Quality of Life among Patients Post CABG Surgery; Comparative Study between Traditional Care Vs Comprehensive Recovery Program

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ABSTRACT

Background: Comprehensive recovery programs previously termed fast-track surgery is a novel approach to the care of cardiac surgical patient that aims to improve their postoperative outcomes. Comprehensive recovery program implementation is achieved through four phases; consulting phases "Pre-habilitation", preoperative phase, intraoperative phase and postoperative phase. **Aim:** The aim of this study was to assess the effect of comprehensive recovery program on Patients' quality of life post CABG surgery. **Research Hypoethis**: The implementation of comprehensive recovery program will affect positively on patients' quality of life post CABG surgery. **Setting**: The study was conducted at Cardiothoracic Intensive Care Unit at Al Nas Hospital. **Subjects**: A retrospective sample of 30 adult patients who had underwent CABG surgery during the past 6 months (control group) and a purposive sample of 30 adult patients who had underwent CABG surgery (study group). **Data collection tools:** First tool, patients' assessment interview questionnaire to assess the studied patients characteristics and medical history, second tool, European system for cardiac operative risk evaluation (EURO score II) to assess their preoperative risk of death and third tool, 36-Item Health Survey questionnaire (SF-36) to assess their quality of life**. Results:** The results of this study revealed that there was a statistically insignificant difference between the study and control group regarding demographic characteristics and medical history data. Also there was a statistically significant difference between the study and control group regarding general health, energy and fatigue, role limitation due to physical health and emotional health and total SF-36 questionnaire score. **Conclusion:** it could be concluded that the implementation of comprehensive recovery program affected positively on patients' quality of life post CABG surgery. **Recommendation:** Enhance the patients' undergoing CABG surgery regarding the comprehensive recovery program and extend the concept of comprehensive recovery program to other cardiac surgeries.

Keywords: CABG Surgery, Comprehensive Recovery Program, Quality of life.

Introduction

Cardiovascular diseases are one of the leading causes of illness and deaths all over the world. According to the World Health Organization, around 17.9 million people die annually due to cardiovascular diseases worldwide, with an expected estimated 23 million deaths by the year 2030. Risk factors for developing cardiovascular diseases are usually classified into modifiable and nonmodifiable risk factors ***(WHO, 2018).***

Open-heart surgery is traditionally performed via a median sternotomy; the sternum is divided completely from the sternal notch to the xiphisternum which connection of cardiopulmonary bypass during the procedure. Coronary artery bypass grafting (CABG) is the most common and important surgical procedure for patients with coronary artery disease, which is usually done through traditional way and leads to improvement of symptoms, survival rate and quality of life ***(Bishawi, 2018).***

Over the past several decades, tremendous efforts had been expended to improve survival and reduce morbidity after CABG surgery. These efforts were focusing on modifiable adult patient's, surgical and environmental risk factors. Over the years, after multiple studies and research, the rehabilitation programs after CABG surgery were developed in order to increase functional capacity, improve quality of life, reduce hospitalization period and hospital readmission ***(Taylor et al., 2019).***

Enhanced recovery after surgery (ERAS) previously termed "fast-track surgery" or comprehensive recovery program all are a novel

approach to care of adult patient with surgical intervention that aims to improve postoperative outcomes among most surgical services. Implementation of a comprehensive recovery program involves a team consisting of surgeons, anesthesiologists, a program coordinator and staff in the preoperative evaluation clinic, para-anesthesia-holding area nurse, operating room nurse, as well as staff in the surgical ward and/or the intensive care unit (ICU) ***(Ljungqvist, 2017).***

The comprehensive recovery program is divided into four phases; consulting "Pre-habilitation", preoperative, intraoperative and postoperative phase. Consulting and preoperative phase usually derived into adult patients' needs assessment and control of the modifiable risk factors that may accelerate incidence of adverse events. Post-operative phase is the phase in which the health care team work to promote rehabilitation, improve quality of life and promote the achievement of the desired outcomes ***(Joshi, 2018).***

Assessment of adult patients' outcomes in CABG surgery focused on objective endpoints, including perioperative morbidity, as well on the short and long-term survival. While these measures are important and influence treatment decisions, they should be measured in the same line with adult patient-related outcomes which measures patients' general health, physical functioning, social, mental and emotional wellbeing that obtained by the patient self-report ***(Basch & Snyder 2017).***

Significance of the study:

CABG is one of the most frequently carried procedure for medical management of coronary artery disease, which could improve patient's general health as well as maintain long term quality of life. Proper perioperative care for patients undergoing CABG surgery could improve their condition and prevent complications. Till now, there is no published protocol in Egypt for patient preparation, management and rehabilitation for patients undergoing CABG surgery and usually these interventions vary from a surgeon to another. Comprehensive recovery program, which is a novel program that implement a series of perioperative interventions based on adult patients' assessment aiming to decrease hospital stay, expedite return to normal life, promote pain control, avoid immobility and prevent complications that may be associated with higher costs with increased morbidity and mortality rate.

Aim of the Study:

This study aimed evaluate the effect of comprehensive recovery program on patients' quality of life post CABG surgery.

Research hypothesis:

The implementation of comprehensive recovery program will affect positively on patients' quality of life post CABG surgery.

Operational definitions:

Quality of life: it refers to self-reported outcomes included in the 36 item health survey questionnaire regarding postoperative general health, pain, social functioning, emotional wellbeing, energy and fatigue, role limitation due to physical health, role limitation due to emotional health and health change.

Subjects and Methods

Technical Design:

Research Design:

Quasi-experimental design was used to achieve the aim of the present study.

Research Setting:

The study had been conducted at Al Nas Charity Hospital. The hospital is a specialized hospital for cardiothoracic and GIT surgeries. It includes outpatient department, endoscopy unit, four operation rooms, two general wards, cardiac cathertirization unit, Cardiac care unit and two ICU; Pediatric Cardiothoracic Intensive Care Unit (CTICU) and adult CTICU.

Subjects*:*

A retrospective sample of 30 adult patients who had underwent CABG surgery during the past 6 months were collected to assess their postoperative outcomes (control group) and then a purposive sample of 30 adult patients who had underwent CABG surgery (study group) were collected using EPI Info 7 program for sample size calculation and assuming 70 % of improvement in post CABG surgery quality of life with margin error = 5 % and at 95 % confidence level ***(Community, Environmental and Occupational Medicine Department, Faculty of Medicine, Ain Shams University).***

Inclusion criteria

The study subjects were selected according to the following criteria:

- Adult patients (<18 years old) undergoing CABG surgery from both genders.
- Adult patients with EURO score result ranging from mild to moderate risk for death.
- Adult patients during the 2 weeks preoperative and up to 3 months postoperative.

Tools for data collection:

Data were collected using the following tools:

Tool I: Patients' assessment interview questionnaire:

It was designed by the researcher in an Arabic language based on recent and relevant literatures to assess the data as clear in the following parts:

Part I: Patients' demographic characteristics: It was concerned with adult patients' personal data such as age, gender, educational level, body mass index and smoking habits.

Part II: Patients' medical history: It was concerned with adult patients' and family medical history.

Tool II: European system for cardiac operative risk evaluation (EURO score II):

This tool was adopted from the **European *Association for Cardiothoracic Surgery (2011)*** to assess factors indicating risk for death post CABG surgery which includes three categories; patient related factors, cardiac related factors and operation related factors.

Patient related factors include age, gender, preoperative renal impairment, extracardiac arteriopathy, poor mobility, previous cardiac disease, chronic lung disease, active endocarditis, diabetes on insulin and critical preoperative state.

Cardiac related factors include New York Heart Association classification of angina, Canadian Cardiovascular Society class 4 angina left ventricular functions, recent myocardial infarction and pulmonary hypertension.

Meanwhile, operation related factors include urgency of the surgery, weight of the intervention and surgery on thoracic aorta.

Scoring system:

The questionnaire consisted of 18 item; 10 items for patient related factors, 5 items for cardiac related factors and 3 items for operation related factors. The response for each item in the questionnaire was either "Yes" or "No". Items have a score ranged from "zero" to "Three".

The scoring of this tool was categorized into the following:

- Low risk for post-operative death (If score is from 0 to ≤ 2).
- Moderate risk for post-operative death (If score is from 2 to ≤ 5).
- High risk for post-operative death (If score is > 5).

Tool III: 36 item Health Survey questionnaire (SF-36):

this tool was adopted from the ***Research and Development corporation "RAND corporation" (1992)*** to assess adult patients' self-reported outcomes post CABG surgery and includes 8 specific dimensions of functioning as follow; general health, pain, social functioning, emotional wellbeing, energy and fatigue, physical functioning, role limitation due to physical health, role limitation due to emotional health and health change postoperatively.

Scoring system:

This questionnaire consists of 36 questions distributed as follow; 2 for general health, 2 for pain, 2 for social functioning, 5 for emotional wellbeing, 4 for energy and fatigue, 10 for physical functioning, 4 for role limitation due to physical health, 3 for role limitation due to emotional health and 4 for health change.

All questions of the questionnaire were scored on a scale from 0 to 100, with 100 representing the highest level of functioning possible and 0 representing the lowest level of functioning. Then the scores from questions that address each specific dimension were averaged together for a final score within each 8 dimensions using the RAND scoring.

Operational design:

The operational design of this study included preparatory phase, validity and reliability of the developed tools, pilot study, field work, and ethical consideration.

Preparatory phase: it includes 3 phases:

A- Assessment and planning phase:

It included reviewing of the related literatures, and theoretical knowledge of various aspects of the study using books, articles, periodicals, magazines, and websites to develop the tools for data collection. The comprehensive recovery program was designed based on the preoperative adult patients' assessment and

ERAS Cardiac (2020) recommendation for the care of open-heart surgery patients "preoperative – intraoperative and postoperative".

Validity

The revision of tool I was done by a panel of seven expertise in the field of the study to measure the face and content validity of the tool then the necessary modifications will be done accordingly.

Reliability

Tools reliability was conducted for the tool I using statistical test alpha Cronbach.

Ethical consideration

The ethical considerations in the study included the following:

- The research approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing Ain Shams University before starting the study.
- The researcher clarified the aim of the study and expected outcomes to each patient included in the study.
- Oral approval had been taken to share in the study.
- The researcher assured anonymity and confidentiality of the gathered data.
- The patients were informed that they are allowed to withdraw from the study at any time.

Administrative design

Approval to carry out this study was obtained through an issued letter from the dean of the faculty of nursing directed to the directors of Al Nas Hospital, Cardiothoracic Surgery department directors and Cardiothoracic Intensive Care Unit (CTICU) directors.

Pilot study

A pilot study conducted on 10 % of adult patients undergoing CABG surgery to test feasibility, simplicity, and applicability of the study tools, as well as to estimate time needed to fill in the study tools.

Based on the result of the pilot study no modifications were needed for the study tools, so, the study subjects included in the pilot study were among the main study participant

Fieldwork

B- Implementation Phase:

A retrospective sample (control group) was collected according to the inclusion criteria of the study sample from Medical Record Department. The researcher reviewed their medical (paper/electronic) files and filled in the questionnaire. The data were collected from the 1st of July 2022 till 1st of August 2022, from Sunday to Tuesday during morning shift. The patient quality of life using SF-36 questionnaire were assessed either via interview at the outpatient department follow up visit or telephone calls up to three months from the date of surgery.

The study subjects (study group) were selected after reviewing waiting list for patients who had been approved for elective CABG surgery with the cardiothoracic surgery medical secretary. They were selected according to previously mentioned inclusion criteria. The aim of the study was explained for the adult patients who agreed to participate in this study.

The Euro Score was calculated from recent data from the medical (paper/electronic) files and during 2 weeks before the surgery the comprehensive recovery program phases and instructions were given either during the preoperative visit at the outpatient department or telephone calls. The data collection took six months started from the 5th of July, 2022 till the mid of January 2023.

The preoperative phase included detailed instructions about open heart surgery and most common symptoms post CABG surgery. The researcher discussed the possible complications with the patient and their family and instructions to avoid incidence of these complications were illustrated. The instructions were included in a booklet discussing the journey from the counseling till recovery and rehabilitation phase.

During the counseling phase, the patients were given the preoperative instructions regarding life style modifications, exercise, nutrition, smoking cessation, blood glucose control, blood pressure control and Multi-drug Resistant Organisms "MDROs" screening and eradication. All instructions related to these preparations were explained to the patient and the researcher ensured that they were implemented. After that, there was a discussion with the patient regarding all questions about CABG surgery, and psychological support was given to the patient.

Preparatory phase, which included preoperative preparation, the SSI prevention bundle and fasting before CABG surgery were

confirmed with the patient and medical staff. It was confirmed that the patient's skin preparation was done according to the recommendations (Hair removal with electrical clippers, showering with antiseptic soap … etc), the patient received prophylactic antibiotic prior to surgery, and the patient was advised to fast from cooked foods 8 hours and liquids 2-4 hours before surgery.

The intraoperative phase, which included interventions to prevent incidence of bleeding, skin preparation prior to surgery and safe insertion of invasive devices were assured with the OR team. Medications to avoid incidence of blood bleeding, proper surgical site preparation using antiseptic soap and proper insertion of invasive devices according to comprehensive recovery program and infection control guidelines were checked.

During the postoperative phase, the patients were closely observed for early extubation from mechanical ventilation, pain management, chest tube observation and removal, SSI prevention bundle, IV fluid management, DVT prophylaxis, delirium screening, body temperature regulation and early detection of AKI.

In the rehabilitation phase, and before discharge from the hospital, the patients were educated about surgical site management, allowed physical activity and time frame for exercise plan, nutrition, medications, life style modifications, smoking cessation, follow up visits and early warning signs that needs seeking quick medical advice.

C- Evaluation phase:

The patients were followed for their compliance to enhanced recovery program and quality of life three months post-operatively. The effect of comprehensive recovery program on patients' quality of life post CABG surgery was assessed using 36 item health survey questionnaire (SF-36).

Statistical design:

The collected data were organized, coded and analyzed by using appropriate statistical significant tests. The statistical analysis of data was done by using the Statistical Package for Social Science (SPSS), version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean ± standard deviation. Qualitative data were expressed as frequency and percentage. Independent-samples t-test and ANOVA test were used to assess significance between study variables. Statistical significant difference was considered at $P < 0.05$ and insignificant at $P > 0.05$.

Results

Table (1): This table revealed that the mean age of the study group was 57.98 ± 8.61 years compared to 58.44 ± 9.11 years of the control group. Also this table showed that 46.7 % and 56.7 % of the study group compared to 40 % and 33.3 % of the control group were not working and from rural residence respectively, with a statistical insignificant difference between study and control group at (p-value >0.05).

Table (2): This table revealed that more mean and SD of the body mass index of studied patients was 29.84 ± 6.09 compared to 29.39 ± 4.97 the control group with insignificant difference between the studied and control group.

Figure (1): This figure showed that 40 % of the study group compared to 60 % of the control patients were smokers while more 23.3 % of studied group compared to 10 % of the control group were Ex. smokers.

Table (3): This table illustrated that 53.3 %, 60 % and 10 % of the study group had DM, HTN and CVS compared to 60 %, 66.7 % and 6.7 % of the control group respectively, with statistical insignificant difference between study and control groups at (p-value >0.05).

Also it was found that 86.7 % of study group had negative family history for CABG surgery compared to 93.3 % of the control group with a statistical insignificant difference between study and control groups at (p-value >0.05).

Table (4): This table revealed that 70 % of the study group had mild risk for postoperative death while 30 % had moderate risk for postoperative death compared to 76.7 % and 23.3 % of the control group respectively, with statistical insignificant difference between study and control groups at (p-value >0.05).

Table (5): This table revealed that there was a statistically significant difference between study and control groups regarding general health, energy, fatigue and total SF questionnaire score at (p-value <0.005). Meanwhile, it was found that there was a

statistically significant difference between study and control groups regarding role limitation due to physical health and emotional health at (p-value <0.05).

Table (1): Distribution of the studied and control patients according to their characteristics (n=30 each group).

Characteristics	Study group		Control group		χ^2	P-value
	No	%	No	%		
Age						
• 30: <40 years old	1	3.3	1	3.3	0.19	0.979
• 40: <50 years old	3	10	4	13.3		
• 50: <60 years old	11	36.7	10	33.4		
• ≥60 years	15	50	15	50		
x̄ ± SD	57.98 ± 8.61		58.44 ± 9.11		*t*=198	0.844
Gender						
• Male	27	90	25	83.3	0.577	0.448
• Female	3	10	5	16.7		
Marital status						
• Married	28	93.3	29	96.7	0.351	0.544
• Not married	2	6.7	1	3.3		
Educational level						
• Educated	30	100	29	96.7	1.017	0.389
• Don't write or read	0	0	1	3.3		
Occupation						
• Not working	14	46.7	12	40	2.294	0.318
• Office work	5	16.7	10	33.33		
• Physical work	11	36.6	8	26.67		
Residence						
• Urban	13	43.3	20	66.67	3.3	0.069
• Rural	17	56.7	10	33.3		

Items equal (0) between the groups were removed

Using: Chi-square test - p-value >0.05 is insignificant.

Table (2): Distribution of the studied and control patients according to their body mass index (n=30 each group).

Body Mass Index	tudy group		C ontrol group		²	-value
	o		o			
• Underweight				.3	.276	.735
• Normal		0		3.3		
• Overweight	1	6.7	1	6.7		
• Obese	6	3.3	4	6.7		
x̄ ± SD	9.84 ± 6.09		2 9.39 ± 4.97		-: 0.739	.463

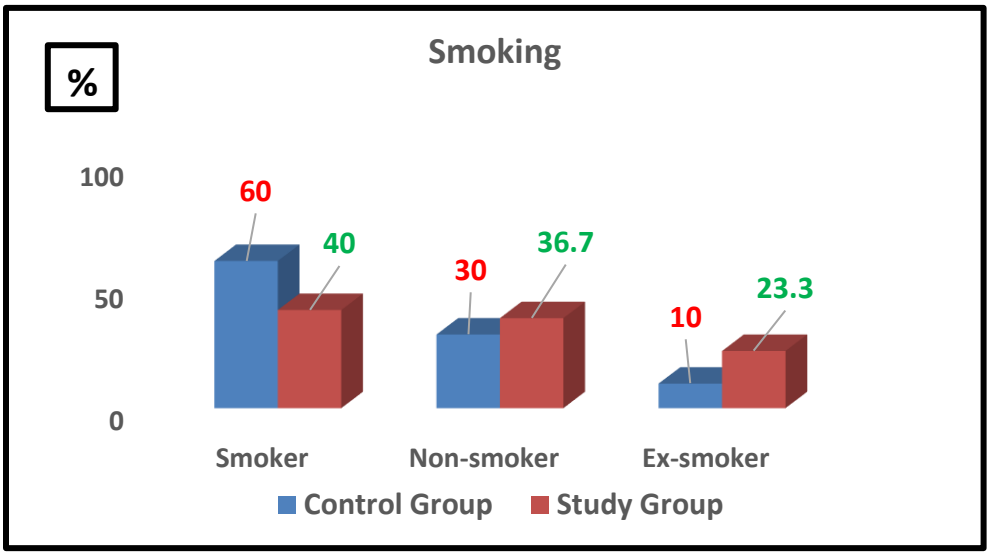

Figure (1): Distribution of the studied and control patients according to smoking habit (n=30).

Table (3): Distribution of the studied and control patients according to their medical history (n=30 each).

Medical history	Study Group		Control Group		χ^2	P-value
	No.	%	No.	%		
Medical history						
• IHD	30	100	30	100	0	0.00
• DM	16	53.33	18	60	0.287	0.592
• HTN	18	60	20	66.67	0.271	0.602
• Liver disease	1	3.33	2	6.67	0.351	0.544
• CVS	3	10	2	6.67	0.218	0.640
• CKD / Renal failure	0	0	3	10	3.158	0.076
• Chronic arrhythmias	1	3.33	0	0	1.017	0.389
Family history for CABG						
• Negative family history	26	86.7	28	93.3	0.741	0.389
• Positive family history	4	13.3	2	6.7		

Items equal (0) between the groups were removed.
Using: Chi-square test - *p-value >0.05 is insignificant.

Table (4): Distribution of the studied and control patients according to total EURO score (risk for postoperative death) (n=30).

EURO Score	Stu dy group		Contr ol group		²	-value
	o.		o.			
• Mild Risk	1	0	3	6.7	.8	.371
• Moderate Risk		0		3.3		
• High Risk		.0		.0		

Using: Chi-square test - *p-value >0.05 is insignificant.

Table (5): Distribution of the studied and control patients according to their self-reported outcomes "SF 36 questionnaire" (n=30).

Total SF 36 questionnaire	Study Group		Control group		-test	p -value
	ean	D.	ean	D.		
General health	1.67	.40	5.67	.58	.688	**<0.001***
Pain	1.87	0.34	8.80	1.46	.088	0.281
Social Functioning	0.08	.33	8.90	.06	.739	0.463
Emotional Wellbeing	6.40	.21	5.73	.14	.813	0.420
Energy and Fatigue	5.00	.71	8.67	.34	.071	**<0.001***
Physical Functioning	8.00	.61	5.17	2.07	.006	0.319
Role limitation due to Physical Health	1.67	3.02	9.17	4.29	.485	**0.016***
Role limitation due to Emotional Health	4.70	4.20	8.10	.02	.344	**0.023***
Health Change	2.50	.63	0.00	0.17	.077	0.286
Total Score	4.67	.10	9.97	.03	.796	**<0.001***

Using: One way Analysis of Variance test for Mean±SD, *p-value >0.05 is insignificant; *p-value <0.05 is significant;

Discussion

Comprehensive recovery program for CABG is a multimodal and interdisciplinary optimization of the perioperative management. In the postoperative phase, patient needs regular monitoring by trained nursing staff for detecting and preventing the complications. After recovery, patients should undergo cardiac rehabilitation program to promote early recovery, improve their satisfaction and reduce postoperative morbidity and mortality rate as well as length of hospital stay ***(Engelman et al., 2019).***

This study aimed to evaluate the effect of comprehensive recovery program on patients' quality of life post CABG surgery.

Regarding the characteristics of the srudy and control groups, the finding of the present study showed that there was a statistical insignificant difference between study and control groups. These findings agreed with ***Chen et al., (2020)*** who carried out a study entitled *"Effect of Enhanced Recovery after Surgery Protocol on Patients Who Underwent Off-Pump Coronary Artery Bypass Graft"* and found that there was a statistical insignificant difference between traditional group and ERAS group regarding their demographic characteristics.

The results also was in agreement with ***Düzyol et al., (2023)*** who conducted a study entitled *"Enhanced Recovery In Cardiac Surgical Patients with Low Left Ventricular Ejection Fraction: A Controlled Before-and-After Study"* and found that that there was a statistical insignificant difference between characteristics of group with ERAS protocol and group without ERAS protocol..

From the researcher point of view this could be attributed to choosing the study and control groups according to the same inclusion criteria which makes the two groups very homogeneous and this leads to the absence of a difference between the groups.

As regards body mass index of the study and control groups, the recent study revealed that body mass index mean and SD of the study group was 29.84 ± 6.09 compared to 29.39 ± 4.97 of the control group with insignificant difference between the study and control groups.

This finding was in an agreement with ***Zurik et al., (2020)*** who carried out a study entitled *"Early Removal of Chest Drains in Patients Following Off-Pump Coronary Artery Bypass Graft (OPCAB); Is Not Inferior to Standard Care – Study in the Enhanced Recovery after Surgery (ERAS) Group"* and found that the mean of BMI of the ERAS group was 28.9 compared to 28.1 in the standard group with insignificant difference between the two groups.

Meanwhile, the findings disagreed with ***Li et al., (2018)*** who carried out a study entitled *"Enhanced Recovery after Surgery Pathway for Patients Undergoing Cardiac Surgery: A Randomized Clinical Trial"* and found that the mean and SD of BMI of the ERAS group was 22.2 ± 2.6 compared to 22.8 ± 3.1 in the standard group with insignificant difference between the two groups.

From the researcher point of view, this is due to more consumption of unhealthy foods, imbalanced diet, lack of physical activity and psychological stress in Egypt and Europe compared to china.

Regarding smoking habit, the study results clarified that less than half of the study group compared to less than two thirds of the control group were smokers while more than one fifth of study group to one tenth of the control group were Ex. Smokers.

This finding agreed with ***MacLeod et al., (2022)*** who carried out a study entitled "*Fast tracking in cardiac surgery: is it safe?"* and found that almost two thirds of the fast track and control group were smokers. Meanwhile; the findings disagreed with ***Chen et al., (2020)*** who found that more than one fifth of the ERAS and traditional group were smokers and less than one third of the ERAS group were former smoker compared to more than one fifth of the control group.

From the researcher point of view this may be attributed to the nature of the Al Nas hospital as a charity hospital so it usually perform operations for low socioeconomic patients in which the smoking prevalence is very high due to type of occupations, life style and economical stressors.

As regards medical history, the recent study illustrated that there was statistically insignificant difference between the study and control groups. These findings agreed with ***Afflu et al., (2021)*** who conducted a study entitled *"Very Early Discharge after Coronary Artery Bypass Grafting Does Not Affect Readmission or Survival"* and found that there was statistically insignificant difference between the study group and control group regarding medical history parameters.

Also the results agreed with ***Yiğit et al., (2023)*** who conducted a study entitled *"Non-interventional Feasibility Assessment for Fast-Track Cardiac Anesthesia"* and found that there was statistically insignificant difference between the fast track group and control group regarding medical history parameters.

From the researcher point of view, this could be attributed to the both groups included in the research are selected according to the inclusion criteria and share the same pathological condition (CAD), which is mostly caused by the same factors such as IHD, DM, HTN etc., and this reflects no significant difference between the two groups.

Regarding EURO score (risk for postoperative death), the recent study revealed that almost three quarters of the study and control group had mild risk for postoperative death while almost one quarter had mild risk for postoperative death. These findings were agreed with the finding of study done by ***Zakhary et al., (2015)*** entitled "*Independent Risk Factors for Fast-Track Failure Using a Predefined Fast-Track Protocol in Preselected Cardiac Surgery Patients*" and found that the majority of the fast-track group and non-fast track group had mild risk for postoperative death.

The results also agreed with ***Lima et al., (2019)*** who carried out a study entitled "*Impact of Fast-Track Management on Adult Cardiac Surgery: Clinical and Hospital Outcomes*" and found that the majority of the fast-track group and control group had mild risk for postoperative death.

From the researcher point of view applying the comprehensive recovery program was mostly suitable for patients with mild and moderate EURO score as it takes at least two weeks and up to one month to complete the program before surgery, in contrast high risk patients do not had the luxury of time or the ability to apply the program adequately before surgery and for this reason the inclusion criteria excluded high risk patients from EURO score.

Regarding self-reported outcomes, the findings of the recent study illustrated that there was a statistically significant difference between study and control groups regarding general health, energy and fatigue, role limitation due to physical health and emotional health and total SF questionnaire score. This findings were similar to ***Paˇcari´c et al., (2020)*** who conducted a study entitled *"Assessment of the Quality of Life in Patients before and after Coronary Artery Bypass Grafting (CABG): A Prospective Study"* and found that there was a statistically significant difference regarding general health, energy and fatigue, role limitation due to physical health and emotional health and total SF questionnaire score before and after ERAS program application.

The results also agreed with ***Moreira and Grilo et al., (2019)*** who conducted a study entitled "*Quality of Life after Coronary Artery Bypass Graft Surgery - Results of Cardiac Rehabilitation Programme"* and found that there was a statistically significant difference regarding physical and mental components after application of the cardiac rehabilitation program.

From the researcher point of view, this could be linked to the improved functions of the heart and the sufficient tissue perfusion so the effect of the program appeared clearly on physical domains as the evaluation was done after three months of surgery, on the other hand, the effect of the program on such domains like social functioning, emotional wellbeing and health change was insignificant because it require more time to monitor its effect.

Conclusion

According to the current study results of this study, it could be concluded that the implementation of comprehensive recovery program affected positively on patients' quality of life post CABG surgery.

Recommendations

In the light of the present study findings, the following recommendations are suggested:

1.Enhance patients' undergoing CABG surgery awareness regarding the comprehensive recovery program.

2.Establish a comprehensive recovery team with clear responsibilities to follow up implementation and compliance to the comprehensive recovery program.

3.Extend the concept of comprehensive recovery program to other cardiac surgeries.

4.Extend the follow up period for more than 3 months for more follow up and monitor improvement in patients' quality of life improvement.

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