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Relationships of dietary phosphate intake and serum phosphate with clinical outcomes in chronic kidney disease patients: findings from the KoreaN Cohort Study for Outcome in Patients With Chronic Kidney Disease study

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Objectives : Recent studies suggest that dietary phosphate intake is only weakly linked to its serum concentration, and the relationship the phosphate intake and clinical outcomes is not yet well studied. We investigated the relationships of dietary phosphate intake and serum phosphate with clinical outcomes in chronic kidney disease(CKD) patients.

Methods : We collected the data of 2238 CKD stage 1-5 non-dialysis patients from a prospective cohort study (KNOW-CKD). A renal event is defined by a >50% decrease in estimated glomerular filtration rate (eGFR) from the baseline values, doubling of serum creatinine concentration, or end stage renal disease. Cardiovascular event is defined as myocardial infarction (fatal and nonfatal), coronary revascularization, stroke and new onset or aggravation of congestive heart failure. We used cox proportional hazards models to assess the associations between baseline 24-hour urine phosphate excretion and serum phosphate concentration with clinical outcomes (renal and cardiovascular events).

Results : Among the 2238 participants in this study, the mean age was 53.68 ± 12.24 years (range 20-75), 61.2% were male. 24-hour urine phosphate excretion was not significantly correlated with serum phosphate concentrations (r=0.016, p=0.484). Models were adjusted for age, sex, primary renal disease (glomerulonephritis, diabetes, hypertension, polycystic kidney disease and others), estimated glomerular filtration ratio(GFR), 24-hour urine protein and nitrogen excretion, body mass index, smoking, use of phosphate binder, and medical history of diabetes, hypertension and coronary artery disease. The lowest quartile of 24-hour urinary phosphate excretion (11.4-400 mg/day) was associated with renal (hazard ratio [HR] 1.734, 95% confidence interval [CI] 1.191-2.524, p=0.004) and total event (HR 1.575, 95% CI 1.146-2.165, p=0.005) when compared with third quartile of 24-hour urinary phosphate excretion (579-745 mg/day) after adjustment for confounders. The highest quartile of serum phosphate (4.2-8.8 mg/dL) was associated with renal (HR

1.743, 95% CI 1.128-2.695, p=0.012) and total event (HR 1.949, 95% CI 1.355-2.804, p<0.001) after fully adjustment. But, neither 24-hour urine phosphate excretion nor serum phosphate concentration was not associated with cardiovascular event alone.

Conclusions : Low dietary phosphate intake assessed by 24-h urinary phosphate excretion and high serum phosphate concentration was associated with poor clinical outcome in CKD patients. Low urinary phosphate excretion and high serum phosphate concentration should be considered as important prognostic factor in CKD.

Keywords : diet, phosphate, kidney disease, outcome