The Effects of Vascular Occlusion Training on Respiratory Quotient and Energy Expenditure When Coupled with Cardiovascular Training

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Purpose: The Purpose of this study was to determine the effects of pairing a vascular occlusion training protocol with a bout of cardiovascular training on substrate utilization and caloric expenditure in healthy adults. **Methods:** 5 healthy adults were recruited to report to the lab one day a week for the duration of two hours for four consecutive weeks. During the first session informed consent was collected, a VO2max test was performed, and a familiarization session with vascular occlusion training was conducted. The next three sessions were randomized for each subject but consisted of the following three protocols. During Protocol A the subject performed 5 sets of body weight squats to volitional fatigue while having blood flow occluded to the quadriceps via 2 thigh sized blood pressure cuffs set at a pressure of 200mm/Hg. 30 seconds of rest was allowed between each set and during this period the cuffs were re-inflated to 200mm/Hg if any pressure was lost throughout the previous set. After completion of the final set blood lactate levels were analyzed in 1 minute intervals via a lactate plus portable analyzer until peak lactate was observed. After completion of the last set the subject then began a 20 minute segment of cardiovascular treadmill walking at an intensity that corresponded to 40-70% of predetermined VO2max. VO2 and VCO2 were collected during the 20 minute exercise bout, the 10 min EPOC, and for 50 minutes post-EPOC. Respiratory exchange ratio and total caloric expenditure as calculated by the Weir equation were computed for all three time segments. During Protocol B the subject performed 5 body weight squats without vascular occlusion and then performed the same 20 minute bout at the same intensity. Peak [lactate] after completion of the final set, respiratory exchange ratio and total caloric expenditure were collected for all three time segments again. Lastly during protocol C the subject performed the 20 minutes of cardiovascular training at the same intensity without performing any form of resistance training prior to beginning. RER and total caloric expenditure were collected again for all three time segments. **Results:** A repeated measures ANOVA revealed that there were significant differences between the respiratory exchange ratio during exercise and during EPOC between protocols ($p<.05$). Specifically, for the RER during the exercise there is a significant difference between protocols A and C (0.832 vs. 0.874). For the RER during the EPOC there is a significant difference between protocols B and C (0.852 vs. 0.952). **Discussion:** There appears to be a shift in substrate utilization as a result of performing a vascular occlusion training protocol prior to cardiovascular training as reflected in the difference in RER. During the EPOC there were no significant differences between the vascular occlusion training and the cardiovascular training not preceded by occlusion however there appears to be a shift in substrate utilization by performing body weight squats to failure without occlusion prior to cardiovascular training as reflected in RER.