Introduction and Aims: The loss of physiological stiffness mismatch between aorta and peripheral arteries was strongly and independently associated with increased mortality in adult dialysis population. The aim of the study was to evaluate if the reversal of arterial stiffness mismatch was present in pre-dialysis patients with chronic kidney disease (CKD).

Methods: The aortic-brachial arterial stiffness mismatch (pulse wave velocity (PWV) ratio) were assessed using carotid-femoral PWV divided by carotid-radial PWV in 112 adult treated hypertensive CKD patients: 54 - with CKD IIIa (age 59.5±8.4 years, male 46.3%, brachial blood pressure (BP) 149.6±10.3/85.8±9.8 mmHg), 35 - with CKD IIIb (age 60.2±7.8 years, male 45.7%, BP 152.5±12.5/86.4±10.2 mmHg) and 23 with CKD IV (age 57.3±10.2, male 43.4%, BP 156.1±14.3/92.8±12.4 mmHg). P<0.05 was considered significant for group comparisons, Spearman correlation test and multivariate regression analysis.

Results: In CKD IIIa aortic PWV was 10.2±2.0 m/s, brachial PWV 12.9±1.6 m/s, PWV ratio 0.82±0.25. In CKD IIIb aortic PWV was 11.3±2.9 m/s, brachial PWV 12.2±1.8 m/s, PWV ratio 0.90±0.27. In CKD IV aortic PWV was 12.7±3.1 m/s (p<0.05 vs CKD IIIa), brachial PWV 11.4±1.6 m/s (p<0.05 vs CKD IIIa), PWV ratio 1.09±0.33 (p<0.05). Increased arterial stiffness (PWV >10 m/s) was observed in 55.6%, 62.9% and 73.9%, respectively. For the whole study population (n=112) multivariate analysis revealed independent significant correlation between aortic PWV and glomerular filtration rate (GFR) β=-0.36 (p<0.05), PWV ratio and GFR β=-0.32 (p<0.05), PWV ratio and age β=0.44 (p<0.05).

Conclusions: In the pre-dialysis hypertensive CKD patients worsening of kidney function was associated with discordant changes in aortic and brachial artery stiffness in the reversal of the physiological stiffness mismatch. The loss of this physiological mismatch may promote kidney damage through increased forward pressure wave transmission into the microcirculation. PWV ratio evaluation (in addition to traditional aortic PWV measurement) may be useful for better evaluation of arterial stiffness in pre-dialysis CKD patients.