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Case Report

Secondary Prevention Program through Hybrid Tele-Cardiac Rehabilitation Using a Combination of Vigorous-intensity Interval Training and Low-Intensity Home-based Exercise in Patient with Refractory Angina Post-Percutaneous Coronary Intervention

Arnengsih Nazir, MD[1], Gabriela Anggraini[2], MD, Hana Athaya Nurhalizah[3]
[1]*Department of Physical and Rehabilitation Medicine, Dr. Hasan Sadikin General Hospital, Faculty of Medicine Padjadjaran University, Bandung, West Java, Indonesia*
[2]*General Practitioner Borromeus Hospital, Bandung, West Java, Indonesia*
[3]*Faculty of Medicine Mataram University, Mataram, West Nusa Tenggara, Indonesia*

Correspondent:
Arnengsih Nazir, MD
Department of Physical and Rehabilitation Medicine, Dr. Hasan Sadikin General Hospital, Faculty of Medicine Padjadjaran University, Jl. Pasteur No. 38, Bandung, West Java, Indonesia
E-mail: arnengsih@unpad.ac.id

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Abstract

Refractory angina (RA) refers to symptoms lasting >3 months due to reversible ischemia occurring with coronary artery disease, which cannot be controlled by increased medical therapy or revascularization, including percutaneous coronary intervention (PCI). It may result in a significant impact on patient outcomes such as exercise limitation, biopsychosocial disorders, and decreased quality of life. Participation of patients with RA in cardiac rehabilitation (CR) reduces angina frequency and increases exercise capacity.

A 64-year-old male has undergone PCI and experienced RA. This patient was given a CR program to increase his functional capacity as a secondary prevention of cardiovascular disease through a center-based combined with a home-based CR program. Aerobic exercise was provided as hospital-based, vigorous-intensity interval training and low-intensity, home-based exercise. Problems found were RA that often appeared during activity and low cardiorespiratory endurance and muscular fitness. Psychological issues due to fear of recurrent heart attacks resulted in physical activity limitations. Angina symptoms and hand grip strength improved after 2 weeks, although the muscular fitness classification was still poor. During the program, he could achieve the exercise heart rate target without any symptoms. After 4 weeks, there were still frequent VES with couplet episodes, so the patient was still classified as high-risk stratification. Though the risk stratification was still high, the patient was allowed to enter phase III CR with the prescription of moderate-intensity aerobic, low-intensity resistance, flexibility, and breathing exercises. These exercises were given based on recommendations for the average adult to maintain his level of physical activity and promote lifelong healthy behavior.

Hybrid tele-cardiac rehabilitation through vigorous-intensity interval training and low-intensity home-based exercise combination in a post-PCI RA patient improved functional capacity as a key component for cardiac prevention.

Keywords: *Coronary Artery Disease, Percutaneous Coronary Intervention, Refractory Angina, Secondary Prevention, Tele-cardiac Rehabilitation*

Introduction

Refractory angina (RA) is one of the symptoms experienced by patients with coronary artery disease (CAD), which shows angina symptoms that last more than 3 months and cannot be controlled by increasing the dose of medication and revascularization.[1] This complaint can affect the patient's clinical and functional outcomes, which can cause limitations in the ability to carry out activities of daily living (ADL) or exercises, leading to decreased quality of life.[2]

The annual mortality rate of patients with RA ranges from 3 to 21%. A study found that long-term mortality in patients with RA is low, below 4% per year, thought to be due to improvements in secondary prevention strategies, evidence-based medical therapy, and revascularization techniques. Secondary prevention strategies through dietary changes, exercise, and smoking cessation may contribute to decreased mortality.[3]

A cardiac rehabilitation program (CR) is a non-pharmacological treatment that is proven to reduce the frequency and symptoms of angina obtained as a result of exercise.[4,5] However, the emergence of RA symptoms during activity can cause patients to limit activities that can affect the physiological effects of exercise.[6] A CR program is needed to increase the patient's tolerance for carrying out activities.[7] The main goal is to return patients to their normal activities and increase their functional capacity.[5,8] Increased functional capacity is associated with reduced long-term complications of cardiovascular diseases.[9] Although the benefits of CR are widely known, sometimes patients cannot attend this program. The identified barriers are psychosocial factors, travel distance and accessibility to CR facilities, and cost of the CR program; therefore, home-based CR was developed to overcome these barriers. [10, 11]

The home-based CR could be delivered at home, in the community, and in parks. The main components of home-based CR are similar to center-based CR, including patient assessment, exercise, nutritional counseling, risk factor management, and psychosocial interventions. Physical activity, eating habits, health, stress management, smoking, and medication adherence are important parts of the risk

factor modification program. [12] The present case report aimed to identify whether the CR program through hybrid tele-cardiac rehabilitation could improve the functional capacity needed for daily activities and as a secondary prevention program.

Case Illustration

A male patient, 64 years old, was undergoing phase II CR after a percutaneous coronary intervention (PCI) procedure that was done 10 weeks ago. At the beginning of phase II CR, the patient had difficulty undergoing the CR program due to transportation, cost, and access to the hospital factors. This patient was then given a combination of center-based and home-based CR programs, with a detailed program described in Table 1. In addition to CAD, the patient has hypertension and dyslipidemia.

Table 1. Exercise Prescription

Aerobic	Resistance
Hospital-based • Frequency: 2 times/week • Intensity: bouts at the intensity of 70-80 % HR max, rest at the intensity of 40-50% HR max • Time: 6 cycles with 6 bouts of 2 minutes and rest for 2 minutes • Type: vigorous-intensity intermittent training with treadmill Home-based • Frequency: 3 times/week • Intensity: at RPE scale 9 to 11 at 6-20 Borg scale • Time: 45 minutes • Type: ground walking exercise	Hospital-based • Frequency: 2 times/week • Intensity: 40% of 1-RM • Times: 2 sets, 15 repetitions • Type: endurance exercise of lower extremity muscle groups

HR max, maximum heart rate; RPE, rating of perceived exertion; 1-RM, one-repetition maximum

The problems found at the beginning of the phase II CR program were symptoms of angina during physical activity, especially walking, psychological factors, including a lack of physical and sexual activities due to fear of recurrent heart attack, and social factors that prohibited him from undergoing the center-based CR program, especially a lack of a person who could accompany him to the hospital. His activities at home were limited to activities of daily living with very light intensity. He has already gotten back to his job. He worked for 6–8 hours per day at his motorcycle workshop, located not far from his house, achieved by walking, and his leisure time was filled with watching TV.

After 2 weeks of the CR program, an exercise test was done, and the result showed a change of ventricular extrasystole (VES), which was unifocal infrequent at baseline

into unifocal frequent with bigeminy and couplet episodes, which began at low workload. Other parameters of exercise test results were appropriate hemodynamic response, suggestive ischemic response, and good fitness classification with metabolic equivalents (METs) of 9.56. The results place the patient in a high-risk classification.

A psychological issue was a lack of compliance with physical activity, bad eating habits, and low adherence to a treatment program. His fear of physical activity persists. He experienced several times heart attacks and underwent PCI six times. However, he refused to undergo coronary artery bypass graft (CABG) surgery suggested by the cardiologist due to fear of CABG complications or even death. He consumed medicines regularly but did not obey the diet and physical activity prescribed by the doctor.

There was no specific psychological intervention given during phase II CR except for education and counseling every 2 weeks of hospital visits. This intervention focused on an explanation of the impact of the disease on his functional capability and adherence to lifelong healthy behavior. The goal of CR in the short term (4 weeks) was to increase physical activity, cardiorespiratory fitness, and muscle strength to fulfill the functional capacity required for his daily activities and work. On the other hand, long-term goals (> 4 weeks) were to further increase cardiorespiratory fitness, handgrip strength, and muscular fitness as measures to prevent long-term cardiac and non-cardiac complications.

Follow-up after 2 weeks of exercise found that symptoms of angina and hand grip strength improved, even though muscular fitness classification was still poor (Table 2). The exercise program was continued for 4 weeks. After 4 weeks of exercise and the patient underwent an exercise test, he complained that he could achieve the exercise heart rate target without any symptoms. Hand grip strength was improved, physical activity score increased, and an exercise test using Modified Bruce Protocol revealed no symptoms during the test, appropriate hemodynamic response, and good fitness classification. However, there were still frequent VES with couplet episodes, so the patient was still classified as high-risk stratification.

Table 2. The Patient's Functional Assessments

Assessment Tools	Score	After 2 Weeks	After 4 Weeks
DASS	Depression: 2 (normal) Anxiety: 1 (normal) Stress: 1 (normal)		
Lawton IADL	8/8 (high function)		
Barthel Index	95/100 (normal)		
Tampa Scale of Kinesiophobia	26/68 (no kinesiophobia)		
QPAR	18/153	31/153	

Cardiorespiratory Fitness test with the 6MWT	Pre-test: blood pressure: 122/64 mmHg, heart rate: 73 bpm, oxygen saturation: 98 % room air, and Borg scale: 7/0/0 Distance covered: 450 m VO2 max prediction using Cahalin equation: 16.88 with METs: 4.82. Post-test: blood pressure: 128/69 mmHg, heart rate: 85 bpm, oxygen saturation: 97 % room air, and Borg scale: 12/0/0		
Muscular fitness function	Hand grip strength: 28 kg/29 kg with a total of 57 kgs (poor muscular fitness)	Handgrip strength: 31 kg/30 kg with a total of 61 kgs (poor muscular fitness)	Handgrip strength: 35 kg/30 kg with a total of 65 kgs (poor muscular fitness)
Exercise test using a treadmill with Modified Bruce's Protocol on February 27, 2023	• ECG baseline: sinus rhythm, VES unifocal frequent • Test was stopped at minute 12.14 due to fatigue, Borg scale 17 (maximal test) • Adequacy: The exercise test is adequate to measure the ischemic response test and fitness classification • Symptoms: none • Haemodynamic response: Appropriate • Arrhythmia: VES multifocal infrequent at baseline, then unifocal frequent with bigeminy and couplet episode at exercise stage (started at low workload), unifocal infrequent at peak exercise and recovery • Ischemic: suggestive ischemic response • Fitness classification: good fitness classification (9.56 METs) • Risk stratification: highest risk		• ECG baseline: sinus rhythm, VES unifocal frequent • Test was stopped at minute 13.40 due to fatigue Borg scale 17 (maximal test) • Adequacy: exercise test is adequate to measure the ischemic response test and fitness classification • Symptoms: none • Hemodynamic response: Appropriate • Arrhythmia: VES frequent with couplet episodes • Negative ischemic response • Fitness classification: good fitness classification (11.62 METs) • Risk stratification: highest risk

DASS, Depression, Anxiety, and Stress Scale; IADL, Instrumental Activities of Daily Living; QPAR, Quick Physical Activity Rate; 6MWT, 6-minute walking test; VO2 max, volume oxygen maximum; METs, metabolic equivalents; ECG, electrocardiography; VES, ventricular extrasystole

Although risk stratification was still high, the patient was allowed to enter phase III CR with the prescription of moderate-intensity aerobic, low-intensity resistance, flexibility, and breathing exercises. These exercises were given based on recommendations for average adults to

maintain their level of physical activity and promote lifelong healthy behavior.

Discussion

RA refers to symptoms lasting >3 months due to reversible ischemia occurring with CAD, which cannot be controlled by increased medical therapy or revascularization by bypass grafting or stenting, including PCI. (13) This definition is consistent with the patient. Although he had undergone PCI seven times, the complaint of angina during the activity was sometimes still felt, so the patient limited his activities.

Angina symptoms in patients with RA significantly limit their physical activity due to persistent debilitating chest discomfort. Persistent chest discomfort is often commonly believed to be a life-threatening cardiac event. This results in psychological problems in the form of increased anxiety, depression, and other negative behaviors and further impairs both the physical and psychosocial domains of quality of life.[1,14] Patients with RA also have pronounced cardiac and concomitant disease and a high fatality rate. The mortality rate after one year was higher in patients with RA compared to patients who underwent revascularization. In patients with stable angina pectoris with pharmacological treatment, the one-year mortality is approximately 2–4%.[14]

In this patient, the revascularization procedure further limits his activities. It is already known that revascularization will decrease the functional capacity, causing patients to fall into a sedentary lifestyle. (15) RA can significantly impact patient outcomes, causing exercise limitations.[13,16] It is widely known that the presence of symptoms of the disease, such as shortness of breath, fatigue, pain, or angina, causes fear of recurrence of symptoms during activity so that the patient falls into a state of physical inactivity. The physical inactivity model shown in Figure 1 schematically explains the relationship between angina and physical inactivity in CAD patients.[15,17-20]

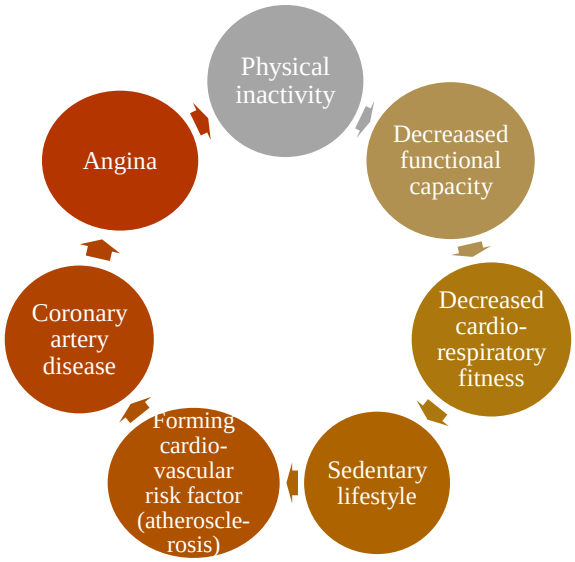

Figure 1. The Relationship of Angina with Physical Inactivity in Coronary Artery Disease

The underlying cause or appropriate therapeutic measures are important in the management. Anginal symptoms with or without documented ischemia are associated with increased adverse cardiovascular events. [13] Revascularization with PCI and CABG is given in moderate to severe cases. [1] Non-revascularization interventions for RA provided as a symptomatic approach, such as spinal cord stimulation, transcutaneous electrical nerve stimulation, epidural anesthesia, enhanced external counterpulsation, and laser revascularization were given.[1,14] Cognitive behavioral therapy is an approach given to improve patients' ability to manage their symptoms.[1]

CR is one of the treatments advocated in managing patients with RA.[21,22] CR is also known as a secondary prevention program. The main goal is to help the patients return to their normal ADLs by increasing their functional capacity. Functional capacity is associated with a person's ability to perform everyday living tasks. It may also refer to aerobic fitness, or the body's ability to use oxygen efficiently under a workload. The primary metric of functional capacity is cardiorespiratory fitness (CRF), usually assessed as maximum oxygen uptake (VO_2 max), which is ideally measured by cardiopulmonary exercise testing. Metabolic equivalents (METs) are obtained by dividing VO_2 max by 3.5. [17, 23]

Exercise training remains a primary therapy for improving functional capacity. Aerobic exercise benefits include shifts in subcellular gene expression (triggered in part by reduced inflammation), boosted cellular metabolism (improved bioenergetics and insulin sensitivity), increased organ efficiency (including increased cardiac, vascular, pulmonary, muscular, neurologic, and cognitive performance), and enhanced systemic biological and physiological integration.[17]

Several factors affect the value of functional capacity, or VO_2 max, including cardiovascular reserve, respiratory reserve, musculoskeletal, and other factors including age and sex. [24] Increasing age causes the functional capacity to further decrease due to the constantly developing process of atherosclerosis and endothelial dysfunction. [17] Functional capacity plays a role in the secondary prevention of cardiovascular disease because higher functional capacity can inhibit the process of atherosclerosis and decrease cardiovascular function. [17] Better functional capacity will also cause the patient to perform activities better so that the circle of inactivity can be broken. [17]

Participation of patients with RA in CR reduces angina frequency and increases exercise capacity as a result of exercise, weight loss, and smoking cessation. Exercise can also improve endothelial function, reduce oxidative stress and arterial stiffness, and improve myocardial perfusion. [25] This patient was given aerobic exercise to increase functional capacity from 9.56 METs to a higher rate to achieve an excellent level of functional capacity according to his

age (95th percentile). [26] Although the patient's functional capacity value is normal (good), the patient is still given a functional capacity improvement program with several considerations, namely: 1) the presence of CAD with RA, which causes activity restrictions; 2) old age leads to a more pronounced physiological impact of aging on functional capacity; and 3) secondary prevention of cardiovascular disease.

This patient was given a hybrid tele-cardiac rehabilitation program. The presence of RA causes us to consider not providing continuous exercise but in the form of interval training. High-intensity interval training (HIIT) is widely used in CR because it is proven effective and safe for patients with CAD and heart failure. [27-29] A case report by Corre et al. on the use of HIIT in a 75-year-old RA patient found that the program was effective and safe, without adverse events during exercise. [30] The prescription of exercise in this patient was adopted from the Corre et al. protocol with some modifications, such as the device used (a treadmill) and exercise intensity (vigorous). The reason for the modification was our consideration of RA that could occur during exercise.

This patient was also given a home-based CR program monitored via WhatsApp calls to achieve adequate training volume. High-risk stratification is contraindicated to unsupervised home exercise programs. [10, 26] Therefore, telemonitoring CR was provided. The literature stated that home-based CR programs are as effective as center-based CR in CAD patients. [10, 31]

To ensure the safety of the home-based CR program, education was also given about the symptoms and signs of exercise intolerance, symptoms and signs of adverse events, and what must be done to overcome it. Symptoms and signs of exercise intolerance include angina, unusual or severe shortness of breath, abnormal diaphoresis, pallor, cyanosis, cold, and clammy skin, central nervous system symptoms such as vertigo, ataxia, gait problems, or confusion, leg cramps or intermittent claudication, and physical or verbal manifestations of severe fatigue or shortness of breath. [32]

At the end of hospital-based CR, the patient achieved a good fitness classification, but he still experienced arrhythmias, so the risk stratification was at high risk. Even though the high-risk stratification prohibited us from giving a home-based exercise program, a good level of functional capacity, low- and moderate-intensity exercise prescription, and a good performance of exercise without adverse events during hospital-based CR allowed us to try to give home-based exercises. With a recommended prescription for an average adult, we hope the patient continues to increase his physical activity and exercise regularly.

Conclusion

Hybrid tele-cardiac rehabilitation through vigorous-intensity interval training

and low-intensity home-based exercise combination in a patient with RA post-PCI improved functional capacity as a key component for a secondary prevention program. In the presence of barriers to center-based CR, hybrid tele-cardiac rehabilitation may become an option. Although the studies on the role of tele-cardiac rehabilitation are still limited, the implementation of this program for RA patients is considered effective and safe.

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References

1. Cheng K, Sainsbury P, Fisher M, de Silva R. Management of refractory angina pectoris. Eur Cardiol. 2016;11(2):69-76.
2. Fanaroff AC, Kaltenbach LA, Peterson ED, Hess CN, Cohen DJ, Fonarow GC, et al. Management of Persistent Angina After Myocardial Infarction Treated With Percutaneous Coronary Intervention: Insights From the TRANSLATE-ACS Study. J Am Heart Assoc. 2017;6(10):e007007.
3. Henry TD, Satran D, Hodges JS, Johnson RK, Poulose AK, Campbell AR, et al. Long-term survival in patients with refractory angina. Eur Heart J. 2013;34(34):2683-8.
4. Anderson L, Thompson DR, Oldridge N, Zwisler AD, Rees K, Martin N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev. 2016;2016(1):CD001800.
5. Mampuya WM. Cardiac rehabilitation past, present and future: an overview. Cardiovasc Diagn Ther. 2012;2(1):38-49.
6. Long L, Anderson L, Dewhirst AM, He J, Bridges C, Gandhi M, et al. Exercise-based cardiac rehabilitation for adults with stable angina. Cochrane Database Syst Rev. 2018;2(2):CD012786.
7. Paneroni M, Scalvini S, Corrà U, Lovagnini M, Maestri R, Mazza A, et al. The impact of cardiac rehabilitation on activities of daily life in elderly patients with heart failure. Front Physiol. 2022;12:785501.
8. Prabhu NV, Maiya AG, Prabhu NS. Impact of cardiac rehabilitation on functional capacity and physical activity after coronary revascularization: a scientific review. Cardiol Res Pract. 2020;2020(1236968).
9. Lavie CJ, Thomas RJ, Squires RW, Allison TG, Milani RV. Exercise training and cardiac rehabilitation in primary and secondary prevention of coronary heart disease. Mayo Clin Proc. 2009;84(4):373-83.
10. Avila A, Claes J, Goetschalckx K, Buys R, Azzawi M, Vanhees L, et al. Home-based rehabilitation with telemonitoring guidance for patients with coronary artery disease (short-term results of the TRiCH study): randomized controlled trial. J Med Internet Res. 2018;20(6):e225.
11. Chindhy S, Taub PR, Lavie CJ, Shen J. Current challenges in cardiac rehabilitation: strategies to overcome social factors and attendance barriers. Expert Rev Cardiovasc Ther. 2020;18(11):777-89.
12. Nazir A, Anggraini G. Implementation of home-based cardiac rehabilitation program in patients with coronary artery disease: A literature review. IndoJPMR. 2023;12(02):164-77.
13. Davies A, Fox K, Galassi AR, Banai S, Ylä-Herttuala S, Luescher TF. Management of refractory angina: an update. Eur Heart J. 2021;42(3):269-83.
14. Andréll P, Ekre O, Grip L, Währborg P, Albertsson P, Eliasson T, et al. Fatality, morbidity and quality of life in patients with refractory angina pectoris. Int J Cardiol. 2011;147(3):377-82.
15. Prabhu NV, Maiya AG, Prabhu NS. Impact of cardiac rehabilitation on functional capacity and physical activity after coronary revascularization: a scientific review. Cardiol Res Pract. 2020;2020:1236968.
16. Milani M, Milani JGPO, Cipriano Junior G. Refractory angina referral to cardiovascular rehabilitation: a neglected patient. Arq Bras Cardiol. 2022;119(5):754-5.

17. Forman DE, Arena R, Boxer R, Dolansky MA, Eng JJ, Fleg JL, et al. Prioritizing functional capacity as a principal end point for therapies oriented to older adults with cardiovascular disease: a scientific statement for healthcare professionals from the American Heart Association. Circulation. 2017;135(16):e894-e918.
18. Gardner AW, Montgomery PS, Ritti-Dias RM, Thadani U. Exercise performance, physical activity, and health-related quality of life in participants with stable angina. Angiology. 2011;62(6):461-6.
19. Joussain C, Joubert J, Laroche D, D'antono B, Juneau M, Grémeaux V. Barriers to physical activity in coronary artery disease patients: development and validation of a new scale. Ann Phys Rehabil Med. 2017;60(5):289-98.
20. Prasad D, Das B. Physical inactivity: a cardiovascular risk factor. Indian J Med Sci. 2009;63(1):33-42.
21. Mannheimer C, Camici P, Chester M, Collins A, DeJongste M, Eliasson T, et al. The problem of chronic refractory angina. Report from the ESC Joint Study Group on the Treatment of Refractory Angina. Eur Heart J. 2002;23(5):355-70.
22. Asbury EA, Webb CM, Probert H, Wright C, Barbir M, Fox K, et al. Cardiac rehabilitation to improve physical functioning in refractory angina: a pilot study. Cardiology. 2012;122(3):170-7.
23. Badillo K. Effectiveness of cardiac rehabilitation: Secondary prevention increases functional capacity in myocardial infarction patients: University of Central Florida 2015.
24. Del Buono MG, Arena R, Borlaug BA, Carbone S, Canada JM, Kirkman DL, et al. Exercise intolerance in patients with heart failure: JACC state-of-the-art review. J Am Coll Cardiol. 2019;73(17):2209-25.
25. Saeidifard F, Wang Y, Medina-Inojosa JR, Squires RW, Huang H-H, Thomas RJ. Multicomponent cardiac rehabilitation and cardiovascular outcomes in patients with stable angina: a systematic review and meta-analysis. Mayo Clin Proc Innov Qual Outcomes. 2021;5(4):727-41.
26. American College of Sports Medicine. ACSM's Guidelines for exercise testing and prescription. 10 ed. Philadelphia: Wolter Kluwers; 2018.
27. Guiraud T, Labrunee M, Gaucher-Cazalis K, Despas F, Meyer P, Bosquet L, et al. High-intensity interval exercise improves vagal tone and decreases arrhythmias in chronic heart failure. Med Sci Sports Exerc. 2013;45(10):1861-7.
28. Wang C, Xing J, Zhao B, Wang Y, Zhang L, Wang Y, et al. The effects of high-intensity interval training on exercise capacity and prognosis in heart failure and coronary artery disease: a systematic review and meta-analysis. Cardiovasc Ther. 2022;2022:4273809.
29. Keech A, Holgate K, Fildes J, Indraratna P, Cummins L, Lewis C, et al. High-intensity interval training for patients with coronary artery disease: Finding the optimal balance. Int J Cardiol. 2020;298:8-14.
30. Corre J, Douard H, Ronchard T. Cardiac rehabilitation with intermittent myocardial ischaemia as a new therapeutic option in refractory angina? ESC Heart Fail. 2021;8(3):2316-9.
31. Li J, Liu B, Wang Z, El-Ansary D, Adams R, Han J, et al. Efficacy of a 6-week home-based online supervised exercise program conducted during COVID-19 in patients with post percutaneous coronary intervention: a single-blind randomized controlled trial. Front Cardiovasc Med. 2022;9:853376.
32. Bezner J. Impaired aerobic capacity/endurance. In: Brody LT, Hall CM, editors. Therapeutic exercise: moving toward function. 3rd ed. Baltimore: Wolters Kluwer/Lippincott Williams & Wilkins Health; 2011. p. 101-23.