P76. Muscle Activity Relationship Between Bicycle Geometric Parameters

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INTRODUCTION

Different factors and their interactions, all dependent to a greater or lesser extent on the neuromuscular system and its efficiency, have been proposed as determinants of endurance cycling performance: muscle fibre type, pedalling cadence and technique, or muscle fatigue (Castronovo et al., 2013). Geometric factors like handlebar height and bicycle frame length are generally adjusted to optimize the biking seating position. The aim of this study was to analyse the effects of different exercise conditions on muscular activity in 30-sec maximal cycling exercise.

METHODS

Nine male recreational cyclists participated in this study (21.6±1.9 years; 75.3±5.8 kg; 1.8±0.1 m; crotch height: 9.5±26.1 m; seat height: 0.7±0.0 m; saddle distance from the handlebar_ high: 0.6±0.0 m; saddle distance from the handlebar low: 0.5±0.0 m). Each subject performed: i) five minutes warm-up and ii) 30 seconds at maximal intensity in a specifics conditions: a) handlebar height (high and low) and in a b) specific bicycle frame length (long and short), according to the previous measures of each subjects. Using a wireless signal acquisition system (bioPlux research, Portugal), surface EMG was collected in 4 muscles trapezius descendens (upper) (TD), latissimus dorsi (LD), gluteus maximus (GM) and deltoid anterior (DA). EMG analysis were conducted with a MATLAB routine. The average amplitude of EMG of each active phase was estimated using the average rectified value (ARV) and plotted as a function of time. Statistical difference was set at $p<0.05$.

RESULTS

In the 30-sec at maximal cycling intensity in the 4 different exercise conditions (handlebar_high "C1" and low "C2" and frame length_long "C3" and short "C4") no statistical differences were observed in ARV in TD and LD muscles. Regarding GM muscle, statistical differences in ARV were observed in relation to handlebar low with long and short bicycle frame, namely C2 and C4 ($p<0.05$) and C1 and C4 ($p<0.01$). Also, in DA muscle, ARV was statistically different in C3 relatively to C1 and C2 ($p<0.01$).

CONCLUSIONS

This study revealed that exercise conditions in cycling influence muscle activity, namely lower body gluteus maximus and deltoid anterior muscles, both in relation to bicycle frame and handlebar height. These evidences should be considered in daily training basis and in competition moments.

References

Castronovo, A. M., Conforto, S., Schmid, M., Bibbo, D., D'Alessio, T. (2013). How to assess performance in cycling: The multivariate nature of influencing factors and related indicators. *Frontiers in Physiology*; 21; 4: 116: doi:10.3389/fphys.2013.00116.