Vascular Alteration with Postural Change as Observed Using the Right Anterior Tibial Artery: A Pilot Study

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ABSTRACT

Plantar fasciopathy and plantar fasciosis are common lower extremity conditions. Vascular health is an important aspect of plantar fascia health. Footwear choices are thought to influence lower extremity vascular flow, but how the anterior tibial artery is affected by purely postural changes over time is unknown. **PURPOSE**: To observe the anterior tibial artery vascular alterations over a ten-minute period after transitioning from a sitting to a standing position while barefoot. **METHODS**: Nine participants (age= 23.8yrs ±2.5, height= 176.0cm ±8.0, weight= 69.8kg ±10.2) were recruited from Brigham Young University for a single 30-minute visit. The participants had no previous lower extremity injuries within 6 months. The individual's dominant foot arch height index was recorded, and the participant had a 3-lead ECG placed on their trunk. A Logic Fortis machine with an L8-18i probe was used to capture pulse wave (PW) images of the anterior tibial artery of the dominant foot. The participant sat barefoot on an elevated platform for five minutes and baseline PW was recorded. The participant then stood on the platform for 11 total minutes. PW images were captured once at the end of every minute for the first five minutes and a final PW measurement was captured after ten minutes of standing. A paired t-test was used to compare standing time points to baseline (α=0.05). **RESULTS**: After standing, time-averaged mean velocity (TAMean) significantly dropped through minutes one ($p<0.01$) and two ($p<0.01$) compared to baseline. Through minutes three ($p=0.12$), four ($p=0.10$), five ($p=0.44$), and ten ($p=0.33$), TAMean is not significantly different compared to baseline. The average TAMean at 10 minutes exceeded baseline values, but some participants remained under baseline. After standing, volume flow (VF) significantly dropped after two minutes ($P=0.03$) compared to baseline measures. Through minutes one ($p=0.07$), three ($p=0.41$), four ($p=0.13$), five ($p=0.37$), and ten ($p=0.22$) after standing were not significantly different compared to baseline. **CONCLUSION**: Blood flow through the anterior tibial artery is significantly altered with postural changes likely through cardiovascular responses. Vascular recovery is observed after three minutes while the average increase in vascular response occurs around ten minutes.