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The effect of serum corrected calcium and other kidney-related factors on left ventricular hypertrophy in pre-dialysis chronic kidney disease

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Objectives: Left ventricular hypertrophy (LVH) is prevalent in patients with chronic kidney disease (CKD) and considered to be the strong independent predictor of CVD. Chronic kidney disease-mineral bone disease is one of the risk factors of LVH, however, the role of serum calcium remains to be elucidated. This study is aimed to assess the association of serum calcium for LVH in a nationwide CKD cohort.

Methods: The cross-sectional study included 2123 subjects who underwent echocardiogram as part of the KoreaN Cohort Study for Outcome in Patients With Chronic Kidney Disease (KNOW-CKD). The associations between albumin-adjusted serum calcium and left ventricular mass index (LVMI) and LVH were examined using multivariate linear regression and logistic regression, respectively.

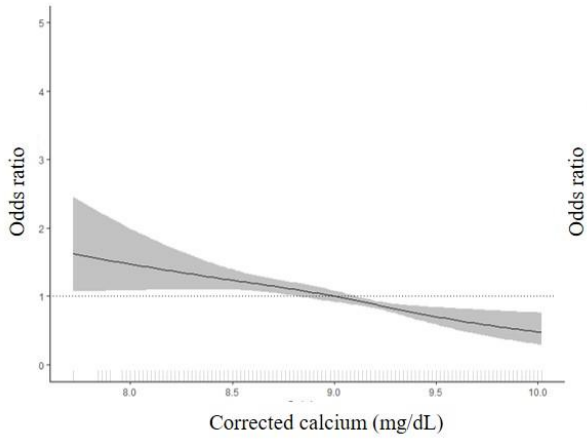
Results: The level of corrected calcium tend to be higher according to higher LVMI quartiles (P <0.001). LVMI was negatively associated with corrected calcium (β =-5.86, 95% CI -8.21, -3.51, P < 0.001) in multivariate linear regression analysis. In logistic regression analysis for LVH, corrected calcium still showed risk reduction (OR = 0.68, CI 0.52-0.90, P = 0.007) in multivariate analysis. The combination of low corrected calcium (< 9.0 mg/dL) and high phosphorus (≥ 3.6 mg/dL) was associated with the highest risk of LVH compared with high corrected calcium and low phosphorous. This effect is clearly shown as the renal function deteriorated. Compared with the area under the receiver operating characteristic (ROC) curve for age+sex+body mass index+systolic blood pressure+diastolic blood pressure+hypertension, area under the ROC curve adding corrected calcium and phosphorous increased from 0.716 to 0.745.

Conclusions:

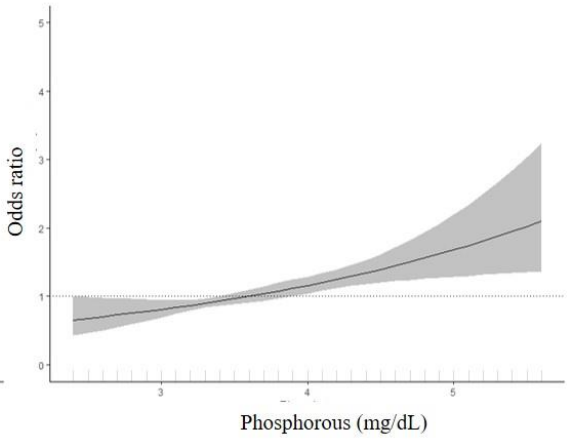
Albumin-adjusted serum calcium is associated with an increased risk of LVH in CKD patients.

Restricted cubic spline curves relating odds ratio with 95% confidence intervals of left ventricular hypertrophy and (A) corrected calcium and (B) phosphorous.

A


Odds ratio
0
1
2
3
4
5
8.0
8.5
9.0
9.5
10.0
Corrected calcium (mg/dL)

B


Odds ratio
0
1
2
3
4
5
3
4
5
Phosphorous (mg/dL)