

10. SWACSM Abstract

Electromyographic Analysis of the Vastus Lateralis and Vastus Medialis Muscles Among Different Crank Lengths in Cycling

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ABSTRACT

Crank length (CL) on a bicycle may influence the total activation and period of activation of the leg muscles. Differences in total muscular activation suggest that CL may alter muscular fatigue. Differences in muscular onset and offset suggest that CL may shift muscle activation periods across a 360 degree crank cycle. **PURPOSE:** To examine the effects of four different CL (155, 165, 175, and 185 mm) on muscular activation of vastus lateralis (VL) and vastus medialis (VM). **METHODS:** Nine non-cyclists (6M, 3F, aged 18-55) participated in a single blind randomized cross-over experiment with four CL. Delsys EMG sensors were placed on five muscles of the right leg (VL, VM, TAS, GAS, BF). Participants completed two trials at 70 RPM and two trials at a constant pedal speed of 1.4 m/s for each CL. EMG data for each trial was recorded for one minute at 2 W/kg, trimmed to 30 seconds, and then averaged into one 360 degree crank cycle in MATLAB. Averaged EMG signals were rectified and filtered with a 4th order Butterworth low-pass filter, with a 20 Hz cut off frequency. A threshold value of 20% of the maximum voltage was applied to determine periods of muscular activation. Onset time, offset time, total onset time, and total onset time were recorded to determine changes in muscular activation at various CLs. Mean amplitude of the EMG signals were recorded to quantify muscle excitation. Area under the curve was recorded to estimate total muscular activity. An ANOVA and General Linear Model were run to compare participant data across CLs. Data was only analyzed for VL and VM at 70 RPM. **RESULTS:** There were no significant differences between any of the dependent measures at the four different CLs ($p>0.05$). **CONCLUSION:** CL has no significant effect on total muscular activation or period of activation in VL and VM.