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Letter

Alpha-Lipoic Acid: A Treatment Option for Diabetic Patients with COVID-19

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Abstract

The new coronavirus pneumonia, which first occurred in China in December 2019, has a wide spectrum of symptoms from asymptomatic to very severe involvement and even death. The main reason for the increase in the severity of this disease is the body's inflammatory response to the virus, and it is necessary to take therapeutic interventions to reduce the body's inflammatory response due to the lack of effective antiviral treatment for this disease. It is noteworthy that diabetic patients are more severely exposed to this disease and this calls for appropriate treatment to control diabetes in patients with COVID-19. In addition to its antioxidant and anti-inflammatory effects, alpha-lipoic acid also has therapeutic effects in controlling diabetes and blood sugar. Therefore, it is suggested that clinical trials should be performed to evaluate the effects of alpha-lipoic acid on diabetic patients with COVID-19.

On December 31, 2019, new coronavirus pneumonia (COVID-19) first occurred in Wuhan, China, and became known as the acute respiratory syndrome of coronavirus 2 (SARS-CoV-2) (1, 2). SARS-CoV- 2 has 79.5% similarity to SARS-CoV (the SARS epidemic in 2003) (3). The incubation period of this disease is 5 days on average, but the maximum is 14 days (4). It includes a wide range of symptoms, the most common of which are fever, cough, and shortness of breath. Other respiratory, gastrointestinal, and neurological symptoms have also been observed in these patients (5, 6). Although most patients with COVID-19 have mild symptoms, COVID-19 can cause serious complications, including pneumonia, pulmonary edema, ARDS, multiple organ failure, and eventually death (7).

It seems that the main cause of death and increased severity of the disease in patients with COVID-19 is the increased inflammatory response to this virus (8). In this regard, levels of inflammatory factors such as interleukin-2 (IL-2), IL-6, IL-7, IL-10, tumor necrosis factor-alpha (TNF-α), granulocyte-colony stimulating factor (G-CSF), inducible protein 10 (IP-10), monocyte chemoattractant protein-1 (MCP-1), and macrophage inflammatory protein-1 alpha (MIP-1α) are associated with disease severity (9, 10).

Diabetes and high blood pressure are the most important risk factors for death in patients infected with COVID-19 (11). According to an estimation by the International Diabetes Federation, 415 million people have diabetes mellitus, of whom 90% have type 2 diabetes mellitus (12).

The mechanisms that underlie the association between diabetes and COVID-19 include chronic inflammation, increased coagulation activity, immune response impairment, and potential direct pancreatic damage by SARS-CoV-2 (13). People with diabetes have a low-grade chronic inflammation that relieves the cytokine storm, which is the cause of increased disease severity and mortality in many patients with COVID-19. [8] Increased severity of the disease in patients with diabetes is accompanied by complications such as ARDS and acute heart damage, which will lead to receiving more antibiotics and getting attached to a mechanical ventilator (14). Since there is currently no specific antiviral drug treatment for COVID-19, treatment should be focused on checking the progression of the inflammatory cascade. Therefore, as far as the development and treatment of this disease are concerned, what is of paramount importance is the factor of time: The cytokine storm needs to be blocked at early stages (15).

Pharmacological effects of alpha-lipoic acid (ALA) are primarily related to its antioxidant activity, but ALA has also demonstrated interesting cardiovascular, cognitive, anti-aging, detoxifying, anti-inflammatory, anti-cancer, and neuroprotective properties (16). It has the ability to regenerate the reduced form of vitamin E, vitamin C, coenzyme Q, and glutathione, thereby preserving the endogenous reduced state and neutralizing oxidative stress and so further affords a favorable role for this unique antioxidant in multiple physiologic systems either in health and pathology (17). Alpha-lipoic acid has been reported to

significantly decrease serum CRP, IL-6, and TNF-α levels, and results indicate a possible decreasing effect of ALA on inflammatory mediators, especially in high doses (18). It is a key cofactor for mitochondrial bioenergetic enzymes, including pyruvate dehydrogenase and α-ketoglutarate dehydrogenase complexes, stimulating glucose and lipid metabolism (19). It significantly reduces oxidative stress, blood sugar, and blood lipids and can improve the function of beta islands (20). This acid can also increase glucose uptake by a wide range of natural muscle types and improve insulin response by insulin-resistant skeletal muscle (21).

In the study of Zhong et al., ALA consumption was associated with a lower increase in SOFA score and lower 30-day mortality in COVID-19 critically ill patients than the placebo group. However, the number of patients in their study was limited (17 patients), and the statistical difference is borderline (22). Therefore, given the proven role of ALA in reducing inflammation and its antioxidant effect, as well as its improving role in controlling diabetes, it is suggested that clinical trials, especially on patients with diabetes, should be performed to determine the role of this substance in the prognosis of the disease and patients' mortality.

Footnote

Conflict of Interests: We have no conflict of interest to declare.

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