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Association of serum uric acid level and coronary artery stenosis severity in end stage renal disease patients

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Objectives : Hyperuricemia is common in end stage renal disease (ESRD) patients, and many previous studies have reported associations between hyperuricemia and adverse cardiovascular outcomes, which are the major cause of death in these patients. We investigated the relationship between serum uric acid levels and the severity of coronary stenosis in ESRD patients on maintenance hemodialysis (MHD).

Methods : All patients had ESRD and were treated with MHD at the CHA Bundang Medical Center hemodialysis center between 2005 and 2015. We selected patients who started MHD treatment in our center and underwent coronary angiography to address chest discomfort that began after initiation of MHD.
Among 721 patients who started MHD treatment, 102 patients underwent coronary angiographic tests complaining of chest discomfort new since initiation of MHD. We collected data on uric acid levels and coronary artery luminal diameter, defining luminal diameter narrowing of more than 50% in any major coronary artery as critical-stenosis.

Results : The mean age of the study population was 62.3 ± 10.8 years, and 54.4% of the population was male. Hyperuricemia (serum uric acid level > 6.0 mg/dL in females and > 7.0mg/dL in males [58]) affected 47.7% of the total study population, and it was more prevalent in the critical-stenosis group (73.0% vs. 13.1%. P<0.001).
The coronary angiographic test diagnosed 52 patients (57.7%) with critical coronary artery stenosis; the remaining 38 (42.4%) composed the non-critical-stenosis group. The mean uric acid level was 6.6 ± 2.2 md/dL, and that was significantly higher in the critical-stenosis group (4.9 ±1.4 vs. 7.8 ±2.0 P <0.001). Compared with the non-critical-stenosis group, patients with critical-stenosis had significantly higher WBC (7378.4 ± 2723.5 vs. 9016.7 ± 4456.8, P=0.036) and glucose levels (141.4 ± 64.8 vs. 198.4 ± 111.9, P=0.003). Serum

protein (6.6 ± 0.9 vs. 6.2 ± 0.8, P=0.037) and calcium levels (9.2 ± 1.0 vs. 8.7 ± 1.0, P=0.015) were significantly lower in the critical-stenosis group.
We performed a binary logistic regression analysis to assess the effects of covariates on critical coronary artery stenosis, using variables found to be significantly correlated with critical-stenosis in the univariate analysis. The only independent predictor of critical-stenosis was serum uric acid level in multivariate analysis (P <0.001).

Conclusions : High serum uric acid levels were associated with critical coronary artery stenosis in ESRD patients. The association remained important despite adjustment for other possible risk factors. Further research is needed to investigate the biological role of uric acid and determine whether decreasing serum uric acid levels reduces the risk of severe coronary artery disease in ESRD patients.

Keywords : Chronic kidney disease, Coronary stenosis, Cardiovascular disease, Hemodialysis, Uric acid