

# PROTEINURIA AND SERUM VITAMIN E CORRELATE WITH PULSE WAVE VELOCITY (PWV) IN DIABETIC NON-DIALYSIS CHRONIC KIDNEY DISEASE (CKD) PATIENTS

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## INTRODUCTION

Cardiovascular disease is common in CKD patients and is the most frequent cause of death. Diabetic CKD patients are at especially high risk for cardiovascular mortality. PWV assesses arterial stiffness and is a predictor of both mortality and cardiovascular outcomes. Some studies suggest that vascular injury is so advanced at the dialysis stage that the response to some interventions, like statin treatment, is quite poor. Finding predictors of vascular stiffness in earlier stages of CKD in diabetics may identify potentially modifiable risk factors for adverse cardiovascular outcomes.

## OBJECTIVES

To identify predictors of PWV in a prospective cohort of diabetic non-dialysis CKD Patients.

## METHODS

A cross-sectional analysis of a prospective cohort of seventy seven diabetic CKD patients (53 males, 24 females, mean age 63.9 ± 12.9 years). 40 laboratory parameters potentially related to cardiovascular risk, echo- cardiogram and carotid-femoral PWV (using SphygmoCor) were prospectively assessed. CKD stage distribution among those patients was 8 (11%) stage 1, 25 (34%) stage 2, 21 (28%) stage 3A, 16 (16%) stage 3B, 4 (6%) stage 4 and 2 (3%) stage 5. Albuminuria 30-300 mg/g Cr was present in 36 patients (56.2%), 300-1000 in 17 (26.6%) and >1000 in 11 patients (17.2%).

## RESULTS

❖ Mean carotid femoral PWV was 12.84 ± 5.1 m/sec. Higher than expected for age values were observed in 38 (49%) patients.

❖ A univariate analysis showed that PWV had:

➤ A significant positive correlation with Age ( $r^2=0.523$ ,  $p=0.0000$ ), Systolic blood pressure ( $r^2=0.348$ ,  $p=0.009$ ), Left ventricular ejection fraction (LVEF,  $r^2=0.246$ ,  $p=0.0495$ ) and Valvular calcification ( $p=0.0246$ )

➤ A trend towards a positive correlation with urinary Protein/creatinine ratio ( $r^2=0.238$ ,  $p=0.0575$ ).

➤ A negative correlation was with serum vitamin E ( $r^2=0.385$ ,  $p=0.0140$ ), Urinary creatinine ( $r^2=0.267$ ,  $p=0.0250$ ), and serum phosphorus ( $r^2=0.258$ ,  $p=0.0270$ ).

❖ A multivariate analysis using those variables yielded:

➤ A model with an  $r^2=0.44$ .

➤ Age ( $r^2=0.008$ ,  $p=0.0053$ ), urinary protein/creatinine ratio ( $r^2=0.103$ ,  $p=0.0118$ ) and serum vitamin E ( $r^2=0.017$ ,  $p=0.0473$ ) significantly and independently contributed to predict PWV in this model.

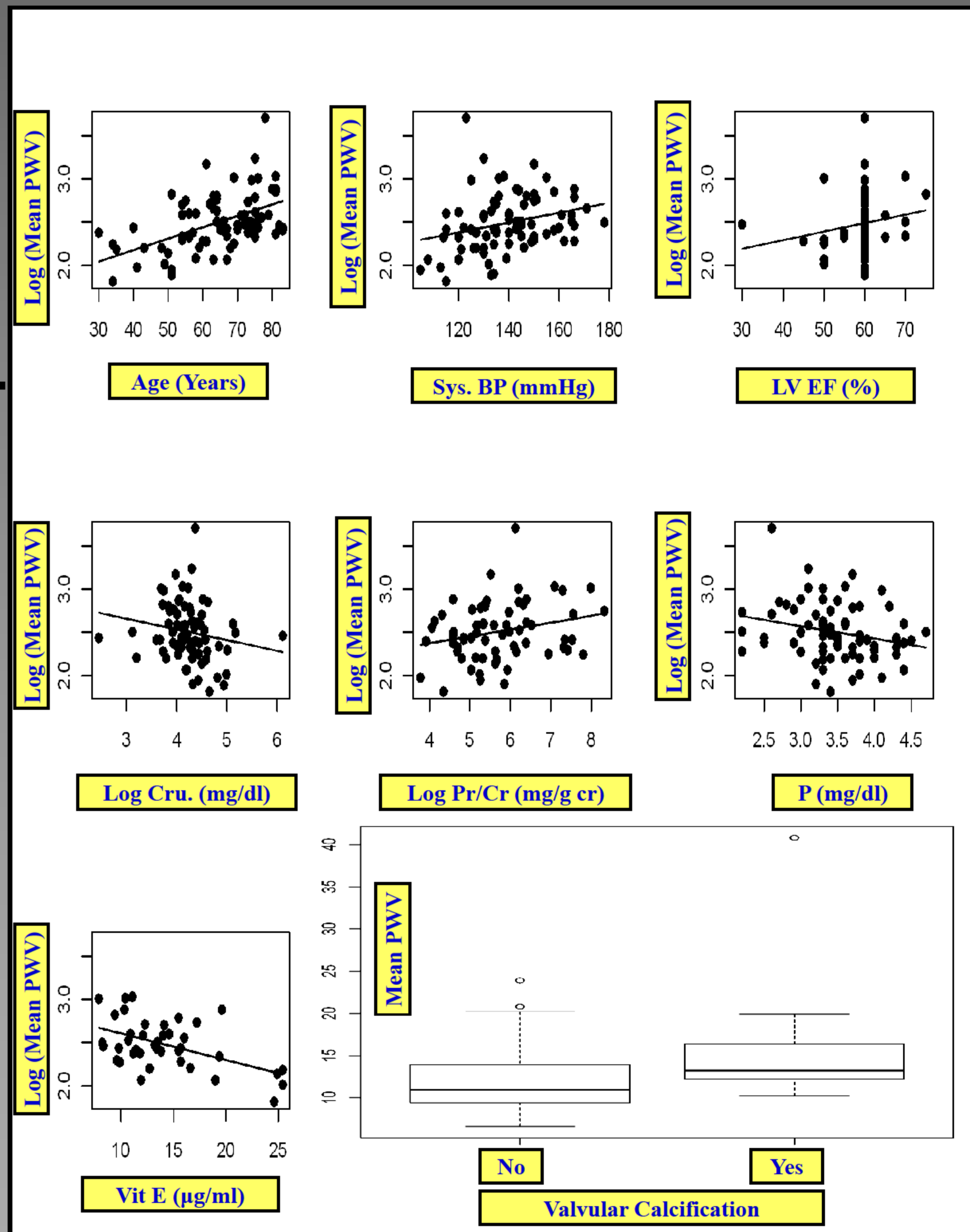
❖ Every 1% increase in serum vitamin E is associated with a 1.7% reduction of the mean PWV.

## Distribution of PWV (m/sec) according to Age:

Age (Years)	Normal Population (*) Mean PWV ( ± 2 SD)	CKD Patients Mean PWV ( ± 2 SD)
<30	6.2 (4.7–7.6)	0
30–39	6.5 (3.8–9.2)	8.8 (4.9 - 12.7)
40–49	7.2 (4.6–9.8)	8.8 (5.5 - 12.1)
50–59	8.3 (4.5–12.1)	10.9 (4.5 - 17.3)
60–69	10.3 (5.5–15.0)	12.8 (4.5 - 21.0)
≥70	10.9 (5.5–16.3)	15.2 (2.9 - 27.4)

(\*) Mattace-Raso FU, Hofman A, Verwoert GC, et al., Eur Heart J. 2010

## PWV CORRELATIONS



## CONCLUSIONS

- 1) Around 50% of our diabetic CKD patients have high PWV indicating presence of vascular stiffness.
- 2) Proteinuria and low serum vitamin E values are associated with high PWV; indicating higher vascular stiffness
- 3) Prospective studies should explore whether nutritional vitamin E supplementation improves arterial stiffness in this context.

