Physiological and Perceptual Responses During Self-Regulated Exercise in Men with Coronary Artery Disease

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ABSTRACT

PURPOSE: Physiologically based exercise prescriptions normally involve identifying an intensity range that elicits a predetermined VO_2 or heart rate. In many instances prescribed exercise that exceeds an individual's preferred level of intensity may establish a negative attitude toward physical activity. Longitudinal studies report that participants tend to deviate from physiologically based prescribed levels of intensity in favour of their apparently preferred levels. Self regulated exercise intensity may increase enjoyment and promote adherence by allowing individuals successfully complete an activity within their perceptual preference range and without undue physiological strain. This study examined the physiological and perceptual responses during self-regulated exercise in men with CAD

METHODS: Eight men with CAD (65.7 ± 4.5 yr, VO_2peak 28.0 ± 2.6 $ml \cdot kg^{-1} \cdot min^{-1}$, BMI 29.7±3.3 $kg \cdot m^{-2}$) exercised on a treadmill for 20 min at a self regulated intensity. They were allowed to change the velocity and grade every 5 min. Respiratory metabolic and gas exchange variables were measured continuously using open circuit spirometry. Heart rate was continuously recorded using telemetry, and undifferentiated RPE (RPE-O) was recorded every 5 min using the Borg 15-category scale.

RESULTS: Perceptual and physiological responses remained stable after the first 5 min of exercise. Subjects exercised at 65.7 ± 14.2 % VO_2peak and 94 ± 5.0 % HR peak during the final 15 min of self regulated exercise. This equates to a treadmill velocity of 5.3 ± 0.9 $km \cdot h^{-1}$, and a grade of 0.7 ± 1.1. The RPE-O was 12±2 and falls between the verbal descriptors of fairly light and somewhat hard.

CONCLUSIONS: When allowed to self-regulate their exercise intensity, men with CAD select an intensity that is perceived to be fairly light to somewhat hard, and elicits a physiological response likely to improve cardiovascular health.

INTRODUCTION

Despite the well-documented benefits of exercise, adherence among patients with coronary artery disease (CAD) has been low during and after cardiac rehabilitation (CR) as well as among patients not attending CR. Exercise programs should be designed not only to develop optimal fitness, but also to enhance long-term adherence to training. Allowing individuals to self-regulate exercise intensity has been advocated to increase adherence. However, it is important that when individuals are allowed to self-regulate exercise intensity that they select an workrate that is adequate to produce health benefits (1). This study examined the physiological and perceptual responses during self-regulated exercise in men with CAD.

METHODS

Subjects: Eight men with diagnosed CAD volunteered. Ethical approval was granted by the Dublin City University Research Ethics Committee. Subjects visited the Vascular Research Unit in the School of Health and Human Performance on 2 separate occasions.

Visit 1: The nature and risks of the study were explained, and written informed consent was obtained. Following a brief medical examination, subject's performed a maximal treadmill exercise test using a ramp protocol. A 12 lead ECG, blood pressure, rating of perceived exertion, and expired gases were monitored throughout the test.

Visit 2: Subjects exercised on a treadmill for 20 min. Treadmill velocity and gradient were self regulated by each subject. Subjects were given the opportunity to adjust the treadmill velocity and/or grade every 5 min. Heart rate was continuously recorded and undifferentiated RPE (RPE-O) was recorded every 5 min using the Borg 15-category scale. Respiratory metabolic and breath-by-breath expired O_2, CO_2 and ventilatory volume were determined using open circuit spirometry (Vmax 29, Sensormedics Corp., Yorba Linda CA).

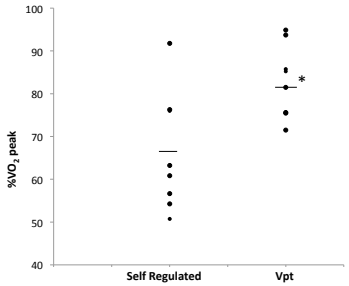
RESULTS

- **Subjects selected a treadmill velocity of. 5.3 ± 0.9 $km \cdot h^{-1}$. and 0.7 ± 1.1. % grade**
- **Treadmill velocity corresponded to 65.7 ± 14.2 %VO_2peak and 94 ± 5.0 %HRpeak**
- **RPE-O was 12 ± 2 and falls between the verbal descriptors of fairly light and somewhat hard**
- **Majority of CAD patients self-selected an exercise intensity below the ventilatory breakpoint (Figure 1)**

Table. Perceptual and physiological responses during self-regulated exercise

	Time (min)			
	0-5	5-10	10-15	15-20
RPE-O	9.88 ± 0.74	10.63 ± 0.75	12.19 ± 0.63	12.88 ± 0.85
VO_2 ($l \cdot min^{-1}$)	1.24 ± 0.12	1.43 ± 0.14	1.60 ± 0.18	1.73 ± 0.23
VO_2($ml \cdot kg \cdot min^{-1}$)	14.57 ± 0.95	16.74 ± 1.12	18.71 ± 1.62	20.26 ± 2.34
%VO_2	54.14 ± 4.09	61.85 ± 3.88	68.74 ± 4.85	74.15 ± 6.59
Heart rate (bpm)	86.86 ± 4.11	93.86 ± 4.92	98.86 ± 6.51	105.43 ± 9.22
% Heart rate	73.2 ± 5.39	78.6 ± 5.02	82.2 ± 4.94	86.6 ± 4.34

Figure 1



Individual and mean % VO_2peak values for 15 min of self regulated exercise and the Vpt* p<0.001 vs. self-regulated

CONCLUSION

These findings suggest that an exercise intensity that is less formal and self-determined can be effective in eliciting a physiological response likely to improve cardiovascular health according to ACSM and could possibly increase adherence to exercise programmes in patients with CAD. Future research will look at the adherence to self regulated exercise intensity in men with coronary artery disease over a long term training programme

BIBLIOGRAPHY

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