

Alternative Concussion Balance Testing Between Land & Aquatic Athletes

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ABSTRACT

Sports related concussions have been a global and community health issue, with up to 3.8 million occurring in the U.S each year (Langlois et. al. 2006). Impaired postural control is one of the most common symptoms. Balance assessments have been an integral part of concussion analysis to assess if an athlete can return to play (RTP). Swimmers show significant differences in Star Excursion Balance Test (SEBT) performance compared to a normal population (Sugiura et. al. 2021). **PURPOSE:** This study aimed to determine if the SEBT (Plisky et. al. 2009) can assess differences in dynamic balance between land and aquatic athletes as a measure of dynamic postural stability in RTP protocols. We hypothesized that land athletes will outperform aquatic athletes on the SEBT. **METHODS:** Thirty healthy NCAA DIII athletes (13 male, 17 female athletes) volunteered to participate in accordance with the local IRB. Subject height, mass, and leg length were measured. Participants completed the following warm-up: 10 anterior tibialis raises, 10 squats, and 10 single leg Romanian deadlifts on each leg. After a 3-minute recovery, participants proceeded with 3 trials on each leg of the SEBT. Reach in each direction was normalized by leg length and averaged across trials. Paired t-tests in each direction compared land and aquatic athletes (jamovi v2.2.5). Repeated measures ANOVA compared all directions across both groups for each leg.

Significance was set at $\alpha = 0.05$. **RESULTS:** Athletes were (Mean \pm SD) 21 \pm 1.25 years old, 1.70 \pm 0.10 m tall, mass of 73.48 \pm 15.95 kg, and leg length of 0.92 \pm 0.06m. Both left (F=47.5, p<.001) and right leg (F=52.1, p<.001) revealed differences in directional leg excursions (Fig. 1 & 2). Left leg anteromedial excursions (Fig. 1) were greater for aquatic (85.92%) versus land athletes (81.39%, t(14) = 2.53, p=0.024).

CONCLUSION: The SEBT was able to determine differences in excursion direction and between athlete populations. Land and aquatic athletes performed approximately equal in each direction, except for when aquatic athletes reached further in the anteromedial direction with the left leg. In the future, we plan to recruit a larger group and include center of pressure with the SEBT n analysis to further evaluate dynamic postural control as part of pre- and post-concussion protocols.