

Gender Comparisons of the Electromyographic Responses to Knee Extension Exercises with Different Initial Restriction Pressures

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ABSTRACT

The effects of blood flow restriction training (BFR) may be impacted by the several physiological and biological differences found between genders. Since the pattern of regional body composition may be different between males and females, the impact of tightness of the restrictive cuffs (initial restrictive pressure; IRP) might be different for females causing variation in the level of muscle activation; therefore research on a female population is needed to have a complete understanding of BFR. **PURPOSE:** To compare changes in electromyography (EMG) amplitude (RMS) and median frequency (MDF) in males and females during application of different IRPs of 40-45 mmHg and 60-65 mmHg on knee extension exercises. **METHODS:** Subjects consisted of 10 males and 10 females (age=24.4 ± 4.6), who visited the lab on three separate occasions. The first session consisted of measurement of skin thickness using ultrasound. In the sessions thereafter, the EMG electrode was placed on the VL to the mark made at one-third the distance from the lateral femoral epicondyle to the greater trochanter. A BFR cuff was then placed over the inguinal region of the subjects' right leg. Subjects performed a pre-exercise maximum voluntary contraction (MVC) during first visit and the values from MVC test were used to determine the load lifted for both first and second visits. Each session consisted of a set of 30 repetitions and three sets of 15 repetitions performed at 20% MVC, with one minute rest between sets. **RESULTS:** Thigh skin thickness was significantly less in males ($p < 0.01$). Data showed that there are significant increases in RMS ($p < 0.05$) and decreases in MDF during exercise in both males and females ($p < 0.01$), however there was a trend for condition*gender ($p = 0.07$) in RMS. There were also interactions for condition*repetition in RMS ($p = 0.04$) and gender*repetition ($p \leq 0.01$) in both RMS and MDF. **CONCLUSION:** Both conditions were determined to increase RMS throughout the exercise, which suggests a shift and increase in muscle fiber recruitment. However, lower values in EMG activity for the female subjects indicate that a higher IRP may be required to mirror the effects of BFR on males. Greater skin thickness in females may be acting as a barrier between the BFR cuff and circulatory pathways, producing lower neuromuscular activation.

