



EFFECTIVENESS OF PHASE I CARDIAC REHABILITATION ON POSTOPERATIVE OUTCOME AMONG PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFT SURGERY IN A TERTIARY CARE CENTRE- A RANDOMIZED CONTROLLED TRIAL

Cardiovascular

Dr. Kavitha Chandran C

Government Nursing College, Kottayam, Kerala, India- Department Of Medical Education

Mrs. Remya J M

Government Medical College, Trivandrum, Kerala, India, Dept- Neuro Surgery

Dr Abdul Rasheed M H

Government Medical College, Trivandrum, Kerala, India, Cardio Thoracic Surgery

ABSTRACT

This study aimed to determine the effectiveness of phase I cardiac rehabilitation on post-operative outcome among patients undergoing CABG. The design was randomized controlled trial. Sample consisted of 50 participants. The participants from experimental group received phase I cardiac rehabilitation along with routine care of the hospital. The control group received routine hospital care only. Result revealed that, phase I cardiac rehabilitation was effective in physiological function including cardiac (mean arterial pressure), respiratory (SpO₂, arterial blood gas values)

KEYWORDS

INTRODUCTION

According to World Health Organization (WHO) reports, the annual age adjusted cardiovascular disease mortality rate in men and women in India is 386 and 283/100,000 respectively.^{1,2,3} Data from India shows a large regional variation with annual mortality rate greater than 250/100,000 in Southern and Eastern region of the country and less than 100/100,000 in Central India.^{4,2} Kerala with a population of over 33 million is the most advanced state in epidemiological transition and the highest prevalence of coronary artery disease risk factor in India.⁵ CABG is a widely used method to bypass or get around the narrowed part of the coronary arteries and improve the blood supply to the heart.⁶ Undergoing cardiac surgery is a challenging and distressing event for patients and families and can trigger negative emotional, physiological, and cognitive responses.^{8,9,10} Comprehensive early rehabilitation (phase I rehabilitation) improves physical and psychological outcome of patients, reduces postoperative hospital stay and thereby improves quality of life.^{11,12,13} Surgical trauma alters the normal activity of the muscles, mainly the diaphragm.¹⁴ The recognition of the importance of cardiac rehabilitation in the treatment of CABG continues to evolve as evidenced in the recent decision by centres for medicare and medicaid services.^{15,16} The impact of cardiac rehabilitation on outcomes in a developing country like India is not presently known.^{17,18}

Methodology

Ethical Statement

This single blinded RCT was conducted following formal permission from institutional research committee, ethics committee, Medical College Hospital Thiruvananthapuram (IRB no: CNT/IEC/42/10/2020)

METHOD

The research design was randomized controlled trial. Sample consisted of 50 participants.. The study setting was cardiovascular and thoracic surgery outpatient department, cardiovascular and thoracic surgery ICU and cardiovascular and thoracic surgery. The participants from experimental group received phase I cardiac rehabilitation along with routine care of the hospital. care on 2 weeks prior to surgery in the out patient department. Motivation and adherence ensured through daily phone calls. They were instructed to follow the health care instructions in the booklet at home upon discharge till first follow up.

The control group received routine hospital care only. The outcome measured post operatively on 3 rd day, before discharge and first follow up day for both groups.

RESULTS

The Socio personal and clinical variable of participants were analysed by frequencies and percentages.

Table 1 Distribution of participants based on age and gender (n =50)

Socio personal Data	Control group (n=25)		Experiment al group (n=25)		Total		χ^2	df	p
	n	%	n	%	n	%			
Age in years	41-50	9	36	7	28	16	0.4	2	0.8
	51-60	12	48	13	52	25			
	61-70	4	16	5	20	9			
	Total	25	100	25	100	50			
Gender	Male	22	88	20	80	42	0.5	1	0.4
	Female	3	12	5	20	8			
	Total	25	100	25	100	50			

Table 1 , shows that,52% participants in the experimental group and 48% participants in the control group belonged to the age group of 51-60 years.

Table 2 Distribution of participants based on body mass index and NYHA functional class, Family history of CAD and History of CAD and other diseases (n=50)

Clinical data	Control group (n=25)		Experim ental group (n=25)		Total		χ^2	df	p
	n	%	n	%	n	%			
	Normal (18.5-22.9 kg/m ²)	5	20	6	24	11			
BMI	Overweight(23.0-24.9 kg/m ²)	11	44	16	64	27	4.3	2	0.8
	Obese (>25 kg/m ²)	9	36	3	12	12			
NYHA	Class II	17	68	16	64	33	0.7	2	0.6
	Class III	6	24	5	20	11			
Family history of CAD	Yes	7	28	9	36	16	0.3	1	0.5
	No	18	72	16	64	34			
History of CAD and other diseases	CAD	9	36	13	52	22			
	Hypertension	7	28	6	24	13			
	Hyperlipidemia	4	16	2	8	6	14.9	16	0.5
	Diabetes Mellitus	5	20	4	16	9			

Table 2 , depictsthat, 64% participants in the experimental group and 44% participants in control group had over weight. Regarding NYHA

functional class of CAD 64% participants in the experimental group 68% participants control group comes under NYHA class II.

64% participants in the experimental group and 72% participants in the control group had no family history of heart diseases. Regarding history of disease, 52% of participants in experimental group and 36% in control group had history of CAD and other diseases.

Table 3 Distribution of participants based on type of surgery (n=50)

Clinic al data	Type of surge ry	Control group(n=25)		Experiment al group (n=25)		Total		χ^2	df	p
		n	%	n	%	n	%			
	On pump CABG	21	84	17	68	38	76			
	Off pump CABG	4	16	8	32	12	24	1.8	1	0.29

Table 3, shows that 68% participants in the experimental group and 84% participants in the control group underwent on pump CABG.

Table 4 Effectiveness of phase I cardiac rehabilitation on post-operative echocardiography (ejection fraction) (n=47)

Echocardiography (EF)	N	Mean	SD	t	p
Experimental group	24	54.8	8.5		
				0.45	0.65
Control group	23	53.9	6.8		

Table 4 compares the Ejection fraction on first follow up between experimental and control group. The experimental group had mean ejection fraction 54.8($\pm$ 8.5SD) and in control group it was 53.9($\pm$ 6.8SD) (p>0.653).

Table 5 Effectiveness of phase I cardiac rehabilitation on mean arterial pressure (n=50; n=47)

Mean arterial pressure	Experimental group			Control group			F ratio	p
	N	Mean	SD	N	Mean	SD		
3 rd postop day	25	104.5	10.8	25	109.2	8.2		
Before discharge	25	100.4	7.4	25	102.3	7.0	1213.27	0.005
First follow up	24	97.5	5.6	23	98.4	6.4		

Table 5 reveals that,experimental group had the mean of mean arterial pressure was 104.5 ($\pm$ 10.8SD), 100.4($\pm$ 7.4SD),97.5($\pm$ 5.6SD), and in control group it was 109.2 ($\pm$ 8.2SD),102.3 ($\pm$ 7.0SD),98.4 ($\pm$ 6.4SD) on 3 rd. post-operative day , before discharge and first follow up respectively.

Table 6 Effectiveness of phase I cardiac rehabilitation on post-operative myocardial infarction and Post- operative arrhythmia (n=50)

Post-operative myocardial infarction		Experiment al group		Control group		χ^2	df	p
		n	%	n	%			
3 rd postop day	Yes	2	8	4	16			
	No	23	92	21	84	0.76	1	0.33
Before discharge	Yes	0	0	0	0			
	No	25	100	25	100			
Post-operative Arrhythmia								
3 rd postop day	Yes	2	8	3	12			
	No	23	92	22	88	0.22	1	0.65
Before discharge	Yes	0	0	0	0			
	No	25	100	25	100			

Table 6 demonstrates that,8 % participants in the experimental group developed post operative myocardial infarction as against 16 % participants in the control group.

8% participants in the experimental group developed post operative arrhythmia as against 12% participants in the control group.

Table 7 Effectiveness of phase I cardiac rehabilitation on ABC (n=50; n=47)

28	International Journal of Scientific Research
----	--

SpO ₂	Experimental group			Control group				
	N	Mean	SD	N	Mean	SD	F ratio	p
3 rd postop day	25	98.0	1.0	25	96.24	0.65		
Before discharge	25	97.68	1.02	25	97.5	0.82	15.58	0.005
First follow up	24	97.5	0.76	23	96.1	0.62		
PaO ₂	25	126.00	13.25	25	124.85	0.009	20.277	0.009
PCO ₂	25	40.08	3.26	25	41.76	4.56	5.61	0.02
pH	25	7.34	0.04	25	7.39	0.07	6.99	0.001
HCO ₃	25	23.42	1.33	25	23.50	1.39	0.060	0.807

Table 7 shows that,Experimental group had a mean SpO₂ of 98.0 ($\pm$ 1.0SD), 97.68($\pm$ 1.02SD), 97.5($\pm$ 0.76SD) and in the control group it was 96.24 ($\pm$ 0.65SD), 97.5($\pm$ 0.82SD), 96.1($\pm$ 0.62SD) on the 3 rd post-operative day, before discharge and first follow up day respectively.

In experimental group the ABG value was PaO₂ 126.00 ($\pm$ 13.25SD), PCO₂ 40.08 ($\pm$ 3.25SD), pH7.34 ($\pm$ 0.03SD), HCO₃ 23.42($\pm$ 1.33SD), and in control group it was PaO₂ 124.85 ($\pm$ 12.25SD), PCO₂ 41.76 ($\pm$ 4.55SD), pH 7.39 ($\pm$ 0.07SD), HCO₃ 23.50($\pm$ 1.39SD), (p<0.05).

REFERENCES

- Ainsworth, B. E., Montoye, H. J., & Leon, A. S. (1994). Methods of assessing physical activity during leisure and work.
- World Health Organization. (2013). Health topics: Cardiovascular diseases. Fact Sheet. Available online: http://www.who.int/cardiovascular_diseases/en/ (accessed on 11 December 2020).
- Gupta, R., Misra, A., Pais, P., Rastogi, P., & Gupta, V. P. (2006). Correlation of regional cardiovascular disease mortality in India with lifestyle and nutritional factors. *International journal of cardiology*, 108(3), 291-300.
- Mony, P. (2009). Geographical epidemiology of cardiovascular disease in India: An exploratory study (Doctoral dissertation, MSc thesis, University of Toronto 2009, Publication No. MR67504. Available from: https://tspace.library.utoronto.ca/bitstream/1807/18899/3/Mony_Prem%20kumar_200911_MSc_Thesis.pdf [accessed on 2011 Mar 1]).
- Soman, C. R., Kutty, V. R., Safraj, S., Vijayakumar, K., Rajamohanam, K., Ajayan, K., & PROLIFE Study Group. (2011). All-cause mortality and cardiovascular mortality in Kerala State of India: results from a 5-year follow-up of 161 942 rural community dwelling adults. *Asia Pacific Journal of Public Health*, 23(6), 896-903.
- Eisenberg, M. J., Filion, K. B., Azoulay, A., Brox, A. C., Haider, S., & Pilote, L. (2005). Outcomes and cost of coronary artery bypass graft surgery in the United States and Canada. *Archives of Internal Medicine*, 165(13), 1506-1513.
- Fuster, V. (2014). Global burden of cardiovascular disease: time to implement feasible strategies and to monitor results. *Journal of the American College of Cardiology*, 64(5), 520-522.
- Briffa, T. G., Hobbs, M. S., Tonkin, A., Sanfilippo, F. M., Hickling, S., Ridout, S. C., & Knuiaman, M. (2011). Population trends of recurrent coronary heart disease event rates remain high. *Circulation: Cardiovascular Quality and Outcomes*, 4(1), 107-113.
- Sipahi, I., Akay, M. H., Dagdelen, S., Bliz, A., & Alhan, C. (2014). Coronary artery bypass grafting vs percutaneous coronary intervention and long-term mortality and morbidity in multivessel disease: meta-analysis of randomized clinical trials of the arterial grafting and stenting era. *JAMA internal medicine*, 174(2), 223-230.
- Sandesara, P. B., Lambert, C. T., Gordon, N. F., Fletcher, G. F., Franklin, B. A., Wenger, N. K., & Sperling, L. (2015). Cardiac rehabilitation and risk reduction: time to "rebrand and reinvigorate". *Journal of the American College of Cardiology*, 65(4), 389-395.
- Anderson, L., Thompson, D. R., Oldridge, N., Zwisler, A. D., Rees, K., Martin, N., & Taylor, R. S. (2016). Exercise based cardiac rehabilitation for coronary heart disease. *Cochrane database of systematic reviews*, (1).
- Anderson, L., Thompson, D. R., Oldridge, N., Zwisler, A. D., Rees, K., Martin, N., & Taylor, R. S. (2016). Exercise based cardiac rehabilitation for coronary heart disease. *Cochrane database of systematic reviews*, (1).
- Anderson, L., Thompson, D. R., Oldridge, N., Zwisler, A. D., Rees, K., Martin, N., & Taylor, R. S. (2016). Exercise based cardiac rehabilitation for coronary heart disease. *Cochrane database of systematic reviews*, (1).
- Pasternak, R. C., Criqui, M. H., Benjamin, E. J., Fowkes, F. G. R., Isselbacher, E. M., McCullough, P. A., ... & Zheng, Z. J. (2004). Atherosclerotic vascular disease conference: writing group I: epidemiology. *Circulation*, 109(21), 2605-2612.
- Jenkins, S. C., Soutar, S. A., Loukota, J. M., Johnson, L. C., & Moxham, J. (1989). Physiotherapy after coronary artery surgery: are breathing exercises necessary?. *Thorax*, 44(8), 634-639.
- Sharif, F., Shoul, A., Janati, M., Kojuri, J., & Zare, N. (2012). The effect of cardiac rehabilitation on anxiety and depression in patients undergoing cardiac bypass graft surgery in Iran. *BMC cardiovascular disorders*, 12, 1-7.
- Detroyer, E., Dobbels, F., Verfaillie, E., Meyfroidt, G., Sergeant, P., & Milisen, K. (2008). Is preoperative anxiety and depression associated with onset of delirium after cardiac surgery in older patients? A prospective cohort study. *Journal of the American Geriatrics Society*, 56(12), 2278-2284.
- Devi, A. M., Dular, S. K., & Yadav, R. (2015). A descriptive study to assess the level of knowledge and attitude regarding menopause among menopausal women in selected rural areas in Faridabad. *International Journal of Advances in Nursing Management*, 3(1), 7-9.