Exercise Programmes

Hemodynamic response to high and low load resistance exercise in patients with coronary artery disease: a crossover, randomised, clinical trial

Kambic T.[1]; Hadzic V.[2]; Lainscak M.[3]

[1]General Hospital Murska Sobota, Department of Research and Education, Cardiac Rehabilitation Unit, Murska Sobota, Slovenia
[2]University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia
[3]General Hospital Murska Sobota, Division of Cardiology, Murska Sobota, Slovenia

Funding Acknowledgements: Type of funding sources: Public grant(s) – National budget only. Main funding source(s): Slovenian Research Agency

Background: Low loads resistance exercise (LL-RE) is advised as an adjunct therapy to aerobic exercise in cardiac rehabilitation (CR), while the implementation of high loads (HL) RE in the early phase of CR is limited by the scarce body of evidence on the safety associated with hemodynamic response during the exercise.

Purpose: The aim of this study was to evaluate hemodynamic response during HL-RE and LL-RE in patients with coronary artery disease (CAD) prior to enrollment in CR.

Methods: A total of 43 patients were enrolled into the study, age, mean (SD), 61 (10) years, height 172.3 (7.8) cm, weight 88.09 (16.66) kg and left ventricular ejection fraction 53 (10) %. After the initial ambulatory screening by cardiologist and cardiopulmonary exercise test, patients were familiarised with proper lifting and breathing technique, and performed one repetition maximum (1-RM) test on leg press machine during the first visit to CR. During the second and third visit to CR, hemodynamic response (measured as heart rate [HR], systolic blood pressure [SBP], diastolic blood pressure [DBP] and blood oxygen saturation) to LL-RE (3 sets, 16 repetitions per set at 40 % of 1-RM) and HL-RE (3 sets, 8 repetitions per set at 80 % of 1-RM) was measured in a crossover randomised manner. A lifting cadence of 1 s of concentric contraction and 1 s of eccentric contraction was used with 90 s of rest between sets, and 48-72 hours of rest between both RE sessions. Rating of perceived exertion (RPE, 0-10 Borgs` scale) was assessed at baseline and after each set of LL-RE and HL-RE.

Results: Both types of RE were shown to be safe, without any reported cardiovascular events. Forty-one patients completed LL and HL-RE, and two were excluded from the final analysis (one due to failure in measurement and one was unable to complete the last set of HL-RE). Compared to baseline, HR and SBP increased during LL-RE [+21 bpm, $p < 0.001$; +17 mm Hg, $p < 0.001$] and HL-RE [+18 bpm, $p < 0.001$; +16 mm Hg, $p < 0.001$]. Increase in HR compared to baseline was greater after the last set of LL-RE compared to HL-RE (32 % vs. 28 %, $p = 0.015$), without significant changes in SBP and DBP between RE. RPE increased during LL-RE and HL-RE (both $p < 0.001$), with higher rating after the 1st set of HL-RE compared to LL-RE (Median (interquartile range), 6 (5-7) vs. 6 (5-6), $p = 0.009$).

Conclusions: LL-RE and HL-RE were shown to be safe and well tolerable among patients with CAD. HL-RE induced similar hemodynamic response compared to LL-RE. Future trials should aim to compare the safety and efficacy of LL and HL resistance training in out-patient CR.