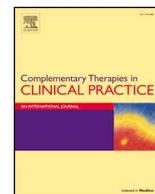




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## The effect of progressive muscle relaxation on cancer patients' self-efficacy

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## ABSTRACT

**Background and purpose:** Self-efficacy is considered as one of the influential parameters affecting the health of patients. This study aimed to investigate the effect of relaxation techniques on self-efficacy of patients suffering from cancer.

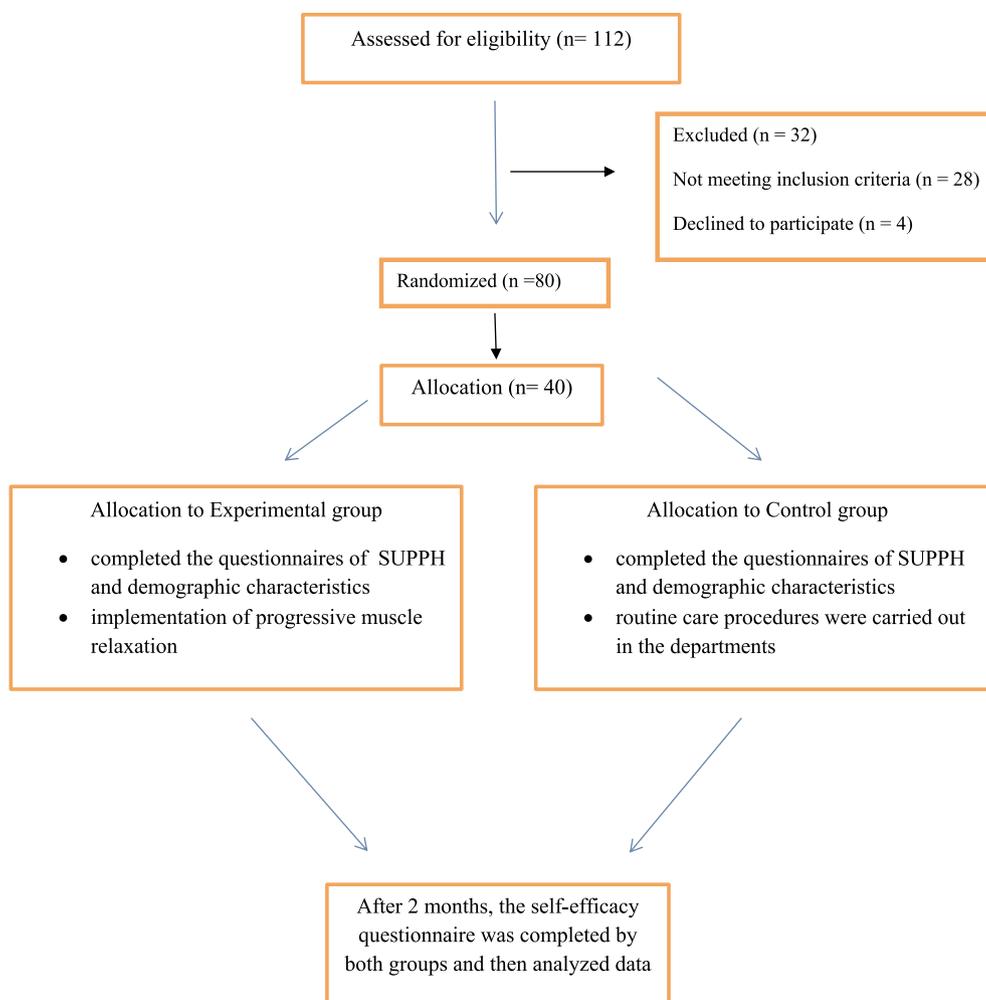
**Materials and methods:** This study was a clinical trial in which 80 patients suffering from cancer were randomly assigned to two groups of experimental and control. Data collection instruments consisted of demographic information and Strategies Used by People to Promote Health questionnaires. In the experimental group, the patients performed relaxation techniques once a day for 30 min over two months. In the control group, the patients received the routine care.

**Results:** A statistically significant difference was observed between the mean self-efficacy indices in the experimental group ( $p = 0.001$ ). There was no significant difference in the control group ( $p = 0.3$ ).

**Conclusion:** Muscle relaxation can enhance self-efficacy of cancer patients. Therefore, it can be used as an alternative method for patients who are willing to use this technique.

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## 1. Introduction

Cancer is a generic term for a large group of diseases that can affect any part of the body [1]. In fact, it is not a disease with a specific cause, but a group of diseases with different causes, clinical manifestations, treatments, and prognoses [2]. Cancer has become a major public health problem worldwide; it is the second leading cause of death in the United States [3] and the third one in Iran [4]. Today, advances in cancer diagnosis and treatment have increased the patients' life expectancy; yet, there is some evidence of psychological adaptation problems and reduced quality of life among the patients [1]. Thus, attempts made for physical and psychological rehabilitation of these patients are of great importance [5]. One of the factors affecting cancer patients' lifespan and quality of life is self-efficacy [6]. Self-efficacy, which is considered as an individual's belief in his/her abilities [7], influences many aspects of personal functioning [8] and increases the quality of life so that people with higher levels of self-efficacy have better physical and mental health [9]. Bandura (1986) states that a person with low self-efficacy probably avoids hard activities in a given situation and has lower enthusiasm and commitment to the goals, while an individual with high self-efficacy does more challenging actions in a certain circumstance, tries to overcome difficult situations, and is further committed to the objectives [10]. From Bandura's viewpoint, a perceived inefficiency can lead to feelings of emptiness, sorrow, and anxiety. When a person considers himself/herself ineffective in reaching his/her precious goals, he/she will be depressed and when he/she is unable to cope with potentially threatening stimuli, he/she will

become anxious [11]. Nurses can play an active role in increasing the patients' self-efficacy [12] and solve their clinical problems by their active participation and application of novel nursing approaches and problem-solving processes [13].

Activation of autonomic reactions, catecholamine secretion and release of endogenous opioids is one of the results of a weak sense of self-efficacy to exert control over stressors. As these biological systems are involved in the regulation of the immune system, it is substantially beneficial to experience enhanced immune function during developing of coping strategies. There is some evidence that a positive effect on immune function can be expected if people are provided with effective means for managing stressors [14].

One of the basic and safe nursing measures is the use of complementary and alternative medicine [15] since, according to the research results, complementary and alternative medicine has favorable efficacy at a low cost, while producing fewer side effects. It is also less invasive with greater accessibility compared to other therapies [16,17]. Progressive muscle relaxation technique is one of the forms of complementary and alternative medicine introduced and employed by Jacobson in 1938 [18] which has recently comprised an important part of care for patients with chronic diseases [19]. Relaxation through Jacobson's method is a technique by which a person gains a sense of calmness with active contraction and then loosens certain muscles in a progressive state [20].

Learning this technique is very easy and doing it can cause distraction, reduction of stress and anxiety, relief of tension and muscle contractions, improvement of sleep, and decrease in sensitivity to pain and fatigue [21]. Therefore, relaxation technique has been raised as a non-invasive method used to enhance the patients' self-efficacy and

quality of life. In addition, it does not need to be done in a specific time and place and requires no special technology and equipment; most importantly, it strengthens the nurse-patient relationship.

Thus, considering the above-mentioned points and the fact that few researches have been conducted on this field so far, this study aimed to investigate the effect of relaxation on self-efficacy in cancer patients.

## 2. Material & methods

### 2.1. Design

This research was an experimental double-group study conducted on cancer patients hospitalized in the Hematology and Oncology Departments of Ayatollah Khansari Hospital in Arak City, Iran in 2015. Based on the previous studies [22], taking into account the confidence interval of 95% and test power of 80%, and considering the likelihood of sample loss, we measured the sample size as 40 participants for the experimental group and 40 for the control group.

To perform the study, we first obtained the approval of the ethics committee of Arak University of Medical Sciences. Then, the researcher attended the study environment and began sampling after obtaining a written informed consent from the qualified participants. It should be noted that the research participants were first selected through convenience sampling and then randomly assigned to experimental and control groups. To carry out the random assignment, we wrote numbers 1 and 2 on two separate similar cards and the participants were asked to choose one of them. Accordingly, they were placed in experimental or control groups if they selected card number 1 or 2, respectively. The lottery was continued until the assignment was completed.

### 2.2. Participants

The inclusion criteria were: being in the age range of 30–60 years, having full consciousness and ability to do the relaxation technique, being able to read and write, passing of 6 months since the date of diagnosis, having at least one course of chemotherapy, being diagnosed with cancer in stages 2, 3, and 4 by an oncologist, and having no history of mental illness, epilepsy and other serious physical illnesses confirmed by the doctor. The participants in any of the groups were excluded from the study if they were not willing to continue the research or had a crisis or an unforeseen accident during the intervention, such as patient's death.

### 2.3. Data collection tools

A demographic information questionnaire, including 7 questions on age, gender, marital status, employment status, economic status, education level and type of cancer, and also Strategies Used by People to Promote Health (SUPPH) questionnaire as a standard instrument for evaluating the efficacy of self-care were used for data collection. The SUPPH questionnaire is a self-report instrument which has been translated into Persian and includes 29 questions and 3 subscales of the degrees of decision-making, stress reduction, and compatibility [23]. The questions are answered based on a 5-point Likert scale ranging from “full confidence” (5 points) to “low confidence” (1 point) and evaluate an individual's level of confidence to do the cases listed in the tool. The total score of this questionnaire is 145 points, while gaining higher scores indicate higher self-efficacy. The validity and reliability of this tool have been assessed on a wide range of patients and healthy participants in several studies in different countries as well as Iran and the internal correlation of this tool has been reported as 0.94 using Cronbach's alpha [24].

**Table 1**  
Comparison of demographic characteristics in the control and intervention groups, using the Chi-square test.

Variable		Experimental group (N = 40) No%	Control group (N = 40) No %	p-value
Sex	Female	19(47.5)	18(45)	0.27
	Male	21(52.5)	22(55)	
Age Category (Year)	30–40	3(7.5)	2(5)	0.64
	41–50	7(17.5)	9(22.5)	
	51–60	30(75)	29(72.5)	
Marital Status	Single	1(2.5)	2(5)	0.27
	Married	39(97.5)	38(95)	
Educational level	Elementary school	11(27.5)	11(27.5)	0.94
	High School	17(42.5)	17(42.5)	
	High school diploma	7(17.5)	8(20)	
Employment status	Academic	5(12.5)	4(10)	0.57
	Jobless	17(42.5)	16(40)	
Duration Of disease	Employed	23(57.5)	24(60)	0.78
	Less Than A Year	7(17.5)	7(17.5)	
	1–2 years more than 2 years	10(25)	12(30)	
Kind of disease	23(57.5)	21(47.5)	0.85	
	Leukemia and Lymphoma	29(72.5)		25(62.5)
Type of treatment	Other cancers	11(27.5)	15(37.5)	0.1
	Chemotherapy	12(30)	12(30)	
	Radiotherapy	1(2.5)	1(2.5)	
	Surgery	1(2.5)	1(2.5)	
Disease staging	Combination of treatments	26(65)	26(65)	0.66
	2	7(17.5)	5(12.5)	
	3	20(50)	19(47.5)	
	4	13(32.5)	16(40)	

### 2.4. Data collection procedures and relaxation technique

In the first stage of the study, the patients in both groups completed the questionnaires of SUPPH and demographic information, and then the intervention was begun in the experimental group. To carry out the intervention, the researcher instructed Jacobson's relaxation technique (progressive muscle relaxation and deep breathing) to the patients in 2 half-hour sessions over two consecutive days. The curriculum in each session included providing a quiet environment and a comfortable position, training contraction and loosening of muscles from the head to foot and vice versa, responding to the patients' questions about the relaxation technique, and the proper method of its implementation. When the participants learned how to do it, they performed the technique at home once a day for 30 min over two months (60 sessions), enjoying the advice and follow-up of the researcher for the correct

**Table 2**  
Comparison of the self-efficacy score in the control and intervention groups before and after of the intervention.

Group	Before intervention	After intervention	<sup>a</sup> p-value
	Mean ± SD	Mean ± SD	
Experimental	107.05 ± 9.46	115.85 ± 8.98	0.0001
Control	106.35 ± 11.67	100.35 ± 12.46	0.0001
<sup>b</sup> p-value	0.3	0.0001	–

<sup>a</sup> Paired t-test.

<sup>b</sup> ANOVA Test.

**Table 3**  
Comparison of the mean scores of the subscales of self-efficacy in the control and intervention groups before and after of intervention.

subscales of self-efficacy	group	Before intervention	After intervention	a p-value
		Mean ± SD	Mean ± SD	
stress reduction	Experimental	38.75 ± 4.83	41.42 ± 4.42	0.0001
	control	38.87 ± 5.05	36.42 ± 5.15	0.0001
		<sup>b</sup> p-value	0.63	0.0001
decision-making	Experimental	9.92 ± 1.6	11.27 ± 1.73	0.0001
	control	9.48 ± 1.67	8.63 ± 1.86	0.0001
		<sup>b</sup> p-value	0.53	0.0001
Compatibility	Experimental	58.52 ± 7.79	63.15 ± 8.04	0.0001
	control	57.62 ± 9.2	55.32 ± 9.29	0.0001
		<sup>b</sup> p-value	0.252	0.0001

<sup>a</sup> Paired *t*-test.

<sup>b</sup> ANOVA Test.

implementation. The average time of practicing the relaxation technique was once a day for 2 months according to the studies performed on this method [25]. In the control group, only routine care procedures were carried out in the departments. After 2 months, the self-efficacy questionnaire was completed by both groups again.

### 2.5. Analysis

The data obtained were finally analyzed using SPSS version 21. We used descriptive statistics to describe the demographic characteristics of the sample. To compare self-efficacy before and after the intervention in both groups, we used Chi-square and paired samples *t*-test. Also ANOVA was used to compare the self-efficacy subscales in both groups with the level of significance of 5%. The researcher and instructor were blinded to the study but for the assessor one way blinding was done and he was not aware of the intervention and control group allocation procedure.

### 3. Results

All the participants remained in the study until the end and completed SUPPH questionnaire again, i.e. there was no sample loss. As listed in Table 1, the experimental and control groups had no statistically significant differences in demographic features and were homogeneous. The results revealed that the majority of the patients were in the age group of 51–60 years; they were male, married and employed. Also, they had no academic degrees. Moreover, the majority of the participants receiving combination therapies were diagnosed with leukemia and lymphoma at stage III of the diseases and more than 2 years had passed since the time of diagnosis.

According to the results shown in Table 2, the mean score of the patients' self-efficacy in the experimental group was 107.05 ± 9.46 before the intervention that reached 115.85 ± 8.98 after it. In addition, the means of this index in the control group were 106.35 ± 11.67 and 100.35 ± 12.46 before and after the intervention, respectively. Based on the results of ANOVA test, there was a statistically significant difference between the mean self-efficacy indices in the experimental group ( $p = 0.001$ ). However, the difference was not significant for the control group ( $p = 0.3$ ). Furthermore, the results of the ANOVA test revealed that there was a statistically significant difference between the means of self-efficacy test in both experimental and control groups after the intervention ( $p = 0.001$ ). However, no significant difference was observed between the control and experimental groups when comparing the mean scores of the subscales of self-efficacy (i.e. the degrees of decision-making, stress reduction, and compatibility) before relaxation ( $p > 0.05$ ), while there was a significant difference in the mean scores of the mentioned subscales after the relaxation between the two

groups ( $p < 0.001$ ).

Also, compared with the mean scores of the subscales of self-efficacy, a significant difference ( $p < 0.001$ ) was observed in the experimental group before and after relaxation in Table 3. Also, Cronbach's alpha coefficient of SUPPH questionnaire was obtained as 0.92.

### 4. Discussion

Bandura believes that physiological indicators of self-efficacy have an influential role in the health and also athletic and physical activities of patients; with an increase in their coping efficacy, the time period they perform the activities is extended. Also, a sense of coping efficacy is restored and developed through protective aids and reducing the severity of threats. In addition, perceived coping self-efficacy can affect the biological systems involved in the individual's health. It is thought that stress is an important contributing factor to many physical dysfunctions through perceived controllability. In other words, the perceived inability to manage stressful conditions is debilitating not the conditions themselves. Thus, no adverse biological effect results from exposure to stressors, while having the ability to control them. However, lack of this ability results in impairment of the immune system. Impaired immune system contributes to susceptibility to infection, development of physical disorders, and progression of diseases [14].

In this research, the effect of relaxation on cancer patients' self-efficacy was studied. Assessment of the self-efficacy scores of the patients in the study showed an increase in the self-efficacy scores of the patients in the experimental group after the intervention, which indicates that the relaxation intervention improved the cancer patients' self-efficacy. The results of this study confirm the findings of the study by Hoogland et al. (2018) on the effect of self-administered stress management training on cancer patients [26]. Also, the results of a study conducted by Zhang et al. on the effectiveness of a rehabilitation program for cancer survivors in terms of the quality of life (2016) are consistent with those of this study [27].

The findings of the study conducted by Karbandi et al. on the effect of relaxation on self-efficacy of breast-feeding women with premature infants (2017) revealed significant increases in self-efficacy scores of the experimental group compared with the control group during 4 and 8 weeks of relaxation [28]. Also, in the study of Masoudi et al. (2011), a significant increase was observed in the mean scores of the general self-efficacy and quality of life of family caregivers of patients receiving relaxation after 3 months of intervention [29]. The results of another study carried out by Kim et al. (2012) entitled "Effect of Guided Relaxation and Imagery on Falls Self-Efficacy" revealed the effectiveness of guided relaxation for self-efficacy enhancement [30].

Several studies have been conducted on the effect of relaxation on other complications of cancer, such as depression, anxiety, and length of hospital stay [31]. A research investigated the effects of muscle relaxation techniques on the quality of life of cancer patients and concluded that muscle relaxation was effective in improving the quality of life of patients with cancer [32]. Additionally, Kim et al. (2016) reached similar results concerning the positive effect of relaxation on the reduction of stress levels in cancer patients [33].

Various studies reveal that muscle relaxation can reduce depression and anxiety and increase the quality of life in cancer patients [34,35] In a study conducted by Molassiotis, it was shown that muscle relaxation reduces the chemotherapy complications in breast cancer patients [36]. Also, Kumar (2017) has shown that muscle relaxation improves the sleep quality in cancer patients [37]. In addition to its effects on reduction of cancer treatment side effects, muscle relaxation technique causes tranquility and improvement in quality of life, which can in turn improve the cancer patient's self-efficacy.

The results of this study are consistent with those of the studies conducted in this field and thus confirm the positive effect of relaxation technique on self-efficacy of patients with cancer. Despite extensive

searches in the scientific literature, no study was found to be in contrast with the findings of this investigation.

The limitation of this study was the possible influence of confounding factors on the results of self-efficacy index. Thus, to remove this restriction, a random sampling was employed to select the research samples, and the means of self-efficacy scores of the participants were compared before and after the intervention. Also, this study did not control the amount of time and attention given to the experimental group. There was no verification that the participants actually used the technique at home.

**Implications for nursing practice:** The clinical outcome of this study was to elicit the understanding that the health care personnel should take measures to increase the self-efficacy of patients as there is a direct relationship between self-efficacy and quality of life. To this aim, progressive muscle relaxation can be considered as an uncomplicated candidate to be used for improving the self-efficiency of cancer patients.

## 5. Conclusion

Generally, the findings revealed that relaxation had a favorable impact on the self-efficacy of patients with cancer. Also, this method improved the subscales related to self-efficacy. Therefore, this approach can be adopted as a non-drug, simple, low-cost, and affordable strategy to increase self-efficacy in patients with cancer. According to the results of the study, it is suggested that the effect of relaxation on other symptoms and complications of cancer, such as fatigue, pain, nausea, stress, anxiety and depression should be examined.

## Conflicts of interest

The authors report no declaration of interest.

## Ethical approval

This research was approved at Arak University of Medical Sciences and registered under the code number 2N201507011311 at Iranian Registry of Clinical Trials.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2018.10.014>.

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