

NON INVASIVE ASSESSMENT OF ARTERIAL STIFFNESS USING PULSE WAVE VELOCITY IN NEPHROLOGY OUTPATIENTS

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OBJECTIVES

Under disease conditions natural elasticity of large arteries may be lost, a condition termed arterial stiffness, leading to high pulse pressure and systolic blood pressure (BP), low diastolic BP, increased left ventricular afterload and lower coronary perfusion. Arterial stiffness as measured by carotid-femoral pulse wave velocity (PWV) is an independent predictor of cardiovascular (CV) and total mortality. Arterial stiffness increases with age. However, modifiable risk factors such as smoking, BP and salt intake also impact on PWV. The finding of modifiable risk factors may identify treatable factors, and, thus, is of interest to practicing nephrologist.

To assess the prevalence and correlations of arterial stiffness; assessed by PWV, in order to identify modifiable risk factors for arterial stiffness in nephrology outpatients clinic.

METHODS

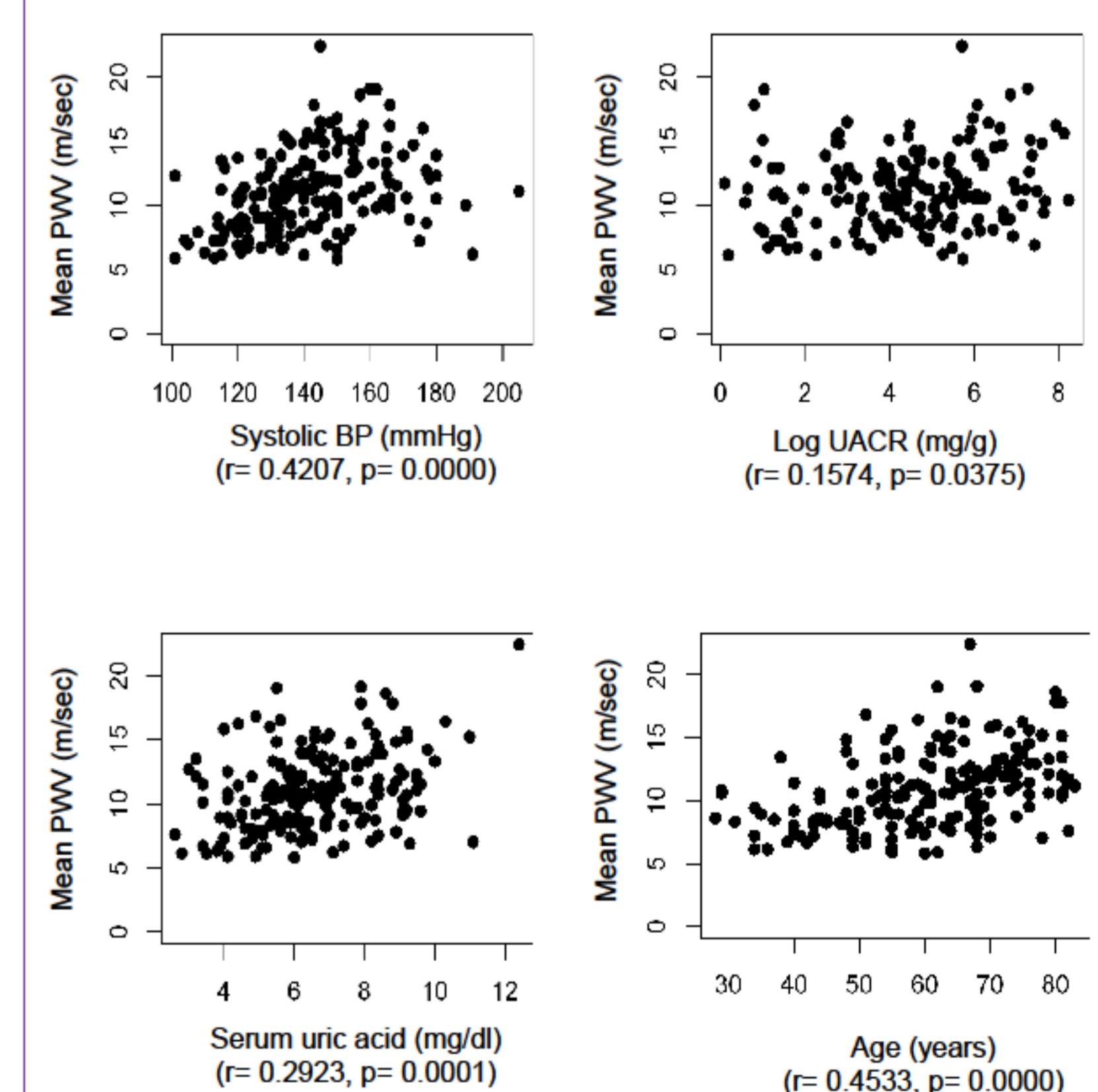
This is a cross-sectional observational study assessed baseline data from 191 individuals. Most participants had DM (153/191, 80%) or CKD (153/191, 80%), were males (140, 73%) with mean age 61.2 ± 12.9 years and mean BMI 29.6 ± 5.2 kg/m². Mean eGFR was 64.0 ± 21.7 ml/min/1.73 m². CKD stage distribution among those patients 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%). 40 laboratory parameters potentially related to cardiovascular risk and echocardiogram were prospectively analyzed. PWV assessed using the SphygmoCor CV Management System (CvMS) 2010 software version 9 (AtCor Medical, Sydney, Australia), adhering to the new EURECA-m recommendations to standardize the technique. analyzed. PWV assessed using the SphygmoCor CV Management System (CvMS) 2010 software version 9 (AtCor Medical, Sydney, Australia), adhering to the new EURECA-m recommendations to standardize the technique.

RESULTS

Mean \pm SD PWV was 10.9 ± 3.1 m/sec and 85/191 (44.5%) of patients had PWV above normal values for their age. PWV in CKD patients was 11.5 ± 3.0 m/sec and for non-CKD patients PWV 8.6 ± 2.2 m/sec. Among CKD patients 73/153 (47.7%) had mean PWV above normal values for their age.

PWV was significantly higher in patients with DM ($p=0.0000$), hypertension ($p=0.0000$), history of CVD ($p=0.0199$), male gender ($p=0.0072$) and treated with calcium-containing phosphate binders ($p=0.0357$), calcium polystyrene sulfonate ($p=0.0000$) or any calcium-containing medication ($p=0.0003$), iron supplements ($p=0.0160$), statins ($p=0.0040$), ezetimibe (0.0221), angiotensin receptor blockers ($p=0.0003$), diuretics (0.0032), alpha blockers ($p=0.0202$), proton pump inhibitors ($p=0.0011$) or anti-platelet agents ($p=0.000$). In addition, in univariate analysis PWV (m/sec) positively correlated with age ($p=0.0000$), systolic BP ($p=0.0000$), pulse pressure ($p=0.0000$), ejection fraction ($p=0.0201$), UACR ($p=0.0375$), serum uric acid ($p=0.0001$), glucose ($p=0.0336$) and HbA1c ($p=0.0004$) and negatively correlated with eGFR-EPI (<0.0001), total serum cholesterol ($p=0.0015$), LDL cholesterol ($p=0.0010$) and, $1,25(\text{OH})_2\text{Vit-D}$ ($p=0.0058$).

Multivariate analysis showed that advanced age ($p=0.0001$), systolic BP ($p=0.0003$), diabetes mellitus (0.0112), serum uric acid ($p=0.0080$) and calcium polystyrene sulfonate therapy ($p=0.0008$) or calcium-containing medications ($p=0.0256$) were independent predictors of PWV.



CONCLUSIONS

1. Arterial stiffness was very prevalent in nephrology outpatients.
2. Among modifiable factors associated with increased arterial stiffness, we found;
 - Systolic blood pressure,
 - Serum uric acid,
 - Potassium chelation therapy and
 - Therapeutic calcium.

