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Introduction and objectives

Mild to moderate renal impairment affects 10% of the population but it is difficult to detect because the disease is usually asymptomatic. Patients with chronic kidney disease (CKD) have an increased risk of myocardial infarction, heart failure, stroke and death. Patients with severe renal dysfunction often have changes in the structure and function of the heart. The close interaction between the heart and kidney is summarized in the concept of "Cardiorenal syndrome". Previous reports show that also early renal dysfunction is a risk factor for cardiovascular death, but it is not fully known if the changes in cardiac structure and function already exist in early impairment of renal function. Cystatin C is a stronger predictor for the risk of cardiovascular morbidity compared with creatinine. The study aims to investigate if there is an early link between kidney disease and cardiac structural and/or functional changes.

Methods

The population was selected from Malmö Preventive Project Re-examination-study (MPP-RES). 1792 participants with mean age 67 ± 6 were examined in 2002-2006. Echocardiography with tissue doppler imaging (TDI), is a method that provides a precise measure of left ventricular (LV) wall motion and new possibility to quantify global and regional LV function. This method has demonstrated high sensitivity to detect early signs of both diastolic and mild systolic left ventricular (LV) dysfunction. Among other variables we measured left ventricular ejection fraction (LVEF), left atrial area indexed for body surface area (LAA/BSA), peak myocardial velocity of the basal left ventricular wall in early (Em or \acute{e}) and late (Am or \acute{a}) diastole in the lateral and septal walls and doppler measurement of peak velocity of blood flow through the mitral valve in early (Mitralis Emax) and late (Mitralis Amax) diastole. Cystatin C was analysed in plasma and estimated glomerular filtration rate (eGFR) with CKD-EPI formula was calculated. General linear regression was used for statistical analyses. We included 1504 of the participants with no prior history of heart failure (HF), EF $\geq 40\%$ and eGFR based >15 mL/min/1.73m². The participants were then divided in 8 groups based on e-GFR levels ≥ 90 mL/min/1.73m²; 80-89; 70-79; 60-69; 50-59; 40-49; 30-39 ;and <30 . Number of participants in these groups were 167, 221, 376, 322, 238, 121, 51 and 8, respectively. 29,9% of the participants were women and 70,1% were men.

We studied correlations between e-GFR groups and echocardiography parameters (mean values from lateral and septal walls). All analyses were adjusted for age, gender, hypertension, diabetes and medication with renin angiotensin inhibitors. We looked at the whole group and performed a subgroup analysis based on gender.

Results and Conclusions

Results: We found significant correlations between eGFR groups and Mean \acute{e} latsept and Mean E/ \acute{e} in the total cohort ($p=0,001$ and $p=0,022$, respectively). These correlations remain significant among men but not among women.

We dichotomized the cohort in those with eGFR <40 and >40 mL/min/1.73m² and those with eGFR <50 and >50 mL/min/1.73m². This showed that the association between eGFR and echocardiographic variables was found in persons with eGFR <40 mL/min/1.73m².

Conclusions: A significant correlation between moderate impairment of renal function and functional and structural echocardiographic markers of early diastolic dysfunction was observed. This supports our hypothesis that interaction between the heart and kidney exists even in moderate stages of renal impairment.