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Left ventricular hypertrophy and cardiac remodeling in chronic kidney disease and hemodialysis patients, role of altered metabolism of some arginine derivatives

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Introduction: Left ventricular hypertrophy (LVH) and left ventricular dysfunction are highly prevalent in patients with end-stage renal disease (ESRD). Interestingly, unlike the general population, in which coronary atherosclerotic disease is the principal cause of cardiovascular (CV) mortality, patients with chronic kidney disease (CKD) often die from chronic heart failure and sudden cardiac events resulting from left ventricular hypertrophy (LVH). Left ventricular hypertrophy (LVH) is present in 75% of the patients at the start of dialysis. Several studies suggest that left ventricular mass and function is strongly modulated by the nitric oxide (NO) system. Asymmetric dimethylarginine (ADMA), an endogenous inhibitor of endothelial-based NO synthase, is emerging as an important cardiovascular risk factor in ESRD patients.

Objective: To evaluate the relationship between plasma ADMA level and LVH among hemodialysis (HD) patients.

Subjects & Methods: Plasma ADMA measurements by enzyme-linked immunosorbent assay and echocardiographic evaluation were performed for 20 patients on regular HD, 20 patients with pre-dialysis chronic kidney disease, and 20 healthy age and sex-matched subjects as a control group.

Results: Mean values of plasma ADMA level were significantly high in all patient groups when compared with the control group ($P<0.001$). It was also seen that plasma ADMA was correlated with left ventricular mass index.

Conclusions: We concluded that dimethylarginine dimethylaminohydrolase (DDAH) levels significantly decrease with declining renal functions and this is probably the main cause of elevated plasma ADMA concentration among CKD and HD patients, hence inhibiting NO synthesis leading to endothelial dysfunction and subsequent cardiovascular events, elevated ADMA levels were positively correlating with increased left ventricular mass index (LVMI) commonly seen in CKD patients.

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