

Immune System against Covid-19: The Importance of Prebiotics and Probiotics

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Received: April 06, 2020; **Published:** July 30, 2020

In the beginning of 2020, an unexpected outbreak due to a new corona virus made the headlines all over the world. A novel coronavirus (nCoV) spillover event, with its epicenter in Wuhan, People's Republic of China, has emerged as a public health emergency of international concern [1,2]. Similar to other viral respiratory infections, SARS-CoV-2 or COVID-19 can be transmitted through the respiratory tract. Based on recent reports, the novel Corona virus can be identified through various symptoms (fever, cough, dyspnea, myalgia and fatigue) [2].

As yet, effective treatment is unavailable [3]. However, a strong immune system helps recovery (without death) more quickly from the disease. An adequate and balanced diet in terms of energy and nutrients (carbohydrates, protein, fat, vitamins, minerals, water) supports the strengthening of the immune system [4]. In addition, the effects of prebiotics and probiotics on the immune system are often mentioned [5].

Prebiotics are fermented, non-digestible carbohydrates that increase the activity of colon bacteria. A disaccharide, lactulose, inulin, oligosaccharides (maltose, soy, xylose), oligofructose and galactooligosaccharides (legumes) are the main sources of prebiotics. The main dietary sources of fructooligosaccharides are wheat, onion, banana and garlic. Other sources include leek, asparagus, peas. 4 - 10 g/day of fructooligosaccharide shows bifidogenic effect. Nutritional sources of probiotics are fermented yogurts, cheese, pickles, wine and kefir using *Lactobacilli*, *Bifidobacteria*, *Enterococcus*, *Streptococcus* [6].

Probiotics have been defined as "live microorganisms that could confer health benefits on the host when administered in adequate amounts [7]. These microorganisms are known to provide beneficial health effects by competing with pathogens, providing epithelial cell stability and showing regulatory effects on the immune system. They provide immunomodulatory, anti-inflammatory, anti-microbial, antioxidant effects with their released metabolites, produced molecules and cell structure components [8].

The main effects of probiotics include fighting pathogens, directing the immune system, and protecting and improving the intestinal epithelial barrier. Probiotics can regulate the immune system by interacting directly with the intestines with the molecules they produce or using cell-building components [8]. Microbe Associated Molecular Structures (MAMP) such as peptidoglycan, lipopolysaccharide, teichoic acid, lipoteichoic acid, bacterial DNA, exopolysaccharide and flagella, activate natural and acquired immune system by interacting with receptors that recognize these structures in the immune system [9]. Probiotics have been shown to decrease the frequency of ventilator-associated pneumonia without an overall improvement in outcome [10].

For healthy life, pre/probiotics should be taken from natural foods, and if necessary, supplements should be taken in line with expert recommendations. When probiotics are to be taken as supplements, it should not be forgotten that the effects of probiotics on human

health may differ. The effects vary depending on the number and probiotic bacteria strain consumed, the formulation of the probiotic product, the intestinal microflora and the metabolic status of the consumer. Therefore, it should not be used without consulting specialists (doctor, pharmacist).

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Volume 15 Issue 8 August 2020

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