

Increased Infection-related Mortality in Dialysis Patients with Low Serum Phosphorus Level: A Prospective Multicenter Cohort Study

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Background: The abnormality of mineral metabolism in maintenance dialysis patient has significant role on mortality related to cardiovascular disease. However, it remains unknown whether mineral metabolism parameters are associated with infection-related death, which is another common cause of death in dialysis patients. This study investigated the effect of the serum calcium and phosphorus level on the infection-related mortality in dialysis patients.

Methods: Maintenance patients on hemodialysis and peritoneal dialysis were enrolled from a multicenter prospective cohort study in Korea. The patients were divided into low, normal, and high groups according to their baseline serum calcium or phosphorus levels. Cox proportional analysis was used to calculate hazard ratios (HRs) for the association of serum calcium and phosphorus levels with all-cause, infection-related and cardiovascular-related death. Time-dependent values of calcium and phosphorus were also evaluated to assess the effect of longitudinal change in mineral metabolism parameters on various mortalities.

Results: A total of 3,226 dialysis patients were followed up for mean 19.8±8.2 months. The patients with baseline low phosphorus level showed significantly increased infection-related death compared to patients with normal phosphorus level (HR=1.68, confidence interval [CI]=1.04-2.73, p=0.034). However, the baseline low phosphorus level was not related with all-cause and cardiovascular-related mortality. The low phosphorus level was also significantly associated with all-cause and infection-related death using time-dependent values (HR=1.47, CI=1.11-1.95, p=0.007 and HR=1.93, CI=1.20-3.10, p=0.007, respectively). Serum phosphorus was correlated with nutritional factors such as serum albumin, serum creatinine, and body mass index. Baseline low calcium was associated with decreased all-cause mortality (HR=0.66, CI=0.48-0.89, p=0.007). However, time-dependent analysis of serum calcium level showed no significant effect on mortality.

Conclusions: Low serum phosphorus in maintenance dialysis patients was an independent risk factor for infection-related death. Persistently low serum phosphorus levels might be a nutritional biomarker to predict the susceptibility to infection and in turn worse outcomes in dialysis patients.

Key Words: Phosphorus, Mortality, Dialysis