



COVID-19 and Alcohol - A Review

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Abstract

Background: Alcohol use has been associated to a number of disorders, including SARS-CoV-2 infection since Alcohol can have a negative impact on the immune system through multiple pathophysiological mechanisms like reducing the number of T lymphocytes, favoring a pro-inflammatory status through an increased level of proinflammatory cytokines, such as tumor necrosis factor alfa (TNF α) and interleukins 1 and 6 (IL-1, IL-6), by decreasing the function, number of NK (Natural Killers) cells responsible for removing infected or malignant cells, disturbing the macrophage functions in the lung alveoli and damage to the respiratory ciliated cells which plays an essential role in filtering pathogenic microorganisms. It can also worsen mental and biological conditions, as well as pre-dispose to behaviour that increase the risk of infection and disease severity, though not necessarily sociopathic or violent behaviour. Another important factor is malnutrition secondary to excessive alcohol intake.

Introduction: Alcohol misuse impairs both the innate and adaptive immune systems, potentially lowering resistance to the coronavirus SARS-CoV-2 and speeding up the onset of coronavirus illness (COVID-19). Alcohol use has been associated to several disorders, including SARS-CoV-2 infection since Alcohol can have a negative impact on the immune system through multiple pathophysiological mechanisms.

Aims and Objectives

- To review the relationship between Covid-19 and alcoholism
- To learn about the illness signs of alcohol use in Covid-19
- To compare the mortality of alcoholics and non-alcoholics in the covid-19 population.
- To learn about the effects of alcohol withdrawal in the aftermath of the pandemic.

Methodology: Data was gathered from PubMed Central, Medscape, NCBI's website, PMC, and BMJ journals, among other sources. The data on the relationship between alcohol and Covid-19 has been examined, analysed, and summarised in this publication.

Review: When it comes to COVID-19, patients with alcohol use disorder or alcohol-related liver disease, as well as relevant comorbidities, are at a higher risk.

The World Health Organization (World Health Organization, 2020) [26] and the National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism, 2020) [27] have issued comments stating that heavy alcohol consumption does not prevent COVID-19 infection.

Mucociliary clearance is regarded to be the first line of defence against inhaled pathogenic microorganisms, even though alcohol has long been known to decrease coughing (Calesnick and Vernick, 1971). Heavy drinking disrupts the cilia's cyclic nucleotide pathway, limiting cilia beat frequency from increasing (Wyatt and Sisson, 2001) [28].

Discussion: Alcohol raises the risk of death and worsens the symptoms of ARDS. By increasing alveolar barrier permeability, alcohol consumption affects the oxidative stress response and makes the lungs more sensitive to oedematous stress. AUD is often associated with comorbidities such as diabetes mellitus and chronic kidney disease, which also increase the risk for complications in COVID-19 [34].

Conclusion: Alcohol influences practically every lung cell. Most of these modifications may increase the likelihood of COVID-19 infection and more severe pneumonia or ARDS in heavy drinkers.

Keywords: Alcohol; Covid-19; SARS-CoV-2; ARDS (Acute Respiratory Distress Syndrome)

Abbreviations

SARS-CoV-2; TNF α ; IL-1; IL-6; SARS; MERS; AUD: Alcohol Use Disorder; AW: Alcohol Withdrawal.

Introduction

Coronaviruses cause respiratory infections in humans, which can range from a simple cold to life-threatening diseases like Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS) [1]. COVID-19 disease is caused by the coronavirus SARS-CoV-2 [2]. COVID-19 was initially discovered in individuals with pneumonia in late 2019 in Wuhan, China's capital and capital of Hubei Province [3].

Excessive alcohol use impairs the immune system, making it more susceptible to infection with the SARS-CoV-2 virus in the current setting.

Millions of individuals die prematurely because of excessive alcohol use around the world. The new coronavirus has been associated to a number of medical and mental problems [4], all of which can make a person prone to it. Because alcohol weakens the immune system, it increases the chance of contracting certain diseases [5]. AUD is often associated with comorbidities such as dia-

betes mellitus and chronic kidney disease, which also increase the risk for complications in COVID-19 [34].

COVID-19 may affect alcohol consumption in two ways, physical and financial availability according to specialists in the field [6].

Alcohol is a widely available chemical that is widely tolerated in most communities, yet it has the potential for addiction as well as acute and chronic toxicity [7]. It depresses the central nervous system, resulting in a reduction in neuronal activity [8-10]. Many patients who suffer from anxiety, sadness, or sleeplessness utilise it because of its anxiolytic, antidepressant, relaxing, and sedative properties [11].

Acute and chronic ethanol poisoning can affect the entire body [12], causing general medical disorders because of alcohol usage.

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Materials and Methods

Data was gathered from PubMed Central, Medscape, NCBI's website, PMC, and BMJ journals, among other sources. Around 32 articles were reviewed. The data on the relationship between alcohol and Covid-19 has been examined, analysed, and summarised in this publication.

Review

Around 30 articles from various databases were compiled and reviewed.

Results and Discussion

A survey of 1,982 people in the United States found that for every week spent at home in isolation during the pandemic, the likelihood of an alcoholic engaging in binge drinking increased by 1.19 percent at the conclusion of the week. The survey also revealed that binge drinkers consume 60% more alcohol than occasional drinkers, with 69 percent of female binge drinkers and 31 percent of male binge drinkers [13].

When compared to pre-COVID-19, another cross-sectional U.S. survey of 832 participants found that 60% reported increased drinking and 13% reported decreased drinking during the pandemic. More stress (45.7%), increased alcohol availability (34.4%), and boredom were all cited as reasons for increased drinking (30.1 percent). Participants who said they were stressed by the pandemic drank more alcohol over a longer period of time, raising implications for both individual and public health [14].

Almost every organ in your body is affected by alcohol, whether short- and long-term. Overall, the research implies that there is no such thing as a "safe limit" for alcohol consumption; in fact, the risk of harm to one's health grows with each drink drunk. Alcohol abuse, particularly heavy drinking, impairs the immune system, reducing the body's ability to fight infectious infections [15].

Alcohol use would have aided in the elimination of the SARS-CoV-2 virus, according to current incorrect information. This notion is based on no scientific evidence; in fact, alcohol intake weakens the body's defences against viral respiratory diseases [16].

Although there is no specific guidance on management of alcoholic hepatitis during the COVID-19 pandemic, caution is advised regarding glucocorticoids therapy in SARS-CoV-2 infection [34].

The following topics are addressed in WHO's published guidelines on maintaining a balanced psychological state [17].

According to the findings of a cross-sectional survey conducted in Romania on 115 male patients and 57 controls, patients with severe mental illness and alcohol use disorder are at an increased risk of getting COVID-19 and having poor COVID-19 infection outcomes. One factor is a lack of knowledge of COVID-19 prevention methods and an inability to distinguish false information from reality [18].

Ram A. Sharma, MD., *et al.* [19] investigated the link between the COVID-19 pandemic and AUD (Alcohol Use Disorder) and AW (Alcohol withdrawal). Because greater rates of AW persisted during the reopening phases, stress, worry, interrupted treatment plans, and increased alcohol consumption could all be contributors. He also objectively identified the pandemic's harmful effects on alcohol withdrawal: "In 2020, there were 34% greater alcohol withdrawal rates among hospitalised patients than in 2019." since the Alcohol can induce alterations in various pathophysiological mechanisms, withdrawal might help reducing the negative impact. AUD is often associated with comorbidities such as diabetes mellitus and chronic kidney disease, which also increase the risk for complications in COVID-19 [34].

Prior to the stay-at-home order, 340 patients were diagnosed with alcohol withdrawal, 231 patients were diagnosed during the stay-at-home period, and 507 patients were diagnosed following the stay-at-home period. In 2020, hospitalised patients experienced a higher rate of alcohol withdrawal than in 2019 and the combined average of 2018 and 2019; however, the difference was bigger in the period after the stay-at-home order. The incidence rate ratio was higher in 2020 compared to 2019 in the latter two weeks of the stay-at-home order. Alcohol withdrawal rates among hospitalised patients increased by 34% during the pandemic in 2020, compared to the same period in 2019.

When it comes to COVID-19, patients with alcohol use disorder or alcohol-related liver disease, as well as relevant comorbidities, are at a higher risk [20].

In the research, two distinct scenarios for how COVID-19 pandemic lockdowns might affect alcohol consumption have been proposed [21]. Second, psychological distress mechanisms such as fear of infection, unemployment, or social isolation can generate stress and anxiety, leading to increased alcohol consumption [22].

Little is known about how excessive alcohol use affects COVID-19 infection. Despite the fact that less than 15% of drunk alcohol enters the lungs, exhalation is a substantial process for alcohol excretion, as indicated by the widespread use of the breathalyser test to accurately assess blood alcohol levels (Birkenstein and Smith, 1961) [23]. Heavy alcohol use alters pulmonary innate and adaptive immunity, increasing the risk of viral pneumonia (de Roux, *et al.* 2006), influenza A infection (Wyatt, *et al.* 2019), respiratory syncytial virus (RSV) infection (Wyatt, *et al.* 2019), and bacterial pneumonia (Wyatt, *et al.* 2019).

In Iran, there was a popular belief that gargling with alcohol or consuming alcoholic beverages would disinfect the mouth or the inside of the body, preventing infection by killing the virus. The World Health Organization (World Health Organization, 2020) [26] and the National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism, 2020) [27] have issued comments stating that heavy alcohol consumption does not prevent COVID-19 infection.

Mucociliary clearance is regarded to be the first line of defence against inhaled pathogenic microorganisms, despite the fact that alcohol has long been known to decrease coughing (Calesnick and Vernick, 1971). The major airways are lined with ciliated and mucus-producing airway epithelial cells. To push mucus containing trapped particles out of the lung and into the oropharynx, cilia beat in tandem. Heavy drinking disrupts the cilia's cyclic nucleotide pathway, limiting cilia beat frequency from increasing (Wyatt and Sisson, 2001) [28]. Protein kinase C epsilon, an enzyme that is elevated in the ciliated cells of the airway in older persons, may actively block the cilia if the heavy drinker also smokes cigarettes, which is common (Bailey, Kharbanda, Katafiasz, Sisson, and Wyatt, 2018) [29].

COVID-19 is linked to COPD, according to an early meta-analysis of individual findings. COPD is, in fact, the single most important predictor of comorbidity for severe COVID-19 requiring ICU hospitalisation (Jain and Yuan, 2020) [30]. However, smokers are more likely to consume alcohol, and drinking has been found to be an

independent risk factor for COPD (Nihlen, Greiff, Nyberg, Persson, and Andersson, 2005) [31].

Alcohol raises the risk of death and worsens the symptoms of ARDS. By increasing alveolar barrier permeability, alcohol consumption affects the oxidative stress response and makes the lungs more sensitive to oedematous stress (Esper, Burnham, and Moss, 2006) [32].

Xiude Fan, *et al.* [33] discovered that frequent drinking, especially heavy drinking, was connected to an elevated risk of death in people with obesity and COVID-19, but not in people who did not have obesity.

Discussion

The World Health Organization (World Health Organization, 2020) [26] and the National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism, 2020) [27] have issued comments stating that heavy alcohol consumption does not prevent COVID-19 infection. Heavy alcohol use alters pulmonary innate and adaptive immunity, increasing the risk of pneumoniae of viral, bacterial and fungal etiology. Alcohol can have a negative impact on the immune system through multiple pathological mechanisms like reducing the number of T lymphocytes, favoring a pro-inflammatory status through an increased level of proinflammatory cytokines, such as tumor necrosis factor alfa (TNF α) and interleukins 1 and 6 (IL-1, IL-6), by decreasing the function, number of NK (Natural Killers) cells responsible for removing infected or malignant cells, disturbing the macrophage functions in the lung alveoli and damage to the respiratory ciliated cells which plays an essential role in filtering pathogenic microorganisms.

Alcohol raises the risk of death and worsens the symptoms of ARDS. By increasing alveolar barrier permeability, alcohol consumption affects the oxidative stress response and makes the lungs more sensitive to edematous stress. AUD is often associated with comorbidities such as diabetes mellitus and chronic kidney disease, which also increase the risk for complications in COVID-19 [34].

Conclusion

Alcohol has an effect on practically every lung cell. Most of these modifications may increase the likelihood of COVID-19 infection

and more severe pneumonia or ARDS in heavy drinkers. More research is needed to better understand how COVID-19 can benefit people with alcohol use problems. As the epidemic worsens, increased awareness for signs of alcohol withdrawal, as well as rigorous screening of hospitalised patients, will be critical.

In obese patients, alcohol consumption, particularly heavy drinking, is linked to a higher risk of poor COVID-19 clinical outcomes.

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Conflict of Interest

No conflict of interest exists.

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