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Serum Osteoprotegrin Levels are Associated with an Increased Risk of Developing Anemia in Patients with Non-dialysis Chronic Kidney Disease

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Objectives: Osteoprotegerin (OPG), which is an osteoclastic inhibitory factor, have been shown associated with adverse renal outcomes and progression of vascular calcification in chronic kidney disease (CKD) patients. Anemia and CKD-bone mineral disorders (CKD-MBD)are also frequently observed in these patients. Since CKD-MBD and anemia might be closely linked, therefore, we further examined whether OPG level as a marker for bone turnover can predict the future development of anemia in a large-scale prospective cohort.

Methods: Among 2,238 patients with non-dialysis CKD enrolled in the KoreaN cohort study for Outcome in patients With Chronic Kidney Disease (KNOW-CKD), 2,086 patients who measured hemoglobin, hepcidin, iron profiles and OPG level were included in the analysis. Anemia was defined as a hemoglobin level of < 13.0 g/dL and 12.0 g/dL for male and female, respectively.

Results: The mean age was 53.6 ± 12.2 years and 1,270 (60.9%) patients were males. At baseline, anemia was found in 941 (45.1%) patients. Log transformed OPG levels significantly correlated with FGF23 levels, but inversely with iron profiles and hemoglobin levels at baseline. A multivariate logistic regression model showed that log OPG level was independently associated with the prevalence of anemia (odds ratio [OR], 2.22; 95% confidence interval [CI], 1.41-3.48, P=0.001). Among 1110 patients without baseline anemia, 258 (25.3%) patients developed anemia during a median follow-up duration of 34.6 (interquartile range, 23-48) months. In the fully adjusted multivariable Cox models, risk of developing anemia was significantly higher in the fourth (hazard ratio [HR], 1.99; 95% CI, 1.08-3.67; P =0.028) than in the first OPG quartile. Similar association was observed in a model when OPG was treated as a continuous variable.

Conclusions: We showed that high serum OPG levels are associated with an increased risk of developing anemia in patients with non-dialysis CKD.