Establishing Normative Data for Peripheral Arterial Disease Using Pulse Wave Analysis

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Summary of the research

Peripheral arterial disease (PAD) is common in the adult population affecting 10–25% of people over the age of 55. It contributes to vascular diseases and foot amputation. Accurate and early diagnosis can lessen this public health burden.

Current clinical measures of PAD have been shown to have reliability problems in some patient groups. The Ankle Brachial Pressure Index (ABPI), pulse palpation (PP) and Edinburgh Claudication Questionnaire (ECQ) have been shown to not be sensitive enough to evaluate clinical asymptomatic and calcified arteries especially in the diabetic population. Therefore, a new evaluation method, pulse wave analysis consisting of peak blood flow velocity (PBFV) and fractal dimension (FD), has been tested in the lower limb.

A “non pathological” group was selected using convenience sampling of students and staff from Charles Sturt University, participants of the Diabetes Complication Screening Initiative, and the Allied Health Podiatry Clinic at Charles Sturt University.

Normative values were determined for PBFV (95% confidence interval 9.9-37.3 cm/sec) and the fractal dimension (95% confidence interval 1.082-1.261). A statistically significant difference was observed for ABPI versus PP (chi-square = 4.9, p=0.03), ABPI versus PBFV (chi-square = 11.53, p<0.001) and ABPI versus FD (chi square = 12.63, p<0.001). The difference between the ABPI and the new methods may be due to their increased sensitivity to vessel disease. Using this confidence interval for PBFV and FD may have led to the identification of possible false positives in this population when compared to the clinical parameters of ABPI. Some age and gender differences were also observed. This study also observed the occurrence of four peaks in the pulse wave (33.33% of study population) which is a finding that has not been reported previously in the literature. The results indicate the value of adding PWA into basic clinical assessment to identify early asymptomatic PAD.