THE EFFECT OF DIFFERENT VELOCITIES OF MOVEMENT ON MUSCLE ACTIVATION PATTERNS OF THE QUADRICEPS AND HAMSTRINGS MUSCLES, DURING A CLOSED KINETIC CHAIN EXERCISE
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The purpose of this study was to analyse the effects of different velocities of movement on the neuromuscular patterns of the quadriceps and hamstrings muscles and. The subjects used on this study were eight healthy males, familiarized with parallel half squat (PHS) exercise. Forty eight hours after the PHS repetition maximum estimation (1RM), the subjects performed 4 repetitions of PHS, at two different velocities (fast velocity- 2s and slow velocity- 4s), with an intensity load of 60% of the 1RM. The electromyographic activity from rectus femoris, vastus lateralis and biceps femoris, was measured with single differential active electrodes at 1000Hz. Simultaneously, the knee and hip angles were evaluated by two goniometers at 1000Hz. The EMG root means square (RMS) was computed between the 1st and 4th repetition. For each repetition, the maximum and minimum angle of the knee and hip was calculated to identify the eccentric and concentric phase of the movement cycle. The effects of experimental conditions (two different velocities) on the measured variables were tested using the Student’s t-test with a significance set at p<0.05. The fast velocity of movement induced a significant increase of the EMG amplitude of the vastus lateralis and rectus femoris, especially in the eccentric phase (p<0.01). No significant differences were found on the muscle activation of the biceps femoris.

In conclusion, the activation of the quadriceps muscles was affected by the velocity of movement, especially during the eccentric phase. These results can be an indication that recruitment thresholds of motor units diminish with the increase of the velocity of contraction.


Keywords: Electromyography, Velocity, Strength and Conditioning

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