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Association of hyponatremia and low bone density in hemodialysis patients

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Objectives: Patients on maintenance hemodialysis (HD) are at risk of developing bone and mineral metabolism disorder. Many studies suggested that hyponatremia has been known to be implicated in with bone disease associated with malnutrition, use of diuretics, and dysfunction in osteoblast. This study aimed to reveal whether hyponatremia is associated with low bone density in patient on HD.

Methods: Cross-sectional analysis based on a database of multi-center prospective cohort for ORCHESTRA study including adult patients on HD from 18 medical centers in South Korea. Low bone density was defined as T-score < -2.5. Hyponatremia was defined as serum sodium < 135 mEq/L, following correction with serum glucose level. The patients with hypernatremia (Na > 145 mEq/L) were excluded.

Results: Among total 673 patients, 110 showed hyponatremia at baseline. The patients with hyponatremia had higher prevalence of cerebro-cardiovascular disease as well as lower level of albumin compared to normonatremic patients. Hyponatremia patients also showed higher prevalence of low bone density (35.4% vs. 23.9%, $p=0.047$).

Among 172 patients with low bone density at baseline. Mean serum sodium was significantly lower (137 ± 3 vs 138 ± 3 mEq/L, p value = 0.006). In a multivariable logistic regression, normonatremia significantly associated with the risk of low bone density even after adjustment with such as age, gender, body mass index, serum albumin, total CO₂, phosphorus, alkaline phosphatase and the history of non-Ca based phosphate binder use (adjusted odds ratio 0.896 [95% CI 0.921-0.979], $p=0.015$).

Conclusions: This result suggests that hyponatremia is associated with low bone density in patients on maintenance HD. Further studies for the effect of hyponatremia on bone health in HD should be warranted.