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Dialysis

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Association of Hyponatremia Combined with Adrenal Insufficiency and Risk of Mortality in Hospitalized Patients with Dialysis

Chang-Yun Yoon*¹, Tae Ik Chang², Sug Kyun Shin², Ea Wha Kang²

¹Department of Internal Medicine, Yonsei University College of Medicine, Seoul, ²Division of Nephrology, Department of Internal Medicine, National Health Insurance Service Medical Center, Ilsan Hospital, Goyang, Gyeonggi-do, Korea, Republic Of

Background: Hyponatremia has been noticed with significant role in predict the adverse clinical outcomes in dialysis patients, but causality has been difficult to prove due to confounding clinical conditions. Although the etiologic role of adrenal insufficiency (AI) in development of hyponatremia and its association with mortality in critically ill patients are well elucidated, clinical impact of hyponatremia combined with AI appears not to have been reported in critically ill patients with dialysis. Thus, we investigated the association of hyponatremia with AI and mortality in hospitalized patients with dialysis.

Methods: This prospective observational study included 170 admitted patients who maintaining dialysis between March 2011 and March 2014. The admitted patients with heart failure or liver cirrhosis were excluded from present analysis. The patients were followed up for median 28 (11-44) months. AI was defined as the patients who showed positive result from low-dose adrenocorticotrophic hormone stimulation test. The 6, 12, and over the time of follow-up mortality were investigated in hyponatremia only group and hyponatremia with AI group compared to normonatremia group.

Results: The mean age was 62.0±12.8 years, and 69 patients (40.6%) were male. 89 patients (52.4%) had hyponatremia and among hyponatremia patients, 42 patients combined with AI. Hyponatremia with AI group showed significantly lower serum albumin (2.6±0.7 vs 2.2±0.5 g/dL, P<0.001) but higher sensitivity C-reactive protein (hs-CRP) (0.71 [0.25-4.12] vs 3.28 [0.90-9.72] mg/dL, P<0.001) compared to hyponatremia only group. In multiple linear regression analysis, the presence of AI was independently associated with serum sodium levels (β [95% confidence interval, CI], -1.808 [-3.332, -0.284], P=0.020) even after adjustment for multiple confounding factors. During a 6-month, 12-month, and over the time of follow-up, the all-cause mortality was observed in 20 (11.8%), 28 (16.5%), and 65 (38.2%) patients, respectively. In multiple Cox analysis, hyponatremia with AI group showed significantly higher risk of mortality for all during follow up period (6-month, hazard ratio [HR], 16.773, 95% CI, 2.829-99.449, P=0.002; 12-month, HR, 3.389, 95% CI, 1.097-10.471, P=0.034; over the time of follow-up, HR, 2.171, 95% CI, 1.013-4.650, P=0.046) compared to normonatremia group after adjustment for age, sex, diabetes, cardiovascular disease, hemoglobin, serum albumin, tCO₂, and hs-CRP. However, hyponatremia only group did not show significant association with higher risk of mortality compared to normonatremia group.

Conclusion: Hyponatremia combined with AI rather than hyponatremia only was significantly associated with higher risk of mortality in hospitalized patients with dialysis. Considering the association hyponatremia with AI with grave outcome in our study, we would suggest that the diagnosis of AI be considered in hyponatremia in critically ill patients with dialysis.

Keywords: Adrenal insufficiency, Dialysis, hyponatremia, mortality