The role of probiotics in COVID-19 treatment: Gut microbiota can help physicians in the outbreak

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Dear Editor,

The Coronavirus disease 2019 (COVID-19) pandemic is rapidly spreading worldwide as of May 10, 2020, and the number of cases and deaths is increasing. As of this date, more than 4 million people worldwide have been infected with the Coronavirus. In a very short period, this highly infectious and rapidly transmitted aggressive outbreak has become a pandemic that has adversely affected health systems, economies, and governments around the world, halting the social, sporting, and economic activities. No active antiviral agent or vaccine developed against the Coronavirus has yet been identified. Different treatment options are being discussed by scientists, and vaccine and drug trials for the treatment are continuing rapidly.

At a health center in Wuhan, Wang et al. (1) evaluated the clinical features and initial symptoms of the patients diagnosed with COVID-19 and detected diarrhea as one of the symptoms in 10.1% (1) of the patients. Fecal-oral spread of the virus has been shown in some studies, although it is mostly spread by aerosol. Thus, diarrhea should be considered not only as a symptom but also as one of the major problems in combating the pandemic (2, 3) because diarrhea-related dehydration may have an effect on the mortality of patients with COVID-19 infection. Research shows that diarrhea is one of the key factors in pandemic spread, transmission, treatment success, and mortality rates.

The role of gut microbiota in all aspects for COVID-19 infection should be discussed. Multiple laboratory studies have revealed that the composition and products of the gut microbiota have a positive effect on the immune system and inflammatory responses (4). The idea that some beneficial bacteria develop molecules that induce immune responses and also regulate systemic immune responses is not new and is still being discussed at the scientific level. The gut microbiota, which colonizes the gastrointestinal tract, helps a lot of physiological processes such as providing energy, supporting and shaping the intestinal epithelium, protecting against pathogens, and regulating the host immune system. The gut microbiota not only induces the anti-inflammatory responses that contribute to immune tolerance but also balances the proinflammatory and anti-inflammatory responses to increase the protection against pathogens. Synergism occurring between the host immune system and the gut microbiota selects, regulates, and then ends the most appropriate responses of the organism against pathogens throughout life. Metabolites produced by the gut microorganisms are helpful for epithelial endurance, regulatory T cell formation, and anti-inflammatory immunity. Furthermore, these metabolites work to promote immune system reactions in the gut against pathogens that stimulate the secretion of interleukin (IL)-18 and defensins. Therefore, the products of microbiota metabolism are an important component of mucosal barrier endurance and immune balance regulation.

The gut microbiota can change after respiratory viral infections, and they also change the adaptive immune responses against respiratory pathogens. The gut microbiota is essential for stimulating innate immune responses against pulmonary infections as well. In viral infections, the power of macrophage activity against respiratory viruses depends on the presence of gut microbiota (5). Brown et al. (6) observed that the microbiota improved respiratory defenses via granulocyte-macrophage colony-stimulating factor (GM-CSF) signaling, which stimulated pathogen killing and clearance by alveolar macrophages through an extracellular signal-regulated kinase signaling. The microbiota increases pulmonary GM-CSF production in response to

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infection through IL-17A (6). A study showed that in a group with poor microbiota, the alveolar macrophages and neutrophils demonstrated decreased phagocytic activity and decreased inflammatory cytokine production after ex vivo stimulation by toll-like receptor ligands such as lipoteichoic acid (7).

The role of microbiota in the immune response to respiratory viral infections has been shown in previous studies. We believe that the idea of using probiotics in the treatment of COVID-19 should be discussed and evaluated. A strong immune system and probiotic intake can provide a protective effect from the pandemic. Effective management of diarrhea is an important factor in reducing the transmission and mortality in the fight against the COVID-19 pandemic and strengthening the microbiota with the use of probiotics may be of prophylactic importance. Because no effective treatment protocol has been established for the pandemic and no effective antiviral agent or vaccine has yet been produced, further clinical trials may be useful to study the effect of probiotic use and microbial diversity on the patients with COVID-19, and they may offer new treatment strategies in combating the pandemic.

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