

# Hemodialysis in COVID-19 Patients: Yes or No? A Commentary

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Dear Editor,

COVID-19 is responsible for lower respiratory infections and can cause acute respiratory distress syndrome (ARDS). Studies have shown that patients in a critical condition can quickly develop ARDS, shock, metabolic acidosis, impaired blood coagulation function, and functional failure of various organs.<sup>1</sup> Recent studies have shown a strong link between ARDS and acute kidney injury (AKI), which often creates a complicated, threatening situation in patients in a critical condition that can increase their risk of death. The disease progresses in those of older age, with a body mass index above normal, diabetes mellitus, and a history of heart failure.<sup>2</sup> A retrospective study found that of the 357 patients with ARDS, 68% had AKI. Before developing ARDS, they did not have acute or chronic renal failure.<sup>3</sup> Other studies have reported different relationships between the two conditions.<sup>4</sup> This condition also occurs in COVID-19 disease (and its resulting ARDS). One reason for this is that in COVID-19, as recent studies have shown, cytokine release syndrome (CRS) or cytokine storm occurs. In patients with CRS, AKI may occur due to intravenous inflammation, increased vascular permeability, decreased volume, cardiomyopathy, and glomerular damage by clots as a result of overreaction. In this regard, proinflammatory interleukin-6 (IL-6), which is considered to play an important role in CRS, is increased in the blood of patients with ARDS as a result of COVID-19, which can lead to AKI.<sup>5</sup> It is also likely that the S-protein in the coronavirus will react with angiotensin-converting enzyme 2 (ACE2)

molecules to facilitate entry into target cells, increasing ACE2 expression. Studies have shown that ACE2 has a greater tendency to bind to coronavirus. On the other hand, ACE2 is located at the level of renal tubular cells, and their infection can increase the response to local inflammation and increase the severity and duration of AKI disease periods.<sup>6</sup>

Therefore, assessing and determining the risk of AKI in patients with COVID-19 (or in the cases of high severity of the disease), who need alternative kidney therapies, is essential in the early implementation of preventive and protective measures.<sup>7</sup> But it is also important to choose alternative therapies. For example, though hemodialysis can increase patient survival, in turn, it is considered an inflammatory situation that increases the level of cytokines such as IL-6, which itself produces acute phase factors. Studies have shown that IL-6 levels increase in 30% of patients undergoing dialysis.

In patients with end-stage renal disease, proinflammatory cytokines levels are increased by peripheral blood mononuclear cells (PBMCs).<sup>8</sup> Hemodialysis in people with a history of coagulation disorders can increase the level of inflammatory factors more than in patients without these disorders. The level of inflammatory factors in patients undergoing hemodialysis with a history of previous thrombotic events is higher than in those patients without a history of these disorders.<sup>9</sup> In COVID-19 infection, endothelial cell dysfunction develops, leading to increased thrombin production and cessation of fibrinolysis, indicating an increase

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in coagulation status (one of the major risk factors for vascular thromboembolism) in a patient with infection.<sup>10</sup> In addition, elevated IL-6 levels stimulate protein catabolism, lipolysis, insulin resistance, and suppression of appetite. Cytokine production by PBMCs also causes hypermetabolism. As a result, the patient is faced with protein-energy wasting, so chronic inflammation is caused in the patient under hemodialysis, and the patient who has hypoalbuminemia, which is the main cause of resting energy expenditure, oxidative stress, poor clinical outcome, and increasing the risk of mortality. However, the concentration of IL-6 in patients who died of COVID-19 was higher than in survivors.<sup>11</sup> Therefore, hemodialysis in patients with COVID-19 may increase IL-6 production, exacerbate weakness, and increase their mortality. Hence, the use of hemodialysis in patients with COVID-19 may worsen the clinical condition. However, more clinical studies are needed to prove this.

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