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High calcium-phosphorus product level increases the risk of acute kidney injury, end-stage renal disease, and mortality in hospitalized patients

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Objectives:

Calcium-phosphorus (Ca-P) product level is an important concern in chronic kidney disease patients, regarding vascular calcification and mineral bone disorder. However, the clinical implications of Ca-P production in the risk of acute kidney injury (AKI), end-stage renal disease (ESRD), and mortality after hospitalization remain unresolved.

Methods:

A total of 16,757 patients (aged ≥18 years) were retrospectively reviewed from a tertiary referral center who admitted during 2013 year. Patients were categorized into 4 groups by the quartiles of Ca-P product (Ca × P) at the time of admission. The odds ratios (ORs) for AKI and ESRD and hazard ratios (HRs) for all-cause mortality were calculated after adjusting multiple covariates.

Results: The ranges of Ca-P product levels were < 24.9 in the 1st quartile, 24.9–29.5 in the 2nd quartile, 29.6–34.0 in the 3rd quartile, and > 34.0 in the 4th quartile. AKI developed in 2,010 patients (12.0%). The 4th quartile group had a higher OR of AKI [1.40 (1.182-1.651)] than the 1st quartile group. The recovery rate from AKI was lower in the 4th quartile than in the 1st quartile with an OR of 0.74 (0.584-0.927). Furthermore, the 3rd and 4th quartile groups had a risk of ESRD compared to the 1st quartile, with ORs of 2.43 (1.415-4.170) and 2.59 (1.543-4.347), respectively. During the median follow-up period of 3.6 years (maximum 5 years), 284 patients (1.7%) died. The 4th quartile group had a higher HR of mortality [2.64 (1.870-3.737)] than the 1st quartile group.

Conclusions:

High Ca-P product level is related with the risk of AKI, ESRD, and mortality. Accordingly, it may be needed to monitor Ca-P product levels in the hospitalized patients in addition to the chronic kidney disease patients.