

DELTA PULSE WAVE VELOCITY IN CHRONIC KIDNEY DISEASE PATIENTS

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OBJECTIVES

Under disease conditions natural elasticity of large arteries may be lost, a condition termed arterial stiffness. Arterial stiffness as measured by carotid-femoral pulse wave velocity (PWV) is an independent predictor of cardiovascular and total mortality.

To identify treatable factors linked to arterial stiffness in nephrology outpatients.

METHODS

Cross-sectional observational study assessing baseline data from 191 individuals. Most participants had DM (153/191, 80%) or CKD (153/191, 80%), were males (140, 73%) with mean age 61.2 ± 12.9 years. Mean eGFR was 64.0 ± 21.7 ml/min/1.73 m². CKD stage was 16 (8.4%) stage 1, 49 (25.7%) stage 2, 80 (41.9%) stage 3 and 8 (4.3%) stages 4&5. Albuminuria 30-300 mg/g Cr was present in 68 patients (35.6%), 300-1000 in 33 (17.3%) and >1000 in 18 patients (9.4%). PWV was assessed using the SphygmoCor CV Management System (CvMS) 2010 software version 9. A new parameter was defined: Delta above upper limit of normal PWV (Delta PWV), calculated as (measured PWV) - (upper limit of the age-adjusted PWV values for the general population). Delta PWV represents the absolute increase in PWV over the higher expected normal limit of the age-adjusted PWV in the general population and aims to decrease the weight of age on PWV-related analyses.

RESULTS

Mean \pm SD Delta PWV was 0.76 ± 1.60 m/sec. That is, in the overall population PWV was 0.76 m/sec higher than the expected PWV according to age. For these calculations patients with no increase over age-expected values were considered to have a delta PWV of 0.00. In the patients that did have a PWV above that expected for age, the mean increase over the expected values was 2.35 ± 2.05 m/sec.

In univariate analysis, Delta PWV was higher in patients with DM ($p=0.0008$), active smoking ($p=0.0148$) and use of calcium polystyrene sulfonate ($p=0.0046$) or other calcium-containing drugs ($p=0.0483$) or ARBs ($p=0.0087$) and was lower in those with valve calcification ($p=0.0148$) or on beta blockers ($p=0.0000$).

Delta PWV was significantly positively correlated with systolic BP ($r=0.2215$, $p=0.0021$), diastolic BP ($r=0.1649$, $p=0.0226$), mean BP ($r=0.2004$, $p=0.0054$), UACR ($r=0.1774$, $p=0.0188$) and HbA1c ($r=0.1667$, $p=0.0233$). While it was inversely correlated with age ($r=-0.2338$, $p=0.0011$) and urinary potassium ($r=-0.3225$, $p=0.0001$).

In multivariate analysis, systolic BP ($p=0.0092$), active smoking ($p=0.0152$) and calcium polystyrene sulfonate therapy ($p=0.0212$) remained independently positively correlated with delta PWV, while age ($p=0.0014$), urinary potassium ($p=0.0015$) and beta blocker therapy ($p=0.0013$) were independently negatively correlated with delta PWV. The multivariate model explained 27% of the delta PWV variability.

CONCLUSIONS

A new parameter, Delta PWV, was defined to decrease the weight of age on PWV analyses. Our study suggests that smoking, potassium metabolism and beta blockers impact on arterial stiffness in nephrology outpatients.

