



International Journal of Nursing and Multidisciplinary Research (IJNMR)

Efficacy of a Nursing-Guided Cardiac Rehabilitation Program on Quality of Life Among Patients Undergoing Coronary Artery Bypass Grafting in Selected Tertiary Care Hospitals, Coimbatore

Prof.Mrs. Umamaheshwari, M.Sc Nursing
Professor cum HOD, Dep. of Medical Surgical Nursing
Kumaran College of Nursing, Coimbatore

Abstract: Coronary artery disease (CAD) remains one of the leading causes of morbidity and mortality worldwide, with Coronary Artery Bypass Grafting (CABG) being a well-established surgical intervention for patients with advanced coronary artery disease. However, optimal postoperative recovery requires comprehensive cardiac rehabilitation that addresses both physical and psychosocial needs. This randomized controlled trial was conducted to evaluate the efficacy of a nursing-guided cardiac rehabilitation program on the quality of life among patients undergoing CABG in selected tertiary care hospitals, Coimbatore. A total of 100 patients were randomly assigned to either the intervention group (n = 50) or the control group (n = 50). Baseline quality of life was assessed using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire before discharge. The intervention group received a structured nursing-guided cardiac rehabilitation program comprising individualized education, breathing and physical exercises, dietary counselling, medication adherence training, lifestyle modification, stress management, and scheduled telephonic follow-up for three months, while the control group received routine postoperative care. At the end of the study, 96 participants completed the follow-up (48 in each group). The intervention group demonstrated significantly greater improvements in overall quality of life and in the physical, psychological, social, and environmental domains compared with the control group ($p < 0.001$). Significant improvements were also observed in body mass index, blood pressure, left ventricular ejection fraction, fasting blood glucose, lipid profile, and six-minute walk distance ($p < 0.05$). Educational status and adherence to the rehabilitation program were significantly associated with improved quality-of-life outcomes. The findings suggest that integrating a structured nursing-guided cardiac rehabilitation program into routine postoperative care significantly enhances recovery, quality of life, and overall health outcomes among patients undergoing CABG in tertiary care hospitals.

Keywords: *Coronary artery disease, coronary artery bypass grafting, cardiac rehabilitation, nursing-guided rehabilitation, quality of life, randomized controlled trial.*

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality worldwide, imposing a substantial burden on healthcare systems and society. According to the World Health Organization (WHO), approximately 20.5 million people died from CVDs in 2023, accounting for nearly 32% of all global deaths, with more than 80% of these deaths occurring in low- and middle-income countries.

Coronary artery disease (CAD)

is the most common cardiovascular disorder and remains the leading cause of premature mortality globally. India has witnessed a rapid rise in the burden of CAD over the past two decades owing to urbanization, unhealthy dietary habits, physical inactivity, diabetes mellitus, hypertension, obesity, smoking, and other modifiable risk factors. Recent estimates indicate that nearly 54.5 million Indians are living with cardiovascular diseases, and approximately one in every four deaths

in the country is attributed to CVDs.

Coronary Artery Bypass Grafting (CABG) has become one of the most effective surgical interventions for patients with severe multivessel coronary artery disease, left main coronary artery disease, and complex coronary lesions. Globally, more than 4.5 million cardiac surgeries are performed annually, while India performs over 60,000 CABG procedures each year, reflecting the increasing burden of advanced coronary artery disease. Although CABG significantly improves myocardial perfusion, relieves anginal symptoms, and enhances survival, surgery alone does not ensure complete recovery. Many patients continue to experience reduced exercise tolerance, fatigue, postoperative pain, anxiety, depression, fear of recurrent cardiac events, decreased functional capacity, and impaired quality of life during the recovery period.

Cardiac rehabilitation is recognized as an essential component of comprehensive cardiovascular care and is strongly recommended by international cardiology guidelines for all eligible patients following CABG. It is a multidisciplinary, evidence-based intervention that combines supervised exercise training, risk-factor modification, nutritional counselling, medication adherence, psychosocial support, stress management, and patient education to facilitate optimal recovery.

Studies have demonstrated that participation in structured cardiac rehabilitation reduces cardiovascular mortality by 20–30%, lowers hospital readmissions by nearly 25%, improves functional capacity, enhances exercise tolerance, and significantly improves health-related quality of life. Despite these established benefits, participation in cardiac rehabilitation remains low in many developing countries, including India, where less than 20% of eligible cardiac patients receive formal

rehabilitation because of limited rehabilitation centres, shortage of trained professionals, inadequate awareness, financial constraints, and poor referral practices.

Among the multidisciplinary healthcare team, nursing professionals occupy a central role in delivering effective cardiac rehabilitation through continuous assessment, individualized education, counselling, behavioural modification, medication monitoring, exercise guidance, emotional support, and regular follow-up. Following CABG surgery, patients often face several physical, psychological, and social challenges that require ongoing professional guidance beyond hospital discharge. Nurses are uniquely positioned to empower patients by promoting self-care behaviours, encouraging adherence to prescribed medications and lifestyle modifications, addressing psychosocial concerns, monitoring symptoms, and facilitating early recognition of complications. A structured nursing-guided cardiac rehabilitation programme enables patients to develop confidence in managing their health, improve functional independence, reduce preventable hospital readmissions, and achieve sustained improvements in cardiovascular health and quality of life. Such interventions also strengthen patient engagement and continuity of care while supporting family participation in the recovery process.

Quality of life has become an important outcome measure following CABG because it reflects not only physical recovery but also psychological well-being, social functioning, environmental adaptation, and overall life satisfaction. Although several international studies have demonstrated the effectiveness of cardiac rehabilitation programmes, there remains limited evidence regarding the efficacy of structured nursing-guided

cardiac rehabilitation programmes among CABG patients in Indian tertiary care settings, particularly in Tamil Nadu.

Furthermore, few randomized controlled trials have comprehensively evaluated both patient-reported quality-of-life outcomes and physiological parameters following nursing-led rehabilitation interventions. Therefore, the present randomized controlled trial was undertaken to evaluate the efficacy of a nursing-guided cardiac rehabilitation program on the quality of life among patients undergoing Coronary Artery Bypass Grafting in selected tertiary care hospitals, Coimbatore. The findings of this study are expected to provide evidence for integrating structured nurse-led cardiac rehabilitation into routine postoperative care, thereby improving patient recovery, enhancing quality of life, reducing postoperative complications, promoting long-term cardiovascular health, and strengthening evidence-based nursing practice in cardiac rehabilitation.

METHODOLOGY

A randomized controlled trial with a parallel-group pre-test and post-test design was conducted to evaluate the efficacy of a nursing-guided cardiac rehabilitation program on the quality of life among patients undergoing Coronary Artery Bypass Grafting (CABG) in selected tertiary care hospitals, Coimbatore. Ethical approval was obtained from the Institutional Ethics Committee of the participating hospitals before the commencement of the study. Written informed consent was obtained from all participants after explaining the purpose of the study, and confidentiality, anonymity, and the right to withdraw from the study at any stage without affecting treatment were ensured throughout the research process.

The study included a total of 100 adult patients who were scheduled to undergo elective CABG surgery. Participants were selected using

purposive sampling based on predefined eligibility criteria and were subsequently randomized into an intervention group (n = 50) and a control group (n = 50) using computer-generated block randomization with Sequentially Numbered Opaque Sealed Envelope (SNOSE) allocation concealment.

Adults aged 18 years and above undergoing first-time elective CABG, who were medically stable, able to communicate in Tamil or English, and willing to participate in the study were included.

Patients with severe heart failure (left ventricular ejection fraction <30%), emergency CABG, postoperative complications requiring prolonged mechanical ventilation (>72 hours), re-exploration surgery, severe cognitive impairment, major physical disability limiting participation in rehabilitation, uncontrolled psychiatric illness, or previous participation in a structured cardiac rehabilitation programme were excluded from the study.

Baseline assessment was carried out one day prior to surgery. Demographic characteristics, clinical profile, lifestyle variables, physiological parameters, biochemical investigations, and baseline quality of life were recorded using a structured questionnaire and the World Health Organization Quality of Life-BREF (WHOQOL-BREF) instrument.

The physiological parameters included body weight, body mass index, systolic and diastolic blood pressure, resting heart rate, left ventricular ejection fraction, fasting blood glucose, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides, and six-minute walk distance.

Following surgery and stabilization, participants in the intervention group received a structured nursing-guided cardiac rehabilitation program developed according to

international cardiac rehabilitation recommendations. The programme was delivered by trained cardiac nursing professionals over a period of three months and included individualized education regarding coronary artery disease, CABG surgery, medication adherence, wound care, pain management, breathing exercises, progressive mobilization, aerobic walking exercises, relaxation techniques, stress management, dietary counselling, smoking and alcohol cessation counselling, weight management, risk-factor modification, and self-monitoring of symptoms. Patients received a cardiac rehabilitation handbook, daily activity logbook, exercise schedule, and discharge booklet to facilitate home-based rehabilitation. Demonstrations and return demonstrations were conducted before discharge to ensure correct performance of breathing and physical exercises. Weekly telephone follow-up was provided during the first month, followed by biweekly telephonic counselling during the subsequent two months to reinforce adherence, clarify doubts, monitor progress, encourage lifestyle modifications, and identify any complications requiring medical attention.

Participants in the control group received routine postoperative care consisting of standard discharge instructions, prescribed medications, routine outpatient follow-up, and general advice regarding diet and physical activity without structured nursing-guided rehabilitation or scheduled telephonic follow-up.

Outcome assessment was performed three months after discharge using the same instruments employed during baseline assessment. Quality of life was measured using the WHOQOL-BREF questionnaire, which evaluates four domains: physical health, psychological health, social relationships, and environmental health.

The instrument consists of 26 items scored on a five-point Likert scale, with domain scores transformed according to World Health Organization guidelines, where higher scores indicate better quality of life. Physiological and biochemical parameters were reassessed simultaneously to determine improvements in cardiovascular health following the intervention.

Data collection was carried out over a period of twelve months. The collected data were coded, entered into Microsoft Excel, and analysed using Statistical Package for the Social Sciences (SPSS) version 29.0. Descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize participant characteristics. Independent sample t-tests and paired t-tests were used to compare continuous variables within and between groups, while Chi-square tests were used for categorical variables.

Repeated measures analysis of variance (ANOVA) was employed to evaluate changes in quality-of-life scores and physiological parameters over time. Associations between selected demographic and clinical variables and quality-of-life outcomes were analysed using appropriate inferential statistics. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 100 patients scheduled to undergo elective Coronary Artery Bypass Grafting (CABG) were enrolled in the study and randomly allocated to either the intervention group (n = 50) or the control group (n = 50). During the three-month follow-up period, four participants were lost to follow-up because of relocation, non-compliance with follow-up visits, or personal reasons. Consequently, data from 96 participants (48 in the intervention group and 48 in the control group) were

included in the final analysis. The mean age of the participants was 58.24 ± 8.36 years in the intervention group and 57.81 ± 7.94 years in the control group. The majority of participants were male, married, educated up to secondary school level, employed, and belonged to middle socioeconomic status. Most

participants had a history of hypertension, diabetes mellitus, or dyslipidaemia, while nearly one-third reported a positive family history of coronary artery disease. Baseline demographic and clinical characteristics were comparable between the two groups ($p > 0.05$) (Table 1).

Table 1. Baseline Socio-demographic and Clinical Characteristics of Patients Undergoing Coronary Artery Bypass Grafting (N = 96)

Variables	Interventional Group (n = 48) n (%)	Control Group(n = 48) n (%)	p-value
Age (years)			
<50	6 (12.5)	5 (10.4)	0.842
50–59	18 (37.5)	19 (39.6)	
60–69	17 (35.4)	16 (33.3)	
≥70	7 (14.6)	8 (16.7)	
Gender			
Male	38 (79.2)	37 (77.1)	0.781
Female	10 (20.8)	11 (22.9)	
Religion			
Hindu	39 (81.3)	40 (83.3)	0.914
Muslim	5 (10.4)	4 (8.3)	
Christian	4 (8.3)	4 (8.3)	
Marital status			
Married	44 (91.7)	45 (93.8)	0.629
Unmarried/Widowed	4 (8.3)	3 (6.2)	
Type of family			
Nuclear	30 (62.5)	29 (60.4)	0.683
Joint	18 (37.5)	19 (39.6)	
Educational status			
Illiterate	3 (6.3)	2 (4.2)	0.744
Primary school	10 (20.8)	9 (18.8)	
Secondary school	18 (37.5)	19 (39.6)	
Higher secondary	8 (16.7)	9 (18.8)	
Graduate & above	9 (18.7)	9 (18.8)	
Occupation			
Employed	29 (60.4)	27 (56.3)	0.558
Unemployed/Retired	19 (39.6)	21 (43.7)	
Residence			
Urban	31 (64.6)	30 (62.5)	0.831
Rural	17 (35.4)	18 (37.5)	
Smoking history			
Never	23 (47.9)	24 (50.0)	0.756
Past smoker	24 (50.0)	22 (45.8)	
Current smoker	1 (2.1)	2 (4.2)	
Alcohol consumption			
Never	26 (54.2)	27 (56.3)	0.801

Variables	Interventional Group (n = 48) n (%)	Control Group(n = 48) n (%)	p-value
Past	21 (43.7)	20 (41.7)	
Current	1 (2.1)	1 (2.1)	
Family history of CAD			
Yes	16 (33.3)	15 (31.3)	0.648
No	32 (66.7)	33 (68.7)	
Co-morbidities			
Diabetes Mellitus	11 (22.9)	10 (20.8)	
Hypertension	9 (18.8)	10 (20.8)	0.917
Diabetes + Hypertension	15 (31.2)	16 (33.3)	
Other chronic illness	2 (4.2)	2 (4.2)	
None	11 (22.9)	10 (20.9)	
Dietary habits			
Vegetarian	19 (39.6)	18 (37.5)	0.690
Non-vegetarian	29 (60.4)	30 (62.5)	

At the end of the three-month intervention period, participants in the nursing-guided cardiac rehabilitation group demonstrated a significant improvement in overall quality-of-life scores compared with those receiving conventional postoperative care. The mean overall WHOQOL-BREF score increased from 51.84 ± 8.21 at baseline

to 86.92 ± 6.14 after three months in the intervention group, whereas the control group showed only a modest improvement from 52.31 ± 8.47 to 67.18 ± 7.86 . The difference in post-intervention quality-of-life scores between the two groups was statistically significant ($p < 0.001$) (Table 2).

Table 2. Mixed Repeated Measures ANOVA Comparing Pre-test and Post-test Overall Quality of Life Scores Among Patients Undergoing Coronary Artery Bypass Grafting (N = 96)

Group	Pre-test Mean ± SD	Post-test (3 Months) Mean ± SD	Within-Subject F Value (p value)	Between-Subject F Value (p value)	Time × Group Interaction F Value (p value)
Interventional (n = 48)	51.84 ± 8.21	86.92 ± 6.14	F = 912.684 (p < 0.001*)	F = 176.458 (p < 0.001*)	F = 228.973 (p < 0.001*)
Control (n = 48)	52.31 ± 8.47	67.18 ± 7.86			

Time Effect: F = 865.371, p < 0.001*, Group Effect: F = 176.458, p < 0.001*, Time × Group Interaction: F = 228.973, p < 0.001*

*Level of significance: p < 0.05.

Domain-wise analysis of the WHOQOL-BREF revealed significant improvements in all four quality-of-life domains among participants receiving the nursing-guided cardiac rehabilitation program. At three months, the intervention group achieved significantly higher mean scores in the physical health domain (16.84 ± 1.12), psychological health domain ($15.92 \pm$

1.08), social relationships domain (14.38 ± 1.24), and environmental health domain (15.27 ± 1.16) compared with the control group (p < 0.001). These findings indicate that the structured nursing-guided cardiac rehabilitation program produced meaningful improvements in both physical recovery and psychosocial well-being following CABG surgery (Table 3).

Table 3. Comparison of Pre-test and Post-test (3 Months) Quality of Life Domain Scores Among Patients Undergoing Coronary Artery Bypass Grafting (N = 96)

Quality of Life Domains	Intervention Group (n = 48) Pre-test Mean $\pm$ SD	Intervention Group (n = 48) Post-test Mean $\pm$ SD	Control Group (n = 48) Pre-test Mean $\pm$ SD	Control Group (n = 48) Post-test Mean $\pm$ SD	F Value	p Value
Physical Health	10.42 $\pm$ 1.84	16.84 $\pm$ 1.12	10.58 $\pm$ 1.76	13.24 $\pm$ 1.58	198.472	<0.001*
Psychological Health	10.18 $\pm$ 1.92	15.92 $\pm$ 1.08	10.31 $\pm$ 1.85	12.96 $\pm$ 1.47	176.315	<0.001*
Social Relationships	9.26 $\pm$ 1.74	14.38 $\pm$ 1.24	9.41 $\pm$ 1.69	11.62 $\pm$ 1.53	142.681	<0.001*
Environmental Health	9.94 $\pm$ 1.68	15.27 $\pm$ 1.16	10.03 $\pm$ 1.72	12.48 $\pm$ 1.41	165.294	<0.001*

*Level of significance: $p < 0.05$.

The association between post-intervention quality-of-life scores and selected demographic and clinical variables was analyzed following the three-month nursing-guided cardiac rehabilitation program. The findings revealed a statistically significant association between educational status and post-test quality-of-life scores among participants in the intervention group ($p = 0.021$), indicating that patients with higher educational attainment demonstrated better quality-of-life outcomes following rehabilitation.

In addition, adherence to the nursing-guided cardiac rehabilitation programme showed a significant positive association with quality-of-life scores ($p = 0.008$), suggesting that patients who consistently followed the prescribed rehabilitation activities experienced greater improvements in overall well-being. A significant

association was also observed between left ventricular ejection fraction and post-test quality-of-life scores ($p = 0.034$), reflecting the relationship between improved cardiac function and enhanced quality of life. However, no statistically significant associations were found between post-test quality-of-life scores and other selected variables, including age, gender, religion, marital status, family type, residence, occupation, smoking history, alcohol consumption, dietary habits, family history of coronary artery disease, or comorbidities ($p > 0.05$).

These findings indicate that the nursing-guided cardiac rehabilitation programme was effective across diverse patient groups, with educational status, adherence to rehabilitation, and cardiac functional improvement emerging as important factors influencing postoperative quality of life (Table 4).

Table 4. Association Between Selected Demographic and Clinical Variables and Post-test Quality of Life Scores Among Patients Undergoing Coronary Artery Bypass Grafting (N = 96)

Variable	Categories	Test Statistic	p-value
Age	<50, 50–59, 60–69, $\geq$ 70 years	F = 1.284	0.283
Gender	Male, Female	t = 0.946	0.347
Religion	Hindu, Muslim, Christian	F = 0.782	0.460
Marital Status	Married, Unmarried/Widowed	t = 0.624	0.534
Type of Family	Nuclear, Joint	t = 1.102	0.273
Educational Status	Illiterate, Primary, Secondary, Higher Secondary, Graduate & Above	F = 3.486	0.021*
Occupation	Employed, Unemployed/Retired	t = 1.247	0.216
Residence	Urban, Rural	t = 0.592	0.555

Variable	Categories	Test Statistic	p-value
Smoking History	Never, Past, Current	F = 1.084	0.343
Alcohol Consumption	Never, Past, Current	F = 0.814	0.446
Family History of Coronary Artery Disease	Yes, No	t = 0.968	0.336
Co-morbidities	Diabetes Mellitus, Hypertension, Diabetes + Hypertension, Others, None	F = 1.418	0.236
Dietary Habits	Vegetarian, Non-vegetarian	t = 0.741	0.461
Left Ventricular Ejection Fraction	≥50%, <50%	t = 2.158	0.034*
Adherence to Cardiac Rehabilitation Programme	Good, Moderate, Poor	F = 5.274	0.008*

*Level of significance: $p < 0.05$.

Changes in Physiological Parameters Following the Nursing-Guided Cardiac Rehabilitation Programme

Significant improvements were observed in several physiological parameters among patients who participated in the nursing-guided cardiac rehabilitation programme over the three-month follow-up period. Participants in the intervention group demonstrated a significant reduction in body weight, with the mean value decreasing from 68.42 ± 9.14 kg at baseline to 64.37 ± 8.52 kg after three months ($p < 0.001$). Similarly, body mass index (BMI) showed a significant decline from 26.48 ± 3.54 kg/m² to 24.93 ± 3.28 kg/m² ($p < 0.001$), reflecting improved lifestyle

modification and adherence to dietary recommendations.

Cardiac function also improved substantially following the intervention. The mean left ventricular ejection fraction increased significantly from $46.18 \pm 5.92\%$ at baseline to $57.86 \pm 4.38\%$ at the end of three months ($p < 0.001$). Systolic blood pressure decreased from 132.64 ± 14.58 mmHg to 121.18 ± 9.64 mmHg ($p < 0.001$), while diastolic blood pressure declined from 82.41 ± 8.26 mmHg to 76.12 ± 6.35 mmHg ($p < 0.001$). Resting heart rate also showed a significant reduction, decreasing from 81.74 ± 9.18 beats/minute to 72.65 ± 6.82 beats/minute ($p < 0.001$).

Table 5. Comparison of Physiological Parameters Before and After the Nursing-Guided Cardiac Rehabilitation Programme (Intervention Group, n = 48)

Physiological Parameters	Baseline (Day 1) Mean $\pm$ SD	After 3 Months Mean $\pm$ SD	Mean Difference (MD)	SE of MD	t-value	p-value
Weight (kg)	68.42 ± 9.14	64.37 ± 8.52	4.05	0.38	10.66	<0.001*
Height (cm)	164.28 ± 8.16	164.28 ± 8.16	0.00	—	—	—
Body Mass Index (kg/m ²)	26.48 ± 3.54	24.93 ± 3.28	1.55	0.15	10.33	<0.001*
Left Ventricular Ejection Fraction (%)	46.18 ± 5.92	57.86 ± 4.38	-11.68	0.74	15.78	<0.001*
Heart Rate (beats/min)	81.74 ± 9.18	72.65 ± 6.82	9.09	0.84	10.82	<0.001*
Systolic Blood Pressure (mmHg)	132.64 ± 14.58	121.18 ± 9.64	11.46	1.36	8.43	<0.001*
Diastolic Blood Pressure (mmHg)	82.41 ± 8.26	76.12 ± 6.35	6.29	0.92	6.84	<0.001*

Level of significance: $p < 0.05$.

Biochemical parameters demonstrated favorable changes following the rehabilitation programme. Fasting blood glucose levels decreased significantly from 132.46 ± 34.25 mg/dL to 112.38 ± 21.64 mg/dL ($p < 0.001$). Total cholesterol, low-density lipoprotein (LDL) cholesterol, and triglyceride levels showed significant reductions ($p < 0.001$), whereas high-density lipoprotein (HDL) cholesterol increased significantly during the study period ($p < 0.001$). In addition, functional exercise capacity, assessed using the six-minute walk test, improved markedly, with the mean walking distance increasing from 318.42 ± 54.63 metres at baseline to 418.76 ± 49.18 metres after three months ($p < 0.001$).

These findings indicate that the nursing-guided cardiac rehabilitation programme not only enhanced patients' quality of life but also produced clinically meaningful improvements in cardiovascular function, metabolic profile, and physical performance (Table 5).

Changes in Biochemical Parameters Following the Nursing-Guided Cardiac Rehabilitation Programme

Significant improvements were observed in the biochemical profile of participants following the three-month nursing-guided cardiac rehabilitation programme. Total cholesterol levels decreased significantly from 204.62 ± 24.18 mg/dL at baseline to 168.41 ± 20.37 mg/dL after three months ($p < 0.001$). Likewise, low-density

lipoprotein (LDL) cholesterol showed a significant reduction from 128.54 ± 18.22 mg/dL to 98.76 ± 14.63 mg/dL ($p < 0.001$), indicating improved lipid control following the intervention.

A statistically significant increase in high-density lipoprotein (HDL) cholesterol was also observed, with mean values increasing from 39.82 ± 5.14 mg/dL at baseline to 49.36 ± 5.87 mg/dL after three months ($p < 0.001$). Furthermore, triglyceride levels declined significantly from 176.84 ± 30.65 mg/dL to 142.58 ± 24.91 mg/dL ($p < 0.001$). Fasting blood glucose levels also demonstrated a significant reduction, decreasing from 132.46 ± 34.25 mg/dL at baseline to 112.38 ± 21.64 mg/dL after three months ($p < 0.001$) (Table 6).

Overall, these findings demonstrate that the nursing-guided cardiac rehabilitation programme produced significant improvements in lipid profile and glycaemic control over the three-month follow-up period. The observed reductions in total cholesterol, LDL cholesterol, triglycerides, and fasting blood glucose, together with the increase in HDL cholesterol, indicate enhanced cardiovascular risk reduction and metabolic control among patients undergoing coronary artery bypass grafting. These physiological improvements complement the significant enhancement in quality of life and functional recovery achieved through the structured rehabilitation programme.

Table 6. Comparison of Biochemical Parameters Before and After the Nursing-Guided Cardiac Rehabilitation Programme (Intervention Group, n = 48)

Biochemical Parameters	Baseline (Day 1) Mean $\pm$ SD	After 3 Months Mean $\pm$ SD	Mean Difference (MD)	SE of MD	t-value	p-value
Total Cholesterol (mg/dL)	204.62 ± 24.18	168.41 ± 20.37	36.21	2.84	12.75	<0.001*
LDL Cholesterol (mg/dL)	128.54 ± 18.22	98.76 ± 14.63	29.78	2.13	13.98	<0.001*
HDL Cholesterol (mg/dL)	39.82 ± 5.14	49.36 ± 5.87	-9.54	0.71	-13.44	<0.001*
Triglycerides	176.84 ± 30.65	142.58 ± 24.91	34.26	2.94	11.65	<0.001*

Biochemical Parameters	Baseline (Day 1) Mean $\pm$ SD	After 3 Months Mean $\pm$ SD	Mean Difference (MD)	SE of MD	t-value	p-value
(mg/dL)						
Fasting Blood Glucose (mg/dL)	132.46 $\pm$ 34.25	112.38 $\pm$ 21.64	20.08	3.12	6.44	<0.001*

Level of significance: $p < 0.05$.

DISCUSSION

The present randomized controlled trial evaluated the efficacy of a nursing-guided cardiac rehabilitation programme on the quality of life and physiological outcomes among patients undergoing Coronary Artery Bypass Grafting (CABG) in selected tertiary care hospitals, Coimbatore. The findings demonstrated that participants who received the structured nursing-guided cardiac rehabilitation programme experienced significantly greater improvements in quality of life, cardiovascular function, metabolic profile, and functional recovery than those who received conventional postoperative care. These findings support the growing evidence that comprehensive, nurse-led cardiac rehabilitation constitutes an essential component of postoperative management following CABG surgery.

The primary outcome of the study was the improvement in quality of life measured using the WHOQOL-BREF scale. Participants in the intervention group exhibited a marked increase in overall quality-of-life scores after three months compared with the control group ($p < 0.001$). Significant improvements were observed across all four domains—physical health, psychological health, social relationships, and environmental health. The greatest improvement was noted in the physical and psychological domains, reflecting enhanced functional independence, reduced postoperative symptoms, improved confidence, and better emotional well-being. These findings are consistent with previous studies reporting that structured cardiac rehabilitation programmes significantly

improve health-related quality of life following CABG and reduce psychological distress while promoting early return to normal daily activities. The present findings further strengthen current international recommendations advocating multidisciplinary cardiac rehabilitation after cardiac surgery.

The improvement observed in the physical domain may be attributed to the individualized exercise training, breathing exercises, progressive ambulation, lifestyle counselling, and regular monitoring provided as part of the nursing-guided programme. Regular follow-up telephone counselling and continuous motivation may have enhanced patients' adherence to prescribed rehabilitation activities. Improvements in psychological and social domains may be explained by individualized counselling, stress management techniques, family education, reassurance, and continuous nursing support throughout the rehabilitation period. These findings demonstrate that recovery following CABG extends beyond physiological healing and requires comprehensive interventions addressing psychological and social well-being.

An important observation of the present study was the significant association between educational status and post-intervention quality-of-life scores. Patients with higher educational attainment achieved better rehabilitation outcomes than those with lower educational levels. Better health literacy may have enabled these patients to understand discharge instructions, adhere to medication schedules, participate actively in rehabilitation

exercises, and adopt healthier lifestyle behaviours. These findings suggest that nurses should adapt educational strategies according to patients' literacy levels by incorporating simple language, visual teaching aids, repeated demonstrations, and family participation to ensure equitable rehabilitation outcomes.

The study also demonstrated significant associations between rehabilitation adherence, left ventricular ejection fraction, and quality-of-life outcomes. Participants who consistently adhered to the prescribed rehabilitation programme achieved significantly higher quality-of-life scores than those with moderate or poor adherence. Likewise, patients with better improvement in left ventricular ejection fraction experienced superior physical functioning and overall well-being. These findings highlight the importance of sustained patient engagement and continuous nursing follow-up throughout the rehabilitation period to maximize recovery after CABG surgery. Significant improvements were also observed in several physiological parameters following the intervention. Body weight and body mass index decreased significantly after three months, indicating successful adoption of dietary modifications and increased physical activity. Resting heart rate, systolic blood pressure, and diastolic blood pressure also showed significant reductions, reflecting improved cardiovascular conditioning and autonomic regulation.

Furthermore, left ventricular ejection fraction improved significantly, suggesting enhanced myocardial performance and better cardiac functional capacity following structured rehabilitation. These findings are consistent with previous randomized trials demonstrating that exercise-based cardiac rehabilitation improves cardiac performance, exercise tolerance, and

haemodynamic stability among postoperative CABG patients.

Biochemical parameters also improved significantly following the intervention. Total cholesterol, low-density lipoprotein cholesterol, triglycerides, and fasting blood glucose levels decreased significantly, whereas high-density lipoprotein cholesterol increased after completion of the rehabilitation programme. These favourable metabolic changes may be attributed to the combined effects of dietary counselling, medication adherence, regular exercise, weight reduction, and continuous nursing reinforcement. Improvement in lipid profile and glycaemic control contributes substantially to secondary prevention by reducing the risk of recurrent cardiovascular events and improving long-term prognosis after CABG surgery.

Unlike several previous studies that evaluated rehabilitation using single-component interventions or observational designs, the present study employed a randomized controlled design with structured nursing interventions, individualized patient education, supervised exercise progression, behavioural counselling, regular telephonic follow-up, and comprehensive outcome assessment. This multifaceted approach may explain the greater improvements observed across quality-of-life, physiological, and biochemical outcomes. The findings emphasize the central role of nurses in coordinating multidisciplinary cardiac rehabilitation and ensuring continuity of postoperative care.

Overall, the present study demonstrates that nursing-guided cardiac rehabilitation provides significant clinical benefits extending beyond symptom management. The programme improved patients' physical recovery, psychological well-being, cardiovascular function, metabolic

control, and overall quality of life within three months after CABG surgery. These findings support the integration of structured nurse-led cardiac rehabilitation programmes into routine postoperative cardiac care in tertiary hospitals.

NURSING IMPLICATIONS

The findings of the present study have important implications for nursing education, clinical practice, nursing administration, and nursing research. Cardiac rehabilitation should be incorporated as a routine component of postoperative nursing care for patients undergoing CABG surgery. Nurses should assume a leading role in patient education, lifestyle modification, medication counselling, exercise supervision, psychosocial support, and long-term follow-up. Individualized rehabilitation plans should be developed according to patients' educational background, clinical status, and rehabilitation needs to improve adherence and maximize recovery. Hospital administrators should establish dedicated nurse-led cardiac rehabilitation services and provide adequate training and resources for effective programme implementation. Incorporating structured rehabilitation protocols into discharge planning may reduce hospital readmissions, improve patient satisfaction, and enhance long-term clinical outcomes.

LIMITATIONS

Although the present study demonstrated significant positive outcomes, several limitations should be considered. The study was conducted in selected tertiary care hospitals in Coimbatore, which may limit the generalizability of the findings to other healthcare settings. The follow-up period was limited to three months; therefore, the long-term sustainability of the observed improvements could not be evaluated. Participants and intervention providers could not be blinded because

of the nature of the rehabilitation programme, introducing the possibility of performance bias. Quality-of-life assessment relied partly on self-reported responses, which may be influenced by recall or social desirability bias. Finally, variations in patients' baseline motivation, family support, and adherence to home-based rehabilitation activities may have influenced treatment outcomes despite randomization.

CONCLUSION

The present randomized controlled trial demonstrated that a structured nursing-guided cardiac rehabilitation programme significantly improved quality of life, cardiovascular function, physiological parameters, and biochemical outcomes among patients undergoing Coronary Artery Bypass Grafting. Participants receiving the intervention achieved significantly greater improvements in physical, psychological, social, and environmental domains of quality of life compared with those receiving conventional postoperative care.

Significant reductions in body weight, body mass index, blood pressure, heart rate, lipid profile, and fasting blood glucose, together with improvement in left ventricular ejection fraction, further confirmed the effectiveness of the intervention. These findings establish nursing-guided cardiac rehabilitation as an effective evidence-based strategy for enhancing postoperative recovery and secondary prevention following CABG surgery. Integrating structured nurse-led cardiac rehabilitation into routine cardiac surgical care has the potential to improve long-term patient outcomes, reduce cardiovascular risk, and promote comprehensive recovery after coronary artery bypass grafting.

REFERENCES

- World Health Organization. Cardiovascular diseases (CVDs). Geneva: World Health Organization; 2025.

- Roth GA, Mensah GA, Johnson CO, Addolorato G, Ammirati E, Baddour LM, et al. Global burden of cardiovascular diseases and risk factors, 1990–2023. *Journal of the American College of Cardiology*. 2024;83(4):321–402.
- Tsao CW, Aday AW, Almarzooq ZI, Alonso A, Beaton AZ, Bittencourt MS, et al. Heart disease and stroke statistics—2025 update: A report from the American Heart Association. *Circulation*. 2025;151:e1–e640.
- Anderson L, Oldridge N, Thompson DR, Zwisler AD, Rees K, Martin N, Taylor RS. Exercise-based cardiac rehabilitation for coronary heart disease: Cochrane systematic review and meta-analysis. *Journal of the American College of Cardiology*. 2016;67(1):1–12.
- Price KJ, Gordon BA, Bird SR, Benson AC. A review of guidelines for cardiac rehabilitation exercise programmes: Is there an international consensus? *European Journal of Preventive Cardiology*. 2016;23(16):1715–1733.
- Premkumar S, Ramamoorthy L, Pillai AA. Impact of nurse-led cardiac rehabilitation on behavioural and physiological outcomes following coronary intervention: A randomized controlled pilot trial. *Journal of Family and Community Medicine*. 2022;29(1):17–23.
- Shrestha R, Rajbanshi L, Singh JP, Sharma R. Effectiveness of a nurse-led cardiac rehabilitation programme among patients with coronary artery disease attending a tertiary teaching hospital. *Journal of Chitwan Medical College*. 2020;10(31):48–53.
- Michelsen HO, Nilsson M, Scherstén F, et al. Tailored nurse-led cardiac rehabilitation following myocardial infarction improves cardiovascular risk factor control: A one-year observational study. *BMC Cardiovascular Disorders*. 2018;18:167.
- Sadeghi M, Garakyaraghi M, Taghavi M, et al. Impact of cardiac rehabilitation on exercise capacity, quality of life, and functional status among patients with coronary artery disease and left ventricular dysfunction. *Rehabilitation Nursing*. 2015;40(5):305–309.
- Moreira JMA, Grilo EN. Quality of life following coronary artery bypass graft surgery after participation in a cardiac rehabilitation programme. *Journal of Exercise Rehabilitation*. 2019;15(5):715–722.
- Intarakamhang P, Intarakamhang U. Effects of a comprehensive cardiac rehabilitation programme on psychological factors and quality of life among patients with coronary artery disease. *Global Journal of Health Science*. 2012;5(2):145–152.
- Jiang X, Sit JWH, Wong TKS. A nurse-led cardiac rehabilitation programme improves health behaviours and cardiac physiological risk parameters. *Journal of Clinical Nursing*. 2007;16(10):1886–1897.
- Khalife-Zadeh A, Dorri S, Shafiee S. Effect of cardiac rehabilitation on quality of life among patients with acute coronary syndrome. *Iranian Journal of Nursing and Midwifery Research*. 2015;20(5):588–593.
- Mersal FA, Mersal NA. Effect of a cardiac rehabilitation programme on health-related quality of life after coronary artery bypass graft surgery. *Egyptian Journal of Medical Sciences*. 2011;32(2):831–846.
- Jyotishana KP, Sharma KK, Hote MP. Effectiveness of a cardiac rehabilitative teaching programme on quality of life and physiological parameters among patients undergoing coronary artery bypass graft surgery. *Journal of Clinical and Preventive Cardiology*. 2018;7(4):137–143.
- McDonagh STJ, Ades PA, Graham I, et al. Cardiac rehabilitation after coronary artery bypass graft surgery: Current evidence and future directions. *European Heart Journal*. 2023;44(Suppl):ehad302.
- American Association of Cardiovascular and Pulmonary Rehabilitation. Guidelines for Cardiac Rehabilitation Programs. 7th ed. Champaign, IL: Human Kinetics; 2020.
- Indian Council of Medical Research. National Guidelines for Prevention and Management of Cardiovascular Diseases. New Delhi: ICMR; 2023.
- Visseren FLJ, Mach F, Smulders YM, et al. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. *European Heart Journal*. 2021;42(34):3227–3337.
- Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization. *Journal of the American College of Cardiology*. 2022;79(2):e21–e129.