

Effect of Deep Breathing Technique on severity of Pain among Postoperative Coronary Artery Bypass Graft patients

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Abstract: Coronary artery bypass grafting (CABG) is the most common kind of heart surgery. Good pain control after surgery is important to facilitate overall recovery, improve patient satisfaction, and reduce health care cost. Deep breathing technique is a non-pharmacological way to counteract the negative effects of surgery as reducing pain, and to refocus attention away from uncomfortable events. Aim of the study: To determine the effect of deep breathing technique on severity of pain among postoperative coronary artery bypass graft patients. Research design: A quasi-experimental design was utilized. Setting: The study was conducted in the cardio-thoracic intensive care unit at Fayoum University Hospitals. Methods: A purposive sample of 60 adult patients from both genders who were randomly and alternatively divided into two equal groups study and control (30 patients in each). Tools: data collection tool included: Interview patient's assessment sheet, patient observational checklist sheet, pain assessment and vital signs. Results: The study revealed that there was a significant difference in decrease of pain severity among study group after implementing the deep breathing technique. Conclusion: the application of deep breathing technique for CABG patients is effective in decreasing severity of pain. Recommendations: Apply the deep breathing technique for each patient undergoing CABG.

Keywords: Coronary artery bypasses graft, Deep breathing technique, Pain.

1. INTRODUCTION

Coronary artery bypass grafting (CABG) since its introduction in the 1960s has rapidly become the standard of care for patients with multi vessel coronary artery disease (1). Thousands of heart surgeries are performed every day in the United States. In recent years, surgeons performed five hundred thousand coronary bypass procedures. This is the most common kind of heart surgery, also called coronary artery bypass graft surgery (CABG), coronary artery bypass (CAB), coronary bypass, or bypass surgery. CABG surgery is an effective modality for the management of a subset of CAD patient (2).

The surgery involves using a healthy section of blood vessel from another part of the body to bypass a part of a diseased or blocked coronary artery. This creates a new route for blood to flow so that the heart muscle will get the oxygen-rich blood it needs to work properly to improve the quality of life, the pumping action of heart, and the chance of survival so that the results of CABG are usually excellent. The surgery improves or completely relieves symptoms in most patients (3).

Management of acute postoperative pain is an essential component of perioperative patient care. Good pain control after surgery is important to facilitate overall recovery, improve patient satisfaction, and reduce health care cost. Effective postoperative pain management is also likely to decrease morbidity and improve functional outcome. Moreover, severe acute postoperative pain is a risk factor for chronic postsurgical pain, raising more awareness regarding the importance of adequate perioperative pain management, despite heightened awareness and clinical advancements in pain management postoperative pain continues to be a significant clinical problem (4).

Deep breathing technique can be defined as the most frequently method used from non-pharmacological interventions during a painful procedure and the therapeutic intervention by which purpose full alteration of a given breathing pattern is categorized as breathing exercises. Outcomes have ranged from relaxes to calms due to influence on parasympathetic nervous system, reduces and prevents the build-up of toxins in the lungs by encouraging the clearing of the small air sacs (alveoli), increase lung volume, to clear secretions, to improve gas exchange, to control breathlessness, to increase exercise capacity, to reduce blood pressure, to reduce obesity, relaxation response for stress reduction and to control pain (5).

Significance of Study:

Pain is still the main manifestation reported by patients who undergo cardiac surgery, possibly accounting for complications and delays in recovery. Studies show that from 47% to 75% of patients report pain in the postoperative (PO) period of cardiac surgery. Untreated acute pain may become chronic pain. The incidence of post-sternotomy chronic pain ranges from 18% to 61% in different samples (6).

Coronary artery bypass graft (CABG) surgery is one of the most frequently performed cardiac surgery procedures worldwide that improves blood flow to the heart. It is used for people who have severe coronary heart disease. The prevalence of CABG is 26.79% in North America, 0.72% in Asia, 17.94% in Western Europe and 18.14% in the rest of the world. In Iran, 60% of all open-heart surgeries are CABGs (7) .

2. AIM OF THE STUDY

The aim of the present study was to determine the effect of deep breathing technique on the severity of pain among postoperative coronary artery bypass graft patients through the following objectives:-

1. Assess patients practice regarding the deep breathing technique.
2. Implement deep breathing technique for patients undergoing CABG.
3. Evaluate the effect of implemented deep breathing technique on the severity of pain among postoperative CABG patients.

3. THE RESEARCH HYPOTHESIS

At the end of the study patients undergoing CABG and who will receive deep breathing techniques will experience less pain after receiving deep breathing techniques as measured by (pain scale).

Design:

A Quasi-experimental research design was utilized in this study.

Setting:

This study was carried out at the cardio-thoracic intensive care unit at Fayoum University Hospital.

Subjects:

A purposive sample of 60 adult patients from both genders undergoing CABG were involved in this study from the above mentioned setting and divided into two equal study and control groups (30 patients for each group).

Inclusion criteria:

1. Adult patients from both gender undergoing CABG.
2. Fully conscious.
3. Extubated form mechanical ventilator (1st day after extubation).
4. Free from narcotics.

Exclusion criteria:

1. Cancer patients.
2. Re open and Redo CABG.

3. Patients complaining from chronic pain.
4. Patients complaining from pulmonary problem.

Tools for Data Collection:

Three tools were used to collect the data according to the following:

Tool (I): Interview Patient's assessment sheet :

It is an interview administered sheet that was adapted form (8) and the investigator makes some changes to be suitable for the present study and consists of the following three parts that were filled by the investigator:

The socio demographic characteristic and medical data of the patient

The medical and surgical history of the patient

The life style of the patient and consists of the three parts: smoking, nutrition status and physical activity.

Tool (II): Patient Observational Checklist Sheet:

It was developed by the investigator based on literature review (9) and used to assess patient how to perform deep breathing technique before CABG and evaluate patient practice how to perform deep breathing technique after CABG.

Tool(III) : Pain assessment and vital signs sheet :

It's administered sheet which was adapted form (8) and consist of the following two parts:

Part A:

Pain assessment pre and post deep breathing technique : It was used two time to assess pain characteristic after 24 h from CABG hour one before and two hour after application of deep breathing technique, including the following items location of pain, pain severity, pain quality, pain pattern, pain expression, factor aggravated, factor alleviated, type of analgesic, duration of last analgesic taken before practice and post application of deep breathing technique the same tool was used to assess pain including all the previous items except Factor aggravated, Factor alleviated, type of analgesic, duration of last analgesic taken before practice .

Part B : Vital signs sheet:

It used to assess patient vital sings two times before and after deep breathing technique to detect the effect of pain on patient and including (temperature, pules, respiration and blood pressure).

Operational design

The operational design includes preparatory phase, content validity of the modified tool and reliability, pilot study and fieldwork.

Validity:

Content validity was conducted to determine whether or not the instrument measures what it is designed to measure. The tools were revised by a jury of 5 experts as the following ; Lecturer of medical surgical nursing from faculty of nursing Fayoum University, assistant professor of cardio thoracic surgery department from faculty of medicine Fayoum University, professor of medical surgical nursing from faculty of nursing, Ain shams University, lecturer of critical and emergency nursing from faculty of nursing, Cairo University, and assistant professor of critical and emergency nursing from faculty of nursing Cairo University, who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability. Minor modifications were done.

Reliability:

Reliability of the tool was tested to determine the consistency of the measurement instrument. The degree to which an instrument measures the same way each time if used under the same condition with the same subjects. The Cronbach's alpha model, which is a model of internal consistency, was used to test tool reliability. Reliability factor of the second tool observational checklist was 0.843 and third tool pain assessment was 0.793 Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1; higher values more than 0.7 denote acceptable reliability.

Pilot study:

A Pilot study was carried out with 10% (10 patients) of the sample under study to test the applicability, clarity and efficiency of the tools, then the tools modified according to the results of the pilot study, patients who shared in pilot study were not included in the sample and replaced by other patients.

Administrative design:

An official permission was obtained from the director of Fayoum University Hospital and head of cardio thoracic ICU unit, in which the study was conducted. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining the permission for data collection.

Ethical consideration:

An approval was obtained from a scientific research ethics committee of the faculty of nursing at Helwan University and oral informed consent was obtained from the study subjects individually before starting the study. The aim and objectives of the study was clarified to the patients included in the study by the investigator. Participants were assured that anonymity and confidentiality would guarantee. Patients were informed that they are allowed to choose to participate or withdraw from the study at any time. Ethics, culture, values were respected.

Field work includes three phases:
I-First phase (Assessment phase):

During this stage each patient was assessed individually and data collection was filled by the investigator in the morning and afternoon shifts one day before CABG by using tool I interview patient assessment sheet was filled for the study and control group by the investigator before CABG. It took around 5-10 minutes for each patient.

II-Second phase (Implementation phase):

Based on the basic assessment, the deep breathing technique was implemented for each patient in 5 sessions by using tool II: patient were observed while performing deep breathing technique using observational checklist sheet was filled for the study group by the investigator before and after CABG as following:

A- First 24 hour before CABG:

During the day the investigator gave each patient 3 sessions, each session took 2 hours by using brochure, picture and video and at the end of the each session was evaluated as following:

First session:

The investigator divided this session into two parts. It started by theoretical part which included (what is the deep breathing technique, importance and uses) and take hour followed by practical part which included (teaching patient how to performing deep breathing technique and performing it) and take hour and at the end of this session was evaluated.

Second and third session:

In this session the investigator repeated practical part which included (teaching patient how to performing deep breathing technique and performing it) and take 2hour for each session and at the end of this sessions the patient's was evaluated.

B- First and second day after CABG:

During this phase the investigator was provided only one session to each patient in every day, each session had taken 2 hour started by pain assessment before practice for each patient by using tool (III).

Fourth and fifth session:

To assess the effect of deep breathing technique on severity of pain after CABG by using tool (II) and tool (III) after practice as the following technique:

- 1- The investigator started to assess patient's condition: the patient must be alert, fully conscious extubated from endotracheal tube and able to communicate with investigator.
- 2- The investigator started to assess patient's pain level before intervention.

- 3- Ask patient to start deep breathing technique after patient placed in the sitting so that chest is upright position and the feet are on the floor, and arms are resting on over bed table or High fowler's position with head supported on pillow, with legs slightly flexed, and relax neck and shoulder.
- 4- The investigator observed patient during inspiration, how to use his/ here hands, how to exhale.
- 5- The patient repeats the steps until evaluating the effectiveness of the breathing technique.

IV-Third phase (Evaluation phase):

According to nursing process; the evaluation occurred through two phase:

- 1- First phase: 24 hour before surgery at the end of each learning session.
- 2- Second phase: First and second day after CABG to evaluate the effectiveness of the breathing technique on severity of Pain.

Statistical Analysis

- Data were collected and coded to facilitate data manipulation and double entered into Microsoft Access and data analysis was performed using Statistical Package of Social Science (SPSS) software version 18 in windows 7.
- Simple descriptive analysis in the form of numbers and percentages for qualitative data, and arithmetic means as central tendency measurement, standard deviations as measure of dispersion for quantitative parametric data.
- Quantitative data included in the study was first tested for normality by One-Sample **Kolmogorov-Smirnov** test in each study group then inferential statistic tests were selected.
 - **For quantitative parametric data:**
 - In-depended **student t-Test** used to compare measures of two independent groups of quantitative data
 - **Paired t-test** in comparing two dependent quantitative data.
 - **For qualitative data**
 - **Chi square** test to compare two or more than two qualitative groups.
 - **Mc-Nemar** test for paired dependent qualitative data.
 - **Bivariate Spearman correlation test** to test association between quantitative non-parametric variables.
 - **General linear model to compare repeated** measures
- The **P-value ≤ 0.05** was considered the cut-off value for significance.

4. RESULTS

Table (1): Socio demographic characteristic for both study and control group (N=60):

Socio demographic characteristic	Study Group (N=30)		Control Group (N=30)		t-test	p-value
Age (years)						
Mean ±SD	44 ± 7.2		42.4 ± 8.8		0.8	0.4
Gender					X²- test	p-value
Male	21	70%	18	60%	0.7	0.6
Female	9	30%	12	40%		
Level of education						
Illiterate	4	13.3%	3	10%	8.3	0.08
Primary	1	3.3%	7	23.3%		
Preparatory	3	10%	3	10%		

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Secondary	14	46.7%	15	50%		
University	8	26.7%	2	6.7%		
Occupation						
Not working	15	50%	13	43.3%	1.3	0.5
Worker	9	30%	13	43.3%		
Employer	6	20%	4	13.4%		

Statistical significant p-value ≥ 0.05

Table (1) above illustrates that; there is no statistically significant difference with p-value > 0.05 between study and control groups as regards Socio demographic characteristic with mean age of study group (44 ± 7.2) versus (42.4 ± 8.8) among control group, also majority of both groups were male. As regards level of education the majority of both groups were secondary level and occupation level show half of study group and near half of control group not working.

Table (2): Assessment of patients practice regarding the deep breathing technique before CABG for study group (N=30):

Practical score	Study Group (N=30)	
	Not satisfactory	Satisfactory
Session 1	21(70%)	9(15%)
Session 2	9(30%)	21(70%)
Session 3	3(10%)	27(90%)
X²-test	7.8	
p-value	<0.001**	

*statistical significant p-value ≤ 0.05

Table (2) above illustrates that there is highly statistically significant difference with p-value < 0.001 between practical score sessions with high percentage of patient (90%) had satisfactory level of practical score at the third session among study group versus (15%) in first session.

Table (3): Basic pain assessment before deep breathing technique for both study and control group in the 1st day post CABG (N= 60):

Variables	Study Group (N=30)		Control Group (N=30)		X ² -test	p-value
	No.	%	No.	%		
Location of pain						
Chest	30	100%	30	100%	---	----
Pain severity						
Moderate	9	30%	11	36.7%	0.3	0.8
Sever	21	70%	19	63.3%		
Pain quality						
Pulling	5	16.7%	0	0%	7.6	0.05*
Aching	10	33.3%	12	40%		
Burning	3	10%	8	26.7%		
Sharp	12	40%	10	33.3%		
Pain pattern						
Constant	18	60%	13	43.3%	1.7	0.3
Intermittent	12	40%	17	56.7%		
Intermittent pain						
Periodic	12	100%	16	94.1%	0.73	0.9
Momentary	0	0%	1	5.9%		
Pain expression						

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Grimacing	3	10%	12	40%	9.9	0.04*
Moaning	8	26.7%	8	26.7%		
Crying	2	6.7%	3	10%		
Restlessness	13	43.3%	6	20%		
Protecting	4	13.3%	1	3.3%		

*statistical significant p-value ≤0.05

Table (3) illustrates that; there is no statistically significant difference with p-value >0.05 between study and control groups as regards location of pain, pain severity, pain pattern, and its intermittency before practice, On the other hand there is statistically significant difference as regards pain quality and expression, with high percentage of patients reported sharp (40%) and restlessness pain (43.3%) among study group, and high percentage of patients reported aching pain (40%) and grimacing (40%) among control group before practice with p-value <0.05, 0.04 respectively.

Table (4): Pain assessment for the study and control group after practicing deep breathing technique by the study group in the 1st day after CABG (N =60):

Variables	Study Group (N=30)		Control Group (N=30)		X ² -test	p-value
	No.	%	No.	%		
Location of pain						
Chest	30	100%	30	100%	-----	-----
Pain quality 2hr						
NO	1	3.3%	0	0%	33.02	<0.001**
Discomfort	13	43.3%	0	0%		
Pulling	6	20%	0	0%		
Aching	5	16.7%	12	40%		
Burning	0	0%	8	26.7%		
Sharp	5	16.7%	9	30%		
Crushing	0	0%	1	3.3%		
Pain pattern						
No	1	3.3%	0	0%	9.9	<0.001**
Constant	10	33.3%	22	73.3%		
Intermittent	19	63.3%	8	26.7%		
Intermittent pain						
Periodic	15	78.9%	8	100%	0.3	NS
Momentary	4	21.1%	0	0%		
Pain expression						
NO	1	3.3%	0	0%	26.9	<0.001**
Grimacing	6	20%	3	10%		
Moaning	3	10%	9	30%		
Crying	3	10%	8	26.7%		
Restlessness	1	3.3%	9	30%		
Protecting	16	53.3%	1	3.3%		

*statistical significant p-value ≤0.05

Table (4) illustrates that; there is no statistically significant difference with p-value >0.05 between study and control groups as regards location of pain and intermittence after practice, On the other hand, there is highly statistically significant difference as regards pain quality and expression and pain pattern with high percentage of patient report discomfort (43.3%, 40 %) respectively of quality of pain in study and control group, protecting manner expression (53.3%) in study but moaning and restlessness (30%) in control group with p-value <0.001, 0.001 and 0.001 respectively.

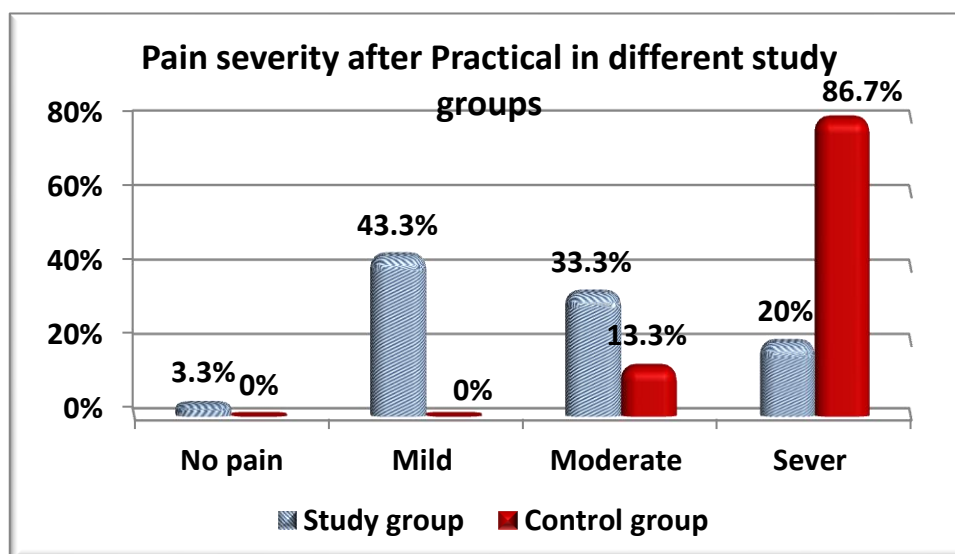


Figure (1): Pain severity after practicing deep breathing technique by the study group after CABG in the 1st day among study and control group.

Figure (1) shows that percentage of pain severity after Practical in different study and control group in the 1st day after CABG with high percentage of mild pain (43.3%) in study group, but high percentage of severe pain (86.7%) in control group.

Table (5): Basic pain assessment before practicing deep breathing technique for both study and control group in the 2nd day after CABG (N= 60):

Variables	Study Group (N=30)		Control Group (N=30)		X ² -test	p-value
	No.	%	No.	%		
Location of pain						
Chest	30	100%	30	100%	---	----
Pain severity						
Moderate	28	93.3%	23	76.7%	3.3	0.2
Sever	2	6.7%	7	23.3%		
Pain quality						
Discomfort	5	16.7%	1	3.3%	9.04	0.1
Pulling	11	36.7%	6	20%		
Aching	12	40%	15	50%		
Burning	1	2.3%	6	20%		
Sharp	1	3.3%	1	3.3%		
Stapping	0	0%	1	3.3%		
Pain pattern						
Constant	3	10%	12	40%	9.9	0.007**
Intermittent	27	90%	18	60%		
Intermittent pain						
Periodic	25	92.6%	17	94.4%	4.5	0.7
Momentary	2	7.4%	1	5.6%		
Pain expression						
Grimacing	6	20%	3	10%	7.9	0.09
Moaning	8	26.7%	15	50%		
Crying	0	0%	2	6.7%		
Restlessness	9	30%	8	26.7%		
Protecting	7	23.3%	2	6.7%		

*Statistical significant p-value ≤0.05

Table (5) above illustrates that there is no statistically significant difference with p-value >0.05 between study and control groups as regards pain characters (severity, quality, intermittency and expression). But there is statistically significant difference with p-value > 0.007 regarding pain pattern.

Table (6): Pain assessment for the study and control group after practicing deep breathing technique by the study group in 2nd day after CABG (N = 60):

Variables	Study Group (N=30)		Control Group (N=30)		X ² -test	p-value
	No.	%	No.	%		
Location of pain						
Chest	30	100%	30	100%	----	-----
Pain quality 2hr						
NO	15	50.3%	0	0%	40.2	<0.001**
Discomfort	10	33%	1	3.3%		
Pulling	2	6.7%	8	26.7%		
Aching	2	6.7%	13	43.3%		
Burning	0	0%	6	20%		
Sharp	1	3.3%	2	6.7%		
Pain pattern						
NO	15	50%	0	0%	25.7	0.03*
Constant	4	13.3%	20	66.7%		
Intermittent	11	36.7%	10	33.3%		
Intermittent pain						
Periodic	2	18.2%	10	100%	14.3	<0.001**
Momentary	9	81.8%	0	0%		
Pain expression						
NO	15	50%	0	0%	39.1	<0.001**
Grimacing	3	10%	3	10%		
Moaning	1	3.3%	6	20%		
Crying	1	3.3%	0	0%		
Restlessness	0	0%	17	56.7%		
Protecting	10	33.4%	4	13.3%		

*Statistical significant p-value ≤0.05

Table (6) illustrates that there is highly statistically significant difference as regarding pain quality and expression and pain pattern, and its intermittency with high percentage no quality of pain after second hour (50%) and aching quality (43.3%) intermittent momentary pain in pattern(81,8%). NO and protecting expression (50%, 56, 7%) respectively were noticed among study and control group after the practice in the 2nd day with p-value <0.001, 0.03, 0.001and 0.001 respectively.

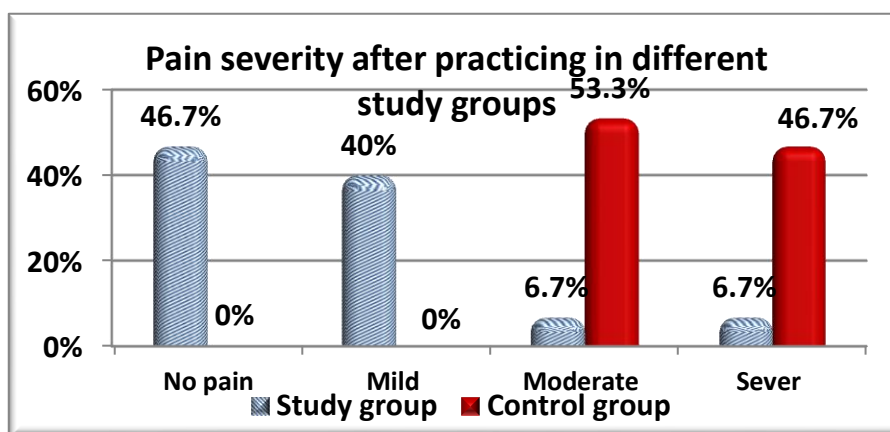


Figure (2): Pain severity after practicing deep breathing technique by the study group after CABG in the 2nd day among study and control group.

Figure (2) shows that percentage of pain severity after Practical in different study and control group in the 2nd day after CABG with high percentage of no pain (46.7) mild pain (40%) in study group, but high percentage of moderate pain (53.3%) and sever pain (46.7%) in control group.

Table (7): The evaluating of Practice score for deep breathing technique after CABG in 1st and 2nd day among study group (N =30):

Practice score	Study Group (N=30)	
	Not satisfactory	Satisfactory
Day 1	6(20%)	24(80%)
Day 2	2(6.7%)	28(93.3%)
X ² -test	8.6	
p-value	0.03*	

*Statistical significant p-value ≤0.05

Table (7) above illustrates that there is a statistically significant difference between number of patient with Satisfactory level of practice score at the second day among group (93.3%) versus (80%) in first day with p-value <0.03.

Table (8): Comparison between study and control regarding pain severity before and after practice in 1st and 2nd day after CABG (N= 60):

Pain severity score	Study Group (N=30)	Control Group (N=30)	t-test	p-value
	Mean ± SD	Mean ± SD		
in the 1st day				
Before	7.1 ± 1.1	6.9 ± 1.1	0.47	0.6
After	4.07 ± 2.2	7.4 ± 0.89	-7.6	<0.001**
t-test	9.6	-3.2		
p-value	<0.001*	0.003*		
in the 2nd day				
Before	5 ± 0.9	5.7 ± 0.91	-2.8	0.006**
After	1.5 ± 2.2	6.3 ± 1	-10.7	<0.001**
t-test	4.1	-3.2		
p-value	<0.001**	0.003**		

*statistical significant p-value ≤0.05

Table (8) above illustrates that; there is no statistically significant difference with p-value >0.05 between study and control groups as regards pain severity before the procedure.

On the other hand there is highly statistically significant decrease in pain severity among studied patient after implementing deep breathing technique from (7.1 to 4.07) among study group after 1st day, and from (5 to 1.5) before and after 2nd day of practice with p-value <0.001 but significant increase in pain intensity among control group from (6.9 to 7.4) in 1st day and from (0.91 to 1) in 2nd day with p-value <0.003, Also, there is a statistically significant low mean of pain severity in study group after 1st day, and before and after 2nd day of practice.

5. DISCUSSION

Part 1: The socio demographic characteristic and medical data sheet of the study sample

The present study showed that less than half of studied patients study and control groups were between 42.4 and 44 years. The majorities of them were male and completed secondary education and not work. No one of them made any types of physical activity and not drink alcohol which indicated proper matching between two groups in these variables and the result of the study which indicated there was no significant difference between study and control group regarding socio demographic characteristic that indicate the only effect was detected that result the provided nursing intervention (deep breathing technique).

These findings were supported by (10) who conducted "Assessment of Coronary Artery Bypass Grafts Status in Symptomatic Patients: An Observational Study" confirmed that, Almost half of the study patients belonged to age group of 65 years or less with a male predominant population. Also (11) who conducted "Coronary artery bypass grafting, Effect of developing and implementing nursing care standards on patient's outcomes" in Egypt reported that, In relation to educational level, more than half of the patients were illiterate, as regards their occupation, the current study revealed that about one-third of patients were farmer; also reported that physical activity and loading, such as lifting heavy objects can cause exceptional angina.

In accordance with present study (12) who conducted "improved oxygenation during standing performance of deep breathing exercises with positive expiratory pressure after cardiac surgery" reported that, No significant differences were found between the two groups in terms of demographic or surgical data. All patients fulfilled the protocol as planned and were included in all statistical analyses.

Part 2: Patients practice regarding the deep breathing technique

There is statistically significant improvement in Practical score sessions with high satisfactory level at the third session among study group. These findings were consistent with (13) who conducted "Deep breathing exercise education receiving and performing status of patients undergoing abdominal surgery" in Turkey, emphasized that, one of the most important findings of this study was that a strong positive correlation was found between receiving education and performing exercises.

On the same line, (14) who conducted "Benefits of home-based exercising ability in patients with osteoarthritis/Osteoarthritis" in Turkey, one of the reasons of not performing regular exercises was found to be the lack of information and the possibility of performing exercises was found to be 7.96 times greater among patients who received information about exercises than among those who did not. This means, patients' practice was improved due to follow instruction of investigator step by step and performing practice positively.

Part 3: Basic pain assessment before and after practice for both study group in 1st day and 2nd day

Regarding pain assessment, the basic pain assessment before practice for both study groups in the first day showed that, there is no statistically significant difference between study and control groups as regards location of pain, pain severity, pain pattern, and its intermittency before practice. On the other hand there is statistically significant difference as regards pain quality and expression, with high percentage of sharp and restlessness pain among study group, and high percentage of aching pain and grimacing pain among control group before practice, but after implementation deep breathing technique study group show improvement in pain severity to be mild, with discomfort quality, periodic intermittent pattern, and protecting expression.

But as regards pain assessment in the 2nd day before practice deep breathing technique there was no statistical significance change in pain characters in both groups. Study group show significant improvement after implementation of deep breathing technique after CABG in 2nd day in all pain characters (severity, quality, pattern, and intermittency, and expression), with more than have of them show no pain at all; versus higher percentage of control group complain moderate pain, aching quality, with constant pattern, and restlessness expression. These results confirmed the positive effect of practice deep breathing technique on pain alleviation and improving pain characters.

On the same line (15) who conducted "Comparison the effect of conservative therapy and blow bottle among open heart surgery patients for the prevention of post-operative pulmonary complications" showed that, regarding to postoperative pain it was noticed by using numerical scale that statistical significant difference was found between the two groups regarding pain while coughing.

This finding was in accordance with (15) emphasized that, distribution of sample according to Postoperative pain using numerical scale after routine deep breathing exercise and chest physiotherapy (by blow bottle) for post-operative cardiac surgery. It was noticed that statistical significant difference was found between the two groups regarding to pain. In this respect, (16) who conducted "Cold Application and Breathing Exercises to Reduce Pain and Anxiety during Chest Tube Removal" in Egypt, showed that there was a high statistically significant difference in pain intensity immediately, 15 and 30 minutes after chest tube removal between studied and control groups post intervention.

This result matched with a study conducted by (17) who conducted "Current incidence of acute neurologic complications after open-heart operations in children" who found that, physical exercises and changing position have profound positive effect on severity of pain, respiratory pattern, and oxygen saturation. Also **in the same direction** (18) who conducted "Effect of Breathing Exercise on Respiratory Efficiency and Pain Intensity among Children Receiving Chemotherapy" in Egypt, illustrated the positive effect of deep breathing exercise on the decrease the pain score after more breathing exercise.

Regarding factors affecting pain before practice in the 1st and 2nd days of both study and control groups; the present study showed that more than half of study and control group reported that movement aggravated pain. Also there were statistically significant relations between study and control group as regard factors alleviated pain as lower percentage of study group depend on analgesic in comparison to control group, on 2nd day the control group need more analgesic; study group show longer duration of last analgesic so they need less analgesic.

In this respect (19) who conducted "Assessment and path physiology of pain" emphasized that, the most severe pain was associated with coughing, movements, turning around, getting up from bed. Although pain scores were high immediately after the operation, the mean pain score reported by the patients when coughing and on the sixth day after the surgery was decreased.

Assessment of vital signs before practice for both study groups in the 1st day, there is slight elevation of blood pressure and normal range for temperature, pulse and respiration with no statistically significant difference between study and control groups but after practice deep breathing technique in the 1st day all vital signs were statistically decreased but within normal rage among study group. In 2nd day before practice deep breathing only pulse was statistically decreased among study group, and after practice the technique in the 2nd day all vital signs were statistically decreased among study group. These results illustrated the positive effect of practice deep breathing technique on pain control through making patient feel relaxed which will decrease the sympathetic effect of pain on vital signs.

In this respect (20) who conducted "Comparison of the Effects of Aromatherapy with Rose and Lavender on Physiological Parameters of Patients Undergoing Open Heart Surgery" emphasized that, Patients undergoing coronary artery bypass grafting (CABG) are transferred to intensive care units (ICUs) where they are normally under mechanical ventilation during the first 6 hours following surgery. Anxiety and agitation in these patients result in sleep disorders, increased oxygen consumption by the heart muscles, increased burden of the sympathetic nervous system, tachypnea, increased heart rate, neural-hormonal responses, and increased blood pressure, which challenge the process of weaning from mechanical ventilation.

This result is also supported by (15) confirmed that, Assessment of vital signs in the two groups in preoperative cardiac surgery phase and postoperative phase after routine deep breathing exercise and chest physiotherapy (by blow bottle). Concerning the respiratory rate and temperature a significant differences were found between the two groups during the first assessments.

On the same line (21) who conducted "efficacy of breathing and coughing exercises in the prevention of pulmonary complications after coronary artery surgery" reported that no significant differences between 3 groups using (routine chest physiotherapy and prophylactic chest physiotherapy) as regard temperature at any stage of treatment during fourth postoperative day.

Results of (22) who conducted "Postoperative Pain after Coronary Artery Bypass Grafting Surgery: effect of Relaxation" That show similarity of present study as it illustrated that relaxation has significant effects on patients' vital sign such that 24 hours after extubation, their vital sign was not significantly different because of relaxation but with more training, it became significant after 48 and 72 hours from extubation.

(18), results pointed out that the mean scores are positively changed in O₂ saturation, respiratory rate, heart rate and temperature. This result matched with a study conducted by (23) "The invasive cardiopulmonary exercise test" who indicated that deep breathing is one of the best ways to lower stress in the body, also heart rate, breathing, and blood pressure, all decrease by breathe deeply.

Part 4: patients practice regarding the deep breathing technique after CABG

Concerning evaluating of Practice score for deep breathing technique after CABG in 1st and 2nd days among study group the present study illustrated that there is a statistically significant difference with between practice score with high satisfaction level of practice score at the 2nd day among group I versus in 1st day. This result illustrated the good level of patients' training on the deep breathing technique.

(18) demonstrated that, there were significance differences between pre and post breathing exercises in the 1st and 2nd measurements, which reflect the effectiveness of breathing exercises in the second measurement. This result supported by (24) who conducted "Deep-Breathing Exercises Reduce Atelectasis and Improve Pulmonary Function After Coronary Artery Bypass Surgery" in Sweden, reported that with increasing the frequency and intensity of the exercises is likely to be more efficacious all patients found the breathing technique easy to perform, and most of the patients experienced a subjective benefit of the exercises; this is important for completion of the treatment.

(25) who conducted "Assessment of pain during rest and during activities in the postoperative period of cardiac surgery" was in disagreement with current study as it founded no statistical difference in the intensity of pain experienced during deep breathing between the 1st and the 2nd days, but illustrated that pain decreased over time.

Part 5: Pain severity in different study groups

Current study found no statistically significant difference between study and control groups as regards degree of pain severity before procedure in the 1st and 2nd days. On the other hand there is statistically significant difference between study groups as regards degree of pain severity after procedure in the 1st and 2nd days with increase in percentage of patients with no pain and mild pain in 1st day, and 2nd day. Also pain severity degrees show significant improvement after practice deep breath technique from sever to mild and moderate degree in the 1st day and to mild degree or no pain in the 2nd day among study group. But this effect of decreasing pain severity was noted among study group; this result reflects the success of that technique in decreasing pain severity degree especially when done for a couple of days.

This finding was in accordance with (26) who conducted "Assessment of pain during rest and during activities in the postoperative period of cardiac surgery" in Brazil, the results showed that, majority of the studied sample experienced pain at least once. Most patients reported pain on the 1st and 2nd days postoperative, while the highest incidence of pain occurred on the 1st day postoperative.

According to (27) who conducted "Exercise and children "the results showed that deep breathing exercise is considered a useful form of complementary and alternative treatment apparently, the presence and characteristics of pain as pre and post breathing exercises, highly significance differences were detected in both presence of pain, time and severity of pain. Also it agrees with (28) who conducted "The Effect of Deep and Slow Breathing on Pain Perception, Autonomic Activity, and Mood Processing-An Experimental Study" who found that after breathing intervention a significant reduction of tension, anger, and depressive feelings in patients with chronic pain.

(29) who conducted "The effect of deep-slow and regular breathing on pain intensity of burn dressing" in Iran, approved that using deep-slow and regular breathing can be an important factor in reducing pain intensity during burn dressing. This was in agreement with (30), who conducted "Effect of relaxation exercises on controlling postoperative pain" that reveled effect of relaxation on pain control after upper abdominal surgery stated that pain level after relaxation was significantly lower.

6. CONCLUSION

The deep breathing technique is a safe, inexpensive, and a non -pharmacologic nursing intervention effective technique to reduce the severity of pain after CABG. DBS that can be recommended as a pain relief technique after CABG.

Recommendations for better patient's outcome:

- Apply the deep breathing technique for patients undergoing CABG by teaching technique before surgery and apply it after surgery as routine and regular care to decrease the incidence of pain associated with surgery.

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