



# Imam Reza General Hospital Newsletter Tabriz University of Medical Sciences



**Mohammad Hosein Somi**  
Professor of Gastrointestinal and Liver Diseases  
Gastrointestinal and Liver Diseases  
Challenges in COVID-19 Pandemic  
Chancellor of Tabriz university of  
Medical Sciences

COVID-19 as an unknown disease, in addition to respiratory problems, can affect other organs, including the gastrointestinal tract. Due to the presence of ACE-2 receptors in the liver and gastrointestinal tract in addition to the respiratory system, so many patients develop gastrointestinal symptoms. Studies have shown that about half of patients develop gastrointestinal symptoms in addition to respiratory symptoms, and even in some patients (16%), only gastrointestinal symptoms occur. Also, at least a quarter to three-quarters of patients develop liver enzyme disorders as one of the symptoms of Covid-19. Diarrhea, followed by nausea, vomiting, and abdominal pain are the most common gastrointestinal symptoms of Covid-19.

### Is there a need for PCR test in people with gastrointestinal symptoms?

Recommendations for PCR testing in people with gastrointestinal symptoms may differ in inpatients and outpatients. In hospitalized patients, in the case of sudden onset of gastrointestinal symptoms, a PCR test is performed. In outpatients, if gastrointestinal symptoms are present, it is recommended that a PCR test should be performed if symptoms persist for more than 48 hours. In people with any underlying disease, in case of exacerbation of symptoms, among other aggravating cases, it is necessary to suspect Covid-19 and take the necessary tests. (Continue on Next Page)

**Message of Respectable Chancellor of Tabriz University of Medical Sciences about the Congress of Patient Safety and Medical Education**



The main goal of holding the First Virtual Congress of Patient Safety and Medical Education is to draw the attention of all those who are involved in medical education. It has been tried to address the challenges of medical education in relation to patient safety with online discussion programmes in the presence of experts in various medicine fields including medicine, ethics, forensic medicine, nursing and pharmacy to suggest solutions in order to improve the patient safety. It would be a great honor of holding this congress will be a step towards improving the patient safety especially in educational and medical centers. It's my pleasure to declare sincerely thanks and appreciation to all colleagues for their valuable efforts in developing and holding the congress.

**Mohammad Hosein Somi**  
Chancellor of Tabriz University of Medical Sciences



**Masood Faghihdinevari**  
Founder and Director-In-Charge's Message  
Congress of Patient Safety and  
Medical Education  
Assistant Professor of Internal Medicine,  
Division of Adult gastroenterology  
Dean of Imam Reza General Hospital

We are pleased that the first national Virtual Congress of Patient Safety and Medical Education was successfully held in four days from 26-29th, May 2021. More than one hundred forty papers were received in this congress. Thirty-five lecturers from Tabriz University of Medical Sciences, from other Iranian universities of medical sciences and honorable ministry officials as well participated. It's remarkable to point out that at the opening ceremony, the two honorable deputy ministers of health, deputy minister of education and deputy minister of treatment gave their speech. This congress was held under the support of two pharmaceutical companies, Zahravi and Abidi, so it's worthy to say thank and appreciate from these two pharmaceutical companies for their support of scientific congresses. I would also like to acknowledge from Roxan International Holding Company, Informatics and Public Relations of Imam Reza General Center, who did their best during the programs. Finally, I appreciate the valuable efforts and supports of vice chancellor of Tabriz University of medical sciences, Deputy of education and research of Imam Reza General Hospital and the Executive committee of the Congress for their best performances for almost a year to hold the Congress as useful and glorious as possible. Those who are interested in the field of patient safety and medical education can get the electronic files of the congress booklet from the website <https://imamreza.tbzmed.ac.ir> of Imam Reza General Hospital, Tabriz, Iran.

**Editorial**  
**Hassan Soleimanpour**  
Mission of Deputy of Education  
and Research of Center



**Editor-In-Chief**  
Professor of Intensive Care Medicine  
Dean of Education and Research Deputy

A society cannot talk about independency unless it has an acceptable scientific position in the current world. In today's world, a society is called an independent one when it is not solely the recipient and consumer of the results of other researchers; because in this case, they do not provide this society with what is needed for a better life, rather they offer what themselves want and is in line with their own national interests. Research is the basis of development and is a guarantee for continuation of this development. On the other hand, development is based on research as it is the driving force of the development. Basically, any kind of progress and development is directly related to scientific research, and the growth and development of developed countries is the result of the investment in research. The vast amount of the scientific researches in the developed and industrialized countries reflects the fact that advanced industrialized countries have allocated a significant part of their gross national product (GNP) for investing in research and development units. According to experts, this amount is 5% for industrialized countries, while it is about 0.5% in Iran. This is why research is called the "missing link in development" or the "cornerstone of the development." which is learned and applied except through education. (Continue on Next Page)



## The First Virtual Congress of

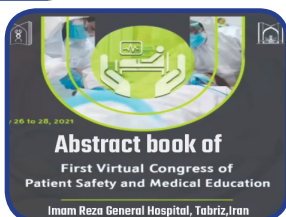


## Patient Safety and



## Medical Education

**At a Glance**  
(26-29th, May 2021)



## Mohammad Hosein Somi

Gastrointestinal and Liver Diseases Challenges in COVID-19 Pandemic

(Cont.)

### Can gastrointestinal products also be infected with the Covid-19 virus?

Gastrointestinal products such as feces and upper GI secretions can also be infected and the treatment team must be careful in dealing with these factors.

### Do PPIs increase the risk of Covid-19?

According to the literature, the chronic use of PPIs increases the risk of Covid-19 twice. However, for proper clinical decision in this regard, there is a need for further and high quality studies.

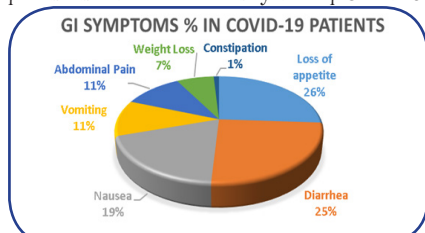
### Is the risk of Covid-19 high in patients with gastrointestinal immunodeficiency diseases?

Although studies have shown that patients with immunosuppression have a higher risk of Covid-19 disease, existing studies have not shown that patients with two gastrointestinal autoimmune diseases, such as IBD and autoimmune hepatitis, have a higher chance of developing Covid-19 than the general population. But if these patients get Covid-19, the symptoms are usually more severe.

**How is the management of IBD patients in the Covid-19 pandemic?** In patient with IBD (in the remission stage) and without Covid-19, usual medications should not be changed. Although symptoms of Covid-19 are more severe in those who are receiving 5ASA and corticosteroids, 5ASA should not be discontinued in outpatients with Covid-19. In the case of corticosteroids, however, the drug should be given in a targeted manner and only in small doses if needed. But in hospitalized patients, as with any immunodeficiency disease, some medications, such as azathioprine, methotrexate, and injectable biologic drugs, must be discontinued in the severe phase of the illness. Fortunately, the drugs remains in the body for up to 3 months, it does not cause any problems for the patient in the short term, and as the patient's level of immunity increases, the severity of Covid-19 symptoms decrease slightly.

### What about liver involvement in Covid-19?

The liver is one of the most important organs affected by Covid-19. Elevated liver enzymes, hypoalbuminemia, elevated bilirubin, impaired PT indicate liver involvement, impaired liver function, and poor prognosis of Covid-19. Various factors including viral receptors, the effect of different drugs on the liver, activation of the inflammatory cascade, and ischemia of the liver can cause liver involvement. Liver dysfunction (level of LFT 5 times more than normal), may indicate the need for changes in the use of some medications. In patients with advanced liver disease such as Child-C cirrhosis or patients with fatty liver disease, the prognosis of Covid-19 is poor, so these patients need extra care if they develop Covid-19.



Adopt of: Nahil A, Elshemy MM, Uto K, Soliman R, Hassan AA, Shihu G, Elbara M. Coronavirus (SARS-CoV-2) in gastroenterology and its current epidemiological situation: An updated review until January 2021. EXCLI J. 2021 Feb 16;20:366-385.

## Hassan Soleimanpour

Mission of Deputy of Education and Research of Center

(Cont.)

In my opinion, for being an ideal university teacher in teaching and training, it should be to become a skilled researcher and able to use our own research to provide the best educational materials for students. Based on the above, the Vice Chancellor of Education and Research has established its services in the two areas of education and research. In addition to assigned tasks and duties, this deputy tries to achieve the goals of a fourth generation university, by creating a clinical skills lab, clinical research development unit and innovation office as well as establishing a scientific committee for COVID-19 and also COVID-Studio to communicate with scientific and academic societies.



**Mohammad Reza Taban**  
Associate Professor of Cardiology  
COVID-19 and  
Cardiovascular Diseases

Based on the type of study and the criteria considered, the prevalence of cardiac involvement in COVID-19 patients among hospitalized patients has been reported up to 20-35%. The spectrum of this involvement is very different and from positive cardiovascular biomarkers (troponin or D-dimer) alone without any cardiac symptoms to patients without obvious clinical symptoms but cardiac involvement on ECG or echocardiography or patients who cardiac involvement is the predominant symptom and sometimes it is the first presentation and the reason for the patient's hospitalization. Cardiovascular involvement can be divided into 4 general categories. 1- Clinical effects of COVID-19 involvement in known cardiovascular patients. 2- New cardiac involvement in COVID-19 patients. 3- The side effects of COVID-19 treatments on the cardiovascular system in healthy patients. 4- Drug interactions of COVID-19 and cardiovascular treatment on patients. Given the significant prevalence in critically ill patients, the indications for assessing cardiac involvement in COVID-19 patients are still unclear. Most of the cardiac involvement reported in the initial studies were not clinically significant and did not affect the clinical course of the disease. In the patient with the possibility of cardiovascular involvement, three principles should be considered. First, the patient should not be missed or delayed diagnosis, should not lead to deprivation of patient of classical treatment of heart disease. Second, unnecessary or non-emergency interventions in the acute COVID-19 disease should not delay or interfere with the treatment of COVID-19 disease. Unnecessary interventions should be avoided, which may be associated with more complications at this phase. Third, the unnecessary exposure of medical personnel and the contamination of devices such as echocardiography and angiography, CT angiography, MRI, etc. should be reduced to a minimum. It seems that the patients who have obvious symptoms of heart disease and also whose clinical symptoms cannot be explain with COVID-19 alone (such as chest pain or shortness of breath disproportionate to pulmonary involvement, symptoms of pulmonary edema, etc.), as well as patients with multiple cardiovascular risk factors are among the patients who should be evaluated for cardiovascular disease at the time of hospitalization or during treatment.

Preliminary examination may include cardiac biomarkers (such as troponin or di-dimer), ECG and echocardiography as an available screening tool (considering the indications performed in COVID-19 patients, if echocardiography changes the patient's diagnosis or treatment process). If there is abnormal finding, additional options can be requested based on the defined indications. In some centers, Coronary angiography, including primer angioplasty (due to the high probability of complications of invasive procedures in critically ill patients, deprivation of other non-COVID-19 patients due to the need to close the Cath lab to sterile room and also increase the exposure of medical staff) will be done with different guidelines. There are some challenges in Diagnosing cardiovascular disease in COVID-19 patients. In Covid-19 patients, 6-9% of cardiac troponins have been reported positive, and it should be noted that any positive troponin is not acute coronary syndrome and can be due to viral myocarditis or non-cardiac causes such as sepsis and cytokine storm, hypotension and Hypoxia, renal failure and etc. Positive Di-dimer does not necessarily mean pulmonary embolism or acute coronary syndrome, and may be due to non-cardiac causes. It should be noted that positive biomarkers for non-cardiac reasons indicate more severe Covid-19 disease and in some studies, there was a relationship between positive biomarkers and increased mortality rate. Non-specific ST / T changes and abnormal repolarization have been reported in COVID-19 patients, and some ECG changes may be non-cardiac. In addition, there are similarities between the symptoms of COVID-19 and cardiovascular diseases, on the other hand, sometime the symptoms of COVID-19 are so severe that it causes no attention to the cardiovascular symptoms. The prevalence of arrhythmias is also higher in COVID-19 patients than in the normal population. Fever, sepsis and cytokine storms may have a role. The most common arrhythmia was sinus tachycardia, and with less prevalence PVC / PAC has been reported. Control of fever and infection, treatment of hypoxia and acid-base disorders are initial treatment. Sometimes Atrial fibrillation occurs in these patients, which requires rate and rhythm control and anticoagulation. Attention to QT in prescribing drugs that prolong QT should be considered before starting medications. Another important point is that despite not expecting a reduction in heart disease during the COVID-19 era, in most communities during the peak period, a decrease in the number of patients who referred to hospitals with a diagnosis of acute coronary syndrome or exacerbation of heart failure has been reported. Then most admitted patients with chest pain or exacerbation of heart failure are complicated and ill or delayed referral has deprived the patients of classical treatment such as primary angioplasty. Health experts advised to inform the general population for timely referral of patients with cardiac symptoms to medical centers, and health managers are advised to screen upon arrival at the hospital, establish isolated wards in the emergency room, and quarantine wards for admission suspected or COVID-16 patients with coronary artery disease requiring specific cardiac treatment. This can creating public trust to avoid delays in referring to medical centers, does not cause delays in specialized cardiac treatments in COVID-19 patients (of course, based on the center's guidelines).





**Zahra Mousavi**  
Assistant Professor of Psychiatry  
Fellowship of Psychosomatic Disorder  
Psychological Problems in COVID-19

As we all know, Covid-19 has involved more than 200 countries all over the world. This pandemic has caused many physical and mental problems, however psychological issues are higher. People, as well, suffer from many stressor factors and tensions. According to Mr. Holmes and Rahe classified table of stressor factors, the first one is death spouses in which people lose their spouses and many people become irritable and isolate and experience low mood conditions, therefore divorce has increased during this period. Beside of these problems, sleep disorders, financial problems, lower income and loss of work have also occurred. Less accessibility to recreational facilities, death, fear of other's death, consuming drugs and alcohol, fear of getting infected or infecting others have been reported in abundance during this pandemic. The most psychologically affected groups of people during the quarantine are medical staff, children, students, pregnant women, and people with a history of psychological disorders. During the quarantine, communication and social relationships has decreased, anxiety, depression and suicide has increased, and people worry about running out of food. Furthermore, is a decline in sources of information, and sometimes people like to distance themselves from sources of information, and as a result, the right behaviors to reduce pollution and infection are difficult. The most vulnerable group of people who needs intervention are medical staff and their families. There is a concern in this group from getting infected and infecting their family members. The power of concentration and decision-making decreases and insufficient rest increases errors. Studies have shown that the quality of sleep in this group, especially among women, have been disturbed. Nurses who are not on the front line suffer more stresses than frontline health care workers and general population. In this group, anxiety, depression, anger and disturbed sleep quality has increased more. Numerous longer shifts for hospital nurses, short sleep hours, less time-off, lack of adequate safety resources and inadequate ventilation increase the problems. The next vulnerable group is students. Students are worry about their jobs, future careers, education, work, loss of relationships, delay in marriage and financial problems. In pregnant women, preterm birth, increased pregnancy poisoning with detergents and cleaning products, increased nausea and vomiting and low birth babies are seen. Another important issue that is obvious in pandemic condition in all countries is the COVID-19-related conspiracy beliefs. Some people in communities assume that the events related to the COVID-19 spread seemingly have been created by a particular sect or political group. This issue becomes worrying when it comes to receiving vaccine, as it drastically decreases the capacity to admit treatment. Role of psychiatrists is particularly significant at this stage to increase treatment acceptance by increasing analytical thinking and motivational interviewing. Treatment in this course includes, medication and psychological treatment. Psychological therapies include, stress and anger management, cognitive-behavioral psychoanalysis, training how to give bad news to medical staff, motivational interviewing, and increased analytical thinking especially about conspiracy theories. In this regard, online treatment has many benefits, for example, being free, spending less time, not facing the counselor (in the case of people who are afraid of facing), possibility of counseling with the same language and lack of mobility (in the case of patients with physical problems). Disadvantages of this type of treatment is for people who use drugs, intend to commit suicide or due to psychotic disorders have lost their connection with reality. In terms of drug treatment for hospitalized patients, it must be taken more careful interaction cares.



**Sanam Dolati**  
Assistant Professor of Immunology  
COVID-19 Vaccines

The safest way to control the global viral pandemic is to protect over 70-75% of the population, therefore universal vaccination is the solution. Simultaneously with the outbreak of the Covid-19 virus, scientists in many countries has begun efforts to produce coronavirus vaccine. So far, about 220 vaccine candidates are undergoing animal studies or different phases of clinical trials. Among these, currently, about 87 vaccines are in the animal phase studies, 39 vaccines in human phase 1, 17 vaccines in human phase 2, 13 vaccines in human phase 3, and 5 vaccines for limited or early use before the phase 3 results are complete, including Cansino vaccine, Sinovac and Sinopharm vaccines, and Sputnik V vaccine. **An effective vaccine has four characteristics:** 1) Prevent the person from getting infected. 2) Prevent symptoms. 3) Prevent severe forms of the disease. 4) Prevent transmission to others. It usually takes a long time to produce a new vaccine and get its approvals. In addition, there are problems with public access to vaccines, including mass production capacity, which requires new equipment and industries. Make the vaccine available for those who account in priority group makes it a complex matter. Thus, the World Health Organization has made efforts to develop a practical strategy for funding and equitable distribution of COVID-19 vaccines. COVAX Facility, the global alliance, has dedicated aims for accessing to the COVID-19 vaccines in order to accelerate the development, production and equitable distribution to all around the world. Its purpose is to prevent vaccine hoarding by the government, so that it can be used in a justice way for people in all countries. 184 countries have already signed cooperation agreements in this program. According to the World Health Organization, COVAX facility plans to vaccinate 20 percent of the country's high-risk population and will also provide almost 2 billion doses of the vaccine by the end of 2021. **Production of a new vaccine requires animal studies and 3 major human phases (clinical trials).** Phase 1 evaluate the safety of the vaccine and its ability to stimulate the immune response, which is done on limited number of people (a few dozen people). Phase 2 is done on a larger number (several hundred people) to assay the safety, an appropriate dosage of vaccine and type of injection. Phase 3 is done for evaluating the side effects of the vaccine on several thousands of people in different age groups, which can finally be approved by the Food and Drug Administration (FDA) if it has obtained the efficacy more than 50%. Phase 4 monitors vaccine efficacy after availability on the market. **Types of vaccines** First-Generation vaccines include live attenuated or killed and inactivated viruses. It is likely that the attenuated strain of the virus in the body returns to an infectious state and dangerous form and leads to a permanent and deadly infection, such as flu vaccine. The vaccines of Sinovac and Sinopharm are produced based on inactivated virus. Sinopharm vaccine in phase 3 has been using in the UAE, Bahrain, Jordan and Egypt. Sinofarm vaccine has recently been declared 86% efficiency in the UAE. Sinovac vaccine had received Emergency Use Authorization in eastern China in August. It is clinically in progress in phase 3 in Turkey, Indonesia and Brazil. Biofarma (Indonesia's pharmaceutical company) has recently declared 97 percent effectiveness of Sinovac vaccine. These vaccines can be stored at 2-8 ° C. Sinopharm and Sinovac vaccines are administered in two doses which are given two weeks apart. Iranian vaccine is based on the inactivated virus which has been started its human phase on Dec 29th, 2020. Subunit vaccines are another type of vaccine that consists of several protein antigens or recombinant protein components. For these type of vaccines

adjuvants are needed for better stimulation the immune response. NVX-CoV2373 vaccine contains a full-length, prefusion spike protein along with saponin adjuvant. NVAX Company has announced that in cooperation with the Serum Institute of India can supply 2 billion doses of vaccine in 2021. The third generation of vaccines are DNA-based. When DNA enters into the host cell, it expresses virus spike proteins by using the transcription and translation mechanisms of the host cell. It doesn't require the cold chain so is resistant to environmental conditions. **Some disadvantages of this type of vaccine include as following:** Due to the DNA structure, it is probable to be located in the host cell genome, leading to activating of oncogenes and inactivating of tumor suppressor genes and possibility of autoimmunity and similar conditions to lupus (anti-DNA antibody). One of these vaccines is INO-4800 vaccine which is in phase 2 clinical trial. Viral vector-based vaccines in which part of a virus genome is inserted inside another virus (adenovirus). Adenovirus, in fact, is weakened type and has no reproductive power and is not dangerous. These vaccines are cheaper than other vaccines and can be stored at 2-8 degrees. Sputnik V-Gamaleya vaccine (Russia), Johnson & Johnson (American company), Chinese CanSino vaccine and Oxford-AstraZeneca vaccine are vector-based vaccines that are in phase 3 clinical trials state. The Sputnik V vaccine has 91 percent efficacy and has been predicted to present 1.2 billion doses to countries around the world by 2021. AstraZeneca Pharmaceutical Company has announced that it will produce and supply more than 3 billion doses by the end of next year. Sputnik V and AstraZeneca vaccines are given in two doses. The second dose will applied 28 days after the first dose. Johnson & Johnson and CanSino vaccines are administered in one intramuscular dose. The new FDA-approved Pfizer-Biontech and Moderna vaccines are based on the mRNA molecule. Once the genome sequence of the Covid-19 virus's spike protein has been identified, and availability of the relevant genetic code, synthetic RNA can be generated in the laboratory by using specific selective enzymes. The mRNA molecule is an unstable molecule packed into extracellular vesicles structures of a Lipid-Based Nanoparticles. After injection of the vaccine, the mRNA molecule uses cellular machinery to produce viral proteins that stimulate the immune response and cause to the production of antibodies and activation of T lymphocytes. The mRNA strand doesn't enter the host cell genome. As a result, it is less likely to cause cancer. It doesn't contain infectious particles. Mass production is possible in a short time. These vaccines require a cold chain. Pfizer vaccine with 90% effectiveness needs to be stored at a temperature of -70 °C. Moderna vaccine can be stored and delivered at a temperature of minus 20 °C with 94.5% effectiveness. The recommended interval between doses is 21 days for Pfizer-BioNTech vaccine and 28 days for Moderna. BioNTech-Pfizer has now promised to supply around 1.3 billion total doses by the end of 2021. Side effects of the Pfizer vaccine include an anaphylaxis-like reaction seen in people with severe allergies. Anaphylaxis-like reaction emerged after the first dose of the Pfizer-BioNTech COVID-19 vaccine.





**Sarvin Sanaie**  
Assistant Professor of Nutrition  
Nutritional Challenges in Patients  
with COVID-19

Patients with COVID-19 requires nutritional supports along with other therapeutic interventions. One of the major problems in these patients that affects their food intake is anorexia which has been suggested as the most common gastrointestinal finding of these patients. Another gastrointestinal problem is nausea and vomiting which can reduce food intake. Anosmia and ageusia, which are common symptoms of this disease affect patients' food intake as well. On the other hand, an inflammatory process occurs during the disease and the patient experience a hypercatabolic state and increased protein catabolism. So due to the reduction of calorie intake in one hand, and an increased catabolism on the other hand, the patient with COVID-19 will require a proper nutritional support. Obesity, as well as, is an important issue in patients with COVID-19. Obesity along with diabetes, cardiovascular disease and immune deficiency are important risk factors for COVID-19. A study published in early 2020 identified obesity as the Achilles heel of COVID-19 and noted that obese patients showed poor outcomes. Moreover, most of the patients who require hospitalization, ICU admission and mechanical ventilation are obese patients. Mortality among these patients is also high, because in addition to obesity, its comorbidities such as type 2 diabetes, hypertension and cardiovascular disease also increase mortality. By regarding the effect of obesity on COVID-19, the following issues are important: Obesity affects on lung function by reducing expiratory reserve volume, reducing the functional capacity of the lungs and the compliance of the respiratory system. In particular, abdominal obesity with pressure on the diaphragm reduces diaphragmatic excursion and makes ventilation more difficult,

especially in the supine position, and impairs lung function. Obesity also increases inflammatory cytokines in the body and affects the immune response by destroying the integrity of the lymphoid system, changes in the development and function of leukocytes, changes in the innate and acquired immune response and the ratio of CD8 to CD4 T lymphocytes and reduced regulatory T cells. Currently, there is no definite guideline for nutritional therapy of Covid-19 obese patients. WHO and European Association for the Study of Obesity recommend weight loss by applying a proper low-calorie diet. The proper diet is very important during the pandemic period, because quarantine and staying at home can result in boredom which increases food and calorie intake. Likewise, the stress a person experiences during this period can lead to excessive food intake. Especially tendency for processed and junk foods increase at this time. In fact, an increase in macronutrient intake and a decrease in micronutrient intake occur due to the low nutritional value. Furthermore, voracity to carbohydrates grows, which can be considered as a defense mechanism against stress and depression and also can be an anti-stress self-treatment. Carbohydrates increase the secretion of serotonin and has a positive effect on mood, so this issue eventually becomes an unhealthy nutritional habit and causes obesity. On the other hand, stress causes sleep disturbances which in turn exacerbates stress and rises food intake and, as a result, there is a vicious cycle. The advice that can be given to people during quarantine period is to consume healthy food containing or stimulating the synthesis of serotonin and melatonin, such as vegetables, fruits, like bananas and berries, nuts and oatmeal. In addition, diet including foods high in tryptophan, which is a serotonin precursor and an inhibitor of neuropeptide Y (an orexigenic neuropeptide), is recommended. Regarding micronutrients and supplements, and according to evidences vitamin C, vitamin D, and zinc are beneficial for patients with COVID-19. Vitamin C is the most studied supplement, especially in the ICU. Since vitamin C is an antioxidant with anti-inflammatory and

immune-modulatory properties, the need for it increases under oxidative stress. Moreover, COVID-19 can cause sepsis and acute respiratory distress syndrome in severe cases, so the potential role of high doses of vitamin C in reducing inflammation and vascular damage has been investigated. At present, the COVID-19 Treatment Guideline Panel hasn't been recommend anything for or against taking this vitamin, and now many clinical trials are underway to evaluate its effectiveness. In addition to Vitamin D role in bone metabolism, it modulates the innate and acquired immune response through its receptors at the level of B and T lymphocytes and APCs. However, World Health Organization has not made any new recommendations of using vitamin D supplements to prevent COVID-19, and there is still insufficient evidence of vitamin D administration for patients with COVID-19. Vitamin D supplementation program should be implemented based on the national guidelines of the Ministry of Health's Community Nutrition Improvement Office for different age groups, and it should be supplemented in the cases which is diagnosed by the physician in accordance to the treatment protocols. It has been demonstrated that high intracellular zinc (Zn) levels impair the replication of a number of RNA viruses, but whether low zinc levels exacerbate COVID-19 or supplementation with zinc have positive effects has yet to be investigated. At the present time, COVID-19 Treatment Guideline Panel has not recommend receiving zinc in excess of the recommended daily allowance (RDA). Moreover, many studies have been done on the effects of other micronutrients such as vitamin A, Beta-Carotene, Selenium, Vitamin E, B Magnesium, Omega-3 fatty acids, Polyphenolic and Flavonoid compounds such as Quercetin, Hesperidin, and probiotics in patients with COVID-19. In general, all of these supplements are currently considered as potential candidates for supportive treatment of COVID-19, and further studies are required to confirm their efficiency. And also, it is very important to keep in mind that supplements can have various side effects, so it should be avoided of drug arbitrary consuming.



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