perineal wound care might decrease pain and improve sexual function. Few studies have evaluated the effect of far-infrared (FIR) local thermal therapy in the clinical setting including patients with chronic pain [7], patients with primary dysmenorrhea [8] and the effect on wound healing [9]. These studies have shown that FIR irradiation significantly

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improved pain in patients and promoted wound healing. It has been postulated that FIR can gradually penetrate the skin into deeper tissues, transfer energy and enhance thermal vasodilatation, and has microscopically revealed greater collagen regeneration and fibroblast infiltration [8,9].

The aim of our study was to evaluate the effect of far-infrared radiation on post-partum perineal pain, dyspareunia and sexual function in primiparous women undergoing an episiotomy and experiencing 2nd degree perineal lacerations. We also evaluated the risk factors associated with lower sexual function scores in these primiparous women.

## Material and methods

This is a prospective randomized study conducted to evaluate the effect of FIR radiation therapy on post-partum women. From May 2016 to May 2017, primiparous women with term pregnancies ( $\geq 37$  weeks) and vaginal deliveries with an episiotomy due to obstetric indications and experiencing 2nd degree perineal lacerations were invited to participate in this study. Women who agreed to participate signed an informed consent and were randomly assigned into a far-infrared (FIR) group or a control group. This is a preliminary study conducted to evaluate the effect of FIR in a post-partum setting, so we did not include women with 3rd or 4th degree lacerations due to ethical reasons. We reviewed the chart records to obtain the participant's intrapartum and postpartum history. All of the women were asked to fill in a structure questionnaire, which was translated into a Chinese, immediately postpartum, at 1 week, 6 weeks, 3 months and 6 months postpartum. The study protocol was approved by the Chung Shan Medical University Hospital Institutional Review Board.

The structured questionnaire contains a Visual Analogue Scale (VAS) for pain and a Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaire (PISQ-12) to evaluate postpartum sexual function. PISQ-12 is a self-administered questionnaire containing 12 items divided into three domains: behavioral-emotive (items 1–4), physical (item 5–9) and partner-related (items 10–12). It is measured on a 5-point Likert scale ranging from 0 (always) to 4 (never), and 48 is the maximum score; higher scores indicate better female sexual function. Dyspareunia was evaluated by asking the participant: "Do you feel pain during sexual intercourse?" which is the 5th item on the PISQ-12 questionnaire.

Women in the FIR group first received far-infrared radiation therapy 24 h after delivery, and it was then repeated every 12 h for 2 days. The last far-infrared radiation therapy was given one week postpartum when the women visited the out patient office for follow up. During FIR radiation, patient were asked to lie in a supine position with knees flexed, and the perineal area exposed with the distance of radiation at 30 cm. The thermal therapy lasted for 40 min during every cycle with 160W of radiation (Firapy WS™ Far infrared Therapy unit). The participants were asked if there was any discomfort or skin irritation after each cycle.

SPSS software version 20.0 (SPSS Inc., Chicago, IL, USA) was used for the data analysis. Student's *t* test was used to evaluate the means of continuous variables between groups. Chi-square test and Fisher's exact test were used to evaluate two nominal variables. A *P* value less than 0.05 was considered a significant difference.

## Results

A total of 78 primiparous women agreed to participate in this study and were randomized into a control group and an FIR group. Thirty eight women did not complete follow up due to the non resumption of sexual intercourse after 6 weeks postpartum or they did not complete the questionnaire due to lack of time, so they did

not return the questionnaire that was sent by mail. Forty women (51.3%) were successfully followed up and completed all the questionnaires. The data of the control group (*n* = 22) and FIR group (*n* = 18) were analyzed. The characteristics of the study subjects are shown in Table 1. The mean age of all the participants was 31.7 years (range 21–43) and there was no significant difference between the control and FIR groups. There were also no significant differences in BMI, gestational age at delivery, length of labor, vacuum delivery, neonatal birth weight and maternal history of lower urinary tract symptoms between groups. Table 2 shows the Results of postpartum perineal pain evaluation using the VAS scores. Most of the women had minor perineal pain one week after delivery ( $1.1 \pm 0.9$  in control group vs  $1.4 \pm 1.5$  in FIR group) and there was no significant difference between groups. Our study showed a higher score of improvement in perineal pain immediately postpartum to one week postpartum in the FIR group (score difference: 5.2) but no statistically significant difference compared with the control group (score difference: 4). None of the participants in the FIR group complained of discomfort during thermal therapy or any skin irritation.

Sexual function at 6 weeks, 3 months and 6 months postpartum was evaluated with the PISQ-12 questionnaire (Table 3). The FIR group had a higher PISQ-12 total score at 3 months and 6 months postpartum indicating better sexual function compared with the control group but there was no statistically significant difference. When asked about the presence of pain during sexual intercourse, the participants in the control group had less pain but no significant difference between groups (Table 3). Univariate analysis was used to evaluate the risk factors in participants with lower postpartum PISQ scores which indicated poorer sexual function (Table 4). Significant associations were not found between sexual function and age, BMI, gestational age, fetal body weight, delivery characteristics and lower urinary tract symptoms.

## Discussion

This is a preliminary study to evaluate the effect of postpartum far-infrared radiation on improving perineal pain and sexual function in primiparous women. All the participants included had an episiotomy and second degree perineal lacerations. Genital tract trauma during delivery is associated with postpartum dyspareunia and has an impact on sexual function [10]. According to the World Health Organization, all women should be asked about the resumption of sexual intercourse and the presence of dyspareunia 2–6 weeks after birth [11].

Few studies have been conducted to evaluate methods that improved or promote perineal wound healing after vaginal delivery [12–14]. Dewi et al. compared the effect of far-infrared radiation with iodine on perineal wound healing in puerperal women [12]. They evaluated the wound healing using the REEDA scale which examines and scores redness, edema, ecchymosis, discharge, and approximation of the wound. They concluded that far-infrared radiation is more effective in perineum wound healing than iodine disinfection. Another study conducted by Nethravathi et al. also used the same evaluation method (REEDA scale) to assess the effectiveness of infrared lamp therapy on the healing of episiotomy wound [13]. In this study, 231 postpartum women who received infrared lamp therapy had a significant reduction in score (better wound healing) compared with the control group. A different result was noted in Poonam Sheoran's study which evaluated whether Sitz bath had better episiotomy wound healing compared with infra red light therapy [14]. All these studies did not assess self-perception of pain and the functional outcome after infrared lamp therapy. In contrast, our present study assessed self-perception of pain using the 10 point visual analogue scale to

**Table 1**  
Baseline demographics and clinical characteristics of the enrolled participants.

Characteristics	All patients (n = 40)	Control (n = 22)	FIR (n = 18)	p-value
Age	31.7 ± 4.5	31.4 ± 3.5	32.0 ± 5.2	0.725
Body mass index (kg/m <sup>2</sup> )	25.1 ± 3.5	24.7 ± 2.7	25.6 ± 4.4	0.417
Gestational age	39.2 ± 1.1	39.3 ± 1.0	39.1 ± 1.3	0.67
Stage of labor (mins)				
I	1007.0 ± 799.6	1122.3 ± 965.3	885.3 ± 580.3	0.375
II	64.6 ± 93.4	75.7 ± 119.5	52.8 ± 55.4	0.463
Epidural anesthesia	25 (62.5)	13 (59.1)	12 (66.7)	0.622
Vacuum delivery	3 (7.5)	3 (13.6)	0 (0)	0.238
Birth weight(g)	2953.0 ± 290.2	2910.6 ± 282.4	3004.7 ± 299.3	0.314
History of UTI	5 (12.5)	2 (9.1)	3 (16.7)	0.642
Previous gynecological surgery	4 (10)	2 (9.1)	2 (11.1)	1
SUI	16 (40)	7 (31.8)	9 (50)	0.243
Urinary frequency	7 (17.5)	5 (22.7)	2 (11.1)	0.427

Data presented as n (%) or mean ± standard deviations.

FIR: far-infrared.

UTI: Urinary Tract Infection, SUI: stress urinary incontinence.

**Table 2**  
Comparison of postpartum perineal pain by VAS score among control and FIR groups.

	Control (n = 22)	FIR (n = 18)	p-value
postpartum	5.1 ± 2.7	6.6 ± 2.9	0.118
1 week	1.1 ± 0.9	1.4 ± 1.5	0.399
6 weeks	0.2 ± 0.4	0.1 ± 0.3	0.517

FIR: far-infrared.

**Table 3**  
Postpartum sexual function of control and FIR groups evaluated by PISQ-12 questionnaire.

	Control (n = 22)	FIR(n = 18)	p-value
PISQ-12			
6 weeks	35.0 ± 5.5	33.3 ± 5.6	0.335
3 months	34.7 ± 5.7	35.4 ± 6.4	0.692
6 months	35.6 ± 5.7	36.4 ± 5.6	0.654
Dyspareunia			
6 weeks	3.0 ± 0.9	2.8 ± 1.2	0.614
3 months	3.1 ± 1.1	2.6 ± 1.4	0.199
6 months	3.3 ± 0.8	3.0 ± 1.4	0.452

PISQ-12: Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaire.

compare the effect of far-infrared radiation with a control group. For pain intensity, the scale was anchored by “no pain: (score of 0) and on the opposite end of the scale was “worst imaginable pain” (score of 10). Our study did not show any significant difference between groups in the intensity of perineal wound pain

immediately after delivery, 1 week and 6 weeks postpartum. Most women have minimal perineal pain after one week postpartum.

Studies have shown that women who experience episiotomies have increased perineal pain, postpartum dyspareunia and delayed return of sexual activity [15,16]. Perineal pain is usually resolved by 3 months postpartum, however dyspareunia usually takes longer to resolve. So, it is important to evaluate the functional outcome such as sexual function in women who receive far-infrared radiation. In our present study, we adopted the PISQ-12 questionnaire to evaluate postpartum sexual function in these primiparous women. There was improvement in sexual function in both groups evaluated at 6 weeks, 3 months and 6 months postpartum. However, there were no statistically significant differences between groups in the overall PISQ score and dyspareunia in the FIR and control groups. A study by Signorello et al. found that third and fourth degree perineal laceration increased the risk of postpartum dyspareunia [15]. Since all the participants included in our study were primiparous with second degree perineal lacerations, future study are required to evaluate the effectiveness of far-infrared radiation on women with third and fourth degree perineal lacerations. Therapeutic far-infrared radiation is electromagnetic with a wavelength range from 3 to 25 μm. It will penetrate the skin and absorb the subcutaneous tissues and cause a thermal effect. However, the increase in skin temperature during radiation is kept below 40 °C which is much lower and constant than the near infrared ray [17]. The non-therml biological effect of far-infrared radiation such as the stimulation of secretion of transforming growth factor –β1 and the activation of fibroblasts may be the mechanism of promoting wound healing [9]. In our present study,

**Table 4**  
Univariate analysis of risk factors among women with different postpartum sexual function at six months analyzed by PISQ-12 questionnaire.

	PISQ score ≤30 (n = 8)	PISQ score >30 (n = 32)	p-value
Age	31.9 ± 6.7	31.7 ± 3.9	0.917
Body mass index (kg/m <sup>2</sup> )	25.5 ± 6.2	25 ± 2.6	0.850
Gestational age	39.6 ± 1	39.1 ± 1.1	0.339
UTI	1 (12.5)	4 (12.5)	1
Fetal body weight	2919.4 ± 222.3	2961.4 ± 307.3	0.719
Stage of labor (mins)			
I	962.6 ± 720.1	1015.6 ± 824.8	0.884
II	33.3 ± 20.7	70.6 ± 100.8	0.378
Vacuum delivery	0 (0)	3 (9.4)	1
Urinary frequency	1 (12.5)	6 (18.8)	1
SUI	2 (25)	14 (43.8)	0.439

Data presented as n (%) or mean ± standard deviations.

UTI: Urinary Tract Infection, SUI: stress urinary incontinence.

PISQ-12: Pelvic Organ Prolapse Urinary Incontinence Sexual Questionnaire-12; higher PISQ scores indicate better sexual function.

all participants who received far-infrared radiation did not complain of any discomfort or adverse effect after radiation therapy.

There are limitations in the current study. The first limitation is the small sample size in the intervention (FIR) group. Of the 33 women who received postpartum far-infrared radiation, 15 women did not complete the study. Among these women, most were unwilling to fill in the follow up questionnaire due to lack of time, and a few did not answer the telephone or return the questionnaire that was sent by mail. The second limitation is the use of a self-report questionnaire to evaluate sexual function in these women may have caused recall bias in this study. Although all the participants that completed the follow up questionnaire had resume sexual activity 6 weeks postpartum, but the frequency decreased compared to before pregnancy. Another limitation is that the perineal wound healing and pain assessment might be influenced by the suture technique of different doctors, postpartum nutritional status of the women and the use of analgesic medications during follow up periods.

In conclusion, our study showed that postpartum prophylactic far-infrared radiation on primiparous women undergoing an episiotomy and experiencing second degree perineal tears did not result in better sexual function evaluated by the PISQ-12 questionnaire. Women who did not receive postpartum FIR radiation therapy, had wound healing and perineal pain improvement comparable to the FIR group. Our study did not show any additional benefit of postpartum FIR radiation therapy in this particular group of women.

### Conflict of interest

There is no conflict of interest.

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