

# The Effect of a Combination of Jacobson Progressive Muscle Relaxation and Benson Relaxation on Improving Sleep Quality in Cancer Patients

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## Abstract:

**Background:** Sleep disturbance is a common problem among cancer patients and can be worsened by pain, anxiety, fatigue, and chemotherapy-related symptoms. Non-pharmacological nursing interventions such as Jacobson Progressive Muscle Relaxation and Benson Relaxation may help reduce physical and psychological hyperarousal and improve sleep quality.

**Materials and Methods:** This study employed a quasi-experimental design with a pretest–posttest control group design. The population consisted of cancer patients with sleep disturbances. Sampling used consecutive sampling based on inclusion criteria. A total of 70 cancer patients were divided into intervention and control groups, each consisting of 35 respondents. The intervention group received a combination of Jacobson Progressive Muscle Relaxation and Benson Relaxation for five consecutive days, two sessions per day, with each technique performed for 15 minutes. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using the Mann–Whitney test.

**Results:** The results showed a significant improvement in sleep quality in the intervention group after receiving the combined relaxation intervention, with a decrease in the median PSQI score from 15 to 11 and a  $p$ -value  $< 0.001$ . In the control group, there was no significant difference before and after routine care ( $p = 0.298$ ). Between-group analysis showed a significant difference in post-test scores between the intervention and control groups ( $p = 0.001$ ), indicating the effectiveness of the combined intervention in improving sleep quality in cancer patients.

**Conclusion:** The combination of Jacobson Progressive Muscle Relaxation and Benson Relaxation significantly improves sleep quality in cancer patients. This combined intervention can be considered a safe, simple, and holistic nursing approach to support sleep management in cancer care.

**Key Word:** Jacobson progressive muscle relaxation, Benson relaxation, cancer, sleep quality, PSQI

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## I. Introduction

Cancer is one of the leading causes of death worldwide. WHO data reported 20 million new cases and 9.7 million deaths in 2022, making it a major health problem characterized by uncontrolled abnormal cell growth that can invade surrounding tissues and metastasize to other parts of the body<sup>(1,2)</sup>. In Indonesia, cancer remains a leading cause of morbidity and mortality, and national cancer control efforts continue to emphasize early detection, treatment, symptom management, and supportive care<sup>(3)</sup>.

Sleep disturbance is one of the most frequently reported problems among cancer patients. Previous studies show that sleep problems may occur before, during, and after cancer treatment, manifesting as difficulty initiating sleep, frequent nighttime awakening, early morning awakening, non-restorative sleep, and daytime dysfunction<sup>(4-7)</sup>. Poor sleep quality may worsen fatigue, pain sensitivity, mood disturbances, immune dysregulation, and patients' ability to tolerate cancer treatment<sup>(6-8)</sup>. Therefore, sleep quality should be considered an important nursing outcome in cancer care.

The Pittsburgh Sleep Quality Index (PSQI) is widely used to measure subjective sleep quality, where higher scores indicate poorer sleep quality. In clinical settings, simple and reliable assessment tools are essential to identify patients requiring supportive interventions<sup>(9)</sup>.

Pharmacological management can be used to treat sleep problems; however, long-term use of sedative agents may lead to side effects and dependency risks. Therefore, non-pharmacological interventions are increasingly important in nursing care. Jacobson Progressive Muscle Relaxation is a technique involving systematic contraction and relaxation of muscle groups to reduce somatic tension and promote physiological relaxation<sup>(10)</sup>.

Benson Relaxation is a mind–body technique that combines deep breathing, repetition of calming words or phrases, and a passive attitude toward intrusive thoughts to elicit a relaxation response <sup>(11)</sup>.

Both techniques have been reported to improve sleep quality and reduce anxiety or stress in patients with chronic diseases and cancer <sup>(12–15)</sup>. However, their combined application in cancer patients is still rarely implemented in routine nursing practice. This combination may provide synergistic effects, as Jacobson relaxation targets physical tension while Benson relaxation targets cognitive and psychological stimulation. This study aims to examine the effect of the combination of Jacobson Progressive Muscle Relaxation and Benson Relaxation on sleep quality in cancer patients.

## II. Material And Methods

**Study Design:** Quasi-experimental non-randomized pretest–posttest control group design.

**Study Setting:** Oncology ward of Dr. Zainoel Abidin General Hospital, Banda Aceh, Indonesia.

**Study Duration:** November 2025 – March 2026.

**Sample Size:** A total of 70 respondents divided into two groups: 35 intervention and 35 control.

**Sampling Method:** Consecutive sampling was used. Patients were screened using the Insomnia Severity Index (ISI), and those with ISI  $\geq 10$  were recruited based on inclusion and exclusion criteria.

### Inclusion Criteria

1. Cancer patients aged  $\geq 18$  years
2. Fully conscious and able to communicate verbally
3. ISI score  $\geq 10$
4. Possess a smartphone for monitoring and follow-up

### Exclusion Criteria

1. Severe psychological disorders
2. Decreased level of consciousness
3. History of chronic sleep disorders prior to cancer diagnosis (e.g., insomnia, sleep apnea)
4. Use of sleep medication
5. Medical conditions limiting light physical activity (e.g., heart failure, chronic lung disease)

### Procedure methodology

After obtaining ethical approval (No. 334/ETIK-RSUDZA/2025), participants were selected according to eligibility criteria and provided informed consent. On day 1, both groups underwent pretest assessment using PSQI. The intervention group received Jacobson Progressive Muscle Relaxation followed by Benson Relaxation from day 2 to day 6, twice daily. Each session consisted of 15 minutes Jacobson relaxation followed by a rest period and 15 minutes Benson relaxation.

The control group received standard nursing care and sleep education without relaxation intervention. On day 7, posttest PSQI assessment was conducted.

### Statistical analysis

Univariate analysis was conducted to describe the respondents' characteristics, including age, gender, education level, occupation, type of cancer, chemotherapy cycle, anxiety, fatigue, and pain. Categorical data were presented in the form of frequency and percentage. The normality test was performed using the Shapiro–Wilk test to determine the distribution of sleep quality score data. The results showed that the data were not normally distributed; therefore, the bivariate analysis used the Mann–Whitney U test to compare score differences between groups.

## III. Result

The demographic characteristics of the respondents included age, gender, education level, occupation, type of cancer, chemotherapy cycle, anxiety, fatigue, and pain. Demographic data were presented using frequency distributions and percentages, as shown in Table 1. This presentation aimed to provide an overview of the respondents' characteristic.

**Table no 1:** Frequency Distribution of Respondents' Demographic Characteristics (n = 70)

Respondent Characteristics	Intervention (n=35)		Control (n=35)	
	f	%	f	%
Age				
Mean $\pm$ SD	46,89 $\pm$ 14,204		49,26 $\pm$ 11,165	
Min-Max	20-76		27-69	
Adolescent	2	5.7	-	-

Early adulthood	10	28.6	10	28.6
Late adulthood	21	60.0	19	54.3
Older adult	2	5.7	6	17.1
<b>Sex</b>				
Male	13	37.1	9	25.7
Female	22	62.9	26	74.3
<b>Education</b>				
Elementary school	1	2.9	1	2.9
Junior high school	7	20.0	7	20.0
Senior high school	23	65.7	23	65.7
Diploma/Bachelor's degree	4	11.4	-	-
<b>Occupation</b>				
Civil servant/Military/Police	2	5.7	2	5.7
Entrepreneur/self-employed	18	51.4	11	31.4
Housewife	13	37.1	22	62.9
Unemployed	2	5.7	-	-
<b>Chemotherapy cycle</b>				
Early (1-3 cycles)	14	40.0	18	51.4
Middle (4-6 cycles)	21	60.0	17	48.6

Based on Table 1, the majority of respondents in both groups were female, accounting for 62.9% in the intervention group and 74.3% in the control group. Most participants had completed senior high school education (SMA), comprising 65.7% in both groups. Breast cancer was the most common type of cancer, with 31.4% in the intervention group and 40% in the control group. Most respondents in the intervention group were in the middle phase of chemotherapy, totaling 21 individuals (60.0%), whereas the control group had a slightly higher proportion of respondents in the early phase of chemotherapy, with 18 individuals (51.4%).

**Table no 2.** Differences in Sleep Quality of Cancer Patients Before and After the Intervention in the Intervention and Control Groups (N=70)

Variable	Intervention Group (n=35)		Control Group (n=35)		Z	p-value
	Median	IQR	Median	IQR		
Pre-test	15	1	15	1	-0.104	0.917
Post-test	11	2	15	1	-5.859	0.001

Table 2 shows that before the intervention, there was no significant difference between the intervention group and the control group, with a p-value of 0.917 ( $p > 0.05$ ). After the intervention, there was a significant difference in sleep quality between the two groups, with a p-value of 0.001 ( $p < 0.05$ ). The intervention group showed an improved median score of 11 (IQR = 2), whereas the control group remained at a median of 15 (IQR = 1), indicating that the combined relaxation intervention significantly improved sleep quality compared with standard care

#### IV. Discussion

This study found that sleep quality before the intervention was poor and comparable between the intervention and control groups. The median PSQI score before the intervention was 15 in both groups, and the between-group test showed no significant difference. This baseline similarity supports the equivalence of the two groups before the intervention. Clinically, poor sleep quality in cancer patients may be associated with cancer-related symptoms, chemotherapy side effects, pain, fatigue, anxiety, and psychological stress related to diagnosis and treatment<sup>(4,5)</sup>.

After the intervention, the intervention group showed a significant reduction in PSQI scores, whereas the control group did not show meaningful changes. This indicates that the combined intervention of Jacobson's progressive muscle relaxation and Benson relaxation was effective in improving sleep quality. Because the PSQI is scored in a direction in which lower scores indicate better sleep quality, the decrease from a mean of 14.60 to 11.77 reflects a clinically relevant improvement. The posttest difference between groups also supports the effect of the intervention.

The effectiveness of the intervention can be explained by the complementary mechanisms of the two relaxation techniques. Jacobson's progressive muscle relaxation reduces muscle tension by systematically tensing and relaxing muscle groups, which may reduce somatic arousal, lower sympathetic activation, and facilitate parasympathetic dominance<sup>(10,12,13)</sup>. Benson relaxation enhances the relaxation response through diaphragmatic

breathing, repetition of calming words, and passive attention, which may reduce cognitive arousal, stress, and anxiety before sleep<sup>(16)</sup>. When combined, these techniques address both the physical and psychological components of sleep disturbance.

In addition, other studies have shown that the combination of progressive muscle relaxation and Benson relaxation provides benefits for patients with chronic diseases and sleep disorders<sup>(17)</sup>. Furthermore, recent studies and reviews support the use of non-pharmacological and multimodal interventions as effective approaches for managing insomnia and cancer-related sleep disturbances<sup>(18,19)</sup>.

The difference in posttest results between the groups reinforces that the improvement in sleep quality was related to the administration of the combination of Jacobson's progressive muscle relaxation and Benson relaxation. These findings indicate that the combination of the two techniques is statistically effective and clinically relevant as a simple non-pharmacological approach to improving sleep quality in cancer patients. Therefore, Jacobson's progressive muscle relaxation and Benson relaxation can be recommended as complementary nursing interventions that are easy to perform, low-cost, and potentially applicable in routine care for cancer patients experiencing sleep disturbances.

## V. Conclusion

This study demonstrates that the combination of Jacobson's progressive muscle relaxation and Benson relaxation significantly improves sleep quality in cancer patients. The intervention group experienced a meaningful reduction in PSQI scores after receiving the relaxation intervention for five consecutive days, whereas the control group showed no significant change. These findings indicate that this combined relaxation intervention is a safe, simple, and feasible non-pharmacological nursing intervention to support sleep management in cancer patients, particularly those undergoing chemotherapy and experiencing sleep disturbances.

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