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Covid-19 Infection and Gastrointestinal System

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Abstract

A pneumonia outbreak of unknown etiology and pathology spread to the whole world in Wuhan, China in December 2019 and this outbreak is called as COVID-19. COVID-19 is an infectious disease caused by the SARS-CoV-2 virus and it can cause various clinical pictures such as respiratory, enteric, hepatic, nephrotic, and neurological involvement in humans and animals. This outbreak has caused the death of millions of people. Vaccination studies have continued today, and vaccination of all humanity may take a long time. The best prophylactic approach to reduce the severity of such viral diseases is to enhance human host immunity. We will summarize effects of COVID-19 infection on the gastrointestinal system and we will remark the importance of probiotics in this manuscript.

Keywords: COVID-19 Infection; Probiotics; Gastrointestinal System

Introduction

The digestive system consists of organs that are involved in the uptake and digestion of food, the absorption of electrolytes and water, and the excretion of residual waste as feces [1]. The Digestive system is responsible for immunology and the digestive tract (microbiome) that consists of thousands of different bacteria [2] and the liver, biliary tract, and pancreas contribute as organs to aid in the absorption and digestion of food. The intestinal microbiota (formerly, flora) consists of all microorganisms such as bacteria, archaea, viruses, and fungi. The skin, eyes, vagina, mouth, respiratory and intestinal mucosa contain numerous bacterial phyla. Intestinal bacteria are composed of four phyla and these are Actinobacteria, Firmicutes, Proteobacteria, and Bacteroidetes. The Intestinal microbiota is protective and supports the regulation of human health. The Gastrointestinal tract plays role in viral infection. At the end of 2019, the new coronavirus-2019 (2019-nCoV), caused respiratory disease in Wuhan of China and it caused a pandemic in a very short time and affected the whole world [3]. This pandemic virus was called as COVID-19 by The World Health Organization (WHO) [4]. COVID-19 has affected to threaten global health, weaken the global economy, and destabilize societies around the world [4-6]. It has caused thousands of death because there is no specific antiviral treatment. Many researchers have observed that COVID-19 can involve many organs [7].

Microorganisms are localized in the gut and remain active by reproducing by fermentation of ingested nutrient fibers from the host. It is responsible from participation in digestion, production of anti-inflammatory butyric acid, strengthening the intestinal epithelial barrier, preventing pathogens, and supporting and modulating the immune

system [8]. Researchers have discovered colonization that is similar to the gut microbiota which is found in the lung [9]. The phylum of Bacteroidetes and Firmicutes are more common in the gut, while the phylum of Bacteroidetes, Firmicutes, and Proteobacteria are common in the lung [10]. Keely, et al. has shown that the interaction between the lung-intestinal axis plays a role in lung health and modulation of gut microbiota [11]. For instance; endotoxin and microorganism metabolites can cause inflammation of the lung and this situation occur intestinal dysbiosis [12]. Many experimental and clinical studies have highlighted that intestinal microbiota plays a role in the pathogenesis of sepsis and acute respiratory distress syndrome, and it may change intestinal and pulmonary ACE2 levels [13].

Vaccine studies have continued for the COVID-19 infection. Therefore, the researchers have recommended alternative treatments such as prophylactic and therapeutic precautions such as probiotics. Probiotics affect the gut-lung axis and modulate the immune system, and support the repair of damaged tissues and organs [14]. Probiotics strengthen the intestinal epithelial barrier, compete with pathogens for nutrients, adhere to the intestinal mucosa, produce antimicrobial agents, and regulate the host immune system [15]. Lactic acid bacteria are present in the intestines of humans and most animals. Since these bacteria are resistant to gastric acid and bile salt, they are resistant to human gastrointestinal conditions and can adhere well to colonic epithelial cells. Many studies have shown that bacteria that produce lactic acid have been shown as beneficial in various gastrointestinal and inflammatory diseases by inhibiting the adhesion and growth of pathogens and activating cytokines [16,17]. Some lactobacilli and bifidobacteria produce antimicrobial bacteriocins that act against various intestinal bacterial pathogens and viruses (such as rotavirus). Thus, bacteriocins may be beneficial in the treatment against SARS-CoV-2 infection. The toxins produced by Lactobacillus and Bifidobacterium also benefit other viral infections [18].

Conclusion

SARS-CoV-2 is similar to SARS-CoV and it binds to the human ACE-2 receptor so it can invade the human body. SARS-CoV-2 damages the digestive tract indirectly or directly through an inflammatory response. Many viral infections are associated with dysbiosis of the gut microbiota and lead to serious gastrointestinal infections.COVID-19 can cause digestive symptoms. Maybe probiotic therapy can be significant in the prevention of viral infections and probiotic supplementation can be recommended to prevent cytokine storm for patients with respiratory and intestinal symptoms caused by COVID-19.

Probiotics have numerous benefits, such as improving the human gut microbiota, strengthening gut barrier function, and generating protective immune responses. Thus, probiotics can play role in preventing of cytokine storm.

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