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1,25-Dihydroxyvitamin D is Independently Associated with Sarcopenia in Patients with Pre-dialysis Chronic Kidney Disease

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Objectives : Sarcopenia is characterized by progressive and widespread loss of skeletal muscle, resulting in muscle weakness and frailty. While there are reports linking vitamin D deficiency, prevalent in chronic kidney disease (CKD), to sarcopenia in the general population, limited information exists regarding the specific relationship between vitamin D and sarcopenia in CKD patients. This study aims to explore the association between vitamin D deficiency and sarcopenia in patients with pre-dialysis CKD.
Methods : This cross-sectional study enrolled 569 patients with pre-dialysis CKD. Sarcopenia was assessed using computed tomography (CT)-derived skeletal muscle index (SMI), calculated based on the cross-sectional area of skeletal muscles at the 3rd lumbar vertebra. Patients were categorized into sarcopenic and non-sarcopenic groups using Korean-specific SMI cutoffs. Logistic regression analyses were employed to explore associations between sarcopenia and baseline variables, including 25-hydroxyvitamin D [25(OH)D] and 1,25-dihydroxyvitamin D [$1,25(OH)_2D$] levels.
Results : The prevalence of sarcopenia increased with advancing CKD stage. Univariate logistic regression analysis revealed that serum $1,25(OH)_2D$ levels, but not serum 25(OH)D levels, are associated with sarcopenia. In multivariable logistic regression analysis, $1,25(OH)_2D$ levels remained independently associated with sarcopenia (per 1 pg/dl increase, odds ratio: 0.84; 95% confidence interval: 0.80–0.87, $P < 0.001$). Additionally, age, diabetes, serum albumin, and high-sensitive C-reactive protein were also independently associated with sarcopenia. Receiver operating characteristic curve analysis showed that $1,25(OH)_2D$ levels had good diagnostic potential for predicting the presence of sarcopenia in study participants (area under curve: 0.844, $P < 0.001$, best cutoff value: 12.2 pg/dl with sensitivity of 75.2% and specificity of 82.3%).
Conclusions : This study revealed an independent association between serum $1,25(OH)_2D$ levels and sarcopenia derived from CT scans in pre-dialysis CKD patients. Including serum $1,25(OH)_2D$ assessment could serve as a valuable tool for physicians in effectively stratifying the risk of sarcopenia in these patients.