Comparison of kinematics and joint kinetics between seated-down and standing positions in water cycling.

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INTRODUCTION

Water cycling is a fairly recent water programme in comparison to head-out aquatic programmes. As far as our understanding goes, there are only a few reports on the acute physiological response exercising in different bikes (Giacomini et al., 2009), changing water temperature (Yazigi et al., 2013) or using different training methods (Brasil et al., 2011). However, evidence on the biomechanical adaptations are non-existent yet. The aim of this study was to compare the angular kinematics and joint forces between different pedalling positions in water cycling.

METHODS

Seventeen young women (21.6±1.6 years, 58.5±7.9 kg of body mass and 1.60±0.06 m of height) were recruited to ride a stationary underwater bike during one minute at the cadence of 149 bpm in two randomly assigned conditions: (i) standing and; (ii) seated-down. Kinematic analysis of three full revolutions were performed by a motion capture system (APAS). Kinetic characteristics were estimated by 2D inverse dynamics. The maximum and minimum angles, range of motion, angular velocity peak, maximal horizontal force, maximal vertical force and torque peak for both knee and ankle joints, were analysed.

RESULTS

Higher values of maximum (168±9º), minimum angles (89±8º), range of motion (79±6º) and angular velocity peak (352±4º/s) were noted in the knee joint for the standing position. Whereas, for the ankle joint, higher values were obtained in the seated-down condition just for the maximum (139±9º) and minimum (100±9º). No differences between exercise conditions were found in forces acting in the knee. However, ankle showed a higher maximal horizontal force (51±11N) and torque peak (21±7N.m) while seated-down.

CONCLUSIONS

It can be concluded that angular kinematics are changed when assuming different pedalling positions in water cycling. The higher joint forces occur in the most distal joint (i.e. the ankle) pedalling seated-down.

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