IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

A STUDY TO EVALUATE THE EFFECTIVENESS OF STRUCTURED EXERCISE PROGRAMME ON LEVEL OF SELECTED CARDIOPULMONARY PARAMETERS AMONG PATIENTS UNDERGONE CARDIAC SURGERY AT SELECTED HOSPITAL, ERODE.

Ms. Sneha. E, M. Sc (N), Prof. Dr. M. Sumathi, M. Sc (N), Ph.D. (N),

Department of Medical Surgical Nursing, Vivekanandha College of Nursing, Tiruchengode.

Abstract:

The research design adopted in this study was quasi experimental post-test only control group design. The study was conducted at KMCH Speciality Hospital, Hospital. Using purposive sampling, 40 patients were selected based on inclusion and exclusion criteria, in which 20 patients were experimental group and 20 patients were control group. Structured exercises were demonstrated to the patients of experimental group, prior to the surgery. Starting from 2nd post operative day to 15th post operative day, the samples of experimental group performed exercises 4 times a day. The patients of control group received only routine care. Scale to measure cardiopulmonary parameters was used as a tool to collect post test data. The data obtained were analysed and interpreted using descriptive and inferential statistics.The present study finding shows that the post-test mean score of heart rate, respiratory rate, SPO_2, blood pressure, and fasting blood sugar among patients undergone cardiac surgery in the experimental group was 0.8±0.4, 0.7±0.45, 0.9±0.3, 3.85±0.35, 1.75±0.43 respectively. The post- test mean score of heart rate, respiratory rate, SPO_2, blood pressure, and fasting blood sugar among patients undergone cardiac surgery in the control group was 0.25±0.43, 0.20±0.4, 0.65±0.49, 2.4±1.01, 0.75±0.53 respectively.The calculated student independent 't' test value of heart rate, respiratory rate, blood pressure, and fasting blood sugar t = 4.1882, t = 3.7139, t =6.0665, t = 6.5562 respectively was found to be statistically significant at $p<0.05$ level.The calculated 't' test value of SPO_2t = 1.9339was not found to be statistically significant at $p<0.05$ level.This indicates that the administration of structured exercise in the experimental group is effective in improving the level of heart rate, respiratory rate, blood pressure and fasting blood sugar.

Keywords: structured exercise, cardiac surgery, cardiopulmonary parameters.

Introduction:

The term "cardiovascular disease" (sometimes known as "heart disease") describes a set of illnesses that affect the body's blood arteries and heart. These conditions can damage the heart and/or blood vessels in one or more areas. These are as follows: abnormal heartbeat rhythms, heart valve disease, a plaque-induced narrowing of blood arteries in the heart, other organs, or across the body, heart throbbing and breathing problems, birth defects of the heart and blood vessels, the outer lining of the heart is having issues **(Cleveland Clinic, 2022).**

Most cardiovascular diseases can be avoided by addressing behavioral risk factors such as tobacco use, poor diet and obesity, physical inactivity, and excessive alcohol consumption. Globalization, urbanization, and population ageing are the primary factors driving social, economic, and cultural change. Poverty, stress, and inherited factors are also CVD risk factors. It is essential to recognize cardiovascular illness as early as possible in order to begin treatment with counselling and medications. Furthermore, medication for hypertension, diabetes, and high blood lipids is required to minimize cardiovascular risk and prevent heart attacks in persons with these illnesses (**World Health Organization, 2021).**

Cardiac surgery, often known as cardiovascular surgery or heart surgery, treats a variety of heart and blood vessel disorders. The most common types of cardiac surgery are coronary artery bypass grafting (CABG) and operations to correct valve disorders.CABG, known as coronary artery bypass grafting, is a technique that restores blood flow to parts of the heart. Artery obstructions can cut off blood flow, resulting in heart attacks or symptoms resembling a heart attack. CABG restores blood flow by using blood arteries from other places of the body to build a bypass around obstructions **(Cleveland Clinic, 2022).**

The initial postoperative period following cardiac surgical procedures such as coronary artery bypass grafts and valve replacements is characterized by a pattern of myocardial injury and recovery. Understanding this pathophysiology allows for the prediction of physiologic alterations as well as the early detection and avoidance of complications **(Atilio Barbeitoetal., 2022).**

Cardiac rehabilitation (cardiac rehab) is an exercise, education, and counselling program aimed to assist recovery following a heart attack or other heart ailment. This individualized program will assist in regaining strength, preventing the condition from worsening, and lowering the chance of future cardiac problems **(Heart and Stroke Foundation of Canada, 2023).**

NEED FOR THE STUDY:

An estimated 17.9 million people die from cardiovascular diseases (CVDs), which are the main cause of death worldwide. Heart attacks and strokes are the leading causes of CVD deaths, accounting for more than four out of five of these deaths, and they account for one-third of all deaths that happen before the age of 70 **(World Health Organization, 2021)**.

The prevalence of CVD varies greatly within India, with Kerala, Punjab, and Tamil Nadu having the highest rate. Additionally, the prevalence of high blood pressure and cholesterol is highest in these states. Out of 65.3% mortality of non- communicable disease, 19.5% of deaths are due to cardiovascular disease in Tamil Nadu (**ICMR GBD, 2020**).

The primary goal of postoperative open-heart patient management is to provide adequate hemodynamic performance by optimizing myocardial oxygen supply and demand. A sufficient cardiac output is the most essential factor in optimizing myocardial oxygen supply and demand, as well as tissue oxygenation. Coronary blood flow, diastolic duration, coronary perfusion pressure (systemic diastolic pressure minus LVEDP), hemoglobin level, and arterial oxygen saturation all influence myocardial oxygen supply. Postoperatively, myocardial oxygen supply is optimized by preventing tachycardia, maintaining adequate perfusion pressure (minimizing hypotension and hypertension), preventing ventricular distention and inappropriately increased LVEDP, and judiciously regulating preload **(DiMarco RFetal.).**

Exercise training improves functional capacity and quality of life in people with coronary artery disease. Exercise has been shown to enhance a variety of cardiovascular and non-cardiovascular parameters, including glucose metabolism, skeletal muscle functioning, oxidative stress, vascular function, pulmonary circulation, ischemia-reperfusion lesion, and ventricular remodeling **(Ricardo Fontes-Carvalhoetal.).**

OBJECTIVES

- To assess the post-test level of cardiopulmonary parameters among patients undergone cardiac surgery in experimental and control group
- To compare the post-test level of cardiopulmonary parameters among patients undergone cardiac surgery between experimental and control group.
- To associate the post-test level of cardiopulmonary parameters of patients undergone cardiac surgery with their selected socio-demographic & clinical variables in both experimental and control group.

HYPOTHESES

- H_1: There will be a significant difference between the cardiopulmonary parameters after performing structured exercise among patients undergone cardiac surgery in experimental and control group.
- H_2: There will be significant association between the level of cardiopulmonary parameters with their selected socio-demographic & clinical variables among patients undergone cardiac surgery.

RESEARCH APPROACH

Quantitative approach is used to evaluate the effectiveness of structured exercise programme on level of cardiopulmonary parameters among patients undergone cardiac surgery.

RESEARCH DESIGN

In this study, **quasi experimental post-test only control design** is used. This study was intended to evaluate the effectiveness of structured exercise programme on level of cardiopulmonary parameters among patients undergone cardiac surgery.

STUDY SETTING:

The study was conducted at KMCH Speciality Hospital, Erode.

SAMPLE:

The patients undergone cardiac surgery who fulfils the sample selection criteria are the study's sample.

SAMPLE SIZE:

A total of 40 patients (Experimental group- 20 & Control group- 20) will be selected for the study.

SAMPLING TECHNIQUE:

The technique of non-probability purposive sampling is used.

DESCRIPTION OF THE TOOL

- Section A: Semi structure interview for collecting socio- demographic variables and clinical data
- Section B: Scale to measure cardiopulmonary parameters

VALIDITY OF THE TOOL:

5 experts including 1 cardiothoracic surgeon, 1 physiotherapist, 3 nursing experts validated the tool**.**

RELIABLITY OF THE TOOL:

In order to confirm the tool's reliability, Spearman rank correlation (r= 0.93) is used, which was administered to 6 patients who underwent cardiac surgery, who are not in the sample.

ETHICAL CONSIDERATION:

Ethical clearance was obtained from ethical committee of Vivekanandha Medical Care Hospital. Formal permission was obtained from authorities of KMCH Speciality Hospital.

DATA COLLECTION PROCEDURE

Pre-operatively socio demographic data and clinical data was collected from the patients of both experimental and control group. First the control group data was obtained who were provided with only hospital's routine care and then the structured exercises were demonstrated to the patients of experimental group. The patients of experimental group performed the structured exercises everyday starting from 2^{nd} post-operative day till 15^{th} post-operative day, 4 times each day. The researcher made sure they perform the exercises everyday through phone call. At the end of the 15^{th} day, post test was conducted to both the experimental and control group patients.

The patients of experimental group were oriented to the structured exercise programme which includes the following:Deep breathing exercise,Pursed lip breathing technique, Incentive spirometry, Coughing exercise, Arm stretch exercise, Shoulder bracing or shoulder shrug, Wrist rotation, Leg exercise, Walking**.**

Result:

Table 1: Distribution of post-test level of Heart Rate among patients undergone cardiac surgery in the experimental and control group.

n = 40(20+20)

Heart Rate	Experimental Group		Control Group	
	F	%	F	%
Normal	16	80.0	5	25.0
Tachycardia & Bradycardia	4	20.0	15	75.0

The figure1 shows that in the experimental group, 16(80%) had normal heart rate and 4(20%) had tachycardia & bradycardia. Whereas in the control group, 5(25%) had normal heart rate and 15(75%) had tachycardia & bradycardia.

Table 2: Distribution of post-test level of Respiratory Rate among patients undergone cardiac surgery in the experimental and control group.

n = 40(20+20)

Respiratory Rate	Experimental Group		Control Group	
	F	%	F	%
Normal	14	70.0	4	20.0
Tachypnea& Bradypnea	6	30.0	16	80.0

The figure 2 shows that in the experimental group, 14(70%) had normal respiratory rate and 6(30%) had tachypnea & bradypnea, whereas in the control group, 4(20%) had normal respiratory rate and 16(80%) had tachypnea & bradypnea.

Table 3: Distribution of post-test level of SPO_2 among patients undergone cardiac surgery in the experimental and control group.

n = 40(20+20)

SPO_2	Experimental Group		Control Group	
	F	%	F	%
Normal (95 – 100%)	18	90.0	15	75.0
Deviation from normal (<95%)	2	10.0	5	25.0

The figure 3 shows that in the experimental group, 18(90%) had normal oxygen saturation level and 2(10%) had deviation from normal oxygen saturation level whereas in the control group, 15(75%) had normal oxygen saturation level and 5(25%) had deviation from normal oxygen saturation level.

Table 4: Distribution of post-test level of Blood Pressure) among patients undergone cardiac surgery in the experimental and control group.

n = 40(20+20)

Blood Pressure	Experimental Group		Control Group	
	F	%	F	%
Normal	17	85.0	3	15.0
Pre-hypertension	3	15.0	7	35.0
High Blood Pressure Stage – I	0	0	5	25.0
High Blood Pressure Stage – II	0	0	5	25.0

The figure 4 shows that in the experimental group, 17(85%) had normal blood pressure and 3(15%) had pre-hypertension and none had high blood pressure stage -I & II, whereas in the control group, 3 (15%) had normal blood pressure, 7(35%) had pre-hypertension, 5(25%) had high blood pressure Stage – I, and 5(25%) had high blood pressure Stage –II.

Table 5: Distribution of post-test level of Fasting Blood Sugar among patients undergone cardiac surgery in the experimental and control group.

n = 40(20+20)

Fasting Blood Sugar (FBS)	Experimental Group		Control Group	
	F	%	F	%
Normal	15	75.0	1	5.0
Border level hyperglycemia	5	25.0	13	65.0
Hyperglycemia	0	0	6	30.0

The figure 5 shows that in the experimental group, 15(75%) had normal fasting blood sugar level; 5(25%) had border level hyperglycemia and none had hyperglycemia, whereas in the control group, 1(5%) had normal fasting blood glucose level; 13(65%) had border level hyperglycemia, and 6(30%) had hyperglycemia.

Table 6: Effectiveness of structured exercise programme on level of Heart Rate among patients undergone cardiac surgery in the experimental group and comparing with control group.

n = 40(20+20)

S.no	Variables	Mean	S.D	Mean Difference	Student Independent 't' Test Value
1.	**HEART RATE** Experimental Control	0.8 0.25	0.4 0.43	0.55	**t=4.1882** **p=0.05 , S***
2.	**RESPIRATORY RATE** Experimental Control	0.7 0.2	0.45 0.4	0.5	**t=3.7139** **p=0.05, S***

3.	**SPO_2** Experimental Control	0.9 0.65	0.3 0.49	0.25	t=1.9339 p=0.05, N.S
4.	**Blood Pressure** Experimental Control	3.85 2.4	0.35 1.01	1.45	**t= 6.0665** **p=0.05, S***
5.	**Fasting Blood Glucose** Experimental Control	1.75 0.75	0.43 0.53	1.0	**t=6.5525** **p=0.05, S***

p<0.05, S* – Significant, NS –Not Significant

Table 6 shows that the post-test mean score of heart rate, respiratory rate, SPO_2, blood pressure, and fasting blood sugar among patients undergone cardiac surgery in the experimental group was 0.8±0.4, 0.7±0.45, 0.9±0.3, 3.85±0.35, 1.75±0.43 respectively. The post- test mean score of heart rate, respiratory rate, SPO_2, blood pressure, and fasting blood sugar among patients undergone cardiac surgery in the control group was 0.25±0.43, 0.20±0.4, 0.65±0.49, 2.4±1.01, 0.75±0.53 respectively.

The calculated student independent 't' test value of heart rate, respiratory rate, blood pressure, and fasting blood sugar t = 4.1882, t = 3.7139, t =6.0665, t = 6.5562 respectively was found to be statistically significant at p<0.05 level.The calculated 't' test value of SPO_2 t = 1.9339 was not found to be statistically significant at p<0.05 level. This indicates that the administration of structured exercise in the experimental group is effective in improving the level of heart rate, respiratory rate, blood pressure and fasting blood sugar. So, the research hypotheses (H_1) is accepted.

NURSING IMPLICATIONS:

Nursing Practice

- The structured exercise programme can be used among patients undergone cardiac surgery to improve the level of cardiopulmonary parameters post operatively.
- The findings helps the nursing personnel to estimate the impact of structured exercise programme.
- Nurses can utilize the structured exercises to have effective post operative outcome among patients undergone cardiac surgery in clinical practice.
- It helps to improve the standard of providing nursing care by implementing evidence-based nursing practice.

Nursing Education

- This study enhances the nursing student to acquire knowledge about structured exercise programme and understands about the need for patients undergoing cardiac surgeries.
- Evidence-based research studies on post-operative outcomes for patients after cardiac surgery can be included in the nursing curriculum.
- This study lays the groundwork for satisfying the overall needs of patients undergoing heart surgery and ensuring quality of care.

- To improve knowledge of post-operative exercises, a health education programme can be implemented in cardiothoracic intensive care units, as well as medical and surgical wards.
- If students have enough knowledge of post-operative structured exercises, they will be capable of motivating patients in a clinical setting by applying their theoretical knowledge into practise.

Nursing Administration

- The current study assists nursing administrators in encouraging nurses to conduct post-operative structured exercises forpatients undergoing cardiac surgery in clinical settings.
- The study's findings assist the administrator in organising a continuing education programme for nurses on structured exercises forpatients undergoing cardiac surgery.
- Improving nurses' knowledge and competence in adopting post-operative structured exercise programmes will improve their professional status, dignity, and save lives.

Nursing Research

- The findings of this study contribute to the scientific body of professional knowledge for future research.
- Large-scale investigations can be carried out while other important elements are taken into account.
- This study assists the nurse researcher in developing insight in the development of different research methodologies and establishing information for varied settings to promote healthy living.

RECOMMENDATIONS

This study made the following recommendations:

- A similar study in different settings is required in order to generalise the findings.
- A comparable study with a bigger sample size might be conducted to generalise the findings.
- A similar study can be conducted on different physiological parameters.
- A similar study can be conducted among patients undergone thoracic surgery.

CONCLUSION

This study is concluded that the structured exercise programme can be used as an effective tool for better post operative outcomes among patients undergone cardiac surgery. The researcher recommends that the findings should be generalized and other interventional strategies and physiological parameters can also use to improve the quality of life among patients undergone cardiac surgery.

Reference

1. DiMarco RF Jr. Postoperative Care of the Cardiac Surgical Patient. *Surgical Intensive Care Medicine*. 2010: 535–66. doi: 10.1007/978-0-387-77893-8_47. PMCID: PMC7120630.
2. Fontes-Carvalho R. Sampaio F. Teixeira M. et al. The role of a structured exercise training program on cardiac structure and function after acute myocardial infarction: study protocol for a randomized controlled trial. *Trialsjournal* 16. 90 (2015). https://doi.org/10.1186/s13063-015-0612-6
3. https://my.clevelandclinic.org/health/treatments/16897-coronary-artery-bypass-surgery
4. https://my.clevelandclinic.org/health/treatments/17525-heart-surgery

5. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/2380#:~:text=The%20expected%20values%20for%20normal,and%20monitoring%20glycemia%20are%20recommended.