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Nutritional Recommendations for the Physical and Mental Health of Patients with COVID-19: Rapid Review

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Abstract

Evidence suggests that the assessment of the nutritional status of COVID-19-infected patients is crucial before undertaking treatments. Nutritional support should be the basis of the management of an infected individual. The nutritional supplementation for COVID-19 patients' needs to account for the sleep, stress level, anxiety, depression, as well as body mass index of the individual. Therefore, the main objective of this review was to clearly show the role of nutrition during COVID-19, symptoms of COVID-19 with nutrition implications, micronutrients (vitamins and minerals) for Covid-19, the nutrients needed for improving mental well-being during COVID-19 response, and to find out the common brain chemicals that can be affected during stressful conditions like COVID-19.

Keywords: Nutrition; Physical ;Mental; covid-19 response

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Background

Nutrition is a crucial component of the management of acute as well as chronic infectious diseases [1]. Nutrition plays a vital role in the immunity status of an individual and worldwide, malnutrition is the most common cause of immunodeficiency [2] Macro and micro deficiency leads to cell-mediated immunity impairment, phagocyte function, complement system, cytokine production, and immunoglobulin A antibody secretion. Deficiency of single nutrients could result in altered immune responses such as zinc, selenium, iron, copper, magnesium, manganese, vitamins A, C, E, and B-6; and folic acid influencing immune responses [3, 4]. Epidemiological evidence shows that nutritional therapy has been considered a very important component of treatment strategies for acute viral infections such as Ebola [5], severe acute respiratory tract syndrome (SARS) [6], and Middle East Respiratory Syndrome (MERS) [7]. Thus, this treatment strategy is generally assumed very important and should be used for the current pandemic viruses (Coronaviruses (COVID-19).

The coronavirus (COVID-19) is a large family of viruses that may cause illness in animals or humans [8]. In humans, several coronaviruses are recognized to induce respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [6, 7]. A novel coronavirus (COVID-19). Is a new coronavirus that has not been previously identified and is not the same as the coronaviruses that are commonly transmitted among humans and cause mild illnesses, like the common cold (8). the main objective of this review clearly showed the role of nutrition during Covid-19, common symptoms of COVID-19 with nutrition implications, recommended micronutrients (Vitamins and minerals) for Covid-19, a nutrient needed for improving mental well-being during COVID-19 response and to find out the common brain chemicals that can be affected during stressful conditions like Covid-19. Based on a simple review of related literature, this document was developed to be used during Covid-19 prevention and response.

Nutrition and COVID-19

Nutrition management/treatment is very important to enhance the immune response of an infected person against COVID-19 viral infection. Considering nutritional assessment and counselling services is preferable to early identify the possible deficiency, increased need because of disease/illness, or other modes of feeding if the normal food intake is inadequate or not possible. The nutritional supplementation for COVID-19 patients' needs to account for sleep, stress level, anxiety, depression, as well as body mass index of the individual. Therefore, foods containing serotonin, melatonin, amino acid, and tryptophan are crucial for addressing sleep, anxiety, stress, and depressive symptoms associated with COVID-19 infections. In addition, foods containing

important vitamins and minerals such as Vitamin C, zinc, Vitamin A, B6, D, E, iron, Folate, and fiber are advised and should be included in the nutritional treatment strategies for COVID-19.

Why nutrition during Covid-19?

When feeling ill or sick, general nutritional recommendations include eating a variety of foods as tolerated and maintaining proper hydration. Certain foods may be easier to tolerate when experiencing flu-like symptoms such as fever, cough, and shortness of breath. Fever especially can be a risk factor for dehydration and therefore, individuals experiencing fever should focus on adequate hydration by drinking plenty of fluids. Healthy individuals need 8 to 10 cups of fluid each day. Sick individuals may need to drink more to replace fluids lost to fever [9]. In addition, staying hydrated with water, seltzer, and tea can help thin and loosen the mucus that causes congestion, sore throat, and coughing [10].

Common Symptoms of COVID 19 with Nutrition Implications

The symptoms of COVID-19 range from mild to severe symptoms that need specialized management. The symptoms are:

- Uncomplicated Illness: - runny nose, fever, cough, headache, sore throat
- Mild pneumonia: breathing difficulty, inflammation in the lungs
- Severe pneumonia
- Acute respiratory distress syndrome
- Septic Shock
- Kidney failure

Basic Micronutrients (Vitamins and minerals) for Covid-19 prevention and treatment

The best way to prevent illness is to avoid being exposed to the COVID-19 virus [3], being committed to applying social distancing, and proper hand washing can help protect yourself and others from infection while diet alone may not be able to prevent infection, focusing on nutrient-rich foods paired with healthy lifestyle behaviours, can help give your body extra protection by supporting a healthy immune system [3, 4].

Consider supplementation with Vitamin C, zinc, Vitamin A, B6, D, E, iron, Folate, and fiber if not getting enough from the diet.

Vitamin A: Vitamin A is an important nutrient involved in immune-boosting and can be found in many fruits and vegetables such as carrots, sweet potatoes, squash, broccoli, spinach, cantaloupe, mango, peppers, and tomatoes [11, 12]. An impaired immune response is due to a deficiency of a particular nutritional element. Low vitamin A diets might compromise the effectiveness of inactivated bovine coronavirus vaccines and render calves more susceptible to infectious disease. Therefore, vitamin A could be a promising option for the treatment of this novel coronavirus and the prevention of lung infection [13].

Zinc: Zinc deficiency has been shown to increase susceptibility to various pathogens. Incorporating meat, seafood, tofu, nuts, and beans into your diet will ensure adequate intake of this immune-boosting mineral [14].

Vitamin D: Vitamin D has many roles in the body, including contributing to immune function [15]. Vitamin D is naturally found in fatty fish (such as salmon, tuna, and mackerel) and in small amounts in some dairy products, egg yolks, and mushrooms. Vitamin D-fortified foods such as cow's milk, plant-based milk alternatives, orange juice, and ready-to-eat breakfast cereals, provide most of the Vitamin D in American diets [15]. Vitamin D is known to play a role by stimulating the maturation of several cells including immune ones. A significant number of healthy individuals with decreased levels of vitamin D, particularly at the end of the Winter season coincides with the COVID-19 discovery in the Winter of 2019 [16].

Vitamin C: Vitamin C helps to maintain immunity [11, 13]. Vitamin C-rich foods include citrus fruits (like orange, lemon, and grapefruit), berries, melons, tomatoes, bell peppers, and broccoli [15] It is well known that vitamin C supports immune functions and protects against infection caused by a coronavirus. COVID-19 had been reported to infect the lower respiratory tract, and vitamin C could be one of the effective alternatives to treat COVID-19. It was reported throughout some controlled trials that vitamin C-supplemented patients presented, under certain conditions, a lower incidence of pneumonia. However, supplying patients with high-dose vitamin C has not received any evidence-based approval [13, 17].

Selenium, Zink and Iron

Supplementing COVID-19-affected patients with selenium could be an effective intervention for the treatment of this novel virus. COVID-19-related symptoms such as diarrhoea and lower respiratory tract infection could be improved by Zinc supplementation. It has been shown that Iron deficiency constitutes a risk factor for the development of recurrent acute respiratory tract infections [18, 19].

Recommended Nutrient needed for improving mental well-being during COVID-19 response

Due to the COVID-19 pandemic, the majority of the world population is staying at home and doing less in terms of social interactions and exercise. Epidemiological evidence suggests that staying alone, less social interactions and less exercise are linked with poor physical and mental health outcomes. In addition, adopting the new changes and stressful events including temporary unemployment, working from home, the home schooling of children, and lack of physical contact with loved ones, other family members, friends, and colleagues take time and require strong mental resilience. Moreover, the psychological distress due to the pandemic includes fear of contracting the virus and worrying about people close to us who are particularly having high vulnerable. Both struggling with adapting to the new challenges associated with the pandemic as well as the psychological distress due to COVID-19 are linked to an increased risk of developing an imbalance in brain chemicals (neurotransmitters) which in turn increases the risk

of mental health problems. Therefore, getting foods containing important neurotransmitters is a very important component of the management of patients with COVID-19.

Common brain chemicals can be affected during stressful conditions like Covid-19.

Neurotransmitters (e.g., serotonin) are manufactured in neurons (nerve cells) to carry messages from cell to cell, crossing the synaptic gap between the axon (transmitting terminal) of one neuron to the dendrites (receiving terminals) of the next [20]. The chemical structure of each neurotransmitter is designed to fit its receptor. A change in a neurotransmitter's chemical structure, or an imbalance at any point in this complex process, may affect emotions, moods, thoughts, and behaviours [20]. Evidence suggests COVID-19 is associated with considerable psychological distress and struggling with the new changes associated with the pandemic as well as the virus by itself (COVID-19) in the affected individuals is linked with a significant imbalance in various chemicals in the human body including neurotransmitters. Shortage (deficiencies) of neurotransmitters including serotonin, noradrenaline, acetylcholine, and gamma-amino butyric acid (GABA) is associated with increased risks of depression, anxiety, sleep problems as well as suicide [20-22]. Below we have highlighted common neurotransmitters and food containing them:

Serotonin: a neurotransmitter in the brain that is made up of the amino acid tryptophan. A deficiency in one or both of these amino acids is associated with low mood and aggression [20, 23]. We can improve our brain concentration of serotonin by consuming eggs, meat, milk, yoghurt, nuts (peanuts), banana, seed, cheese, oat, and legumes such as soya In addition, the level of the brain, chemicals like dopamine which is found in the consumption of Beats, soybeans, almonds, meat, grains, and eggs.

Acetylcholine which is most abundant in the Liver, eggs, Wheat germ, soybeans, peanuts, and lecithin, choline plays a great role in the well-being of mental conditions during such outbreaks.

General nutritional recommendation for mild and moderate COVID-19 cases Recommendations

- Ensure intake of adequate fluids; at least two litres of water per day or more if there is a fever.
- Increase the amount of nutritious food by increasing the number of times you eat. The food should include a variety of foods considering the six food groups (meat, milk, legumes and pulses, fruits, and vegetables).
- It is recommended to supply 20 ~ 30 kcal.kg-1.d-1 and 1.2 to 2.0 g.kg-1 protein depending on the severity of the disease. Wasting and loss of immunity in severe patients due to increased protein catabolism and supplementing protein intake can reduce mortality [20-23].
- Omega-3 polyunsaturated fatty acids (PUFA) Omega-3 and omega-6 PUFAs have a strong effect serving as a novel antiviral drug by acting as precursors of resolving/protections and prostaglandins/leukotriene's, respectively, omega-3 including protectin D1 could be considered for one of the potential interventions of the novel virus COVID-19
- Coughs can be relieved by the use of honey, locally available hot drinks including tea and hand washing.
- A sore throat can be relieved by taking tea, honey, ginger, turmeric and sage.
- Consumption of fruits and vegetables is preferable to improve antioxidant levels in the body.
- Fluid intake should be based on weight, on average 2L-5L for 40-60kg, 2.0L-2.5L for 60-80kg, and 2.5L-3.0L or 30-35L/kg for weights above 80K with allowances for extra losses via drains.

What is recommended for those who are at home during the COVID-19 response?

With the rapid coronavirus spread, the general population has been highly advised, for safety and prevention, to reduce moving and travelling and to stay at home aiming to limit COVID-19 transmission. Unfortunately, such restrictions against regular physical activities will unavoidably affect individuals' routine daily activities, psychosocial status, and well-being and may increase sedentary behaviour by lowering energy expenditure, favouring screening activities such as watching television, using mobile devices, and playing games.

- Ensure enough sleep, reduced stress, exercise, and avoid the intake of alcohol and tobacco products.
- Physical activity should be maintained even at home using home exercises, such as walking, push-up, etc. at least 30 min of moderate physical activity every day and/or at least 20 min of vigorous physical activity every other day which can help to reduce considerably stress, anxiety and depression, particularly during the current circumstances.

What is the need for the integration of nutritional interventions for COVID-19?

Integration of nutritional assessment and counselling services for all Covid-19 patients at quarantine, isolation and treatment sites helps the medications achieve their intended effects, less need for additional intervention, fewer calorie or nutrient supplements are required, adverse side effects that are resulted from staying at quarantine, isolation and treatment centers are minimized, optimal nutritional status is preserved, disease complications are minimized, the cost of health care services is reduced and there is less professional liability.

Conclusion

Balanced nutrition plays a major role to improve the existing and the decline of immune status by maintaining immune homeostasis throughout life and reinforces immunity mechanisms especially among vulnerable individuals (elderly, pregnant, and infant groups). Food and nutritional intervention is an option in supplementing other management modalities for COVID-19 response. The nutritional supplementation for COVID-19 patients' needs to account for the sleep, stress level, anxiety, depression,

as well as body mass index of the individual. Therefore, foods containing serotonin, melatonin, amino acid, and tryptophan are crucial for addressing the sleep, anxiety, stress, and depressive symptoms associated with COVID-19 infections. In addition, giving attention to an individual menu with a locally available diet including a variety of fruit and vegetable helps in improving the immune system of an individual that can help in tackling susceptibility to infection. Regular physical activity and routine exercising in a safe home environment should be maintained to avoid anxiety and depression and that constitutes a strategy for healthy living during the coronavirus crisis.

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