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Effect of progressive muscle relaxation technique on self-esteem and self- efficacy among coronary artery diseases patients

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Abstract---Background: Coronary artery disease is a common heart condition that involves atherosclerotic plaque formation in the vessel lumen. This leads to impairment in blood flow and thus oxygen delivery to the myocardium. It is a cause of major morbidity and mortality rate. Low self-esteem and efficacy are major problems in coronary artery diseases patients. A progressive muscle relaxation technique is one of the complementary therapies which has positive impacts on self-efficacy and self-esteem, revocable personal resource that influences disease outcomes, rehabilitation adherence, and health-related quality of life. Aim: To evaluate the effect of progressive muscle relaxation technique on self-esteem and self-efficacy among coronary artery disease patients. Design: A quasi-experimental research design was used to achieve the aim of this study. Sample: 100 adult patients with coronary artery disease were selected on purpose as the sample. The study and control groups, each with 50 patients, were equally and randomly assigned to the participants. Setting: This study was conducted at the cardiology unit and outpatient clinics at Ain Shams University Hospital. Tools: the used tools were: Tool (1) a structured interviewing questionnaire, Tool (2) a cardiac self-efficacy scale, Tool (3) a cardiac exercise self-efficacy scale, and Tool (4) Coopersmith Self-Esteem Inventory. Results: According to the study's findings, the mean ages of the study group (84%) and control group (76%) were both between the ages of 30- and 60, with a mean age of (47.33 6.05) and (48.45 9.34), respectively. The majority of the study group's patients had high levels of cardiac self-

efficacy, self-esteem, and exercise self-efficacy following the PMRT intervention. In contrast to the control group, the study group's self-esteem and self-efficacy mean scores both significantly improved throughout the intervention. Conclusion: Patients with coronary artery disease who use the progressive muscle relaxation technique report higher self-esteem and self-efficacy. Recommendations: Deliver an instructional program on the benefits of and how to use progressive muscle relaxation therapy to patients with coronary artery disease.

Keywords--Coronary artery disease patients, Cardiac self-efficacy, Self-esteem, progressive muscle relaxation technique.

Introduction

Coronary artery disease (CAD) is a medical condition marked by the buildup of atherosclerotic plaque in the coronary arteries brought on by myocardial ischemia, which results in a reduction in the blood flow to the heart muscle. Coronary Heart Disease (CHD) is a condition whose prevalence rises yearly and places a significant economic burden world widely (**Knuuti et al., 2020**).

In CAD patients, several factors may contribute to non-compliance with post-attack therapy. Lack of health literacy, unhealthy beliefs, and behaviors, side effects of therapy, financial constraints, and depression can all contribute to non-compliance with post-acute management. These factors also significantly impacted how well CAD patients felt they could take care of themselves. To obtain the best illness stabilization or regression, the European Society of Cardiology (ESC) developed guidelines for the care of coronary syndromes that comprised pharmaceutical management, establishing healthy lifestyle habits, and percutaneous coronary procedures (**Borzou et al., 2018**).

The best management outcomes can be attained through a multidisciplinary team approach that offers patients individualized and adaptable care (**Knuuti et al., 2020**). Cardiac self-efficacy is a measure of a patient's assurance in their ability to carry out tasks that may be constrained by the symptoms and difficulties posed by their cardiovascular disease, as well as their capacity to successfully adhere to particular health behaviors, such as compliance with exercise training regimens. Self-efficacy is regarded as a crucial, changeable personal resource that influences rehabilitation adherence, the treatment of numerous chronic diseases, and disease outcomes including health-related quality of life in patients with cardiovascular disease (CVD) (**Banik et al., 2018**).

The provision of health education without the findings of a thorough analysis of the learning needs of patients with general material is one of the current difficulties related to health education, especially in cardiac intensive units in one of the referral hospitals. The excessive workload of nurses in the ICU, according to nurses, is another barrier to giving patients with health education. They added that this makes it difficult to find the time to do so. These findings might make it

less useful to provide advice on taking care of oneself following severe attacks on patients and families (**Nuraeni et al., 2019**).

Coronary artery disease significantly raises the death rate and results in high degrees of physical, sexual, occupational, and social stress and incapacity. Self-efficacy is adversely impacted by these stressors because they lower self-esteem, instill fear and disappointment, and impair mental health. The subjective self-evaluation of one's value is referred to as self-esteem (**Holloway, 2016**). Self-esteem issues are present in CAD patients. Social interactions, thinking, mood, and functioning of patients are all impacted by their level of self-esteem (**Wantiyah et al., 2020**).

One of the non-pharmacological treatments for these problems is the progressive muscle relaxation technique, It was created by Jackson in 1929 and entails gradually contracting and relaxing the main muscle groups voluntarily in a sequence over a set amount of time to alleviate stress (**Ferendiuk et al., 2019**). The most straightforward, affordable, widely available, patient-initiated, and without any negative side effects is progressive muscle relaxation therapy. The body's defenses and sense of well-being are strengthened by endorphin release (**Krupinska & Kulmatycki, 2019**).

Significant of the study

Egypt has one of the highest secondary mortality rates from cardiovascular diseases (CVD) in the region and is fast rising due to the high prevalence of cardiovascular diseases risk factors such as hypertension, dyslipidemia, and obesity among Egyptians (**Reda et al., 2019 & Ibrahim et al., 2013**). According to statistics from the World Health Organization, 40% of all fatalities in Egypt are believed to be caused by cardiovascular disorders (**WHO, 2020**).

One non-pharmacological management option, the progressive muscle relaxation technique, helps coronary artery disease patients feel better about themselves and more capable of dealing with their condition. PMR is recognized as the simplest therapy to learn because it is easily accessible, inexpensive, self-initiated by the patient, and has no negative side effects (**Barham et al., 2019**).

Aim of the Study

This study aimed to evaluate the effect of progressive muscle relaxation technique on self-esteem and self-efficacy among coronary artery diseases patients through:

1. Assessing coronary artery disease patients' needs for self-efficacy.
2. Assessing coronary artery disease patients' self-esteem.
3. Developing and implementing progressive muscle relaxation technique on self-esteem and self-efficacy among coronary artery diseases patients.
4. Evaluating the effect of Progressive Muscle Relaxation Technique on Self-esteem and Self- efficacy among coronary artery diseases Patients.

Research hypothesis

The current study hypothesized that:

The implementation of Progressive Muscle Relaxation Technique on coronary artery diseases patients will have a positive effect on self –esteem and self – efficacy among study subjects.

Subjects And Methods

Research design:

A quasi-experimental design was utilized to achieve the aim of this study. A quasi – experimental design is an empirical interventional study used to estimate the causal impact of an intervention on target population without random assignment (*Middleton, 2019*).

Setting:

This study was conducted at the Cardiology Unit and Outpatients' Clinics at Ain Shams University Hospital. This setting was selected due to the high flow rate of cases additionally it serves the biggest region of the population. The cardiac unit is located on the second level of the hospital and consists of 4 rooms, each with 4 beds. Clinics for outpatient patients are housed in a single room on the hospital's first level. Only one bed, a table, several chairs, an echogram, and some emergency medications are included.

Subjects:

The diagnosis of coronary artery disease was made on a targeted sample of (100) adult individuals. Participants were divided evenly and at random into (the study and control groups), with fifty patients in each. A simple random sample technique was used to select the participants. Randomization was carried out by requesting that each patient select a piece of paper. The study group was the patient who selected the letter carrying the paper (E), and the control group is the patient who selects the letter carrying the control paper (C). While routine care was given to the control group and progressive muscle relaxation therapy was given to the study group.

Sample size calculation:

The level of significance for power analysis, $0.95(=1-0.05=0.95)$, at alpha, was used to calculate the sample size. 0.05 (one-sided) was chosen as the significance level, and 0.001 was chosen as the level of high significance.

Inclusion criteria included:

- Free from other chronic disease
- Agree to participate in the study
- Cardiac adult patients of both sexes who are younger than 60 years old

Exclusion criteria included:

- Patients have injuries, mental diseases, and other chronic conditions.

Tools of data collection:**Tool I: A structured interview questionnaire:**

After evaluating pertinent literature and research findings, the researchers created it (*Kohle et al., 2018 & Yu et al., 2019*). There were two components:

- **Part 1:** It contained the patient's demographic information, which was made up of (5) different items (age, gender, educational level, occupation, and residence).
- **Part 2:** It included present and past medical history as (medication compliance, duration of hospital stay, cardiac catheterization, and open heart surgery). It contained six items, six of which were closed-ended questions and six of which were open-ended questions.

Tool (2) cardiac self-efficacy scale:

It was adapted from *Sullivan et al. (1998)* to measure self-efficacy. This measure has 16 items on self-efficacy and confidence in managing symptoms, medication compliance, and general care-related activity compliance. Scores for the CSES items range from 0 ("not at all confident") to 4 on a five-point scale ("completely confident"). A scale's overall score can vary from 0 to 64, with higher scores indicating greater self-efficacy. Varela's study looked at the CSES's Content Validity Index (CVI) in terms of the sentences' relevance, clarity, simplicity, and fluency. Each part scored 93.40 for content, 89.80 for clarity, and 90.80% for simplicity.

The questionnaire's CVI was 91.33% overall. Also, the internal consistency approach was used to assess the questionnaire's dependability. The Cronbach's alpha coefficient was 0.977 (*Varaei et al., 2017*). The evaluation system for the cardiac self-efficacy scale: Using a 5-point scale, the patients were asked to reply to 16 statements (0 being unconfident, 1 being slightly confident, 2 being moderately confident, 3 being very confident, and 4 being completely confident). The items were first summarised after being rated on a 5-point Likert scale with a range of 0 to 5. A higher level of cardiac self-efficacy in sustaining function was indicated by higher ratings.

Tool (3) cardiac exercise self-efficacy scale:

It was adopted from *Hickey et al. (1992)*. 16 items are included. The scale, a self-report instrument, was created especially to gauge cardiac patients' exercise self-efficacy. It evaluates the degree of comfort patients have performed tasks associated with physical exercises, such as warming up before exercise, exercising without experiencing chest pain, monitoring their heart rate before and after exercise, enduring arduous, moderate, and light exercise, cooling off after exercise, and exercising for at least 20 minutes three times per week. This tool's Arabic translation from English was double-checked for accuracy and content validity.

Scores on the Cardiac Exercise Self-Efficacy Scale (ESES) are as follows: Patients were encouraged to respond on a 5-point rating scale, with 1 denoting no confidence, 2 denoting very little confidence, 3 denoting some confidence, 4 denoting confidence, and 5 denoting strong confidence. It was categorized as having high cardiac exercise self-efficacy if the result is more than 70%. If the result is less than 70% of the possible score, you have low cardiac exercise self-efficacy.

Tool (4): Coopersmith Self-Esteem Inventory (CSEI):

It was adopted by *Madani et al. (2002)*. Adults' self-esteem is measured with this survey. It has 35 items and is graded on a scale from 1 ("Completely disagree") to 4 (the highest possible score) ("Completely agree"). As a result, the scale's overall score spans from 35 to 140, with higher values signifying more self-esteem. In the study, the correlation coefficient ($r = 93\%$) was used to confirm the validity of the CSEI. The researcher's calculated Cronbach's alpha coefficient was 0.97. A multimedia educational presentation prepared based on the literature and approved by five cardiologists in the study setting served as the study intervention (*Hinkle et al., 2014*).

Validity and reliability of the tool:

The validity of the tool developed by a jury of 5 experts from different academic categories (professors and assistant professors) of the medical –surgical nursing at the faculty of nursing, Ain Shams University. The expertise reviewed the tools for clarity, relevance, comprehensiveness, simplicity and minor modification was done. While reliability was evaluated using Cronbach's alpha test with a score of 0. 0.977 on the cardiac self-efficacy scale, 0. 925 on the cardiac exercise self-efficacy, and 0.97 on the CSEI, the first tool's reliability.

The procedure of data collection:

Preparatory phase:

Designing the data collection techniques, involved evaluating the literature that was previously available and theorizing about various components of the study utilizing a booklet, articles, the internet, journals, and magazines.

Administrative design:

Administrative approval was obtained to carry out this study and secure consent for data collection from the directors of the previously chosen department.

Ethical considerations:

The researchers met with the directors of the previously chosen locations before the study began to explain the purpose of the investigation and secure their cooperation. The adult cardiac patients were first informed of the study's goals, and each participant gave verbal agreement before proceeding. They were advised that participation in the study was completely up to them and that they could opt-out at any moment, without having to give a reason. The participants were informed that the information they provided would be kept private and solely utilized for the study.

Pilot Study:

The research process was tested for clarity, feasibility, and applicability in a pilot study that involved 10% of the patients (10 adult cardiac patients). The study excluded adult cardiac patients who had participated in the pilot.

Fieldwork:

The researchers visited the settings they had previously selected twice a week, from 9 am to 1 pm. From the beginning of March to the end of August 2021, data was gathered for six months. It takes between 35 and 45 minutes to finish each interview tool. The researchers met with patients one-on-one in previously selected places, introduced themselves, and then described the study's objectives. The researchers read the questions and assisted the patients in filling out the instruments as they conducted face-to-face interviews with the patients. The study's implementation process has three stages (assessment phase, implementation phase, and evaluation phase).

Assessment phase:

By having brief conversations with the patients at first, the researcher developed a nice rapport with them. The researchers responded to the survey questions (demographic and medical data sheet, self-esteem, and self-efficacy). The investigation's goal and subject matter were described.

Implementation Phase:**For the study group:**

Each participant in the study group was introduced by the researchers, who also gave a brief description of the study's objectives. The patient's self-esteem and self-efficacy were then gauged using the PMR approach, along with demographic and medical information. Depending on the patient's level of understanding, each interview lasted around an hour.

- Progressive muscle relaxation was given to the 50 patients in the study group in addition to regular care. As teaching aids, we used demonstrations, pictures, and group discussions (progressive muscle relaxation technique).
- After applying relaxation, the researchers had the patients repeat each step of the PMR procedure after being shown how to do so. After that, the researchers gave them instructions to repeat each step three times until they were proficient with the process.

A progressive muscle relaxation technique

Before beginning the progressive muscle relaxation method, the individuals in the study group were told to find a comfortable position and empty their bladders (sitting or lying). By contracting and relaxing certain muscle groups, the Jacobson method was utilized to gradually relax the muscles until total relaxation was attained.

- In a room with enough lighting and no background noise, the patients in the study group experienced the Jacobson relaxation technique for 30 minutes while resting on their sides with their legs slightly bent to avoid putting pressure on any muscles. The eight parts of the body's muscles were divided up according

to the Jacobson approach, which entailed performing a 5-second active muscle contraction followed by a 30-second muscle relaxation (tension/rest).

- First, the muscles in the right foot, left foot, right hand, left hand, stomach, back, chest, shoulders, face, head, and scalp were clenched, and then they were let go. This process was carried out in front of the researcher by playing a CD that had been recorded and prepared for each individual in the study group. The researchers gave the participants instructions on how to apply the strategy three times per day during the morning, evening, and night shifts. After 30 days, when the study participants were returned to the clinics, the researcher went back to the area to complete the last stage of the questionnaire (evaluation).

For the control group:

During a face-to-face discussion with each patient in the control group that lasted about 30 minutes, the researchers introduced themselves, discussed the study's objectives, and obtained their verbal agreement. After that, without applying the progressive muscle relaxation approach, the researchers gathered data on the patient's demographics, medical information, self-esteem, and self-efficacy.

Evaluation phase:

Using the same instruments as the pretest, the researchers reevaluate self-esteem and self-efficacy levels in both the study and control groups four weeks after using the PMR approach (tools II III, and IV as post-test).

Statistical analysis:

The data were examined using SPSS statistical software, version 20. Continuous data were gathered for three days before and after the intervention, and the mean and standard deviation were expressed (SD). Percentages and numbers were used to report categorical data. The independent t-test was used to compare the two groups, and the paired t-test to compare each group's results before and after the intervention. One-way repeated-measures analysis of variance was used to look at (ANOVA). The Mann-Whitney test was used to examine variables that did not conform to the parametric assumptions. Chi-square analysis was used to examine the results. In the instance of noncontiguous data, the association between two variables was evaluated using the chi-square test. p value less than 0.05 was used to determine statistical significance.

Results

Table (I) shows that (44%) of the study group and (40%) of the control group were both in the 50- to 60 years old, with mean ages of (47.33 ± 6.04) and (48.55 ± 9.32) respectively. Regarding gender, the study groups (78%) and control groups (76%) were male members. In terms of education, the study and control groups, respectively, had high school (44% & 48%). Both the study group (60%) and the control group (64%) worked. Regarding residence, (76%) of the study group and (80%) of the control group both resided in urban. There were no statistically significant differences between the patients in the study and control groups regarding to their sociodemographic characteristics.

Table (2) shows that 60% of the study group and 50% of the control group, had undergone cardiac catheterization. While just 40% and 50%, of patients in the study and control groups, had undergone open-heart surgery respectively. Patients in the study and control group spend less than five days in hospitals (80% and 92%, respectively). Regarding every aspect of their prior medical history, patients in the study and control groups did not differ significantly from one another.

Table (3) demonstrates that there were highly statistically significant variations in the patients' self-efficacy during cardiac exercise between the study and control groups before, immediately after, and one month after the PMRT intervention as $P \geq 0.001$.

Pre-progressive muscle relaxation technique intervention, **Table (4)** reveals that the majority of the study and control group patients (90% & 92%, respectively) exhibited low exercise self-efficacy. 86% of the study and 6% of the control group exhibited high levels of exercise self-efficacy immediately after the intervention using the progressive muscle relaxation approach. Regarding CESE, highly statistically significant differences were found between the two groups immediately after, and one month after the intervention using the progressive muscle relaxation approach. The two groups did not differ statistically significantly before the use of the progressive muscle relaxation intervention.

Table (5) demonstrates that there were highly statistically significant differences between the study and control groups of patients and that the mean score of cardiac self-esteem in the study group was higher than the control group before, immediately after, and one month after the intervention of the progressive muscle relaxation technique as $P \geq 0.001$.

Table (1): Demographic data in the study and control groups (N=100)

Demographic data	Study (n=50)		Control (n=50)		Chi-square T-test	p-value
	No	%	No	%		
Age (in years)						
21-<30-	4	8.0	5	10.0	0.389	0.768
30- <40	6	12.0	7	14.0		
40- <50	18	36.0	18	36.0		
50- ≤ 60	22	44.0	20	40.0		
(Mean ± SD)	47.33 ± 6.04		48.55 ± 9.32			
Gender						
Male	39	78.0	38	76.0	0.024	1.000
Female	11	22.0	12	24.0		
Educational level						
Not read or write	12	24.0	11	22.0	1.234	0.767
Read and Write	11	22.0	9	18.0		
High school	22	44.0	24	48.0		
University education	5	10.0	6	12.0		
Occupation						
Worked	30	60.0	32	64.0	1.569	0.659
not-worked	20	40.0	18	36.0		
Residence						
Rural	12	24.0	10	20.0	5.243	0.037
Urbn	38	76.0	40	80.0		

Not significant $p < 0.05$

Table (2): Medical history in the study and control groups (N=100)

Medical history and lifestyle	Study (n=50)		Control (n=50)		Chi-square/ T test	p-value
	No	%	No	%		
Cardiac catheterization	30	60.0	25	50.0	1.453	0.243
Open heart surgery	20	40.0	25	50.0	0.265	0.549
Length of stay						
Less than five	40	80.0	46	92.0	2.438	0.678
Days More than five days	10	20.0	4	8.0		

Table (3): Comparison between mean scores among patients in both study & control groups concerning cardiac Self-Efficacy pre- immediately post and post one month of progressive muscle relaxation technique intervention (N=100)

CSES	Study group	Control group	F ratio	P-value
	Mean ± SD	Mean ± SD		
CSES				
- Pre-test	1.72 ± 2.24	1.67 ± 2.07	73.342	< 0.001
- Immediately post-test	9.42 ± 4.21	2.68 ± 2.32		
- Post two months	8.77 ± 2.87	2.59 ± 1.69		

** Highly Significant (HS) $p \geq 0.001$

Table (4): Comparison between mean scores among patients in both study & control groups concerning Cardiac Exercise Self-Efficacy pre, immediately post, and post one month of progressive muscle relaxation technique intervention (N=100)

Items	Groups				Chi-square	P-value
	Study group		Control group			
	No	%	No	%		
CESE (pre-test)						
Low exercise self- efficiency	45	90	46	92	1.678	0.27
High exercise self-efficiency	5	10	4	8		
CESE (immediately post-test)						
Low exercise self- efficiency	7	14	47	94	59.07	<0.001
High exercise self-efficiency	43	86	3	6		
CESE (post-one month)						
Low exercise self- efficiency	10	20	47	94	72.22	<0.001
High exercise self-efficiency	40	80	3	6		
Cochrane Q	70		0			
p-value	<0.001		1			

Table (5): Comparison between mean scores among patients in both study& control groups concerning cardiac Self- esteem pre- immediate post and post-one month of progressive muscle relaxation technique intervention (N=100)

CSEI	Study group	Control group	F ratio	p-value
	Mean ± SD	Mean ± SD		
CSEI				
- Pre-test	95.05 (5.22)	92.9 (6.55)	62.567	< 0.001 □ □
- Immediately post-test	100.3 (3.77)	91.33 (4.44)		
- Post two months	102.46 (2.66)	91.45 (5.79)		

** Highly Significant (HS) $p \geq 0.001$

Discussion

Several relaxation methods are employed, including Jacobson's progressive muscle relaxation. One of the best complementary therapies, this technique is straightforward to learn, cheap, and simple to use because it doesn't require any particular equipment (*Alwan et al., 2018*). Health knowledge is one of the factors that affect self-efficacy, which in turn affects the compliance of CAD patients with self-care. Health knowledge is crucial for determining activities in health management, developing health behavior, and boosting self-esteem (*Zarei et al., 2018*).

Concerning age, less than half of the participants in the study and control groups were between the ages of 50 and 60. This finding is comparable to that of *Yu et al. (2019)* titled "**Effect of health education based on behavioral change theories on self-efficacy and self-management behaviors in patients with chronic heart failure**" that supports the findings of this study." which found that the bulk of the study sample's age fell within the range of 31 to 60. This suggests that coronary artery disease can affect people of all ages.

According to the gender, results of the current study, the majority of study and control groups were men. The findings of *Bay et al. (2018)*, identified **factors associated with low exercise self-efficacy in people with congenital heart disease** and discovered that the majority of the study's participants and the control group were men. This outcome is also supported by *Peng et al., (2018)* study "**Home-based Telehealth exercise training program in Chinese Patients with heart failure: A randomized controlled trial**," which indicated that the majority of patients were men. The majority of the study sample, according to *Cheng et al. (2019)* titled, **Measuring Exercise Self-Efficacy In Hong Kong Chinese Adults with Cardiovascular Risk: Validation of a Chinese version of the Cardiac Exercise Self-efficacy Instrument**, were females, hence this conclusion was not the same.

The results of this study revealed that more than one-third of the patients in both the study and control groups had attained a high school. This result is not matched with that of *Barham et al. (2019)*, who assessed **cardiac self-efficacy and quality of life patterns among coronary heart disease patients** and revealed that less than half of their study subjects had just completed elementary school.

According to the study's conclusions about occupational status, less than two-thirds of the study group and more than two-thirds of the control group worked. This conclusion is in line with *Tawalbeh's, (2018)* study on **the effects of a cardiac education program on patients with heart failure knowledge and self-care practices**, which discovered that nearly two-thirds of the patients were employed. The results are in opposition to *Baradaranfard et al. (2018)*, who established the **relationship between quality of life and cardiac self-efficacy in patients with heart failure** and claimed that the majority of the sample consisted of employees.

There were no statistically significant differences in any of the demographic data between the study group's patients and the control group, this finding shows that the two groups were complementary. The results support those of **Peng et al. (2018)**, who found no appreciable differences in patient demographics between the study and control groups.

The results of the current study on cardiac self-efficacy demonstrate that there were highly statistically significant variations in the patients' self-efficacy during cardiac exercise between the study and control groups before, immediately after, and one month after the PMRT intervention. From the researcher's point of view, this might be due to the effectiveness of the progressive muscle relaxation technique implementation and the motivation of cardiac patients to be familiar with their disease.

The study about **"Progressive muscle relaxation therapy to relieve dental anxiety: a randomized controlled trial"** by **Park et al., (2019)**, found that using relaxation techniques can effectively lessen their discomfort, also, **Li et al., (2018)**, who studied **"Effects of progressive muscle relaxation training on sleep in patients without convulsion"** support these findings. This could serve as evidence of the importance of using the PMR to alleviate pain and promote health. The results are in line with the study finding by **Cheng et al., (2013)** found that relaxing techniques were effective.

Also, this study is in line with the most recent studies. In a different investigation, **Baljani et al. (2019)** looked at **the "Effects of a nursing intervention on improving self-efficacy and reducing cardiovascular risk factors in patients with cardiovascular diseases,"** they discovered that education was successful in raising patients' self-efficacy for following their medications and engaging in healthy behaviors like exercising, losing weight, quitting smoking, and eating well.

The findings of this study are in line with those of **Borzou et al. (2018)**, who investigated the **"effects of the first phase of cardiac rehabilitation training on self-efficacy among patients undergoing coronary artery bypass graft surgery"** discovered that the mean self-efficacy score was statistically significantly different between the two groups before intervention. These findings are in line with those of a study conducted by **Nuraeni et al., (2019)** on the **"effect of a health education workbook on self-efficacy and quality of life of coronary heart disease patients."**

The findings of the study showed that two months following the measurement, the patients' self-efficacy had dramatically changed. Additionally, the findings of this study are consistent with those of **Boroumand & Moeini, (2018)**, who found significant differences in self-efficacy six weeks and six months after the intervention and mentioned that the mean cardiac self-efficacy scores of the intervention group were significantly higher than the control group three and four months after the interventions in the study about **"The Effect of A Text Message and Telephone Follow-Up Program on Cardiac Self-Efficacy of Patients with Coronary Artery Disease: A Randomized Controlled Trial"**.

The majority of the study group and the minority of the control group, respectively, demonstrated high exercise self-efficacy following the progressive muscle relaxation technique intervention. According to the researchers, this result demonstrates the positive effects of PMR application, which meets the needs of the patients. The research by **Wang et al. (2018), "Multimedia fitness training program promotes distance walked, heart rate recovery, and self-efficacy in cardiac surgery patients,"** also supports the findings. They found that an exercise training program increases the patient who has undergone cardiac surgery capacity to walk further.

According to a study by **Borzou et al. (2018)** titled "**Effects of The First Phase of Cardiac Rehabilitation Training on Self-Efficacy Among Patients Undergoing Coronary Artery Bypass Graft Surgery,**" exercise self-efficacy scores were significantly different between the intervention and control groups at the time of discharge and one month after program implementation. This finding contrasts with that of **Claes et al. (2020)**, who reported that there was a documented decline in exercise self-efficacy following the intervention in their recent study titled "**Feasibility, acceptability, and clinical effectiveness of a technology-enabled cardiac rehabilitation platform physical activity towards health: randomized controlled trial,**" even though they also reported that the findings were not statistically significant.

The findings of the current study demonstrate that there were highly statistically significant differences between the study and control groups of patients and that the mean score of cardiac self-esteem in the study group was higher than the control group before, immediately after, and one month after the intervention of the progressive muscle relaxation technique. According to the researchers, it proved the major advantages of the progressive muscle relaxation technique on self-esteem and showed how effective they are at changing behavior and improving patient outcomes. This conclusion is supported by **Feizalahzadeh et al., (2019), "Effectiveness of multimedia based on education and traditional methods on life quality and self-esteem of hemodialysis patients"**. Who found that patients' quality of life and sense of self-esteem is greatly increased by multimedia-based education. Additionally, **Wu et al., (2018)**, studied the "**effectiveness of a multimedia instructional program with accessibility enhancements for lowering anxiety and increasing self-esteem and satisfaction of patients undergoing cardiac catheterization,**" and the current study's findings are in agreement with each other.

Conclusion

Based on the current study results, it was concluded that "The implementation of Progressive Muscle Relaxation Technique on coronary artery diseases patients" has a statistically significant positive effect on self-esteem and self-efficacy among study patients, which supports the study hypotheses.

Recommendations

Based on the findings of the current study, the following recommendations are proposed:

1. Replication of the current study on a large sample is recommended to achieve generalization of the results and wider utilization of progressive muscle relaxation technique.
2. Delivering an instructional program on the benefits of and how to use progressive muscle relaxation therapy to patients with coronary artery disease to improve cardiac patients' self-efficacy and self-esteem.
3. Nurses should strive to increase the self-efficacy of cardiac patients as much as possible while providing care for them.
4. Further studies about the effect of the progressive muscle relaxation technique on the quality of life for patients with coronary artery diseases.

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