Dyspnea, Fatigue and Sleep Quality Post Cardiac Surgeries: Effect of Selected Relaxation Techniques

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Abstract

Background: Cardiac surgery often leads to numerous postoperative complaints that can impact patient outcomes. Employing relaxation techniques can significantly alleviate many of this discomfort. **Aim:** evaluate the effect of selected relaxation techniques on dyspnea, fatigue and sleep quality among patients post cardiac surgeries. **Design:** A quasi-experimental research design (pre & post-test). **Settings:** The study was conducted in the Cardiothoracic Intensive Care Unit. Follow-up occurred in the Cardiology Department and Outpatient Clinic of the Cardiothoracic Hospital, affiliated from Minia University Hospitals, Minia City, Egypt. **Sample:** The study included 90 patients. **Tools:** the study included four tools, Health Assessment Sheet, The Modified Medical Research Council Scale, Fatigue Assessment Scale and Pittsburgh Sleep Quality Index**. Results:** regarding age 44.4% were between 40 – 49 years, & 33.3 % were more than 60 years. About 61.1% of them were males. The mean ± SD of dyspnea was 3.06 ± 0.699 at the pre intervention which decreased to 0.855 ± 0.552 at the follow up. Fatigue mean ± S.D was 17.5 ± 6.29 and decreased to 11.7 ± 2.39 after 8 weeks. The overall sleep quality was 10.1±1.84 at pre intervention and 4.70 ± 0.869 at the follow up. **Conclusion:** Patients who underwent cardiac surgeries and were exposed to relaxation techniques exhibited significant improvements in dyspnea, fatigue, and sleep quality levels. **Recommendations:** relaxation techniques should be incorporated into the routine management plans for patients following major surgeries.

Keywords: Dyspnea, fatigue, sleep, cardiac surgeries, and relaxation techniques**.**

Introduction

Cardiovascular disease (CVD) is the primary cause of mortality nowadays and approximately 60% of the patients undergoing cardiac surgery is 65 years and older, this proportion is still increasing (**Jones et al., 2022**). Aging population is increasingly the primary cause of the CVD pandemic. The burden of CVD will keep rising due to the aging population's fast growth. The majority of elderly individuals also experience multimorbidity, which is closely linked to death, reliance, a reduced quality of life (QOL), and impairment (**Zhou et al., 2022**)

Cardiac surgery is among the most commonly performed surgical interventions among middle and elderly aged patients. It is divided into two categories: substitutive, which covers surgeries like valve replacement, and reconstructive, which includes procedures like cardiac valve repair and coronary artery bypass grafts **(Salah et al., 2022).** Postoperative symptoms include weariness, dyspnea, anxiety, disturbed sleep, and reduced QOL. It is well recognized that cardiac rehabilitation (CR) enhances the mental and physical well-being of individuals with CVD, which lowers overall and cardiovascular mortality **(Archana, et al., 2021).**

Early postoperative dyspnea is a common symptom, and postoperative pulmonary complications (PPCs) are still a leading cause of post-heart surgery morbidity, death, higher hospital costs, and longer hospital stays **(Srimookda, et al., 2021).** Cardiac surgery patients are prone to develop pulmonary impairment as well as gas exchange abnormalities in the earlier hours after surgery. Early application of relaxation technique as positioning, mobilization, exercises for the shoulder girdle, and breathing exercises are also recommended in the recovery regime of many post-operative patients **(Akram, & Hegazy, 2020).**

Fatigue is a frequent concern among old age cardiac patients, typically occurring between two and four weeks post cardiac-surgery. It is associated with a decrease of independence, significant mental distress, depression, and impaired heart function **(Loh, et al., 2022).** Postoperative poor sleep quality can be attributed to multi factors such as pain from the surgical wound, have a thoracic drain, extended periods in bed, muscle spasms, and elevated anxiety levels. Sleep disturbances manifest in two types: insomnia as well as poor-quality sleep. Insomnia encompasses problems in sleep, as frequent awakenings during the night, and awakening very early in the day. Lack-quality of sleep includes excessive or inadequate sleep, and continuous awakenings (**Nazari, et al., 2022).**

It is crucial to implement preventive measures for managing sleep and fatigue, particularly from the first hours to 6 months after discharge from cardiac surgery. Relaxation techniques can benefit in enhancing sleep quality and reducing anxiety which may reduce fatigue level in post cardiac surgery patients **(Hamdi, et al., 2021, & Sarmadi, et al., 2024).**

The role of nurses in CR and minimizing post-operative complications is pivotal. Nurses play a crucial role in supporting patients to alleviate pain, fatigue, and dyspnea, as well as enhancing sleep quality. Educating and advising cardiac surgery patients during rehabilitation programs is essential for optimizing the benefits of relaxation techniques implemented **(Mohammed,et al., 2020).** Nurses help patients and family achieve everyday tasks that are typically limited or challenging after surgery. The necessity of employing relaxation techniques as a complementary therapy to alleviate dyspnea, fatigue, as well as enhance sleep pattern in heart surgery patients was seen as crucial **(Lin, et al., 2023).**

Significance of the study

Cardiovascular disease is a prevalent and serious health issue in both developed and developing nations, accounting for approximately 50% and 25% of deaths, among middle and elderly populations (**Nazari, et al., 2022**). In developed countries, CVD causes 5 million out of 12 million deaths annually, The Middle East and Eastern Europe exhibit the highest mortality rates for CVD. Specifically, in Egypt, CVD has been identified as the primary reason of death, comprising 46.2% of all mortality in 2017 **(Hassanin, et al., 2020)**.

Broncho-pulmonary complications pose a significant challenge for critical care nurses following cardiac surgery. Intubated patients experience changes in lung volumes, capacities, oxygen saturation, and arterial blood gases. Lung capacities may decrease by 30-60%, persisting at a reduced level of 12% for up to one year, leading to dyspnea **(Ali, et al., 2020).** Formal documents indicate that a significant number of patients, ranging from 33% to 75%, reported experiencing moderate to severe pain and fatigue following heart surgery. Additionally, between 39% and 69% of patients experience sleep problems during the 1st month post-cardiac surgery (**Nazari, et al., 2022**). The researchers observed that post-cardiac surgery patients in the cardiothoracic ICU, who experienced the previously mentioned issues, only received routine pharmacological and nursing care. These patients did not participate in any relaxation exercises or rehabilitation techniques. As a result, the researchers decided to implement selected relaxation techniques to help alleviate their complaints.

Aim of the study

To evaluate the effect of selected relaxation techniques on dyspnea, fatigue and sleep quality among patients post cardiac surgeries.

Research hypothesis:

To fulfill the aim of the present study it was hypothesized that:

- Patients post cardiac surgeries whom exposed to selected relaxation techniques show a significant improvement in their dyspnea level
- Patients post cardiac surgeries whom exposed to selected relaxation techniques show a significant improvement in their fatigue level
- Patients post cardiac surgeries whom exposed to selected relaxation techniques

show a significant improvement in their sleep quality.

Subjects and methods

Design: The research employed a quasi-experimental (pre- and post-test) research design with aims to establish a link of causation and effect between a dependent and independent variable.

Setting: the research was performed at the Cardiothoracic Intensive Care Unit (CICU) and follow-up was conducted at the Cardiology department and Outpatient Clinic of the Cardiothoracic Hospital affiliated from Minia University Hospitals, Minia City, Egypt.

Duration of the study: Data gathered for this research was completed in seven months from the beginning of September to the end of March 2023 (7/9/2023 to 31/3/2023).

Sampling: In the actual research, 90 patients were recruited as a purposive sample. The number of participants required to meet the required sample size was determined using the **Isaac and Michael (1995)** formula that was (N= n x 30 / 100) N = sample size

n = Total number of patients post cardiac surgeries.

N = 300 x 30 / 100 = 90 Patients.

Inclusion criteria: Participants eligible to the allocated study if they have the next inclusion criteria, adult to more than 60 years admitted in cardiothoracic surgery department 2 days pre-open heart surgery. Hemodynamic stable, aware and able to communicate

Exclusion Criteria: If participants had one or more of the following criteria, they were excluded from the actual research: Patients receiving mechanical breathing, either invasive or noninvasive, for a duration exceeding twenty-four hours subsequent to their admission to the Cardiothoracic ICU. Previous cardiac surgery, history of mental or psychiatric disorders, impaired hearing or vision. Follow anesthetics medications that could affect sleep quality/ and or complain of sleep disorders as sleep apnea syndrome.

Tools: four tools used in the study, all of them field by the researchers:

First Tool: Health Assessment Sheet prepared by the researchers, adapted from **Morton & Fontaine, (2018).** It covers patient personal data as age, level of education gender, as well as occupation, presence of comorbidities, body mass index (BMI) to assess obesity, and history of smoking.

Second Tool: The Modified Medical Research Council Scale (MMRC), this scale utilized to assess the severity of dyspnoea among post cardiac surgery patients, adopted from **AbuBakr, et al., (2018).** It consists of five grades.

Scoring system:

- Grade 0 reveals breathlessness only through strenuous exercise
- Grade one indicates breath problems when hurrying on level ground.
- Grade two implies walking slow on level ground due to breathlessness or needing to stop for breath during regular walking.
- Grade three exhibits the need to stop for breath after walking a few minutes on level ground. Finally,
- Grade four indicates severe breathlessness, where individuals are too breathless while dressing/undressing.

Third Tool: Fatigue assessment scale, adopted from Youniss et al., (2019) with ten components, it was a self-rating scale. which evaluate people's degree of exhaustion from a week's worth of activities in the physical, social, psychological, and spiritual domains and how it relates to the time of day. There was a total score range of 0 to 100, with 0 representing no weariness and 10 being the worst conceivable. The following categories: none, very little, mild, moderate, severe, and worst (0, 1–9, 10–30, 31–60, 61–80, and 81–100, respectively).

Fourth Tool: Pittsburgh Sleep Quality Index (PSQI), adopted from Bagheri et al., (2021). The questionnaire called the PSQI was created in **1989 by Buysse et al.** to assess the quality of sleep. Nineteen questions make up the PSQI, which measures the subjective quality of sleep during the previous month. Sleep quality, sleep latency, length, habitual sleep efficiency, sleep disruptions, use of sleeping medications, and dysfunction throughout the day are all covered by its seven subscales. the 0–21 worldwide score. A PSQI

Scoring system:

The scores range from 0 to 21 and a total score of > 5 denotes inadequate quality of sleep.

Method: Permission to conduct the study was obtained from the hospital director, the head of the cardiac intensive care unit (CICU), the Cardiology Department, the Cardiac outpatient clinics and the head nurses of these settings after discuss of the study's aim.

Validity: To ensure validity, the research tools underwent assessment by a panel of five experts from the medical surgical and critical care nursing department at the faculty of nursing, Rehabilitation and physical medicine and nnecessary modifications were made based on their feedback.

Reliability was assessed using Cronbach's Alpha test to determine the internal consistency and stability of the tools. Reliability of health assessment sheet, the modified medical research council scale (MMRC), fatigue assessment scale and Pittsburgh sleep quality index (PSQI) were (0.77, 0.96, 0.71 and 0.86) respectively.

A pilot study: was conducted on 9 patients post cardiac surgeries who met the inclusion criteria to test the tools for clarity, objectivity, and feasibility. There were no modifications made, so the trial sample was included in the basic sample.

Ethical considerations: ethical agreement was taken from the faculty of nursing ethical research committee (code no: 202393). Once the goals and methods of the research were explained, written informed permission was acquired. Patients received guarantees that their information would be kept private and would not be utilized for any other purpose without their express consent. Every patient gave their free and informed consent. They were also told that they may leave their research at any moment and that they weren't required to give a reason.

Data collection: The actual research was conducted 24 hours before cardiac surgery at the cardiology department and completed after endotracheal tube extubation and stabilization of the patient condition after the 1st 24 hours of admission to the CICU. All patients in the study were 1st assessed before application of the study at the cardiology department (at the preoperative phase) using the previously listed tools (four tools) before application of the relaxation techniques to provide baseline data on the patient's level of dyspnea, fatigue and sleep quality to be compared and evaluated after the intervention at the CICU discharge time and after 2 & 8 weeks at the outpatient clinic (follow up).

The Selected Relaxation Techniques: relaxation techniques created by the researchers post revising extensive related literature review **Bagheri et al., (2021), Morton & Fontaine (2018) & Archana et al., (2021).**

The relaxation technique includes groups of activities that were educated to the patients of the study and repeated along the day. All of these exercises were done in two sessions every day the duration of every session was 30 minutes. Patients start demonstration and re-demonstration of the exercise at the cardiology department at the preoperative phase and continued twice a day postoperatively.

Preparatory phase

In order to design the data gathering methods, it involved examining the most recent and pertinent literature in the field as well as theoretical understanding of the numerous connected elements through the use of books, papers, the internet, and periodical publications. The researchers visited the selected setting before data collection to coordinate and establish the procedures for recruiting, and collection of data. The researcher discussed the selected relaxation exercises with the specialized physiotherapist in order to follow his instructions and directions about the correct way of applying the exercises to reach the best way of benefit. This stage helped in guiding, directing, planning, and developing the rehabilitation plan.

Implementation phase:

This phase started preoperatively and continued postoperative, the researchers firstly introducing self and explained the research's objective . The data collection started using the first, second, third and fourth tools (Health Assessment Sheet, MMRC, fatigue assessment scale, and the PSQI, these data was gathered by the researcher preoperatively (before implementing the relaxation techniques) for only one time.

In order to adhere to the recommended guidelines, preoperative teaching regarding the chosen relaxation methods was conducted via in-person interviews over the course of one or two days. A total of two to three preoperative sessions were held for data collection and training, with the number of sessions adjusted based on participant understanding. Every session lasted anywhere from twenty to thirty minutes.

The 1st session; at the beginning of this session every patient was given an educational brochure about the applied relaxation techniques, the researcher illustrated the content of the brochure, gave patients detailed discussion about every technique and helped them enhance skills regard to each technique to ensure that every patient perform these techniques accurately post their hospital discharge.

The second session; was arranged for demonstration and re-demonstration of the relaxation exercises to ensure that the patients can apply these procedures with competence. However, as co-researchers working in the same study environment, the researcher instructed the cardiac department's nursing staff to monitor the study group that employed the chosen relaxation techniques precisely during a given work shift.

Family caregivers were requested to assist and encourage the participants in performing their daily exercises, and they were also invited to attend the training session in order to improve compliance with relaxing techniques.

The application of Benson's technique (BR) based on (Mohammed et al., 2020), (Archana t al., 2021) & (Bagheri et al., 2021)

In a calm, dimly lit environment, the patient is seated comfortably. Remove rings, watches, and tight clothing. Gently shut his eyes and relax his muscles, starting from his feet and working a way up to the face.

Ask the patient to inhale deeply, hold it for two seconds, and then exhale gently. Repeat the process once more. The patient repeats a word or sentence softly while gradually exhaling through their mouth. The patient attempts to maintain relaxed muscles and breaths in a regular, comfortable manner. After a few minutes, the patient opens their eyes but remains motionless. The patient allows relaxation to happen at its own rate, not worrying about whether a deep state of relaxation has been reached. The patient attempts to ignore or be unaffected by distracting ideas when they arise. This procedure takes about ten minutes to complete.

The application of progressive muscle relaxation technique (PMR) based on (Mohammed et al., 2020), (Archana t al., 2021) & (Bagheri et al., 2021)

In a recliner chair or on a bed, the patients are asked to lie down comfortably with their his back to the researchers. Patients were instructed to take off their jewelry, watches, and tight clothing. Next, as instructed, tighten and release the following individual muscle groups: palm, forearm, upper arm, shoulder, neck, eyes, forehead, scalp, eyebrow, chest, belly, buttock, thigh, lower leg, foot, and sole muscles.

To begin the progressive muscle relaxation approach, the patients were instructed by the researchers to inhale deeply, hold it for two seconds, and then exhale gently. Once again, repeat the exercise and feel a wave of calm wash over the entire body. Then, take a big breath, hold it for two seconds, and gently release it. The procedure was to be performed three times a day, in the morning, in the afternoon, and at night, by the patients. This procedure takes about ten minutes to complete.

The researchers continued data collection every day from surgery day to discharge time through the morning as well as evening shift at the CICU and then at the inpatient cardiology department. Prior to the patients' release, the researcher underlined the value of follow-up appointments and coordinated with them the day and time of their appointments, which took place in the outpatient cardio thoracic surgery clinic two and eight weeks after surgery.

Evaluation phase: evaluation was done one time preoperatively using the previously mentioned 4 tools; Patients assessment sheet (1st tool), MMRC (2nd tool), Fatigue assessment scale (3rd tool) and PSQI (4th tool) and three times at the postoperative phase, once at discharge form the CICU then after 2 and 8 weeks at the outpatient cardio thoracic surgery clinic using three tools MMRC (2nd tool), Fatigue assessment scale (3rd tool) and PSQI (4th tool).

Statistical Analysis

With the use of the Statistical Package for Social Science (SPSS) version 22, the collected data were tabulated, analyzed, and summarized using statistical tests to verify the study hypothesis. Numerical data were summarized using descriptive statistics like mean and standard deviation (SD), whilst qualitative data were shown as frequency and percentage. The chi-square test was used to evaluate the relationship between the category variables. To compare means across multiple variables based on repeated observations, repeated measures ANOVA were employed. The Friedman test was utilized to determine significant differences among three or more variables. Additionally, Pearson correlation test was conducted to assess correlation coefficients between variables. A significance less than 0.05 (P value) was deemed statistically significant, while values below 0.001 were considered highly significant.

Results

Table 1: Shows that 44.5% of the studied patients' age ranged from 40 – 49 years, and 33.3 % of them had more than 60 years age. On the other hand 61.1% of them were males, 31.1% have basic education and 62.2% were employed

Figure 1: Clarifies that 44.4% of the studied patients suffered from comorbidities (chronic diseases), 44.4% had a history of smoking or active smokers and 23.3% of them were obese.

Table 2: Reflects the improvement in level of dyspnea among studied patients, as seen in the table 36.7 % of the studied patients had moderate dyspnea at discharge, while 57.8% had the same level after 2 weeks and 67.8 % had mild dyspnea after 8 weeks. The table showed that mean ± SD of dyspnea score was 3.06 ± 0.699 at pre intervention which decreased to 1.91 ± 0.647 after 2 weeks and 0.855 ± 0.552 at the follow up evaluation (after 8 weeks) with highly statistical significant difference

Figure 2: Reflects the improvement in level of fatigue among the studied sample. The table showed that mean ± S.D of fatigue was 17.5 ± 6.29 at pre intervention and increased to 31.1 ± 765 at the CICU discharge post-operative then decreased to 24.8±4.62 after 2 weeks then improved to 11.7 ± 2.39 at the follow up evaluation after 8 weeks of the intervention with highly statistical significant difference.

Table 3: Reflects the improvement in the overall sleep quality among studied sample which was 10.1±1.84 at pre intervention and 9.30 ± 1.14 at the CICU discharge, 7.76 ± 0.842 after two weeks and 4.70 ± 0.869 at the follow up evaluation with statistical significance difference in all items of the PSQI scale that include sleep quality, latency, duration and disturbance.. etc.

Table 4: Displays a non-statistical significant relation between dyspnea, fatigue and sleep quality and personal data of the studied patients pre as well as post intervention, except with age

Table 5: displays statistical significant negative correlation between dyspnea, fatigue and sleep quality post intervention.

Table 1: Percentage Distribution of studied patients related their Personal Data (n=90)

Demographic characteristics	Study (90)	
	No	%
Age		
• 30< 40 years	10	11.1
• 40<50 years	40	44.5
• 50 < 60 years	10	11.1
• 60+ years	30	33.3
Mean ± SD	50.9 ± 12.2	
Gender		
• Male	55	61.1
• Female	35	38.9
Education qualifications		
• Illiterate	11	12.2
• Read and write	12	13.3
• Basic	28	31.1
• Diploma	21	23.3
• University	18	20.1
Occupation		
• Employee	56	62.2
• Not employee	34	37.8

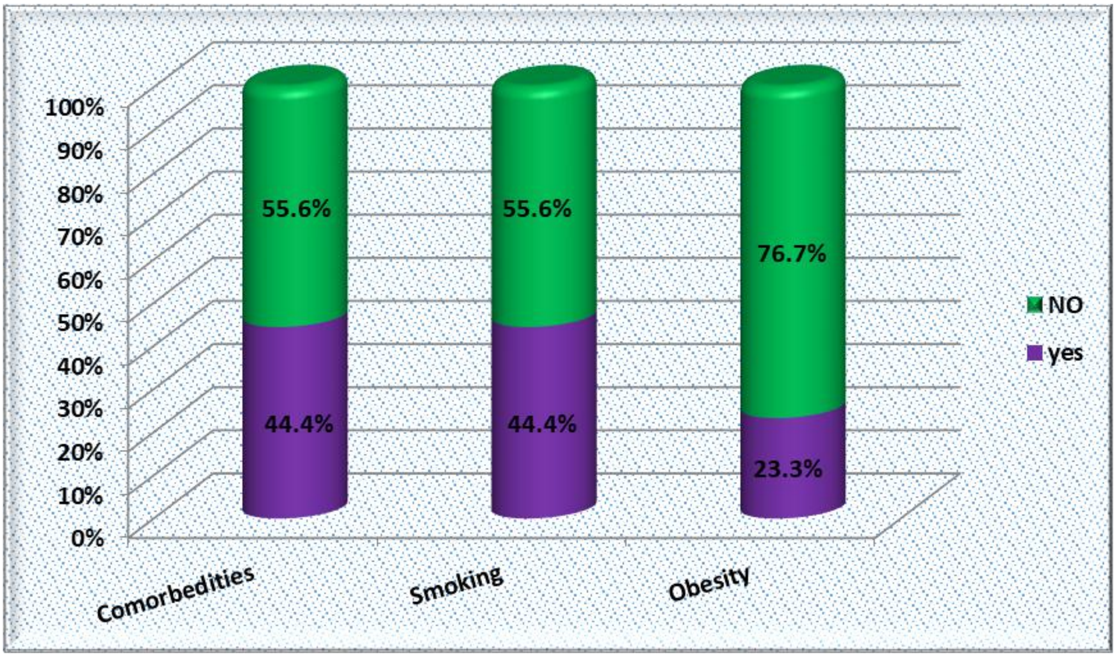

Figure (1): Percentage Distribution of studied patients regarding Medical Characteristics (n=90)

Table (2): Percentage Distribution of Studied patients Regarding their Dyspnea Grades using the MMRC (Pre and Post Intervention) (n=90)

Dyspnea Grades	Baseline		ICU Discharge		After 2 Weeks		After 8 Weeks		Sig test (P value)
	No	%	No	%	No	%	No	%	
No dyspnea (0)	0	0	0	0	0	0	21	23.3	Friedman test =225 P (0.001**)
Mild dyspnea (1)	0	0	0	0	23	25.5	61	67.8	
Moderate dyspnea (2)	19	21.1	33	36.7	52	57.8	8	8.9	
Severe dyspnea (3)	46	51.1	54	60	15	16.7	0	0	
Very severe dyspnea (4)	25	27.8	3	3.3	0	0	0	0	
Mean ± SD	3.06 ± 0.699		2.66 ± 0.540		1.91 ± 0.647		0.855 ± 0.552		Anova 288.1 P (0.001**)

** highly Statistical significant difference (P ≤ 0.01)

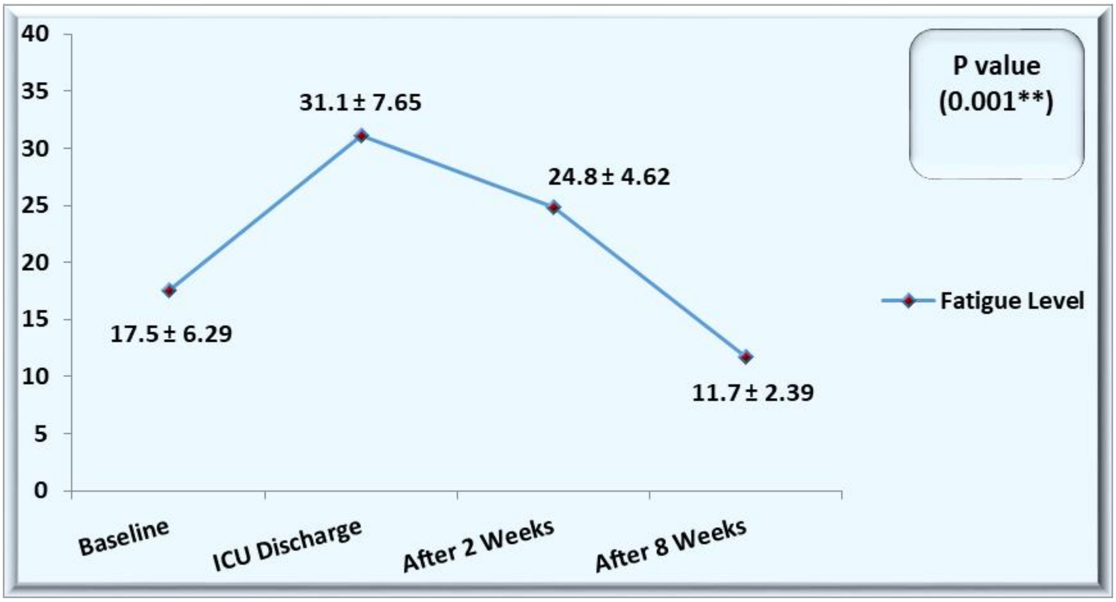

Figure (2): Mean Score of studied patients related their Fatigue Level Pre as well as Post Intervention (n= 90)

Table (3): Mean Score of Pittsburgh Sleep Quality Index of studied patients, Pre as well as Post Intervention (n=90)

PSQI	Baseline	CICU Discharge	After 2 Weeks	After 8 Weeks	Anova (P value)
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	
Subjective sleep quality	1.68 ± 0.464	1.56 ± 0.336	1.19 ± 0.241	0.833 ± 0.259	160 (0.001**)
Sleep latency	1.77 ± 0.513	1.66 ± 0.472	1.31 ± 0.248	0.743 ± 0.303	189 (0.001**)
Sleep duration	1.83 ± 0.444	1.70 ± 0323	1.33 ± 0.256	0.818 ± 0.309	196 (0.001**)
Habitual sleep efficiency	1.43 ± 0.248	1.40 ± 0.233	1.19 ± 0.235	0.721 ± 0.251	250 (0.001**)
Sleep disturbances	1.58 ± 0.280	1.50 ± 0.222	1.24 ± 0.259	0.744 ± 0.251	269 (0.001**)
Sleeping medication	0.100 ± 0.301	0.133 ±0.341	0.177 ±0.384	0.177 ± 0.384	4.66 (0.003**)
Daytime dysfunction	1.63 ± 0.285	1.51 ± 0.171	1.29 ± 0.253	0.666 ± 0.237	320 (0.001**)
Overall sleep quality	10.1 ± 1.84	9.30 ± 1.14	7.76 ± 0.842	4.70 ± 0.869	534 (0.001**)

** highly Statistical significant difference (P ≤ 0.01)

Table (4): Relationship between Patient Personal Data, Dyspnea, Fatigue and Sleep Quality among Studied Patients Pre as well as Post Intervention (n=90)

bio-demographic characteristics		*Pre intervention*									*Post 8 weeks*								
		Dyspnea			*Fatigue*			*Sleep Quality*			*Dyspnea*			*Fatigue*			*Sleep Quality*		
		M	SD	X^2(P)	M	SD	X^2(P)	M	SD	X^2(P)	M	SD	X^2(P)	M	SD	X^2(P)	M	SD	X^2(P)
Age / years	- < 60	3.01	0.702	4.31 (0.038*)	16.3	6.09	10.4 (0.725)	9.12	1.04	63.8 (0.003**)	0.812	0.529	6.59 (0.037*)	10.2	1.03	5.90 (0.484)	4.50	1.15	26.3 (0.034*)
	- > 60	3.50	0.527		17.7	6.33		16.3	6.09		1.20	0.632		11.9	2.45		4.73	0.833	
Gender	- Male	3.07	0.662	1.16 (0.508)	18.2	6.77	10.2 (0.740)	9.96	1.91	35.6 (0.483)	0.890	0.566	0.794 (0.672)	11.8	2.47	2.97 (0.888)	4.62	0.857	13.7 (0.544)
	- Female	3.05	0.764		16.4	5.37		10.1	1.76		0.800	0.531		11.4	2.26		4.82	0.886	
BMI	- Obese	2.95	0.669	1.04 (0.594)	18.1	5.36	11.6 (0.633)	9.87	1.62	40.5 (0.275)	0.884	0.556	0.852 (0.653)	12.2	2.68	8.50 (0.290)	4.70	0.861	13.1 (0.591)
	- Not Obese	3.10	0.710		17.3	6.57		10.1	1.92		0.761	0.538		11.5	2.29		4.58	0.909	
Smoking	- Smoker	3.16	0.738	3.91 (0.124)	17.1	5.83	14.4 (0.415)	10.1	1.81	41.7 (0.235)	0.780	0.545	2.15 (0.340)	11.8	2.46	5.47 (0.603)	4.75	0.856	11.7 (0.702)
	- Not Smoker	2.95	0.638		17.8	6.68		10.1	1.89		0.950	0.552		11.6	2.35		4.64	0.893	

*** Statistical significant difference (P ≤ 0.01)** **** Highly Statistical significant difference (P ≤ 0.01)**

Table (5): Correlation between Dyspnea, Fatigue and Sleep Quality among Studied patients Pre and Post Intervention (n=90)

	Pre			***Post***		
Variable Name	**Sleep quality**	**Dyspnea Grades**	**Fatigue**	**Sleep quality**	**Dyspnea Grades**	**Fatigue**
	r (P)	***r (P)***	***r (P)***	***r (P)***	***r (P)***	***r (P)***
Sleep quality	***1***			**1**		
Dyspnea Grades	**-0.134 (0.208)**	***1***		**-0.238 (0.024*)**	**1**	
Fatigue	**-0.119 (0.265)**	**0.183 (0.084)**	**1**	**-0.217 (0.040*)**	**0.108 (0.309)**	**1**

*** Statistical significant difference (P ≤ 0.01)** **** Highly Statistical significant difference (P ≤ 0.01)**

Discussion

The cardiovascular disease ranked among the initial causes of death worldwide. Resuming normal life after such a procedure presents significant physical, mental, and social challenges **(Yau, et al., 2021).** The best evidence suggests that the relaxation techniques offer benefits in improving functional capacity, reducing dyspnea and fatigue, and enhancing sleep quality **(Reis et al., 2023).**

Relaxation techniques encompass various procedures that patients can easily learn and perform under the guidance of professional nurses. Examples include aerobic exercise, massage, yoga, and progressive muscle relaxation, deep breathing exercises, and listening to nature sounds **(Hindelang et al., 2020).** These alternative, non-pharmacological interventions are very safe and do not require expensive equipment **(Mohammed et al., 2020).** Therefore, the present study was conducted to evaluate the effect of selected relaxation techniques on dyspnea, sleep quality, and fatigue among patients following cardiac surgery.

The actual study found that less than fifty percent of the participants were aged 40-49 years with a mean of age 50.9 ± 12.2, and over half of them were male. Additionally, more than a quarter had only basic education. These findings indicate that CVD increased with aging and that males are at a higher risk of developing CVD compared to females. **Alparslan et al. (2016)** support the findings of the present study, noting that mean age of the studied sample 53.67 ± 14.86. Also, **Jarrah et al. (2022)** reported that most participants were male, with about a quarter having completed high school or college education. In contrast, **Mohammed et al. (2022)** found that the mean ages of patients in the study and control groups were 38.48±13.22 and 39.68±12.74, respectively.

Comorbidity and obesity, along with smoking, are well-known modifiable risk factors for CVD and contribute to various complications following cardiac surgery. In the actual study, less than half of the participants were obese, smokers, or had comorbid conditions. **McCarthy et al. (2020)** made similar observations, noting that patients often had multiple comorbidities before surgery. **Shahin et al. (2023)** also reported comparable findings, observing that less than fifty percent of the post-cardiac surgery patients were active or former smokers.

Effect of relaxation techniques on dyspnea post cardiac surgeries

The present study demonstrated that approximately a quarter of the participant's experienced significant improvements in dyspnea severity from the time of discharge to the eighth week post-cardiac surgery. This improvement was observed after incorporating multiple relaxation techniques (deep breathing exercises, Benson's relaxation technique, and progressive muscle relaxation) into the standard routine protocol provided to the study participants**.**

Consistent with these findings, **Rodrigues et al. (2021)** observed a significant reduction in dyspnea severity next to the use of postural drainage and relaxation training in patients after cardiac surgery. They noted that breathing therapy exercises are a well-accepted intervention for reducing the risk of post pulmonary complications (PPCs), functional capacity impairment, and extended hospital stays due to compromised pulmonary function. Similarly, **Srimookda et al. (2021)** concurred with the present study, reporting that breathing exercises and relaxation techniques effectively reduce dyspnea, improve lung function, and enhance patient comfort.

Effect of relaxation techniques on fatigue level post cardiac surgeries

Ogul and Ergin (2020) found that 50% of patients experiencing fatigue in their daily and general activities by the eighth week post-surgery. The actual study's results indicated that the mean and SD of fatigue levels increased at CICU discharge post cardiac surgery but significantly decreased after two weeks and again after eight weeks. This demonstrates the effectiveness of non-pharmacological interventions, such as relaxation techniques and breathing exercises, in reducing patient's fatigue level. These findings align with those of **Chou et al. (2023)**, who observed that preoperative rehabilitation, support, training, and family involvement play a crucial role in symptom management and long-term fatigue reduction for cardiac surgery patients. Similarly, **Mohammed et al. (2020)** found a significant reduction in fatigue scores in the study group, both one day post-intervention ($p = 0.0001$) and five days post-intervention ($p = 0.0001$), following the use of progressive muscle relaxation techniques.

Additionally, **Archana et al. (2021)** highlighted that fatigue is strongly linked to low levels of independent functioning, and poor cardiac function. In their study, the experimental group that underwent progressive muscle relaxation showed a statistically significant decrease in fatigue from the preoperative period to six weeks after surgery, as well as from two weeks after surgery to six weeks after surgery.

Effect of relaxation techniques on sleep quality post cardiac surgeries

Patients undergoing cardiac surgery frequently report sleep disturbances and shortened sleep duration. **Nazari et al. (2022)** documented that inadequate sleep can compromise the immune system and impair the function of the hypothalamus, pituitary, and adrenal glands in the days following surgery. In the present study, significant statistical differences were observed in the overall sleep quality items that include sleep latency, duration and disturbance among patients who practiced the selected relaxation techniques from the pre-intervention (baseline) period to the 2 weeks and after 8 weeks of the application of the selected relaxation technique.

Bagheri et al. (2021) align with the findings of the present study, demonstrating that progressive muscle relaxation (PMR) techniques can lead to improved overall sleep quality in patients following coronary artery bypass grafting (CABG) surgery. After four weeks of PMR intervention, they reported substantial improvements in subjective sleep quality, sleep latency, duration, sleep disruptions, and total sleep quality. Similarly, **Soh et al. (2024)** found that relaxation techniques such as progressive muscle relaxation can alleviate somatic tension and associated symptoms of depression or anxiety, thereby promoting better sleep.

On the contrary, **Zhang et al. (2020)** reported significantly improved sleep quality using relaxation techniques such as ocean sounds and music therapy. **Zolfagharzadeh et al. (2024)** similarly found that Benson's relaxation technique (BRT) plays a crucial role in enhancing sleep quality in patients with systolic heart failure. To further improve sleep outcomes after open heart surgery, BRT is recommended as a complementary method alongside pharmacotherapy. The use of relaxation techniques in the postoperative period represents effective and safe approaches that alleviate many distressing symptoms experienced by patients undergoing cardiac surgeries. Relaxation techniques applied by nurses are cost-effective and free of complications **(Chandrababu et al., 2023)**

Conclusion:

Based on the results obtained, the researchers confirmed study hypothesis that patients undergoing cardiac surgery who were exposed to multiple relaxation techniques demonstrated significant improvements in dyspnea, sleep quality, and fatigue levels. These techniques offer alternative approaches to pharmacological methods for alleviating these symptoms. They are practical, easily learned, and can be integrated into nursing care alongside routine interventions.

Recommendations:

Healthcare providers should incorporate relaxation techniques into the management plans for patients recovering from cardiac surgery. Nurses involved in the care of post-cardiac surgery patients should receive adequate education and training on actual knowledge regarding relaxation techniques and breathing exercises. Patients and their families should be included in the rehabilitation process to learn how to utilize relaxation techniques effectively. Relaxation techniques can complement standard care in effectively managing distressing symptoms in patients following cardiac surgeries. Further research should be conducted using larger, probability-based samples and include different types of cardiac surgeries to enhance the generalizability of findings.

Limitation of the study:

The study needs to be applied on large sample using other types of the relaxation technique and includes more types of surgery over longer duration in order to provide generalization of the results.

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