CASE REPORT

# Alcohol Use Disorder and COVID-19: A Case Series

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## Abstract

**Aim:** The following case series aims to highlight and put forth the various outcomes of alcohol use disorders (AUDs) and coronavirus disease-2019 (COVID-19).

**Background:** The hazardous and well-established relation of how alcohol damages every functional component of the human body, plays a vital role in understanding the enormously severe effects it can have with a comorbid infection especially COVID-19. Tagged along come the various degrees of complications ranging from mild to severe, the latter being the most common.

**Case descriptions:** This case series presents three cases with AUDs succumbing to COVID-19 infection eventually having unfavorable outcomes.

**Conclusion:** Patients with AUDs are not only prone to acquire COVID-19 infection, the chances of having complications are not unlikely.

**Clinical significance:** A better understanding of AUD and COVID-19 including the etiopathogenesis, should be emphasized on and management plans for better outcomes should be put forth. Establishing protocols and being vigilant of what to expect in such cases serves of utmost value.

**Keywords:** Alcohol dependence, COVID-19, Substance abuse.

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## Background

The coronavirus disease-2019 (COVID-19) pandemic[1] and substance use are the two most common disorders, which when occuring together negatively impact the physical and mental health of the individual.[2] It is a known fact that alcohol almost negatively affects all the cells of the body, hardly sparing any. Chronic use of alcohol and respiratory distress seems to be well connected. With the individuals of AUDs having more risk and chances of acquiring COVID-19 due to various reasons, once acquired, it can be hard to escape the complications that follow.[3] There might be a hindrance in establishing and managing such cases, if unaware of what can follow. This might lead to unforeseen and unfortunate events, even death.

## Case Descriptions

### Case 1

A 60-year-old married male, with well-adjusted premorbid history, with nil significant family history, and without any comorbid medical illnesses, presented to the casualty with a history of fever, cough, and difficulty to breathe for 2 days. He had a history of alcohol use since the past 5 years with dependence criteria met in the form of craving, tolerance, withdrawal, salience, and continued usage despite knowing the harmful use, with an increase in consumption since the past 6 months following lockdown due to COVID-19 pandemic. His last consumption of alcohol was a day prior to reporting to casualty. The patient had no other medical comorbidities.

After investigations, his reverse transcriptase-polymerase chain reaction for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was positive; high-resolution computed tomography (HRCT) score was 10, with a total white cell count of 16,720 cells/cumm, total bilirubin: 1.60 mg/dL, serum glutamic oxaloacetic transaminase: 359.2 U/L, serum glutamic pyruvic transaminase: 167.8 U/L, ALP: 161.3 U/L, D-dimer: 1101 ng/mL, serum ammonia: 249 µg/dL, and normal serum electrolytes. He was treated for alcohol detoxification and simultaneously for COVID-19. On examination, no abnormality was detected except basal crept in the chest.

The patient went into delirium and was shifted to the intensive care unit (ICU); the patient did not show the usual pattern of fleeting consciousness as seen in delirium tremens. The patient was in a continuous delirious picture with no episodes of gaining normal consciousness, following which he succumbed after 1 week of hospital admission even after extensive treatment in COVID ICU.

### Case 2

A 41-year-old married male, presented with an altered state of consciousness and a history of throat pain, cough, and fever for the last 3 days. The patient had a history of alcohol use independence

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patterns in the form of craving, tolerance, withdrawal, salience, and continued usage despite knowing harmful use, with an increase in alcohol intake for 3 months following stressors secondary to lockdown and loss of work. His last consumption was 3 days prior to the presentation. A history of alcohol dependence was present in the patient's father and elder brother. The patient had no other medical illness. He had a history of being hospitalized for de-addiction treatment three times, with maximum abstinence being 1 year. On examination, he had no abnormality.

The patient tested positive for SARS-CoV-2, with mildly deranged liver function test, total protein: 6.2 g/dL, serum ammonia: 250 µg/dL, and D-dimer: 780 ng/mL. HRCT score was 9.

He was treated in ICU for delirium tremens. He was started on injection remdesivir, higher antibiotics, and oxygen therapy. The delirious picture was more of a fleeting type initially but remained continuously later. After about 3 days of intensive treatment, the patient was stabilized and recovered completely with a total of 15 days of hospitalization.

He tested negative for SARS-CoV-2 later.

### Case 3

A young 30-year-old married male patient, driver by occupation, with alcohol use independence pattern, was brought with history of fever, cough, and sore throat from past 1 day and difficulty to breathe for 2 hours.

The patient had a history of de-addiction treatment a year back and was abstinent for about 1 week. Due to increased debts and a broken marriage patient restarted using alcohol slowly then became dependent later. His last drink was 2 days before admission. He had withdrawal symptoms like tremors, sweating, and insomnia, indicating delirium tremens features.

He was also diagnosed to have type II diabetes mellitus, for the past 1 year and was on irregular treatment with poor glycemic control.

On examination, the patient was drowsy, not oriented. Central nervous system (CNS) examination was within normal limits. He was tested positive for COVID-19, with random blood sugars: 321 mg/dL, serum ammonia: 288.5 µg/dL, and markedly deranged liver functions. He was shifted to ICU for further management. The patient was extensively managed for detoxification, COVID-19, and diabetes mellitus, but the patient failed to recover from delirium. His condition deteriorated within 48 hours and he succumbed.

## Discussion

The aim of the above case series is to highlight the outcome of patients with AUDs and COVID-19 infection.

Since the declaration of the pandemic of COVID-19 by the World Health Organization (WHO),[1] various stages of isolation, quarantine, and lockdown were implemented in several countries.

In the above-mentioned cases, the patients had alcohol dependence, along with COVID-19 infection acquired through various ways. The patients had increased their consumption due to various stressors following COVID-19 lockdown. A review of literature on alcohol intake and psychological stress concluded that stress leads to increased risk for excessive alcohol use and AUDs.[2] It is a well-established fact that the risk of acquired community infections is higher in people with alcohol consumption,[3] increasing the risk for pulmonary infections too. This would explain the vulnerability of AUD patients to acquiring COVID-19.

A complex issue like financial difficulties, social isolation, future uncertainty, and the scarcity of clinical services could contribute to heightened alcohol intake and relapse under lockdown and subsequently contribute to complications associated with liver functions, either by direct injury to the liver or through delayed presentations.[4–6] All three patients had deranged liver functions. Two out of three patients presented with dyspnea which was a symptom of COVID-19, the dyspnea however worsened with time. Dyspnea or shortness of breath is one of the hallmark symptoms of coronavirus infection. The association of Alcohol with dyspnea in some circumstances[7] suggests the increased risk for dyspnea in the patient with COVID-19 and AUD.

The patients either presented to us in an altered state of consciousness or within a matter of 12 hours' patients went into delirium, irrespective of the last consumption of alcohol. It became difficult to differentiate between delirium due to alcohol withdrawal and COVID-19 infection. Taking into account that all three patients had hyperammonemia, the possibility of encephalopathy was also present.

In recent studies, it was noted that liver injury can be independently contributed to COVID-19 viral infection also. It was found that patients who were infected with COVID-19, had three times elevated serum ammonia, without any obvious causes to explain hyperammonemia.[8] The high levels of ammonia could further cause neuronal damage leading to encephalopathy. This can complicate and overlap with alcohol withdrawal delirium. The fleeting picture of alcohol withdrawal delirium was not seen clearly in any of the three patients, the delirious picture seems to have been more continuous and prolonged.

According to the WHO, even before fever and cough, "altered consciousness/confusion" may be one of the presenting symptoms of COVID-19 which could be encephalopathy.[9,10] Hypoxemia in viral infection like COVID-19 may trigger delirium, which could be further facilitated by comorbidities.[11] Especially those who were critically ill, who also required ICU care were at utmost risk of developing delirium.[12]

Even after intensive treatment was given, the patients showed no improvement in terms of oxygen requirement and also continued to have dyspnea. Alcohol has a severe and negative impact on lungs, innate immunity, and acquired defense against infections and alters the response to injury.[13,14]

The primary route of excretion of alcohol from the lungs is exhalation, when lungs are exposed to COVID-19 infection, there might be diminished removal of alcohol, potentially increasing the direct damage and impairment of lung defenses.

Alcohol disrupts homeostasis and when consumed for a long time can pose a risk factor with potential long-term harmful effects associated with it.

Pro-inflammatory cytokines are responsible for the cytokine storm responsible for acute respiratory distress syndrome (ARDS) in patients with COVID-19. On the contrary, in patients with AUDs, high levels of inflammatory cytokines and chemokines have been already found.[14,15] Chronic alcohol use is also an established risk factor in developing ARDS. Multiple-system organ failure may develop in those with ARDS predisposed by heavy alcohol use.[16] The cytokine storm along with excessive damage to the immune system may have been a reason favoring bad outcomes in the patients.

Managing alcohol withdrawal symptoms amidst medical comorbidities and other medical treatments like antibiotics,

antivirals, and oxygen therapy was indeed challenging. Administering antivirals like remdesivir for COVID-19 infection and higher antibiotics to treat secondary infections was a challenge in these patients due to their hepatotoxic side effects.[17]

Therefore, patients with substance use disorders are a sure risk population for contamination and acquiring COVID-19, due to multiple attributable factors—like their clinical, physical, and psychological conditions.[18] Eventually, these patients might end up having life-threatening consequences following a COVID-19 infection.

While dealing with AUD and COVID-19, health care professionals must be forewarned about the challenges, risks, and complications they should be anticipating.

Creating awareness, clearing the myths, and promoting early de-addiction in patients with AUD can help manage the cases towards a favorable end and can further reduce the burden of disease.

The dire need to come up with preventive measures should also be further emphasized.

## Conclusion

Alcohol can affect nearly every cell in the lung and body. Those who consume alcohol for the long-term and also who use it heavily in short periods are at a higher risk for ARDS, COVID-19 infection, and severe pneumonia.

Worsening of symptoms, continuous delirious picture requiring frequent restrains may be expected in such patients. Hyperammonemia and heightened inflammation secondary to alcohol abuse and COVID-19 infection may further complicate the clinical picture and prolong recovery or can lead to fatal outcomes.

The correlation between AUD and the probability of COVID-19 infection or any viral lung infection is high. However, to help us understand the better treatment options and to have treatment protocols for the management of AUD with COVID-19 requires more research.

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