

ELECTROMYOGRAPHY ANALYSIS OF FOUR DIFFERENT TYPES OF ABDOMINALS EXERCISES

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INTRODUCTION

Since WWII, according with Correia & Mil-Homens (2004) EMG studies were generalized by scientist for clinical purpose and kinesiological studies. Abdominal exercises have been analyzed considering different trunk muscles, as for example, rectus abdominis supra-umbilical and infra-umbilical portion, an external obliquous to show which excersice is more effective during training. (HILDENBRANT et al. 2004; STERNLICHT et al. 2003; STERNLICHT et al. 2005; WILLETT et al. 2001).

The purpose of the study is to analyze conventional, conventional leg supported, reverse conventional and sit up abdominal exercises to verify which one is more effective for abdominal muscles.

METHODS

Sample was constituted by eight subjects (7 men, one female), 22.9±7.2years, 1.75±0.07 m; 77.12±7.57kg body mass and 13.01 ± 5.7 %BF. Surface bipolar disposable electrodes, model 31118733 (Kendall-USA) were used, placed according to SENIAM Project recommendations for muscles analyzed. EMG data were recorded using 4 channel Miotool 400 with sample frequency of 2000 Hz. Data analyze was done by Miographic 2.0 software (MIOTEC, Biomedical Equipments-Brazil) with band-pass 20 to

500 Hz. After filter process, RMS was obtained. Data was normalized using mean value for each channel. Channels were divided as following: channel 1 = 2nd area of rectus abdominis, channel 2 = 4th area of rectus abdominis; channel 3 = external obliquos; channel 4 = femoral rectus. Reference electrode was placed on the tibial tuberosity. All electrodes were placed on the right side of the subject and later performed 3 sets of 10 repetitions per type of exercise randomized.

SPSS 11.5 and Bioestat 4.0 statistical software were used for data analysis.

Firstly, data normality was verify using Kolmogorov-Smirnov ($p \leq 0,05$) test. Friedman with a post hoc test ($p \leq 0,05$) was used later for data interpretation.

RESULTS AND DISCUSSION

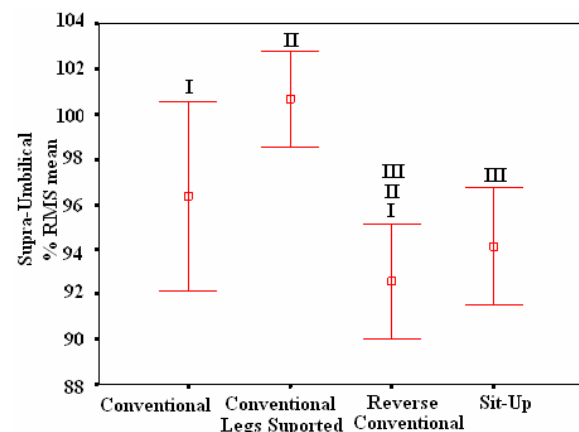


Figure 1: % RMS mean of muscle supra-umbilical.

Conventional and conventional leg supported exercises had greater supra-umbilical muscle activation. Hildenbrand et al. (2004) found similar results using appropriate apparatus. Willett et al. (2001) showed that conventional exercise was less effective for that purpose.

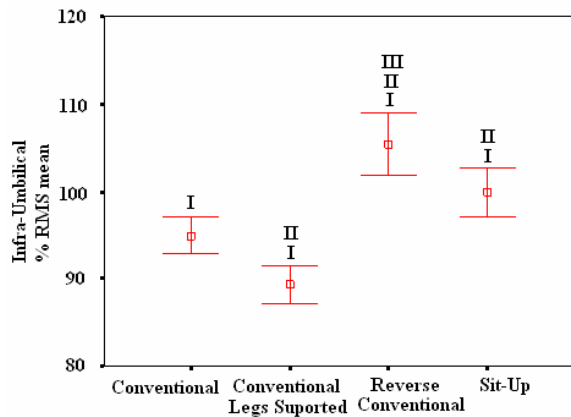


Figure 2: % RMS mean of muscle infra-umbilical

Related to Infra-umbilical exercise activation Willett et al. (2001) found reverse conventional exercise as more effective however, as seen in figure 2, sit-up exercise activated in a similar pattern comparing with reverse conventional exercise.

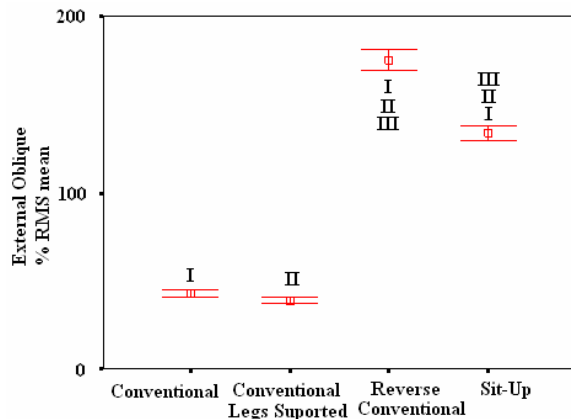


Figure 3: % RMS mean of muscle external oblique.

External oblique greater activation was found during reverse conventional exercise followed by sit-up exercise. Both

conventional exercises had lesser activation and corroborate Willett et al. (2001) results.

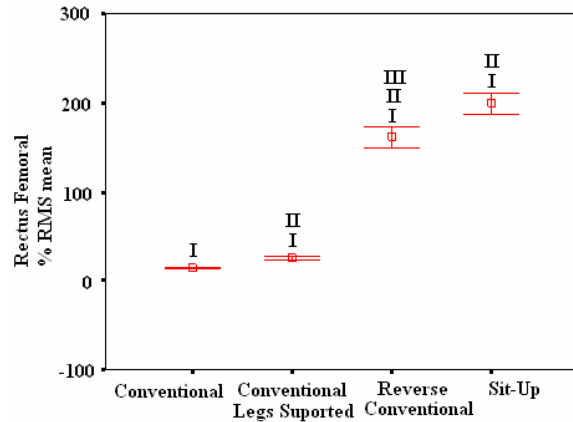


Figure 4: % RMS mean of muscle rectus femoral

Rectus femoralis lesser activation was found during both conventional exercises. This presumes that no hip bend occurs together with trunk bend.

CONCLUSIONS

It was found that conventional exercise highly activated rectus abdominis. By the way, it less activated rectus femoralis.

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