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FC025 ACID BASE DISORDERS IN COVID-19

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BACKGROUND AND AIMS: Acid-base disorders are common in severely ill patients and reflect the severity of the underlying pathologic process. The incidence and effects of acid-base derangement in COVID-19 patients have been poorly evaluated until now. Tropism of the virus for the lungs and kidneys may theoretically lead to frequent acid-base alterations due to pneumonia and kidney injury, respectively. To verify the derangement of acid-base disorders in COVID-19, we investigated the distribution and the impact of acid-base disorders on the survival of symptomatic patients with a diagnosis of COVID-19.
METHOD: We retrospectively collected data from electronic charts of all COVID-19 patients hospitalized at the University Hospital of Modena from 4 March to 20 June 2020.
Arterial blood gas (ABG) analysis was required to monitor pulmonary gas exchange and acid-base status. A pH of less than 7.37 was categorized as acidemia and a pH of more than 7.42 was categorized as alkalemia.
211 patients were included in the study population. In patients with multiple ABG analyses, we selected only the first measurement.
RESULTS: The estimated mean age of the population was 64.7 ±15,3 years with a high predominance of males (71.6%). Half of the population referred dyspnea and 61.4% at physical examination. Most patients (82.6%) were on oxygen therapy when ABG analysis was performed. Overall, ABG analyses revealed acute respiratory compromise manifesting with a low arterial partial pressure of oxygen ($P0_2$, 70.2±25.1 mmHg), oxygen saturation (SO_2, 92%) and a mild reduction of PO_2/FiO_2 ratio (231±129).
Acid-base disturbance was found in the 79.7% of the patients, and contrary to our expectation, metabolic alkalosis (33.6%) was the main alteration followed by respiratory alkalosis (30.3%), combined alkalosis (9.4%) respiratory acidosis (3.3%) metabolic acidosis (2.8%) and other compensated acid-base disturbances (3.6%).
ANOVA with post hoc Tukey, revealed statistically significant differences in age, sex, serum level of K, Na, bicarbonate, creatinine of PCO_2, $PO2/FiO_2$ ratio, CKD, symptoms (caught, diarrhea) and fatality rate among groups.
Metabolic acidosis was associated with death (HR=8.2; CI 95%, 1,93-32,39; P<0.004), after adjustment for lung injury (PaO_2/FiO_2 ratio) tissue hypoperfusion (lactate) and renal involvement (estimated as GFR< 60 ml/min or development of acute kidney injury), Pathological pH (alkalosis or acidosis), variations of PCO_2 or hypobicarbonatemia were not associated with mortality in our study population.
Metabolic acidosis occurred in patients with a mean creatinine of 4.5±4.5 mg/dl. Notably, 33.3% of patients were on hemodialysis, 33.3% developed COVID-19-associated acute kidney injury and 33.3% had a GFR <60 ml/min. Patients with metabolic acidosis had the highest death-fatality rate (100%) after 7±5.6 days from admission, 50% died of acute respiratory distress syndrome and 50% of septic shock.
CONCLUSION: In conclusion, all kinds of acid-base alterations were found in patients with COVID-19. Metabolic and respiratory alkalosis were the most common acid-base disorders, whereas metabolic acidosis was the only acid-base disturbance associate with poor outcome in our cohort of patients.