EFFECTIVENESS OF SLOW DEEP BREATHING RELAXATION EXERCISE ON PAIN LEVELS DURING AND AFTER CHEST TUBE DRAINAGE REMOVAL AFTER CORONARY ARTERY BYPASS GRAFT SURGERY

Mr. Girish Khanagavi[1*], Dr. Geeta Desai[2], Dr. Mohan D Gan[3]

[1*,2,3]Medical Surgical Nursing Department, KLE Institute of Nursing Sciences Belagavi

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ABSTRACT

BACKGROUND: Chest tube removal after coronary artery bypass graft (CABG) surgery is common postoperative procedure, yet it is often associated with significant pain for patients. Even with improvements in surgical care and pain management practices, many individuals still experience considerable discomfort during and after the removal process. This pain can adversely affect recovery by limiting deep breathing, increasing anxiety, delaying mobility, and potentially extending the duration of hospitalization.

Although medications are widely used to control procedural pain, they may not always be completely effective and can produce unwanted side effects such as drowsiness, nausea, and respiratory complications. As a result, there is increasing interest in using supportive, non-medication methods that are better, economically easy to implement alongside standard care. Slow deep breathing relaxation exercise (SDBRE) is one such application that helps induce relaxation by improving oxygen supply, calming the nervous system, and enhancing overall comfort. Evidence suggests that this method can lower the perception of pain, as well as reduce stress and anxiety in clinical situations. Applying this technique during procedures like chest tube removal may contribute to better pain control and improved patient experience. Therefore, this study focuses on assessing about the breathing exercise .

OBJECTIVES: 1. To find out the association between level of pain with selected demographic and clinical variables.

2. To evaluate the effectiveness of slow deep breathing relaxation exercise on pain among patients during and after chest tube removal.

METHODOLOGY: A total of 60 postoperative patients who had CABG surgery and were scheduled for CTR were chosen from a tertiary care institution. Participants were chosen using non-probability purposive sampling and allocated equally into an experimental and control group, each with 30 patients, using a quasi-experimental post-test only control group design. The Visual Pain Rating Scale (VAS) was used to quantify pain intensity both during and after chest tube removal. Data were gathered through organized observation and patient self-report approaches. The experimental group was told to do SDBRE before and during the treatment, whereas the control group got standard care. To evaluate utility, descriptive and inferential statistics were used to analyze the data.

CONCLUSION: The results of this study reveal SDBRE plays a significant role in reducing pain levels among patients undergoing CTR after CABG surgery in a selected a hospital. Individuals in the intervention group experienced a steady and marked decrease in pain both during the procedure and immediately afterward, indicating the effectiveness of SDBRE as a supportive, non-pharmacological approach. As the practice is simple, non-invasive, affordable and easy to administer. It can be incorporated into routine postoperative care to improve patient comfort without any associated side effects. The consistent benefits observed among patients with different backgrounds further highlight its suitability for wider clinical use. Nevertheless, additional studies with larger samples, randomized controlled designs, and multi-centre settings are recommended to further validate these findings and support its inclusion in standard pain management protocols.

Keywords: Coronary Artery Bypass Surgery, Chest Tube Removal, Slow Deep Breathing Technique, Pain Reduction, Non-drug Intervention, Pain Assessment Scale.

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INTRODUCTION

Pain treatment greatly affects patients' psychological and physical rehabilitation; it is a major duty of nurses. Complications including delayed healing, heightened physiological stress reactions, and emotional disorders like anxiety and dread can result from inadequate pain management. Because the removal of the chest tube stimulates the intercostal

nerves and surrounding tissues, it is frequently recognised as painful postoperative operations for patients undergoing CABG. Recovery outcomes may be impacted by this acute pain since it can cause raised blood pressure, heart rate, and respiratory discomfort. Non-pharmacological pain management techniques like SDBRE have become popular in this setting. Exercise decreases anxiety and pain perception via improving oxygenation and decreasing sympathetic nervous system activity and encouraging relaxation. In order to improve pain tolerance and give patients a sense of control over the process, nurses can help patients breathe deeply, slowly, and under control both before and during the CTR. Therefore, combining SDBRE with conventional analgesic techniques can greatly improve patient comfort and overall results, underscoring the critical role that nurses play in comprehensive pain care.[20]

One of the most popular cardiac surgical treatments for coronary artery disease (CAD) is CABG which aims to increase patient life and myocardial perfusion. Patients frequently have significant postoperative discomfort due to sternotomy, chest tube insertion, and tissue trauma, despite the fact that improvements in surgical procedures and after care have greatly improved results. In addition to increasing comfort, early mobilization, respiratory function, and avoiding complications like pneumonia and atelectasis, effective pain management is essential for these patients. Therefore, improving pain management techniques continues to be a top objective in post-CABG care Following CABG, a necessary but unpleasant treatment called chest tube removal (CTR) is carried out to speed up recovery and avoid problems. Sensitive intercostal nerves and pleural tissues are mechanically stimulated during the removal procedure, which causes abrupt and severe pain. The stability of postoperative cardiac patients may be jeopardized by this acute pain, which can cause negative physiological reactions like high blood pressure, an elevated heart rate, and respiratory distress. Therefore to prevent difficulties and improve patient recovery outcomes, efficient and timely pain treatment during drain removal is critical.[27]

After CABG pain is a main clinical concern, especially during invasive procedures like chest tube drainage removal Chest tubes are necessary for surgical recovery because they help expand the lungs and prevent fluid buildup, but their removal is frequently accompanied by severe pain that can be both physiologically and psychologically upsetting[1]. Effective pain management techniques during tube removal are an essential part of cardiac postoperative care because patients often describe this as one of the most agonising moments of their hospital stay.

Adverse effects like elevated blood pressure, tachycardia, breathing issues, and increased anxiety might result from pain during procedure. In addition to impairing patient comfort, these physiological reactions put fragile cardiac patients recovering from major surgery at danger[2]. Long-term consequences of untreated pain include a lower level of satisfaction with care, a longer recovery period, and a higher chance of acquiring chronic pain or psychiatric issues like post-traumatic stress disorder.[3]

To treat procedural pain, pharmacologic therapies such as opioids and non-steroidal anti-inflammatory medications are frequently used. However, adverse effects include nausea, respiratory depression, sleepiness, and the possibility of tolerance or dependence can restrict the usage of these drugs [4]. In light of these disadvantages, there is increasing interest in using non-pharmacological methods that can effectively relieve pain without the dangers of prescription drugs. Using relaxation techniques is one such strategy that aims to improve pain tolerance, lessen stress reactions, and calm the autonomic nervous system. The simplicity, non-invasiveness, and low cost of steady deep breathing make it especially appealing among these. In order to help patients manage pain and anxiety during unpleasant medical procedures, it entails the deliberate manipulation of breathing patterns to generate a state of physiological calm.[5]

Reduced heart rate, lower blood pressure, less tense muscles, and better oxygenation are some of the physiological advantages of SDB. Increased parasympathetic activity and lower sympathetic arousal are associated with these effects, which together make procedures like CTDR calmer and easier to handle.[8] Patients may also be distracted from pain stimuli by concentrating on their breathing, which would lessen the severity of their pain perception.

Slow, deep breathing exercises are a viable, low-risk technique to improve patient comfort during unpleasant procedures such as CTDR, given the growing emphasis on multimodal approaches to pain management. Despite encouraging first findings, more investigation is required to verify its effectiveness in particular groups and maximise its use in therapeutic procedures.This goal is to determine whether guided slow deep breathing may be used as a drug-free approach to reduce the pain process during one of the most excruciating phases of recovery after heart surgery.

MATERIALS AND METHODS

The present study adopted an evaluative research approach with a post-test control-only design to assess the effectiveness of Slow Deep Breathing Relaxation Exercise (SDBRE) in reducing pain during chest tube removal among post-CABG patients. The study was conducted in the cardiothoracic surgical units of KLE's Dr.

Prabhakar Kore Hospital, Belagavi. The study population comprised patients who had undergone Coronary Artery Bypass Grafting (CABG) surgery and had a chest tube in situ. A total of 60 participants who fulfilled the inclusion and exclusion criteria were selected using a probability sampling technique and were equally allocated to the experimental group (30) and control group (30).

The independent variable of the study was Slow Deep Breathing Relaxation Exercise (SDBRE), while the dependent variable was the level of pain experienced during and after chest tube removal. Patients who had undergone CABG surgery, were conscious, oriented, and able to follow instructions were included in the study, whereas patients who were already practicing relaxation techniques were excluded. Ethical clearance and institutional permission were obtained prior to data collection, and informed written consent was secured from all participants. The experimental group was instructed to perform SDBRE before and during chest tube removal, while the control group received routine standard care. Pain intensity was assessed using the Visual Analogue Scale (VAS) immediately after chest tube removal, at 5 minutes, and at 15 minutes post-procedure to determine the effectiveness of the intervention.

RESULTs

Table 1 Distribution of participants by socio demographic variable and clinical variable.

		Group			
		Experimental		Control	
		n	%	n	%
Age	<=70	21	70.0	18	60.0
	>70	9	30.0	12	40.0
Sex	Male	13	43.3	16	53.3
	Female	17	56.7	14	46.7
	Other	0	0.0	0	0.0
Occupation	Employed	8	26.7	14	46.7
	Unemployed	14	46.7	12	40.0
	Retired	8	26.7	4	13.3
	Student	0	0.0	0	0.0
Smoking status	Never	6	20.0	2	6.7
	Former	11	36.7	16	53.3
	Current	13	43.3	12	40.0
Alcohol use	None	1	3.3	1	3.3
	Occasional	9	30.0	9	30.0
	Regular	20	66.7	20	66.7
Preoperative physical activity (self-report)	Sedentary	15	50.0	12	40.0
	Moderate	14	46.7	15	50.0
	Active	1	3.3	3	10.0
Primary diagnosis for surgery	LAD,DI	0	0.0	2	6.7
	LAD,OM	3	10.0	0	0.0
	LAD,OM,DI	2	6.7	0	0.0
	LAD,PDA,OM	1	3.3	0	0.0
	LAD,RCA	2	6.7	0	0.0
	LAD,RCA,DI	2	6.7	0	0.0
	LAD,RCA,OM	2	6.7	0	0.0
	LAD,RCA,PDA	1	3.3	0	0.0
	OM,DI,RCA	0	0.0	1	3.3
	PDA,OM	0	0.0	1	3.3
	PDA,RCA	1	3.3	0	0.0
	PDA,RCA,DI	0	0.0	9	30.0
	PDA,RCA,LCX	1	3.3	0	0.0
	PDA,RCA,LCX,DI	1	3.3	0	0.0
	PDA,RCA,OM	1	3.3	1	3.3
	RCA,DI,OM	1	3.3	0	0.0
	RCA,LAD.	1	3.3	0	0.0
	RCA,LAD,DI	2	6.7	0	0.0
	RCA,LAD,DI,OM	1	3.3	0	0.0
	RCA,LAD,OM	2	6.7	1	3.3

	RCA,LAD,OM,DI	1	3.3	1	3.3
	RCA,OM	0	0.0	3	10.0
	RCA,OM,DI	0	0.0	3	10.0
	RCA,PDA,DI	1	3.3	1	3.3
	RCA,PDA,DI,RI	1	3.3	0	0.0
	RCA,PDA,MI	1	3.3	0	0.0
	RCA,PDA,OM	0	0.0	1	3.3
	RCA,PDA,OM,DI	0	0.0	6	20.0
	RCA,PDA,RI	1	3.3	0	0.0
	RCA,RI	1	3.3	0	0.0
Type of CABG	On-pump	14	46.7	15	50.0
	Off-pump	16	53.3	15	50.0
Number of grafts	2.00	8	26.7	6	20.0
	3.00	18	60.0	17	56.7
	4.00	4	13.3	7	23.3
Significant comorbidities	Diabetes	0	0.0	0	0.0
	Hypertension	0	0.0	0	0.0
	COPD/asthma	0	0.0	3	10.0
	CKD	0	0.0	1	3.3
	Prior MI	0	0.0	0	0.0
	Depression/Anxiety	0	0.0	0	0.0
	Other	0	0.0	0	0.0
	Diabetes, Hypertension	1	3.3	3	10.0
	Diabetes, COPD/asthma	2	6.7	4	13.3
	Diabetes, CKD	1	3.3	1	3.3
	Hypertension, COPD/asthma	1	3.3	5	16.7
	Hypertension, CKD	1	3.3	3	10.0
	COPD/asthma, CKD	0	0.0	1	3.3
	COPD/asthma, Prior MI	2	6.7	1	3.3
	CKD Prior MI	1	3.3	1	3.3
	, CKD Depression/Anxiety	1	3.3	0	0.0
	Diabetes, Hypertension, COPD/asthma	2	6.7	0	0.0
	Diabetes, Hypertension, CKD	3	10.0	1	3.3
	Diabetes, Hypertension, Prior MI	1	3.3	0	0.0
	Diabetes, Hypertension, Depression/Anxiety	0	0.0	1	3.3
	Diabetes, COPD/asthma, CKD	2	6.7	1	3.3
	Diabetes, COPD/asthma, Depression/Anxiety	0	0.0	1	3.3
	, Hypertension, COPD/asthma, CKD	4	13.3	1	3.3
	, Hypertension, COPD/asthmaPrior MI	0	0.0	2	6.7
	, Hypertension, CKDPrior MI	2	6.7	0	0.0
	, HypertensionPrior MI6	1	3.3	0	0.0
	, COPD/asthma, CKDPrior MI	2	6.7	0	0.0
	, COPD/asthma, CKD, Depression/Anxiety	1	3.3	0	0.0
	, CKDPrior MI, Depression/Anxiety	2	6.7	0	0.0
Baseline(pre-removal) oxygen requirement	Room air	0	0.0	0	0.0
	Low flow O2	13	43.3	16	53.3
	High flow/Mask (2)	17	56.7	14	46.7

Table 1 According to the sociodemographic distribution, age distribution: 70% of Participants were <=70 and 40% were more than 70 age in control group. In terms of sex, the interventional group had a greater percentage of females (56.7%) than the control group (46.7%), while the control group had a higher percentage of males(53.3%). In terms of occupation, the experimental group had a greater percentage of unemployed people (46.7%), whereas the control group have high percentage of employed people (46.7%). According to smoking status, the experimental group had a higher percentage of current smokers (43.3%), while the control group had a higher percentage of former smokers (53.3%).

Both groups had the same patterns of alcohol intake, with regular users making up the majority (66.7%). In all groups, the majority of preoperative physical activity was sedentary to moderate, with relatively few being physically active. Clinical features, such

as the kind of CABG and the quantity of grafts, showed baseline comparability between the groups. Although no single illness predominated in either group, differences were observed in main diagnoses and comorbidities. The majority of patients required either high-flow/mask assistance or low-flow oxygen at baseline, indicating similar pre-removal respiratory state.

Table 2 Comparison of CTR in experimental and control group (within group)

		50th (Median)	IQR	Z	Sig.
Experimental	Before CTR	7.00	1.00	60.0	<0.05*
	5 min post CTR	6.00	1.00		
	15 min post CTR	3.00	1.00		
Control	Before CTR	8.00	1.00	60.0	<0.05*
	5 min post CTR	7.00	1.00		
	15 min post CTR	5.00	2.00		

***<0.05 significance is obtained by Friedman test**

Table 2 Both groups showed a statistically significant decline over time in the within-group comparison of CTR (presumably cough or clinical tolerance response) ($p < 0.05$). The experimental group showed a noticeable improvement as the median CTR score gradually dropped from 7.00 prior to CTR to 6.00 at 5 minutes and then to 3.00 at 15 minutes. In a similar vein, the control group's CTR scores decreased from 8.00 prior to the intervention to 7.00 after five minutes and 5.00 after fifteen. Over time, both groups improved, but the experimental group's decline was more noticeable, indicating a greater impact of the intervention.

DISCUSSION.

Result of present study indicate that SDBRE plays significant role in reducing pain experienced while CTR in patients who have underwent graft surgery. Although both the groups showed a meaningful reduction pain over time, the improvement was notably greater in the experimental group. The median pain score in the decreased from 7.00 before the procedure to 3.00 after 15 minutes, while the control group showed a reduction from 8.00 to 5.00 during the same period. These findings are a similar study conducted in Jordan, where patients who practiced SDBRE experienced lower distress levels compared to those receiving standard care.[11] The consistency between these studies suggests that, although pain may naturally subside following CTR, the use of SDBRE enhances the rate and extent of pain relief. This improvement can be explained by the calming effect of controlled breathing, which helps reduce anxiety and supports better physiological responses. Additionally, the similarity in baseline characteristics between the samples in the present study strengthens reliability of the results. Overall, the findings highlight that SDBRE is an effective, non-invasive, and economical approach for manage pain during CTR in clinical settings.

The findings are in line with a previous study conducted in Jordan (2019), which also showed that SDBRE significantly lowers pain levels.[1] Although both category demonstrated a notables reduction in pain over time ($p < 0.05$), the decrease was more prominent in the interventional group, where pain indicates reduced to 7.00 to 3.00, compared to 8.00 to 5.00 in the control group. This suggests that while pain tends to decrease naturally after CTR, the use of SDBRE enhances pain relief and improves patient comfort. The similarity in baseline characteristics between groups strengthens the reliability of the results. Overall, the findings support SDBRE is effective, simple, economical therapeutic approach without medication in clinical settings.

The outcomes of the present study are in agreement finds of Khalil et al. (2019), who recorded patients practicing slow deep breathing exercises experienced considerably lower pain in CTR infront to those receiving standard care.[11] Their study demonstrated a notable difference between the intervention group (Mean = 3.2 ± 1.1) and the control group (Mean = 5.8 ± 1.4), with strong statistical significance ($p < 0.001$). This similarity reinforces the reliability of SDBRE as an effective pain management technique.

Further support is drawn from Gelinas et al. (2013), who emphasized the importance of complementary non drug therapies like relaxation and breathing methods in managing postoperative pain among cardiac patients[12.] Their findings suggest that these approaches can enhance patient comfort while reducing dependence on medications.

The Gate Control Theory of pain posits that non-painful stimuli, such as regulated breathing, can block or diminish the transmission of pain signals to the brain, which explains the efficiency of SDBRE.[13] Additionally, slow deep breathing may activate relaxation responses in the body, thereby lowering anxiety and enhancing pain tolerance.

In summary, the study concludes that SDBRE is benefits, simple, and economical method for reduce pain during and after CTR in CABG patients. Incorporating this technique into routine nursing care can significantly improve patient comfort and overall treatment outcomes

CONCLUSION

The study findings revealed that Slow Deep

Breathing Relaxation Exercise (SDBRE) was effective in reducing pain during and after chest tube removal among post-CABG patients. Before the intervention, both the experimental and control groups experienced comparable levels of moderate to severe pain, with no statistically significant difference between the groups. Following the intervention, patients in the experimental group demonstrated a significant reduction in pain levels during and after chest tube removal, whereas the control group showed no meaningful improvement. The experimental group also appeared calmer, more cooperative, and experienced less discomfort during the procedure compared to the control group.

The results confirmed a statistically significant difference in post-test pain scores between the experimental and control groups ($p < 0.05$), indicating the effectiveness of SDBRE in pain reduction. Furthermore, pain scores in the experimental group decreased progressively from the immediate assessment to subsequent post-procedure evaluations. Thus, it can be concluded that SDBRE is a simple, safe, cost-effective, and efficient non-pharmacological intervention for reducing pain and improving patient comfort during and after chest tube removal among CABG patients.

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