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Research article

A Kinematic Study of Finswimming at Surface

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ABSTRACT

Finswimming is a sport of speed practiced on the surface or underwater, in which performance is based on whole-body oscillations. The present study investigated the undulatory motion performed by finswimmers at the surface. This study aiming to analyze the influence of the interaction of gender, practice level, and race distance on selected kinematic parameters. Six elite and six novices finswimmers equipped with joints markers (wrist, elbow, shoulder, hip, knee, and ankle) were recorded in the sagittal plane. The position of these anatomical marks was digitized at 50 Hz. An automated motion analysis software yielded velocity, vertical amplitude, frequency, and angular position. Results showed that stroke frequency decreased whereas the mean amplitude of all joints increased with increasing race distance ($p < 0.01$). Mean joint amplitude for the upper limbs (wrist, elbow and shoulder) was smaller for experts than for novices. Whereas that of the ankle was larger, so that the oscillation amplitude increased from shoulder to ankle. Elite male finswimmers were pitching more acutely than female. Moreover, elite male finswimmers showed a smaller knee bending than novices and than elite females ($p < 0.01$). This indicated that elite male finswimmers attempt to reduce drag forces thanks to a weak knee bending and a low upper limbs pitch. To sum up, gender, expertise, and race distance affect the performance and its kinematics in terms frontal drag. Expertise in finswimming requires taking advantage of the mechanical constraints pertaining to hydrodynamic constraints in order to optimize performance.

Key words: Swimming, undulations, technique, movement

Key Points

- Finswimmers are at one and the same time a propelling and a propelled body. This study investigates the undulatory motion performed by finswimmers at the surface.
- Elite male finswimmers were pitching more acutely than female swimmers and showed a smaller knee bending than both novices and elite female swimmers.
- Finswimmers tended to perform a dolphin-like motion, which is used underwater situation and optimizes hydrodynamics.

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