Review article

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Misinformation about ethanol drinking and COVID-19: A mini review

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Abstract

Background and objective: Alcohol drinking is popular among adolescents, largely due to its pleasant and relaxing effects. There is a mixture of opinions on alcohol's beneficial or harmful effects on the body. Some studies have shown that low to moderate alcohol intake can reduce the risk of cardiovascular diseases, but other studies have demonstrated the deleterious consequences of alcohol consumption especially during the COVID-19 pandemic. This review briefly addressed the main side effects of ethanol drinking and misconceptions about its role in suppression of COVID-19.

Results and conclusion: The literatures indicate that ethanol-intoxicated people suffer from significant malabsorption of nutrients due to suppressed peristaltic movements, gastric mucosal lesions, and alcohol-associated diarrhea. Alcohol use can also cause endotoxemia, followed by activation of oxidative pathways in the liver. In general, no safe threshold is defined for ethanol consumption. It is believed that the benefits of low-dose alcohol drinking on reducing cardiovascular outcomes are largely compensated by its stimulatory effects on the development of cancers especially breast cancer in women. Considering the adverse impacts of ethanol on human health and impaired immunity, no evidence of COVID-19 suppression has been reported for ethanol consumption in the population. Therefore, no ethanol consumption or at least its limited intake is recommended.

Keywords: ethanol, hangover symptoms, COVID-19, intoxication

1. Introduction

The world is now struggling with one of its biggest crises: the COVID-19 pandemic. One of its major implications is the misuse of alcohol consumption as a treatment. There were several rumors and misinformation circulating amongst the general public and on social media regarding unsubstantiated claims that drinking alcohol could prevent or treat COVID-19. In light of the potential increase in alcohol-related problems during the pandemic, the authors decided to take this opportunity to briefly highlight some of the important findings on the possible relationships between the alcohol consumption and COVID-19.

2. Ethanol misuse during the COVID-19 pandemic

It is regrettable to mention that a majority of the public has been misled by the erroneous assertion that since alcohol-based sanitizers can disinfect contaminated surfaces, they can do the same

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when ingested [1]. One of the first consequences of this false perception was reported in Iran, where methanol poisoning continued to be a leading cause of death in adults who consumed illegal homemade alcoholic beverages [2,3]. Additionally, increased alcohol use or misuse during the COVID-19 pandemic could be due to psychiatric disorders arising from the stress of the pandemic, especially during long-term lockdown measures by local authorities [4]. A national survey revealed that Canadians were drinking more alcohol during the pandemic, with alcohol sales up by 38% in early 2020 compared to a year before, likely due to the COVID-19 pandemic [5].

3. Toxic effects of ethanol in the body

The role of chronic alcohol abuse in the development of acute respiratory distress syndrome should not be ignored; Haddadi et al. [4] has asserted a very high correlation between them. As highlighted in several studies, alcohol abuse can make individuals more susceptible to other infectious complications. Chronic ethanol exposure impairs the immune system by interfering with immune cells' functioning [5,6]. Other than the impaired nutrients' absorption in drinkers [7], it is notable that alcohol intake induces endotoxemia followed by an activation of hepatic Kupffer cells, progression of oxidative reactions, and activation of inflammatory mediators such as interleukins [8]. In addition, alcohol might contribute to disruption of the normal functioning of the body's non-immunological defense system through structural changes in the barrier functions of alveolar epithelium [9]. Some clinical adverse effects of ethanol drinking are summarized in Table 1.

Table 1- Adverse impacts of orally-administered ethanol on the body

Target organ	Ethanol side effect	Reference
Stomach	Impaired synthesis of contractile proteins and decreased peristaltic movement	[10]
	Oxidative stress and inflammation	[11]
	Gastric ulcer	[11]
Small intestine	Mucosal lesion	[10]
	Hemorrhage	[10]
	Diarrhea	[12]
	Malabsorption of B-group vitamins	[13-17]
	Glutathione malabsorption	[18]
	Glutamine malabsorption	[7]
	Impaired synthesis of contractile proteins and decreased peristaltic movement	[19]
	Microbial imbalance	[20,21]
Colon	Cancer due to the adverse impact of acetaldehyde on the colon surface	[10]
	Flatulation caused by fermentation of undigested carbohydrates in the large intestine by colonic bacteria	[12]
Blood	Endotoxemia	[22]
Liver	Oxidative stress and inflammation	[23-25]
	Hyperhomocysteinemia followed by inflammation	[26,27]
	Changing the cells' strength (more fluidity in acute alcoholism due to ROS production, more rigidity in chronic alcoholism due to saturated fatty acids and cholesterol production)	[28]
	Fatty liver due to the interfering effect of ethanol in fatty acid metabolism	[29-32]

Brain	Oxidative stress and inflammation	[22]
	Depression as a result of GABA-A receptor blockage by ethanol	[28]
	Degradation of myelin layer due to folate and B_6 vitamin deficiency, hyperhomocysteinemia followed by thromboembolic and brain lesions	[26,27]
Reproductive system	Production of lower sperm under oxidative stress	[33]
Others	Breast cancer due to the competition of ethanol with estrogen	[28]
	Esophageal cancer due to the increased penetration of carcinogens into the aerodigestive tract by ethanol	[34,35]
	Anorexia by stimulation of leptin hormone and inflammatory responses	[36,37]

The side effects presented in Table 1 attenuate the immune system and make the body susceptible to further diseases. Since good immunity is critical for the prevention and management of COVID-19, it is clear that a defective immune response induced by inappropriate alcohol consumption will cause severe illness from COVID-19. In comparison, an early report confirmed that injection of high doses of ascorbic acid serves as an antioxidant agent in patients hospitalized with COVID-19, and reduces the likelihood of severe complications of the disease [38]. Based on the fact that excessive alcohol drinking contributes to depletion of the body's antioxidant reserves, its usage only exacerbates the symptoms of COVID-19. Although the mechanisms of coronavirus infection are not well understood, it has been found that the coronavirus largely settles in the lower respiratory tract, leading to abnormal lung function. The impaired lungs, alcohol-induced immunity failure, and antioxidant deficiency may complicate the treatment of the disease. There is some evidence that ethanol can activate pro-inflammatory mediators such as IL-6 and inhibit anti-inflammatory actions, thereby interfering in the normal functions of lung macrophages [5,6]. A recent study has found that several drugs that are presumed effective in suppressing the coronavirus could be ineffective when exposed to ethanol [39].

To avoid the dramatic consequences of drinking during COVID-19, the World Health Organization advised drinkers to either abstain drinking or limit the amount to not more than one drink per day [40] owing to the mental and immunity-related consequences of alcohol in worsening the effects of COVID-19 exposure [41].

4. Conclusion

Alcohol consumption is highly prevalent in most societies. Ethanol consumption is primarily linked to gastrointestinal malabsorption of micronutrients, in particular water-soluble vitamins, and their deficiencies in the body. Alcohol abuse induces intestinal lesions and stimulates the overgrowth of pathogenic bacteria in the lumen. It also causes oxidative stress in the body and stimulates the inflammatory cytokines production that is associated with some serious disorders such as fatty liver disease, cardiovascular diseases, reproductive deficits, immune dysfunction, and certain cancers. In the context of the COVID-19 pandemic, no evidence has been provided by the scientist in alleviation of the symptoms by ethanol. Therefore, avoiding ethanol intake or at least its limited consumption is recommended by health agencies especially during the COVID-19 pandemic.

5. Conflict of interest

The authors declare that there is no conflict of interest.

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