

## Rowing technique determinants: a comparison between international and national level rowers

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Rowing is a motor skill that requires high levels of consistency, coherence, accuracy and continuity, particularly at an elite level [1]. The rowing stroke consists of two phases: the drive, during which force is applied to the blade in order to move the boat relative to the water, and the recover, during which the rowers return to their former position [2]. The goal of the current study was to investigate the kinematic differences between rowers of International Level (IL) and National level (NL), in order to identify parameters that have the potential to characterise the best ergometer rowing technique. With this objective, we analysed three IL (age: 18.3 (0.5) [years]; height: 183.0 (8.8) [cm]; weight: 76.3 (8.9) [kg]), and thirteen NL rowers (22.2 (1.9) [years]; 182.5 (4.7) [cm]; 77.1 (7.4) [kg]), using a motion capture system (BTS SpA, Italy). Duration of the stroke phases, Range of Motion (RoM) of the knee 3D trajectories, length of the body Centre of Mass trajectory (COMd) and the curvature of the wrist path during the stroke (Index of Curvature, IC) were compared using the Mann-Whitney U test. The findings showed that the IL rowers presented a non-significant decrease of the drive phase duration (IL: 0.94 (0.04) [s]; NL: 1.05 (0.08) [s];  $p=0.122$ ), higher Knee Rom (IL: 0.68 (0.04) [m]; NL: 0.51 (0.02) [m];  $p=0.018$ ) in the Anterior-Posterior direction, a higher COMd (IL: 2.62 (0.12) [m]; NL: 1.74 (0.15) [m];  $p=0.026$ ) and a higher IC (IL 0.984(0.003); NL: 0.980(0.003);  $p=0.040$ ). In conclusion, the stroke duration, the amplitude of the movement in the Anterior-Posterior direction and the control of the wrist path seem to be associated with high-level performances; the findings suggest that IL rowers present a better command of technique, timing and power, compared to NL rowers.

### References

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- [2] Cuijpers et al. (2015) Rowing Crew Coordination Dynamics at Increasing Stroke Rates. *PLoS One* 10 (7): e0133527.

### Keywords

Ergometer rowing, elite athletes, sport kinematics, sport biomechanics