



ISB 2013
BRAZIL

XXIV CONGRESS OF THE INTERNATIONAL
SOCIETY OF BIOMECHANICS

XV BRAZILIAN CONGRESS
OF BIOMECHANICS

ELECTROMYOGRAPHIC ACTIVITY OF THE CONCENTRIC AND ECCENTRIC PHASES IN THE PORTIONS CLAVICULAR AND STERNAL OF THE PECTORALIS MAJOR, AND ANTERIOR DELTOID DURING HORIZONTAL CRUCIFIX EXERCISE.

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Financial Support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais - FAPEMIG

SUMMARY

The aim of this study was to compare the electromyographic activity (EMG) during eccentric and concentric phases in the muscle Clavicular Portion of Pectoralis Major (CPPM), Sternal Portion of Pectoralis Major (SPPM) and Anterior Deltoid (AD) in the Crucifix Horizontal (CH) exercise. For data collection were used 12 repetitions, where the first two and the last two were excluded, thus creating a series of eight repetitions, the show consisted of eight male subjects with experience in resistance training at least 12 months. The results revealed no significant difference between the clavicular portion of pectoralis major in the eccentric phase (CPPME) and the clavicular portion of pectoralis major in the concentric phase (CPPMC), sternal portion of pectoralis major in the eccentric phase (SPPME) and sternal portion of pectoralis major in the concentric phase (SPPMC) and anterior deltoids in the eccentric phase (DAE) and anterior deltoids in the concentric phase (DAC). Taking into account the results found in this study we can conclude that although there is a difference between the stimuli electromyographic the concentric phase compared with the eccentric phase.

INTRODUCTION

Muscle contraction is the result of the nervous system: central and peripheral, and musculoskeletal [1,2]. Resistance exercises can be performed in different ways, including: isometric, isotonic and isokinetic [3], we can mention among isotonic eccentric and concentric contractions, such contraction is the most used by practitioners of weight training. When we seek an improvement in resistance training, it is important to include this type of muscle actions [3,4]. Regarding levels of electrical stimulation between the eccentric and concentric phases of the movement, some studies show an increased electrical activity during the concentric phase, [1,5,6], in contrast, some studies have shown no significant differences during the two phases . [8,9]. Therefore, the objective of this study was to compare the electromyographic activity during eccentric and concentric of exercise on sternal and clavicular portion of

the pectoralis major and anterior deltoids exercise in the CH exercise.

METHODS

Subjects for this study consisted of 8 men; (mean age= 27,63 ± 6,24 years, mean relative body fat= 10,93 ± 4,84, mean height= 175 ± 0,08cm mean and body mass= 83,28 ± 11,59kg and mean years of training 3.58 ± 2.90 years). To be included in the study, subjects had to have absence of bone and muscle disorders that impair the performance of movements, having minimum experience of 12 months in resistance training and be familiar with performing the exercises. Participants were instructed to refrain from any form of physical activity for a period of 48 hours that preceded the tests. All volunteers signed an Informed Consent Form (ICF), previously approved by the Ethics and Research Involving Human Subjects of the University Center of south of Minas (UNIS), Minas Gerais State - Brasil (protocol 0068/2010).

The volunteers made one visit to the laboratory. The first consisted in the clarification of the likely questions about the research, signature of IC, anthropometric assessments, and explanation as would occur at the speed of execution of the movements during the exercises. For the measurement of the sample characteristics, data of height and weight were collected from a scale with stadiometer Welmy ® brand. The estimate of relative body fat was measured from a tetra polar bioimpedance apparatus Quantum BIA-II ® (RJL Systems, Inc. Clinton: US-MI). The electrodes used to collect were brand of Conmed ®. The process of shaving and cleaning the skin with cotton and hydrated ethyl alcohol, and then affixing the electrodes in the muscle portions that were analyzed. The electrodes used were 3M ® brand and were attached to the body of assessed according to the points proposed by Merletti (1999) [10]. The execution speed of movement was monitored using a digital metronome (DM-50®), and predetermined 2 seconds for the concentric phase and 2 seconds for the eccentric phase,

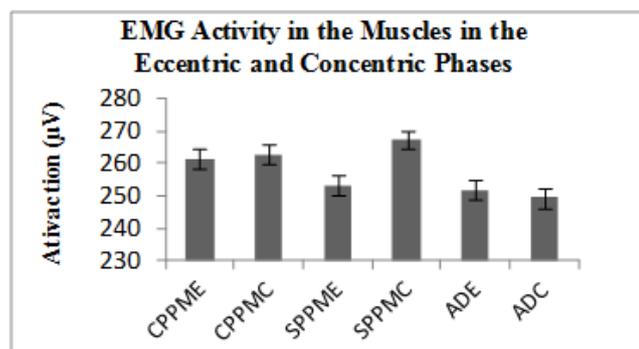
totaling 4 seconds for a movement or 1 repetition. In the before testing the subjects underwent common processes to avoid skin impedance. and then performed a series of 20 replications and specific warm, with a load set to 30% of their body mass.

To obtain the EMG signal, we used a series of 12 repetitions performed in the crucifix horizontal exercise. The signals collected were filtered through filter 5th order Butterworth-type band-pass with a cutoff frequency of 20-500 Hz The amplitude of the EMG signal was calculated on the mantle RMS (Root Mean Square). To select the time intervals used in the study 12 repetitions was performed excluding the first two and the last two of all, which led to a series of 8 reps for analysis. This procedure was adopted in order to exclude the first and last repetitions of the series, since factors such as proper execution speed and fatigue.

Data analysis was performed with statistical comparison of averages and standard deviations. To investigate the distribution of the sample was used the Shapiro-Wilk. Statistical analysis to identify the performance between muscle activations within each year was adopted T test for dependent samples. For statistical evidence adopted was $p < 0.05$.

RESULTS AND DISCUSSION:

The results revealed no significant differences between CPPME x CPPMC, SPPME x SPPMC, ADE x ADC, none of the muscular portions evaluated showed significant differences between the concentric and eccentric phase.



CPPME- Clavicular portion of Pectoralis Major in the eccentric phase; CPPMC- Clavicular portion of Pectoralis Major in the concentric phase; SPPME- Sternal portion of Pectoralis Major in the eccentric phase; SPPMC- Sternal portion of Pectoralis Major in the concentric phase; ADE- Anterior Deltoid in the eccentric phase; ADC- Anterior Deltoid in the concentric phase.

Figure 1: Graphic the EMG Activity in the Muscles in the Eccentric and Concentric Phases.

Many studies show the existence of a smaller electromyographic activation during the eccentric phase of the exercise when compared with the concentric phase [1,6,7,] but an adaptation to the weight training can result in a similarity in the electrical activity of the two phase [8].

The most plausible explanation for this would be related to the protective action of the Golgi tendon organs (OTGs) that due to a system protection osteoneuromuscular, would lead to a decrease in the electromyographic signal during eccentric contractions [9], since the adaptation to weight training would be an inhibition of OTGs, so we would have a resemblance between the electrical activity in eccentric and concentric contractions in trained people [8].

CONCLUSIONS

Through the results of the present study it was not possible to identify significant differences between the stimulus electromyographic the eccentric and concentric phases of the exercise, when evaluating the same muscle group.

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