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EFFECTIVENESS OF EARLY CARDIAC REHABILITATION IN IMPROVING QUALITY OF LIFE FOR ACUTE CORONARY SYNDROME PATIENTS: A SYSTEMATIC REVIEW

Rany Novia Wardin[1]*, Elly Nurachmah[2], Sri Yona[2]
[1]Master of Medical Surgical Nursing Study Program, Faculty of Nursing, Universitas Indonesia, Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Beji, Depok, Jawa Barat 16424, Indonesia
[2]Department of Medical Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Beji, Depok, Jawa Barat 16424, Indonesia
*noviawardin@gmail.com

ABSTRACT
The provision of early cardiac rehabilitation intervention in patients with cardiovascular disease is necessary as it can accelerate recovery and determine the needs for the subsequent phases of cardiac rehabilitation. This study aims to identify the effectiveness of early cardiac rehabilitation on the quality of life of patients with acute coronary syndrome (ACS). The method used is a systematic review by searching articles in five journal databases: Clinical Key Nursing, ProQuest, PubMed, ScienceDirect, and Scopus. Article analysis used the PRISMA (Preferred Reporting Items for Systematic-Reviews and Meta-Analyses) method. The results of the study indicate that early cardiac rehabilitation significantly improves cardiac function, hemodynamic parameters, and patients mental health. Additionally, the use of innovative educational technologies, such as augmented reality and mobile applications, has been shown to enhance self-efficacy, exercise tolerance, and adherence to rehabilitation programs. Cardiac rehabilitation also provides additional benefits for patients with Diabetes Mellitus (DM) complications, improving cardiorespiratory function, exercise capacity, and quality of life. The conclusion from the ten analyzed articles suggests that comprehensive and structured early cardiac rehabilitation is effective in improving the quality of life of ACS patients and provides long-term benefits in the secondary prevention of cardiovascular diseases.

Keywords: acute coronary syndrome; cardiac rehabilitation; quality of life

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INTRODUCTION

Cardiovascular disease is a major contributor to mortality rates worldwide each year. According to the World Health Organization (WHO) in 2019, an estimated 17.9 million people representing 32% of all global deaths died from cardiovascular disease (WHO, 2020). Thus, cardiovascular disease ranks first as a cause of global death compared to other causes. This mortality rate is predicted to increase every year and by 2030 will reach 23.4 million deaths (Tsao et al., 2023). For this reason, cardiovascular disease has become a major focus of attention worldwide today.According to data obtained from the results of the Indonesian Health Survei/ Survei Kesehatan Indonesia (SKI) 2023, the biggest cause of death in Indonesia is non-communicable diseases, where the basic causes in the first and second ranks respectively are cerebrovascular disease (18.4%) and ischemic heart disease (13.1%) (Survei Kesehatan Indonesia, 2023). When compared to the results of previous national-scale research in Indonesia, namely the Basic Health Research/ Riset Kesehatan Dasar (Riskesdas) 2018, cardiovascular disease is still the second leading cause of death after stroke (Riskesdas, 2018).

Cardiovascular disease includes various medical conditions, including congenital heart disease, rheumatic heart disease, deep vein thrombosis, pulmonary edema, cerebrovascular disease and Acute Coronary Syndrome (ACS) (Byrne et al., 2024). ACS is one of the

cardiovascular diseases that has a significant contribution to mortality rates (Tsao et al., 2023). Therefore, optimal management of the condition of patients with ACS is very important to pay attention to and take action quickly. Acute Coronary Syndrome (ACS) has an impact on various aspects of the patient's life. Physically, patients will feel shortness of breath, fatigue, experience sexual disorders, and chest pain, in addition, psychosocial problems such as anxiety and depression are also often experienced by patients (Li et al., 2020). Changes in physical, psychosocial and spiritual conditions in ACS patients affect the patient's quality of life (Kronish et al., 2020). Basically, there are three things that play a role in determining the quality of life, namely mobility, pain and mental health (depression/anxiety). These three factors can be measured objectively and expressed as health status. The period of coronary heart disease presents its own challenges, especially in maintaining a good quality of life in patients (Ski et al., 2024).Cardiac rehabilitation is a secondary prevention program that is integrated with comprehensive care for patients with ACS (Ambrosetti et al., 2021). As a comprehensive program, cardiac rehabilitation will involve the process of education, training, risk factor modification, and counseling designed to limit the physiological and psychological effects of heart disease, focusing on improving the physical, social, emotional, and spiritual improvement of patients (Craciun et al., 2023). Phase one cardiac rehabilitation is an exercise and education program for patients who are still in the hospital, the program consists of light exercise, home activity instructions, identification of risk factors, and further explanation of the disease suffered (Bäck & Hansen, 2019; Gadager et al., 2022).

Cardiac rehabilitation has long been considered as secondary prevention after ACS, which is a multidisciplinary intervention aimed at improving the physical and psychological function of patients (Hendriks & Jaarsma, 2021). Based on previous studies, early cardiac rehabilitation in ACS patients is very important in reducing negative effects on quality of life as well as morbidity and mortality (Dibben et al., 2023; Sunamura et al., 2018). According to the Indonesian Cardiovascular Specialist Doctors Association (PERKI) in 2019, the cardiac rehabilitation program consists of three phases with phase one carried out when the patient is hospitalized and phases two to three carried out when the patient is outpatient (PERKI, 2019). Early cardiac rehabilitation in ACS patients is very important to help patients recover during inpatient care which begins during hospitalization by assessing the patient's physical abilities, motivation, and tolerance for rehabilitation (Ghlichi Moghaddam et al., 2023). Early cardiac rehabilitation itself consists of patient baseline assessment, nutritional counseling, risk factor modification, psychosocial interventions, physical activity counseling, and bedside exercises (Bianchi et al., 2021).

The effectiveness of early cardiac rehabilitation has not been widely studied, the interpretation of findings from previous studies has not been defined in terms of clinical significance and evaluation of cost-effectiveness in patients with acute myocardial infarction. Therefore, in this study, researchers conducted a systematic review of the effect of early cardiac rehabilitation on the quality of life of ACS patients. This systematic review aims to explore and provide a comprehensive analysis of the effectiveness of early cardiac rehabilitation in improving the quality of life of patients with ACS. The findings of this study are expected to encourage further, in-depth research on the benefits of early cardiac rehabilitation in this population..

METHOD

The systematic review used in this study used the PRISMA (Preferred Reporting Items for Systematic-Reviews and Meta Analyses) search strategy. The databases used in the literature search were ClinicalKey Nursing, ProQuest, PubMed, ScienceDirect and Scopus.

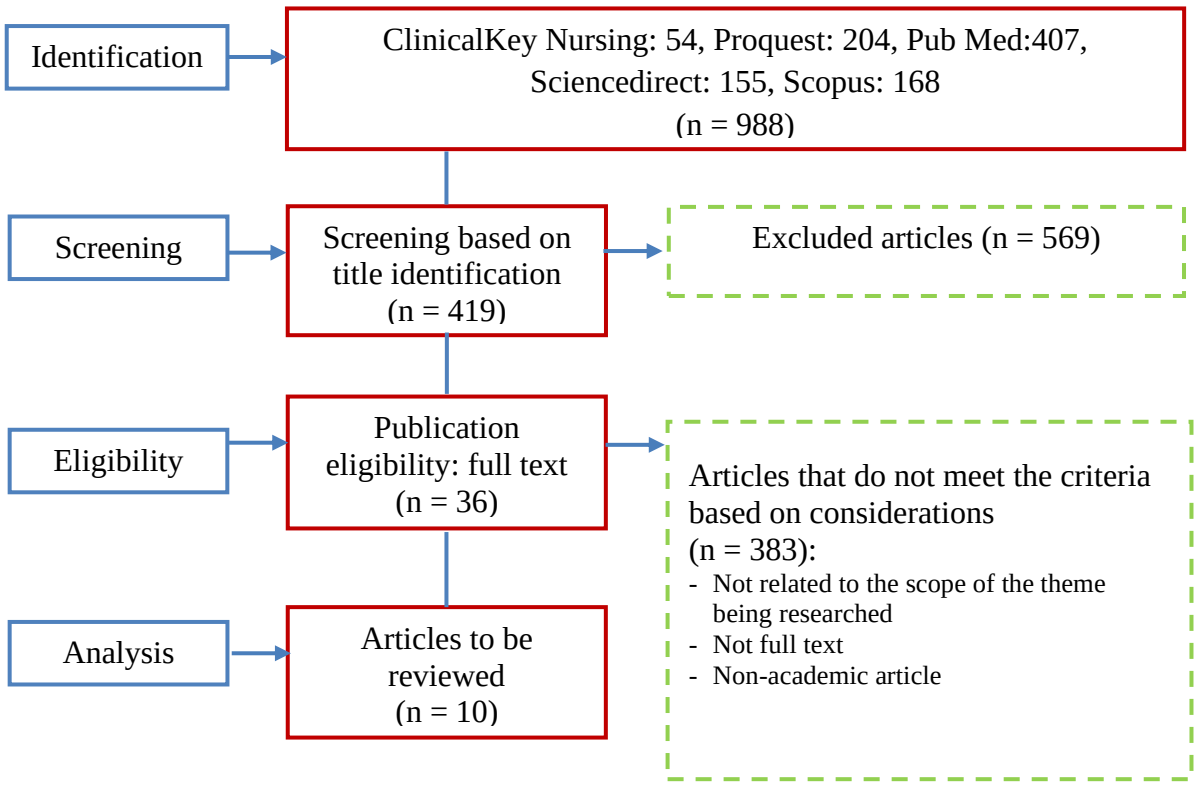

Figure 1. PRISMA Diagram

The author conducted a literature search through databases using English and a systematic literature search between 2019 and 2024, with the keywords "Acute Coronary Syndromes" OR "Coronary Syndrome, Acute" OR "Coronary Syndrome, Acute" AND "early cardiac rehabilitation" OR "cardiac rehabilitation" AND "quality of life" OR "QoL".The author conducted a literature search of all related titles for eligibility for inclusion and exclusion criteria. The exclusion criteria in this study were: Articles that were not research such as guidelines, news, reviews, books, conferences, correspondence, editorials, encyclopedias and research that discussed other than phase one cardiac rehabilitation with the quality of life of patients with acute coronary syndrome. After the author filtered the results from several databases based on title, abstract, and obtained the full text, the author then assessed the articles found by conducting a critical review using a checklist from the JBI Critical Appraisal Tools. In each critical appraisal process, the agreement on related articles was discussed with two reviewers to strengthen the analysis and provide reviews related to the articles that had been filtered.

RESULT

Literature studies have shown that early cardiac rehabilitation, along with routine medication, significantly improves cardiac function and hemodynamic parameters in patients with Acute Coronary Syndrome (ACS) (Wang et al., 2022). Early initiation of cardiac rehabilitation using innovative educational technologies such as augmented reality has also been shown to improve self-efficacy in ACS patients (Ghlichi Moghaddam et al., 2023). A mobile app-based rehabilitation program effectively improves exercise tolerance, exercise adherence, disease-related knowledge, self-efficacy, and perceived social support in patients after Percutaneous Coronary Intervention (PCI) (Shi et al., 2022). In addition, cardiac rehabilitation contributes to improved cognitive function (Fujiyoshi et al., 2020), optimal post-revascularization management, and adherence to guideline-recommended medical therapy (Hurdus et al., 2020). In patients with complications of Diabetes Mellitus (DM), cardiac rehabilitation also

significantly improves cardiorespiratory function, exercise ability, and quality of life (Wen et al., 2023). Overall, early cardiac rehabilitation combined with cognitive and behavioral interventions effectively improves cardiac function, independent exercise capacity, and mental health of patients (Bai et al., 2024).

Table 1.
Summary of Literature Analysis

Article Identity	Research Methods	Research Results
Wang et al., 2022, China, Effects of early phase 1 cardiac rehabilitation on cardiac function evaluated by impedance cardiography in patients with coronary heart disease and acute heart failure	Randomized Clinical Trial (RCT)	Phase one cardiac rehabilitation plus routine medication can improve cardiac function and hemodynamic parameters in patients with Coronary Heart Disease (CHD) and Acute Heart Failure (AHF). in the short term. Therefore, it is important to recommend Phase one cardiac rehabilitation to patients after the condition is stable.
Ghlichi Moghaddam et al., 2023, Iran, The efficacy of phase I cardiac rehabilitation training based on augmented reality on the self-efficacy of patients undergoing coronary artery bypass graft surgery: A randomized clinical trial	RCT	The results of this study indicate that implementing an early rehabilitation program, using innovative, educational technologies such as augmented reality, improves self-efficacy in patients undergoing coronary artery bypass grafting. These findings suggest that programs such as augmented reality can be used effectively as an educational tool across different stages of cardiac rehabilitation.
Shi et al., 2022, China, Effects of multidisciplinary exercise management on patients after percutaneous coronary intervention: A randomized controlled study	RCT	A total of 51 patients after PCI who completed the study (25 patients in the intervention group and 26 patients in the control group) were included in the analysis. After 2 months of intervention, exercise compliance of patients in the intervention group was better than that of the control group. And the 6-Minute Walking Distance (469.36 ± 57.48 vs 432.81 ± 67.09), and knowledge scores about PCI treatment for coronary heart disease (52.64 ± 9.82 vs 42.42 ± 8.54), Self-Efficacy Scale for Chronic Disease (42. 40 ± 8.04 vs 36.88 ± 7.73) and Perceived Social Support Scale (74.04 ± 5.73 vs 66.69 ± 6.86) in the intervention group were higher than those in the control group with statistical significance ($P < 0.05$). In conclusion, multidisciplinary exercise management based on mobile application can effectively improve exercise tolerance, exercise adherence, disease-related cognition, self-efficacy, and perceived social support during exercise training for patients after PCI.
Ul-haq et al., 2019, Pakistan, Effectiveness of Cardiac Rehabilitation on Health-related Quality of Life in Patients with Myocardial Infarction in Pakistan	RCT	Cardiac rehabilitation consists of two phases: 1-2 weeks of inpatient hospitalization, followed by 6-7 weeks of outpatient structured exercise program. Cardiac rehabilitation after MI is effective in improving HRQoL health related quality of life (HRQoL).
Zou et al., 2023, China, A social media-based Mindfulness psyCho-behAvioRal intErvention (MCARE) for patients with acute coronary syndrome: A randomized clinical trial	RCT	The six-week intervention consisted of one face-to-face session (Phase I) and five weekly sessions delivered via WeChat (Phase II) on awareness training and health education and lifestyle modification. The primary outcomes were depression and anxiety. Secondary outcomes included psychological stress, health-related quality of life, and cardiovascular risk factors.
Fujiyoshi et al., 2020, Japan, Effect of cardiac rehabilitation on cognitive function in elderly patients with cardiovascular diseases	Cohort prospective	Changes in cognitive function over 6 months were compared between patients with monthly cardiac rehabilitation (at least once a month; n = 27) and those who did not attend monthly cardiac rehabilitation (n = 39). Cognitive function was assessed using the Mini-mental State Examination (MMSE) and Frontal Assessment Battery (FAB). Cognitive function may improve with regular cardiac rehabilitation. These results explain the effectiveness of cardiac rehabilitation for secondary prevention of cardiovascular disease.
Craciun et al., 2023, 2023, Romania, The Benefits of a Comprehensive Cardiac	Cohort prospective	Twelve months of post-ACS patients' participation in comprehensive cardiac rehabilitation resulted in excellent post-revascularization management, as well as good adherence to guideline-directed medical therapy, providing further confirmation

Rehabilitation Program for Patients with Acute Coronary Syndrome: A Follow-Up Study		of the benefits of secondary prevention. Although adherence to drug therapy was high, blood pressure, total cholesterol and LDL cholesterol targets were not adequately achieved. Therefore, in the era of personalized medicine, patients with ACS should benefit from a specific and comprehensive cardiovascular rehabilitation program consisting of physiotherapists, psychologists, nutritionists and cardiologists experienced in cardiovascular rehabilitation.
Hurdus et al., 2020, England, Association of cardiac rehabilitation and healthrelated quality of life following acute myocardial infarction	Cohort prospective	Health-Related Quality of Life (HRQoL) was estimated using the EuroQol 5-Dimension-3 Level Questionnaire at hospitalization, 30 days, and 6 and 12 months after hospital discharge. analysis. Cardiac rehabilitation was independently associated with transient improvements in health-related quality of life up to 12 months after hospitalization, with these changes increasing in physically active patients.
Wen et al., 2023 2022, China, Effects of Cardiac Rehabilitation on Cardiac Function andQuality of Life in Patients with Ischemic Nonobstructive Coronary Artery Disease and Diabetes Mellitus	Cohort retrospective	Patients were divided into control group (n = 50). Observation group was given routine drug therapy (50 cases) treated with routine drugs combined with cardiac rehabilitation for 6 months for 1 therapy. Curative effect, cardiac function, 6 Minutes Walking Distance (6MWD), Cardiopulmonary Exercise Test (CPFT) index, SF-36 Health Status Survey Scale, and quality of life score were compared between the two groups. In patients with ischemic and nonobstructive coronary artery disease complicated by Diabetes Mellitus (DM), cardiac rehabilitation can significantly improve cardiorespiratory function, exercise ability, and quality of life.
Bai et al., 2024 China Effects of Phase I Cardiac Rehabilitation Combined with Cognitive Behavioural Therapy on Cardiac Function, Exercise Capacity and Mental Health in Patients after Aortic Valve Replacement: A Retrospective Study3	Cohort retrospektive	The study aimed to apply Phase I Cardiac Rehabilitation (CR-I) combined with Cognitive Behavioral Therapy (CBT) in patients after Aortic Valve Replacement (AVR). The conclusion is that CR-I combined with CBT effectively improves cardiac function, self-exercise capacity and mental health level of patients after AVR and provides new directions for the formulation and selection of further clinical management.

DISCUSSION

Early cardiac rehabilitation has been shown to be effective in improving various aspects of health in patients with acute coronary syndrome, both physically and mentally (Sulzgruber et al., 2020). Significant improvements in cardiac function and hemodynamic parameters suggest that cardiac rehabilitation can be an integral part of routine treatment in patients with acute coronary syndrome (ACS) (Gadager et al., 2022; Wang et al., 2022). The use of innovative technologies such as augmented reality in patient education also provides additional benefits, especially in improving self-efficacy and adherence to rehabilitation programs (Ghlichi Moghaddam et al., 2023).The use of mobile applications for multidisciplinary exercise management has shown better results in improving exercise tolerance and adherence, as well as disease-related knowledge. This suggests that technological approaches can be more widely integrated into cardiac rehabilitation programs to improve effectiveness and patient engagement (Shi et al., 2022). Furthermore, the reported improvements in cognitive function and mental health in patients undergoing cardiac rehabilitation highlight the importance of a holistic approach in cardiovascular disease management (dos Santos et al., 2019; Fujiyoshi et al., 2020).

The analyzed study also showed that although adherence to drug therapy was high, blood pressure and cholesterol targets had not been optimally achieved Creaciun et al., 2023). Therefore, a comprehensive and personalized cardiac rehabilitation program, involving a multidisciplinary team including physiotherapists, psychologists, nutritionists, and cardiologists, is essential to achieve better outcomes (Hendriks & Jaarsma, 2021). In addition, cardiac rehabilitation is particularly beneficial for patients with complications of diabetes mellitus (DM), showing significant improvements in cardiorespiratory function and quality of life (Wen et al., 2023). Therefore, phase one cardiac rehabilitation should be considered as an important part of cardiovascular disease management, especially in patients with comorbid

conditions (Brown et al., 2024).Overall, the analyzed studies confirmed the importance of early cardiac rehabilitation in improving the quality of life of patients with acute coronary syndrome (Brown et al., 2024; Byrne et al., 2024). Integration of educational technology and a multidisciplinary approach into rehabilitation programs can provide better outcomes and help patients achieve their desired health targets (Hendriks & Jaarsma, 2021). Comprehensive and structured cardiac rehabilitation will provide significant long-term benefits in secondary prevention of cardiovascular disease (Ambrosetti et al., 2021).

CONCLUSION

This systematic review identified ten studies that demonstrated that early cardiac rehabilitation significantly improved the quality of life in patients with acute coronary syndrome (ACS). The program was effective in improving cardiac function, hemodynamic parameters, and mental health in patients. The use of innovative technologies such as augmented reality and mobile applications improved self-efficacy, exercise tolerance, and patient compliance. Additional benefits were seen in patients with Diabetes Mellitus (DM), including improvements in cardiorespiratory function and exercise capacity. Overall, comprehensive and structured early cardiac rehabilitation was effective in improving quality of life and provided long-term benefits in secondary prevention of cardiovascular disease.

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