

Effect of Foot Massage on Fatigue and Incisional Pain among Post Caesarean Women

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Abstract

Background: Cesarean section is accompanied by persistent post-operative pain. Alternative techniques such as acupressure and massage therapy are fairly efficient for minimizing post-cesarean pain and reducing fatigue levels in some trials. Foot massage appears to be effective, affordable, low-risk, adaptable, and simple to use. **Aim:** To determine the effect of foot massage on fatigue level and incisional pain among post-cesarean women. **Subjects and Methods: Design:** A quasi-experimental design was utilized to conduct this study. **Setting:** The study was conducted at obstetrics department in Beni-Seuif university hospital/ Egypt. **Subject:** A purposive sampling technique was employed to choose a sample of 100 post-cesarean women who were then randomly assigned into two groups, with 50 post-cesarean women in each group (the intervention and control groups). **Tools:** Three tools were used (I) a structured interview questionnaire, (II) a fatigue assessment scale, and (III) Visual Analogue Scale. **Results:** The current study revealed that the majority of intervention group experienced mild pain during the posttest when compared to the control group. Additionally there was highly statistical significant differences regarding to the scores of fatigue and pain in the intervention group as compared to control group pain ($P = <0.05$). **Conclusion:** Foot massage was useful in reducing fatigue level and incisional pain among post-cesarean women. **Recommendations:** Post cesarean women should be provided with a simple and applicable strategy to reduce fatigue levels and control pain.

Keywords: foot massage, fatigue level, incisional pain, post cesarean women.

Introduction:

According to new research from the WHO; caesarean section continues to rise globally, now accounting for more than 1 in 5 (21%) of all childbirths. This number is set to continue increasing over the coming decade, with nearly a third (29%) of all births likely to take place by caesarean section by 2030, the research finds. While a caesarean section can be an essential and lifesaving surgery, it can put women and babies at unnecessary risk of short- and long-term health problems if performed when there is not medical need (WHO, 2021). It is now the most common surgery performed in the United States, with over 1 million women delivered by caesarean every year. The caesarean delivery rate rose from 5% in 1970 to 31.9% in 2016 (Robertson & White, 2021).

Fatigue is one of the most common and debilitating side effects of cancer diagnosis and treatment. Generalized weakness, poor mental concentration, insomnia or hypersomnia, and

emotional changes are among clinical symptoms of fatigue that significantly reduce cancer patients' overall quality of life during and after treatment. Although the etiology of the link between cancer and fatigue has yet to be determined, physiological, biochemical, and psychological abnormalities appear to play a role. Several strategies in the management of cancer-related fatigue have been examined due to their complex character (Armstrong et al., 2018).

Pain can be triggered by physical or psychological stimuli, such as a surgical wound, flatulence, uterine contractions, or psychological stress and tension such as fear, fatigue, or sadness. Respiratory, cardiovascular, gastrointestinal, urogenital, and metabolic abnormalities, as well as endocrine and mental disorders, are all physiological responses to pain. Fear of pain or concerns about losing sexual function, body image, returning to normal daily activities, or even losing a career can all cause anxiety after caesarean surgery (Kant & Akpınar, 2017).

Pain and fatigue are unpleasant symptoms that most women endure throughout the postoperative period. Pain is associated with substantial disability from reduced mobility, avoidance of activity, falls, depression and anxiety, sleep impairment, and fatigue. Effective pain and fatigue management can lead to increased comfort, improved life quality, a faster return to normal life, shorter hospital stays, and cheaper expenditures. Furthermore, discomfort and fatigue might affect a mother's ability to care for and breastfeed her baby optimally throughout the postpartum period (**Abdulla et al., 2013**).

There are various pharmaceutical strategies for controlling pain and fatigue; however, due to the transient effects and side effects of pharmacological methods such as benzodiazepines and analgesics, several studies on nonpharmacological pain management methods have been conducted in recent years. Reflexology (a type of foot massage that focuses on points on the foot that are thought to correspond to bodily components) and simple massage treatment are two of the most generally accepted non-pharmacological approaches (**[Non-Pharmacological Interventions for Chronic Pain in Multiple Sclerosis] Cochrane, n.d. 2021**).

The new emerging measures in pain management and reducing fatigue are complementary therapy which includes cutaneous stimulation, massage, cold and hot therapies, transcutaneous electrical nerve stimulation (TENS), relaxation techniques, and hypnosis. Among them, massage therapy has a long history in different cultures around the world. Today, people use different types of massage therapy for a variety of health promotions. Massage is a natural way of light touching, rubbing the entire body gives comfort both physically and psychologically and gives general relaxation in the body, reducing pain perception; reduce fatigue, by affecting the locomotor system and the nervous system as well as cardiovascular system (**Massage - Physiopedia, 2021**).

Nurses are critical in providing post-abdominal surgery patient counseling, education, and advice to ensure the technique's success. Also, play an important role in

assisting patients to help them minimize their discomfort and sleep better. Non-pharmacological treatment tactics and approaches include pharmaceutical therapy, information, distraction, attention focusing, and relaxing treatments (**Esther Lilly & Dakshayani, 2018**).

Significance of the study:

Massage is a systematic and rhythmic form of touch that involves various manipulations of the body's soft tissues to improve the comfort, well-being, and pain alleviation of patients. The nerve fibers in the feet are stimulated, resulting in the production of pain-relieving endorphins. Because the feet have the highest concentration of pain receptors (each extremity has over 7,000 nerve endings), foot massage and neuron stimulation may be an effective way to relieve pain and exhaustion following a cesarean section (**Boyd et al., 2016**).

Foot massage is one of the most affordable and effective ways to relieve pain in post-cesarean mothers. The nerve fibers in the feet are stimulated, resulting in the production of pain-relieving endorphins. Foot massage is a technique for relieving stress and pain in the soles and arches of the feet. When compared to all other nonpharmacological pain reduction options for post-cesarean moms, foot massage has the most promise for pain-alleviation, and it is an effective, economical, low-risk, and simple massage technique for post-cesarean pain management (**Degirmen et al., 2010**).

Aim of the study

This study aimed to:

Determine the effect of foot massage on fatigue level and incisional pain among post-cesarean women.

Research hypothesis:

The women who receive foot massage will experience little incisional pain and fatigue than those who do not.

Subjects and Methods:

Research design:

A quasi-experimental pretest-posttest control group research design was utilized to

conduct this study. It is used for establishing the cause-and-effect relationship between an independent and dependent variable.

Setting:

The study was conducted at obstetrics department affiliated with Beni-Seuif University Hospital/ Beni-Suef governate/ Egypt. The department is located on the second floor. This setting was selected due to the high flow rate of cases additionally it serves the biggest region of the population.

Sample:

Simple random sampling technique (SRS) was used to select the participants. About 100 post CS women were recruited in this study; the women were randomly divided into 2 groups, (intervention groups, and control group) each group contained 50 woman. The randomization achieved by asking each woman to pick piece of paper. The paper carry letter (C) is control group and woman who pick paper carrying (I) letter is intervention group. The intervention group receives foot massage\ treatment program, and the control group received the routine care of department. The women included in this study were selected according to the following

Inclusion criteria:

- Age more than 18 years.
- Free from chronic diseases
- Full-term pregnancy
- Healthy feet
- Full consciousness after the surgery
- Agree to participate in the study

Exclusion criteria were as follow

- Women are suffering from postoperative complications.
- Foot problems
- History of chronic pain
- Injury in extremities

Sample size calculation:

The sample size was calculated based on considering the level of significance of power analysis of 0.95($\beta=1-0.95=0.5$) at alpha .05 (one-sided) with a large effect size (0.5) was used as the significance, 0.001 was used as the high significance.

Tools of data collection:

Tool (I): A structured interview questionnaire:

Was developed by the researchers after reviewing related literature (WHO, 2021; Robertson & White, 2021); It was composed of two parts:

Part (1): It includes demographic data which consisted of 4 items related to age, educational level, occupation, and residence.

Part (2): It includes the medical history of patients; it consisted of 4 items about parity, gestational week, previous cesarean history, and history of analgesic consumption.

Tool (II): Fatigue assessment scale:

This tool was adopted from De Kleijn et al., 2011, it was a self-developed rating scale consisting of 10 items (which assess fatigue level of individuals during various activities in a week in terms of physical, social, psychological, and spiritual domains and their relationship with time of the day). Scores ranged from 0 (no fatigue) to 10 (worst fatigue) with a total score range from 0 to 100. No fatigue (0), very little (1-9), mild (10-30), moderate (31- 60), severe (61-80), worst denotes (81-100).

Tool (III):- Visual Analogue Scale (VAS) for pain;

The VAS (Visual Analogue Scale) is a widely used standardized pain assessment scale for determining pain severity. Test-retest reliability was ($r = 0.94$) The **numeric rating scale** (NRS) is a segmented numeric version of the VAS with a single 11-point numeric scale on which respondents select a value between 0 and 10 to describe the intensity of pain and discomfort (Hawker et al., 2011). The pain score assessed before intervention and after each session of intervention. The women were asked to choose a number that matched their degree of pain.

Tools validity and reliability

The content validity of the tools, their clarity, comprehensiveness, appropriateness, and relevance were reviewed by three experts; in the maternity nursing field. Modifications were made according to the panel judgment to ensure clarity and content appropriateness for the internal consistency of the tools. The test-

retest reliability was determined by administering of the same tools to the same participants under similar conditions on two or more occasions. Scores from repeated testing were compared using Cronbach's alpha coefficient method. Fatigue assessment scale reliability is considered good with Cronbach's alpha of 0.81 for the total score. The Pain Visual Analogue Scale (VAS) reliability was ($r = 0.94$).

A pilot study

To assess the clarity and feasibility of the research method, a pilot study was conducted on 10% (10 post-cesarean women) of the total sample. To produce the final form of the tools, modifications were made. Post-cesarean women included in the pilot study were excluded from the study.

Ethical considerations:

Before beginning the study, the researchers met with the obstetric directors of the chosen setting to explain the study's aim and gain their cooperation. Post-cesarean women's informal consent was obtained in exchange for their cooperation. The purpose of the study was explained to the women. The post-cesarean women were informed that participation in the study was voluntary, and they were free to withdrawn from the study at any time, without giving any reason. Post-cesarean women were told that their information would be kept confidential and used for research purposes only.

Fieldwork:

The researchers have visited the previously selected settings two days/ a week from 9 am to 1 pm. They met post-cesarean women individually and explain the aim of the study after introducing themselves to patients. Data was collected within six months, from the beginning of July to the end of December 2019. Approximately, 50-60 minutes were taken to complete each interview tool. The researchers used face-to-face interviews

• *The field work was achieved through the following sequences:*

Initially, the researcher created a pleasant relationship with the post-cesarean women by engaging in brief conversations. The

researchers complete the questionnaires (structured interview questionnaire, fatigue assessment scale, and VAS), then the intervention achieved through the *following sequences*.

- The researchers measured pain and fatigue three hours after the surgery for all participants. The control group was left for routine hospital care, and the massage intervention was applied to the intervention group.
- The post-cesarean woman was positioned in comfort position then a ten minute massage intervention was applied to the patient's extremities (5 minutes for each). Rotational friction movements, stretching, gripping, and flexing on diverse areas of the feet without focusing on a specific point were the main specialized massage. Friction is defined as deep, circular movements that attempt to rub tissue layers against each other to improve blood flow.

The following massage techniques were used:

- Effleurage was used to distribute the lubricant (olive oil) throughout the participants' feet by stroking them from toes to ankles.
- Use petrissage, a short, soft, and rapid movement, to squeeze and roll your feet, fingers, and toes.
- Tapotement was accomplished with short finger taps (i.e. thumping or percussion).
- Friction was used to rub the layers of tissues to promote blood flow.

Statistical analysis:

The data were analyzed using SPSS statistical software version 20. Continuous data were obtained before and after the massage for three days and expressed as mean standard deviation (SD). Categorical data were expressed using numbers and percentages. The independent t-test was used to investigate differences between the two groups, while the paired t-test was employed to investigate differences between each group before and after a massage session. Changes in pain and fatigue levels were analyzed using a one-way repeated-measures analysis of variance

(ANOVA). The Mann-Whitney test was used for variables that did not match the parametric assumptions. The chi-square test was used to evaluate the results. The link between the two variables was investigated using the chi-square test. The chi-square test was used to assess the relationship between two variables in the case of noncontiguous data. A P value of less than 0.05 was used to determine statistical significance.

Results:

As shown by **table 1** the mean age of the samples were 23.14 ± 10.33 and 24.10 ± 8.23 years in intervention group and control group respectively. Regarding the level of education, it was observed that more than half of them (58%) of the post-cesarean women in the experimental group had secondary education compared to 50% in the control group. In the experimental group, the same table pointed out that (66%) of post-cesarean women was housewives compared to 62% in the control group. Regarding residence, (74%) of post-cesarean women in the experimental group was living in urban areas compared to 70% in the control group. There was no significant difference between the two groups concerning their demographic.

Table 2 shows that there was no significant difference between the two groups regarding to obstetrical history and analgesics use. The majority of studied women (72% and 68%) their parity was $1 < 3$ respectively in experimental and control groups. Regarding their gestational weeks, it was observed mean

weeks in both the experimental group and the control group were (39.1 ± 0.8 and 39.1 ± 1.7 respectively). The majority of experimental group and the control group (74% and 66% respectively) do not have previous cesarean history. In both the experimental and the control groups (64% and 60% respectively) do not have a history of analgesic consumption. There was no significant difference between the two groups regarding medical data.

As displayed by **figure 1** the majority of women in experimental group and the control group (80% and 85% respectively) had a moderate level of pain pre-treatment. But after treatment the majority of the post-cesarean women (98%) had a mild level of pain in the experimental compared to 60% in the control group who had a mild level of pain.

Table 3 illustrates that there were a highly significant difference and improvement in fatigue level among post-cesarean women with a noticeable decrease in the fatigue scores among intervention/experimental group when compared to control group.

As shown in **table 4** there was a highly statistically significant difference in fatigue level was identified between the mean pretest and posttest scores of post-cesarean women in the experimental group at the $p < 0.05$ level.

Table 5 shows that there was a statistically significant difference between the mean pretest and posttest scores of post-cesarean women in terms of pain level in the experimental group at the 0.05 level.

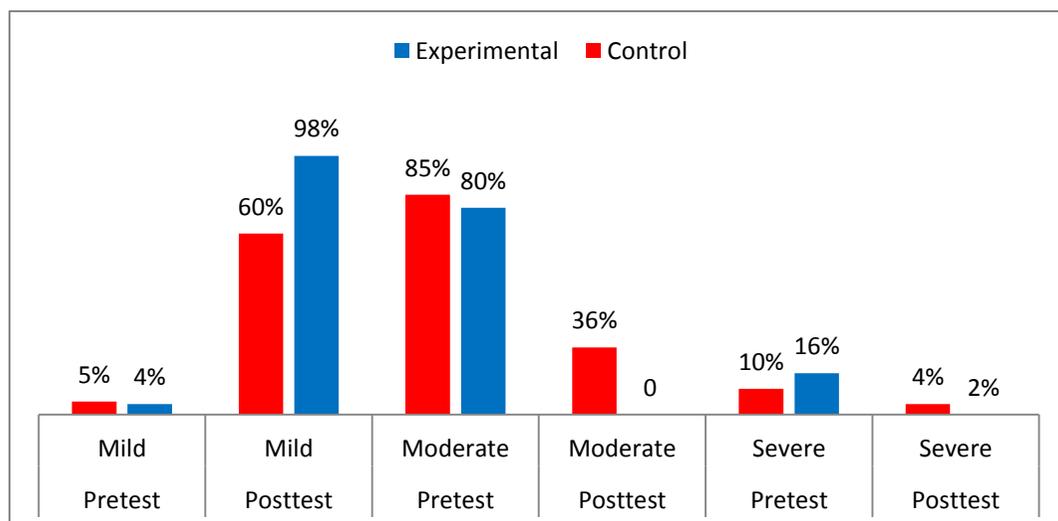
Table (1): Socio-Demographic Characteristics of The Studied women (N=100)

Demographic characteristics	The experimental group (n=50)		Control group (n=50)		X ²	p-value
	No.	%	No.	%		
Patients' age						
- 18 < 30	29	58.0	30	60	4	0.15 ^{NS}
- 30 ≤ 40	21	42.0	20	40		
Mean ± Stander deviation	23.14 ± 10.33		24.10 ± 8.23			
Patients' education						
-Primary education	10	20.0	13	26	3	0.17 ^{NS}
-Secondary education	29	58.0	25	50		
-University education	11	22.0	12	24		
Occupation:						
-Working	17	34	19	38	3	4.38 ^{NS}
-Housewives	33	66	31	62		
Residence:						
-Urban	37	74	35	70	2	1.27 ^{NS}
-Rural	13	26	15	30		

NS-non-significant

Table (2): Distribution of the Studied Women In Terms of Obstetric History and Analgesics Use (n=100)

Obstetric history	Experimental group (n=50)		Control group (n=50)		X ²	p-value
	No.	%	No.	%		
Parity						
- 1 < 3	14	28.0	16	32.0	1.23	0.12 NS
- > 3	36	72.0	34	68.0		
Gestational week						
Mean ± Stander deviation	39.1±0.8		39.1± 1.7		1.22	0.14 NS
Previous cesarean history						
- Yes	13	26.0	17	34	1.3	.20 NS
- No	37	74.0	33	66		
History of analgesic consumption						
- Yes	18	36.0	20	40	1	0.7
- No	32	64.0	30	60		

**Figure 1:** Incisional pain scores among studied groups pre and post intervention (n=100)**Table (3):** Distribution of posttest fatigue level among the studied post-cesarean women (n=100)

Fatigue level	Experimental group (n=50)		Control group (n=50)		T	P-value
	No	%	No	%		
No fatigue (0)	5	10	0	0.0	13.025	<0.001**
Very little (1-9)	11	22	0	0.0		
Mild (10-30)	19	38	0	0.0		
Moderate (3- 60)	15	30	22	44		
Severe (61-80)	0	0.0	15	30		
Worst (81-100)	0	0.0	13	26		

Table (4): Fatigue mean scores among studied groups pre and post intervention (n=100)

Group	Fatigue level				X ²	p-value
	Pretest		Posttest			
	Mean Score	SD	Mean Score	SD		
Experimental Group	3.55	1.06	2.66	1.09	57.3	<0.001**
Control Group	2.79	1.01	2.49	0.61	0.56	1.63 ^{NS}

NS=Non-significant, *= significant at $p < 0.05$ level

Table (5): Comparison between the Studied Groups as Regards to Pain Scores (n=100)

Group	Incisional pain				X ²	p-value
	Pretest		Posttest			
	Mean Score	SD	Mean Score	SD		
Experimental Group	6.34	1.06	4.36	0.93	56	<0.001**
Control Group	5.12	1.01	4.69	0.84	.58	1.77 ^{NS}

NS=Non-significant, *= significant at $p < 0.05$ level

Discussion:

Foot massage was effective in reducing the amount of pain and fatigue level after cesarean section. Although the precise mechanism of action in massage therapy is not known, it seems to regulate the central nervous system neurotransmitters and as a result, improve anxiety disorders and alleviate pain (**Abbaspoor et al., 2014**)

The findings of the current study indicated that no significant difference was detected between the two groups in their demographic and medical data. From the researchers' point of view, this reflects that the baseline of pain and fatigue disturbances was similar in the two groups.

According to the findings of the current study, during the pretest, the majority of post-cesarean women in both the experimental and control groups felt a moderate level of pain. From the researchers' point of view, this indicates that pain as a result of cesarean section affected women similarly. This result is similar to the study of **Lorentzen et al., (2012)** demonstrated in their study on pain experience and pain management in surgical patients that the majority of post-operative patients in both the experimental and control groups reported a moderate level of pain.

The results of the current study indicated that the post intervention majority of the post-cesarean women had a mild level of pain in the experimental group. This result, according to the researchers' point of view, demonstrates the favorable effect of foot massage application, which fits the needs of the patients and aids in the reduction of pain and improvement of fatigue level. This result is matched with to the study of **Renuka et al., (2020)** , **Babu & Annal, (2019)** who found that less than one percent had mild pain and none of them had worst pain after massage intervention.

Additionally it was in the same line of with **Ucuzal & Kanan, (2014)** who studied "Foot massage intervention on postoperative pain" and observed on the first postoperative day, 20 minutes of foot massage significantly was effective in pain reducing among patients.

Furthermore **Chithra & D'Almeida, (2014)** , **Degirmen et al., (2010)** and **(Kim, 2002)** reported that a significant reduction in pain was observed in the experimental group following foot massage. And it had a positive effect among post-operative patients on minimizing acute postoperative pain. The results of the present study reflected the success and positive effect of foot massage intervention in decreasing pain level among post-cesarean women which supported the aim and hypotheses of the present study. These results are similar with **Tütün Yümin et al., (2017)** demonstrated massage was more effective than the usual care for reducing pain.

The study results indicated that a significant difference, decrease, and improvement in fatigue level scores were found among post-cesarean women. From the researchers' point of view, this result attributed to that during massage release of certain peptides is occurred, which have sedating and analgesic effects resulting in lowered activity of sympathoadrenal system activated during stressful situations such as surgery (**Kotani et al., 2001**). From the researchers' point of view, it reflected the noticeable good impact of foot massage in improving and reducing fatigue. These are confirmed the significant modifications in the post-cesarean women's fatigue level that reflected the main goals of the massage intervention.

The study finding revealed that there was a statistically significant difference between the mean pretest and posttest scores of post-cesarean women regarding pain level in both experimental and control groups. From the researchers' point of view, it reflects the

success of foot massage application to reduce pain among post-cesarean women. This finding supported by Babu & Annal, (2019) who reported a significant difference was observed between pre- and posttest in pain level in both experimental and control groups.

Conclusion:

Based on the findings and hypotheses of this study, it was concluded that foot massage was effective in lowering fatigue and incisional pain in the experimental group when compared to the control group after the intervention program was implemented. Furthermore, the study found a statistically significant difference in pain and fatigue scores between pre- and post-intervention at $p < 0.05$.

Recommendations:

Based on the current study results, the following recommendations are proposed:

- Post cesarean women should be provided with a simple and applicable strategy to reduce fatigue levels and control pain
- Improving post cesarean women ' awareness about foot massage and its positive effect in reducing pain and fatigue level.
- Obstetric nurses can incorporate a systematic pain evaluation into their everyday routine for post cesarean women.
- Improved nurses' awareness through the implementation of an educational program about pain and how to manage it with non-pharmacological approaches.
- Further studies about the effect of different massage techniques on pain and fatigue among post cesarean women undergoing cesarean section to minimize the physical and psychological problems.

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