A NUTRITION VIEW OF COVID 19 IN THE PANDEMIC

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ABSTRACT

COVID-19 is a disease caused by a coronavirus, called SARS-CoV-2. This virus has become a major public health concern worldwide, causing a collective outbreak, leading to the pandemic in 2020. People become

infected with other common coronaviruses throughout their lives, but currently the concern is the COVID-19 type due to its severity in some cases. The immune system protects the body against external aggressions and preserves the body's homeostasis, and nutrients are involved in the development and preservation of this system. Considering the degree of complications that can occur in an individual with COVID-19, regardless of their age group, and in some cases even lethal, there was an interest in researching studies about this disease, and which nutrients are mentioned in the literature regarding immunity in this disease. The aims of this research were to describe concepts about the disease COVID-19 and to identify nutrients involved in the immunity and treatment of this disease, through a literature review in the period from December 2019 to October 2020. There is no doubt that it is essential to maintain an adequate nutritional status, through a balanced diet that can contribute to a better coping with the infectious state. Supplementation of vitamins, minerals, probiotics and prebiotics can provide the immune system, several of them were cited as an adjunct to the treatment of COVID-19, including their doses, but there was a lack of agreement regarding the dose of nutrients. Obviously maintaining social distance, wearing masks and proper hygiene are essential to reduce the risk of contamination, while not having access to vaccination.

Keywords: COVID-19, nutrition, immunity, SARS-CoV-2, nutrients.

1. INTRODUCTION

The coronavirus, COVID-19, has become the main public health concern worldwide, causing a collective outbreak, leading to the pandemic. It was first diagnosed in December 2019 in Wuhan, China, from where it spread rapidly to many other countries [1, 2].

According to WHO [2] the number of cases on November 20, 2020 in the world reached 56,623,643 confirmed cases and more than 1,355,963 deaths, varying depending on the region: in the Americas region 24,035,426 confirmed cases, 690,020 deaths; Europe 16,353,141 and 365,480; Eastern Mediterranean 3,725,280 and 94,332 deaths; in Africa 1,431,795 and 32,232 respectively, finally globalized growth, and in some recurring places.

The human coronaviruses were isolated for the first time in 1937; however, it was in 1965 that the virus was described as coronavirus, due to the profile of its microscopy, looking like a crown. Most people become infected with common coronaviruses throughout their lives, which are alpha coronavirus 229E and NL63 and beta coronavirus OC43, HKU1 [3]. However, currently the concern is the type of coronavirus COVID-19 due to its severity in some cases. Preventive solutions to control the level of spread of the virus are necessary, such as social withdrawal and hygiene measures [4].

COVID-19 is a disease caused by the coronavirus, called SARS-CoV-2 (SARS = “Severa Acute Respiratory Syndrome”). It is a virus family that can cause respiratory infections and other clinical complications, and in its severe form, it can evolve to intense inflammation, triggered by an exaggerated immune response – a ¨storm” – of cytokines that can lead to damage to various organs, leading to death. Antioxidant compounds can be considered in an attempt to reduce this storm associated with the virus [3, 5].

Patients may present asymptomatic infections to severe respiratory complications, ranging from a simple cold to severe pneumonia. They may present other symptoms such as: cough, fever, runny nose, sore throat, anosmia (loss of smell), ageusia (taste change), asthenia (tiredness), hyporexia (decreased appetite), dyspnoea (shortness of breath), gastrointestinal disorders (nausea/vomiting/diarrhea). Most of the contaminated 80% are asymptomatic or oligosymptomatic (little symptoms) 20% may need hospitals due to complications with respiratory problems and 5% may have ventilatory support needs [3].

The maintenance of the immune system is necessary to produce responses to infectious agents, for regeneration and to prevent the worsening of diseases. Scientific studies prove that the deficit of nutrients in food and malnutrition are directly linked to the immune system: when you have good nutrition the immune system is more resistant. It is necessary to have a healthy diet, an active life regardless of age to sleep well. For good immunity, these are the main defenses against infectious agents [3, 6]

The elderly and the chronically ill are the groups with the highest risk of infection, being exposed to the highest risk of mortality. An individual aged 60 years or more has a greater chance of decreasing the functions of the immune system, in addition to presenting gradual loss of muscle mass and skeletal function (sarcopenia), triggering an increased severity of infectious diseases that can complicate with COVID 19. They are more prone to a higher mortality rate associated with viral infection, and they can even reach more severe stages of COVID 19 [7, 8].

According to Ros [9], another group of patients considered to be at greater risk is the obese and patients with comorbidities, as they may have greater chances of complications with COVID-19, such as diabetes, cardiovascular diseases and systemic arterial hypertension. These complications are frequently caused by inadequate eating habits, further compromising the treatment of infected patients.

The entire population was affected by social distance, but the elderly are the population most affected by the measures of social isolation and reduction of the contagion of the virus, implemented worldwide. On the other hand, social isolation can expose them to a greater nutritional risk due to factors such as socioeconomic insecurity, which can affect the acquisition of food, the need for support in daily tasks and meals. Elderly people often depend on food donations, which may have decreased due to the economic crisis caused by the pandemic in addition to the aging process itself, changes in nutritional needs and eating habits [10].

COVID-19 reactivated discussions on the importance of food, food security, nutrition and hunger, now more emphasized by the emergence of the pandemic, involving the extent and magnitude of nutritional and social problems. In Brazil, involving the three spheres of government (federal, municipal and state) to ensure access to adequate and healthy food, highlighting that this is a right of all, with a view to reducing nutritional deficiencies and the negative impacts of the disease on the condition of food, health, nutrition and immunity, especially in the most vulnerable [11]. The pandemic affected several countries in the world and in some situations led to the financial crisis, that is, no income, no food or less food, affecting the entire food system and revealing its fragility [2].

Through these described aspects, the degree of complication that an individual with the COVID-19 virus can reach, regardless of their age group, being in some cases even lethal, the interest in researching concepts about this disease arose, and which nutrients are mentioned in the literature regarding immunity.

Thus, the aims of this research were to describe concepts about COVID-19 disease and to identify nutrients involved in immunity and treatment of this disease.

2. METHODS

This research was developed through a bibliographic survey of scientific articles in the databases Scielo, Google Scholar, MedLine and social media when articles with interesting titles were published in academically respected magazines. The websites of the Ministry of Health (MS) and the World Health Organization (WHO), Federal Council of Nutritionists (CFN), were also used from December 2019 to October 2020. The keywords used for the research were: COVID- 19, nutrition and immunity. Articles that did not address the objectives of this study were excluded.

3. RESULTS AND DISCUSSIONS

3.1.General Aspects

One took steps to select the articles according to the flowchart shown in Figure 1. One found 218 articles, and 26 were used for the development of this research due to their titles and objectives of this research. Their languages were: Portuguese (18), English (7), Spanish (1).

The nutritional status directly interferes with the immune response, so in individuals with nutritional deficiencies, there is a higher incidence of development of various diseases and the recovery from the disease is slower. In this context, the use of food supplements as a complement to feeding can bring benefits in relation the immune response, reducing the power of infection of certain pathogens, or even accelerating the individual's recovery process [6].

Zhang and Liu [4] suggest the importance of checking the nutritional conditions of each infected patient and, based on a review of the literature regarding the forms of treatment, they mentioned some nutrients that could be considered as therapy: vitamins A, B2, B3, B6, C, E, and the minerals Selenium and Zinc. A balanced diet is capable of providing nutrients such as vitamins A, D, C, B complex, Iron, Zinc and Selenium, among others, which can act positively on the immune system. However, the use of supplementation can improve immunity in the treatment of COVID-19 [12].

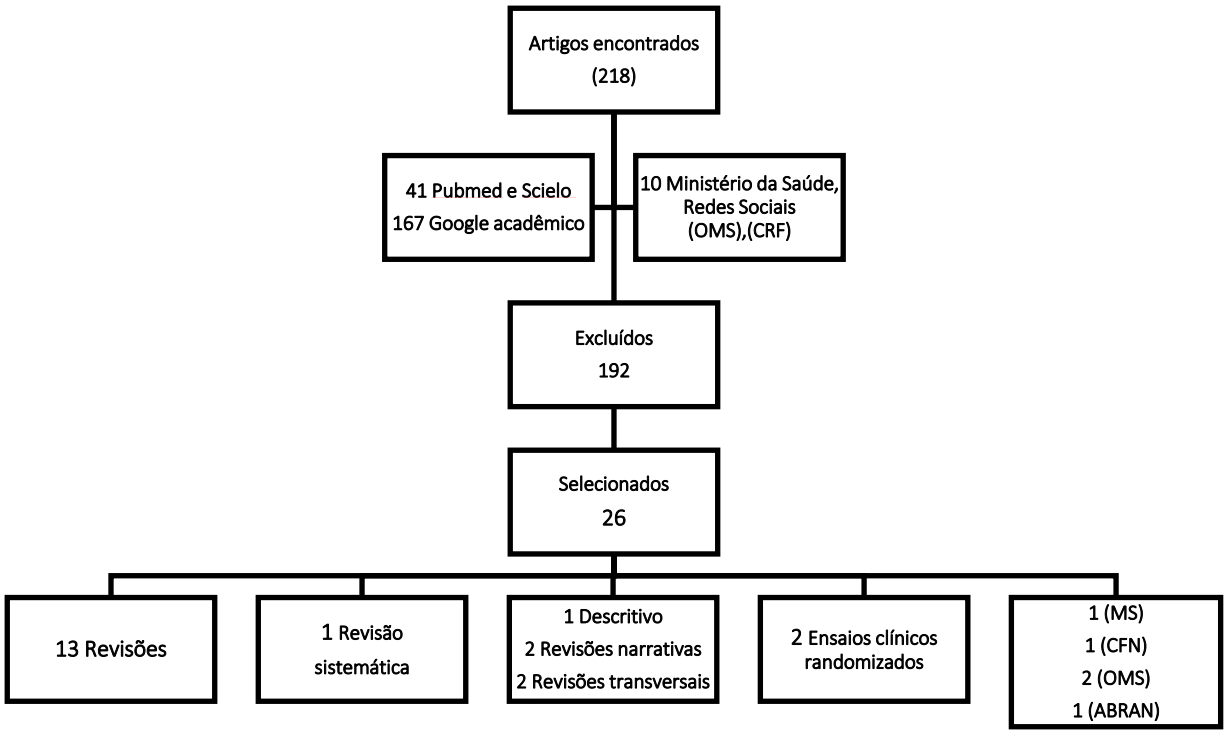

Figure 1-Fluxogram of the selected articles

Food supplements with vitamins, minerals, bioactive substances and probiotics, foods with claims of functional property, are defined in Brazil by the ANVISA (National Health Surveillance Agency), through resolution No. 243/2018. According to this resolution, food supplements can be defined as a "product for oral ingestion, presented in pharmaceutical forms, intended to supplement the diet of healthy individuals with nutrients, bioactive substances, enzymes or probiotics, isolated or combined". Food supplements cannot contain on their labels claims for medicinal or therapeutic purposes, whether preventive, palliative or curative; doses are indicated by the manufacturers for the different populations and also published in Anvisa, vitamins A, B12, B6, B9, C, D, and the minerals copper, iron, selenium and zinc are allowed in the labels "auxiliary in the functioning of the immune system". [6, 13].

Diagnosing the risk of malnutrition should be an initial step in the general assessment of all patients in the population at risk, such as the elderly, individuals with chronic diseases, with obesity, acute diseases and children. Thus, the use of nutritional screening methods, such as MUST * and NRS2002 ** can contribute to diagnosis and nutritional treatment [7].

∗Critério Must : See at: https://www.bapen.org.uk/screening-and-must/must-calculator.
∗∗NRS-2002 : See at: https://www.mdcalc.com/nutrition-risk-screening-2002-nrs-2002.

Malnutrition must be diagnosed not only by low body mass index, but also by the inability to preserve healthy body composition and skeletal muscle mass. Therefore, it is important to offer an adequate nutritional supply to patients at different times of the disease. Caloric needs can be identified by means of indirect calorimetry or as alternative prediction equations or weight based formulas, these are presented below in Chart 1 [7].

The protein must be individually adjusted in relation to the nutritional status and level of physical activity, severity of the disease and tolerance of the patient. For the elderly, 1 g of protein per kg body weight per day. Equal or above 1 g for hospitalized polymorphs to prevent weight loss, reduce the risk of complications, hospital readmission and improve the functional result. At a critical moment in the evolution of the disease, the protein intake must be increased to 1.3 kg. While the fats and carbohydrates will have to be adapted to the 30:70 total calories in individuals without respiratory deficiency and 50:50 ventilated patients. Obviously assessing your best route of administration of the diet whether oral, enteral or parenteral [7].

Chart 1: Formulas for calculating caloric needs based on weight based formula per day

27 kcal/kg body weight/day for polymorbid patients aged > 65 years **30 kcal/kg** body weight/day for severely underweight polymorphic patients In elderly people, this value should be adjusted individually in relation to nutritional status, physical activity level, disease status and tolerance. The target of **30 kcal/kg** of body weight in severely underweight patients should be gradually evolved to avoid the refeeding syndrome. In a critical patient with enteral feeding, it is recommended to start the more gradual caloric intake **20 kcal/kg** of body weight, increasing from 50 to 70% of energy on the 2nd day and reaching 80 to 100% on the 4th day. If intolerance to enteral nutrition is present, parenteral nutrition should be considered

Source: Adapted from ESPEN, 2020 [7].

In another study, one showed that patients with COVID-19 should have an intake of 1.5 g of protein per kg, 25-30 kcal per kg of weight. Vitamins A, B6, B12, C, E, folate, trace elements such as zinc, iron, selenium, magnesium and copper help the immune system and can promote the recovery of inflammation. On the other hand, the lack of micronutrients affects immune function negatively and may decrease resistance to infections [5].

Malnutrition is associated with affected immunity. Among the micronutrients that play important roles in the immune response, one can highlight vitamins A, D, C, E and complex B. Several studies have shown that vitamin A can lead to reduced complications and mortality from various infectious diseases and vitamin C can reduce the rate of pneumonia. On the other hand, several studies have reported that deficiency of vitamins B, D and E can make the body more vulnerable to the virus and impair immune system responses. Effective medications are needed for treatment, to improve the regulation of the immune system and the condition of the patient, due to the wide severity and mortality rate. Studies have pointed out the effectiveness of multivitamin supplementation, including vitamins A, B, C, D, E in improving and mortality rates in patients with COVID-19 in intensive care units in Iran [14].

There is no consensus or recommendation for the specific use of nutrients in the literature that points to the reduction of viral load in infections, increased immune response or prevention of acute or chronic

viral conditions. However, one can identify some aspects in the literature that may contribute to this pandemic moment of COVID 19, in Tables 1 and 2, in addition to the contextualized ones.

Table 1 – Vitamins and benefits against COVID 19

Nutrient	Benefit	Recommendations
Vitamin A	Anti-infectious, helps in the defense of the organism against infections [15, 16]	Adults: 700 mcg/day for women; 900 mcg/day for men [16].
Complex B vitamins	It has an anti-inflammatory effect acting on the immune response; Indicated as a basic treatment option for COVID-19 [4, 14]	In patients ICU from 20 to 60 years: B2 -3.6 mg/day; B5 – 15 mg/day and B6- 4.0 mg/day [14].
Vitamin C	Antioxidant and positive impact on the immune system; Protects the body against infections, prevents respiratory infections, relieves flu-like symptoms. Improved flu symptoms [5, 16 – 19].	1 g/day respiratory infections does not prevent, but is able to reduce or alleviate them; 1-4 g /day for ICU patients [5]. 2g/day [16].
Vitamin D	Modulation of the immune system decreases viral replication, increasing innate immunity [14, 16].	From 1 to 12 years old: 3,000 to 6,000 IU/day, taken orally; 12 years or more: 6,000 IU/day, orally [20]. General dose to risk group: 2,000 – 4,000 orally/day; If vitamin D $\geq$ 20 to 30 ng/ mL in blood: 25,000 IU a week. If vitamin D < 20 ng/mL in blood: 50,000 IU a week [16]. 600,000 IU once (20 to 60 years old) for ICU patients [14].
Vitamin E	Immunological effects, reduces oxidative stress that triggers inflammation [6, 14].	In patients ICU from 20 to 60 yeasr: 2 doses 300 IU /day [14].

In addition to the aforementioned nutrients, it is also important to highlight the polyunsaturated fatty acids (PUFAs) as omega 3, which can be considered functional nutrients, due to their effects. However, so

far there is little evidence of its use as a prophylactic or therapeutic agent against COVID 19 [5, 6]. It is important to emphasize that social and solidarity initiatives, also considering the most vulnerable, with a sustainable view, food and nutrition education through educational programs in the media (television, virtual or radio) can guide and encourage the adoption and maintenance of healthy eating habits for all, with health precautionary measures, in addition to monitoring nutritional conditions, including via online technologies. The nutritionist can contribute by working in multidisciplinary teams in the treatment of COVID-19 and assisting in educational campaigns in its prevention [2, 11, 21].

3.2.Vitamin A

Vitamin A helps in defense against infections, and acts significantly in immunity. There are reports in the literature of the benefit in reducing morbidity and mortality in different infectious diseases, such as measles, diarrheal diseases, measles-related pneumonia, infection by the human immunodeficiency virus (HIV) and malaria. It can be a promising option for the treatment of coronavirus and the prevention of pulmonary infection [4].

As it is not synthesized by the body, it is ideal to obtain through food. The main sources of animal origin are milk, yogurt, cheese, liver meat, fish oils, milk and vegetable origin can be found in carrots, pumpkin, kale, spinach, sweet potatoes, papaya, mango and oil red palm [15].

3.3.Complex B vitamins

The B-complex vitamins are water-soluble vitamins and function as part of coenzymes, with specific functions, such as the following examples: vitamin B2 (riboflavin) which plays a role in the energy metabolism of all cells; vitamin B3 (niacin) was able to increase the death of *Staphylococcus aureus*, and it was effective in preventive and therapeutic contexts, also significantly inhibited the infiltration of neutrophils into the lungs, with a strong anti-inflammatory effect during ventilation and induced lung injury; vitamin B6 is involved in protein metabolism and participates in more than 100 reactions in the body's tissues, also acting on immune function. Complex B deficiency can weaken an individual's immune response. Thus, they should be supplemented in patients infected by the virus to improve their immune system, and can be chosen as a basic option for the adjuvant treatment of COVID -19 [4].

3.4.Vitamin C

The severity of COVID-19 infection in pulmonary deterioration is already known. However, the reason for this rapid deterioration is not yet complete, it is described that it has similarities with the macrophage activation syndrome which is the organism's first line of defense, secondary forms of pro-inflammatory hypersecretion that damage the lungs, hence the intravenous administration of vitamin C may be effective due to its powerful anti-inflammatory activity [18].

In addition, vitamin C, is an antioxidant, has a role in the metabolism of the human body including energy transformations, iron absorption, antimicrobial properties; it reduces the risk of infections, with immunomodulatory functions. Particularly at high concentrations, vitamin C plays a crucial role in immunomodulation, inhibiting the activation of the pro inflammatory transcription factor, genetic regulation and inhibitors of apoptosis (cell death). Vitamin C in high doses can inhibit oxidative stress. An

important part of the innate immune response to viral respiratory infection can progress to lung injury. Oxidative stress can also play a role in the COVID-19 mechanism. It has been reported that Vitamin C can repair oxidative damage in the human pulmonary bronchial epithelium by modulating the generation of reactive oxygen species and inflammatory expression. This vitamin can prevent lung damage, regulating the clearance of alveolar fluid by increasing the function of the pulmonary epithelial barrier, the protein channels that regulate the clearance of alveolar fluid; it can help to decrease symptoms of acute respiratory distress syndrome and improve respiratory function [22].

3.5.Vitamin D

Vitamin D has a protective role in preventing and reducing the risk of acute respiratory tract infections, including viral infections. Vitamin D can be a potential adjunct to the protection and treatment of patients with respiratory viral infections that normally have low levels of vitamin D. During the pandemic of COVID-19, vitamin D supplementation can be an important step in preventing infection and spread. However, the hypothesis that vitamin D supplementation may reduce the risk of SARS-CoV-2 and the incidence of death from COVID-19 is still under investigation, so clinical trials to determine the appropriate doses and prove this hypothesis are fundamental [23].

Vitamin D, through innate immunity, induces catechins and decreases viral replication. It can be obtained in the diet, supplementation, or by solar means. In the skin, it is activated with the incidence of UVB rays [5]. In the presence of a deficit of 25–hydroxyvitaminD (25 [oh], cholecalciferol should be promptly supplied according dot the results os serum levels with 50.000 IU a week if above 20 ng/mL or 25.000 UI a week $\underline{>}$ 20 to 30 ng/ mL and follow the evolution [16].

Martins and Oliveira [19] present in their research several studies by different authors with varying doses of vitamin D. A study in progress in COVID-19 with a single dose of 200,000 IU of vitamin D, another study in 2012 with the same dose in respiratory tract diseases, this did not reduce the incidence or severity of the disease. Another one from 2017 with 100,000 IU of vitamin D in the elderly in preventing acute respiratory infections decreased the incidence of respiratory diseases. Finally the study of Beigmohammadi et al. [14] during of 7 days in patients with covid 19 in ICU used 600.000 IU once.

In a cohort study of 489 subjects who obtained the amount of vitamin D assessed in the year prior to the COVID-19 test, the risk of a positive test for this disease was 1.77 times higher in individuals with probable vitamin D deficiency compared to patients with likely sufficient vitamin D status, this difference, which was statistically significant, appears to be able to support the role of the lower vitamin D level in the risk for COVID-19 [24].

3.6.Vitamin E

It is a group of fat-soluble antioxidants. Vitamin E deficiency impairs immune functions; it can have immune effects by reducing oxidative stress, it is associated with the protection of polyunsaturated fatty acids (PUFAS), it regulates the production of reactive oxygen and nitrogen species, protects cells against oxidative damage due to the high concentration of metabolic activity and the PUFA content. So far, there is no evidence about its use as a prophylactic and therapeutic agent against COVID 19 [5].

With the protective function for the lipid portion of the plasma membrane, reducing oxidative damage, vitamin E is able to regulate the production of reactive oxygen generated from oxidative stress and also reactive nitrogen. Considering immunity, it can increase the production of lymphocytes, decrease the production of interleukin 6, increase the activity of interleukin 2, decrease inflammatory respiratory diseases and prevent infectious diseases [15]. According to Zhang and Liu [4] a study carried out on calves identified that the decrease in vitamin D and E caused the infection with bovine coronavirus.

3.7.Minerals

Copper is associated with the defense cell functions, both in innate immunity and in adaptive immunity, its deficiency is associated with an increase in infections. One found that the SARs-CoV-2 virus is very sensitive to the surface of copper, as exposure of human coronavirus to copper resulted in destruction of the viral genome and affected the morphology of the virus. Copper deficiency is rare and its imbalance is usually related to individuals with severe diseases receiving exclusively parenteral nutrition, which does not include this nutrient [5].

According to Zhang and Liu [4], iron deficiency is associated with a risk factor for diseases resulting from acute respiratory tract infections, while a high iron load can cause oxidative stress to spread harmful viral mutations.

A study carried out at the University of Surrey, in England, published in the American Journal of Clinical Nutrition, was able to identify a link between the recovery rate of SARs –CoV-2 and the consumption of selenium. Selenium is of great importance for human health and can be obtained through a diet that contains fish, meat and cereals, proving to be important in combating various diseases and their progressions. In China, differences in geographic soils affected selenium levels and amounts in the diet to low or high levels. In this study, regional data were examined, where it was found that areas with a high selenium value had greater possibilities for improvement in their COVID-19 condition. In the city of Enshi, which belongs to Hubei province, a higher selenium intake was recorded, and the number of patients' improvement was almost three times the average for all other cities. On the other hand, in Heilongjiang Province, where selenium intake is one of the lowest in the world, the COVID-19 mortality rate was almost five times higher than the average for all other provinces, concluding that the higher the dosage of selenium in the population, the greater the number of individuals with COVID-19 who recovered. The suggested dose was 55 micrograms every day [4].

Zinc is an essential trace element for countless essential human mechanisms. It has amounts ranging from 1.5 to 2.5 g in the body of an adult. Most of this mineral is found in the fat-free mass, mainly inside the cells, in the skeletal musculature and in the bone mass, they have the largest amount of the mineral. The main sources are oysters, red meats, viscera (liver and kidneys), seafood, oilseeds, whole grains, legumes and milk. Fruits and vegetables lack significant amounts of this nutrient. Food from animal sources has the largest source, while vegetables the smallest [19].

Zinc is involved in the regulation of carbohydrate and lipid metabolism. It can modulate antiviral and antibacterial immunity, and regulates the inflammatory response. In vitro experiments have shown that zinc has antiviral activity in the RNA polymerase in SARs-CoV-2, so it is considered that zinc compounds can be used in the therapy of the treatment of COVID 19 [5].

The doses of Zinc also vary, a study in pediatrics has shown that 10 mg and 20 mg in children under 1 year of age improved the respiratory rate and saturation of children with pneumonia and the use of 10 mg zinc associated with vitamin C 1,000 mg per day improved discomfort in colds [19].

Table 2 – Mineral and benefits against COVID

Nutrient	Benefits	Recommendations
Copper	Effective in eliminating virus infections such as bronchitis or polyvirus [5]	Not presented
Iron	Deficiency can be a risk factor for acute respiratory tract infections [4]	Not presented
Selenium	Immunomodulator, acts directly on the immune system. Deficiency of this nutrient can increase the chance of mortality in COVID-19 [4, 16, 25].	Adults: 55 mcg/day [16, 25].
Zinc	Determinant for maintenance of immune function, zinc antiviral activity has been reported by inhibiting viral replication in cell culture, inhibiting the RNA activity of coronavirus [9, 16].	From 20 to 60 years old: 8 mg/day women; 11 mg/day men; 20- 40 mg/day if the patient present diarrhea, taken orally [16].

3.8.Probiotics and Prebiotics

The gastrointestinal tract houses a huge population of microorganisms, called human gut microbiota, which interact with each other on the host's epithelium and immune system. Changes in quantities relative to the population and intestinal microbial diversity can disrupt the beneficial interactions between the microbiota and the host (dysbiosis), with a direct effect on human health. Some patients with COVID-19 infection have gastrointestinal repercussions (abdominal pain, diarrhea) due to direct viral contamination in the intestinal mucosa or consequent to changes in drug treatment. The imbalance of the microbiota can lead to the translocation of gut bacteria, which favors secondary infections and worsens the patient's general condition. Although there is no consensus, recent recommendations indicate that the use of probiotics in COVID-19 infection can contribute to treatment. Researchers are studying the use of probiotics or symbiotic bacteria to reduce pneumonia associated with mechanical ventilation and serious infections [16].

COVID-19 interacts with the intestinal microbiota, and in 5 to 10% of cases, diarrhea and gastrointestinal symptoms were present. There is a cross-interaction between the intestine and lung, called the intestine-lung axis, where endotoxins and microbial metabolites can affect the lung and inflammation of the lung parenchyma and can alter the gut microbiota. Probiotics have shown good results in improving inflammatory conditions and regulating innate immunity. Prebiotics such as fructooligosaccharides (FOS) and galactosaccharides (GOS) increase butyrate concentrations thereby reducing inflammation, while dietary fiber increases short-chain fatty acids (SCFAs) protecting against inflammation in the lungs. The

consumption of whey and pea protein increased the gut bacteria bifidobacterium and lactobacillus. Yogurt probiotics appear to significantly reduce enteropathogens such as *E. coli* and *Helicobacter pylori* [5].

The rebalancing of the gut microbiota can reduce enteritis and pneumonia. Thus, the hypothesis about the use of probiotics, such as *Lactobacillus rhamnosus* and *Bifidobacterium*, may contribute to the improvement of innate and adaptive immunity. The inclusion of prebiotics and probiotics can improve and accelerate the recovery of patients infected with the SARs-CoV-2 virus [5].

4. FINAL CONSIDERATIONS

A healthy diet favors the immune system, contributing to good homeostatic functioning and the actions of nutrients, enhancing the body's prevention of possible viral infections. On the other hand, nutritional deficiency favors the worst prognosis in viral infections. It is noticed that there was a lack of agreement regarding the doses of nutrients in COVID-19, on the other hand, there is no doubt that it is essential to maintain an adequate nutritional status, through a balanced diet that can contribute to a better coping with the infectious state. Supplementation of vitamins, minerals, probiotics and prebiotics can boost the immune system, several of which have been cited as an adjunct to the treatment of COVID-19, including its doses. Obviously maintaining social distance, wearing masks and proper hygiene are fundamental to reduce the risks of contamination, while there is no access to vaccination and its proven effectiveness in the entire population.

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