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# Vitamins, Supplements and COVID-19

Rana Talib Mohsen
Department of Biotechnology, College of Science, University of Anbar, Al-Anbar, Iraq
*Corresponding author: rana2011@uoanbar.edu.iq

# الفيتامينات والمكملات الغذائية وكوفيد-19

رنا طالب محسن
قسم التقنيات الاحيائية, كلية العلوم, جامعة الانبار , العراق

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## ABSTRACT

Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is possible for SARS-CoV-2 to produce multiorgan failure (MOF), which can be fatal. The purpose of this review is to assess the amounts of certain minerals (zinc, iron, and selenium) then vitamins (C, A, D, and E) in coronavirus-infected persons. Every study we looked at showed deficiencies in the aforementioned vitamins and minerals. We come to the conclusion that the immune depends heavily on micronutrients, and that the immune system is significantly impacted by their inadequacies. It has been proposed that increasing antioxidant intake can improve immunity, even though the majority of antioxidants are thought to be found in food. Despite the immune system's continuous activity, the presence of pathogens increases the activation of specialized immunity. The expression of genes in immune cells is regulated by the metabolites of vitamins A, D, and other nutrients. The imaginable healing welfares of vitamins C, A, D, and E through immunomodulation in COVID-19 patients are assessed and investigated in this study. We discovered that zinc, iron, and selenium—essential micronutrient minerals—have antioxidant and antiviral qualities that strengthen the body's defenses via a variety of mechanisms and immunomodulatory pathways.

Key words: Vitamins; supplements; COVID-19; immunity

## INTRODUCTION

COVID-19 is a highly infectious sickness, with almost 215 million confirmed cases and above 6 million recorded fatalities worldwide, this illness has reached pandemic status [1]. COVID-19 can cause severe illness and even death, particularly in elderly adults and persons with causal medical conditions. Reducing severe COVID-19-related illness, hospitalization, and mortality requires vaccination [2]. This illness has taken many lives, overwhelmed healthcare systems, and seriously harmed the global economy. Regulators, doctors, and scientists have worked together to rapidly expand our understanding of virology, epidemiology, clinical symptoms, multiorgan impact, and



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the effects of the virus and illness [3]. Given the substantial cardiovascular effects of the disease, understanding its epidemiology is essential for limiting its spread, lowering rates of illness and mortality, creating effective injections, applying efficient contagion control strategies, and applying treatment algorithms [4]. The illness is mostly spread by oral and nasal droplets, while airborne particles can potentially spread it [5]. People may also have moderate upper respiratory symptoms or no symptoms at all. As a means of managing diseases, telemedicine-based patient evaluation and triage techniques have been given top priority. The illness had a catastrophic effect on civilization, killing nearly 6 million people worldwide [6,7]. They improve the function of the epithelial barrier, control inflammatory reactions, and preserve the integrity of the mucosal membrane [8,9].

## COVID-19 and vitamin C

Vitamin C's antioxidant qualities make it essential for the immune system. It promotes collagen synthesis, iron absorption, and wound healing. Topical vitamin C lowers hyperpigmentation, encourages the production of collagen, and shields the skin from UV radiation. Its potential to cure COVID-19 and other active infections, such as common cold, is still being investigated [10]. In order to increase immunity and guard against COVID-19, vitamin C is essential [11]. Patients with influenza and other viral infections have been shown to benefit from great-dose intravenous vitamin C (HDIVC), which has immunomodulatory and antioxidant properties [12]. In COVID-19 individuals, HDIVC can lessen thrombotic consequences, vascular and alveolar damage, and the cytokine storm. Nevertheless, it is still unknown how vitamin C contributes to COVID-19, and there are no specific clinical trials that back up its use through the current pandemic [12,13]. Vitamin C has demonstrated potential in the treatment of viral illnesses including hepatitis C and influenza. Research indicates that by consolidating the immune system and constraining viral replication, a great-amount vitamin C can lessen the intensity and length of viral infections like COVID-19 [14]. Though, extra study is wanted to confirm its effectiveness against certain viruses, including SARS-CoV-2 [13,15]. The studies indicate that. Compared to those who are not sick, COVID-19 patients have meaningfully reduced plasma ascorbate (vitamin C) heights, and these levels are substantially lower in cases of plain and dangerous COVID-19 infections. It is yet unknown what specifically causes COVID-19 patients to have lower vitamin C levels. However, the depletion of antioxidants like vitamin C may be caused by increased inflammation and reactive oxygen species produced during the illness [15].

## COVID-19 and vitamin D

Vitamin D has a critical part in immune system support, illness prevention, and bone health maintenance. It improves the body's absorption of calcium, which is vital for fit bones. Sunlight exposure, some foods, and pills can all provide vitamin D. At least 600 IU should be consumed daily, and after the age of 70, 800 IU. Good health requires a blood 25-hydroxyvitamin D concentration of 30 to 60 ng/mL . An absence of vitamin D can increase the danger of various diseases and cause weak muscles and bone problems. It's important to speak with a healthcare

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provider about your individual vitamin D needs [16]. An absence of vitamin D consumption remained related to a higher risk and more severe infections, especially those that impact the respiratory system. Complementing with vitamin D has been demonstrated to recover immune responses to infections and may help cure and prevent future illnesses. Furthermore, it has been found that vitamin D alters immunological checkpoint molecules [17], potentially falling the severity of COVID-19 and its death rate [18]. Researchers suggest that a lack of vitamin D may make people more vulnerable to viruses like COVID-19 [19]. Nevertheless, further top-notch studies and carefully thought-out randomized clinical trials are wanted to confirm the joining among vitamin D and COVID-19. Vitamin D supplementation may have benefits, however there is presently not enough information to support its use in treating or preventing COVID-19. Low vitamin D levels in COVID-19 patients can be caused by the illness itself, among other things. Serum vitamin D levels may drop in COVID-19 patients as a consequence of the infection-induced systemic inflammatory response [19]. Furthermore, typical danger features, counting obesity and advanced age, may be the cause of little vitamin D levels in COVID-19 patients. Furthermore, COVID-19 can change how vitamin D is metabolized, which results in much lower levels of 25-hydroxyvitamin D, which prevents hypocalcemia. A combination of these factors may contribute to reduced vitamin D levels in COVID-19 patients [20,21].

## COVID-19 and vitamin A

Healthy skin, vision, and the immune system all depend on vitamin A. Absence is communal, especially in evolving countries, and can lead to exophthalmia and higher death rates. However, excessive vitamin A consumption can be harmful, raising the risk of liver damage and bone fractures [22]. Supplementing with vitamin A has been found to lower overall death rates by 25% and primarily lower diarrheal mortality in children aged 6–59 months by 30%. Mega doses of vitamin A have also been shown to lower the overall mortality rate from measles. Before starting any supplement regimen, it is imperative to see a doctor [23]. Immune system performance is greatly influenced by vitamin A. It controls humoral and cell-mediated immunity, affecting solid tumor microenvironments, inflammatory reactions, leukocyte development, differentiation, and homing. A lack of vitamin A impairs innate and adaptive immune systems, creating a person more susceptible to infectious diseases. Supplementation lowers death and morbidity rates in a range of infectious diseases [24]. Additionally, vitamin A improves the innate immune response to RNA viruses through interferon-based synthesis and equilibriums of Th1and Th2 responses. However, an excess of vitamin A may be detrimental [24]. The strong immune-inflammatory response to the virus is thought to be the cause of the drop in vitamin A levels during acute inflammation, which may have a negative impact on the respiratory system as well as other organ systems [25, 26].

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## COVID-19 and vitamin E

Antioxidant vitamin E is necessary for metabolism and the immune system. Nuts, seeds, leafy greens, and vegetable oils all contain it. It is also found in cereals and other foods. Vitamin E supplements may improve lung function, skin health, cognitive function, and older adults' health. Excessive supplementation may raise the risk of bleeding and prostate cancer. Excessive vitamin E intake should be avoided as research suggests it may increase mortality from all causes [27]. Before using vitamin E supplements, it is best to see a doctor if you are taking prescription medication. The association between blood vitamin E levels and COVID-19 is not well established. Nonetheless, COVID-19 pathogenicity is associated with oxidative stress [27]. The antioxidant properties of vitamin E may help reduce it. Because of increased oxidative stress brought on by infection, COVID-19 patients may have abridged blood vitamin E levels. A deficit in serum vitamin E has been found in COVID-19 patients, compared to healthy persons. Increased oxidative stress and inflammation may be the cause of vitamin E deficiency [26]. Another study found that lower levels of vitamin E and higher levels of thing aphamin may also be linked to composite bad perinatal outcomes and increased oxidative stress in the etiopathogenesis of COVID-19 [28]. The circulation contains the glycoprotein afamin, which is mostly made by the liver. It contains unique vitamin E binding characteristics and is a member of the albumin gene family. Afamin has a character in the breakdown of fats and carbohydrates, among other physiological functions. One particular protein that binds vitamin E is called afamin. Both alpha- and gamma-tocopherol, two significant forms of vitamin E, are bound by it. Afamin contains many vitamin E binding sites and might convey vitamin E in bodily fluids, including follicular fluid and plasma. When the lipoprotein system is inadequate, it may contribute to vitamin E transport due to its high binding volume for the vitamin [28,30].

## COVID-19 and Magnesium

In the same way that oral magnesium supplements have been demonstrated to lower serum CRP [31]. Scientists concentrated on methods to cure or prevent COVID-19 after the worldwide epidemic. Additionally, they attempted to minimize COVID-19 symptoms in patients by introducing vitamins or drugs [32, 33]. In this context, essential supplements (e.g., vitamin D, zinc, and magnesium) were provided to modify the immune system and the interferon (IFN) signaling pathway [34]. In order to prevent and cure COVID-19, magnesium supplements were recommended [32]. In a prior trial, 17 COVID-19 patients received a brief course of a magnesium supplement together with vitamins B12 and D [31]. While magnesium supplements might not be beneficial for persons with normal blood magnesium levels, they might aid those with hypomagnesemia by reducing symptoms [34]. Supplemental magnesium administration may replenish intracellular magnesium, hence reducing cytokine overproduction and regulating the cytotoxic activities of CD8+ T cells and NK cells [35],[36]. When suggesting magnesium supplements as a supportive therapy for COVID-19 patients, there are two crucial points to cover: Serum magnesium levels are measured, and the bioavailability of magnesium supplementation is assessed. To determine magnesium status, one can evaluate either total

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serum magnesium (tMg) or ionized serum magnesium (iMg). Due to the need for specialist technology, iMg cannot be evaluated in many clinical settings, despite the fact that it may be a superior predictor of clinical outcomes, particularly in critically sick patients [37]. Zhan et al. [38] evaluated responses to an oral magnesium supplement (MgCl2) by comparing the effectiveness of iMg whole blood concentrations with tMg concentrations. Following oral MgCl2 treatment, the results demonstrated a substantial rise in iMg concentrations as compared to tMg. When a magnesium supplement is given, the authors found that the measurement of iMg whole blood concentration is more sensitive than tMg [38]. However, in order to compare the findings of different investigations, a trustworthy reference range for iMg should be supplied

## *COVID-19 and Selenium*

Depending on its concentration, the vital trace element selenium can have both positive and negative effects (39). While consuming enough selenium helps prevent illness, taking too much of it might have detrimental effects. Numerous body processes, including immunological, endocrine, metabolic, and cellular ones, depend on selenium. Its antioxidant properties assist preventing heart disease and several cancers[39]. Overconsumption can outcome in unpleasant side effects like nausea, hair loss, and aching muscles. Because of its limited medicinal use, selenium supplementation should be taken with caution. Rare toxic consequences include joint discomfort, diarrhea, and exhaustion. Selenium not only reduces oxidative stress and increases immunity, but it also helps stave off viral infections like COVID-19 [40]. Since studies show that a selenium lack is related to worse COVID-19 outcomes, taking supplements of selenium may help lower the likelihood and severity of the disorder. Selenium has been linked with a decreased severity of COVID-19 and a greater chance of recovery [41]. More thorough investigation and randomized clinical studies are needed to confirm the benefits of selenium supplementation in COVID-19 patients (40). Low serum selenium levels in COVID-19 patients may be the consequence of the virus triggering an inflammatory response that lowers the expression of selenium proteins [42]. Furthermore, selenium insufficiency may be associated with worse outcomes for COVID-19 patients. According to research, COVID-19 patients have suggestively lesser blood selenium stages than healthy people [43].

## Phosphorus and COVID-19

Since hypophosphatemia, or low phosphorus levels, are directly linked to the harshness of COVID-19, monitoring blood phosphorus levels in individuals with severe COVID-19 is useful for prognosis [44]. Coronavirus infection susceptibility is increased by hypophosphatemia. Phosphorus mostly affects immunological responses because there aren't many minerals available, which makes it hard to fix the damage done to cells and tissues and encourages the development of disease. It clarifies the conceivable role of phosphorus in lowering COVID-19 fatalities [45].

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## Potassium and COVID-19

Potassium issues can occur in COVID-19 patients. Compared to hyperkalemia, hypokalemia makes up a larger percentage. However, there is a dismal prognosis and repercussions for both of them. It is possible to avoid serious arrhythmias, particularly in individuals with severe COVID-19. Regular ECG monitoring and early detection and management of potassium problems are used to carry out this treatment[46]. Potassium variability in this instance was far lower than sodium fluctuation. One indicator of a coronavirus infection is the drop in plasma potassium and sodium levels[47].

## Recommendations

People who have respiratory virus infections or are at risk for them should receive vitamins and minerals. The severity of the COVID-19 infection is reduced by these supplements. In order to keep their circulation levels within an ideal range, persons who are at a higher risk of vitamin and mineral deficiencies should think about taking these supplements. Consuming minerals and multivitamins protects against COVID-19, which lessens the virus's intensity.

## CONCLUSION

The imaginable healing welfares of vitamins C, A, D, and E through immunomodulation in COVID-19 patients are assessed and investigated in this study. We discovered that zinc, iron, and selenium—essential micronutrient minerals—have antioxidant and antiviral qualities that strengthen the body's defenses via a variety of mechanisms and immunomodulatory pathways. The recovery from the COVID-19 infection may benefit from vitamin and micronutrient supplements. Following a study of several research, we draw the conclusion that taking adequate vitamin and micronutrient supplements may aid in the treatment of SARS-CoV-2 infections.

## Conflict of interests.

Non conflict of interest

## References

[1] Y.-J. Lai *et al.*, “The role of micronutrient and immunomodulation effect in the vaccine era of COVID-19,” *J. Chinese Med. Assoc.*, vol. 84, no. 9, pp. 821–826, 2021.

[2] H. Ouassou *et al.*, “The Pathogenesis of Coronavirus Disease 2019 (COVID-19): Evaluation and Prevention,” *J. Immunol. Res.*, vol. 2020, no. 1, p. 1357983, 2020.

[3] M. H. Ahmed, A. Hassan, and J. Molnár, “The role of micronutrients to support immunity for COVID-19 prevention,” *Rev. Bras. Farmacogn.*, vol. 31, no. 4, pp. 361–374, 2021.

[4] Y. Oosaki, “Studies on the tissue culture of murine sarcoma (Dunn sarcoma)--a fix cell line established in vitro (DSK) and its cytokinetic findings (author’s transl),” *Nihon Seikeigeka Gakkai Zasshi*, vol. 56, no. 1, pp. 37–49, 1982.

[5] M. Wei, N. Yang, F. Wang, G. Zhao, H. Gao, and Y. Li, “Epidemiology of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),” *Disaster Med.*

*Public Health Prep.*, vol. 14, no. 6, pp. 796–804, 2020.

[6] R. A. Escobedo, D. Kaushal, and D. K. Singh, "Insights into the changing landscape of coronavirus disease 2019," *Front. Cell. Infect. Microbiol.*, vol. 11, p. 761521, 2022.

[7] M. K. Fath *et al.*, "Molecular mechanisms and therapeutic effects of different vitamins and minerals in COVID-19 patients," *J. trace Elem. Med. Biol.*, vol. 73, p. 127044, 2022.

[8] P. Kumar *et al.*, "Role of vitamins and minerals as immunity boosters in COVID-19," *Inflammopharmacology*, vol. 29, no. 4, pp. 1001–1016, 2021.

[9] A. C. Carr and S. Rowe, "The emerging role of vitamin C in the prevention and treatment of COVID-19," *Nutrients*, vol. 12, no. 11. Mdpi, p. 3286, 2020.

[10] B. X. Hoang, G. Shaw, W. Fang, and B. Han, "Possible application of high-dose vitamin C in the prevention and therapy of coronavirus infection," *J. Glob. Antimicrob. Resist.*, vol. 23, pp. 256–262, 2020.

management of hospitalised COVID-19 patients: A minireview," *World J. Virol.*, vol. 11, no. 5, p. 300, 2022.

[12] B. M. Gruber-Bzura, "High-Dose Vitamin C Supplementation as a Legitimate Anti-ARS-CoV-2 Prophylaxis in Healthy Subjects—Yes or No?," *Nutrients*, vol. 14, no. 5, p. 979, 2022.

[13] U. Shahbaz *et al.*, "Role of vitamin C in preventing of COVID-19 infection, progression and severity," *AIMS Microbiol.*, vol. 8, no. 1, p. 108, 2022.

[14] I. Nayila *et al.*, "Vitamin C supplementation ameliorates liver function profile and antiviral treatment response in Hepatitis C patients.," *Pak. J. Pharm. Sci.*, vol. 35, 2022.

[15] T. Sinnberg *et al.*, "Vitamin C deficiency in blood samples of COVID-19 patients," *Antioxidants*, vol. 11, no. 8, p. 1580, 2022.

[16] W. B. Grant and B. J. Boucher, "Requirements for Vitamin D across the life span," *Biol. Res. Nurs.*, vol. 13, no. 2, pp. 120–133, 2011.

[17] A. Rastogi *et al.*, "Short term, high-dose vitamin D supplementation for COVID-19 disease: a randomised, placebo-controlled, study (SHADE study)," *Postgrad. Med. J.*, vol. 98, no. 1156, pp. 87–90, 2022.

[18] S. F. Ling *et al.*, "High-dose cholecalciferol booster therapy is associated with a reduced risk of mortality in patients with COVID-19: a cross-sectional multi-centre observational study," *Nutrients*, vol. 12, no. 12, p. 3799, 2020.

[19] E. Merzon *et al.*, "Low plasma 25 (OH) vitamin D level is associated with increased risk of COVID-19 infection: an Israeli population-based study," *FEBS J.*, vol. 287, no. 17, pp. 3693–3702, 2020.

[20] M. E. Castillo *et al.*, "Effect of calcifediol treatment and best available therapy versus best available therapy on intensive care unit admission and mortality among patients hospitalized for COVID-19: A pilot randomized clinical study," *J. Steroid Biochem. Mol. Biol.*, vol. 203, p. 105751, 2020.

[21] A. Povaliaeva *et al.*, "Impaired vitamin D metabolism in hospitalized COVID-19 patients," *Pharmaceuticals*, vol. 15, no. 8, p. 906, 2022.

[22] A. Bendich and L. Langseth, "Safety of vitamin A," *Am. J. Clin. Nutr.*, vol. 49, no. 2, pp. 358–371, 1989.

[23] A. Imdad, M. Y. Yakoob, C. Sudfeld, B. A. Haider, R. E. Black, and Z. A. Bhutta, "Impact of vitamin A supplementation on infant and childhood mortality," *BMC Public Health*, vol. 11, pp. 1–15, 2011.

[24] T. Džopalić, B. Božić-Nedeljković, and V. Jurišić, "The role of vitamin A and vitamin D in the modulation of the immune response with focus on innate lymphoid cells," *Cent. Eur. J. Immunol.*, vol.

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46, no. 2, pp. 264–269, 2021.
[25] I. K. Midha, N. Kumar, A. Kumar, and T. Madan, “Mega doses of retinol: A possible immunomodulation in Covid-19 illness in resource-limited settings,” *Rev. Med. Virol.*, vol. 31, no. 5, pp. 1–14, 2021.
[26] P.-R. Tepasse *et al.*, “Vitamin A plasma levels in COVID-19 patients: a prospective multicenter study and hypothesis,” *Nutrients*, vol. 13, no. 7, p. 2173, 2021.
[27] M. C. da C. Carvalho *et al.*, “Retinol Levels and Severity of Patients with COVID-19,” *Nutrients*, vol. 15, no. 21, p. 4642, 2023.
[28] J. GeríŸ and W. Köpcke, “The questionable association of vitamin E supplementation and mortality-inconsistent results of different meta-analytic approaches,” *Cell. Mol. Biol.*, vol. 55, no. 4, pp. 1111–1120, 2009.
[29] M. Vasheghani, M. Rekabi, and M. Sadr, “Protective role of vitamin D status against COVID-19: a mini-review,” *Endocrine*, vol. 79, no. 2, pp. 235–242, 2023.
[30] M. Vogel-González *et al.*, “Low zinc levels at admission associates with poor clinical outcomes in SARS-CoV-2 infection,” *Nutrients*, vol. 13, no. 2, p. 562, 2021.
[31] C.-F. Tang, H. Ding, R.-Q. Jiao, X.-X. Wu, and L.-D. Kong, “Possibility of magnesium supplementation for supportive treatment in patients with COVID-19,” *Eur. J. Pharmacol.*, vol. 886, p. 173546, 2020.
[32] L. E. Simental-Mendia, A. Sahebkar, M. Rodriguez-Moran, G. Zambrano-Galvan, and F. Guerrero-Romero, “Effect of magnesium supplementation on plasma C-reactive protein concentrations: a systematic review and meta-analysis of randomized controlled trials,” *Curr. Pharm. Des.*, vol. 23, no. 31, pp. 4678–4686, 2017.
[33] L. L. Speakman, S. M. Michienzi, and M. E. Badowski, “Vitamins, supplements and COVID-19: a review of currently available evidence,” *Drugs Context*, vol. 10, 2021.
[34] M. Nabi-Afjadi, H. Karami, K. Goudarzi, I. Alipourfard, and E. Bahreini, “The effect of vitamin D, magnesium and zinc supplements on interferon signaling pathways and their relationship to control SARS-CoV-2 infection,” *Clin. Mol. Allergy*, vol. 19, pp. 1–10, 2021.
[35] G. Faa, L. Saba, D. Fanni, G. Kalcev, and M. Carta, “Association between hypomagnesemia, COVID-19, respiratory tract and lung disease,” *Open Respir. Med. J.*, vol. 15, p. 43, 2021.
[36] J. J. DiNicolantonio and J. H. O’Keefe, “Magnesium and vitamin D deficiency as a potential cause of immune dysfunction, cytokine storm and disseminated intravascular coagulation in COVID-19 patients,” *Mo. Med.*, vol. 118, no. 1, p. 68, 2021.
[37] G. Scarpati, D. Baldassarre, F. Oliva, G. Pascale, and O. Piazza, “Ionized or Total Magnesium levels, what should we measure in critical ill patients?,” *Transl. Med. UniSa*, vol. 23, p. 68, 2020.
[38] J. Zhan *et al.*, “Circulating ionized magnesium as a measure of supplement bioavailability: results from a pilot study for randomized clinical trial,” *Nutrients*, vol. 12, no. 5, p. 1245, 2020.
[39] M. Kieliszek, I. Bano, and H. Zare, “A comprehensive review on selenium and its effects on human health and distribution in middle eastern countries,” *Biol. Trace Elem. Res.*, vol. 200, no. 3, pp. 971–987, 2022.
[40] S. Khatiwada and A. Subedi, “A mechanistic link between selenium and coronavirus disease 2019 (COVID-19),” *Curr. Nutr. Rep.*, vol. 10, pp. 125–136, 2021.
[41] M. P. Rayman, E. W. Taylor, and J. Zhang, “The relevance of selenium to viral disease with special

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reference to SARS-CoV-2 and COVID-19," *Proc. Nutr. Soc.*, vol. 82, no. 1, pp. 1–12, 2023.

[42] O. Younesian *et al.*, "Decreased serum selenium levels of COVID-19 patients in comparison with healthy individuals," *Biol. Trace Elem. Res.*, pp. 1–6, 2021.

[43] L. Hiffler and B. Rakotoambinina, "Selenium and RNA virus interactions: potential implications for SARS-CoV-2 infection (COVID-19)," *Front. Nutr.*, vol. 7, p. 164, 2020.

[44] X. Xue *et al.*, "Correlation between hypophosphatemia and the severity of Corona Virus Disease 2019 patients," *MedRxiv*, pp. 2003–2020, 2020.

[45] W. Ni *et al.*, "Role of angiotensin-converting enzyme 2 (ACE2) in COVID-19," *Crit. Care*, vol. 24, pp. 1–10, 2020.

[46] M. Noori, S. A. Nejadghaderi, M. J. M. Sullman, K. Carson-Chahhoud, A. Kolahi, and S. Safiri, "Epidemiology, prognosis and management of potassium disorders in Covid-19," *Rev. Med. Virol.*, vol. 32, no. 1, p. e2262, 2022.

[47] G. Lippi, A. M. South, and B. M. Henry, "Electrolyte imbalances in patients with severe coronavirus disease 2019 (COVID-19)," *Ann. Clin. Biochem.*, vol. 57, no. 3, pp. 262–265, 2020.

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## الخلاصة

فيروس كورونا 2 المسبب لمتلازمة الجهاز التنفسي الحادة الوخيمة (سارس-كوف-2) هو سبب مرض فيروس كورونا 2019 (كوفيد-19). لدى فيروس سارس-كوف-2 القدرة على التسبب في فشل الأعضاء المتعددة (MOF)، وهو أمر مميت. تهدف هذه المراجعة إلى تقييم مستويات بعض الفيتامينات (فيتامينات سي، أ، د، هـ) والمعادن (الزنك والحديد والسيلينيوم) لدى الأفراد المصابين بفيروس كورونا. تشير جميع الدراسات التي تمت مراجعتها إلى نقص في المعادن والفيتامينات المذكورة أعلاه. نستنتج أن المغذيات الدقيقة تلعب دورًا مهمًا في الجهاز المناعي وأن نقصها له تأثير كبير على الجهاز المناعي. على الرغم من الاعتقاد بأن معظم مضادات الأكسدة موجودة في الأنظمة الغذائية، فقد اقترح أن تناول المزيد من مضادات الأكسدة سيعزز المناعة. على الرغم من أن الجهاز المناعي نشط باستمرار، إلا أن المناعة المحددة تنشط أكثر عندما تكون مسببات الأمراض موجودة. تتحكم مستقلبات فيتامين أ وفيتامين د والعناصر الغذائية الأخرى في التعبير عن الجينات في الخلايا المناعية. تم تقييم الفوائد العلاجية التي يمكن تخيلها لفيتامينات ج وفيتامين أ وفيتامين د وفيتامين هـ من خلال تعديل المناعة لدى مرضى كوفيد-19 والتحقيق فيها في هذه الدراسة. اكتشفنا أن الزنك والحديد والسيلينيوم – وهي معادن أساسية دقيقة المغذيات – لها خصائص مضادة للأكسدة ومضادة للفيروسات تعمل على تقوية دفاعات الجسم من خلال مجموعة متنوعة من الآليات ومسارات تعديل المناعة.