



Ensuring Athlete Immunity Through Nutrition During the Pandemic Period



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Abstract

The aim of the study was to provide recommendations for increasing the immunity of athletes through regular training as well as nutrition during the pandemic period.

Coronavirus (Covid-19) infection, considered a pandemic by the World Health Organization [37], poses a significant threat to public health as well as to athletes around the world. While the danger of new types of coronavirus has been observed in the world increasing day by day, it stresses the importance of athlete's attention to prevention measures for Covid-19 as well as strengthening the immune system. Although there is no vaccine to prevent or treat coronavirus transmission alone, it is known that healthy and balanced nutrition of athletes strengthens the immune system along with planned and programmed training / physical activity and regular sleep. The healthier nutrition of athletes, when evaluated in the context of the coronavirus pandemic, contributes greatly to improving the performance of healthy athletes, along with training and genetic factors. The higher the athlete's knowledge about athlete nutrition, the higher the rate of application. If we consider the performance of both themselves and the athletes they will train in the future, awareness about athlete nutrition is very important. Health professionals, point out that keeping immunity strong in this process is important because Covid-19 disease degree and risk of death are associated with weakening in the immune system; They say that a diet enriched with vitamins, minerals and antioxidants reduces the risk of developing infectious diseases.

As a result of the study, athletes will learn the right nutrition ways and gain immunity, which becomes even more important during the pandemic period.

Keywords: Nutrition; Athletics; Pandemic; Covid-19, Immunity

Abbreviations: COVID-19: Coronavirus Disease 2019

Introduction

Thousands of people around the world are struggling with this epidemic because of the coronavirus that is experienced in the world, which the World Health Organization also accepts as a pandemic. So, how should it be fed during this period? Many scientists related to coronavirus are working intensively on treatment and healing processes Coronavirus, the immune system is weak and chronic disease people under the influence of more. Because of this epidemic, the importance of strengthening our immune system comes to the fore once again. The solution to this disease is of course not possible with just a medical diet plan, but healthy eating, regular sleep and physical activity can help strengthen our immune system. You should take steps to strengthen your immune system before you catch coronavirus. For this reason, you can start by increasing your consumption of vegetables and fruits first [1].

The source of the word nutrition is the word nutria, a Latin word [2]. According to the World Health Organization, nutrition is the intake of foods that are needed in connection with the body's dietary requirements. Good nutrition, an adequate, balanced diet combined with regular, physical activity, is one of the cornerstones of Health. Poor nutrition can lead to decreased immunity, increased susceptibility to disease, poor physical and mental development, and decreased productivity [3].

Of all the sub-disciplines of sports and exercise science, sports nutrition has been the most important in the past decade [4]. Athletes should seek guidance from qualified sports nutrition professionals who can advise on individual energy, nutrient and fluid needs, and help develop sports-specific nutrition strategies for training, racing and recovery [5]. Coaches have significant effects on their athletes, even in the field of sports nutrition [6].

But in our country, the only profession that is trained in athlete nutrition and can write a diet for athletes is dietitian. Therefore, it will contribute to the performance of athletes to receive nutritional advice from dietitians who are experienced in athlete nutrition. The sports nutritionist should stay up to date on the role of nutrition on training so they can provide athletes with honest and accurate information about the role of nutrition and dietary supplements on performance and training [7]. Therefore, athletes should be referred to a registered dietitian nutritionist for a personalized diet plan [8].

Specific nutritional goals should be set to improve the performance of athletes. Nutritional goals vary from athlete to athlete, the type of sport and the performance expectations of the athlete. The training period of the athlete and the nutrition plan of the competition 4 period also changes. Nutrition goals during competition periods meet the body's need for fuel and improve performance. Improving the performance of athletes is not a condition to be provided with a daily diet. It is a long process for the athlete to train regularly, adapt to the athlete's nutrition plan, increase the muscle glycogen stores, and meet the novelties needed during the competition.

Whether you are an athlete or just going to exercise, pre-feeding with exercise workouts is important for all levels of exercise. Fluid consumption and the type of fluid before exercise or training are also critical [9]. The importance of hydration for performance is undeniable. The athlete's body temperature increases during training or competition. The body begins to sweat in response to this condition. With sweating, loss of water and certain minerals occurs in the body. Not only the athlete's body temperature, but also the temperature and humidity of the environment, such as the circumstances affect the sweating.

Immune system and phytotherapy

Plants have been used in medical treatment throughout human history. Today, interest in herbal treatment has increased all over the world. Plants have also been a guiding resource for synthetic drugs. Viruses, which are the main causes of their disease, trigger a series of diseases by weakening the immune system of the living thing and cause some important diseases [10]. These diseases are a major health issue as effective drugs against Viral infections are still not developed [11]. The effects of antiviral drugs developed today are limited. Given the structural diversity and numerical multiplicity of plant components present in nature, the plant world is a promising resource for new antiviral treatments [12].

There are studies showing that effective results are obtained with Phytotherapy related to strengthening the immune system. Tea made from black elderberry, ginger, sage, black pepper, and balm leaves strengthens the immune system. The flavonoids and anthocyanins in the elderberry plant have an antioxidant effect as well as stimulating the immune system and increasing the body's resistance [13].

The antiviral effect of Melissa Officinalis aqueous extract, which is common in our country and known as Son weed and is used for the healing effect of herpes especially from daily ailments, against herpes virus was proved by researchers in 2 clinical trials and 3 *in vitro* studies. Clinical trials for the antiviral effect against Herpes Labialis virus and *in vitro* studies against HIV, Influenza and Vaksinia viruses, respectively.

As a result of the studies, melissa cream showed positive results in reducing complaints and treating infections in Herpes simplex lesions. The volatile components contained in Sage are known to be beneficial in infections and inflammation (pharyngitis, jingivitis, etc.) that settle in the mouth and throat [14].

In recent years, the effects of piperidine in black pepper on the central nervous system, stimulants, painkillers, and fever-reducing effects have also been identified. Omega-9 fatty acids found in oils such as olive oil and nut oil also positively affect the immune system.

The effects of food on immunity

Vitamin A: Vitamin A is a powerful vitamin in yellow, orange and green vegetables and fruits such as eggs, milk, fish, spinach, oranges, carrots, yesilbiber, apricots, and certain amounts of these foods play an important role in preventing diseases. Vitamin A is a powerful antioxidant vitamin that fights free radicals, promotes skin and eye health, Fights Cancer by blocking DNA mutations in cancerous cells and delays aging. In foods, vitamin A is found as retinol and vitamin A precursor carotene. The daily requirement is 1000mcg for adult male and 800mcg for female.

Vitamin C: Vitamin C helps to remove harmful substances from the body and strengthens the defense system. Green pepper, parsley, Cress, arugula, cauliflower, spinach, orange, lemon, tangerine, rosehip contains plenty of vitamin C. To prevent vitamin C loss, salads should also be prepared just before they are consumed, such as fruit juices. The deficiency can cause symptoms such as immune system, gingivitis, and easy bruising. Conversely, getting enough can help protect against disease and infection, increase iron absorption, and even reduce the risk of painful conditions such as gout. 3 servings of fruit should be consumed every day to increase the consumption of vitamin C, besides adding plenty of lemon salad must not neglect to your meals. The amount required to take Vitamin C daily is 50-75mg per day for adults.

Vitamin E: The most important feature of vitamin E is that it is a powerful antioxidant. Nuts, walnuts, almonds, Yesil seeds, oils, green leafy vegetables, dried legumes are rich in vitamin E. Daily requirement for adults is 8-10mg/day.

Vitamin B12: Vitamin B12, also called cobalamin, is a water-soluble vitamin that is present in every cell of the human body. Vitamin B12 is the largest of the eight vitamin B varieties. B12 deficiency is thought to be one of the leading nutrient deficiencies

in the world. Vitamin B12, which protects against depression, benefits our mood, energy levels, memory, heart, skin, hair, digestion and much more. It is also an essential vitamin in adrenal gland insufficiency, enzyme production, formation of multiple metabolic functions including DNA synthesis and hormonal balance, and protection of nervous and cardiovascular systems. The amount of B12 that should be taken daily is recommended for adults between 2-3 micrograms/mcg and 4-7 micrograms/mcg per day. The amount of need in pregnant women and breastfeeding is increasing.

Vitamin D: Vitamin D strengthens healthy bone structure and immune system, helps prevent depression and insulin resistance, can have anti-cancer properties. The amount of Vitamin D needed to be taken daily is around 4000 units per day and 1000-1500 units in the first age. Vitamin D regulates calcium and phosphorus absorption and metabolism and plays a key role in maintaining bone health [8].

Vitamin K: It is an important fat-soluble vitamin that plays an important role in bone and heart health. It is one of the main vitamins involved in bone mineralization and blood clotting, as well as helping to maintain brain function, maintain a healthy metabolism and protect against cancer. The daily dose of Vitamin K required for adults is 65-80MCG.

Omega-3: Omega-3 fatty acids found in fish, fish oil, nuts and walnuts are a powerful antioxidant, and Omega-9 fatty acids found in oils such as olive oil and hazelnut oil also positively affect the immune system in strengthening the immune system.

Iron: Iron deficiency, with or without anemia, can impair muscle function and limit work capacity 78,81 leading to compromised training adaptation and athletic performance. Suboptimal iron status often results from limited iron intake from heme food sources and inadequate energy intake (approximately 6mg iron is consumed per ~1,000 kcals). 82 Periods of rapid growth, training at high altitudes, menstrual blood loss, foot-strike hemolysis, blood donation, or injury can negatively impact iron status. 79,81 Some athletes in intense training may also have increased iron losses in sweat, urine, feces, and from intravascular hemolysis [8].

Zinc: Zinc is one of the most effective minerals that boosts the immune system, reducing the frequency of life-threatening infections. The best sources are animal-derived foods such as red meat and shellfish and liver. Zinc is found in animal protein sources such as meat, fish, eggs, as well as pumpkin seeds and almonds.

Probiotics: Myco organisms that help regulate the digestive system and thus positively affect immunity are called "probiotics". Probiotics help the gut's natural flora to create a barrier against all kinds of pathogens, namely harmful organisms that cause disease. A large part of the immune system's cells is found in the intestines, and having strong intestines means that the immune system is also

strong. Yoghurt contains probiotics that strengthen both the gut flora and the immune system. Because it regulates the intestinal flora, it lowers the risk of colon cancer, and because it strengthens immunity, it increases resistance to allergic diseases. Yogurt has a low lactose content compared to milk. For this reason, yogurt consumption is appropriate for individuals who cannot tolerate milk.

Calcium from yogurt also speeds up fat burning. Yoghurt also contains potassium, phosphorus, riboflavin, iodine, zinc, vitamins A, E and B. This makes yogurt a powerful protective food against gastrointestinal disorders, bad cholesterol leading to hypertension, and cardiovascular diseases. In addition, it was determined that the risk of breast cancer decreased due to the consumption of fermented dairy products, especially yoghurt [15].

Honey, garlic, and black elderberry: Honey is used as a natural remedy for infections in the mouth, throat, and bronchi. Garlic also contains high amounts of saponin, phosphorus, potassium, sulfur, zinc, moderate amounts of selenium, vitamins A and C, and small amounts of calcium, magnesium, sodium, iron, manganese, and B complex vitamins. The drugs prepared from the fruits of black elderberry are used in the treatment of upper respiratory tract infections. Black elderberry has both an immune-boosting effect and an antiviral effect. With the right choice of foods, we consume and the fact that we can fight many diseases with protective or therapeutic plants, we can live a healthier life with the right treatment approaches of specialist physicians and the possibilities of today's medicine. It is important to remember that herbal treatments and foods may have interactions with the drugs we use, that is, they may decrease and increase the desired effects of the drugs. Before applying these treatments, the physician who has undertaken the treatment should be consulted.

Foods to be avoided in Coronavirus outbreak: Food and beverages that should be limited during this period; sugar and sugary foods and beverages that rapidly increase blood sugar, pastry products including white bread, processed meat products, foods containing excess salt (ready sauces, salty products such as chips, popcorn, salty cookies, etc.). The consumption of alcoholic beverages with high energy content should be limited as much as possible since they can negatively affect the absorption of vitamins and minerals and lead to sleep problems. There is no evidence that alcohol consumption prevents coronavirus infection, and fake drinks containing methyl alcohol instead of ethyl alcohol can cause very serious poisoning [16].

Carbohydrates and athletic performance: Multiple transportable carbohydrates, ingested at high rates, can be beneficial during endurance sports in which the duration of exercise is 3h or more. Carbohydrates are organic compounds composed of carbon, hydrogen, and oxygen elements. Carbohydrates, proteins, and fats meet the body's energy needs. 55-60% of a healthy individual's energy needs are provided by carbohydrates (Wallis).

Carbohydrates are converted into glycogen and stored in the body, novelties, and liver. But these stores are limited [17]. Athletes use a range of dietary strategies to improve performance, maximizing glycogen stores is an important strategy for many people [18].

According to the type of sports and the needs of the athlete, the carbohydrate needs of the athlete should be determined and it should be ensured that the athlete consumes the nutrients he needs in time. Only in this way can optimal performance be achieved for the athlete. Carb needs of the athlete; the body type of the athlete, the training situation, the type of sport performed, the season, the pre-season period, the preparation period, the sex of the athlete and the age of the athlete. The formation of the nutrition plan experienced dietitians and the compliance of the athlete with the nutrition plan can contribute to the performance of the athlete. However, it is necessary to evaluate carbohydrate consumption well. Carbohydrate, which is more than the athlete's need, will be stored as fat in the body. It should be considered that the carbohydrate and energy requirements of the athlete are different during training days, non-training days and race days [19]. The ingestion of a combination of different types of carbohydrate during exercise results in high rates of muscle glucose oxidation (1.5g/min) and can improve intense, short-duration (~60min), and prolonged (>90min) submaximal steady-state exercise, either by metabolic or neural mechanisms.

Protein and athletic performance: Protein consumption in the immediate pre- and post-exercise period is often intertwined with carbohydrate consumption as most athletes consume foods, beverages, and supplements that contain both macronutrients [8]. Strength and endurance athletes indicate that, in fact, exercise does increase protein/amino acid need. Proteins are one of the three macronutrients that provide the energy people need, such as carbohydrates and fats [20]. The Latin equivalent of the word Protein is the essential nitrogen element for living beings. Protein is the structure of the living cell, which is the smallest part of the body, and the enzymes that catalyze metabolic reactions. Protein is essential for growth since growth means the proliferation of cells [17].

The main determinants of an athlete's protein need are the training regime and the usual nutritional intake [21]. Protein needs should be properly regulated in the daily nutrition plan of the athlete and the athlete should comply with the specified amounts. The daily recommended amount of protein for a Normal person is 0.8g/kg/day [22,23]. Assuming total energy intake is sufficient to cover the high expenditures caused by daily training, a diet containing 12 to 15% of its energy from protein should be adequate for both types of athletes.

Fat and athletic performance: Fat is a necessary component of a healthy diet, providing energy, essential elements of cell membranes and facilitation of the absorption of fat-soluble vitamins. Body fat and carbohydrate stores provide the major

sources of exercise fuel; whereas fat sources (plasma free fatty acids derived from adipose tissue and intramuscular triglycerides) are relatively plentiful. Approximately 9kcal of energy is obtained from fat, which provides twice the energy of carbohydrates and proteins. However, as more oxygen is needed during the conversion of fats into energy compared to carbohydrates, fats are not as favorable energy source as carbohydrates. In our daily diet, excess fat is stored in the body and used to create energy when necessary [24].

Fat is a necessary component of a healthy diet and maintaining an adequate intake of fat is crucial to meeting the nutritional requirements of essential fatty acids and fat-soluble vitamins, vitamins A, D, E and K [22,25]. Oil consumption must be 25% or less of daily energy [26]. For athletic performance, fat consumption must come from at least 20% of total energy, according to Clifford and Maloney [22].

Water and athletic performance: Athletes might gain a competitive edge by drinking water that contained extra dissolved oxygen. The notion stems from observations that oxygen breathing during exercise enhances athletic performance. Water is the most important element after oxygen for human life. Although human can survive for weeks without food; waterless but vitality can be maintained for a few days. The water content of the human body varies between 42-71% according to age and gender. Average 59% of adult human body is water [17].

The water loss varies from person to person during training/race. Loss of sweat can be monitored by measuring weight immediately before and after exercise. To prevent dehydration, an athlete should drink 5-7 milliliters (mL) per kg of body mass about four hours before the start of an event [22]. Fluid drunk during exercise is necessary to replace fluids lost in sweat. In most cases, sweat loss rates are higher than drinkable during exercise, so most athletes lose fluid [27]. Compared to sports drinks, water can be replaced with sports drinks for shorter activities. Water consumption is very useful for athletes before and during training [28]. In short sports (less than 60 minutes), the best drink is cold water, it is possible to replace the lost electrolytes with nutrients during these periods [29]. Hypohydration and hyperthermia can adversely affect physiological responses to exercise and aerobic exercise performance. However, these effects can be reduced by proper fluid and electrolyte (sodium) consumption [30]. Drinking a sufficient volume of fluid during physical activity to minimize dehydration is the simplest and most effective way to maintain physiological function and improve physical performance [31]. In a dehydrated athlete, the volume of blood circulating in the body decreases.

Vitamin-Mineral and athletic performance: Micronutrients play an important role in energy production, hemoglobin synthesis, protection of bone health, adequate immune function, and protection of the body against oxidative damage. They help

for the synthesis and repair of muscle tissue during exercise and recovery [32]. Careful monitoring of the micronutrient condition is also important for the prevention of inadequate fatigue and immune disorder caused by deficiency [33]. Vitamins are essential nutrients for life that provide healthy growth and development. By participating in biochemical and physiological processes in the organism; They help create energy from nutrients, normal functioning of the nervous and digestive systems, protect body health and grow. People must take most of the vitamins from outside because they cannot produce them in their own organisms [24].

Minerals are substances found naturally in the earth's crust, and some, like vitamins, are very important for your health and can only be obtained from what you eat and drink [34]. Athletes usually do hard physical training and therefore need more energy intake and micronutrients to meet their needs. Mineral deficiency can impair athletic performance [35]. A liquid multivitamin and mineral supplement will improve athlete's anaerobic exercise performance [8].

Nutritional supplement and athletic performance: The key to healthy and successful athletic performance is a carefully designed, healthy and nutritionally balanced diet and a well-developed training program. No quick fixes or shortcuts to success. In general, healthcare professionals note that vitamin supplements are not necessary for the individual for a balanced diet, but can be recommended for some people, such as the elderly, those who don't eat meat only, and women of childbearing age [36]. In some cases, nutritional supplements may be required for athletes. For example, athletes skipping a certain food due to a food allergy or other medical problem, or athletes on lower-calorie diets may need an additional to meet the recommended daily intake. In addition, dietary supplements may be necessary to treat or prevent a known nutrient deficiency. If a vitamin / mineral supplement is required, it should be part of a total diet management plan and should be prescribed by a sports dietitian or physician [31].

Yarar et al., in his study on elite athletes; athletes use nutritional supplements to increase performance, build muscle and provide fitness. Most of the participants think that the nutritional supplements are useful [37].

Nutrition recommendations for endurance sports: The training diet is to provide nutritional support to allow the athlete to stay healthy and injury-free while maximizing the functional and metabolic adaptations to a periodized exercise program that prepares him or her to better achieve the performance demands of their event. While some nutrition strategies allow the athlete to train hard and recover quickly, others may target an enhanced training stimulus or adaptation [8]. Meeting energy needs is the main nutritional goal of endurance athletes [38]. In

endurance athletes to meet the energy required for daily high and intensive training periods and to maintain the necessary muscle tissue; Carbohydrate consumption is important before, during and after training. It is important to prevent protein breakdown and maintain optimal immune function. Before the race, athletes should consume normal or high doses of carbohydrates and practice low intensity. Thus, carbohydrate oxidation capacity is not blunted on race day [39]. It shows that carbohydrate-protein intake increases the performance of multiple sprint sports over carbohydrates, potentially altered through central fatigue or increased protein oxidation [40-42].

Conclusion

Athletes need to consume energy that is adequate in amount and timing of intake during periods of high-intensity and/or long duration training to maintain health and maximize training outcomes. The training diet is to provide nutritional support to allow the athlete to stay healthy and injury-free while maximizing the functional and metabolic adaptations to a periodized exercise program that prepares him or her to better achieve the performance demands of their event. While some nutrition strategies allow the athlete to train hard and recover quickly, others may target an enhanced training stimulus or adaptation. Body carbohydrate stores provide an important fuel source for the brain and muscle during exercise and are manipulated by exercise and dietary intake. Dehydration/hypohydration can increase the perception of effort and impair exercise performance; thus, appropriate fluid intake before, during, and after exercise is important for health and optimal performance. An additional nutritional strategy for events of greater than 60 minutes duration is to consume carbohydrate according to its potential to enhance performance. vitamin and mineral supplements are unnecessary for the athlete who consumes a diet providing high energy availability from a variety of nutrient-dense foods. Athletes should be counseled regarding the appropriate use of sports foods and nutritional ergogenic aids. Such products should only be used after careful evaluation for safety, efficacy, potency and compliance with relevant anti-doping codes and legal requirements [8]. Nutrition and Dietetics and Sports Nutrition affect their levels positively based on their minds. Athletes should become conscious about the importance of sports nutrition. Having sufficient level of information will also benefit in applying this information. It will be more effective and effective for the athletes to receive training from dietitians who are experts in this field to raise awareness about sports nutrition. In advanced studies, a weekly food consumption record should be kept along with the body analysis of the athletes should be compared with the nutritional knowledge levels. Athletes should be trained on basic nutritional levels. Training on nutritional needs should be provided according to the branches. From time to time, it should be determined whether the athletes are using their nutrition information correctly or not [19].

Conflict of Interest

The author has no conflict of interest.

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