High-Intensity Interval Training (HIIT) and Its Application in Stable Coronary Artery Disease Patients

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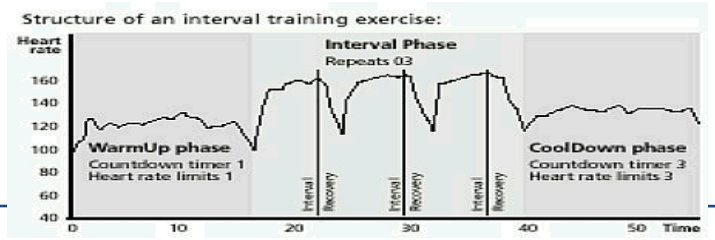
Introduction

- HIIT consists of alternate short bouts of high intensity training and recovery training, last from 40 seconds to few minutes in each bout
- The training is challenging, tough, fun but short lasting. It aims to improve cardiovascular fitness and performance of physically active people nowadays
- It conducts in forms of free weight or resistance circuit training or training modalities such as treadmill, cycling or sky-walking

Objective

- The study aims to explore the feasibility of HIIT in stable coronary artery disease patients (CAD) with percutaneous coronary intervention (PCI) who were comparatively young, energetic and physically active



Benefits of HIIT

Healthy Subjects

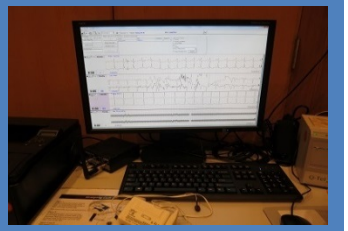
- Significantly reduce subcutaneous fat, abdominal fat and total body mass (Boutcher et al., 2011)
- Improve maximum oxygen uptake VO_2 max and insulin sensitivity (Helgerud J et al., 2007)
- Burn more calories and increase post-exercise oxygen consumption /fat oxidation & energy expenditure (King J et al., 2002)
- Improve blood lipid profile (i.e. decrease total cholesterol, LDL-cholesterol and increase HDL-cholesterol) (O'Donovan G et al., 2005)
- Increase muscle fiber area, capillary density, glycogen and glycogen synthase (Wang Y, et al., 2009)

Cardiac Patients

- Improve max oxygen uptake (VO_2 max) in stable CAD patients (Rognmo et al., 2004, Warburton et al., 2005) and stable heart failure patients (Wisloff et al., 2012)
- Improve in the artery endothelial function in terms of artery flow-mediated dilation (Wisloff et al., 2011)
- Increase patients exercise compliance and adherence (Drigny et al., 2011)

Methodology

Study Period: between Dec 2015 to Sept 2016



Stable CAD patients (N=26)

High Intensity Interval Training (HIIT) (n=13)
(9 male, 4 female; 61.4±7.7 years old)

Moderate Intensity Training (MIT) (n=13)
(7 male, 6 female; 65.8±4.2 years old)

Trained at 70-85% Maximal Heart Rate (MHR) for about 20 min in each session

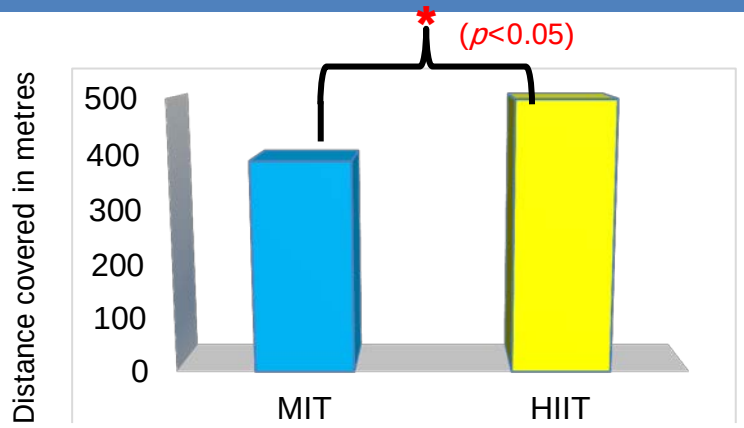
Trained at 50-60 % Maximal Heart Rate (MHR) for the whole session

Outcome Measures
Distance & Rate Pressure Product In 6MWT

Results

Six-Minute Walk Test

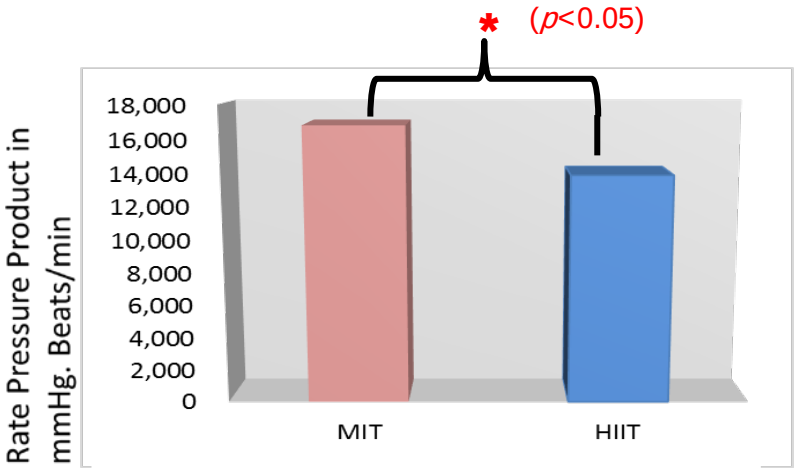
- After eight weeks training, there was a significant improvement in the total distance covered in 6MWT (499±12.6m in HIIT group and 389±18.3m in MIT group, $p<0.05$)



Change in distance of 6MWT of cardiac patients with MIT and HIIT

Rate Pressure Product

- There was a significant reduction in the RPP in the HIIT group as compared with the MIT group (13,843±1876 mmHg.Beats/min in HIIT and 16,788±2190 mmHg.Beats/min in MIT group, $p<0.05$)



Change in RPP of cardiac patients with MIT and HIIT

Conclusions

- Stable coronary artery disease patients undergone PCI with HIIT showed greater improvement in physical capacity and exercise tolerance (6MWT and RPP)
- HIIT group demonstrated higher exercise capacity with less effort
- Close monitoring is necessary in order to uphold quality and safety for cardiac patients during HIIT