PARTIAL BLOOD FLOW RESTRICTION INDUCES GREATER NEUROMUSCULAR FATIGUE AFTER TASK FAILURE: A RANDOMIZED CROSSOVER STUDY

Autores

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Introduction: The exercise with vascular occlusion consists in the partial blood flow restriction (BFR), usually applied proximally in the exercised segment to increase strength and muscle hypertrophy even when associated with low intensity exercise. BFR exercise can be potentially useful for athletes or subjects with with osteoarthritis. Has been shown that total BFR induces electromyographic signals (EMGs) of muscle fatigue, however, it is unclear what the effects of the partial BFR on the EMGs after a submaximal isometric intermittent handgrip exercise (IIHE) carried out to task failure (TF). Objectives: To investigate the effects of partial blood flow occlusion (PBFO) during IIHE on the median frequency (EMGFmed) and peak of EMG signal (EMGpeak) after TF. Methods: In a randomized crossover study, twelve healthy men (21 ± 1.71 years) carried out an IIHE at 45% of the maximum voluntary isometric force (MVIF) (determined before exercise) until the failure (inability to maintain 30% of MVIF) with PBFO or free blood flow (FBF). The washout period was among 72h (minimum) and 1week (maximum). Occlusion pressure was determined individually by Doppler ultrasound previously to the exercise. The EMG signals were measured concomitantly with MVIF before and 1, 3, 5, 7, 9 and 11 minutes after exercise. The local Ethics Committee approved all procedures (CAAE: 36832814.9.0000.5208). A low-pass filter at 15 Hz (Butterworth 4th order) was applied in the raw EMG signal. To identify EMGFmed, a 1-second window (2000 points) was submitted to the Fast Fourier Transform (Hamming window processing). In the time domain, the EMGpeak was identified. EMGFmed and EMGpeak obtained post IIHE was normalized by the PRE measure (i.e., POST/PRE) and then used in the statistical analysis. The statistical Friedman and Wilcoxon tests were used and the significance level was set at $p < 0.05$. The median with the first and third quartiles are reported. Results: TF was significantly faster in PO (390 ± 210s) compared to FF (510 ± 240s). The EMGFmed decreased significantly in the POST 1 (- 20.3%) and POST 3 (-12.7%) measures, when compared to PRE exercise, only in the PO condition. The EMGpeak was significantly higher in the PO (13% and 17.4%) when compared to FF (-7.1% and -11.2%) in POST 7 and POST 9 measures, respectively. Conclusions: Despite the shorter exercise time in the PO condition compared to FF, the EMG analysis showed greater fatigue after failure in the PO condition.