

ISSN 2354-8428
e-ISSN 2598-8727

JURNAL KEPERAWATAN

KOMPREHENSIF

COMPREHENSIVE NURSING JOURNAL

Published by :

Vol. 10 No. 2, April 2024

**Sekolah Tinggi Ilmu Keperawatan
PPNI Jawa Barat**



JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 10	NO. 2	Bandung April 2024	ISSN 2354-8428	e-ISSN 2598-8727
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Research Article

Upper Arm Exercises on Pain Intensity Among Patient with Breast Cancer Dharmais Cancer Hospital, Indonesia

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Received : 03/10/2023

Revised : 22/04/2024

Accepted : 28/04/2024

Online : 30/04/2024

Published : 30/04/2024

Abstract

Aim: to determine the effectiveness of upper arm exercises on pain intensity among patients with breast cancer at the Dharmais Cancer Hospital, Indonesia.

Methods: This study used a queasy experiment with pre-post-test and two-group design. Twenty respondents from breast cancer patients in each intervention and control group were recruited. The upper arm training intervention was carried out 3 times/week for 3 weeks. The Visual Analogue Scale (VAS) was used to assess pain, and linear regression and the dependent t-test with a significance level of 0.05 (CI 95%) were used for analysis.

Result: The significant difference in pain levels between the intervention group and the control group shows that the mean difference in the pain level scale of respondents in the upper arm exercise intervention group was 2.50 (SD=0.60), while in the control group, the mean was 1.70 (SD=0.65). control group with (t=4.00, p=0.001), and age (p-value =0.023; OR=8.645) were predictors in this study.

Conclusions: Upper arm exercises can be recommended to reduce pain in breast cancer sufferers, especially breast cancer patients who have undergone stage 1 and 2 mastectomy operations. It is recommended that further research involve respondents who had the same level of pain before upper arm exercises were carried out

Keywords: Breast, Cancer, Exercises, Pain, Upper Arm

INTRODUCTION

In 2022, 2.3 million women will be diagnosed with breast cancer, causing 670,000 deaths globally. In countries with a very high Human Development Index (HDI), 1 in 12 women will be diagnosed with breast cancer in their lifetime and 1 in 71 women will die from it (1). According to Globocan 2020 data, the three types of cancer with the highest increase in cases in Indonesia in 2020 are breast cancer (16.6 percent), cervical cancer (9.2 percent), and lung cancer (8.8 percent) (2,3). Dharmais Cancer

Hospital is a national cancer center and is an integrated cancer service in Jakarta It is a national referral cancer hospital throughout Indonesia. According to Dharmais Cancer Hospital statistics, 1625 cancer patients had treatment from January to October 2023, with 120 of them being mammae patients hospitalized in October 2023. This high incidence rate undoubtedly necessitates an adequate response. Pain among patients diagnosed with cancer is the most common complaint and can have a

major impact on the patient's quality of life. According to the IASP (International Association for the Study of Pain), pain is an unpleasant feeling that originates in a specific body location and is related to prior experiences (4). The pain felt will harm the patient's performance status and emotional well-being, causing increased anxiety, anger, feelings of depression, and even cognitive dysfunction, thereby reducing the patient's quality of life (5). Research conducted in the USA showed that women with breast cancer had significantly higher levels of fatigue and pain disorders, resulting in higher levels of depressive symptoms (6). Other research shows that nearly 10% of cancer survivors report experiencing pain related to cancer or cancer treatment, and about 20% of those experiencing pain report that the pain is not adequately controlled (7). Complaints of pain in breast cancer sufferers, because pain is caused by the pathology of the disease itself or therapy, including surgical and non-surgical interventions. Treatment for breast cancer can include chemotherapy, immunotherapy, radiation therapy, hormonal therapy, and breast surgery (8). Mastectomy is the most frequent surgical surgery, and the treatments performed will result in a variety of patient complaints, including loss of self-confidence, lymphedema, and even pain post-mastectomy side effects must be overcome by doing arm exercises. Arm exercises can reduce shoulder stiffness and symptoms such as weakness, muscle atrophy, bone pain, and decreased metabolism (9). One of the main complaints of cancer patients is pain, which in breast cancer patients is brought on by pain that is directly brought on by the cancer itself, such as infiltration of cells that are influenced by the neurological system and pain brought on by the therapy and mastectomy procedures. The development of persistent mastectomy pain is complex due to tissue injury that results in intensive activation of primary afferent nociceptive fibers (i.e. A and C fibers) and along which primary afferent nerves that are not normally involved in generating

electrical impulses also become injured, resulting in the formation of ectopic impulses (i.e. spontaneous pain). Subsequently, tissue trauma initiates an inflammatory process through the release of mediators (bradykinin, prostaglandins, histamine, and cytokines) resulting in changes in the rate of activation/inactivation, and a reduction in the threshold required to generate an action potential—this change in the threshold of excitation is known as peripheral sensitization (10).

Both pharmaceutical and non-pharmacological methods can be used to treat pain. In terms of pharmacological approaches, the WHO has established guidelines in the form of a three-stage analgesic procedure for the treatment of cancer: (1) Nonopioid \pm adjuvant, (2) Opioid for mild-to-moderate pain \pm Nonopioid or \pm adjuvant, and (3) cancer pain severe pain, Opioid for moderate-to- \pm Nonopioid \pm adjuvant (11). Approximately 70% of hormonal therapies with adjuvant use in breast cancer are endocrine therapies and cause side effects of hot flashes, sexual dysfunction, weight gain, musculoskeletal symptoms, loss of bone density, depression, cognitive dysfunction, and fatigue (12). Non-pharmacological therapy, on the other hand, is treatment without medication. Mind-body therapies such as progressive relaxation, meditation, creative visualization, music therapy, comedy, laughter, and aromatherapy can be used as non-pharmacological forms of administration (13). Upper extremity functional exercises have a positive impact on the rehabilitation of upper extremity function after mastectomy (14). Arm training is a non-pharmacological therapy that focuses on improving body condition and bringing the body to peak health for physiological changes to occur in the body system (15). Previous research shows that the effects of progressive resistance exercise training (PRET) programs on upper extremity pain and dysfunction in postsurgical head and neck cancer survivors significantly reduce

shoulder pain and disability and increase upper extremity muscle strength and endurance in head and neck cancer patients who experience shoulder dysfunction. due to spinal accessory nerve damage with outcomes (29.6; 95% confidence interval [95% CI], 216.4 to 24.5; P 5.001), upper extremity strength (110.8 kg; 95% CI, 5, 4–16.2 kg; P < 0.001) (16). Treatment of PRET involves upper arm exercises. Here, we report the results of the efficacy of upper arm exercises for pain in breast cancer patients who have undergone stage 1 and 2 mastectomy.

METHODS

The research design used a quasi-experimental design with a two-group pre-test-post-test control group design carried out for 3 weeks at Dharmais Cancer Hospital. Sample collection was based on inclusion criteria. Breast cancer patients with stage 1 and stage 2 mastectomy procedures were examined at the outpatient clinic. (first control after mastectomy), willing to participate in the research. The sample size used in this research using the Lameshow

formula obtained 20 respondents in each group. The sampling technique used is a non-probability sample using the sampling technique method in this research using purposive sampling. In this study, the VAS pain scale was used with a reliability test of > 0.95, and also in the validity test, VAS $r = 0.62$ (17). The scoring method for the VAS-P is using a ruler, the score is determined by measuring the distance in mm on the line 10-cm and the patient gives a score in the range of 0-100 - <10 mm: no pain; $\geq 10 - 30$ mm; mild pain; $\geq 30 - 70$ mm moderate pain. 90 – 100 mm: very severe pain (18) VAS-P is a measuring tool that can be used easily because it can be taken in < 1 minute. The univariate analysis uses percentage, mean, and SD. Multivariate analysis using Generalized Linear Model (GLM).

RESULT

Univariate Analysis of Respondent Characteristics and Homogeneity Test.

The findings of the univariate analysis of respondents' sociodemographic characteristics are shown in Tables 1 and 2 below.

Table 1. Respondent Characteristics : religion, Education and occupation

Respondent Characteristics	Intervention (n = 20)			Control (n = 20)			Homogeneity Chi-Square
	f(%)	Mean(SD)	Min -Max	f(%)	Mean(SD)	Min -Max	
Religion							
Nonmuslim	8 (40)			7(35)			
Muslim	12(60)			13(65)			1
Education							
Low (Elementary - High School)	11(55)			12(60)			1
College	9(45)			8(40)			
Occupation							
Not working	8(55)			9(45)			1
Work	12(45)			11(55)			
age (year)		45.3(6.59)	36 - 62		46.7(8.73)	34 - 60	0.058

Duration of Treatment (Months)	9.75(6.41)	2 – 21	11.4(7.01)	2 – 25	0.998
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Tables 1 show the distribution of respondent characteristics for each group. In the intervention group, the mean was 45.30 (SD=6.59) with an age range of 36 – 62 years. Most of the respondents in the intervention group were Muslim (60.0%), had low education (55.0%), and were still working (45.0%). The mean duration of treatment for 9.75 months from a range of 2 – 21 months (SD=6.41).

Values of the Pain Scale for Each Group

Table 2. Differences in Mean Changes in Pain Scale Values for Each Group

Pain scale	Intervention group				Control group			
	Mean(SD)		p	t	Mean(SD)		p	t
	pre	post			pre	post		
	5.15(0.74)	2.65(0.48)	0.0001	18.42	5.15(0.67)	3.45(0.6)	0.0001	11.57

The paired samples t-test between the pain measures before and after the intervention is shown in Table 2. There is a mean difference of 2.50 between before and after intervention, with a standard deviation of 0.60. Statistical testing showed a *t-value* of 18.42 and a *p-value* of 0.001, indicating that there is a significant difference in the pain scale of breast cancer patients before and after therapy. In the pre-test, the mean pain scale for control group patients was 5.15, while in the post-test, it was 3.45. The mean difference between the baseline and final pain scales measured therapeutic compliance among control group respondents was 1.70, with a standard deviation of 0.65. The statistical test findings also revealed a statistically significant change in the pain scale between before and after the treatment ($t=11.57$, $p=0.0001$).

The effect of upper arm exercise between intervention and control groups

Table 3. The difference in the effect of upper arm exercise between intervention and control groups

Group	n	Mean Difference	SD	SE	t	P value
Intervention	20	2,50	0,60	0,13	4,00	0,0001
Control	20	1,70	0,65	0,14		

Table 3 shows the results of the independent samples t-test statistical test, which indicate that the mean difference in the pain level scale of respondents in the upper arm exercise intervention group was 2.50 (SD=0.60), whereas it was 1.70 (SD=0.65) in the control group. The independent samples t-test statistical test showed a significant difference in the pain level scales of control and intervention group respondents ($t=4.00$, $p=0.001$).

Table 4. Effects of Age, Education, and Occupation on Pain Levels

Model	Variable	B	SE	β	t	Sig.	R ²	Adj. R ²	F
1	(Constant)	3,61	0,70		5,13	0,001	0,286	0,226	4,804
	Age (year)	-0,03	0,01	-0,40	-2,74	0,009			
	education (Low/high)	0,35	0,21	0,23	1,63	0,110			

	Occupation (not working/ working)	0,25	0,22	0,17	1,14	0,260			
2	(Constant)	3,96	0,64		6,18	0,001	0,260	0,220	6,497
	Age (year)	-0,04	0,01	-0,45	-3,19	0,003			
	education (Low/high)	0,40	0,21	0,27	1,92	0,062			
	Occupation (not working/ working)	-	-	-	-	-			

Table 4 shows the results from multiple linear regression tests between pain levels and confounding variables (age, education, and employment). The resulting model (model 2) explained 26% of the variation in the model impacting respondents' pain levels ($R^2=0.260$) based on the test results. The final model demonstrates that age ($\beta = -0.45$, $p=0.003$) predicts changes in respondents' pain levels.

DISCUSSION

The results indicated that there was a significant difference in the mean level of pain following the intervention between the treatment group and the control group. This difference in pain levels was between the intervention group and the control group. Previous research has indicated that following breast cancer surgery, there is a loss of range of motion; offering upper extremity range of motion exercises during rehabilitation can help with recovery (19) upper extremity function, and shoulder movement. Researchers assume that recovering shoulder mobility and upper extremity function suggest a decrease in pain. Regardless of the disease's stage, breast cancer therapies can cause pain or discomfort. Patients are thus most afraid of the painful and disabling effects of breast cancer (20). Breast cancer patients who experience pain can be given more intensive and specialized interventions such as physical exercise interventions (21). According to the research findings, the

intervention group's pain scale decreased following treatment. Upper arm exercises can relieve tension, enhance physical and psychological relaxation, and assist clients and families be self-sufficient in pain management, especially for patients who do not wish to treat pain with medication therapy. Previous research shows free range of motion exercises in the upper extremities in breast cancer sufferers can improve long-term benefits on shoulder function without increasing wound complications, reducing shoulder pain even within 6 months after treatment(22). Previous research conducted in Brazil in 2020 showed that extremity exercises with free ROM during post-mastectomy can reduce pain during recovery (23). Aside from that, upper arm workouts do not necessitate any particular equipment, making this stimulation accessible to individuals of all socioeconomic backgrounds (4). A low-back exercise program combined with neck, shoulder, and upper arm exercises significantly decreases pain and impairment in individuals with persistent low-back pain more than standard low-back exercises (24). Progressive arm exercises have been shown to reduce pain and increase movement compared to standard arm exercises (9). In this study, upper arm training was given progressively for 3 weeks.

In this study, respondents who had received an upper arm exercise intervention reported less discomfort and less stiffness in the shoulders and arms where their breasts had

been removed. The independent samples t-test statistical test indicated a significant difference between the pain level scales of control and intervention group respondents. The effect of upper arm exercise on pain levels in the intervention and control groups. As a result, upper arm exercise is useful in reducing pain levels in ca mammae patients. Results from the study indicate that the factors of age, education, and occupation that have an impact are consistent with the statistical results of the linear regression test, namely the age variable. A previous study found that women with a low level of education (66.7%) were at risk, whereas 28 women were not (33.3%) (18). According to the research results, the patient's education level is related to the early stage of breast cancer with an OR of 2.25 (20). Women with higher education are more likely to recognize the symptoms of early-stage breast cancer and receive treatment earlier than women with lower education, who are more likely to receive treatment after the cancer has spread to a severe stage(21). Education greatly influences the knowledge and attitudes of women with breast cancer which will influence their mindset so they can change their behavior towards health (22). Several studies support the relationship between occupational exposure and the incidence of breast cancer due to workplace exposure to chemicals, radiation, and circadian disruption has the greatest association with breast cancer (23). Other conditions show that women who do not work tend to reduce their quality of life, while those who work will have more social interaction and thus have a wider social environment. The social environment can function as social support through social interaction so that working people have better supporting factors in dealing with stress or illness (24).

In a multivariate study, people with breast cancer report higher discomfort as they age. Age therefore affects pain in people with Ca mammae (25). Increasing age is directly related to the aging process. The aging process increases susceptibility to pain,

affecting the ability to tolerate pain and the ability to recover from injuries when they occur (26). Increased risk of getting breast cancer at the age of more than fifty years is caused by the buildup of toxins in breast fatty tissue (27). Other research shows that breast cancer is 4,297 times more risky than in women aged mid-30s to mid-40s (28). The age range > 42 years is 17.5% of the highest incidence of breast cancer and the lowest is at age < 42 (29). The mean age of the research responder at the oncology polyclinic at Arifin Achmad Hospital in Riau Province was 43 years old, which impacts the prevalence of breast cancer in women (28). The chance of developing breast cancer increases with age. This is due to variations in genetic mutations that are impacted by an individual's age. The amount of estrogen hormone exposure a person receives is also impacted by their age. As age increases, the pain symptoms in breast cancer sufferers get worse, this shows that the respondent's age is positively correlated with their social function (30).

Research Limitations

The limitation of this research is that at the time of conducting the research, it involved respondents with different levels of pain. Researchers have not been able to control respondents who took analgesic medication when they felt pain.

CONCLUSION

This research shows that upper arm exercise progressively causes a significant reduction in pain scores among Breast Cancer patients. The pain that is felt often occurs after breast cancer surgery. It can be reduced by doing upper arm exercises so that it can contribute to the recovery of shoulder movement and upper extremity function. A significant decrease in pain levels in the intervention group occurred between the first week of intervention, while in the control group, pain began to decrease in the second week. Progressive upper arm exercises can be recommended to reduce pain for Breast cancer patients who have undergone stage 1 and 2 mastectomy operations.

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