

KINEMATICAL AND MUSCULAR CHARACTERIZATION OF OPEN WATER SWIMMERS

Carlos Silva¹, Ana Conceição^{1,2}, João Freitas¹, Diana Torres¹, Hugo Louro^{1,2}, Jan Štastný³

¹ Rio Maior School of Sport - Polytechnic Institute of Santarém (ESDRM-IPS), Portugal

² Research Center in Sport, Health and Human Development, CIDESD, Vila Real, Portugal

³ Brno University of Technology, Centre of Sports Activities, Brno, Czech Republic

INTRODUCTION

Muscular behaviour during open water swimming has not yet been explored in an natural environment. The aim of this study is to analyse the muscular and kinematical behaviour of open water swimmers during a 5 km swimming.

METHODS

Nine national male open water swimmers performed a 5x1000 m front crawl in a lake at maximum effort with a rest of 30 seconds in each trial. Surface electromyography (EMG) of 7 muscles: *Upper trapezius* (UT); *Latissimus dorsi* (LD); *Pectoralis Major* (PM); *Posterior Deltoid* (PD); *Anterior Deltoid* (AD); *Triceps Brachii* (TB); *Biceps Brachii* (BB) was recorded. Previously to the test, each subject performed three maximal voluntary isometric measurements (MVC) to normalise the amplitude of the EMG signal. The results were expressed in the percentage of the mean MVC. The cycle duration was given in the percentage as well. Swimming speed (v), stroke length (SL), stroke rate (SR) and stroke index (SI) were extracted from the video recordings.

RESULTS

SR increased with a small effect ($F=2.71$, $p \leq 0.05$, $\eta^2=0.25$), SL decreased with a medium effect ($F=3.41$, $p \leq 0.05$, $\eta^2=0.30$), especially in the last trial. The muscles PM (13.2% MVC) and TB (20.3% MVC) were the muscles with the highest muscular activation in the propulsion phase, while UT (33.2% MVC) and BB (14.4% MVC) were the most active in the recovery phase.

DISCUSSION

The findings suggest that some fluctuations were detected in muscle activity during the trials, but the biggest changes were in the last trial, with the appearance of fatigue generated by the increasing SR and decreasing SL (Ikuta et al., 2012; Rodriguez et al., 2021). It seems that muscular behaviour had some compensation from PD, UT and TB in the propulsion and recovery phase.

REFERENCES

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