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일반 인구 집단에서 혈관내피세포 손상의 표지자인 low-grade albuminuria를 예측하는 인자로서 혈중 인의 중요성

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Significance of Serum Phosphorus as a Predictor of Low-Grade Albuminuria which is a Marker of Endothelial Dysfunction in General Population

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Background: Recent epidemiologic studies suggest that low-grade albuminuria (LGA) is associated with cardiovascular disease (CVD) from the earliest stage of chronic kidney disease (CKD). Higher levels of serum phosphorus are associated with CVD and mortality in recent epidemiologic studies although the mechanism remained unclear. We aimed to investigate the association between LGA and serum phosphorus level in general population.

Methods: We examined the individuals who had undergone health inspections at the Seoul National University Bundang Hospital between Oct, 2003 and Feb, 2009. We evaluated 10,412 participants (mean age 47.8 years; 55.9% were men) with glomerular filtration rate (GFR $\geq$60 ml/min/1.73m^2 and with urine albumin-to-creatinine ratio (UACR) <30 mg/g. The participants who were performed colonoscopy were excluded. Serum phosphorus was considered a continuous variable and in quartile categories.

Results: The mean value of UACR was 7.92 mg/g, mean value of phosphorus was 3.8 mg/dL. The mean value of UACR level was significantly increased up to 9.13 mg/g in uppermost quartile group of serum phosphorus (serum phosphorus over 4.1 mg/dL). In univariate analysis, UACR was associated with age, history of coronary artery disease, history of hyperlipidemia, smoking, pulse pressure, erythrocyte sedimentation rate, GFR, serum levels of calcium, phosphorus, bilirubin, total protein, and albumin. After multivariate analysis, serum phosphorus level remained an independent predictor of increased UACR (β (standardized coefficient for linear regression) =0.134, p<0.001).

Conclusion: In our population-based study, higher serum phosphorus level was independently predicted LGA, which is a well-known marker of endothelial dysfunction, in individuals without renal dysfunction. Our data suggests that endothelial dysfunction may contribute to the relationship between serum phosphorus level and the risk for CVD.

Key Words: 인, 알부민뇨, 내피세포기능부전
Phosphorus, Low-grade albuminuria, Endothelial dysfunction