The influence of kineanthropometrical profile in deep-water tethered running

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The purpose of this study was to identify the kineanthropometrical parameters that best predict the maximal horizontal propulsive force during deep-water tethered running.

21 young and healthy males with large experience in aquatic exercises (24.3+/-2.7 years old, 191.9+/-82.6 minutes physical activity per week) performed 3 repetitions of maximal deep-water running for 10-s, using a flotation vest (Golfinho, H-906, Coimbra, Portugal). The subjects were connected to a strain gauge (Globus, Ergo Meter, Codigné, Italy) by a cable of steel with reduced elastic properties. The other end of the cable was fasted to a rubber band and this to a swimming starting block. Dynamometrical data was exported and processed with Matlab v. 6.0. It was evaluated the maximal propulsive force (Fx-max) and computed the maximal horizontal propulsive force through a trigonometric correction, as suggested by Taylor et al. (2003). Body mass (SECA, 884, Hamburg, Germany), height (SECA, 242, Hamburg, Germany), body mass index (BMI) and fat mass (BIA 101, RJL Systems, Florence, Italy) were also measured. Surface area (SA) was calculated according to the procedure of Du Bois and Du Bois (Shuter and Aslani, 2000). The forearms (Globus, Ergo Meter, Codigné, Italy) and hands (TSD 121C, Biopac Systems, California, USA) maximal isometric forces were also measured. Intra-cyclic variation of the Fx-max presented a tetra-modal profile. Computing a step-by-step regression equation, for prediction of the Fx-max, the kineanthropometrical variables that entered the model were the forearms maximal isometric force, the BMI, the body mass and the SA ($r\wedge2=0.57$, $p=0.01$). The purpose of the study was achieved. Evidences revealed that some kineanthropometrical parameters related to buoyancy force (e.g., fat mass), to drag force (e.g., SA and height), to weight force (e.g., body mass) and to propulsive force (e.g., segmental forces) predicted the Fx-max. This means that, besides physical fitness and technical level, often described in the literature, kineanthropometrical characteristics of the runner also affect significantly his performance during a training session. The main conclusion is that tethered running is significantly associated to kineanthropometrical profile of the runner. So, instructors should pay attention to kineanthropometrical characteristics of runners and how it affects their performance.

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Keywords: Running, Water, Kinanthropometry