The Relative Measure of Oxygen Uptake Alone is not a Good Indicator of Exercise Intensity in Male Post-Myocardial Infarction Patients

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INTRODUCTION

Where possible direct measures of VO₂ for determining exercise intensity in cardiac patients are recommended (1). However, Heart failure patients have been found to produce reduced oxygen consumption per watt of work compared to healthy controls compensated for during recovery (2-4) as EPOC, showing them to be less efficient (4). To our knowledge this has not been widely investigated in post-myocardial infarction (MI) patients, who make up the majority of cardiac patients (5). Therefore the aim of this study was to explore differences in VO₂ measures during and post cycle ergometry.

METHODS AND RESULTS

Participants performed a graded cycle ergometry test (CET) at 50, 75 and 100 watt followed by 10 minutes active (at 50 watts) and 22 minutes seated recovery. Throughout participants’ heart rate (beat/min) (HR), ratings of perceived exertion (RPE) and expired air parameters were measured.

Analysis comparing lines of regression showed:
Throughout, post-MIs HR values were lower, related to β-blocker medication (P<0.05).

During CET (Stage A): Post-MIs worked at a statistically significant higher percentage of their anaerobic threshold (AT) (P<0.01), with significantly lower oxygen uptake (VO₂) (ml/kg/min) (P<0.01) (see figure 1) and higher RPE (P<0.01) (see figure 2).

Active recovery (Stage B) (from 100 to 50 watts): Post-MIs displayed higher kcal/LO₂/min (P<0.05). (see figure 3).

Seated recovery (Stage C): Post-MIs showed higher RER (P<0.01) (see figure 4).

CONCLUSION:
Despite post-MIs lower VO₂ (ml/kg/min) during CET they were in fact working at a greater percentage of their AT than the controls, reflected by post-MIs higher RPE values. The post-exercise measures also showed post-MIs to have greater EPOC, increased use of anaerobic processes and expended greater amounts of energy. Therefore AT, RPE and post-exercise measures should be a consideration when determining exercise intensity in post-MI patients.

SUMMARY AND CONCLUSION

Despite post-MIs lower VO₂ (ml/kg/min) during CET they were in fact working at a greater percentage of their AT than the controls, reflected by post-MIs higher RPE values. Post-exercise measures revealed post-MI to have greater EPOC, increased use of anaerobic processes and to have expended greater gross amounts of energy, indicating these post-MIs to be less efficient than the controls during the exercise. Consequently our findings indicate that using VO₂ measure alone are likely to under estimate exercise intensity and energy expenditure in post-MIs and therefore for these uses it is suggested that VO₂ measures be used in conjunction with other measures of exercise intensity/energy expenditure.

REFERENCES
5. Association Chartered Physiotherapists in Cardiac Rehabilitation (ACPRC), Standards for Physical Activity and Exercise in the Cardiac Population: 2009;available at; http://acprc.com/jpublications