Tehran University of Medical Sciences

Nursing Practice Today

2025; Volume 12, No 2, pp. 132-140

Original Article

The effect of pro-self-pain control and its plus guided imagery on pain in breast cancer outpatients: A quasi-experimental study

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ARTICLE INFO

Received 15 June 2024
Accepted 19 December 2024

Available online at:
http://npt.tums.ac.ir

Keywords:
pain;
breast cancer;
pro-self-pain control;
guided imagery;
outpatients

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DOI: 10.18502/npt.v12i2.18336

ABSTRACT

Background & Aim: Globally and in Indonesia, the number of people with breast cancer is still rising, and one of the most commonly reported symptoms is pain. After hospitalization, patients continue their lives at home, and most receive care in an outpatient setting. In this setting, they voluntarily need to be able to manage their pain. Therefore, teaching and assisting patients in self-management is essential for adequate pain management. This study aims to determine the effect of pro-self-pain control and guided imagery interventions on reducing pain intensity in outpatient breast cancer.
Methods & Materials: A quasi-experimental design, using convenience sampling on 49 patients, and allocated into an intervention group (n=25) that received pro-self-pain control and guided imagery intervention and a control group as a comparison (n=24) that received pro-self-pain control only. Pain intensity in both groups was measured before the experiment and ten days after using the Numeric Rating Scale.
Results: The results showed that there was a significant decrease in pain intensity in the intervention group $p<0.001$. The control group also experienced a decrease in pain intensity, but not significant $p=0.212$. Before the intervention, both groups showed no significant difference ($p=0.872$). However, after the intervention, the difference test between the two groups showed a significant difference with a $p=0.004$ and a small effect size ($d=0.40$).
Conclusion: The combination intervention of Pro-self-pain control and guided imagery (with audio recordings) effectively reduces pain intensity, although the effect size produced tends to be small. In caring for cancer patients, it is recommended to improve health education regarding pain management, thereby enabling them to self-manage their pain and participate actively in controlling it.

Introduction

Breast cancer continues to increase year by year, both worldwide and in Indonesia. It is the most commonly diagnosed cancer in women and the leading cause of cancer-related death, with an estimated 2.3 million new cases and 665,684 deaths in 2022 (1). Cancer causes discomfort, with pain often reported as a common symptom (2).

Currently, many cancer patients still often ignore their pain, and most of them receive treatment in outpatient settings (3), which requires them to voluntarily self-manage their pain. Therefore, assisting patients in self-management to achieve effective pain management should receive more attention. Cancer pain management includes pharmacological and non-pharmacological approaches. Due to the complexity of cancer pain, pharmacological management alone is often insufficient (4). Therefore, appropriate non-pharmacological interventions are greatly needed to help reduce the pain experienced by breast cancer patients.

Self-management using pro-self-pain control can help patients develop their self-management skills in dealing with pain, focusing on three strategies: education, building patient skills, and interactive nursing support (5). Pro-self-pain control is defined as the process of patients choosing to manage their pain by making decisions about how to cope with it, finding solutions to pain-related problems, and

Please cite this article as: Yasin N.A, Arafat R, Irwan A.M. The effect of pro-self-pain control and its plus guided imagery on pain in breast cancer outpatients: A quasi-experimental study. Nursing Practice Today. 2025; 12(2):132-40.

integrating pain relief techniques into their daily lives. This aims to help and encourage patients to actively participate in managing their pain (6). One of the other non-pharmacological techniques is guided imagery, which involves modifying mental patterns and images through stories or narratives, often accompanied by background music (7). Guided imagery can be self-directed, led by a practitioner, or done using audio recordings (4). So, these techniques can be selected and integrated into cancer pain management for daily use by patients independently

Previous research used pro-self-pain control in a German context and showed a significant reduction in pain intensity in cancer patients (8). However, according to other studies, pro-self-pain control is only able to increase patient knowledge and is not sufficient to relieve cancer pain (9). Therefore, in addition to patient education, it is also necessary to facilitate patients with other non-pharmacological techniques that can be integrated into their daily lives to help reduce their pain. Several studies related to pro-self-pain control and guided imagery have been conducted but not combined (10). Previous research has combined SEFT (Spiritual Emotional Freedom Technique) with pro-self-pain control, but only to assess increased activity caused by pain in colorectal cancer patients (11). However, in this study, pro-self-pain control as a cancer pain self-management intervention was combined with guided imagery (with audio recordings) to reduce pain in breast cancer outpatients. This study aims to determine the effect of pro-self-pain control intervention added with guided imagery on reducing pain in breast cancer outpatients.

Methods

Study design

This study implements a quasi-experimental design involving breast cancer patients who visited the outpatient installation at Hasanuddin University Hospital. The hospital was chosen because it has superior services, namely the Cancer Center, and is one of Eastern Indonesia's referral centers for cancer patients.

Population and sampling

The population is breast cancer outpatients at Hasanuddin University Hospital. A non-random convenience sampling technique was used, and data collection occurred between September 2023 and February 2024. A total of 49 patients participated and completed the intervention through day 10. The sample size was calculated using the Mean difference formula: $N = 2(Z_{1-\alpha/2}+Z_{1-\beta})^2Sp^2/\sigma^2$, where $\delta=\mu_1-\mu_2$ is the target mean difference between the two groups, and where $Z_{1-\alpha/2}$ and $Z_{1-\beta}$ are the ordinates for the standard normal distribution, $z\sim N(0,1)$, we use two-sided significance level $\alpha=0.05$, and power $1-\beta=0.8$ (7), resulting in a sample size of 52 people. These 52 participants were then allocated into two groups: the intervention group (n=26) and the control group (n=26), with participant codes assigned on the demographic data sheet. Codes R01–R26 were given to the control group, while codes R27–R52 were given to the intervention group. The study was explained to outpatients at the surgical oncology polyclinic, and verbal and written informed consent was obtained to participate. Inclusion criteria are 1) patients diagnosed with breast cancer, 2) aged 18-60 years and cooperative, 3) patients who experience pain and get analgesics 4) able to write and read, and 5) able to operate a cellphone because the monitoring process via WhatsApp or phone calls, and guided imagery audio recordings are accessed via cellphone. Exclusion criteria were 1) patients with hearing loss, 2) cancer metastasis (stage IV), 3) Post Op Mastectomy/Lumpectomy breast wounds of less than 1 month, and 4) use of psychotropic or antipsychotic drugs. In addition, dropout criteria were patients who refused to continue the intervention and who experienced a decline in consciousness or died. The confounding factors in this study were cancer stage and treatment type, which were controlled by matching and inclusion and exclusion criteria.

Instrument

Questionnaires and pain diaries were used as instruments in this study (1). Demographic data sheet questionnaires

developed by researchers include age, education level, marital status, employment, duration of breast cancer, cancer stage, and type of treatment; (2) a Numeric Rating Scale instrument in the form of a ruler with a scale of 0-10, namely 0 no pain, scale 1,2,3 mild pain, scale 4,5,6 moderate pain, and scale 7,8,9,10 severe pain with acceptable validity (13). Patients can easily use this instrument, and nurses can use it to monitor patient pain either over the phone or in person (14, 29). The pain diary is used to record the pain felt and to document the patient performing the guided imagery technique. The pain diary is compiled based on the recommendations of the American Cancer Society (15). It is given to participants along with booklets that have been compiled by researchers based on guidelines and recommendations of experts related to management in patients with cancer pain, which have previously gone through the Expert Judgement stage in FGD (Focus Group Discussion) to assess the feasibility of the media to be used. The booklet was then given to 10 breast cancer patients in the outpatient unit to ensure they understood the wording and content. Booklets are educational media that provide information that can be used independently at home. The booklet includes pain recognition, assessment, and pain management using pharmacology and non-pharmacology. The pain education booklet consists of 18 pages, including pictures as illustrations to increase understanding and appeal to patients. The guided imagery audio recording media is a type of pleasant imagery that contains guidance on imagining the beach with a background of relaxation/ natural music with deep breath relaxation techniques developed and used previously (16).

Setting, procedure, and intervention

We met the patients when they visited the surgical oncology clinic and explained the purpose and procedure of this study. Patients were assigned to both groups and baseline measurements were taken using the NRS (Numeric Rating Scale) as pretest results.

The pro-self-pain control intervention focused on three strategies: providing information (education), building patient skills, and interactive nursing support in the form of monitoring from nurses. The intervention group was given pro-self-pain control and guided imagery (with audio recordings) for ten days, carried out at home by the participants, and monitored by researchers via telephone and video call. On the first day, participants were given education related to pain management. The education session lasted 60 minutes, through a one-on-one approach using a pain management education booklet. Patients were given information related to breast cancer pain, how to assess pain, and how to manage pain with pharmacology and non-pharmacology. This included building patient skills for evaluating and reporting pain, using pain medication, making pain control plans independently, and communicating with medical staff. Support patient care by monitoring and strengthening pain management knowledge and skills. Teach patients how to fill out a pain diary, as well as how to use booklets and use audio recording guided imagery independently.

The intervention continued on the second day until the fifth day. Participants conducted the intervention independently and were monitored by the researcher (via telephone call) for 30 minutes. The researcher evaluated participants' skills in recognizing or knowing about pain management. The intervention continued until the tenth day. Except on the sixth day, monitoring was carried out via video call (participants were accompanied when listening to audio-guided imagery). When tracking by telephone, participants were ensured that they had carried out the intervention, had read the booklet or filled in the pain diary, and discussed obstacles that might be experienced and helped participants to be more independent in choosing other non-pharmacological techniques that could be used in their daily lives to help reduce their pain. Guided imagery audio was distributed to participants, and earphones were to help them relax and reduce noise. It was used every day only once, namely 6 hours after participants consumed analgesics or when the researcher was monitoring, which was listened to for approximately 7 minutes.

The control group was only given a pro-self-pain control intervention. Only given education according to the contents of the booklet, monitoring patients every day, without being facilitated by audio-guided imagery and without being taught how to use audio independently. However, for the principle of fairness in research ethics, the control group was still given the same intervention after completing the study. After following the intervention for ten days, participants were measured again using NRS (Numeric Rating Scale) as a posttest result on the 11th day, carried out at the hospital or home based on agreement with the participants. The researchers carried out data collection and intervention.

Ethical consideration

Before the commencement of the study, ethical approval was obtained from the Ethics Committee of the Faculty of Public Health, Hasanuddin University 5131/UN4.14.1/TP.01.02/2023. The participants were explained the purpose and methods of the study, and written informed consent was obtained. We also explained that participation was voluntary and the data obtained would be kept confidential.

Statistical analysis

Sample characteristics between the two groups were compared using the Mann-Whitney U test for numerical data and the Chi-Squared test for categorical data. Both groups' Pretest and post-test pain intensity scores used the Wilcoxon sign rank test because the data was not normally distributed based on the Shapiro-Wilk test. The Mann-Whitney U test was used to determine the difference in pretest and posttest pain intensity between the intervention and control groups. The non-parametric test was used because the data was not normally distributed even though data transformation had been carried out. IBM SPSS version 25 was used for analysis, and the significance level was set at $p<0.05$. And displays the effect size value obtained from calculating the Cohen coefficient formula. For the Mann-Whitney test, $r=z/(\sqrt{n})$, where z is the standardized test value and n is the number of cases/samples. If Cohen's Coefficient result shows a value of 0.2-0,5, it means the effect size is small, 0.5-0,8 means the effect size is medium, and >0.8 means the effect size is large (17).

Results

A total of 52 breast cancer patients were recruited for the study. 3 participants were excluded due to death (n=1), and refusal to continue the intervention (n=2), and 49 participants completed the study and were eligible for analysis. Shown in the study flowchart (Figure 1). The mean ages of the intervention and control groups were 49.48 (8.068) and 50.29 (7.726), respectively. There was no significant difference in terms of education (p=0.783), marital status (p=0.199), employment (p=0.513), stage of breast cancer (p=0.103), duration of breast cancer (p=0.292), and type of treatment (p=0.187) (Table 1).

A comparison of the results in both groups before and after the intervention is shown (Table 2). It can be seen that the pain intensity in both groups has decreased; the average pain intensity before the intervention in the intervention group was 3.52, and the average pain intensity after the intervention was 2.32 with a value of ($p<0.001$), which means it has a statistically significant difference. In the control group, the average pain intensity before the intervention was 3.33, and the average pain intensity after the intervention was 3.13, but showed a value of (p=0.212), which means there was no significant difference before and after the intervention based on the Wilcoxon test. Before the intervention, the two groups showed no significant difference, with a value of (p=0.872) based on the Mann-Whitney U test. After the intervention, there is a significant difference between the two groups with a value of (p=0.004), and the effect size tends to be small (d=0.40).

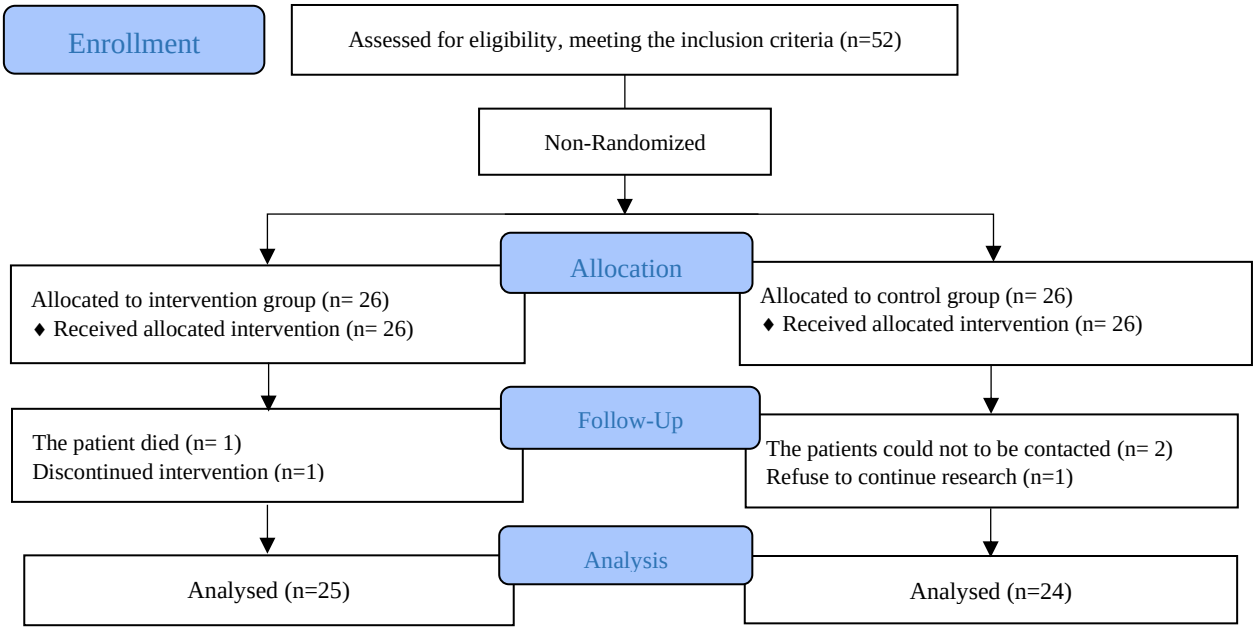

Figure 1. Study Flowchart

Table 1. Demographic data of participants

Variable	Intervention Group (n=25)	Control Group (n=24)	Total (n=49)	*p-value*[*]
Age (years): Mean(±SD)	49.48 (8.068)	50.29 (7.726)		0.718[ǂ]
	n (%)	**n (%)**	**n (%)**	
Education				
Elementary School	2 (8.0)	1 (4.2)	3 (6.1)	
Junior High School	4 (16.0)	3 (12.5)	7 (14.3)	
Senior High School	6 (24.0)	8 (33.3)	14 (28.6)	0.783
Bachelor	12 (48.0)	12 (50.0)	24 (49.0)	
University, graduate school	1 (4.0)	0 (0.0)	1 (2.0)	
Marital Status				
Married	23 (92.0)	19 (79.2)	42 (85.7)	0.199
Unmarried	2 (8.0)	5 (20.8)	7 (14.3)	
Employment status				
Teacher	6 (24.0)	3 (12.5)	9 (18.4)	
Lecturer	1 (4.0)	0 (0.0)	1 (2.0)	
Civil servant	2 (8.0)	2 (8.3)	4 (8.2)	0.513
Housewife	15 (60.0)	18 (75.0)	33 (67.3)	
Nurse	0 (0.0)	1 (4.2)	1 (2.0)	
Retired	1 (4.0)	0 (0.0)	1 (2.0)	
Stage of BC				
Stage 1	4 (30.8)	9 (69.2)	13 (26.5)	0.103
Stage 2	8 (47.1)	9 (52.9)	17 (34.7)	
Stage 3	13 (68.4)	6 (31.6)	19 (38.8)	
Duration of BC				
0-1 years	17 (68.0)	11 (45.8)	28 (57.1)	0.292
1-2 years	3 (12.0)	5 (20.8)	8 (16.3)	
2-3 years	5 (20.0)	8 (33.3)	13 (26.5)	
Type of treatment				
Chemotherapy	19 (76.0)	14 (58.3)	33 (67.3)	0.187
>1 type	6 (24.0)	10 (41.7)	16 (32.7)	

[*]*Chi-squared test*; [ǂ]*Mann- Whitney U test; SD=Standard deviation; BC=Breast Cancer*

Table 2. Difference in pain intensity before, and after intervention and comparison of pain intensity between the intervention group and control group (n=49)

Variable	Time	Intervention Group		Control Group		*p value*§	Z (ES)†
		Mean (SD)	Median (Min-Max)	Mean (SD)	Median (Min-Max)		
Pain Intensity	Pre-Intervention	3.52 (1.16)	3.00 (2-7)	3.33 (0.761)	3.00 (2-5)	0.872	0.161 (0.023)
	Post Intervention	2.32 (1.249)	2.00 (1-6)	3.13 (1.22)	3.00 (1-7)	0.004*	2.866 (0.40)
	*p value*ǂ	<0.001*		0.212			

**p*<0.05; ǂ*Wilcoxon signed ranks test;* §*Mann-Whitney U test;* †*Cohen's effect size; SD=Standard deviation*

Discussion

This study shows that pro-self-pain control and guided imagery intervention are considered effective in reducing pain in breast cancer patients, although the effect size tends to be small. Based on its principles, pro-self-pain control focuses on three strategies: providing information (education), building patient skills, and providing support through monitoring (5, 30). This study provided education using booklet media so patients could reread it at home. The booklet's components consist of pain recognition, pain assessment, and how to manage pain using pharmacology and non-pharmacology. Previous research has shown that educating cancer patients can improve their understanding of pain and reduce pain intensity scores (18). This could be due to the fact that most of the participants in this study had a high level of education, which positively influenced their ability to process and apply knowledge in daily life. Therefore, the education provided could be easily absorbed, improving their knowledge in managing cancer pain and helping to reduce their pain independently.

The findings indicating a reduction in pain after the implementation of pro-self-pain control are consistent with previous research. Earlier studies reported that a week-long pain self-management support intervention helped reduce pain intensity in 45 cancer patients (19). However, in contrast to previous studies, it is proven that it can only increase knowledge but has not been able to reduce pain (9). This difference may be due to the addition of guided imagery techniques in this study, which can maximize the results obtained. Guided imagery techniques, which are made using audio recordings and combined with pro-self-pain control, proved statistically significant in reducing pain intensity. Research related to guided imagery has been widely conducted and can be facilitated with audio recordings, allowing patients to imagine something pleasant and thereby reduce their perception of pain (4). Although we cannot determine the exact reasons why the interventions in this study helped reduce pain intensity, we assume that the participant's attention was focused on the audio they were listening to, which could create feelings of comfort and calm. Additionally, the education received and well-applied by the participants also contributed to reducing the pain intensity they experienced. According to the Gate Control Theory, only one impulse can simultaneously travel from the spinal cord to the brain. If the pathway is occupied with other thoughts, the pain sensation cannot be transmitted to the brain, thus reducing the feeling of pain (20). This is consistent with previous research (10,21), which has shown that guided imagery, whether directly guided by a therapist or with the help of a compact disc, can help reduce pain in patients with breast cancer pain.

In principle, guided imagery techniques can reduce the severity of pain by relaxing skeletal muscles that are in spasm due to increased prostaglandin levels. Vasodilation of blood vessels caused by prostaglandin increases blood flow to areas experiencing spasms and ischemia. Guided imagery reduces pain by stimulating the body to release endogenous opioids, specifically endorphins, produced in the brain to create a feeling of comfort that overrides the sensation of pain (22). Therefore, in this study, the use of guided imagery can help maximize the pro-self-pain control intervention

in reducing pain intensity in breast cancer patients.

Similar research has been conducted on two groups: one received self-care education for chemotherapy, and the other, the intervention group, received additional guided imagery with the help of a compact disc, which patients listened to independently at home for seven days. This showed a significant reduction in pain (21, 28). Another study combined pro-self-pain control with SEFT (Spiritual Emotional Freedom Technique), which was found to improve pain self-management in colorectal cancer patients after nine days (11). In this study, patients listened to guided imagery (with audio recordings) after 6 hours of taking analgesics. The duration of action of analgesics, both opioids and non-opioids, varies with a maximum of approximately 6 hours (23), after which the effectiveness of the medication decreases. Therefore, adding guided imagery can help create analgesics from within the body.

Participants in the control group also experienced a reduction in pain intensity, but it was not statistically significant. This could be because participants in the control group also only received pro-self-pain control, which involves educating them on pain management and monitoring, helping them to self-manage their pain and reduce the perceived intensity of pain. Pain in breast cancer patients can be caused by cancer progression or treatments such as surgery, radiation, or chemotherapy. Most participants in this study underwent chemotherapy and experienced pain as a side effect. Chemotherapy drugs can lead to peripheral neuropathy, which induces peripheral nerve damage. Clinical manifestations can involve sensory, motor, and autonomic systems (24). Most participants in this study complained of neuropathic pain, described as tingling sensations felt in the breasts that radiate to the armpits, arms, palms, and fingers and sometimes extend to the legs.

In this study, 78% of the participants were over 45 years old. Based on previous studies that examined the influence of age on breast cancer prognosis, the dominant age group was found to be above 40 years (25). According to the WHO, increasing age can increase the risk of breast cancer (26). Additionally, most participants were at stage three, which may be due to breast cancer symptoms typically not showing any signs or symptoms in the early stages. Signs and symptoms often appear when the tumor has grown large enough to feel like a lump in the breast or when the cancer has spread to surrounding tissues (27). Based on our research findings and previous studies, there is evidence that these interventions can help reduce pain intensity. However, continued attention is needed, with enhanced educational programs related to cancer pain management to assist breast cancer patients in managing their pain independently.

Limitations

We cannot fully control the factors that may affect pain intensity in breast cancer patients. However, this study was conducted at a central referral hospital for cancer patients, which can represent the populations of Eastern Indonesia. We conducted follow-up for ten days, and we recommend a more extended follow-up period for future research. The observed effect size is relatively small, and most of the sample in this study have a higher education level. Therefore, we cannot determine whether this approach would work well for patients with lower education levels.

Implications

Although this study has limitations, the results indicate a reduction in pain intensity scores after receiving the intervention. This study suggests that the intervention can be an additional nursing intervention that enhances the quality of nursing practice. Further research is needed to determine the long-term effectiveness of this intervention with a randomized controlled trial and to explore the benefits of using the booklet and pain diary, including the involvement of the patient's family member caregivers using the Brief Pain Inventory (BPI) tool to assess pain intensity.

Conclusion

The combination intervention of Pro-self-pain control and guided imagery (with audio recordings) effectively reduces pain

intensity, although the effect size produced tends to be small. In caring for cancer patients, it is recommended to improve health education regarding pain management, thereby enabling them to self-manage their pain and participate actively in controlling it.

Acknowledgments

We would like to thank the staff of Hasanuddin University Hospital. We also thank the participants for their contributions to this research. Conceived and designed the study, collected and organized the data (NAY, RA). Analyzed and interpreted the data (NAY, RA). Interpretation of the data, critical revision, and final drafts of the article (NAY, RA, AMI). All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript

Conflict of interest

The authors have no conflicts of interest to declare, and there is no funding for this research.

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