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Low magnesium is associated with a weak bone strength in pre-dialysis CKD patients: Results from the KNOW-CKD study

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Objectives: In patients with chronic kidney disease (CKD), bone strength was weakened as CKD progressed. There are still controversy of the association between magnesium (Mg) deficiency and osteoporosis in pre-dialysis CKD patients. We aimed to investigate the association between Mg and bone strangth in pre-dialysis CKD patients.

Methods: We investigated the association between serum Mg and a decrease of bone mineral density (BMD) from the prospective, multicenter cohort of pre-dialysis CKD patients (n=928). Patients were divided into tertiles according to serum Mg. The primary endpoint is a decrease of BMD, defined as decline of BMD of lumbar spine <-0.05g/cm^2. We performed sensitivity analysis with decline of BMD of femur neck.

Results: After 4 years of follow-up, BMD decreased in 267 (28.7%) patients. In a multivariable binary logistic regression model, the lowest tertile of Mg was associated with risk of the decrease of BMD of lumbar spine (T1, serum Mg ≤2.2 mg/dL, Odd ratio (OR) 2.79 [1.58–4.92]; *P*=<0.001; T3, serum Mg ≥2.3 mg/dL, reference group). Similar results were obtained when sensitivity analysis was performed with BMD of femur neck. Subgroup analyses showed that low Mg was particularly associated with risk of the decreased BMD of lumbar spine in patients <50 years of age, in those without diabetes mellitus, and in those with low physical activity.

Conclusions: Low level of Mg is associated with a weak bone strength in pre-dialysis CKD patients.