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Walking Exercise Improves 6MWT Capacity After PCI in Single-Vessel CAD: A Case Report

Fina Sauna Sari[1], Farid Rahman[2], Ridwan Andi Susilo[3]

[1,2]Professional Physiotherapy Program, Faculty of Health Sciences, Muhammadiyah University of Surakarta, Surakarta, Indonesia
[3]Integrated Cardiac Care Unit, Dr. Moewardi General Hospital, Surakarta, Indonesia

Corresponding author:
Name: Farid Rahman
E-mail: fr280@ums.ac.id
Phone: +62 853-3581-0302

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Abstract
Background: Coronary artery disease (CAD) commonly reduces aerobic capacity and exercise tolerance after percutaneous coronary intervention (PCI). Structured walking exercise during phase II cardiac rehabilitation may improve functional capacity in post-PCI patients; however, evidence in single-vessel CAD remains limited.
Objective: To describe the effects of moderate-intensity walking exercise on aerobic capacity in a patient with single-vessel CAD after PCI.
Methods: This CARE-based case report involved a 59-year-old male with single-vessel CAD following PCI with one stent in the osteal–mid left anterior descending artery. The patient underwent phase II cardiac rehabilitation consisting of moderate-intensity walking exercise at 40–60% heart rate reserve and Borg scale 11–13 for six supervised sessions over two weeks, combined with a home-based walking program. Outcomes included the 6-minute walk test (6MWT), metabolic equivalents (METs), blood pressure, heart rate, oxygen saturation, and exercise tolerance.
Results: After six rehabilitation sessions, the 6MWT distance increased from 304 m to 415 m, representing a 36.5% improvement and exceeding the reported minimal clinically important difference for cardiac populations. METs increased from 3.74 to 4.54 (21.4%). Blood pressure improved from 132/81 mmHg to 114/73 mmHg, while resting heart rate decreased from 66 to 62 bpm with stable oxygen saturation at 98%. No adverse cardiovascular events or exercise intolerance were observed.
Conclusion: This case suggests that structured moderate-intensity walking exercise may improve aerobic capacity and hemodynamic response in patients with single-vessel CAD after PCI. Further controlled studies are required.

Keywords
Coronary Artery Disease; Percutaneous Coronary Intervention; Cardiac Rehabilitation; Walking Exercise; Exercise Tolerance

Introduction

Coronary artery disease (CAD) remains one of the leading causes of mortality and disability worldwide. Cardiovascular diseases account for approximately 17.9 million deaths annually and contribute substantially to the global burden of non-communicable diseases.[1] CAD occurs due to atherosclerotic narrowing or obstruction of the coronary arteries, resulting in impaired myocardial perfusion and reduced oxygen delivery to cardiac tissue.[2] This condition contributes to decreased cardiac output, impaired aerobic metabolism, exercise intolerance, and reduced functional capacity, ultimately affecting patients' quality of life and ability to perform daily activities.[2,3] Functional limitation is frequently observed in patients after percutaneous coronary intervention (PCI), despite successful coronary revascularization, because physiological deconditioning and reduced cardiovascular efficiency may persist during the recovery phase.[2]

Percutaneous coronary intervention is currently one of the most commonly performed revascularization procedures for CAD management. PCI effectively restores coronary blood flow and reduces ischemic symptoms through balloon angioplasty and stent implantation.[4] Although PCI improves myocardial perfusion, many patients continue to experience fatigue, decreased aerobic capacity, reduced activity tolerance, and fear of physical activity after hospital discharge.[2] Consequently, comprehensive cardiac rehabilitation is strongly recommended following PCI to restore cardiovascular function, improve exercise tolerance, reduce recurrent cardiovascular risk, and facilitate reintegration into daily activities.[2,5]

Phase II cardiac rehabilitation is initiated after hospital discharge and focuses on supervised exercise training, cardiovascular risk-factor modification, patient education, and gradual return to functional activity.[2] Aerobic exercise constitutes the primary component of phase II rehabilitation because it improves endothelial function, autonomic balance, peripheral oxygen extraction, and cardiovascular efficiency.[2,6] Regular aerobic exercise also contributes to improvements in stroke volume, skeletal muscle perfusion, mitochondrial oxidative capacity, and overall cardiorespiratory fitness.[6] Current international guidelines from the American Heart Association and the American College of Sports Medicine recommend moderate-intensity aerobic exercise performed three to five times weekly for approximately 20–60 minutes in patients with stable CAD.[2,7] Exercise intensity is generally prescribed using heart rate reserve (HRR), percentage of maximal heart rate, oxygen consumption, or Borg Rating of Perceived Exertion scales.[2]

Among various aerobic exercise modalities, walking exercise is considered one of the most feasible and accessible interventions for post-PCI patients. Walking exercise requires minimal equipment, can be implemented in supervised or home-based settings, and demonstrates good patient adherence.[8] Home-based cardiac rehabilitation has gained increasing attention because it may improve accessibility and overcome barriers associated with transportation limitations, financial constraints, and limited rehabilitation facilities.[8] Previous studies demonstrated that walking-based cardiac rehabilitation improves exercise tolerance, functional capacity, and quality of life in CAD populations.[3,9] Li et al.[10] reported that a six-week home-based exercise program significantly improved 6-minute walk test (6MWT) performance and cardiorespiratory fitness in post-PCI patients. Similarly, Yang et al.[3] demonstrated that walking exercise provided cardiovascular benefits comparable to other moderate-to-vigorous aerobic activities in patients with CAD.

Despite the growing evidence supporting exercise-based cardiac rehabilitation, several limitations remain within the current literature. Most previous studies focused on heterogeneous CAD populations, supervised rehabilitation centers, or large cohort analyses, whereas evidence specifically describing structured walking exercise in patients with single-vessel CAD after PCI remains limited.[2,9] Furthermore, many studies primarily emphasized statistical outcomes without providing detailed descriptions regarding individualized exercise prescription, safety monitoring, exercise progression, and real-world physiotherapy implementation during phase II cardiac rehabilitation. This evidence gap is clinically relevant because patients with single-vessel disease may demonstrate different functional limitations, physiological responses, and rehabilitation needs compared with patients with multivessel CAD or chronic heart failure.

The present case involved a 59-year-old male diagnosed with single-vessel CAD who underwent PCI with one stent placement in the osteal–mid left anterior descending (LAD) artery. The LAD supplies a substantial portion of the left ventricular myocardium; therefore, stenosis within this artery may significantly affect myocardial oxygen demand and aerobic capacity.[11] Following PCI, the patient experienced reduced exercise tolerance, decreased aerobic capacity, and mild chest discomfort during rest, resulting in reluctance to resume strenuous physical activity. Considering the patient's stable hemodynamic condition and persistent functional limitation, a structured moderate-intensity walking exercise program was selected as the primary physiotherapy intervention during phase II cardiac rehabilitation.

Walking exercise in this case was prescribed using evidence-based exercise parameters consisting of moderate intensity at 40–60% HRR and Borg scale 11–13, consistent with current cardiac rehabilitation recommendations.[2] Exercise intensity was individualized using the Karvonen formula to ensure safe cardiovascular loading and progressive adaptation during rehabilitation sessions. Functional capacity was evaluated using the 6MWT according to American Thoracic Society guidelines because the 6MWT is considered reliable, practical, and clinically responsive for assessing aerobic capacity in cardiovascular populations.[10] In addition, Holter monitoring, vital-sign assessment, and symptom surveillance were integrated throughout the rehabilitation program to enhance exercise safety and detect potential cardiovascular complications during physical activity.

Therefore, this case report aimed to describe the clinical course and functional outcomes of a structured moderate-intensity walking exercise program during phase II cardiac rehabilitation in a patient with single-vessel CAD after PCI, particularly regarding aerobic capacity, exercise tolerance, and hemodynamic response.

Methods

This study was conducted as a CARE-based case report describing the implementation of phase II cardiac rehabilitation using structured walking exercise in a patient with coronary artery disease (CAD) after percutaneous coronary intervention (PCI). The report focused on the patient's clinical course, exercise prescription, physiological monitoring, and functional outcomes during rehabilitation. Written informed consent was obtained from the patient before intervention and publication of this case report, including permission for the use of anonymized clinical information. Ethical approval was granted by the Ethics Committee of the Faculty of Health Sciences, Muhammadiyah University of Surakarta (No. 1659/KEPK-FIK/XI/2025).

The patient was a 59-year-old male farmer diagnosed with single-vessel CAD who underwent PCI with one stent placement in the osteal–mid left anterior descending (LAD) artery at Dr. Moewardi General Hospital, Surakarta, Indonesia. This case was selected because the patient demonstrated reduced aerobic capacity and exercise tolerance after PCI while remaining hemodynamically stable and eligible for phase II cardiac rehabilitation. The patient had no history of hypertension, diabetes mellitus, or smoking. Laboratory examination before PCI demonstrated low high-density lipoprotein (HDL) levels of 30 mg/dL with normal low-density lipoprotein (LDL) levels. Following PCI, the patient experienced mild left-sided chest discomfort during rest with a Numerical Rating Scale (NRS) score of 3 and reported reluctance to return to strenuous physical activity.

To clarify the clinical course and rehabilitation process, a structured timeline was developed describing diagnosis, intervention, rehabilitation progression, and evaluation outcomes. The timeline is summarized in Table 1.

Table 1. Timeline of Clinical Course and Rehabilitation Program

Time	Clinical Condition and Evaluation	Intervention	Outcome
T0	Diagnosis of single-vessel CAD and PCI with one LAD stent	Baseline phase II rehabilitation assessment and 6MWT	Patient eligible for rehabilitation
T1	Stable hemodynamic condition without angina, arrhythmia, or dyspnea	Moderate-intensity walking exercise	Patient completed 1200 m safely
T2	Stable cardiovascular response during exercise monitoring	Progressive walking exercise	Patient completed 1800 m safely
T3	Final functional and physiological evaluation	Post-rehabilitation assessment	Improved aerobic capacity and exercise tolerance

Before the intervention, the patient underwent physiotherapy assessment consisting of history taking, physical examination, cardiovascular and pulmonary auscultation, vital-sign measurement, exercise tolerance evaluation, and functional capacity assessment. The patient was categorized as New York Heart Association (NYHA) Functional Class II because mild limitation during physical activity was present. Baseline examination included blood pressure, resting heart rate, respiratory rate, oxygen saturation, anthropometric measurements, and the 6-minute walk test (6MWT).

The 6MWT was conducted according to American Thoracic Society (ATS) guidelines using a standardized 30-meter corridor.[1012] The patient was instructed to walk as far as possible for six minutes while maintaining self-paced intensity, and standardized verbal encouragement was provided during the procedure. The 6MWT was selected because it is considered valid, reliable, practical, and clinically responsive for assessing aerobic capacity and functional exercise tolerance in cardiovascular populations.[1012] Total walking distance was recorded in meters and used to estimate oxygen consumption (VO_2). Metabolic equivalents (METs) were subsequently estimated using the formula: METs = VO_2 (mL/kg/min) ÷ 3.5.

The rehabilitation intervention consisted of moderate-intensity walking exercise during phase II cardiac rehabilitation. Exercise intensity was prescribed using the heart rate reserve (HRR) method based on the Karvonen formula: Target HR = [(HRmax − HRrest) × intensity] + HRrest. Maximum heart rate was estimated using the equation 220 − age. Exercise intensity ranged from 40–60% HRR with a Borg Rating of Perceived Exertion target of 11–13, corresponding to moderate intensity according to current cardiac rehabilitation recommendations.[2,7] The intervention was individualized according to the patient's cardiovascular response, exercise tolerance, and symptom presentation.

Each rehabilitation session consisted of a 10-minute warm-up period, 30–60 minutes of walking exercise, and a cooling-down phase. Exercise sessions were performed three to five times weekly over six supervised sessions combined with a structured home-based walking program. Progressive overload principles were implemented gradually by increasing walking distance from approximately 1200 m to 1800 m according to patient tolerance and physiological adaptation. In addition to supervised exercise, the patient received education regarding exercise safety, symptom recognition, self-monitoring of pulse rate and oxygen saturation, and continuation of home-based exercise activities.

Continuous safety monitoring was performed throughout all rehabilitation sessions. Cardiac electrical activity and heart rhythm were monitored using a Holter monitor. Parameters evaluated during monitoring included resting and exercise heart rate, arrhythmias, premature ventricular contractions (PVCs), and ST-segment changes. Exercise was terminated immediately if red-flag symptoms occurred, including angina, severe dyspnea, dizziness, significant blood pressure reduction (>10 mmHg), Borg scale >15, ST-segment depression >2 mm, or clinically significant arrhythmias.[13] Green-flag criteria indicating exercise safety included stable hemodynamic status, oxygen saturation >95%, absence of ischemic symptoms, and absence of clinically significant arrhythmias.

Adherence to the rehabilitation program was monitored using supervised attendance records and patient self-report for the prescribed home program. The patient completed all six supervised rehabilitation sessions without interruption, adverse cardiovascular events, or exercise intolerance.

Outcome evaluation was performed before and after completion of the rehabilitation program. Primary outcomes included 6MWT distance and METs. Secondary outcomes included blood pressure, resting heart rate, oxygen saturation, and exercise tolerance during physical activity. Data analysis was conducted descriptively by comparing pre- and post-intervention clinical outcomes. Percentage changes in 6MWT distance and METs were calculated to evaluate functional improvement. Clinical interpretation was additionally supported using the minimal clinically important difference (MCID) for the 6MWT in cardiovascular populations, estimated at approximately 25–35 meters.[14]

Results

The results of this case report describe the functional and physiological changes observed during six sessions of phase II cardiac rehabilitation using a structured walking exercise program in a patient with single-vessel coronary artery disease (CAD) after percutaneous coronary intervention (PCI). Outcome evaluation focused on aerobic capacity, exercise tolerance, hemodynamic response, and exercise safety throughout the rehabilitation period.

Before initiation of the rehabilitation program, baseline clinical and functional assessments were performed to determine the patient's cardiovascular stability and eligibility for exercise intervention. The patient was fully conscious, cooperative, and able to communicate effectively. General observation revealed no signs of respiratory distress or acute cardiovascular instability. Pulmonary auscultation demonstrated normal vesicular breath sounds without crackles or wheezing, while cardiac auscultation showed regular heart sounds without pathological murmurs. However, the patient reported decreased activity tolerance, generalized fatigue, and mild left-sided chest discomfort during rest, resulting in reduced confidence in resuming strenuous physical activity after PCI.

The baseline physiological and functional findings are presented in Table 2 to provide an overview of the patient's cardiovascular condition before rehabilitation.

Table 2. Baseline Clinical and Functional Assessment

Parameter	Baseline Result
Blood pressure	132/81 mmHg
Resting heart rate	66 bpm
Respiratory rate	18 breaths/min
Oxygen saturation	97%
Body mass index	24.46 kg/m²
Waist circumference	84 cm
6MWT distance	304 m
Estimated VO_2	18 mL/kg/min
METs	3.74
Functional classification	NYHA Class II

The baseline 6-minute walk test (6MWT) result of 304 m indicated reduced aerobic capacity and impaired exercise tolerance. The patient was categorized as New York Heart Association (NYHA) Functional Class II, reflecting mild limitation during physical activity. The baseline METs value of 3.74 also demonstrated reduced cardiorespiratory fitness and decreased functional endurance during daily activities.

To improve functional capacity and cardiovascular adaptation, the patient participated in a structured moderate-intensity walking exercise program during phase II cardiac rehabilitation. Exercise intensity was individualized using heart rate reserve (HRR) and Borg scale monitoring according to patient tolerance and physiological response. Progressive overload principles were implemented gradually by increasing walking distance from approximately 0 m during the early sessions to 1800 m in subsequent sessions.

Throughout the rehabilitation program, continuous monitoring of physiological and cardiovascular responses was performed using vital-sign assessment and Holter monitoring. No clinically significant arrhythmias, ST-segment abnormalities, angina, dizziness, severe dyspnea, oxygen desaturation, or exercise intolerance were observed during any rehabilitation session. The patient completed all six supervised sessions and demonstrated full adherence to the prescribed home-based walking exercise program.

To illustrate the functional and physiological changes following rehabilitation, pre- and post-intervention outcomes are summarized in Table 3.

Table 3. Comparison of Outcomes Before and After Rehabilitation

Parameter	Pre-Intervention	Post-Intervention
Blood pressure	132/81 mmHg	114/73 mmHg
Resting heart rate	66 bpm	62 bpm
Oxygen saturation	98%	98%
6MWT distance	304 m	415 m
METs	3.74	4.54

After completion of six rehabilitation sessions, clinically meaningful improvements were observed in aerobic capacity and exercise tolerance. The 6MWT distance increased from 304 m to 415 m, representing an absolute improvement of 111 m and a relative increase of 36.5%. This increase exceeded the reported minimal clinically important difference (MCID) for cardiovascular populations, which is generally estimated at approximately 25–35 m.[14] These findings indicate clinically relevant enhancement in functional exercise capacity following the rehabilitation program.

The estimated METs value increased from 3.74 to 4.54, representing a 21.4% improvement in aerobic performance. This finding suggests improved oxygen utilization efficiency and enhanced cardiovascular adaptation during physical activity. In addition, resting heart rate decreased from 66 bpm to 62 bpm, while blood pressure remained within physiological limits, indicating favorable hemodynamic adaptation and improved cardiovascular efficiency following structured aerobic exercise.

Oxygen saturation remained stable at 98% throughout the rehabilitation period, suggesting preserved cardiopulmonary response and adequate oxygen delivery during exercise. Importantly, no adverse cardiovascular events or exercise-related complications occurred during intervention sessions, supporting the safety and feasibility of moderate-intensity walking exercise in this patient. The clinical rehabilitation pathway from baseline assessment through exercise progression and post-intervention evaluation is presented in Figure 1.

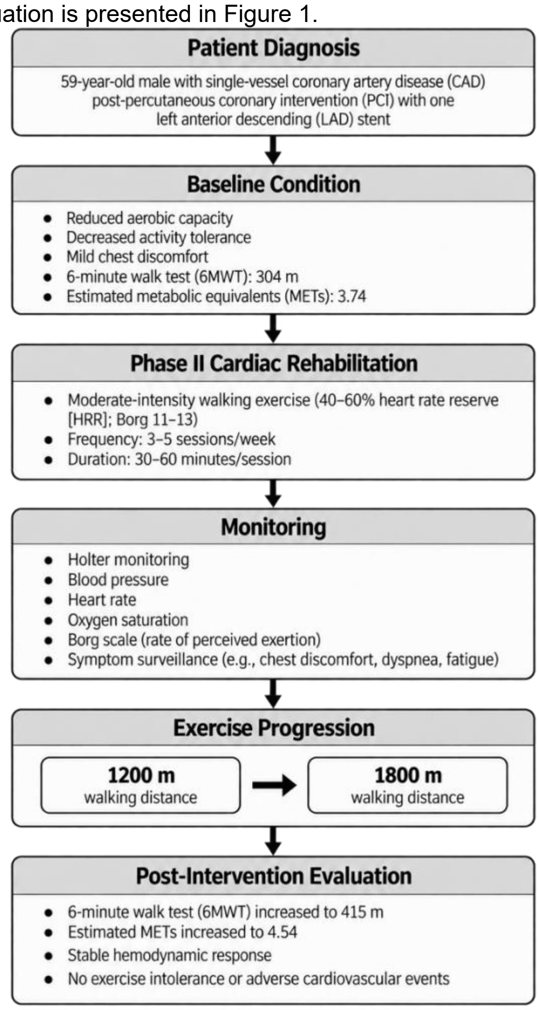

Figure 1. Clinical pathway of Phase II cardiac rehabilitation and functional outcomes following percutaneous coronary intervention.

Overall, the findings demonstrated progressive improvement in aerobic capacity, exercise tolerance, and cardiovascular efficiency during phase II cardiac rehabilitation using structured walking exercise. The intervention was completed safely with stable physiological responses and without evidence of cardiovascular complications throughout the rehabilitation period.

Discussion

This case report demonstrated that a structured moderate-intensity walking exercise program during phase II cardiac rehabilitation was associated with improvements in aerobic capacity, exercise tolerance, and hemodynamic efficiency in a patient with single-vessel coronary artery disease (CAD) after percutaneous coronary intervention (PCI). Following six supervised rehabilitation sessions, the patient showed a clinically meaningful increase in 6-minute walk test (6MWT) distance from 304 m to 415 m, accompanied by improved metabolic equivalents (METs), reduced resting heart rate, and stable oxygen saturation. Importantly, no adverse cardiovascular responses or exercise intolerance were observed throughout the rehabilitation process, supporting the safety and feasibility of individualized walking exercise in this clinical setting. These findings are consistent with previous evidence demonstrating the benefits of structured aerobic rehabilitation in post-PCI populations.[2,3]

The improvement of 111 m in the 6MWT exceeded the minimal clinically important difference (MCID) commonly reported for cardiovascular populations, which ranges from approximately 25–35 m.[14] This finding suggests that the observed functional gains were clinically meaningful and potentially relevant to the patient's daily functional performance. Improvement in walking distance reflects enhanced aerobic endurance and increased tolerance for physical activity after PCI. Similar findings were reported by Li et al., who demonstrated that a six-week home-based supervised exercise program significantly improved 6MWT performance and cardiorespiratory fitness in post-PCI patients.[10] Furthermore, Giannitsi et al.[15] emphasized that the 6MWT is a clinically responsive instrument for evaluating functional recovery and exercise tolerance in cardiovascular disorders. Previous reviews have also consistently shown that structured aerobic exercise improves exercise capacity, quality of life, and cardiovascular outcomes in CAD populations undergoing cardiac rehabilitation.[2]

The increase in METs from 3.74 to 4.54 further supports the improvement in aerobic capacity and cardiovascular efficiency observed in this case. METs reflect oxygen utilization during physical activity and are closely associated with functional independence and cardiorespiratory endurance. Improved METs indicate that the patient became capable of performing physical activities with lower physiological strain and greater oxygen transport efficiency. Nascimento et al.[16] reported that moderate-intensity aerobic exercise significantly improves peak oxygen consumption and functional performance through enhanced cardiopulmonary adaptation in cardiovascular populations. Similarly, Adam et al.[2] explained that exercise-based cardiac rehabilitation after PCI improves aerobic performance, exercise tolerance, and overall functional status in CAD patients.

Several physiological mechanisms may explain the functional improvements observed following the rehabilitation program. From a central cardiovascular perspective, regular aerobic exercise contributes to improved cardiac output by increasing stroke volume and optimizing ventricular filling.[17] In post-PCI patients, successful coronary revascularization restores myocardial perfusion, while subsequent aerobic training enhances myocardial contractility and cardiovascular efficiency.[6] The reduction in resting heart rate observed in this case, from 66 bpm to 62 bpm, may indicate improved autonomic balance characterized by increased parasympathetic activity and reduced sympathetic overactivation. According to Heidenreich et al., improved autonomic regulation following aerobic rehabilitation is associated with better exercise tolerance, lower cardiovascular workload, and reduced risk of recurrent cardiac events.[18]

Peripheral physiological adaptations also likely contributed substantially to the improvement in aerobic capacity. Moderate-intensity walking exercise stimulates mitochondrial biogenesis and oxidative enzyme activity within skeletal muscle fibers, thereby improving aerobic metabolism and oxygen extraction at the tissue level.[19] Increased capillary density and improved endothelial-dependent vasodilation further facilitate oxygen delivery during physical activity. Dziedzic et al.[19] explained that mitochondrial and peripheral muscular adaptations represent important mechanisms underlying improvements in exercise performance during cardiac rehabilitation. These peripheral adaptations are particularly relevant because functional gains in early rehabilitation phases may occur before substantial structural cardiac remodeling becomes evident.

The findings of this case are consistent with previous studies supporting walking exercise as an effective rehabilitation modality in CAD populations. Yang et al.[3] demonstrated that walking exercise provides cardiovascular benefits comparable to other moderate-to-vigorous aerobic activities in improving exercise tolerance and functional performance in CAD patients. Furthermore, Thomas et al.[8] highlighted that home-based cardiac rehabilitation programs may improve accessibility, adherence, and continuity of exercise participation, particularly in low-resource settings where access to supervised rehabilitation facilities is limited. The present findings additionally demonstrate that individualized walking exercise can be implemented safely in real-world clinical practice using progressive overload principles and close physiological monitoring.

Another important finding in this report was the absence of exercise-related complications during rehabilitation sessions. Continuous monitoring using Holter assessment, vital-sign evaluation, symptom surveillance, and Borg scale monitoring allowed safe progression of exercise intensity while minimizing cardiovascular risk. Stable oxygen saturation and blood pressure responses throughout the intervention suggest preserved cardiopulmonary adaptation and hemodynamic stability during exercise sessions. These findings support current recommendations from the American Heart Association and the American College of Sports Medicine regarding the safety of moderate-intensity aerobic exercise in stable CAD patients undergoing supervised rehabilitation.[2,7]

Despite these positive outcomes, the findings should be interpreted cautiously because several limitations may affect internal and external validity. First, this report involved only a single patient; therefore, the results cannot be generalized to broader CAD populations. Individual patient characteristics, including baseline functional status, exercise adherence, age, and successful PCI outcomes, may have contributed substantially to the observed improvements. Second, the absence of a control group limits the ability to differentiate intervention effects from other contributing factors such as natural recovery, placebo effect, regression to the mean, or Hawthorne effect. Reviewer concerns regarding potential overinterpretation were therefore addressed by avoiding causal claims and interpreting the findings descriptively. In addition, the rehabilitation duration was relatively short and no long-term follow-up evaluation was performed, limiting conclusions regarding sustainability of functional improvement over time.

Nevertheless, this report provides clinically relevant implications for physiotherapy practice in cardiac rehabilitation. Walking exercise represents a practical, accessible, and low-cost intervention that can be implemented in both hospital-based and home-based rehabilitation settings.[8] This approach may be particularly beneficial in low- and middle-income settings where access to comprehensive cardiac rehabilitation services remains limited.[20] Individualized monitoring using heart rate reserve (HRR), Borg scale, and symptom surveillance also demonstrated the importance of tailored exercise prescription based on patient tolerance and cardiovascular response. Therefore, physiotherapists should consider structured walking exercise as a feasible rehabilitation strategy for stable post-PCI patients while maintaining appropriate safety monitoring and gradual exercise progression.

Further studies with larger sample sizes, controlled designs, and longer follow-up periods are required to confirm the effectiveness, safety, and sustainability of walking-based cardiac rehabilitation programs in patients with single-vessel CAD after PCI. Additional investigation comparing supervised and home-based rehabilitation models may also help optimize exercise prescription and improve rehabilitation accessibility across different healthcare settings.

Conclusion

This case report demonstrated that a structured moderate-intensity walking exercise program during phase II cardiac rehabilitation was associated with improvements in aerobic capacity, exercise tolerance, and hemodynamic response in a patient with single-vessel coronary artery disease (CAD) after percutaneous coronary intervention (PCI). After six supervised rehabilitation sessions, clinically meaningful improvements were observed in the 6-minute walk test (6MWT) distance and metabolic equivalents (METs), accompanied by stable blood pressure, heart rate, and oxygen saturation without exercise-related adverse events.

These findings suggest that individualized walking exercise may serve as a safe, practical, and accessible physiotherapy intervention for stable post-PCI patients, particularly in settings with limited cardiac rehabilitation resources. The use of structured monitoring through heart rate reserve (HRR), Borg scale assessment, and symptom surveillance may support safe exercise progression and optimize rehabilitation outcomes in clinical practice.

However, because this report involved a single patient without long-term follow-up or control comparison, the findings should be interpreted cautiously and cannot be generalized to broader CAD populations. Further controlled studies with larger sample sizes and longer follow-up durations are required to confirm the effectiveness, safety, and long-term sustainability of walking-based cardiac rehabilitation programs in patients with CAD after PCI.

Author Contribution
Fina Sauna Sari: Conceptualization, methodology, investigation, data curation, formal analysis, visualization, writing—original draft preparation.
Farid Rahman: Conceptualization, methodology, supervision, validation, writing—review and editing.
Ridwan Andi Susilo: Clinical supervision, resources, validation, writing—review and editing.

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Conflict of Interest Statement
The authors declare that there are no conflicts of interest related to this study.

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Ethics Statement
Written informed consent was obtained from the patient for participation and publication of anonymized clinical information in this case report. Ethical approval was granted by the Ethics Committee of the Faculty of Health Sciences, Muhammadiyah University of Surakarta (No. 1659/KEPK-FIK/XI/2025).

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