Effect of Progressive Muscle Relaxation on Pain and Fatigue among Post Cardiac Surgery Patients

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Abstract

Pain and fatigue are common complications after cardiac surgery. All of these factors may compromise treatment and quality of life following surgery; therefore, decreasing pain and fatigue scales may improve outcomes after surgery. Progressive muscle relaxation (PMR) therapy is considered one of the alternative therapies used for reducing pain and fatigue among cardiac surgery patients. **So the study was aimed to** assess the effect of progressive muscle relaxation on pain and fatigue among post cardiac surgery patients. **Design:** A quasi-experimental research design with a pretest-posttest was used. **Setting:** The study was applied in Cardiothoracic Surgery Department at the Chest Hospital in Mansoura. **Subjects**: A purposive sample of 60 adult patients who are undergoing cardiac surgery. **Three tools used for data collection** are **Tool (I):** A structured interview questionnaire, **Tool (II):** A modified Behavioral Pain Scale, and **Tool (III):** Fatigue assessment scale. **Results**: No statistically significant differences were noticed between both study and control groups about their all demographic characteristics and their surgical history. Results of the present study revealed that statistically significant differences were detected between the study and control groups regarding their behavioral responses to pain post-intervention. A significant reduction of fatigue scores in the study group as compared to the control group one day post-intervention (p = 0.0001) as well as five days post-intervention after surgery (p = 0.0001).**Conclusion:** Progressive muscle relaxation technique had a positive effect in reducing postoperative pain and fatigue among patients after cardiac surgery. **Recommendations**: progressive muscle relaxation techniques should be integrated into the rehabilitation programs provided to cardiac surgery patients.

Keywords: Progressive muscle relaxation technique, postoperative pain, postoperative fatigue, cardiac surgery patients.

Introduction:

WHO, the specific cardiovascular conditions are rheumatic heart disease, ischemic heart disease, hypertension, cardiomyopathy, myocarditis, endocarditis, congenital heart disease, and other circulatory disorders (**Gupta et al., 2012**). Due to the rising chronic disease burden, there is an upsurge in cardiac surgeries and catheter-based interventions being performed as well as there are various innovations in form of minimally invasive cardiac operation, cardiac bypass techniques. Cardiac surgeries in themselves are unique and contribute to significant morbidity (**Molina &Heng, 2009**)

Major VHDs are stenosis and regurgitation, aortic stenosis and mitral regurgitation remains the most common lesion requiring surgical intervention (**Iung & Vahanian, 2011**). Returning to normal life after cardiac surgery poses a huge physical, mental and social challenge. Major complaints experienced after cardiac surgery are reported as post-operative pain, decreased quality of life, arrhythmia, electrolyte imbalance, infections, systemic problems, and anticoagulation-related issues. After surgery, these patients are vulnerable to develop depression, anxiety, post-traumatic stress disorder, depleted quality of life, fragility, psychological stress related to scarring, body image, sexual life, parenting, medicines, treatment, and disease course (**Pruteanu, 2014**).

The International Association for the Study of Pain defines pain as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage'. Most patients undergoing

abdominal surgeries experience post-operative pain which results in increased stress responses and accelerates tissue breakdown. Inadequate postoperative pain control leads to post-operative complications including impaired respiration, disrupted sleep, prolonged hospitalization, decreased patient satisfaction, increased treatment costs, and delayed recovery **(Roykulcharoen& Good, 2014)**.

Fatigue is a universal complaint in the cardiac population. It peaks between 2 to 4 weeks postoperatively. Fatigue is strongly associated with low levels of independent functioning, great emotional distress, depression, and poor cardiac function. Preventive management for sleep and fatigue should be undertaken especially during the first 6 months after discharge **(Kruahong, 2013)**. Complementary therapies as PMR are modalities for assisting these patients to recover from postoperative complications. Relaxation therapies have a great impact in improving sleep quality and reducing anxiety as well as there are documented benefits of their effectiveness in pre and post-operative period of patients with stoma surgery, hysterectomy, advanced cancer, multiple sclerosis, hemodialysis, and chronic obstructive pulmonary disease and cardiac surgery as well **(Conway et al., 2010)**. Impaired fatigue and sleep quality cause many problems such as somatic complaints or other psychiatric disorders **(Boergers et al., 2007)**.

A progressive muscle relaxation (PMR) was developed by Edmund Jacobson in 1938, is considered one of the non-pharmacological management and was accepted to be a good method that helps the body relax and relieve mental tension and fatigue **(Cooke, 2013)**. PMR is considered the easiest one to be learned, it is inexpensive, available at any time, self-induced by the patient, and not causes side effects **(Krupinska and Kulmatycki, 2014)**.

Benefits of PMR includes: reducing heart rate, blood pressure controlling, breathing rate slowing, decreasing oxygen need, slowing the metabolic rate, enhancing peripheral dilatation and increasing peripheral heat, increasing blood flow to big muscles, reducing muscular rigidity, stress, fatigue, and pain, inducing comfortable sleep and increasing body's immunity **(over 2011)**.

Medical-Surgical nurses play an important role in providing emotional support to reduce pain and fatigue levels among those patients. They should provide education and advisor for cardiac surgery patients during rehabilitation programs to ensure the positive effects of the PMR technique. Nurses take care of the outcomes of diseases and suffering. They assist patients in the accomplishment of the activities of daily living, which are normally limited or impossible after surgery. Appropriate high-level nursing competencies are necessary, because even simple tasks, such as personal hygiene or mobility, cannot be performed by the patient alone due to limitations caused by the surgery. This includes surgery-related limitations in mobility as well as in combination with other existing restrictions. Furthermore, medical treatments, such as wound care and drug therapy, also require high competencies in nursing. Both the support in activities of daily living and the assumed tasks of medical treatment ask for high-level knowledge and skills as well as competencies to act adequately **(Floer et al., 2017)**.

Significance of the study:

Pain and fatigue can be intervene using two methods; either using pharmacological methods or non-pharmacological methods such as progressive muscle relaxation technique **(Stefanac and Nesbit, 2007)**. Based on 30 years nursing researchers used PMR in the management of some chronic disease problems such as relieving side effects of chemotherapy and hemodialysis, reduce postoperative pain, fatigue, and decrease the anxiety level among cardiac rehabilitation patients **(Eliopoulos 2014)**. Hence, the researchers carried out this study to assess the effect of progressive muscle relaxation on pain and fatigue among post cardiac surgery patients.

Aim of the study:

The study was aimed to assess the effect of progressive muscle relaxation on pain and fatigue among post cardiac surgery patients.

Research hypothesis:

H1: Post cardiac surgery patients who will implement progressive muscle relaxation, their pain intensity will be reduced than patients who will not.

H2: Post cardiac surgery patients who will implement progressive muscle relaxation, their fatigue will be reduced than patients who will not.

Subjects and Methods:

Research design:

A quasi-experimental research design with a pretest-posttest was used. Quasi-experimental research is a prospective or retrospective study in which patients self-select or are selected into one of some different treatment groups to compare the real effectiveness and safety of non-randomized treatments **(Maciejewski, 2020).**

Setting:

The study was applied in the department of Cardiothoracic Surgery at the Chest Hospital in Mansoura. The cardiothoracic Surgery Unit consists of 2 rooms included 12 beds on the second floor of the hospital. The mentioned hospitals were selected due to the high flow rate of patients, as it serves the biggest region of population.

Subjects:

By using the nonprobability sampling technique a purposive sample of 60 adult patients undergoing heart surgery was recruited from the previously mentioned setting. They were assigned into two equal groups (study and control groups) (thirty subjects in the study group who received progressive muscle relaxation technique and routine care and thirty subjects in the control group who received routine care only such as drug administration, laboratory tests, x-rays, and physical examination).

The inclusion criteria included:

- Adult patients aged from 20-60

- Don't have any complications at the time of operation.

- Agree to participate in the study

The exclusion criteria included:

- Adult patients are suffering from mental illness.

Tools of data collection:

Three tools were used for data collection of the study as the following:

The tool I: A structured interview questionnaire:

It was developed by the researchers after reviewing the related literature and research studies. It included two parts: **(Gupta et al., 2012):**

Part (1): It included demographic data of adult patients such as age, educational level, occupation, and residence.

Part (2): It included the medical history of adult patients such as medical diagnosis, having surgical history, and current surgery name.

Tool (II): A modified Behavioral Pain Scale:

It was developed by **Mateo andKrenzischeck, (1992).** It was used to measure the behavioral responses to pain. It includes four dimensions: posture, gross motor activity, facial expression, and verbalization. For each of these four major behavioral responses, one of three choices was elicited by the researcher. For posture, the choice is between relaxed or guarded or tense posture. For gross motor activity, the choice is very restless, slightly restless, and quiet. For facial expression, the choice is between no frowning, some frowning, and constant frowning or grimacing. Finally, parturient verbalization varied between normal no sound, groans/moans, and cries/sobs. Each of the 12 alternatives is scored as either (0) absent or (1) present. The total scores range from 0-12. Statistically, this score was translated to the corresponding pain intensity as follows:

- (0): No behavioral responses to pain

- ($<$ 4): Mild behavioral responses to pain

- (4-6): Moderate behavioral responses to pain

- (7-10): Severe behavioral responses to pain

- ($\geq$ 11): Unbearable behavioral responses to pain

Tool (III): Fatigue assessment scale:

This tool was adopted from **Kleijn et al., (2011)**, it was a self-developed rating scale consisting of 10 items (which assess fatigue of individuals during various activities in a week in terms of physical, social, psychological, and spiritual domains and its relationship with time of the day). Scores from 0 (no fatigue) to 10 (worst possible) with a total score range of 0 to 100. No fatigue, very little, mild, moderate, severe, worst denotes 0, 1-9, 10-30, 31- 60, 61-80, 81-100 respectively. The reliability of the scale is considered good with Cronbach's alpha of 0.81 for the total score.

Designed manual booklet about progressive muscle relaxation technique**:** This booklet was contained illustrative colored pictures and the main points of each training session.

Title: Progressive muscle relaxation technique (**Cooke, 2013; Alwan et al., 2018; and Dehkordi, & Rastar, 2016**)

Outlines of the booklet:

1- Introduction about progressive muscle relaxation technique

2- Meaning of progressive muscle relaxation technique

3- Benefits and Importance of progressive muscle relaxation technique

4- The technique of progressive muscle relaxation technique

Validity and reliability of the tool:

- The content validity of the tool was tested by a board of five experts in medical-surgical nursing. Content Validity Index (CVI) was 0.98.

- The Reliability of the first tool was assessed through Cronbach's alpha test α= 0.87.

A pilot study:

A pilot study was applied on 10% of the adult patients (6 patients). The clarity and testing of the feasibility of the research process needed for modifications were carried out based on the results of the pilot study to develop the final form of the tools. Patients involved in the pilot were included in the current study.

Fieldwork:

- Data Collection was within six months from the beginning of October 2019 till the end of March 2020.

- The participants were divided into two equal groups (study and control groups) (thirty subjects in the study group who received progressive muscle relaxation technique and routine care and thirty subjects in the control group who received routine care only).

- Researches were attended the previously mentioned setting for collected data two days per week (Saturday and Sunday), from 9 am to 12 pm.

- Oral consent was obtained from patients after explaining the purpose of the study

- Teaching methods included group discussion, demonstration and re-demonstration, models, and pictures (progressive muscle relaxation technique).

- The participants in the control group received routine care as an evaluation of their physical health and drug administration.

- The researchers introduced themselves to patients and explained the purpose of the study; the tool I, tool II, and tool III were collected from the patients without the application of the progressive muscle relaxation technique.

- In the study group, the researchers interviewed each patient individually for about 1 hour according to the patients' level of understanding and comfort; the tool I, tool II, and tool III were collected from the patients with the application of the progressive muscle relaxation technique.

- In this study, the questionnaire was distributed three times; pre and post one day and post five days of the intervention, and continuation of doing exercises were followed by phone calls.

- The researchers gave information to the subjects in the study group individually about the progressive muscle relaxation technique before the surgical operation done.

- The process of PMR technique takes approximately 15 min.

- The researchers ask patients to lie down comfortably on a bed facing upward/you can also sit in a reclining chair.

- Patients were asked to lose tight clothes; remove glasses, watch, or jewelry.

- Tense and relax a specific group of muscles (palm, forearm, upper arm, shoulder, neck, eyes, forehead, scalp, eyebrow, chest, abdomen, buttock, thigh, lower leg, feet, and sole muscles) as per the instruction.

- By starting with the progressive muscle relaxation technique, the researchers asked all of the patients to take a deep breath, hold it for 2 sec, and then breathe out slowly.

- Again do it one more time, and feel a wave of relaxation sweeping all over your body and again take a deep breath, hold it for 2 sec, then breathe out slowly.

- The researchers were distributing the designed manual bookletto each patient to clarify how to apply the progressive muscle relaxation technique.

- The patients were asked to do the technique every day, three times per day in the morning, afternoon, and night.

- After the progressive muscle relaxation technique implementation, the researchers demonstrated each step of the progressive muscle relaxation technique then asked the patients to re-demonstrate all the steps and repeat the technique three to four times until the patients master it.

- In both study and control groups, the researchers reassess pain and fatigue after one day and after five days of PMR intervention.

Administrative and ethical considerations:

Official permission was obtained through an issued letter from the Dean of Faculty of Nursing, Mansoura University to conduct this study and the directors of the Cardiothoracic Surgery Department at the Chest Hospital in Mansoura. The aim of the study was explained to obtain permission to collect the research data from the hospital. The purpose of the study was explained to adult patients. The researchers informed the participants that, the study was voluntary, they were allowed to refuse to participate and they had the right to withdraw from the study at any time, without giving any reason. Moreover, they were assured that their information would be confidential and used for research purposes only.

Statistical analysis:

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and SDs for quantitative variables. Differences between the two means tests (t-test) were used. Chi-square (x2) test of significance was used to compare proportions between qualitative parameters. Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables Statistical significance was considered at P-value <0.05.

Results:

Table (1): Showed the mean age of adult patients in the study group and the control group (38.48±13.22 and 39.68±12.74) respectively. Concerning education in most of the adult patients in the study group and the control group had elementary education levels. Regarding occupation, it was observed that (70%) and (61%) in the study group and the control group respectively were not working. Concerning residence, it was noticed that (56%) and (52%) in both the study and control groups respectively were lived in rural areas. No statistically significant differences were noticed between both study and control groups about their demographic characteristics.

Concerning surgical diagnosis**, in Table (2):** (42%) and (33%) in both the study group and control group respectively were had mitral valve disease**.** Regarding having surgical history (79%) and (73%) in both the study group and control group respectively were had no surgical history. Finally, more than two fifths (47%) and (66%) in both the study group and control group respectively were had mitral valve replacement. No statistically significant differences were noticed between both study and control groups about their surgical history.

Table (3): demonstrated that (59%) and (48.7%) in both the study groups and control group respectively were had tense posture pre-intervention, while post-intervention (76%) in the study group had relaxed muscles in comparison with (36%) in the control group. Regarding gross motor, the same table illustrated that (37%) and (31.5%) were quiet in the study group and control group respectively pre-intervention; while post-intervention the percentage has been increased and become (54%) in the study group while in the control group has been decreased to (23%). Regarding facial expression, pre-intervention (39%) and (50%) were having constant frowning in the study group and control group respectively, while post-intervention; most (71%) in the study group had no frowning in comparison with only (18%) in the control group.

Concerning verbalization, (44%) and (46%) in both the study and control groups respectively were having cry out or sob before intervention, while post-intervention (80%) of adult patients in the study group making normal sound in comparison with (26%) in the control group. No statistically significant difference was found between both the study and control groups pre-intervention in all behavioral response to pain items. There were statistically significant differences between the study and control groups regarding the behavioral response to pain in one day post-intervention concerning posture, gross motor, facial expression, and verbalization where (p = 0.005, 0.036, 0.035, and 0.034) respectively and in five days post-intervention concerning posture, gross motor, facial expression, and verbalization where (P = 0.004, 0.013, 0.000, and 0.000) respectively.

From **table (4),** it was observed that no statistically significant decrease was found in fatigue level in pre-intervention among both the groups (p = 0.124 and p = 0.068). In the study group, a statistically significant decrease was noticed in fatigue one day post-intervention (p = 0.0001) as well as five days post-intervention (p = 0.0001) while in the control group, no statistically significant decrease was found in fatigue level one day post-intervention (p = 00.082) as well as five days post-intervention after surgery (p = 0.042).

Table (1): Distribution of the adult patients in both study and control groups regarding their demographic characteristics (n=60)

Item	Study group (30)		Control group (30)		P-value
	No.	%	No	%	
Age in years	38.48±13.22		39.68±12.74		0.834 (0.213)
Education					
- Illiterate	3	10	2	5	0.163 (4.245)
- Elementary	15	50	18	60	
- Higher	12	40	11	35	
Occupation					
- Working	9	30	12	39	0.954 (0.151)
- Not working	21	70	18	61	
Residence					
- Rural	17	56	16	52	0.764 (4.223)
- Urban	13	44	14	48	

X2: Chi-square test. * P < 0.05 (significant)

Table (2): Distribution of the adult patients in both study and control groups regarding their surgical history (n=60)

Items	Study group (30)		Control group (30)		X2	P-value
	No.	%	No	%		
Medical diagnosis						
- Mitral Valve Disease	12	42	10	33	3.723	(0.151)
- Aortic Valve Disease	5	16	6	21		
- Tricuspid Valve Disease	3	9	7	24		
- Multivalve disease	10	33	7	22		
Having surgical history						
- Yes	6	21	8	27	0.278	0.587
- No	24	79	22	73		
Current surgery name:						
- Mitral valve replacement	14	47	20	66	2.253	0.672
- Aortic valve replacement	10	33	6	20		
- Tricuspid valve replacement	0	0	4	14		
- Double valve replacement	6	20	0	0		

X2: Chi square test. * P < 0.05 (significant)

Table (3): Distribution of the adult patients in both study group and control group regarding their behavioral response to pain pre and post-progressive muscle relaxation intervention (n=60)

Behavioral responses to pain	Study group (30)						Control group (30)					
	Pre-intervention		One day post-intervention		Five days post-intervention		Pre-intervention		One day post-intervention		Five days post-intervention	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Posture												
▪ Relaxed muscles	7	22	14	48	23	76	7	24	7	22.5	11	36
▪ Guarded position	5	19	10	32	4	13	8	27.3	6	20.0	7	23
▪ Tense posture	18	59	6	20	3	11	15	48.7	17	57.5	12	41
(X2-P)Pre intervention x2=2.097 P=(0.342)			One day post intervention 10.478 (0.005*)				Five days post intervention 11.903 (0.004*)					
Gross motor												
▪ Very restlessness	10	33	8	27	4	14	10	33	14	46	13	42
▪ Slightly restless	9	30	9	30	10	32	11	35.5	10	33	10	35
▪ Quiet	11	37	13	43	16	54	9	31.5	6	21	7	23
(X2-P)Pre-intervention 0.227 (0.884)			One day post-intervention 6.624 (0.036*)				Five days post-intervention 8.476 (0.013*)					
Facial expression												
▪ No frowning	7	24	15	50	21	71	8	27	7	23	5	18
▪ Some frowning	11	37	8	27	6	20.5	7	23	11	37	13	43
▪ Constant frowning	12	39	7	23	3	8.5	15	50	12	40	12	39
(X2-P)Pre-intervention 1.613 (0.423)			One day post-intervention 6.546 (0.035*)				Five days post-intervention 24.638 (0.000*)					
Verbalization												
▪ Making normal sound	5	16	13	44	24	80	5	17	6	21	8	26
▪ Groans/moan	12	40	8	26	4	14.5	11	37	14	46	15	50
▪ Cry out or sob	13	44	9	30	2	5.5	14	46	10	33	7	24
(X2-P)Pre-intervention 0.227 (0.878)			One day post-intervention 6.668 (0.034*)				Five days post-intervention 29.082 (0.000*)					

Chi-Square Test & P for Test *: Significant at P ≤0.05

Table (4): Comparison of pre/post-progressive muscle relaxation intervention scores of fatigue in the study and control groups

Items	Group	Pre-intervention	One day post-intervention	Five days post-intervention
Fatigue scores	**Study group (30)**	26.90+ 4.03	25.65+ 3.36	14.01+ 2.53
	Control group (30)	27.68+ 4.89	25.82+ 4.42	23.62+ 2.26
P- value	**Study group (30)**	0.124	0.0001*	0.0001*
	Control group (30)	0.068	00.082	0.042

*Significance at 0.0001 levels

Discussion:

Patients undergoing surgical procedures are experienced acute postoperative pain, so, it's necessary to find an effective, inexpensive, and safe measure that can help those patients to cope with their life rapidly. Many preoperative, intraoperative, and postoperative pain management strategies are available. The American Pain Society (APS) is putting a guideline about postoperative pain management to promote evidence-based, effective, and safer postoperative pain management among adults that included preoperative education, perioperative pain management planning, and the use of different pharmacological and non-pharmacological strategies (**Debra 2017**). PMR is an effective method that helps for reducing pain intensity and fatigue; it can be achieved after simple and brief training. From non-pharmacological strategies, Jacobson's progressive muscle relaxation technique is very easy to learn and is considered one of the best complementary therapies which can easily be learned and inexpensive and does not require special equipment (**Alwan et al., 2018**). Hence, the current study was aimed to assess the effect of progressive muscle relaxation on pain and fatigue among post cardiac surgery patients.

Results of the current study indicated that no statistically significant differences were noticed between both study and control groups about their all demographic characteristics and their surgical history. This indicates that those factors did not affect PMR technique.

The result of the current study highlighted that no statistically significant difference was found between both the study and control groups pre-intervention in all behavioral response items. This may be related to the similarity between the two groups that they did not receive the PMR technique.

Regarding the behavioral response to pain, the current study results indicated that the post-intervention majority of adult patients in the study group had relaxed muscles in comparison with more than one third in the control group. This is indicated the positive effect of a progressive muscle relaxation technique on reducing pain among adult patients post cardiac surgery.

Regarding gross motor, the present study findings revealed that post-intervention the percentage of adult patients who become quiet has been increased and reached for more than half in the study group while in the control group has been decreased to less than one quarter. This result indicates the importance of introducing a PMR technique to adult patients post cardiac surgery.

The results of the current study revealed that post-intervention; most of the adult patients in the study group had no frowning and post-intervention majority of adult patients in the study group making a normal sound. These results may be related to the fact that PMR help in pain relief by decreasing muscle tension, decrease fatigue level, and distracting attention by changing pain impulses being transmitted from the peripheral nerve receptors to the brain can result in little or no pain perception (**Roykulcharoen and Good 2014**).

Results of the present study revealed that statistically significant differences were detected between the study and control groups regarding their behavioral responses to pain post-intervention. These findings are supported by **Topcu andFindik, (2012)** who conducted a study about"Effect of Relaxation Exercises on Controlling Postoperative Pain" and found the same result.

Also, the results are matched with **(Varghese, 2014)** who studied "The Effectiveness of Progressive Muscle Relaxation Therapy on Postoperative Pain" and found that progressive muscle relaxation was effective postoperative pain management and improving physical, behavioral, social, and psychosocial wellbeing of postoperative patients than routine hospital interventions.

Also, the result is in line with the study conducted by **Paula et al., (2012)** who conducted a study about "The Use of the Progressive Muscle Relaxation Technique for Pain Relief in Gynecology and Obstetrics" and concluded that PMR significantly decreased pain perception among the study group.

Results of the current study indicated that there was a significant reduction of fatigue scores in the study group as compared to the control group one day post-intervention (p = 0.0001) as well as five days post-intervention after surgery (p = 0.0001); these findings are congruent with findings of **Dehkordi&Rastar, (2016)** who studied the effect of progressive muscle relaxation on social performance and quality of life in aging, **Dayapoglu& Tan, (2012)** who conducted a study titled evaluation of the effect of progressive relaxation exercises on fatigue and sleep quality in patients with multiple sclerosis and **Akgun&Dayapoglu,(2015)** who studied the effect of progressive relaxation exercises on fatigue and sleep quality in patients with chronic obstructive lung disease and found in their studies that PMR was had a positive effect in reducing pain and fatigue. These results supported the aim and hypothesis of the current research. This may be indicated the importance of implementing the progressive muscle relaxation technique.

Conclusion

Based upon the results of the current study and the study aim and hypothesis it was concluded that progressive muscle relaxation technique had a positive effect in reducing postoperative pain and fatigue among patients after cardiac surgery.

Recommendations

From the previous findings the following recommendations are suggested: -

- Progressive muscle relaxation techniques should be integrated into the rehabilitation programs provided to cardiac surgery patients.

- The health care team should prepare cardiac surgery patients to apply PMR technique during the preoperative period to be used as a pain and fatigue control method during the postoperative period.

- Providing education for postoperative cardiac surgery patients about PMR techniques to help reducing fatigue and to improve postoperative sleep quality.

- Future research includes replication of this study on a large group. Comparing the effect of progressive muscle relaxation technique with other methods as listening to music or imagination**.**

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