

# COVID-19 and Hyperglycemia in Non-Diabetic Adult Male with End Stage Kidney Disease Treated with Hemodialysis

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## Abstract

The pandemic of coronavirus disease (COVID-19), a disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is causing substantial morbidity and mortality. Older age and presence of diabetes mellitus, hypertension, and obesity significantly increases the risk for hospitalization and death in COVID-19. The risk factors for severe presentations are observed in patients where their immunity is impaired such as patient with end-stage kidney disease (ESKD) who are dialysis dependent. Preexisting diabetes can be out of control during the course of COVID-19 infection, however development of new onset of diabetes following the exposure of SARS-CoV-2 is rarely reported. Herewith, we report a case of a 62-year-old nondiabetic male with ESKD, secondary to hypertensive nephropathy that developed hyperglycemia after infected with COVID-19 disease.

**Keywords:** COVID-19; Diabetes mellitus; ESKD; Dialysis

## Introduction

Novel coronavirus disease 2019 (COVID-19) is emerging, pandemic and highly infectious, rapidly spreading viral disease with estimating case fatality rate from 3 to 5% [1]. The risk factors for severe presentations are concentrated in patients with chronic kidney disease, particularly patients with end-stage renal disease (ESRD) who are dialysis dependent.

## Case Report

We report a case of a 62-year-old nondiabetic male with ESKD, secondary to hypertensive nephropathy. He had hypertension controlled with calcium channel blocker, amlodipine 5 mg/day and had past history of excessive smoking. During the two years of his dialysis, he has never showed high blood glucose. He is on thrice-weekly maintenance hemodialysis for 2 years in Diaverum-Abu Arish clinic-Saudi Arabia, who

developed nausea, vomiting and abdominal pain during his last session on 11th June 2020, he received antispasmodic and felt relieved to complete his session. Blood glucose measured in dialysis treatment area, and reported as 100 mg/dl. Late that day at home, he developed fever, shortness of breath and vomiting, carried to Abu Arish hospital, where he investigated and swabbed for COVID-19 test, investigation showed high blood glucose 513 mg/dl, repeated again after administered isotonic saline, and it was 315 mg/dl. They referred him to Damad hospital as a case of hyperglycemia with possible COVID-19 infection. Blood glucose level repeated again, and it was 315 mg/dl. Four days later, he brought to our clinic by ambulance for hemodialysis session when screened at the ambulance he was evaluated, screened and labeled as vitally stable with high suspicion for COVID-19. He was admitted to King Fahad hospital where he admitted in isolation setting, received hemodialysis session and managed as per COVID-19 infection protocol. Within the first 24 h, he deteriorated quickly and developed acute respiratory distress syndrome (ARDS), requiring intubation and increasing respiratory support; he had two episodes of cardiac arrest at the intensive care unit. The same day, nasopharyngeal swab came positive for COVID-19. Seven days later, he developed cardiac arrest for the third time and failed to recover this time and announced his death.

## Discussion

New onset diabetes and severe metabolic complications of preexisting diabetes including diabetic ketoacidosis and hyperosmolality for which exceptionally high doses of insulin are warranted have been observed in patients with COVID-19 [2,3]. This case is unique in its atypical initial presentation and highlights the possibility of causation relationship between COVID-19 and new onset diabetes and the bad outcome when COVID-19 is associated with hyperglycemia. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, binds to angiotensin-converting enzyme 2 (ACE2) receptors, which are expressed in key metabolic organs and tissues, including pancreatic beta cells, adipose tissue, the small intestine, and the kidneys [4]. Thus, it is plausible that

SARS-CoV-2 may cause pleiotropic alterations of glucose metabolism that could complicate the pathophysiology of preexisting diabetes or lead to new mechanisms of disease. Greater incidences of fasting hyperglycaemia and acute-onset diabetes have been reported among patients with SARS coronavirus 1 pneumonia than among those with non-SARS pneumonia [5].

Taken together, these observations provide support for the hypothesis of a potential diabetogenic effect of COVID-19, beyond the well-recognized stress response associated with severe illness. However, whether the alterations of glucose metabolism that occur with a sudden onset in severe COVID-19 persist or remit when the infection resolves is unclear. Several questions are raised and need further documentation, how frequent is the phenomenon of new-onset diabetes, and is it classic type 1, type 2 diabetes, or a new type of diabetes? Do these patients remain at higher risk for diabetes or diabetic ketoacidosis? In patients with preexisting diabetes, does COVID-19 change the underlying pathophysiology and the natural history of the disease? Answering these questions in order to inform the immediate clinical care, follow-up, and monitoring of affected patients is a priority.

## Conclusion

In this case, it is clear that COVID-19 induced hyperglycemia in non-diabetic patient have developed in ESKD treated with hemodialysis modality. Given the case scenario, it is also clear

that hyperglycemia in COVID 19 infection carries very poor prognosis. To the best of our knowledge, this phenomenon is unique and has not been reported in hemodialysis patient.

## Disclosure

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