



Effect of Different Handlebar Positions on EMG and Peddle Force during Cycling

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Purpose: The purpose of this study was to investigate the effect of different handlebar positions on EMG and pedaling force in cycling. **Methods:** Eight participants (average height: 174.1 ± 3.5 cm; average weight: 70.5 ± 4.7 kilograms; average age: 22.3 ± 2.1 years) with 1-3 years' cycling experience were included in this study. All participants had no lower extremity neuromuscular disorders within 6 months. We tested three different handlebar positions including forward, central and backward positions (interval 5 cm). The central position was the posture which kept trunk lean 45 degrees and a knee flex 30 degrees with the foot at bottom dead point. Participants were asked to keep the cadence at 90 rpm and 150 W power output. The muscle activation was evaluated by EMG (sampling rate: 1000 Hz) by recording the upper (erector spine, triceps brachii, biceps brachii, anterior deltoid, upper trapezius, latissimus dorsi) and lower (gluteus maximus, rectus femoris, biceps femoris, tibialis anterior and gastrocnemius) extremity. Multi-axial force transducer (sampling rate: 200 Hz) was used to detect the force during pedaling. A visual scale was used to test the comfort during cycling. Statistical analysis was processed by analysis of variance (ANOVA) in repeated measures. The significant level was set at $\alpha=.05$. **Results:** The muscle activation of erector spine in forward position was significant lower than others (backward: 25.5 ± 7.6 MVC% and central: 26.6 ± 9.3 MVC% vs. forward: 21.7 ± 9.1 MVC%). And the muscle activation of triceps brachii in backward positions was significant lower (backward: 9.7 ± 2.0 MVC% vs. central: 11.7 ± 3.1 MVC% and forward: 11.0 ± 2.7 MVC%). Handlebar position did not have any effect on lower extremity and paddling force. **Conclusion:** Changing handlebar positions could affect difference handling strategy. There is more trunk handling strategy when the handlebar position was moving forward and using more upper arm when the handlebar position was moved backward. In this study also find there is no effect of different handlebar position on lower extremity.

KEYWORDS: bike fitting, pedaling performance, muscle activation