High Intensity Interval versus Moderate Intensity Continuous Training in Patients with Coronary Artery Disease: A Meta-analysis of Physiological and Clinical Parameters

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Introduction	Exercise-based cardiac rehabilitation for patients with coronary artery disease (CAD) significantly improves their outcome, although the optimal mode of exercise training remains undetermined. Previous analyses have been constrained by small sample sizes and a limited focus on clinical parameters. Further, results from previous studies have been contradicted by a recently published large RCT.
Method	We performed a meta-analysis of published randomised controlled trials to compare high intensity interval training (HIIT) and moderate intensity continuous training (MCT) in their ability to improve patients' aerobic exercise capacity (VO_{2peak}) and various cardiovascular risk factors. We included patients with established coronary artery disease without or without impaired ejection fraction.
Results	Ten studies with 472 patients were included for analyses (218 HIIT, 254 MCT). Overall, HIIT was associated with a more pronounced incremental gain in participants' mean VO_{2peak} when compared with MCT (+1.78 mL/kg/min, 95% CI: 0.45-3.11). Moderate intensity continuous training however was associated with a more marked decline in patients' mean resting heart rate (-1.8/min, 95% CI: 0.71-2.89) and body weight (-0.48 kg, 95% CI: 0.15-0.81). No significant differences were noted in the level of glucose, triglyceride and HDL at the end of exercise program between the two groups.
Conclusion	High intensity interval training improves the mean VO_{2peak} in patients with CAD more than MCT, although MCT was associated with a more pronounced numerical decline in patients' resting heart rate and body weight. The underlying mechanisms and clinical relevance of these results are uncertain, and remain a potential focus for future studies.
Keywords	Interval training • Continuous training • Coronary artery disease • VO_{2peak}

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Introduction

Exercise based cardiac rehabilitation for patients with coronary artery disease significantly improves their outcome [1]. This in part may be attributed to the improvement in patients' aerobic exercise capacity [2,3]. The optimal exercise regime has yet to be determined however, and many have attempted to compare the efficacy of high-intensity interval training (HIIT) against moderate intensity continuous training (MCT) in their ability to improve patients' aerobic exercise capacity as measured by peak oxygen consumption (VO_{2peak}). Most recently, Elliott et al. have shown HIIT to be superior to MCT in improving the VO_{2peak} of patients with coronary artery disease [4]. This echoed the findings of a previous meta-analysis in this patient cohort [5], as well as meta-analyses undertaken in other patient groups [22].

While these studies have been instrumental in our understanding of exercise physiology particularly in the cardiac population, the number of subjects in each individual study has been relatively small. The heterogeneity among the studies, specifically in relation to the patient characteristics and the type, intensity and duration of continuous training also limits the interpretation and clinical application of these results. Further, most studies have focussed predominantly on changes in patients' physiological characteristics, and not their clinical parameters and risk factor profile. Lastly, no meta-analyses to date have included the largest multi-centred randomised controlled trial (RCT) [6] recently published, which produced a contradictory result to previous analyses. Herein we present the results of our meta-analyses which include the latest RCT rendering it the largest analysis to date. We also focussed on both physiological as well as clinical parameters to improve the clinical relevance of our analyses.

Methods

A systematic literature search was performed by the primary author in May 2015 using Ovid Medline and Embase with no date restriction. A combined search strategy was employed
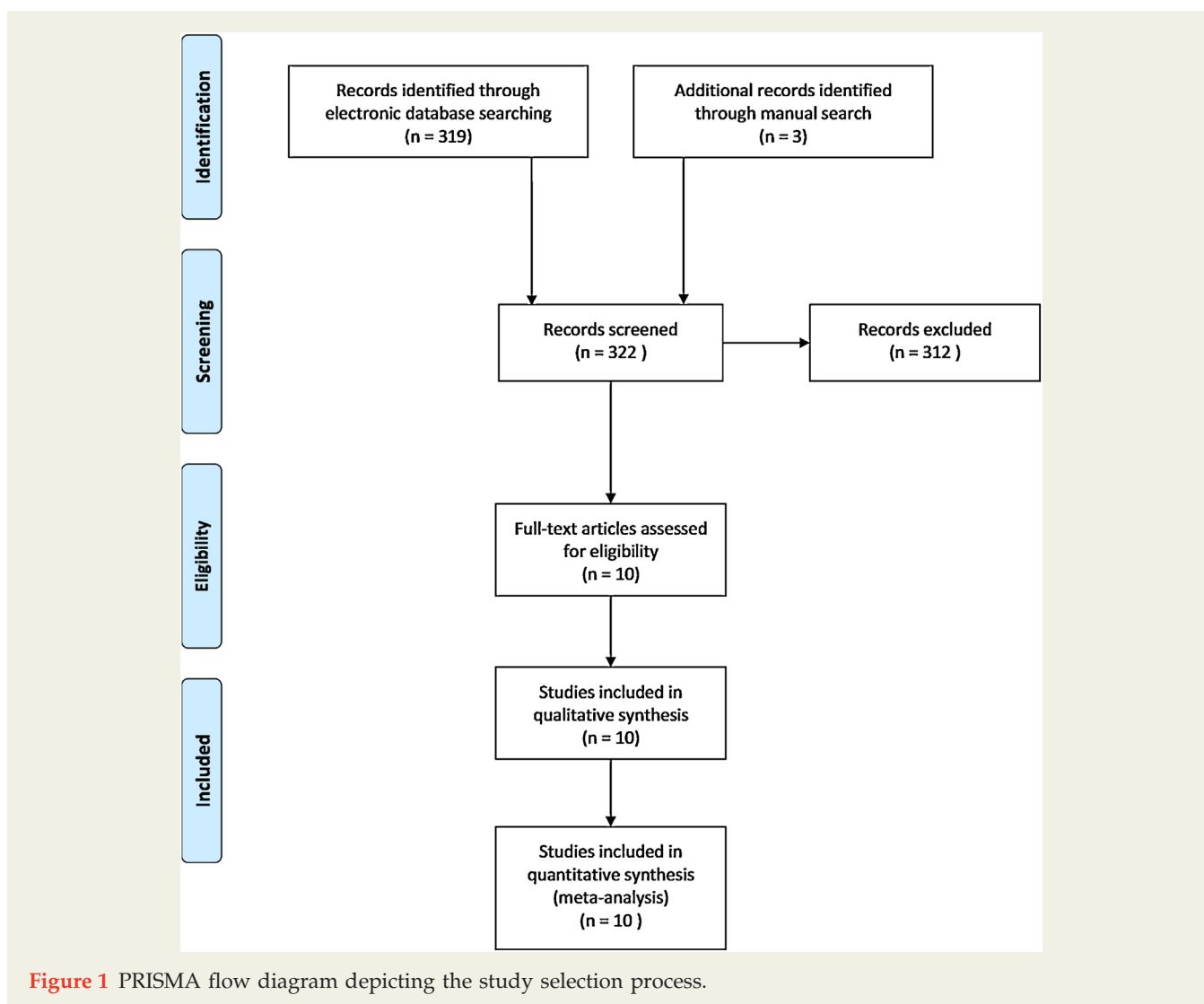

Figure 1 PRISMA flow diagram depicting the study selection process.