

Comparison of resistance characteristics in water between single and multiple repetitions

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Abstract

Introduction: A new muscle training device was developed in this study and it was based on some of physics principles including buoyancy, drag, pressure and Fluid dynamics. Water which is nature and lower carbon emission was used to be mainly material to create the loading; as well as wood and recyclable materials were used as structure material for this new device. However, the resistance characteristic of the new device whether affected by water drag is still unclear. The purpose of this study was to investigate the resistance characteristics between single repetition and multiple repetitions.

Methods: The Biodex isokinetic dynamometer was used to drive the device work at consistent angular velocity and to measure the loading during working. A single repetition during the water purely still in the device and multiple repetitions continuously working were measured. The phases were divided into concentric and eccentric phases.

Results: After analysis of paired t-test, the loading during concentric phase was significantly greater than that during eccentric phase in both multiple (concentric: 37.11kg, eccentric: 14.02kg) and single repetition conditions (concentric: 34.80kg, eccentric: 14.49kg) ($p < .05$). The loading of multiple repetitions was significantly greater than that of single repetition during concentric phase ($p < .05$), but not during eccentric phase ($p > .05$).

Discussion: It concluded that the new device produced larger concentric loading and relatively smaller eccentric loading. The loading of concentric phase during multiple repetitions was increased by water drag and fluctuations.

Keyword : fitness equipment design, muscle training