Cardiac Rehabilitation: Improving Outcomes After Heart Surgery

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ABSTRACT:
Background: Cardiac rehabilitation has long been known to be an integral part of the recovery process following cardiac surgery, with the intention to improve exercise capacity, minimize complications, and improve the general quality of life. Although it has been evidenced that its use has beneficial effects; variations in patient compliance and clinical outcomes existed in populations, and therefore, should be further evaluated among local healthcare facilities.
Objective: The purpose of the study was to evaluate the effect of a structured cardiac rehabilitation program on clinical outcomes, functional performance, and quality of life in patients after heart surgery.
Methods: This study was carried out at Shifa International Hospital, Islamabad, Pakistan, over a period of one year from June 2024 to May 2025. In all, 80 post–heart surgery patients had been recruited. The participants had been enrolled in a structured program of cardiac rehabilitation, including supervised exercise training, lifestyle modification counseling, nutritional guidance and psychological support. The data were obtained from the clinical evaluation, the exercise tolerance test and the standardized questionnaires at baseline and after the end of the rehabilitation program. Stats used to analyze statistical significance of improvement of functional status, complications, and overall patient reported results.
Results: It was found that among the patients participating at the cardiac rehabilitation program there were significant improvements in exercise tolerance reaching an average approximately 28% increase in functional capacity with respect to the basal level. Quality of life scores had significantly improved in physical, psychological, and social areas. The risk of postoperative complication (arrhythmias, re-hospitalization) was also significantly reduced in those with rehabilitation by 18%. The patients had far better compliance with lifestyle modification and medications as well.
CONCLUSION: The study concluded that CR played a significant role in improving recovery following heart surgery. It not only increased functional patient results and quality of life, but also lessened postoperative complications and promoted general patient health. These results indicated the necessity for incorporating well-structured cardiac rehabilitation programs as a part of routine care for cardiac patients undergoing surgery in Pakistan.
Keywords: Cardiac rehabilitation, heart surgery, functional outcomes, quality of life, post-operative complications, patient recovery.

INTRODUCTION:

Cardiac surgery had long been acknowledged as a life-saving treatment for patients with end-stage cardiovascular diseases such as coronary artery disease, valvular heart disease, and congenital heart disease. Although surgical advances had been considerable and the postoperative survival had increased, the immediate postoperative period had still represented a time of considerable risk for patients [1]. These

barriers frequently involved physical disability, emotional distress, and lifestyle alterations, as well as fears of adverse outcomes following surgery. It was clear that the road to recovery was going to be longer than the time spent in the operating room; they needed help to get — and stay — on the path to the healthiest outcomes possible.

Cardiac rehabilitation was developed as a holistic, interdisciplinary program to cater for these requirements [2]. It had traditionally been an outpatient, physician-prescribed program that included exercise training, education in heart-healthy living, counseling to relieve stress and support to change behavior. Rehabilitation had aimed at increasing physical fitness, decreasing cardiac complaint, enhancing QOL and minimizing recurrent cardiac events. Systematic research across settings had shown that enrolment in cardiac rehabilitation was linked with lower rates of hospital readmission, improved functional capacity and better psychosocial health [3].

Forward looking, the relevance of cardiac rehabilitation had also been underscored by an increasing burden of cardiovascular disease worldwide. In the conscient of lack of expensive medical facilities, management after surgery was often suboptimal due to unawareness, limited follow-up and neglect to lifestyle change. The patients after heart surgery were particularly vulnerable considering high recurrence rate of cardiovascular events following non-structured rehabilitation [4]. It was this reason that cardiac rehabilitation had not only been deemed a therapeutic supplement, but also a keystone of the complete cardiac care.

The physiological benefits of cardiac rehabilitation were well established. Scheduled supervised training had significantly improved myocardial economy, circulation and skeletal muscle performance. There was better physical exercise tolerance and a lower incidence of arrhythmias or ischemic episodes in patients who had followed exercise prescription. Rehabilitation had also played a role in treating modifiable cardiovascular risk factors [5]. By personalized educational interventions, patients were motivated to properly control consequences of hypertension, diabetes, obesity and hyperlipidemia. Rehabilitation programs had also included smoking cessation, better diets, and strategies to reduce stress, with the result that the overall risk profile for the heart on average became appreciably lower.

Just as important, however, was the psychosocial aspect of cardiac rehab. Most of the patients suffered from anxiety, depression, or had a fear of physical exertion after the heart operation. Unmitigated, these psychosocial barriers had derailed recovery and follow-up to medical recommendations [6].

Rehabilitation programs had consisted of counselling, peer support, and coping strategies which had reduced distress and given patients a sense of control over their condition. Accordingly, patients also said they were more confident and motivated to make sustainable improvements in their habits.

Cardiac rehabilitation utilization has been suboptimal in the past, despite the known advantages. A limited referral by healthcare providers, a scarcity of structured programs, economic constraints, and patient resistance had been barriers to the use of it [7]. Adoption was even lower in low- and middle-income regions, such as South Asia, and missed opportunities to make a difference in postoperative outcomes. This problem highlighted the need for more awareness and accessibility and the need to integrate rehabilitation into a standard postoperative care protocol.

As such, cardiac rehabilitation had been a crucial means to optimize outcomes following heart surgery. It had blended medical, physical and psychological methods to aid recovery and minimize future risk. The assessment of the efficacy of rehabilitation programs and the encouragement of its implementation were major milestones in the attempt to improve cardiac patient-survival, decrease complications and improve health status [8].

MATERIALS AND METHODS:

This was a study which included patients from Shifa International Hospital, Islamabad between June 2024 to May 2025 to determine the role of cardiac rehabilitation in outcomes after cardiac surgery. Eighty patients with history of heart surgery were involved in the study.

Study Design

The study was performed as a prospective observational analysis. Patients were monitored in the early post-surgical phase up to completion of an organized cardiac rehabilitation program. Results of interest were physical performance, intra and post-operative complications, psychological well-being, and quality of life.

Study Population

The study population consists of 80 male/female aged from 30 to 70 years who were scheduled electively and non-electively for cardiac surgery (CABG, replacement and combined) operations. A purposive sampling was used to choose all the respondents.

Inclusion Criteria

Patients aged 30–70 years.

Patients who have had heart surgery and were medically stable for rehabilitation.

Patients who are able to give informed consent and participate.

Exclusion Criteria

Patients undergoing surgery with serious post-operative complications (e.g. stroke, multi-organ failure).

Patients with end-stage of life diseases or terminal diseases.

Patients with psychiatric disorder and lack of cooperation.

Intervention Protocol

The setting for cardiac rehabilitation was multidisciplinary and included cardiologists, physiotherapists, dietitians, and psychologists. The rehabilitation program included the following phases:

Phase I (Inpatient Phase): Started right after surgery with patients still in hospital. It consisted of activity commenced at an early stage, breathing practice, and life modification education.

Outpatient Phase (Phase II) In the first 12 weeks after hospital discharge. The patients participated in 3 supervised exercise sessions per week, which included aerobic training, resistance exercises, and flexibility training. Intensity was based on individual tolerance and was supervised via heart rate and blood pressure.

Maintenance phase (Phase III): Patients were encouraged to maintain their exercise practice independently at home. Monthly follow-up was made to reenforce the complaisance and to manage unexpected questions.

Data Collection

Data were obtained at baseline (after surgery, before the rehabilitation) and post rehabilitation program. Standardized instruments and clinical measures included:

6 MWT: Six Minute Walk Test to evaluate functional capacity.

HADS (Hospital Anxiety and Depression Scale): To assess psychological status.

Quality of Life Short Form (SF-36): An instrument assessing the individual's health quality of life.

Clinical factors: Measurement of BP, lipid profile, and BMI as markers for risk factor control.

Data Analysis

Data were collected and analyzed with SPSS version 26.0. We used descriptive statistics to summarize demographic statistics. Clinical variables between pre- and post-rehabilitation assessment were compared using paired sample t-tests, and chi-square tests for categorical variables. A p-value < 0.05 was considered as statistically significant.

Ethical Considerations

The research was given ethical clearance from the Institutional Review Board (IRB), Shifa International Hospital, Islamabad. All participants provided written informed consent. The privacy of patient information remained protected, and participation was completely voluntary and could be ended at any time.

RESULTS:

This was a descriptive cross-sectional study carried out at Shifa International Hospital, Islamabad, from June 2024 to May 2025 and included 80 post cardiac surgery patients. Studies were reviewed with the objective of assessing the functional status, quality of life, and decrease in the complications after patients went through a regime of structured cardiac rehabilitation.

Table 1: Baseline and Post-Rehabilitation Clinical Outcomes of Patients (n=80):

Parameter	Baseline (Mean ± SD)	Post-Rehabilitation (Mean ± SD)	p-value
Left Ventricular Ejection Fraction (LVEF, %)	45.8 ± 6.2	53.4 ± 5.9	<0.001
6-Minute Walk Test (6MWT, meters)	280.6 ± 52.4	390.3 ± 48.9	<0.001
Resting Heart Rate (beats/min)	84.5 ± 7.1	75.2 ± 6.4	<0.001
Systolic Blood Pressure (mmHg)	138.7 ± 12.8	126.4 ± 10.7	<0.001
Diastolic Blood Pressure (mmHg)	86.3 ± 8.5	78.6 ± 7.4	<0.001

Results from this study emphasized the importance of cardiac rehabilitation services in enhancing clinical and psychosocial outcomes post heart surgery. According to Table 1 the patients' cardiac function and physical capacity were significantly ameliorated. LVEF significantly improved from 45.8% to 53.4% showing enhanced myocardial performance. Exercise capacity as assessed by the 6MWT also increased by about 110 m, indicating improved physical performance and functional status.

BP and HR at rest also showed a decrease, indicating an improvement in cardiovascular modulation and a lessening of hemodynamic stress. Systolic BP was reduced from 138.7 to 126.4 mmHg and diastolic BP was reduced from 86.3 to 78.6 mmHg. These changes were statistically significant and reflected the effect of lifestyle modification and exercise aspects of the rehabilitation program.

Table 2: Quality of Life and Complications Before and After Cardiac Rehabilitation (n=80):

Parameter	Pre-Rehabilitation (n, %)	Post-Rehabilitation (n, %)	p-value
Improved Quality of Life (WHOQOL Score ≥70)	22 (27.5%)	63 (78.7%)	<0.001
Reported Fatigue	51 (63.7%)	18 (22.5%)	<0.001
Hospital Readmissions	15 (18.7%)	5 (6.2%)	0.014
Post-Surgical Depression/Anxiety	29 (36.2%)	11 (13.7%)	<0.001
Major Cardiac Events	7 (8.7%)	2 (2.5%)	0.089

Secondary outcomes Table 2 highlighted the quality of life and secondary effect of rehabilitation. The ratio of patients who had good quality of life scores (WHOQOL ≥70) increased significantly from 27.5% at baseline to 78.7% after rehabilitation, indicating the psychological and functional advantages of structured rehabilitation programs. Likewise, self-reported fatigue decreased from 63.7% to 22.5%, indicating fewer energy loss and daily activity intolerance.

There was also a marked reduction in hospital readmission rate from 18.7% to 6.2% that demonstrates both improved self-care education and decrease in post-operative complications. The prevalence of depression and anxiety reduced from 36.2% to 13.7%, indicating psychological benefits following counseling, peer support, and stress management techniques provided in the rehabilitation program. The decrease in major cardiac events from 8.7% to 2.5% was not statistically significant (p=0.089), but

trended favorably and was clinically important.

On the whole, these findings showed that cardiac rehabilitation not only increased indicators of physiologic status, but also increased patients' psychologic wellness to a statistically significant degree and with a significant reduction (when compared with odds) in recurrent hospitalizations. ET-LS-PS was a holistic remedy for recovering from cardiac surgery and employing an exclusive approach for the treatment of both physiological and psychological stress.

DISCUSSION:

The results of the present study testified to the importance of cardiac rehabilitation in the enhancement of the results of heart surgery. Those patients who underwent structured rehabilitation programs showed more favorable patterns of recovery, in both physical health and psychological aspects, compared to their not-rehabilitated counterparts [9]. Findings indicated that cardiac rehabilitation was not only an add-on procedure to surgery, but also an indispensable agent in post-operative care to improve the long-term health status.

One of the significant findings was that rehabilitation promoted a faster recovery to functional independence. Patients increased the capacity for exercise and physical fitness, which demonstrated the utility of physical training monitored in the hospital. These findings were similar to those of previous investigations, which suggested that rehabilitation increased peak VO (2) and decreased total cardiac work [10]. They put so much focus on slow, controlled movement; you could rebuild strength without overdoing it after surgery and avoiding complications.

A psychological recovery was another significant advantage of rehabilitation. Anxiety and depression could develop in some patients after surgery, more likely caused by change of reflecting mode, fear of recurrence and unknown long-term postoperative results. Rehabilitation programs including counselling and psychosocial support were found to ameliorate some of these symptoms [11]. An enhanced mental health translated into better compliance to treatments, healthier life-style and, hence, stronger patient motivation to practice physical training. These were important in reducing secondary cardiac events and enhancing quality of life.

Moreover, this work demonstrated that controlling preventable cardiovascular risk factors is an important role of rehabilitation. Those patients who attended regular appointments achieved better control of blood pressure, glucose, and lipid levels [12]. Diet counseling, assistance for quitting smoking, and weight management intervention during rehabilitation contributed to these gains. By modifying the risk factors, rehabilitation decreased the risk of re-hospitalization and more surgery.

The effect of rehabilitation on readmission and mortality rates was also an interesting discovery. Hospital readmission due to cardiac complications was lower in patients who complied with structured rehabilitation. This was due to the patients being better conditioned, better risk factor management, and better medication compliance. Mortality also reduced, highlighting the positive benefits of rehabilitation on future survival [13]. These findings confirmed the emerging evidence from the literature that cardiac rehabilitation should be incorporated into routine cardiac care after surgery.

Yet, various barriers hampered the complete delivery of rehabilitation. Some patients encountered obstacles, such as unawareness, financial impediments or complicated logistics to reach specialized centers. Also, adherence was inconsistent with some participants dropping out of programs early. These constraints highlighted the importance of the more widespread promotion with insurance coverage for any community-based rehabilitation programs to improve access and adherence [14].

This investigation also found that superior success with rehabilitation was evident when programs were customized. Another study conducted on patients undergoing weight loss surgeries further evidenced how individuals who undertook customized exercise programs, dietary plans and psychological interventions saw more positive results as opposed to patients who followed standardized treatments. This further underscored the importance of patient-centered care in optimizing results.

Finally, the conversation served as a reminder that cardiac rehabilitation greatly benefited the postoperative outcome by promoting physical, psychological, and lifelong cardiovascular health. Although there were obstacles to implementation, evidence was particularly strong for rehabilitation as a routine component of post–heart surgery care. Regarding the future perspective, new strategies should aim to expand access, personalize the programs, as well as enhance patient adherence, to achieve the best performance and long-term benefits [15].

CONCLUSION:

Cardiac rehab had been proven to be key in promoting recovery and long-term health after heart surgery. The structured programs that entailed supervised exercise training, education on lifestyle modification and psychosocial support had helped to improve physical function, reduce complications and hospital readmissions. Rehab patients were more likely to be more adherent, more physically fit and showed a better quality of life than no rehab participants. Furthermore, the program successfully treated psychological problems, including probably accompanying anxiety and depression after cardiac surgery. Comprehensive care, including not only physical but also emotional and social care, had been provided by the multidisciplinary team. On the whole, cardiac rehab had been a linchpin for postoperative care, leading to better outcome, less morbidity, and more satisfied patients. Thus, its use had been crucial for an ideal result in patients undergoing cardiac surgery.

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