PROPER NUTRITION AND PREVENTION OF ALLERGIC REACTIONS IN CONDITIONS OF CORONAVIRAL INFECTION COVID-19

Abdullaeva D.
Tashkent Medical Academy

Keywords:
Food
Allergy
SARS-CoV-2
Immunity

Abstract
Coronavirus infection COVID-19 is a respiratory viral infection caused by the RNA virus SARS-CoV-2, first reported in December 2019 in the Chinese city of Wuhan. At the beginning of the COVID-19 pandemic, the World Health Organization (WHO) identified the nutritional factor as one of the key factors for maintaining public health in conditions of quarantine and self-isolation. Nutrition is an important determinant of immune status, with malnutrition being the most common cause of immunodeficiency worldwide. In order to prevent allergic reactions resulting from COVID-19 infection, it is recommended to include in the diet foods rich in certain trace elements and vitamins in diets.

ISSN 2181-3175

Nutrition is an important determinant of immune status, with malnutrition being the most common cause of immunodeficiency worldwide. Already at the beginning of the COVID-19 viral infection pandemic (2020), WHO identified the nutrition factor as one of the key factors in maintaining the health of the population in conditions of quarantine and self-isolation. Allergic diseases, diabetes mellitus and cardiovascular diseases and their combination in polymorbid patients, as well as the elderly, are often associated with a high risk and prevalence of malnutrition (malnutrition) and poorer prognosis. In addition, inflammation and the development of sepsis may contribute to the intensification of all of the above changes in the presence of SARS-CoV-2 infection [2, 3].

It should be said that in the discussed algorithms of the medical literature in the aspect of immunity and infections, there is often no nutrition strategy to maintain the optimal function of the immune system. Individual vitamins, including vitamins A, B6, B12, C, D, E, folic acid; and trace elements, including zinc, iron, selenium, magnesium and copper, play an important and complementary role in supporting both the innate and adaptive immune system. Deficiency or overabundance of trace elements can negatively affect immune function and can reduce resistance to infections. On the contrary, omega-3 fatty acids support the effective functioning of the immune system, in particular, providing an anti-inflammatory and anti-allergic effect [1, 4].

Deficiency of vitamins A, B6, B12, folic acid, C, D, E, as well as trace elements such as iron, selenium, copper and zinc, is associated with immune dysfunction. A balanced diet can provide most of the essential nutrients, including zinc, iron, magnesium, manganese, selenium and copper, which help maintain and modulate the function of the immune system [5]. Several epidemiological and clinical studies suggest that in addition to poor personal hygiene, sanitation or contamination of food and water, the risk of infection increases with nutritional deficiency [6].

The mechanistic role of trace elements in optimizing immune function has been well described recently. People with vitamin C deficiency are susceptible to severe respiratory diseases, such as pneumonia. In order to finally resolve the issue of including high doses of vitamin C in the treatment algorithms for patients with new CVI, a full-scale clinical trial using 24 g per day for 7 days was launched in China.

Many immune cells have vitamin D receptors that affect their function after ligand binding, which causes a significant contribution of vitamin D to the maintenance of immunity. Apparently, vitamin D metabolites also regulate the production of specific antimicrobial proteins that directly kill pathogenic microorganisms and, thus, can help reduce infection, including in the lungs [7].

Vitamin D deficiency has been proven to increase the risk of respiratory infection. Observational studies report an association between low blood concentrations of 25-hydroxy-vitamin D (the main metabolite of vitamin D) and predisposition to acute respiratory tract infections. A few recent meta-analyses have concluded that taking vitamin D may reduce the risk of respiratory tract infections in children and adults [8].

Vitamin A is necessary to support the immune system, the differentiation of epithelial cells, and therefore, people with vitamin A deficiency may be more predisposed to viral infections, and therapy with vitamin A derivatives can improve the condition of patients with pneumonia [9].

According to the literature data, with regular intake of vitamin E at a dose of 200 IU per day, there is a decrease in the risk of upper respiratory tract infec-

Tashkent Medical Academy

ISSN 2181-3175

tions in older age groups [10]. However, at the moment, the role of vitamin E in the prevention and treatment of a new coronavirus infection has not been investigated.

To date, it has been proven that vitamin E has a positive effect on the immune functions of the body and provides protection against a number of infectious diseases (pneumonia, respiratory infections, etc.). Selenium deficiency leads to a decrease in the innate and adaptive immune response, its additional intake activates leukocytes, and in respiratory distress syndrome modulates the inflammatory response in patients, restoring antioxidant capacity in lung tissues [4].

Inflammation is a key component of the immune response. This response is caused by various pro-inflammatory mediators produced by several types of cells, which leads to fluid influx, migration of immune cells and other mediators whose function is aimed at eliminating infection. Among them, omega-3 PUFA, eicosapentatenic acid (EPA) and docosahexaenoic acid (DHA), present at the site of inflammation and enzymatically converted into specialized pro-inflammatory mediators (SPM). These molecules, along with others, are responsible for resolving inflammation and maintaining healing, including in the respiratory tract [1, 11].

The participation of zinc in the formation of the immune defense of the body has been studied previously. Zinc plays an important role in the maintenance and development of cells of both the innate and adaptive immune system. Zinc deficiency leads to impaired formation, activation and maturation of lymphocytes, disrupts intercellular communication through cytokines, and weakens the innate defense of the host organism. Zinc deficiency leads to both a violation of proliferation and a decrease in the pool of B-lymphocytes, CD8+ T-lymphocytes, as well as to violations of the normal functioning of natural killers, IL-2 production and a violation of the cellular immune response. Zinc has the ability to inhibit RNA polymerases necessary for the replication of viral particles, which has also been proven for SARS-CoVs in vitro, and therefore, there are assumptions about the key role of zinc in the host body's resistance to virus replication. The latest meta-analysis of the data confirms a decrease in the duration of cold symptoms, the prevalence of severe pneumonia and mortality from them with regular intake of zinc into the body [12]. Thus, additional safe and cost-effective strategies for maintaining the immune system are needed. One compelling strategy is to provide sufficient nutritional support for immune status. Zinc is an important component for the activation of a large number of enzymes, as well as an adequate immune and antioxidant response of the body [13].

It should be noted that coronavirus infection has something to do with non-communicable diseases, including obesity. However, obese individuals have an increased risk of developing this disease, hospitalization, severe course and mortality, probably due to chronic nonspecific inflammation, altered immune response to infection, as well as due to concomitant cardiometabolic diseases. An important factor affecting immunity during the pandemic of the new COVID-19 is the availability of vitamins and minerals. Thus, vitamin D deficiency not only leads to the development of diseases associated with impaired calcium homeostasis, but also increases the risk of infectious diseases. It is believed that vitamin D deficiency increases the risk of respiratory infections, and, according to meta-analyses, taking vitamin D, on the contrary, helps to reduce this risk [1, 14].

Among the most important factors and medical and social reasons contributing to the formation of disorders in the body during self-isolation and quarantine, stress, reduced physical activity, violation of habitual regimes and diets are important.

Studies in different countries have proved that the risks of severe course and fatal outcomes are largely associated with the presence of alimentary-dependent diseases. Among them, protein-energy deficiency, obesity, atherosclerosis and type 2 diabetes mellitus are of the greatest importance, and a possible relationship with vitamin D deficiency is also discussed. Undoubtedly, protein-energy deficiency is a risk factor for the development of complications of any infection, including the new coronavirus. The problem of protein-energy deficiency is especially relevant for the elderly and senile age. In turn, severe CVI is accompanied by a sharp increase in inflammatory markers: C-reactive protein, ferritin, tumor necrosis factor alpha (TNF-α) and interleukins. At the same time, albumin is used for the synthesis of acute phase proteins, muscle tissue proteins can also be catabolized [15].

Thus, rational nutrition is an important factor in the prevention of allergic reactions in conditions of coronavirus infection.

Literature

1. D.G. Abdulaeva, B.J.Rustamova. Prevention of allergic reactions and proper nutrition in conditions of coronavirus infection COVID-19. Материалы VI традиционной Международной научно-практической конференции «Роль инновационных технологий в освоении нового мира»

научно-методического центра «АЛГОРИТМ» совместно с Республиканским центром педагогического и психологического развития «ДАМУ». I часть / Алматы, 2021. С.3-7
2. Tutelyan V.A., Nikityuk D.B., Burlyaeva E.F., Khotimchenko S.A., Baturin A.K. SOVID-19: new challenges for medical science and practical healthcare // Nutrition issues. 2020.T.89, №3. C.6-13. DOI: 10.24411/0042-8833-2020-10024.
3. Singer P., Blaser A.R., Berger M.M., Alhazzani W., Calder P.C., Casaer M.P. ESPEN guideline on clinical nutrition in the intensive care unit. Clin Nutr. 2019; 38:48–79.
4. Gombart, A.F.; Pierre, A.; Maggini, S. A review of micronutrients and the immune system -working in harmony to reduce the risk of infection. Nutrients 2020, 12, 236.
5. Hemilä H. Zinc lozenges and the common cold: a meta-analysis comparing zinc acetate and zinc gluconate, and the role of zinc dosage. JRSM Open 2017; 8:205427041769429. DOI: 10.1177/2054270417694291.
6. Carr, A.C. Vitamin C in pneumonia and sepsis. In Vitamin C: New Biochemical and Functional Insights; Chen, Q., Vissers, M.C.M., Eds.; CRC Press: Boca Raton, FL, USA, 2020; pp. 115–135.
7. Bergman, P.; Lindh, Å.U.; Björkhem-Bergman, L.; Lindh, J.D. Vitamin D and respiratory tract infections: A systematic review and meta-analysis of randomized controlled trials. PLoS ONE 2013, 8, e65835.
8. Basil, M.C.; Levy, B.D. Specialized pro-resolving mediators: Endogenous regulators of infection and inflammation. Nat. Rev. Immunol. 2016, 16, 51–67.
9. Frasca D, Blomberg BB. The impact of obesity and metabolic syndrome on vaccination success. Interdiscip. Top. Gerontol. Geriatr 2020; 43:86–97.
10. Wessels I, Maywald M, Rink L, et al. Zinc as a gatekeeper of immune function. Nutrients 2017; 9: 1286. DOI: 10.3390/nu9121286.
11. Liu K, Fang YY, Deng Y, Liu W, Wang MF, Ma JP, Xiao W, Wang YN, Zhong MH, Li CH, Li GC, Liu HG. Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. Chin Med J. 2020. https://doi.org/10.1097/CM9.0000000000000744.
12. Barnett JB, Dao MC, Hamer DH, et al. Effect of zinc supplementation on serum zinc concentration and T cell proliferation in nursing home elderly: a randomized, double-blind, placebo-controlled trial. Am J Clin Nutr 2016; 103:942–5. doi:10.3945/ajcn.115.115188.
13. Grant, W.B.; Lahore, H.; McDonnell, S.L.; Baggerly, C.A.; French, C.B.; Aliano, J.L.; Bhattoa, H.P. Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths. Nutrients 2020, 12, 988. https://doi.org/10.1111/apt.15731 and https://doi.org/10.1111/apt.15764
14. Lassi ZS, Moin A, Bhutta ZA. Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. Cochrane Database Syst Rev 2016; 12: CD005978.doi: 10.1002/14651858.CD005978.pub3.
15. Gao, Y.; Zhang, H.; Luo, L.; Lin, J.; Li, D.; Zheng, S.; Huang, H.; Yan, S.; Yang, J.; Hao, Y.; et al. Resolvin D1 improves the resolution of inflammation via activating NF-κB p50/p50–mediated cyclooxygenase-2 expression in acute respiratory distress syndrome. J. Immunol. 2017, 199, 2043–2054.

Tashkent Medical Academy

ISSN 2181-3175