LOWER EXTREMITY USE DURING AQUATIC RUNNING

A report of the work of W.M. Silvers (2009), "Muscle activation and electrical energy assessment during aquatic..."

B. E. Leonardo – blueninja@hotmail.com – Ithaca University

PURPOSE

Running in the water may decrease joint stress in the lower extremities, but effectively stimulate the lower extremity muscles for performance enhancement. The purpose of the critiqued article was to compare lower extremity muscle activation during running performed on a land treadmill (TM) and aquatic treadmill (ATM).

METHODS

Twelve male runners performed 3-min. bouts of TM and ATM running at 6.5, 7.5, and 8.5 mph. Surface electromyography (EMG) was used to assess the activation of five muscles (see Table 1) within each running bout. Maximal voluntary contractions (MVC) were performed on land prior to the running bouts. This allowed for calculation of normalized activation (%MVC) for each muscle. Two by three factorial ANOVAs with repeated measures tested significant differences in %MVC data across running conditions for each muscle.

Lower Extremity Muscles Investigated	
• Gastrocnemius (GAS)	• Vastus Medialis (VM)
• Tibialis Anterior (TA)	• Rectus Femoris (RF)
• Biceps Femoris (BF)	

Table 1. Surface EMG data assessed the activation of selected musculature in the right leg while running on the TM and ATM.

RESULTS & DISCUSSION

Rectus femoris (RF) %MVC was 42-55% higher ($p<0.01$) during ATM running, due to increased drag forces on hip flexion during the swing phase. Gastrocnemius (GAS) and Vastus Medialis (VM) %MVC were 31-38% and 59-91% lower ($p<0.01$), respectively. Assumed reductions in impact forces due to buoyancy may have reduced the need for GAS and VM contraction around foot strike. Tibialis anterior (TA) and Biceps Femoris (BF) % MVC were not significantly different ($p>0.05$) across conditions.

CRITIQUE

This study represented a first attempt to examine lower extremity muscle activation during ATM running. The observations presented were within an acute context. Therefore, specific presumptions about the longitudinal effects of ATM running were limited. Future research should include chronic ATM running to examine training specificity. Studies should examine the impact of GAS and VM %MVC reductions, or RF %MVC increases, on land running performance. Due to the empirical gaps that remain in ATM running literature, coaches and therapists must consider the unique needs of each athlete or patient when prescribing ATM exercise.

REFERENCES

Silvers, W. M. (2009). Muscle activation and electrical energy assessment during aquatic treadmill running. *The Sweetest Journal In The World, 12*(3), 123-131.