

Hyponatremia Incidence Amongst Critically Ill Patients with and without COVID-19

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Background: Various studies have demonstrated the incidence of hyponatremia in patients with Coronavirus 2019 (COVID-19), however, to our knowledge no study has assessed the difference in incidence of hyponatremia in patients with and without COVID-19. The pathogenesis of hyponatremia in COVID-19 is primarily attributed to interleukin-6 (IL-6) induced release of vasopressin.

Objective: The purpose of this study was to compare the incidence of hyponatremia in patients with and without COVID-19 infection in critically ill adults.

Methods: This was a single-center, retrospective cohort study that included adult patients diagnosed with pneumonia or COVID-19 who required care in an intensive care unit (ICU). Patients with a diagnosis of pneumonia from February 1st, 2019 to January 31st, 2020, or a diagnosis of COVID-19 from June 1st, 2020 to May 31st, 2021 were included in the analysis. Included patients were matched on age and sex. Exclusion criteria included admission for postoperative care or neurological disorders, acute renal failure, renal replacement therapy, pregnancy, malignancy, diabetic ketoacidosis, hyperosmolar hyperglycemia syndrome, readmission to the medical ICU, and patients dependent on extracorporeal membrane oxygenation. The primary outcome was the incidence of hyponatremia within 72 hours of admission. Secondary endpoints collected included severity of hyponatremia, symptomatic hyponatremia, and lowest serum sodium. Information regarding concurrent use of medications known to cause hyponatremia, treatment of hyponatremia, intubation second to hyponatremia, duration of mechanical ventilation, ICU length of stay, and hospital length of stay was also collected. Serum interleukin-6, ferritin, and C-reactive protein levels were collected if available. Results were evaluated with a student's t-test for continuous data, Chi-Square test for nominal data, and Mann-Whitney U test for ordinal and continuous data that was not normally distributed.

Results: Ninety-nine patients and one-hundred and four patients met inclusion criteria in the pneumonia and COVID-19 arms, respectively. Twenty-nine patients in the pneumonia group and fifty-six patients in the COVID-19 group had a sodium level ≤ 134 mEq/L (29% vs 56%, RR 1.84, $p < 0.01$). The mean lowest serum sodium within 72 hours of admission was 134.5 mEq/L in the COVID-19 group and 136.9 mEq/L in the pneumonia group ($p < 0.01$). Other notable findings included days of mechanical ventilation (median, 3 days vs 8 days, respectively; $p < 0.01$), downgrade from the ICU (74.8% vs 59.6%, respectively; $p = 0.02$), ICU length of stay (median, 4 days vs 10 days, respectively; $p < 0.01$), hospital length of stay (median, 6 days vs 14 days, respectively; $p < 0.01$), and mortality (16.2% vs 39.4%, respectively; $p < 0.01$).

Conclusions: Amongst critically ill patients with COVID-19, the risk of hyponatremia was significantly greater than the risk in critically ill patients with pneumonia. Over half of those in the COVID-19 group demonstrated hyponatremia, which is a much higher prevalence compared to previous studies. Given the high association between morbidity and mortality with hyponatremia, further exploration into this correlation should be pursued.