

Sex Differences in Plantar Flexor Strength and Contractile Properties after Isometric and Dynamic Fatigue

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Purpose: To determine sex differences in strength and contractile properties after isometric and dynamic fatiguing exercise of the plantar flexors. **Methods:** Recreationally active males ($n=13$, age= 22.4 ± 2.2 yrs) and females ($n=15$, age= 20.9 ± 2.4 yrs) performed a maximal isometric (2 min) and isotonic (120 reps at 30% peak torque) fatigue task on 2 separate visits. Before and after each fatigue task, participants performed a 3 sec maximal voluntary isometric contraction (MVIC) with tibial nerve stimulation being delivered during and immediately after the MVIC. Peak torque (PT; highest 250 ms) was obtained during the voluntary phase of the MVIC. Peak twitch torque (T_{TQ}), rate of torque development (RTD; $\Delta\text{torque}/\Delta\text{time}$), and half relaxation time (HRT; time for T_{TQ} to decrease from peak to 50%) were calculated from the resting twitch after the MVIC. Voluntary activation (VA%; ability of the muscle to be fully activated) was calculated using a corrected interpolated twitch formula. Three-way (condition \times sex \times time) repeated measures ANOVAs were used for analysis. **Results:** Regardless of sex or condition, T_{TQ} (-23.1%), RTD (-12.6%), HRT (+22.9%) were changed after fatigue ($p<0.05$), while VA% remained unchanged ($p>0.05$). Regardless of condition, PT was more reduced in males (-22.5%) compared to females (-19.2%) ($p=0.017$). **Conclusions:** Our findings indicate that the fatigue-induced decrease in strength was greater in males than females. While our findings do not identify the contributing physiological mechanism(s), changes at the peripheral level may be responsible.