COMPARISON BETWEEN THE STANDARD AVERAGE MUSCLE ACTIVATION WITH THE USE OF SNORKEL AND WITHOUT SNORKEL IN BREAKSTROKE TECHNIQUE

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Introduction

In swimming the snorkel (K4b^2, Italy, Rome), which consists of a valve train Aquatrainer (Cosmed, Rome, Italy) is often used for analysis of various physiological and biomechanical aspects [1,2], has allowed researchers to analyze its feability and reliability, as the mechanical constraints caused by this system [3] . Being electromyography (EMG) to evaluate the neuromuscular activity by plotting the electrical activity of muscle and with the pattern of muscle activation [4,5] a benchmark. The purpose of this study is to compare the average pattern of muscle activation in two situations, using a snorkel and one without the use of snorkeling in the breakstroke technique.

Methods

5 male subjects(Mean ± SD: age 19 ± 3,67 years; weight 76.1 ± 6.58 kg; height 178 ± 0.05 cm; fat mass percentage 14,68 ± 1.96; IMC 24 ± 1,66),was subjected to a test consisting of a protocol of 2 x 25m breakstroke, in the first part of the test the swimmers used a snorkel; in the second part they swam without snorkel making each part to 95% of transit time for 200m crawl. Using a wireless signal acquisition system (bioPLUX research, Portugal) and EMG sensors (emgPLUX, Portugal), the muscle activity of Biceps Brachii (BB) and Triceps Brachii (TB) of the right arm was recorded throughout the test and synchronized with the video images.The raw EMG was processed offline using Python(version 2.4) routines to compare morphology of the pattern of EMG signal recorded form BB an TB during both test conditions. The signals were subsampled to a frequence of 200Hz. Then, low-pass filtered with a smoothing window of 50 samples and rectified. We selected the(middle-700_middle+2300) samples of the raw signal on all identical pathways(15m). For each subject, muscle and test condition, the mean, standart deviation, maximum and minimum values fo EMG were determined. In order to compare the pattern EMG wave of the swimming movement with and without snorkel, the mean EMG wave was computed for each subject, muscle and test condition.

Results

The results demonstrated that the mean activation (EMG) of the BB and TB are higher with the use of snorkel thus showing greater activation during the action cycle in this implementation. With respect to the maxima have higher values in BB being in both the muscles the situation with the use of a snorkel that has higher values. The minimum values there are higher in the BB in both situations

Discussion

We can oberved that in both muscles, BB and TB values in the two situations are higher with the use of snorkel. Since the BB higher values mean higher activation in both situations.
The curve of the EMG signal pattern of the cycle for each muscle group is different from subject to subject, and was different between each situation.

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