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Progressive muscle relaxation technique effectiveness on pain and fatigue among post-mastectomy women: A quasi-experimental study

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Abstract---Background: Post-Mastectomy Pain (PPMP) and fatigue are common conditions that can follow surgeries for breast cancer, the most common cancer in women. The progressive muscle relaxation technique appears to be effective, affordable, low-risk, adaptable, and simple to use. Because of the frequency of PPMP and its potential severity, it has received increasing research attention. Aim: To evaluate the effectiveness of progressive muscle relaxation techniques on pain and fatigue among post-mastectomy women. Design: A quasi-experimental design was used to conduct this study. Setting: The study was conducted at the inpatient and outpatient clinic of Sohag Oncology institution. Subject: A purposive sampling technique was enrolled to select a sample of 50 post-mastectomy women who were randomly assigned into two equal groups, with 25 post-mastectomy

women in each group (the experimental and control groups). Tools: *Three tools were used* (I) demographic data of Post mastectomy women sheet, (II) a Visual Analogue Scale, and (III) a fatigue assessment scale. Results: The current study revealed that the majority of post-mastectomy women in the intervention group experienced mild pain and fatigue reduction during the post-test compared to the control group. Additionally, there were highly statistically significant differences regarding the scores of pain and fatigue in the intervention group as compared to the control group ($P = <0.05$). Conclusion: progressive muscle relaxation technique was effective in reducing pain and fatigue levels among post-mastectomy women. Recommendations: Post-mastectomy women should be aware of the progressive muscle relaxation technique as a simple and applicable strategy to control pain and reduce fatigue levels.

Keywords---fatigue level, pain, post mastectomy women, progressive muscle relaxation technique.

Introduction

Breast cancer is the most commonly diagnosed form of cancer among women in the U.S., affecting over 250,000 patients per year, although offsetting advances in treatment have led to decreased mortality and increased five-year survival rates (90.8%, 95% CI = 90.5% to 91.1%) [1]. The rise in survivorship highlights the significance of enhancing the quality of life for breast cancer patients whose lives are prolonged by therapy [2]. Intractable post-mastectomy pain has a significant influence on the quality of life for many individuals [3].

Mastectomy pain has long been acknowledged as a clinically relevant post-operative consequence. It was first characterized as having a dull, burning, and aching feeling in the chest, axilla, and ipsilateral upper extremities 40 years ago. The name "post-mastectomy pain syndrome" (PMPS) was created to describe these symptoms since it was widely believed to be a neuropathy caused by intercostobrachial nerve (ICBN) damage during surgical dissection [5]. Initially believed to be uncommon after the effect of breast surgery, post-mastectomy pain now affects 20% to 50% of patients, according to recent estimates [4].

The wide variation in estimates largely reflects definitional inconsistencies across studies [6]. For example, studies that consider only patients who present with neuropathic symptoms, the classic PMPS constellation, find an incidence at the lower end of the range. Studies that capture not only PMPS, but also other sources of post-mastectomy pain, such as lymphedema, and musculoskeletal pain find a higher incidence [7]. Because of early identification and better treatment options, the long-term survival rate for breast cancer patients is continuously increasing. The majority of breast cancer survivors experience various symptoms, with pain, exhaustion, and psychological anguish being the most common, years after their cancer treatment is over [8].

Studies have shown that between 20% and 30% of women develop symptoms of post-mastectomy pain after surgery. It's most common after operations that remove tissue in the upper outside portion of the breast or the underarm area. Post-mastectomy pain is thought to be linked to the damage done to the nerves in the armpit and chest during surgery [9]. But the causes are not known for sure. Women who are younger, who have had a full axillary lymph node dissection (ALND) and not just a sentinel lymph node biopsy, or who were treated with radiation⁴ after surgery are more likely to have problems with post-mastectomy pain. Because ALND is done less often now, pain post-mastectomy is less common than it once was [10].

The most prevalent and incapacitating side effect of cancer diagnosis and therapy is fatigue. Clinical signs of weariness that considerably lower the overall quality of life for cancer patients both during and after treatment include generalized weakness, poor mental focus, insomnia or hypersomnia, and emotional disturbances. Physiological, metabolic, and psychological problems seem to be involved, even if the exact cause of the connection between cancer and weariness is yet unknown. Due to their complexity, several approaches to managing cancer-related fatigue have been investigated [11].

In addition to endocrine and mental diseases, which are all physiological reactions to pain, pain can also be brought on by physical or psychological stimuli, such as a surgical wound, flatulence, uterine contractions, or psychological stress and tension from things like fear, weariness, or melancholy. Returning to regular daily activities can be accompanied by fears of pain or issues with body image [12]. Most women experience painful side effects throughout the postoperative period, including pain and fatigue. Pain is linked to significant disability from restricted mobility, avoidance of activities, falls, depression and anxiety, disturbed sleep, and exhaustion. Effective pain and fatigue treatment can result in greater comfort, better life quality, a quicker return to normal life, shorter hospital stays, and lower costs [13].

According to reports, 40 to 60 percent of mastectomy patients experience chronic discomfort that lasts longer than three months. In terms of physical well-being, bodily autonomy, relationships, and psychological well-being, studies have shown that individuals with post-mastectomy discomfort have a significantly lower quality of life overall. Chronic pain increases the likelihood of depression, increases healthcare utilization, and reduces work function. Chronic breast and chest pain can be a side effect of any breast procedure, including breast biopsy, lumpectomy, breast augmentation, and breast reconstruction [14].

Benzodiazepines and analgesics are just two examples of pharmacological approaches for managing pain and fatigue. However, current studies on non-pharmacological pain management methods have been done due to the temporary effects and adverse effects of pharmacological methods like these. The two non-pharmacological methods that are most widely acknowledged are simple massage therapy and reflexology (a type of foot massage that concentrates on spots on the foot that are considered to correspond to body components) [15].

The progressive muscle relaxation technique is one of the non-pharmacological treatments for these issues; it lessens stress by improving both mental and physical health [14]. The most straightforward, least expensive, readily available, patient-self-initiated, and without any negative side effects are progressive muscle relaxation therapy. Endorphin release boosts the body's defenses and sense of well-being [15].

The progressive muscle relaxation technique, created by Jackson in 1929, involves gradually tensing and relaxing the major muscle groups voluntarily in a pattern for a set amount of time. Its advantages include stress reduction, better sleep quality, the release of pain and muscle tension, and the use of PMR therapy as an alternate treatment for reducing pain and fatigue [16].

Nurses play a crucial role in counseling, educating, and guiding women who have just received a breast cancer diagnosis so they can benefit from the technique following the intervention and assist in enhancing the quality of life for mastectomy patients. Pharmaceutical therapy, information, diversion, attention-focusing techniques, and calming treatments are a few examples of non-pharmacological treatment strategies and methods [17].

Significance of the study

Post-mastectomy, often known as the condition where pain or physical limits occur following breast cancer surgery, affects about half of all women. However, with the help of therapies including medication, physical or occupational therapy, and lymphedema therapy, many women find relief. Many women who have had breast cancer surgery endure chronic discomfort and exhaustion in the breast or chest region. Up to 50% of women who undergo breast cancer surgery experience this syndrome. There are two ways to treat pain and fatigue: non-pharmacological techniques such as progressive muscle relaxation, reflexology, and relaxation, as well as pharmaceutical techniques [18].

Aim of the study

This study aimed to evaluate the effectiveness of progressive muscle relaxation techniques on pain and fatigue among post-mastectomy women

Research hypothesis

Post-mastectomy women who receive progressive muscle relaxation techniques are expected to experience little pain and fatigue than those who will not.

Subjects and Methods

Research design

A quasi-experimental design was used to conduct this study.

Setting

The study was conducted at the inpatient and outpatient clinic of Sohag Oncology institution. It is located on the first floor. This setting was selected due to the high flow rate of cases additionally it serves the biggest region of the population.

Subjects

To choose a sample of 50 post-mastectomy women, a purposive sampling technique was used. The women were randomly divided into two equal groups, with 25 post-mastectomy women in each group (the experimental and control groups). The participants were chosen using a basic random sampling strategy. By asking each lady to choose a piece of paper, randomization was accomplished. The woman who chooses the letter carrying the paper (E) is the experimental group, and the paper carrying letter (C) is the control group. Progressive muscle relaxation therapy is administered to the experimental group, while standard care is given to the control group.

Sample size calculation

The sample size was determined using the power analysis level of significance of 0.95(=1-0.95=0.5) at alpha. The significance was set at 0.05 (one-sided) with a big effect size (0.5), and the high significance was set at 0.001.

Inclusion criteria included

- Post-mastectomy women age more than 18 years.
- Free from another chronic disease
- Agree to participate in the study

Exclusion criteria included

- Post-mastectomy women are suffering from postoperative complications.
- History of chronic pain

Tools of data collection

Three tools were used:

Tool (I): Demographic data of post-mastectomy women sheet

Was developed by the researchers after reviewing related literature. It includes data that consisted of 4 items related to age, educational level, occupation, and residence.

Tool (II):- Visual Analogue Scale (VAS) for pain: [19]

The VAS (Visual Analogue Scale) is a popularly used standardized scale for assessing pain intensity. Contrarily, test-retest reliability was (r = 0.94) The VAS had a single, 11-point numerical scale on which participants could rate their discomfort, choosing a number between 0 and 10. Because of this, VAS was

employed in this study to gauge the severity of pain before and after each session, and participants were asked to select a number twice daily that reflected their level of discomfort. The NRS employs a 0–10 scale to categorize different levels of pain: no pain (zero), mild pain (1-3), medium pain (4), and severe pain (zero) (5).

Tool (III): Fatigue assessment scale

This instrument was adapted from [20], which was a 10-item self-developed rating scale (which assessed the 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). With a total score range of 0 to 100, scores might be anywhere from 0 (no weariness) to 10 (worst possible). No weariness, hardly any, light, moderate, severe, and worst are denoted respectively. With a Cronbach's alpha of 0.81 for the overall score, the scale's reliability is regarded as good.

Validity of the tools

The content validity of the tools, their clarity, comprehensiveness, appropriateness, and relevance was reviewed by three experts; in the obstetric nursing field and community health nursing. Modifications were made according to the panel judgment to ensure sentence clarity and content appropriateness.

Reliability of the tools

With a total score of 0.81 on the fatigue evaluation scale, Cronbach's alpha is seen as being in a favorable range. The reliability of the pain Visual Analogue Scale (VAS) was ($r = 0.94$).

Methods

The Sohag Faculty of Nursing's Ethical Research Committee gave its approval before the study could be carried out. -The directors of the previously chosen setting gave their consent for this study to be conducted through a letter that was issued from the Dean of the Faculty of Nursing at Sohag University. To get consent to gather research data, the study's goal was described.

A pilot study

To assess the clarity and feasibility of the research method, a pilot study was conducted on 10% (5 post-mastectomy women) of the total sample. To produce the final form of the tools, modifications were made. Post-mastectomy women included in the pilot study were included in the study.

Ethical considerations

Before starting the study, the researchers met with the obstetric directors of the selected setting to secure their participation and to explain the purpose of the study. In exchange for their cooperation, post-mastectomy women gave their unofficial approval. The study's objectives and anticipated results were laid out in

full. Post-mastectomy women were informed of the study's objectives. The post-mastectomy women were advised that enrollment in the study was completely optional and that they could revoke their consent at any moment, without having to provide a reason. Post-mastectomy ladies were informed that their data would be kept private and solely used for research.

The procedure of data collection

Two days a week, from 9 am to 1 pm, the researchers went to the settings they had previously chosen. The collection of data took place over six months, from the start of July to the end of December 2021. Each interview tool took roughly 50 to 60 minutes to complete. In previously chosen locations, the researchers visited with post-mastectomy women individually and introduced themselves before explaining the purpose of the study. The post-mastectomy women were interviewed face-to-face by the researchers, who also read the questions and potential answers to them to assist them in filling out the tools. Implementation of the study included three phases (assessment phase, implementation phase, and evaluation phase).

Assessment phase

The researcher initially established a friendly rapport with the post-mastectomy women by having brief talks with them. The survey questions were answered by the researchers (demographic data sheet, VAS, fatigue assessment scale). The purpose and subject matter of the investigation were explained.

Implementation Phase

For the experimental group

The researchers introduced themselves to each woman in the experimental group and explained the purpose of the study. They then used the PMR technique to collect demographic data, a VAS, and a fatigue assessment scale from the women. Each interview lasted about an hour, depending on the women's comfort level and understanding.

The experimental group of 25 women received normal treatment as well as progressive muscle relaxation. Pictures, demonstrations, and group discussions were all used as teaching tools (progressive muscle relaxation technique). At home, women complied with the researcher's oral instructions. Calls came next, and the exercise session continued.

Following the application of relaxation, the researchers showed women how to perform each phase of the PMR technique before having them repeat it. The researchers then instructed them to go over every step again and practice the procedure three to four times until they were proficient.

A progressive muscle relaxation technique

The subjects in the experimental group were instructed to empty their bladders and to take a comfortable position before beginning the progressive muscle relaxation procedure (sitting or lying). The Jacobson method was used to gradually relax the muscles by contracting and relaxing certain muscle groups until complete relaxation was achieved. The women in the experimental group underwent the Jacobson relaxation technique (lying on the side with their legs somewhat bent, not to put pressure on any muscles) for 30 minutes in a room with proper lighting and no noise. The Jacobson technique involved dividing the body's muscles into eight sections and implementing a 5-second active muscle contraction followed by a 30-second muscle release (tension/rest).

The muscles in the right foot, left foot, right hand, left hand, stomach and back, chest and shoulders, face, head, and scalp were contracted first, then released. Playing a CD that had already been recorded and prepared for each subject in the experimental group, this procedure was carried out in front of the researcher. The approach was instructed to be used by the participants three times daily, in the morning, evening, and night shifts, under the guidance of the researchers. The researcher also visited the location to complete the final stage of the questionnaire when the study subjects were sent back to the clinics after 15 days (evaluation).

For the control group

In the control group, the researchers conducted a face-on-face interview with every woman for about 30 minutes during which they introduced themselves, explained the purpose of the study, and got their verbal consent. After this, the researchers collected information about the women's demographics, datasheets, VAS scores, and fatigue assessment scales without using the progressive muscle relaxation technique. No extra treatment was given to patients save basic care such as taking medicine as directed by the doctor.

Evaluation phase

In both experimental and control groups, the researchers reassess pain and fatigue levels after two weeks of PMR technique implementation using the same tools used in the pretest (tools II and III as post-test).

Statistical analysis

SPSS statistical software, version 20, was used to analyze the data. Continuous data were collected before and following the massage for three days, and the mean and standard deviation were expressed (SD). Categorical data were reported as percentages and numbers. For comparisons between the two groups, the independent t-test was utilized, and for comparisons between each group before and after the intervention, the paired t-test. Using one-way repeated-measures analysis of variance, changes in pain and fatigue levels were examined (ANOVA). Variables that did not adhere to the parametric assumptions were tested using the Mann-Whitney test. Results were evaluated 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

Table (1): Percentage distribution of the studied post-mastectomy women according to their demographic data (N=50)

Demographic data	The experimental group (n=25)		Control group (n=25)		X2	p-value
	No.	%	No.	%		
Post-mastectomy women's age						
- 18 < 30	6	24.0	5	20	3	0.15 ^{NS}
- 30 < 40	10	40.0	10	40		
- 40 ≤ 60	9	36	10	40.0		
Mean ± Stander deviation	43.14 ± 10.72		44.10 ± 8.56			
Post-mastectomy women's education						
-Primary education	7	28.0	6	24	4	0.15 ^{NS}
-Secondary education	15	60.0	14	56		
-University education	8	32.0	5	20		
Occupation:						
-Working	7	28	8	32	3	3.32 ^{NS}
-Housewives	18	72	17	68		
Residence:						
-Urban	20	80	19	76	2	1.23 ^{NS}
-Rural	5	20	6	24		

NS-non-significant

Table (1) demonstrates that the mean age of post-mastectomy women in the experimental group was 43.14± 10.72 years, whereas the mean age in the control group was 44.10 ± 8.56 years. In terms of education, it was found that post-mastectomy women in the experimental group had secondary education at a higher rate (60%) than the control group (56%). The identical table in the experimental group showed that (72%) of post-mastectomy women were housewives as opposed to 68% in the control group. Regarding where they lived, (80%) of post-mastectomy women in the experimental group and (76% in the control group) were living in urban settings. Between the two groups, there was no statistical difference regarding demographic data.

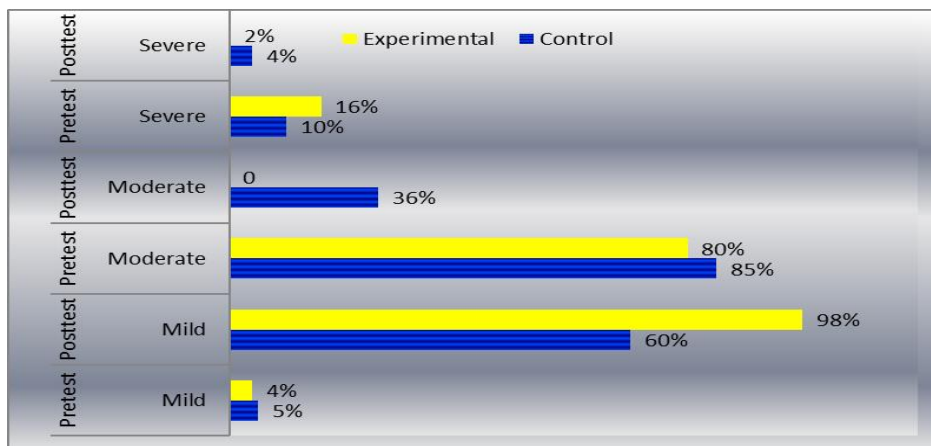


Figure 1: Distribution of pain scores among the studied post-mastectomy women in both groups pre and post-PMR technique (n=50)

Figure 1: reveals that both the experimental group and the control group's post-mastectomy women (80% and 85%, respectively) experienced moderate pain during the pretest. However, during the posttest, the majority of the post-mastectomy women (98%) in the experimental group experienced minor pain, compared to 60% in the control group.

Table (3): Frequency and percentage distribution of pretest and posttest fatigue levels among the studied post-mastectomy women (n=50)

Fatigue level	The experimental group (n=25)		Control group (n=25)		T	P-value
	No	%	No	%		
No fatigue (0)	5	20	0	0.0	18.056	<0.001**
Very little (1-9)	5	20	0	0.0		
Mild (10-30)	8	32	0	0.0		
Moderate (3- 60)	7	28	12	48		
Severe (61-80)	0	0.0	7	28		
Worst (81-100)	0	0.0	6	24		

Table (3): shows that the fatigue level scores among post-mastectomy women were significantly lower, indicating a substantial difference in fatigue levels.

Table (4): Fatigue mean scores among studied groups pre and post-intervention among the studied post-mastectomy women (n=50)

Items	The experimental group (n=25)	Control group (n=25)	P- value
Fatigue score	15.03+ 1.19	27.56+ 3.04	0.129 (0.0001*)

*highly Significance at 0.0001 levels

From table 4, After the PMR intervention, the examined post-mastectomy women showed a very statistically significant ($P < 0.001$) reduction in their fatigue mean score.

Table 5: Comparison of pretest and posttest levels of pain among post-mastectomy women in the experimental and control groups (n=50)

Group	Pain level				X ²	p-value
	Pretest		Posttest			
	Mean Score	SD	Mean Score	SD		
Experimental Group	6.34	1.05	4.22	0.78	53.45	<0.001**
Control Group	6.23	1.01	5.33	0.89	0.58	1.77 ^{NS}

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

Table 5 demonstrates that, at the < 0.05 level, there was a statistically significant difference in the post-mastectomy women's means pain scores between the pretest and posttest groups.

Table 6: Comparison of pretest and post-test fatigue levels among post-mastectomy women in both experimental and control groups (n=50)

Group	Fatigue level				X ²	p-value
	Pretest		Posttest			
	Mean Score	SD	Mean Score	SD		
Experimental Group	4.33	1.07	2.24	1.08	56.4	<0.001**
Control Group	4.79	1.02	3.31	0.45	0.59	1.63 ^{NS}

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

Table 6: demonstrates that, at the < 0.05 level, there was a statistically significant difference in the post-mastectomy women's means pain scores between the pretest and posttest groups.

Discussion

Techniques for relaxing are frequently used, such as Jacobson progressive muscle relaxation. This method requires no special equipment, making it simple to use, and it is one of the greatest complementary therapies because it is simple to learn, inexpensive, and easy to execute [21]. Therefore, the objective of the current study was to evaluate the effect of the progressive muscle relaxation technique on post-mastectomy women's pain and fatigue. The results of the current investigation showed that there was no discernible variation in the demographic characteristics of the two groups. This outcome, in the eyes of the researchers, shows that baseline pain and fatigue problems were comparable between the two groups.

The majority of post-mastectomy women in both the experimental and control groups reported experiencing significant pain during the pretest, according to the findings of the current study. This outcome is comparable to the findings of the

study by [22, 23, 24] which found that the majority of post-operative patients in both the experimental and control groups described their pain as moderate. The findings of the present study showed that the majority of post-mastectomy women in the experimental group experienced minor discomfort following PMR intervention. This outcome, in the opinion of the researchers, shows the beneficial impact of PMR application, which matches the needs of post-mastectomy women and helps in the decrease of pain levels.

These results are corroborated by the [25] study that relaxation technique intervention can successfully reduce dental patients' pain [26]. This may demonstrate the significance of implementing the PMR that can result in pain reduction. The outcome is consistent with this investigation. According to the study by [27], relaxation activities helped individuals with breast and colorectal cancer feel less pain.

The current study's findings validated the study's objectives and hypotheses by demonstrating the effectiveness of PMR intervention in reducing post-mastectomy women's pain levels. Additionally, this outcome is consistent with [28], who carried out a study with 50 intervention and 50 control patients who were diagnosed with breast cancer, underwent a radical mastectomy, and practiced progressive relaxation exercises, and came to the conclusion that the PMR decreased the anxiety level among the patients with breast and colorectal cancers. The results of the study showed that both the experimental and control groups' mean pre-and post-test scores for post-mastectomy women's pain levels differed statistically significantly. According to the researchers, this outcome shows that PMR was successful in reducing pain among post-mastectomy women.

According to the study's findings, post-mastectomy women's fatigue levels significantly varied, decreased, and improved. This outcome is a result of the release of certain peptides during PMR, which have sedating and analgesic effects. As a result, the sympathoadrenal system, which is activated during stressful events like surgery, is less active [29]. From the researchers' perspective, it demonstrated the positive effects of PMR on enhancing and reducing weariness. These verified the substantial changes in post-mastectomy women's fatigue levels that represented the primary objectives of the PMR intervention. Similar to this, [30] observed that long-term tiredness often uses only one follow-up survey and that when compared to healthy populations, post-mastectomy women experience increased prevalence and intensity of fatigue, even years after treatment. Even years after diagnosis and treatment, fatigue is a recurring issue for women with breast cancer. The first six months following diagnosis, when cancer treatment is at its most intensive, appear to be the most difficult for women [31].

Cancer patients need the proper guidance and assistance to help them deal with any adverse effects of the disease or therapy. Cancer-related weariness has been linked to exhaustion, which has been linked to physical activity [32]. The current study's findings showed that there was a statistically significant difference between the two groups in terms of the degree of weariness at the post-program and follow-up one month later ($p < 0.001$). This indicates that the intervention group experienced less weariness following program implementation than the control group.

These findings are in line with those of [33], who discovered a reduction in fatigue severity in the study group with a high statistical significance difference between the study group, which adhered to the nursing management program, which included patient education about diet and lifestyle modification, progressive muscle relaxation technique, and. The same study's findings, according to [32], revealed that cardiovascular exercise, such as walking and cycling, could assist to lessen fatigue before and after cancer treatment. Exercise has been shown to reduce weariness, especially in cases of breast and prostate cancer.

Conclusion

The study findings revealed that PMR was effective in lowering post-mastectomy women's levels of pain and fatigue based on the findings and hypotheses of the present study. According to the study, there was a difference between the mean pretest and posttest ratings for pain and fatigue levels in the experimental group that was shown to be statistically significant at the $p < 0.05$ level.

Recommendations

The following suggestions are made based on the current study's findings:

- Post-mastectomy women should be aware of the progressive muscle relaxation technique as a simple and applicable strategy to control pain and reduce fatigue levels.
- increasing knowledge of PMR and its benefits for easing pain and exhaustion in post-mastectomy ladies
- For post-cesarean women, nurses can add a methodical pain assessment into their daily routine.
- Increased nurses' awareness of how to manage pain and exhaustion without the use of drugs through the implementation of an educational program.
- Additional research on the impact of various massage treatments on post-cesarean women who have had cesarean sections to lessen the physical and psychological complications.

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