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Evaluating the association between hypertension and cerebral white matter alterations in patients with chronic kidney disease

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Objectives : Patients with chronic kidney disease (CKD) are at a higher risk for encephalopathy, which many chronic diseases can exacerbate. Hypertension is a significant risk factor for brain damage in the general population but is limited discussed in CKD patients. Brain Magnetic Resonance Imaging (MRI) is an excellent tool for evaluating cerebral white matter lesions. Therefore, the present study aims to investigate the effect of hypertension on the cerebral white matter lesions of brain MRI in CKD patients.
Methods : In this retrospective study, we enrolled 1,749 CKD patients who underwent brain MRIs under routine care to evaluate their brain lesions in Kaohsiung Medical University Hospital's care systems. The cerebral white matter hyperintensities on MRI were evaluated according to the Fazekas scale, including separate periventricular and deep white matter lesions from grade 0 to grade 3. The multivariable ordinal regression model was analyzed to determine the independent association between hypertension or blood pressure and cerebral white matter hyperintensities.
Results : Hypertension was associated with the Fazekas scale of periventricular lesions in multivariable-adjusted ordinal regression analysis (odds ratio [OR] 1.34, 95% confidence interval [CI] 1.03-1.75) after controlling age, sex, education, comorbidities (hyperlipidemia, cerebrovascular disease, chronic heart failure), laboratory data (hemoglobin, albumin, triglyceride, estimated glomerular filtration rate). However, the hypertension comorbidities did not correlate with the Fazekas scale of deep white matter lesions in the fully adjusted model (OR 1.27, 95% CI [0.97-1.66]). A positive association between blood pressure (per 10 mmHg increase) and the Fazekas scale was mainly on diastolic blood pressure rather than systolic blood pressure.
Conclusions : In CKD patients, hypertension was associated with brain white matter damage, in particular, Fazekas scale of periventricular lesions. Further study is needed to evaluate adequate blood pressure control to decrease the risk of brain damage in CKD patients.