RELATIONSHIP BETWEEN MUSCLE DEOXYGENATION, MUSCLE ACTIVATION AND AEROBIC AND ANAEROBIC ENERGY EXPENDITURE DURING 10s, 30s AND 90s SUPRA MAXIMAL EXERCISE.
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The purpose of this study was to investigate the relationship between aerobic and anaerobic energy expenditure, the oxygen concentration of the vastus lateralis using the near infra red spectroscopy (NIRS) and the muscle activation using electromyography (EMG). To examine the effect of supra maximal exercise on anaerobic capacity determined by accumulated oxygen deficit (AOD) and deoxygenation adaptation nine healthy male subjects, 21 ± 2 (mean ± SD) years of age, weighing 82 ± 4.5 Kg were submitted to 10, 30 and 90 second tests and a 3 minute incremental VO2 max test. All tests were performed on an ergocycle. Breath-by-breath VO2 was measured during each test (VmaxST). Deoxy (HHb)-, oxy and total Hb and/or myoglobin were determined by NIRS (Hamamatsu NIRO-200). Data stemming from electromyography (EMG) was collected using cutaneous electrodes. Results showed that there was no delay in the decrease of oxygenation and the increase of deoxygenation. No change resulted in the iEMG and the RMS during these anaerobic tests. The aerobic/anaerobic energy system contribution was calculated as 12.2/87.8%, 23.5/76.5% and 55.8/44.2 for 10s, 30s and 90s respectively. The AOD increased from the beginning of the test until 20 seconds and decreased after 30 seconds. At the same time, the aerobic pathway increased continuously from the beginning until the end of each test. A relationship was observed between the decrease of oxygenation and the increase of deoxygenation with the increase of the VO2 uptake during the 30 and the 90 seconds tests. The data suggested that oxygen is rapidly used to contribute to the energy production.
Keywords: Near Infrared Spectroscopy, Oxygen Consumption, Anaerobic Power