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ORIGINAL ARTICLE

Hypocalcemia in hospitalized patients with COVID-19: roles of hypovitaminosis D and functional hypoparathyroidism

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Abstract

Introduction Despite the high prevalence of hypocalcemia in patients with COVID-19, very limited studies have been designed to evaluate etiologies of this disorder. This study was designed to evaluate the status of serum parameters involved in calcium metabolism in patients with COVID-19 and hypocalcemia.

Materials and methods This cross-sectional study was conducted on 123 hospitalized patients with COVID-19. Serum concentrations of PTH, 25 (OH) D, magnesium, phosphate, and albumin were assessed and compared across three groups of moderate/severe hypocalcemia (serum total calcium < 8 mg/dl), mild hypocalcemia (8 mg/dl ≤ serum total calcium < 8.5 mg/dl) and normocalcemia (serum total calcium ≥ 8.5 mg/dl). Multivariate analyses were performed to evaluate the independent roles of serum parameters in hypocalcemia.

Results In total, 65.9% of the patients had hypocalcemia. Vitamin D deficiency was found in 44.4% and 37.7% of moderate/severe and mild hypocalcemia cases, respectively, compared to 7.1% in the normal serum total calcium group ($P = 0.003$). In multivariate analysis, vitamin D deficiency was independently associated with 6.2 times higher risk of hypocalcemia ($P = 0.001$). Only a minority of patients with hypocalcemia had appropriately high PTH (15.1% and 14.3% in mild and moderate/severe hypocalcemia, respectively). Serum PTH was low/low-normal in 40.0% of patients with moderate/severe low-corrected calcium group. Magnesium deficiency was not associated with hypocalcemia in univariate and multivariate analysis.

Conclusion Vitamin D deficiency plays a major role in hypocalcemia among hospitalized patients with COVID-19. Inappropriately low/low-normal serum PTH may be a contributing factor in this disorder.

Keywords Hypocalcemia · COVID-19 · Vitamin D deficiency · Functional hypoparathyroidism

Introduction

Since the beginning of the COVID-19 pandemic in December 2019, other manifestations have been progressively reported in various organs in addition to the respiratory system [1]. The endocrine system is one of the targets of Coronavirus. New-onset diabetes, adrenal insufficiency, syndrome of inappropriate secretion of anti-diuretic hormone, and hypocalcemia have been reported in this disease [2–4].

Hypocalcemia is highly prevalent in COVID-19 [5–7]. Up to 80% of hospitalized patients with COVID-19 have been reported to have hypocalcemia [5]. Furthermore, hypocalcemia in COVID-19 is associated with progressive disease and poor outcomes [7, 8]. Despite being a highly prevalent disorder and its robust role in the prognosis of patients with

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