Review Article

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Exercise-Based Cardiac Rehabilitation: An Overview of Science from Systematic Reviews and Meta-Analyses to Guide Clinical Practice

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Abstract

This review article aimed to enlighten evidence-informed researchers and clinicians with a descriptive overview of systematic reviews and meta-analyses on exercises for cardiac rehabilitation from PubMed. Exercise-based cardiac rehabilitation (EBCR) includes either exercise training administered alone or exercise training in addition to psychosocial, risk factor management and / or educational interventions and was considered a Class I indication [i.e., useful and effective] for patients with coronary heart disease.There were six systematic reviews that measured risk factors, clinical and quality of life outcomes following exercise training in cardiac rehabilitation; and five other systematic reviews included one each on high-intensity interval training, resistance training, aerobic training, Chinese Qiqong exercise and physical activity prescription. Overall, there is high-level evidence suggesting exercises as per earlier evidence-based recommendations.

Keywords: Exercise Therapy; Exercise-Based Cardiac Rehabilitation; Exercise Prescription; Exercise Training; Cardiovascular Rehabilitation.

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Effects on Risk Factors and outcomes

Lawler et al [1] performed a meta-analysis of 34 randomized controlled trials (RCTs) from MEDLINE and found that exercise-based CR was associated with a lower risk of reinfarction, cardiac mortality, and all-cause mortality, with favorable effects also on cardiovascular risk factors, including smoking, blood pressure, body weight, and lipid profile.

Oldridge [2] performed an overview of six meta-analyses which included a total of 71 randomized clinical trials on 13,824 patientsand clearly demonstratedbeneficial clinical outcomes (reduced all-cause and cardiac mortality, nonfatal reinfarction and reduced hospitalization rates) and positive changes in modifiable risk factors (total cholesterol, triglycerides and systolic blood pressure).

Isaksenet al [3] reviewed nine studies on 1889 patients with implantable cardioverter defibrillators (ICDs) for exercise training (ET) in cardiac rehabilitation outcomes. ET was safe and was not associated with increased risk of shock. ET also improved aerobic capacity in ICD patients, while effects on anxiety, depression and quality of life are unknown (Isaksenet al, 2011).

Heranet al [4]studied the effectiveness of exercise-based cardiac rehabilitation (exercise training given alone or in combination with psychosocial or educational interventions) on mortality, morbidity and health-related quality of life of patients with coronary heart disease (CHD) by performing a systematic review which identified 47 studies randomising 10,794 patients to exercise-based cardiac rehabilitation or usual care. Exercise-based cardiac rehabilitation was effective in reducing total and cardiovascular mortality (in medium to longer term studies) and hospital admissions (in shorter term studies) but not in preventing total MI or revascularisation (CABG or PTCA). In seven out of 10 trials there was evidence of a significantly higher

level of quality of life with exercise-based cardiac rehabilitation compared to usual care.

Puetzet al [5] performed a meta-analytical reviewof 36 studies consisting of 4765 subjects and found that cardiac rehabilitation exercise programs were associated with increases in energy and decreases in fatigue. Exercise-based cardiac rehabilitation programs also had larger effects on feelings of energy and fatigue compared with anxiety and depression.

Self-Efficacy and Adherence

Woodgateand Brawley [6] systematically reviewed41 CR studiesthat measured self-regulatory efficacy for actions that facilitate adherence. The authors found that most studies examined self-efficacy during the intensive center-based phase of CR, with little attention to long-term maintenance. The authors provided recommendations for CR literature as follows; "examining (a) self-efficacy as a major rehabilitation outcome, (b) measurement of self-regulatory efficacy for behavior change, (c) suspected moderators of self-efficacy (i.e. gender, age), and (d) self-efficacy relative to maintenance."

Interval Training

Guiraudet al[7] performed a non-systematic review of studies on High-intensity interval training (HIIT) in patients with coronary artery disease (CAD) and heart failure (HF), as well as in persons with high cardiovascular risk. To summarize, HIIT appears safe and better tolerated by patients than moderate-intensity continuous exercise (MICE). HIIT gives rise to many short- and long-term central and peripheral adaptations in these populations. In stable and selected patients, it induces substantial clinical improvements, superior to those achieved by MICE, including beneficial effects on several important prognostic factors (peak oxygen uptake, ventricular function, endothelial function), as well as improving quality of life. HIIT appears to be a safe and effective alternative for the rehabilitation of patients with CAD and HF. It may also assist in improving adherence to exercise training.

Resistance Training

The German Federation for Cardiovascular Prevention and Rehabilitation provided recommendations for resistance training in CR which explained the potential risk of increased blood pressure during resistance training, and other factors such asmagnitude of the isometric component, the load intensity, the amount of muscle mass involved as well as the number of repetitions and / or the load duration influence the BP responses. The authors recommendedlow-intensity resistance training [40-60% maximum voluntary contraction (MVC)] with 15-20 repetitions, since it produced only modest elevations in blood pressuresimilar to those seen during moderate endurance training [8].

Aerobic Exercise Training

The European Association for Cardiovascular Prevention and Rehabilitation, the American Association of Cardiovascular and Pulmonary Rehabilitation, and the Canadian Association of Cardiac Rehabilitation published a joint position statement on aerobic exercise prescription in cardiac rehabilitation [9] which provided information regarding the identification of different exercise intensity domains, the methods of direct and indirect determination of exercise intensity for both continuous and interval aerobic training, the effects of the use of different exercise protocols on exercise intensity prescription and the indications for recommended exercise training prescription in specific cardiac patients' groups. A shift from a 'range-based' to a 'threshold-based' aerobic exercise intensity prescription, combined with thorough clinical evaluation and exercise-related risk assessment,was recommended to maximize the benefits obtained by the use of aerobic exercise training in cardiac rehabilitation.

Chinese Qigong Exercise

Chan et al [10] did a systematic review of 6 RCTs and one CCT on a total of 540 patients to assess evidence for Chinese qigong exercise for atrial fibrillation, coronary artery disease, myocardial infarct, valve replacement, and ischemic heart disease. The evidence suggested that Chinese qigong exercise was an optimal option for patients with chronic heart diseases.

Physical Activity Prescription

Chase [11] reviewed 14 intervention studies to maintain or increase physical activity (PA) after CR using cognitive and / or behavioral strategies. The cognitive interventions were self-efficacy enhancement measures, barrier management, and problem solving. Behavioral interventions were self-monitoring, prompting, goal setting, and feedback. Inconsistent findings were reported in cognitive intervention studies, whereas positive findings were reported by behavioral studies and studies that used combinations of interventions.

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References

1. Lawler PR, Filion KB, Eisenberg MJ.Efficacy of exercise-based cardiac rehabilitation post-myocardial infarction: a systematic review and meta-analysis of randomized controlled trials.Am Heart J. 2011; 162(4): 571-584.e2.
2. Oldridge N.Exercise-based cardiac rehabilitation in patients with coronary heart disease: meta-analysis outcomes revisited.Future Cardiol. 2012; 8(5): 729-51.
3. Isaksen K, Morken IM, Munk PS, Larsen AI.Exercise training and cardiac rehabilitation in patients with implantable cardioverter defibrillators: a review of current literature focusing on safety, effects of exercise training, and the psychological impact of programme participation.Eur J PrevCardiol. 2012; 19(4): 804-12.
4. Heran BS, Chen JM, Ebrahim S, Moxham T, Oldridge N, Rees K, et al.Exercise-based cardiac rehabilitation for coronary heart disease.Cochrane Database Syst Rev. 2011; (7): CD001800.
5. Puetz TW, Beasman KM, O'Connor PJ.The effect of cardiac rehabilitation exercise programs on feelings of energy and fatigue: a meta-analysis of research from 1945 to 2005.Eur J CardiovascPrevRehabil. 2006; 13(6): 886-93.
6. Woodgate J, Brawley LR.Self-efficacy for exercise in cardiac rehabilitation: review and recommendations.J Health Psychol. 2008; 13(3): 366-87.
7. Guiraud T, Nigam A, Gremeaux V, Meyer P, Juneau M, Bosquet L.High-intensity interval training in cardiac rehabilitation.Sports Med. 2012; 42(7): 587-605.
8. Bjarnason-Wehrens B, Mayer-Berger W, Meister ER, Baum K, Hambrecht R, Gielen S; German Federation for Cardiovascular Prevention and Rehabilitation. Recommendations for resistance exercise in cardiac rehabilitation. Recommendations of the German Federation for Cardiovascular Prevention and Rehabilitation.Eur J CardiovascPrevRehabil. 2004; 11(4): 352-61.
9. Mezzani A, Hamm LF, Jones AM, McBride PE, Moholdt T, Stone JA, et al; European Association for Cardiovascular Prevention and Rehabilitation; American Association of Cardiovascular and Pulmonary Rehabilitation; Canadian Association of Cardiac Rehabilitation.Aerobic exercise intensity assessment and prescription in cardiac rehabilitation: a joint position statement of the European Association for Cardiovascular Prevention and Rehabilitation, the American Association of Cardiovascular and Pulmonary Rehabilitation, and the Canadian Association of Cardiac Rehabilitation.J CardiopulmRehabil Prev. 2012; 32(6): 327-50.
10. Chase JA.Systematic review of physical activity intervention studies after cardiac rehabilitation.J CardiovascNurs. 2011; 26(5): 351-8.
11. Chan CL, Wang CW, Ho RT, Ho AH, Ziea ET, Taam Wong VC, et al.A systematic review of the effectiveness of qigong exercise in cardiac rehabilitation.Am J Chin Med. 2012; 40(2): 255-67.