CHANGES IN MUSCLE STRENGTH, VOLUME AND NEURAL ACTIVATION IN RESPONSE TO CONCURRENT TRAINING IN OVERWEIGHT WOMEN

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Introduction
Nowadays obesity is a worldwide problem. It is an epidemic, which grows quickly in the contemporary society, affecting children, youths and adults of both genders. The regular practice of physical activity has been associated to efficient strategies of body weight loss. Strength training, together with aerobic training, has been accepted as a useful tool in body weight loss programs. In a previously study (Pinto et al. 2006) we have showed that concurrent training induced a similar energy expenditure compared to a pure aerobic protocol. Considering this observation, it seams that a mixed approach might have additional advantages, such as, the increase in force production and in muscle mass.

The aim of this study was to investigate changes in muscle strength, muscle mass and neural activation of the quadriceps muscles in overweight women, submitted to 52 weeks of the concurrent training (aerobic and strength).

Methods
20 overweight women (39±6 years old, 1.61±0.05m; 67.9±7.4Kg; 26.1±2.6Kg/m²) were randomized distributed by a Training Group (TG) and a Control Group (CG). The training process lasted 52 weeks, twice a week. Subjects performed 15 minutes of walking at 75% of maximal heart rate, followed by 2x20 RM for 8 strength exercises. Before and after the training process, the subjects were evaluated for isometric maximal voluntary contraction (MVC), and EMG activity for the quadriceps muscles. Computer tomography scans of the right thigh, were obtained to evaluate muscle mass, fat and volume. Additionally, total body composition was measured by DXA scans. The statistical analysis included descriptive statistics and paired-samples T-test.

Results
Maximal strength, in a leg-press type movement, increased 23% (p<0.001), together with a better neural activation level (21% – p<0.001) of the quadriceps muscles. The thigh muscle mass showed an increase of 10.4% (p<0.001), together with a reduction of 9.7% (p<0.001) of the thigh fat mass. Additionally, total body fat showed a decrease of 11% (p<0.001).

Discussion/Conclusion
Combined strength and aerobic training, despite the positive effects in the reduction of total body fat, in overweight women, have an additional and positive influence on muscular function. The improvement in maximal strength, together with a better neural drive and an increase on the muscle mass, seems to be an important benefit for daily life activities.