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## Nutrition during COVID-19

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### Introduction

In December 2019, a new strain of the corona virus, as a subset of coronaviruses was identified for the first time in Wuhan, China. Symptoms included fever, cough, and muscle aches that are very similar to the seasonal flu.

Various strategies such as application of vaccines and antibiotics have been used to prevent and treat the disease. However, controlling the infection has not been sufficient. Some of the most fundamental questions in this regard include: 'What is the role of nutrition in COVID-19 condition?' and 'How dietary supplements can play a role in the incidence or improvement of this disease?'

It is well established that diet plays a major role in the function and status of immune system and it is closely related to the host's immunity and resistance to any infectious agent. Malnutrition is the most common cause of failure in immune system worldwide. The function of phagocytosis, complement system, cytokine production, and

secretion of immunoglobulin antibodies are generally associated with protein and energy malnutrition (Martindale *et al.*, 2020). People with COVID-19 need adequate nutritional support due to a weakened immune system and severe loss of appetite (Stachowska *et al.*, 2020). The best diet recommended for patients with COVID-19 includes soup, high-protein, and high-calorie diet. Of course, this diet is for patients who have the ability to chew and swallow; special diets are used for other patients (Chapple *et al.*, 2020).

In general, drinking enough fluids is an effective step in controlling the disease. Intake of water, juices, teas, and soups at the onset of symptoms is also recommended (Pillay *et al.*, 2020). Given that taking liquid compounds requires less energy, the body saves enough energy to fight the disease. Fluids help dilute secretions, eliminate toxins, and relieve sore throats. Other important compounds in the fight against this disease include adequate intake of micronutrients effective in the immune system

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such as vitamin C, vitamins B6, E, D, zinc, magnesium, selenium and omega 3, especially from food sources rich in these compounds (Walsh *et al.*, 2020).

Immune system cells are rich in vitamin C, but the supply of vitamin C to the affected cells increases under stress conditions, which in turn justifies the increased need for vitamin C in conditions of disease and inflammation. Experts believe that vitamin C plays an important role in strengthening the immune system by preventing and controlling the disease (Garófolo *et al.*, 2020).

Macronutrients, micronutrients, and phytonutrients, mainly found in colorful fruits and vegetables, generally promote healthy immune responses. These micronutrients regulate antioxidants and anti-inflammatory nutrients, including beta-carotene, vitamin C, vitamin E, and polyphenolic compounds as well as immune function. An anti-inflammatory strategy, whether containing food, nutrients, or medications, is a good option for managing COVID-19.

### Recommendations

-Observing diversity and balance in the diet plan and using all 6 food groups, including bread and cereals with emphasis on whole grains and breads, different types of sprouts, fruits, and vegetables (Bezerra, 2020).

- Consuming main meals and snacks regularly throughout the day with an emphasis on breakfast.

-Supplying the needed daily protein, especially through eggs, white meat, and legumes.

-Taking the recommended supplements such as vitamin D according to the protocols for different age groups

-Using iron-rich foods such as meats and legumes (Misra, 2020).

-Avoiding sugary drinks, sugary foods, and simple sugars since they weaken the immune system. In general, sugar consumption should be reduced and natural sweeteners such as honey (with immune-boosting and cough suppressing properties) or raisins (red raisins) with anti-

inflammatory properties, should be used (Caccialanza *et al.*, 2020).

-Incorporating low-salt or low-salt nuts into the diet is also good for boosting the immune system. Nuts are a good source of vitamin E, zinc, and selenium. Of course, they should not be consumed excessively because they contain large amounts of fat and cause weight gain and obesity (Ammar *et al.*, 2020).

-Avoiding high consumption of fast foods, processed meats, and fried foods since these foods are high in salt, trans and saturated fatty acids and are bad for the health and function of the immune system (Stachowska *et al.*, 2020).

-Using a variety of liquid (vegetable) oils such as canola oil, sesame, corn, sunflower, soybean, and olive oil in salads and foods. These substances also contain omega-3; so, they are recommended to be consumed within the required energy range. In general, 25 to 30% of the daily energy needs should be provided by fats and oils. Excessive consumption of oil and fat in addition to overweight and obesity increases the risk of cardiovascular diseases. Liquid vegetable oils also contain vitamin E, which is involved in strengthening the immune system (Caccialanza *et al.*, 2020).

Nutrition during COVID-19 is different from nutrition in normal situations. In addition to meeting daily needs, individuals should pay attention to the changes caused by the disease in their body. These changes can include a wide range of changes, including loss of appetite, decreased sense of smell and taste, inability to chew and swallow, weakness due to illness, reluctance to eat certain foods, and other changes depending on the severity and duration of the illness. Therefore, in patients' nutrition, the patients' condition should be examined and their diet plans should be prepared according to their condition.

### Authors' contributions

Marzban A conceived the original idea and designed the project. Khabiri F and Anbari-Nogyni Z collected the data and wrote the draft of

manuscript. All authors read and approved the final version of manuscript.

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