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## Impact of cardiac rehabilitation on quality of life of cardiac patients: A systematic review

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### Abstract

Cardiac rehabilitation (CR) is an effective treatment that promotes exercise capacity, reduces cardiovascular risk, and improves health-related QoL. The core components of guideline-directed therapy in CR included baseline assessment, nutritional counselling, risk factor modification psychosocial interventions, physical activity guidance, and exercise training. The current analysis was inspired by the publication of several studies on the effects of cardiac rehabilitation on quality of life of cardiac patients. All relevant articles published on PubMed, EMBASE, Cochrane database, were searched from the time the database was established until 2022. Following that, databases were accessed in order to conduct a more in-depth search of the literature utilizing key terms and Boolean operators to create articles pertinent to the issue. These papers were screened using inclusion/exclusion criteria to reduce the number of articles to a manageable seven. These seven publications were examined, and the findings revealed that aim were described. The results showed that the proposed various early, tailored, low-cost exercise intervention improves mobility, daily activities, quality of life and outcomes in older patients with cardiac problems. Larger studies are needed to confirm the clinical benefit. Possible mechanisms for these effectiveness include improvements in factors such as increased exercise capacity, independence in carrying out activities of daily living, reduction of symptoms, and increased mental, social, functions. However more research and RCTs are required for confirmations.

**Keywords:** Cardiac, quality of life, cardiac problems

### Introduction

Coronary heart disease is the leading cause of death worldwide and its main manifestation is myocardial infarction (MI). This heart disease causes 1.8 million deaths per year, corresponding to 27% of all deaths in Europe, and its prevalence is estimated to increase by 18% from 2013 to 2030.

The majority of deaths and hospital admissions are due to MI. In many cases, the symptoms improve with surgical or percutaneous revascularization, reducing mortality. Pharmacological medical treatment also plays an important role in the control of symptoms, especially in non revascularizable patients (Khan *et al.*, 2020) [5].

Despite advances in treatments, after cardiac problems with extensive myocardial damage, ventricular dysfunction may appear due to the loss of contractile mass, which is accompanied by the development of heart failure. This fact causes a loss of health-related quality of life due to the inability to perform physical activity when symptoms such as dyspnea, tiredness, and fatigue appear. In addition, up to 25% of patients suffer a deterioration in the quality of life, as well as high levels of anxiety and depression (Sanchis-Gomar *et al.*, 2016) [9]. Therefore, hospital discharge is a critical and challenging time for patients after cardiac problems. Coping with a change and readjustment of lifestyle and adherence to new treatments requires support from professionals through continuity of care. These patients are particularly vulnerable to additional cardiac events, and secondary prevention is a priority (Sanchis-Gomar *et al.*, 2016) [9]. This prevention is based on patient education regarding any suspicion of associated symptoms and control of risk factors

Cardiac rehabilitation (CR) is an effective treatment that promotes exercise capacity, reduces cardiovascular risk, and improves health-related QoL. The core components of guideline-directed therapy in CR included baseline assessment, nutritional counselling, risk factor modification psychosocial interventions, physical activity guidance, and exercise training (Chun & Kang, 2021) [3]. In recent years, there have been systematic reviews and meta-analyses demonstrating the benefits of CR for HF patients, and this evidence has been incorporated into the latest clinical guidelines.

The recently published ESC guidelines on sports cardiology and exercise in patients with cardiovascular disease provided the optimal exercise training prescription for patients with chronic HF, including aerobic exercise and resistance exercise. Current evidence suggests that participation in CR can reduce mortality and morbidity in HF patients by approximately 25%, yet unfortunately CR utilization is low worldwide. Challenges associated with CR compliance include chronic fatigue and shortness of breath; ageing; gender, especially females; more co-morbidities; cognitive impairment; depression; economic conditions and regional traffic restrictions; limited health insurance; and many other factors (Mohanane *et al.*, 2021) <sup>[8]</sup>.

### Justification

Among the different intervention strategies, many focus on the control of risk factors, and others aim to recover physical activity through cardiac rehabilitation programmes. Cardiac rehabilitation is based on measures designed to help patients minimize recovery time after a cardiac event and maximize physical, social, and psychological performance. These interventions aim to promote healthy behaviour in order to alleviate symptoms and reduce limitations (Mampuya, 2012) <sup>[6]</sup>.

Cardiac rehabilitation programmes appear to be related to the quality of life, being a multifactorial concept that includes the domains of physical, mental, emotional, and social functioning. Patients after MI may have alterations in any of these domains, reducing their well-being in up to 61% of cases (Anderson *et al.*, 2016) <sup>[1]</sup>.

Some reviews and meta-analyses focused on analysing the effect of unsupervised cardiac rehabilitation programmes by assessing the quality of life in patients with coronary artery disease without counselling and follow-up. Others analysed programmes that included any core component of cardiac rehabilitation, and some programmes even focused only on patients with stable angina. Additional reviews highlighted the improvements in the quality of life in unsupervised home-based cardiac rehabilitation, or even analysed parameters such as anxiety and depression (Thomas *et al.*, 2019) <sup>[1]</sup>. However, few studies analysed the effect of cardiac rehabilitation interventions on health-related quality of life after cardiac problems, and no studies focused solely on the analysis of interventions supervised by health professionals. Supervised physical exercise programmes, that include monitoring and counselling by trained health professionals, could positively improve motivation, adherence to healthy habits, and increase exercise tolerance, in order to avoid future cardiac events

### Aim

Therefore, the objective of this systematic review and meta-analysis was to analyse the effect of supervised cardiac rehabilitation on the improvement of the health-related quality of life in post-MI patients.

### Methodology

The systematic review was undertaken by following the guideline of recording results followed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement

All relevant articles published on PubMed, EMBASE, Cochrane database, were searched from the time the database was established until 2022. Search strategies were developed based on PICO model, A manual search was also conducted to include any relevant studies that may not have been identified in the original search.

### Criteria for PICO

Participants	Cardiac patients
Intervention	Cardiac rehabilitation
Control	Usual care or educational sessions or additional home exercises
Outcome	Quality of life

### Data Collection Strategies

For this inquiry, three databases were chosen and used throughout the data gathering process. PubMed, CINAHL, and the Cochrane library were all searched. To minimize data saturation, keywords were searched, and logical operators were utilized inside the search. As a result, it is critical to demonstrate that a complete, extended, and broad search was carried out.

### Inclusion/exclusion criteria.

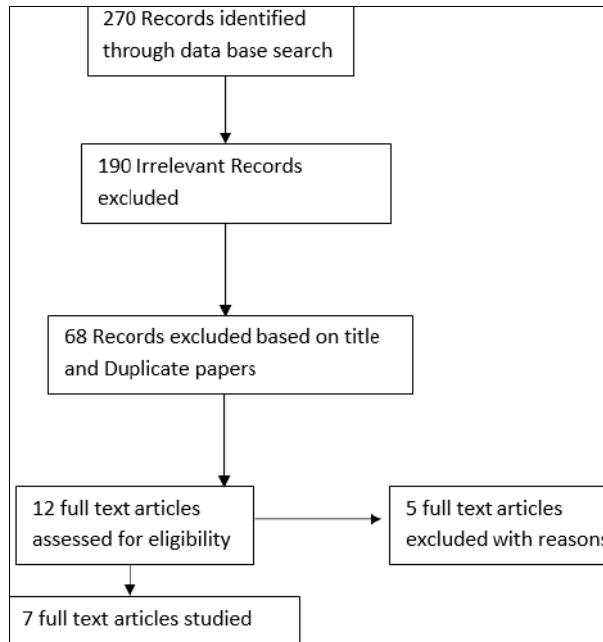
The included studies were: (1) randomised clinical trials, (2) acute myocardial infarction patients, (3) adult samples, (4) hospital or outpatient interventions, (5) health-related quality of life measurements during or after a cardiac rehabilitation programme (baseline data collection before intervention and the follow-up during or after a cardiac rehabilitation programme), (6) rehabilitation programme based on controlled and supervised physical activity, (7) studies published in the last 10 years, (8) not restricted by publication language.

The exclusion criteria were: (1) pilot study or protocols; (2) assessed the health-related quality of life with different interventions, (3) cardiac rehabilitation interventions that did not include physical activity, (4) paediatric patients.

A Boolean search for relevant phrases was performed, followed by filtering them using various filters based on inclusion criteria. This restricted the number of records to 122 in CINAHL, 88 in Medline, and 70 in PubMed.

PRISMA flow diagrams were created. Several items were removed owing to their insignificance to the subject of the study. Duplicates were removed, and the abstracts of each article were examined. Additionally, papers were excluded that did not include meta-analytic review, leaving a total of eight publications that fit the inclusion criteria for this systematic review.

**Prisma flowchart**



**Results**

The finished compositions will be subjected to critiques and analysis. Eight studies are included in the study. The use of a conceptual framework (The C.A.S.P. tool, 2018) enabled

the assessment of the overall and understanding of the literature. The table below summarizes each article.

Author and Year	study design	Sample size	Key findings
Campo <i>et al.</i>	RCT	235	The occurrence of cardiac death and hospitalization for cardiac cause was lower in the intervention group
Mayer Berger <i>et al.</i>	RCT	600	Significant improvement in health-related quality of life.
Ebrahimi <i>et al.</i>	RCT	70	The mean of quality of life and the mean score of self-care behaviors in the experimental group were significantly higher compared to the control group.
Ul Haq <i>et al.</i>	RCT	206	better HRQoL following cardiac rehabilitation
Wang <i>et al.</i>	RCT	136	improves health-related quality of life
Weinbergen <i>et al.</i>	RCT	420	Quality of life was significantly improved
West <i>et al.</i>	RCT	1813	No Quality of life improvement

Mayer berger *et al.* evaluated the efficacy of a long-term secondary prevention programme following inpatient cardiovascular rehabilitation on cardiovascular risk and health-related quality of life in a cohort of middle-aged ( $\leq 58$  years) coronary artery disease (CAD) patients of low educational level compared to usual care. The IG had a significant improvement in health-related quality of life. Mortality, myocardial infarction, and stroke were not different although ‘other cardiac events’ (cardiac surgery or intervention) were significantly lower in the IG than the CG patients ( $p < 0.05$ ). (Mayer-Berger *et al.*, 2014) [7]

Ebrahimi *et al.* assessed the effect of peer education on the quality of life and self-care behaviors of patients with myocardial infarction. After the intervention, the mean of quality of life and the mean score of self-care behaviors in the experimental group were significantly higher compared to the control group. (Ebrahimi *et al.*, 2021) [4]

Ul Haq *et al.* find out the effectiveness of cardiac rehabilitation in patients with myocardial infarction. Cardiac rehabilitation comprised two phases: 1-2 weeks during hospital stay followed by 6-7 weeks outpatient structured exercise programme. Two generic health related quality of life (HRQoL) outcomes (General Health Questionnaire (GHQ) and Self-Rated Health (SRH)) and one post-MI specific tool (MacNew QLMI) were measured at baseline and at 8 weeks follow-up among both groups. The MacNew

QLMI of the cardiac rehabilitation group increased from 3.61 +1.07 to 5.62 +0.5 (Ul-haq *et al.*, 2019) [11]

Wang *et al* evaluated the effects of a home-based rehabilitation program for Chinese patients with myocardial infarction in terms of health-related quality of life and psychological status. Significant differences were evident in the main outcomes when the home-based group was compared with the usual care group at 6 weeks, 3 months, and 6 months. The home-based group had significantly higher scores on 4 of the 8 domains of the Chinese Short Form 36-Item Health Survey and on 3 of the 7 dimensions of the Chinese Myocardial Infarction Dimensional Assessment Scale, with significantly lower scores on the anxiety, but not the depression, subscale of the Chinese Hospital Anxiety and Depression Scale. (Wang *et al.*, 2012) [12]

Weinbergen *et al.* compared a 12-month intensive prevention programme (IPP), coordinated by prevention assistants and including education sessions, telephone visits and telemetric risk factor control, with usual care after MI. Global risk factor control was strongly improved directly after MI before the beginning of the randomized study. Quality of life was significantly improved by IPP ( $p < 0.05$ ). The composite endpoint of adverse clinical events was slightly lower in the IPP group during 12 months (Wienbergen *et al.*, 2019) [14]

West *et al.* determined the effect of cardiac rehabilitation, as currently provided, on mortality, morbidity and health-related quality of life of cardiac patients. A multi-centre randomized controlled trial in representative hospitals in England and Wales compared 1813 patients referred to comprehensive cardiac rehabilitation programmes or discharged to 'usual care' (without referral to rehabilitation). The primary outcome measure was all-cause mortality at 2 years. There were no significant differences between patients referred to rehabilitation and controls in mortality at 2 years (West *et al.*, 2012) <sup>[13]</sup>

### Discussion

The proposed early, tailored, low-cost exercise intervention improves mobility, daily activities, quality of life and outcomes in older patients with cardiac problems. Larger studies are needed to confirm the clinical benefit. (Campo *et al.*, 2020) <sup>[2]</sup> long-term secondary prevention programme with inpatient rehabilitation at the beginning and telephone reminder for a 3-year period was successful. There were significant differences in health-related quality of life between the IG and CG, despite the relatively positive outcomes in the CG. In this low-education (predominantly male), middle-aged cohort, the positive impact on cardiovascular risk was pronounced in the high-risk subgroup (PROCAM 10-year risk 10-40%). (Mayer-Berger *et al.*, 2014) <sup>[7]</sup> to improve the quality of life and promote the self-care behaviors in such patients, using peer education along with healthcare professionals is recommended. (Ebrahimi *et al.*, 2021) <sup>[4]</sup> Cardiac rehabilitation following MI was effective in terms of improving HRQoL and can be implemented in Pakistan as it produced significant improvements in HRQoL. (Ul-haq *et al.*, 2019) <sup>[11]</sup> A simple, home-based cardiac rehabilitation program for patients with acute myocardial infarction, using a self-help manual, improves health-related quality of life and reduces anxiety. It appears feasible and acceptable, and does not produce inferior outcomes compared with usual care (Wang *et al.*, 2012) <sup>[12]</sup>. In this study, we found little evidence about the type of intervention, duration of effects over time, or setting (home or centre-based exercise interventions) associated with a true improvement. Providing interventions based on educational support, follow-up and counseling, and supervision by trained health professionals is strongly supported, in order to improve functional status and health-related quality of life

### Limitations

The limitations in the included a potential variability due to the types of settings, characteristics of the intervention, follow-up time, and modality (individualized programmes or by groups). Therefore, although the research aim was to analyse the effect of supervised cardiac rehabilitation on the improvement of the health-related quality of life after myocardial infarction, the heterogeneity of approaches adopted may influence the study findings. Supervised cardiac rehabilitation programmes are effective for improving health-related quality of life. Health policymakers should improve cardiac rehabilitation programmes, promoting supervision by health professionals, with specific training in this area to generate better public health outcomes

### Conclusion

In the meta-analysis, the effect size of the cardiac

rehabilitation programme was statistically significant in the intervention group for physical activity, emotional reaction, and dependency dimensions. Possible mechanisms for these effectiveness include improvements in factors such as increased exercise capacity, independence in carrying out activities of daily living, reduction of symptoms, and increased mental, social, functions. However more research and RCTs are required for confirmations

### Conflict of Interest

Not available

### Financial Support

Not available

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