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Probiotics, Prebiotics, and COVID-19

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In a diet, probiotics and prebiotics play an important role in regulating the immune response function through the intestinal microbiota, which in turn affects the immune system. While probiotics have been shown to reduce diseases, such as the flu, which is a respiratory infection. The National Health Commission of China and the National Bureau of Traditional Medicine of China recommend that probiotics be used in acute patients with COVID-19 to prevent secondary bacterial infection (Antunes *et al.*, 2020, Anwar *et al.*, 2020).

Like probiotics, dietary fiber can improve the immune system against viral infections. A study conducted on mice has shown that a daily diet with soluble fiber reduces lung viral load and increases survival. Although what you eat does not prevent the body from becoming infected with COVID-19, the gut microbiota, with a well-balanced diet that includes probiotics, helps support the health of the gastrointestinal tract, immune system, and thus reduces the risk of symptoms (Baud *et al.*, 2020, Bottari *et al.*, 2020).

What probiotic foods are effective in improving COVID-19?

Strengthening the immune system by consuming certain foods is one of the measures that can be considered to deal with these conditions. Probably the first thing that comes to mind to strengthen the immune system through diet, is a diet rich in probiotics or beneficial bacteria that helps boost immunity by diversifying the gut microbiome (Angurana and Bansal, 2020).

These good bacteria actually help protect humans against infection. A study published in November 2019 by Research BioMed International showed that healthy probiotics, such as *Electobacillus* and *Bifidobacteria* help reduce inflammation, boost the immune response, and eliminate potential pathogens (Ceccarelli *et al.*, 2020).

Basically, the presence of more good bacteria helps to fight more bad bacteria. Here are four good food sources for people with different dietary restrictions, including beef, tuna, sunflower seeds, and yogurt. One of the best

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choices for providing probiotics is to use probiotic supplements (Dhar and Mohanty, 2020).

What is the mechanism of probiotics against coronavirus?

Probiotics affect the immune system at various levels, including increasing cytokine and immunoglobulin levels, increasing mononuclease cell proliferation, activating macrophages, increasing natural killer cell activity, modulating autoimmunity, and stimulating immunity against disease bacteria named and stimulating immunity against disease bacteria named Protozoa (Conte and Toraldo, 2020).

Probiotics suppress the repression of lymphocyte proliferation and the production of cytokines by T-cells, and probiotics exert these positive effects without causing harmful inflammatory responses (Aguila *et al.*, 2020).

The use of several probiotics, such as when a combination of *Electobacillus* and *Bifidobacteria* is consumed, has a greater synergistic effect on the immune response, such as when a combination of *Electobacillus* and *Bifidobacteria* is consumed (Sundararaman *et al.*, 2020).

Using probiotic supplements along with other health care can be a good way to reduce the risk of viral diseases by strengthening the immune system.

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Authors' contributions

Marzban A was involved in designing and supervising the study. Soleymani-rad M participated in writing the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication.

Conflict of interest

The authors declare that there is no conflict of interest.

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