

Muscular Activations during Underwater Treadmill Walking in Healthy Males: Backward Walking or Forward Walking in Water?

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Introduction

Quantifying muscle activity and gathering scientific evidence has been a major challenge in the research field of water-based exercise. There is no objective evidence available which documents the specific biomechanical responses that occur while walking backward in water. The purpose of this study was to compare muscle activities while walking backward in water with those observed while walking forward in water, with and without a water current.

Material and Methods

Ten healthy males volunteered as subjects for the study. Surface electromyography (EMG) was used to evaluate muscle activities while the subjects walked backward and forward in water (with and without a water current), immersed to the level of the xiphoid process. The subjects underwent the trials utilizing a Flowmill which has a treadmill at the base of a water flume. The measurement of maximal voluntary contraction (MVC) of each tested muscle was made prior to gait analysis, in order to calculate the %MVC.

Result

The %MVCs obtained from the vastus medialis and tibialis anterior while walking backward in water were significantly greater than those obtained while walking forward in water in every experimental session ($p < 0.05$).

Conclusion

Walking backward in water resulted in significantly greater muscle activation of the vastus medialis and tibialis anterior compared with walking forward in water. These data may contribute to the prescription of optimal rehabilitative and preventive exercise programs, and may be beneficial in developing water-based exercise programs.

Key word: Muscle activity, Water, gait, Prevention, Rehabilitation

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