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THE EFFECT OF PROGRESSIVE MUSCLE RELAXATION ON ANXIETY AMONG CANCER PATIENTS UNDERGOING CHEMOTHERAPY

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ABSTRACT
Cancer is a serious disease that causes mortality globally. Cancer patients who undergo chemotherapy frequently experience anxiety. Anxiety may arise from uncertainty regarding treatment outcomes, fear of disease progression, side effects of chemotherapy, and changes in physical and social functioning. Non-pharmacological interventions such as Progressive Muscle Relaxation (PMR) are increasingly recommended. The research objective is to identify the influence of PMR on the level of anxiety among cancer patients undergoing chemotherapy. The research method used quantitative pre-experimental design without control group. The research was carried out among 31 cancer patients undergoing chemotherapy who were selected using purposive sampling technique. Anxiety levels were measured using the Zung Self-Rating Anxiety Scale (ZSAS). PMR was administered twice daily for three days. Data were analyzed using the Wilcoxon Signed Rank Test with a significance level of 5%. The research result showed before the intervention, most of respondents had mild anxiety (74.2%), while 25.8% had moderate anxiety. Following PMR, 74.2% of respondents were categorized having normal anxiety levels and 25.8% in the mild anxiety category. Statistical analysis demonstrated a significant reduction in anxiety after PMR ($Z = -4.874$; $p = 0.000$). The conclusion is PMR significantly reduced anxiety levels among patients with cancer undergoing chemotherapy. PMR may be considered an effective nursing intervention to decrease anxiety among cancer patients receiving chemotherapy.

Keywords: anxiety; cancer; chemotherapy; progressive muscle relaxation

INTRODUCTION
Cancer is one of the serious causes of mortality globally. In 2021, at around 19.9 million new cancer cases and 9.7 million deaths that caused cancer were reported globally, with lung cancer being the most common disease among men and breast cancer the most frequently diagnosed among women. The lifetime risk of having cancer before the age of 75 years was estimated at 21.8% for men and 18.5% for women, while the risk of cancer-related death reached 11.4% and 8.0%, respectively. In addition, more than 53 million patients were living within five years of a cancer diagnosis, reflecting a substantial global burden on healthcare systems (GLOBOCAN, 2021).

In Indonesia, cancer becomes a major public health concern, with at around 408,661 new cases and 242,988 deaths documented in 2021, indicating a significant national burden of morbidity and mortality (GLOBOCAN, 2021). The Indonesian Ministry of Health, through the 2023 Indonesian Health Survey, also identified Central Java as one of the provinces with the highest prevalence of cancer, ranking third after the Special Region of Yogyakarta and Jakarta. These findings indicate that cancer poses not only a global challenge but also a substantial burden at the national and regional levels, requiring comprehensive management strategies that address both physical and psychological aspects of care.

Patients diagnosed with cancer frequently experience psychological distress throughout the course of their disease and treatment. Among various psychological problems, anxiety is one of the most common conditions experienced by cancer patients. Anxiety often arises from uncertainty regarding

disease progression, fear of recurrence, concerns about treatment outcomes, and insufficient understanding of the disease itself (He & Zhang, 2023). Anxiety is defined by emotional response of worry, fear, tension, and emotional discomfort that may impair an individual's ability to cope effectively with stressful situations (Dina, 2022). In oncology settings, anxiety is particularly prevalent among patients undergoing chemotherapy due to the invasive nature of treatment, potential adverse effects, and uncertainty regarding therapeutic outcomes.

The impact of anxiety among cancer patients should not be underestimated. Guidelines of clinical practice issued by the American Society of Clinical Oncology and the Society for Integrative Oncology emphasize that unmanaged anxiety can negatively affect treatment adherence, reduce quality of life, and compromise overall treatment outcomes (ASCO & SIO, 2023). Persistent anxiety may also contribute to negative self-perceptions, hopelessness, diminished self-esteem, and impaired psychosocial functioning (Seputri, 2024). Consequently, effective management of anxiety has become an important component of comprehensive cancer care.

Several studies have demonstrated the high number of anxieties among patients with cancer. A meta-analysis involving 84 international studies documented that around 23% of patients with cancer experienced anxiety, with a higher prevalence among women (31%) compared to men (20%) (Amiri, 2024). Similarly, previous studies have shown that patients undergoing chemotherapy frequently experience moderate to severe anxiety levels due to concerns related to treatment procedures, side effects, and disease prognosis (Hafsah, 2022; Yuliana & Novitasari, 2021). These findings indicate the need for interventions aimed at reducing anxiety among patients receiving chemotherapy.

Management of anxiety can be carried out by pharmacological and non-pharmacological approaches. Although therapy of pharmacology may effectively reduce anxiety symptoms, its use is frequently related to side effects and burden of additional treatment. Therefore, non-pharmacological interventions have gained increasing attention because they are generally safe, inexpensive, and easy to implement in the hospital (Gerliandi et al., 2021). Among various non-pharmacological approaches, Progressive Muscle Relaxation (PMR) has emerged as a promising procedure for reducing anxiety in patients with chronic illnesses, including cancer.

Progressive Muscle Relaxation is a relaxation intervention that involves systematic contraction and relaxation of muscle groups to achieve a state of physical and psychological relaxation. This technique enables individuals to recognize the difference between muscle tension and relaxation while enhancing their ability to manage stress responses independently (Alvionita et al., 2022). PMR is particularly suitable for cancer patients because it does not require specialized equipment, can be performed independently after adequate instruction, and is easily integrated into routine nursing care (Liu et al., 2022).

Previous studies have reported favourable outcomes of PMR in reducing anxiety among cancer patients. Saluy et al. 2021 demonstrated a consequential reduction in anxiety levels following PMR intervention, with mean scores decline from 55.6 to 40.2 ($p = 0.001$). Other non-pharmacological treatment, such as mindfulness-based interventions and music therapy, have also shown effectiveness in alleviating anxiety among patients with cancer (Nguyen et al., 2023; (Hofmann et al., 2020). However, PMR offers several practical advantages, including ease of implementation, low cost, and minimal resource requirements, making it a feasible intervention in both hospital and outpatient settings.

RSUD Dr. Moewardi Surakarta is one of the major referral hospitals for oncology services in Central Java. Hospital data from February 2025 indicated a substantial number of cancer cases receiving outpatient care, including patients undergoing chemotherapy. Given the high prevalence

of anxiety among patients with cancer and the practical benefits of PMR, evaluating the effectiveness of this intervention within the local clinical context is important. Evidence generated from such studies may contribute to the development of nursing interventions that support psychological well-being among patients undergoing cancer treatment. Therefore, this study aimed to determine the effect of Progressive Muscle Relaxation on anxiety levels among cancer patients undergoing chemotherapy. The findings are expected to provide evidence supporting the implementation of non-pharmacological nursing interventions to improve psychological response and enhance holistic cancer care quality.

METHOD

Study Design

This study conducted with a quantitative study. The design of the study used pre-experimental method with a one-group pretest-post test design. The study aimed to evaluate influence of Progressive Muscle Relaxation (PMR) to anxiety among cancer patients undergoing chemotherapy.

Setting and Participants

The study was conducted at the Oncology Outpatient Clinic and Chemotherapy Unit of Dr. Moewardi Regional General Hospital, Surakarta, Indonesia. The time of the study is from May until June 2025. The population consisted of patients with cancer who undergo chemotherapy treatment at the hospital. There are 31 respondents who were selected using purposive sampling technique. Participants were selected according to inclusion criteria, including: (1) diagnosed with cancer, (2) undergoing chemotherapy treatment, (3) willing to participate in the research, (4) can communicate effectively, and (5) physically capable of performing progressive muscle relaxation exercises.

Instruments

The data collection used the Zung Self-Rating Anxiety Scale (ZSAS/SRAS) questionnaire as an instrument to measure the level of patients' anxiety. The scale has been proven to be valid, reliable, and appropriate for assessing anxiety subjectively from psychological aspects with Cronbach's alpha 0.658 and r = 0.043 – 0.530, $p<0.05$ (Antari et al., 2023; Setyowati et al., 2019). It is easy for respondents to understand, practical to administer, and allows for objective quantitative measurement pre and post intervention of the progressive muscle relaxation intervention. The instrument consists of 20 items, including 15 unfavorable statements that reflect increased anxiety and 5 favorable statements that reflect reduced anxiety (Rahmawati, 2024). Progressive Muscle Relaxation was administered according to a standardized procedure involving sequential contraction and relaxation of major muscle groups. Respondents performed the intervention two times in a day, in the morning and afternoon, for three consecutive days under researcher supervision and monitoring.

Statistical Analysis

Summarizing respondents' demographic characteristics and anxiety levels used descriptive statistics. The normality of data distribution was assessed prior to hypothesis testing. The data distribution was not normally distributed, so the differences between pretest and posttest anxiety scores were analyzed using the Wilcoxon Signed Rank Test. Statistical significance was established at $p < 0.05$.

Ethical Considerations

Ethical approval of the study was obtained from the Health Research Ethics Committee prior to data collection with number 1.406/VI/HREC/2025. All respondents received information regarding the research objectives, benefits, procedures, and potential risks before providing informed consent. Confidentiality and anonymity of participant information were performed throughout the study.

RESULT

A total of 31 patients with cancer who undergoing chemotherapy participated in the research.

Table 1. Characteristics of Respondents (n = 31)

Characteristics		Frequency (n)	Percentage (%)
Age	20–40 years	7	22,6
	41–60 years	23	74,2
	<61 years	1	3,2
Gender	Male	6	19,4
	Female	25	80,6
Education	Elementary School	4	12,9
	Junior High School	10	32,3
	Senior High School	11	35,5
	College/University	6	19,4
Occupation	Not Working	14	45,2
	Working	17	54,8
Type of Cancer	Breast Cancer	9	29,0
	Ovarian Cancer	5	16,1
	Cervical Cancer	8	25,8
	Colorectal Cancer	3	9,7
	Lung Cancer	2	6,5
	Testicular Cancer	4	12,9

The majority were in the 41–60 years age group, accounting for 23 respondents (74.2%). Most respondents were female, with 25 respondents (80.6%). Regarding educational level, the largest proportion of respondents had completed senior high school education, totaling 11 respondents (35.5%). In terms of employment status, most respondents were employed, with 17 respondents (54.8%). Regarding cancer type, the most common cancer experienced by the respondents was breast cancer, affecting 9 respondents (29.0%).

Table 2.
Frequency Distribution of Respondents' Characteristics Based on Anxiety Levels

Characteristics		f	%	Anxiety Levels			
				Normal (20-44)	Mild Anxiety (45-59)	Moderate Anxiety (60-74)	Severe Anxiety (75-80)
Age	20–40 years	7	22,6	-	4	3	-
	41–60 years	23	74,2	-	18	5	-
	<61 years	1	3,2	-	1	-	-
Gender	Male	6	19,4	-	6	-	-
	Female	25	80,6	-	17	8	-
Education	Elementary School	4	12,9	-	4	-	-
	Junior High School	10	32,3	-	6	4	-
	Senior High School	11	35,5	-	8	3	-
	College/University	6	19,4	-	5	1	-
Occupation	Not Working	14	45,2	-	9	5	-
	Working	17	54,8	-	14	3	-
Type of Cancer	Breast Cancer	9	29,0	-	7	2	-
	Ovarian Cancer	5	16,1	-	4	1	-
	Cervical Cancer	8	25,8	-	5	3	-
	Colorectal Cancer	3	9,7	-	1	2	-
	Lung Cancer	2	6,5	-	2	-	-
	Testicular Cancer	4	12,9	-	4	-	-

According to age distribution, the majority of the respondents were in the 41–60 years age group, with anxiety levels predominantly in the mild category (18 respondents) and moderate category (5 respondents). Most of respondents were female, with 17 respondents experiencing mild anxiety and 8 respondents experiencing moderate anxiety. Regarding educational level, most respondents had completed senior high school education, totalling 11 respondents, with 8 respondents reporting mild anxiety and 3 respondents reporting moderate anxiety. In the employment status, most of the respondents were employed, with anxiety levels predominantly in the mild category (14 respondents) and moderate category (3 respondents). Regarding cancer type, the most common cancer among

respondents was breast cancer, affecting 9 respondents, of whom 7 respondents had mild anxiety and 2 respondents had moderate anxiety.

Table 3.
Respondents' Anxiety Levels Before the Intervention (n = 31)

Variable	f	%	Mean	Median	SD	Min-Max
Pre-intervention Anxiety						
Normal (20-44)	0	0				
Mild Anxiety (45-59)	23	74,2	50,83	52	2,725	46-55
Moderate Anxiety (60-74)	8	25,8	61,63	61,50	1,768	60-65
Severe Anxiety (75-80)	0	0				

The respondents' anxiety levels before the intervention showed that the majority experienced mild anxiety, with 23 respondents (74.2%), a mean score of 50.83 ± 2.725, a minimum score of 46, and a maximum score of 55. Moderate anxiety was experienced by 8 respondents (25.8%), with a mean score of 61.63 ± 1.768, a minimum score of 60, and a maximum score of 65.

Table 4.
Anxiety Levels of Respondents After the Intervention (n = 31)

Variabel	f	%	Mean	Median	SD	Min-Max
Post-intervention Anxiety						
Normal (20-44)	23	74,2	41,17	42	2,443	36-44
Mild Anxiety (45-59)	8	25,8	53,00	53,50	2,449	50-56
Moderate Anxiety (60-74)	0	0				
Severe Anxiety (75-80)	0	0				

The respondents' anxiety levels after the intervention showed a decrease compared to those before the intervention. Most respondents were in the normal category, totaling 23 individuals (74.2%), with a mean score of 41.17 ± 2.443, a minimum score of 36, and a maximum score of 44. Respondents in the mild anxiety category totaled 8 individuals (25.8%), with a mean score of 53.00 ± 2.449, a minimum score of 50, and a maximum score of 56.

Table 5.
Results of the Wilcoxon Signed-Rank Test Comparing Anxiety Levels Before and After Progressive Muscle Relaxation Intervention

Variable	Z	Sig. (2-tailed)	N
Anxiety	-4,874	0,000	31

The Wilcoxon Signed-Rank Test revealed a Z value of -4.874 and a significance value (2-tailed) of 0.000 ($p < 0.05$), indicating a statistically significant difference in anxiety levels before and after the Progressive Muscle Relaxation intervention.

DISCUSSION

Characteristics of Respondents

The majority of respondents were aged 41–60 years (74.2%), female (80.6%), had a high school education (35.5%), were employed (54.8%), and were diagnosed with breast cancer. These findings indicate that most patients undergoing chemotherapy in this study were middle-aged women who remained socially and economically active. The predominance of respondents aged 41–60 years is consistent with previous studies reporting that middle adulthood is a vulnerable period for anxiety among patients with cancer (Goerling et al., 2023; Roshid et al., 2024). At this stage of life, individuals commonly experience declining physical function while simultaneously maintaining significant responsibilities related to family, employment, and social roles. Concerns regarding disease progression, treatment outcomes, and loss of productivity may increase psychological distress.

Female respondents constituted the majority of participants, which is closely related to the high number of breast and cervical cancer among women. Previous studies have shown that women lead to experience higher anxiety than men due to hormonal influences, body image concerns, and greater emotional sensitivity toward illness and treatment outcomes (Bravo et al., 2020; Zhou et al.,

2023). Changes in physical appearance resulting from chemotherapy, such as hair loss and altered body image, may further contribute to anxiety. Most respondents had high school education. Educational attainment had a pivotal role in health literacy and understanding of disease-related information. Patients with higher education mostly have better understanding in health knowledge and greater ability to understand treatment procedures, which may reduce uncertainty and anxiety. Conversely, limited educational attainment may hinder understanding of cancer and chemotherapy, resulting in increased psychological distress (Susilawati et al., 2023).

More than half of the respondents were employed. Employment may provide social support, financial stability, and a sense of purpose, all of which can positively influence psychological well-being. However, balancing work responsibilities with chemotherapy treatment may also increase stress and anxiety (Marzorati et al., 2025). Therefore, employment may function both as a protective factor and as a source of psychological burden. Breast cancer was the most popular diagnosis among respondents. This finding aligns with global cancer statistics identifying breast cancer as the most frequently diagnosed cancer among women (GLOBOCAN, 2021). Patients with breast cancer often get anxiety due to treatment outcomes, body image changes, and fear of recurrence. In addition, respondents with cervical cancer tended to report higher levels of moderate anxiety, likely due to concerns regarding reproductive function, sexuality, fertility, and interpersonal relationships (Li et al., 2023).

Patients' Anxiety Before and After Progressive Muscle Relaxation

Before receiving Progressive Muscle Relaxation (PMR), most respondents had mild anxiety (74.2%), while the remaining respondents experienced moderate anxiety (25.8%). Anxiety among cancer patients undergoing chemotherapy is common and may arise from concerns regarding treatment side effects, uncertainty about prognosis, fear of disease progression, and the possibility of recurrence. Similar findings have been reported in previous studies showing that anxiety is one of the most popular psychological problems experienced by cancer patients during treatment (Goerling et al., 2023; Li et al., 2023). The presence of mild anxiety among most respondents before intervention may also have been influenced by supportive factors such as family support, spiritual beliefs, adaptation to illness, and previous chemotherapy experiences. Patients who receive strong emotional and social support are generally better able to cope with treatment-related stress and uncertainty. Previous exposure to chemotherapy may also reduce anxiety because patients become more familiar with treatment procedures and potential side effects (Dewi & La Kahija, 2020).

Following PMR intervention, anxiety levels decreased substantially. Most respondents (74.2%) reported no anxiety, while the remaining respondents experienced only mild anxiety. No respondent was in the moderate anxiety after the procedure. These results indicate that PMR was effective in reducing anxiety among patients undergoing chemotherapy. The results are consistent with previous studies demonstrating significant reductions in anxiety following PMR interventions among cancer patients. Yuniarti dan Rahmawati (2022) reported that PMR significantly reduced anxiety levels after three weeks of intervention, while Purwanti dan Khoiriyah (2024) observed a decrease in average anxiety scores among patients receiving PMR therapy. These findings suggest that PMR is a practical and effective non-pharmacological intervention for psychological symptom management in cancer care. PMR combines systematic muscle contraction and relaxation with controlled breathing exercises. This process promotes physical relaxation, reduces muscle tension, and redirects attention away from negative thoughts and worries. As a result, patients experience greater calmness and emotional stability, which contribute to reduced anxiety levels (Alvionita et al., 2022).

Effect of Progressive Muscle Relaxation on Anxiety Reduction

The results of the Wilcoxon test showed a significant reduction in anxiety levels after PMR intervention ($p = 0.000$; $p < 0.05$), indicating that PMR had a significant effect on reducing anxiety among cancer patients undergoing chemotherapy at RSUD Dr. Moewardi Surakarta. This finding

supports previous evidence regarding the effectiveness of PMR in improving psychological outcomes among cancer patients. Afira (2021) concluded that PMR consistently reduces anxiety in patients receiving chemotherapy. Similarly, Nguyen et al. (2023) reported significant reductions in anxiety, depression, and stress among patients with breast and gynecological cancers who received PMR compared with control groups.

The effectiveness of PMR can be explained through physiological and psychological mechanisms. During PMR exercises, alternating muscle contraction and relaxation stimulate proprioceptive receptors and activate the parasympathetic nervous system. This response suppresses sympathetic nervous system activity, resulting in decreased heart rate, blood pressure, and secretion of stress hormones such as cortisol, epinephrine, and norepinephrine (Pathan et al., 2023). These physiological changes promote a state of relaxation and reduce anxiety symptoms. From a neuropsychological perspective, PMR may also enhance alpha and theta brain wave activity, which are associated with relaxation and emotional regulation. In addition, controlled breathing and relaxation exercises stimulate the release of endorphins and serotonin, neurotransmitters that contribute to feelings of comfort and well-being (Toussaint et al., 2021). Consequently, patients become better able to manage emotional responses and cope with treatment-related stress.

The findings of this study suggest that PMR is an effective, safe, and low-cost intervention that can be implemented as part of routine nursing care for cancer patients undergoing chemotherapy. Because the technique is simple, does not require special equipment, and can be performed independently, PMR has the potential to become a valuable complementary intervention for reducing anxiety and improving psychological well-being during cancer treatment.

CONCLUSION

Progressive muscle relaxation significantly reduced anxiety levels among cancer patients undergoing chemotherapy at Dr. Moewardi Regional Hospital, Surakarta. The intervention resulted in a decrease in anxiety scores and an increase in the proportion of respondents categorized as having normal anxiety levels following treatment. Progressive muscle relaxation is a simple, safe, and cost-effective nursing intervention that can be integrated into routine oncology care to support the psychological well-being of cancer patients undergoing chemotherapy.

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