

Reliability of aortic pulse wave velocity assessments in individuals with spinal cord injury

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Background: Aortic pulse wave velocity (aPWV), defined as the speed of the arterial blood pressure wave between the carotid and femoral arterial sites, is a non-invasive measure of arterial stiffness that has been well established in able-bodied populations. Higher aPWV values, which are indicative of increased arterial stiffness, are associated with increased risk of cardiovascular disease. Given that cardiovascular disease is the leading cause of morbidity and mortality after spinal cord injury (SCI), aPWV may serve as an important clinical assessment. The purpose of this study was to determine the reliability of aPWV assessments in individuals with SCI.

Methods: Twelve individuals (2 females) with traumatic SCI (C3-L1; AIS A-D; 7.9 ± 8.4 years post-injury) participated in two testing sessions separated by 2 ± 2 days. Following ten minutes of rest in the supine position, arterial blood pressure measurements were collected simultaneously at the carotid and femoral arterial sites using applanation tonometry. Heart rate was recorded continuously using a single-lead electrocardiogram, while discrete brachial blood pressure measurements were collected throughout testing. Arterial blood pressure signals were band-pass filtered (2-30 Hz) to determine the arrival of blood pressure signal at each site, and pulse transit time was calculated as the time delay between the arrival of the signal at the carotid and femoral sites. aPWV was calculated from 10-second samples by dividing the distance between measurement sites by the pulse transit time. Inter- and intra-observer reliability were assessed using coefficients of variation (CV) and intraclass correlation coefficient (ICC).

Results: There were no significant differences in heart rates or brachial blood pressures between testing days. The average aPWV for visit 1 and visit 2 were 8.8 ± 2.4 m/s and 9.0 ± 2.4 m/s, respectively. Both intra and inter-observer measurements demonstrated almost perfect reliability. Intra-observer measurements had a CV of 5.5% and an ICC of 0.90, while inter-observer measurements had a CV of 4.4% and an ICC of 0.97.

Conclusion: In conclusion, aPWV measurements using applanation tonometry are reliable in individuals with SCI. Future investigations should examine the clinical significance of aPWV assessments in SCI.