

TC.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

**Evaluation of Eating Habits and Use of Food
Supplements According to Awareness Levels of
Health Faculty Students During the Pandemic**

MASTER THESIS

DİLEK ÖZTÜRK

İSTANBUL-2021

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THESIS APPROVAL FORM

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This study have approved as a Master Thesis in regard to content and quality by the Jury.

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated ... and numbered ...

Prof. Dr. Bayram YILMAZ

Director of Institute of Health Science

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

14/12/2021

Dilek Öztürk



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LIST OF SYMBOLS AND ABBREVIATIONS

ACE	Angiotensin Converting Enzyme
ACE 2	Angiotensin Converting Enzyme-2
ALI	Acute Lung Injury
ARA	Arachidonic Acid
ARDS	Acute Respiratory Distress Syndrome
BMI	Body Mass Index
COPD	Chronic Obstructive Respiratory Disease
COX-1	Cyclooxygenase-1
COX-2	Cyclooxygenase-2
Cu	Copper
DBP	D Binding Protein
DHA	Docosahexaenoic Acid
DIC	Disseminated Intravascular Coagulation
DNA	Deoxyribonucleic Acid
DPA	Decasapentaenoic Acid
EFSA	European Food Safety Authority
EPA	Eicosapentaenoic Acid
ESPEN	European Society for Clinical Nutrition and Metabolism
FAO	Food and Agriculture Organization
Fe	Iron
GIS	Gastrointestinal Tract
HCoV	Human Coronavirus

kg	Kilogram
ICU	Intensive Care Unit
IL	Interleukin
IP-10	Interferon Gama Induced Protein-10
IRMs	Inflammation Region Mediators
KIDMED	Mediterranean Diet Quality Index
kg/m ²	kilogram/ meters ²
MAMP	Microorganism-Associated Molecular Patterns
MCP-1	Monocyte Chemoattractant Protein-1
MERS	Middle East Respiratory Syndrome
MERS-CoV	Middle East Respiratory Syndrome- Coronavirus
MEQ	Mindful Eating Questionnaire
MEQ-28	Mindful Eating Questionnaire-28
MEQ-30	Mindful Eating Questionnaire-30
MIP1A	Macrophage Inflammatory Protein-1 Alpha
Mpro	Main Protease
%	Percentages
NF-kB	Nuclear Factor Kappa B
NHANES	National Health and Nutrition Survey
NRS	Nursing
NUT	Nutrition and Dietetics
PGE2	Prostaglandin E2
pH	Power of Hydrogen

PLA2	Phospholipase A2
PTR	Physiotherapy and Rehabilitation
PUFAs	Polyunsaturated Fatty Acids
RNA	Ribonucleic Acid
ROS	Reactive Oxygen Species
SARS	Severe Acute Respiratory Syndrome
SARS-CoV	Severe Acute Respiratory Syndrome- Coronavirus
SARS-CoV-2	Severe Acute Respiratory Syndrome- Coronavirus-2
Se	Selenium
SIRS	Systemic Inflammatory Response Syndrome
S. Nigra	Sambucus Nigra
SPSS	Statistical Package for the Social Sciences
TBSA	Turkey Nutrition and Health Survey
TDD	The Dietetic Association of Turkey
TNF- α	Tumor Necrosis Factor Alpha
TUBER	The Turkey Dietary Guideline
TUIK	Turkish Statistical Institute
URTI	Upper Respiratory Tract Infections
US	United States
USA	United States of America
UVB	Ultraviolet-B
WHO	World Health Organization
Zn	Zinc

ABSTRACT

Öztürk, D. (2021). Evaluation of Eating Habits and Use of Food Supplements According to Awareness Levels of Health Faculty Students During the Pandemic. Yeditepe University, Institute of Health Science, Department of Nutrition and Dietetics, Master's Thesis, Istanbul.

The research was conducted to evaluate the relationship between eating habits and dietary supplement use of health sciences students and their awareness levels during Covid-19. For this purpose, a questionnaire including nutritional habits, supplement usage, and Mindful Eating Questionnaire (MEQ-30) were applied to 241 students aged ≥ 18 who were actively studying at Yeditepe University Faculty of Health Sciences. Since distance education was started due to the pandemic, an online questionnaire was applied to the participants. 62.6% of the participants consisted of Nutrition and Dietetics, 19.1% Nursing, 18.3% Physiotherapy and Rehabilitation students. According to the MEQ-30 score averages, all of the students were at a high level of awareness, and Nutrition and Dietetics students had higher awareness levels compared to other departments ($p < 0.05$). 120 students with higher awareness ate healthier during the pandemic process. 66.4% of the participants think some dietary supplements are beneficial and 23.7% of the participants used dietary supplements. The majority of participants who use dietary supplements were Nutrition and Dietetics students. The difference between the awareness levels of those who use dietary supplements and those who do not was insignificant ($p > 0.05$) but the effect of the awareness level on the use of dietary supplements could not be observed. 38.6% of the students using dietary supplements started to use it with the pandemic. The most commonly used dietary supplements were vitamin D and C, and the majority used dietary supplements to protect and maintain current health. During Covid-19, changes were observed in students' eating habits and dietary supplement use.

Keywords: Eating Habits, Food Supplements, Awareness

ABSTRACT (TURKISH)

Öztürk, D. (2021). Pandemi Döneminde Sağlık Fakültesi Öğrencilerinin Farkındalık Düzeylerine Göre Beslenme Alışkanlığı ve Besin Desteği Kullanımının Değerlendirilmesi . Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Araştırma, Covid-19 pandemi sürecinde sağlık fakültesi öğrencilerinin beslenme alışkanlıkları ve besin desteği kullanımlarının farkındalık düzeyleri ile ilişkisini değerlendirmek amacıyla yapılmıştır. Bu amaç doğrultusunda Yeditepe Üniversitesi Sağlık Bilimleri Fakültesi'nde öğrenciliği aktif olarak devam eden 18 yaş ve üzeri 241 öğrenciye anket çalışması uygulanmıştır. Veri toplama aracı olarak öğrencilere beslenme alışkanlıkları, besin desteği kullanımı ve farkındalık ölçeğini (YFÖ-30) içeren anket uygulanmıştır. Araştırma döneminde pandemi nedeniyle uzaktan eğitime geçildiğinden, katılımcılara çevrim içi anket uygulanmıştır. Katılımcıların %62,6 'sı Beslenme ve Diyetetik, %19,1'i Hemşirelik, %18,3'ü Fizyoterapi ve Rehabilitasyon bölümü öğrencilerinden oluşmaktadır. YFÖ-30 ölçeği puan ortalamalarına göre, öğrencilerin tamamı yüksek farkındalık düzeyinde olup Beslenme ve Diyetetik öğrencileri, diğer bölümlere kıyasla daha yüksek farkındalık düzeyine sahiptir ($p<0,05$). Daha yüksek farkındalık düzeyine sahip 120 öğrencinin, pandemi sürecinde daha sağlıklı beslendiği saptanmıştır. Katılımcıların %66,4'ü bazı besin desteklerinin faydalı olduğunu düşünmektedir ve çalışmaya katılan öğrencilerin %23,7'si besin desteği kullanmaktadır. Besin desteği kullanan öğrencilerin çoğunluğunu Beslenme ve Diyetetik öğrencileri oluşturmakta olup, besin desteği kullanan ve kullanmayanların farkındalık düzeyleri arasında istatistiksel olarak anlamlı bir fark bulunamadığından ($p>0,05$) farkındalık düzeyinin besin desteği kullanımına olan etkisi gözlemlenememiştir. Besin desteği kullanan öğrencilerin %38,6'sı pandemi ile birlikte besin desteği kullanmaya başlamıştır. En çok kullanılan besin destekleri D ve C vitamini olup çoğunluk mevcut sağlığı korumak ve devam ettirmek amacıyla besin desteği kullanmaktadır. Pandemi sürecinde öğrencilerin beslenme alışkanlıklarında ve besin desteği kullanımlarında değişiklikler gözlenmiştir.

Anahtar Kelimeler: Beslenme Alışkanlığı, Besin Desteği, Farkındalık

1. INTRODUCTION AND PURPOSE

Covid-19 emerged in December 2019 in Wuhan, China is a health problem that has been declared as a pandemic by the World Health Organization (WHO) and continues. On January 7, 2020, it was defined as a type of coronavirus (2019-nCoV, Severe Acute Respiratory Syndrome - Coronavirus 2, SARS-CoV-2) that has not been detected in humans before, and its name was accepted as Covid-19 (1,2).

The epidemic, which started on March 11, 2020, with the first positive case in Turkey (3). Various restrictions, quarantine practices, and social isolations applied to control the epidemic have led to great changes in the daily life of individuals (1,2,4).

During the pandemic period, individuals may experience anxiety disorders, increased stress levels, and depression under social isolation conditions (5). Studies have shown that emotions such as increased stress levels, depression, and anxiety cause emotional eating, changes in food consumption and eating habits, and these individuals turn to foods that reduce stress with high sugar and fat content (6–8).

Adequate and balanced nutrition is necessary for a strong immune system. It is important to increase public awareness of the importance of nutrition in strengthening the immune system against Covid-19 (9). In a study conducted in our country, it was seen that the majority of the participants believed that the foods were protective against the epidemic and started to use some nutritional supplements, but there are no definite results about the protection of these supplements against Covid-19 (8).

Studies show that the increase in the use of dietary supplementation is directly proportional to the increase in the level of education (10,11). Dietary supplement use was more common among individuals who received health education compared to the general population, and this was associated with greater knowledge of dietary supplements and their health benefits (12). Since healthcare professionals are a group with a high level of education and health awareness, they are taken as an example by society and patients (12,13). The number of studies made with this sense in our country is quite limited and the studies were mostly conducted with doctors, medical school students, or pharmacists (12,14). For this reason, it is important to examine the behaviors of individuals who

provide health services, receive health education, and continue health education, especially during the current pandemic period.

This study was aimed to evaluate the effects of the Covid-19 pandemic period on the nutritional habits and dietary supplement use status of health faculty students by associating them with their eating awareness levels.



2. LITERATURE REVIEW

2.1 Covid-19 and Immune System

Six different types of human coronavirus (HCoV) have been identified, including Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome-Coronavirus (SARS-CoV) before SARS-CoV-2, as a member of the coronavirus family (2,15). SARS-CoV-2 (Covid-19) shows a similar infection pattern and clinical features as the two previously described coronavirus outbreaks but it has a faster transmission rate than the others (16).

Subtypes of coronaviruses that exist in the human circulation mostly cause the common cold (2). Types of diseases caused by a coronavirus in humans can vary from the common cold to Middle East Respiratory Syndrome (MERS) to Severe Acute Respiratory Syndrome (SARS) (1–3).

Sometime after coronavirus enters the body, it causes inflammation in the epithelial cells of the respiratory tract, causing damage and pneumonia which makes the lungs unable to clear mucus (15). Cytokines are effective in the emergence of this clinical picture and the development of inflammation (15–17). In severe cases of Covid-19, increased levels of cytokines and pro-inflammatory cytokines including IL-2, IL-7, IL-10, IP10, MCP-1, MIP1A, TNF- α are seen and due to the activation of macrophages found most abundant in adipose tissue, an inflammatory response known as cytokine storm is encountered (16–18). Cytokine storm develops as a result of the activation of many cells in succession leading to excessive and/or uncontrolled release of proinflammatory cytokines. Inflammation associated with the cytokine storm begins locally and then spreads throughout the body through the circulation; causing multi-organ failure, rapidly developing respiratory distress (19). This condition may lead to septic shock, metabolic acidosis, coagulation dysfunction, and in advanced cases, death (15,20). It is seen that acute lung injury (ALI), systemic inflammatory response syndrome (SIRS), and acute respiratory distress syndrome (ARDS) occur in Covid-19 patients, as patients infected with SARS-CoV and MERS-CoV (14,15). Therefore, strategies that may effectively suppress the cytokine storm should be used to treat critically ill patients, reduce mortality and prevent worsening of Covid-19 disease (16,21).

In a meta-analysis study, 89.1% of the cases had a fever, 72.2% had a dry cough, and 42.5% had fatigue; some reported pain, runny nose, nasal congestion, sore throat, or

diarrhea. Some of the infected cases with no symptoms are observed and most cases recover without the need for treatment. However, about one out of every five infected people has a severe illness and has difficulty breathing. It has been stated that the disease can progress more severely in patients with chronic diseases such as hypertension, cardiovascular diseases, or diabetes, and in elderly individuals (1).

2.2 Covid-19 and Nutrition

Nutrition is one of the main factors that may help to improve well-being and decrease the harmful health outcomes associated with social isolation by helping to control or prevent most of the chronic diseases; regulation of sleep, mood and prevents tiredness (22). Maintaining a healthy diet and obtaining adequate energy and nutrients are important for a strong and healthy immune system (1,18). The Turkey Dietary Guideline (TUBER), demonstrated nutritional requirements for adequate and balanced nutrition (23). According to that adequate and balanced nutrition is important in order to be healthy before or in the presence of infectious diseases. The body's need for energy and nutrients increases, especially if infections are accompanied by high fever (1). Calder et al. reported that an adequate diet serves as a key during the defense against viral threats (24).

Proper nutrition and nutritional support may help by developing immune responses during the Covid-19 pandemic (25). WHO's healthy diet recommendations for adults during the Covid-19 are given in Table 2.1 (26). At the same time, it is recommended not to smoke, perform regular physical activity, provide an adequate sleep pattern and reduce the stress level in order to support a healthy life during this period (27).

Table 2.1 WHO's Healthy Nutrition Recommendations for Adults during Covid-19 Outbreak

1	Eat fresh and unprocessed foods every day. (e.g., fruits, vegetables, legumes, nuts, whole grains, and foods from animal sources.
2	Drink enough water every day. (e.g., 8-10 cups)
3	Eat moderate amounts of fat and oil. Consume unsaturated fats (e.g., found in fish, avocado, nuts, olive oil, soy) rather than saturated fats and industrially produced trans fats (e.g., fast food, frozen products)
4	Eat less salt and sugar. Limit your daily salt intake less than 5 g (approximately 1 teaspoon), and use iodized salt.
5	For snacks, choose fresh fruit and raw vegetables rather than foods that are high in fat /sugar
6	Do not overcook fruits and vegetables; this can lead to the loss of important vitamins.
7	Avoid eating out.
8	Counseling and psychosocial support.

Source: World Health Organization Regional Office for the Eastern Mediterranean. Nutrition advice for adults during the COVID-19 outbreak. Accessed Nov 2, 2021. Available from: <http://www.emro.who.int/nutrition/news/nutrition-advice-for-adults-during-the-covid-19-outbreak.html>

A balanced diet, with a sufficient amount of nutrients necessary for health, supports T and B cell functions for reducing diseases (22,25). The immune response could be damaged by insufficiencies or even by minor deficiencies of some micronutrients but this can be reversed by changing the patient's nutritional status (1,28). Micronutrients contribute to immune system functions with different pathways in both adaptive and innate immune responses. These nutrients take a role during antibody function, production and support the identification and destruction of pathogens. They have antimicrobial activity, for this reason, they arrange the inflammatory response (22).

The European Food Safety Authority (EFSA) highlighted the healthy maintenance of the immune system depends upon vitamins A, C, D, group B, and minerals zinc (Zn), copper (Cu), iron (Fe), and selenium (Se) have similar roles as well (18,22). These vitamins and minerals are important for the maintenance of functional and structural unity of physical barriers like skin, respiratory tract, gastrointestinal lining, and others as well as function, proliferation, differentiation, and migration of innate immune cells (22,29).

Vitamin E and C also minerals Zn and Se protect immune cells against free radical damage during increased levels of oxidative stress (22). Deficiencies or suboptimal levels in micronutrients affect immune function negatively and decrease resistance against infections (24).

Nearly 70% of the dietary recommendations for Covid-19 encourage the consumption of fruits, vegetables, and whole grains. Two nutrition societies from Spain and Italy, specifically recommend at least 5 servings of fruit and vegetables per day (22). A diet high in fruit and vegetables has high amounts of vitamins and minerals which are important modulators of the immune system (30). They are good sources of antioxidants, fiber, and water and all of these play roles in the control of hypertension, diabetes, and some of the most important risk factors for Covid-19 complications (31). Dietary recommendations which inhibit risk factors for Covid-19 complications are summed up in Figure 2.1 (22).

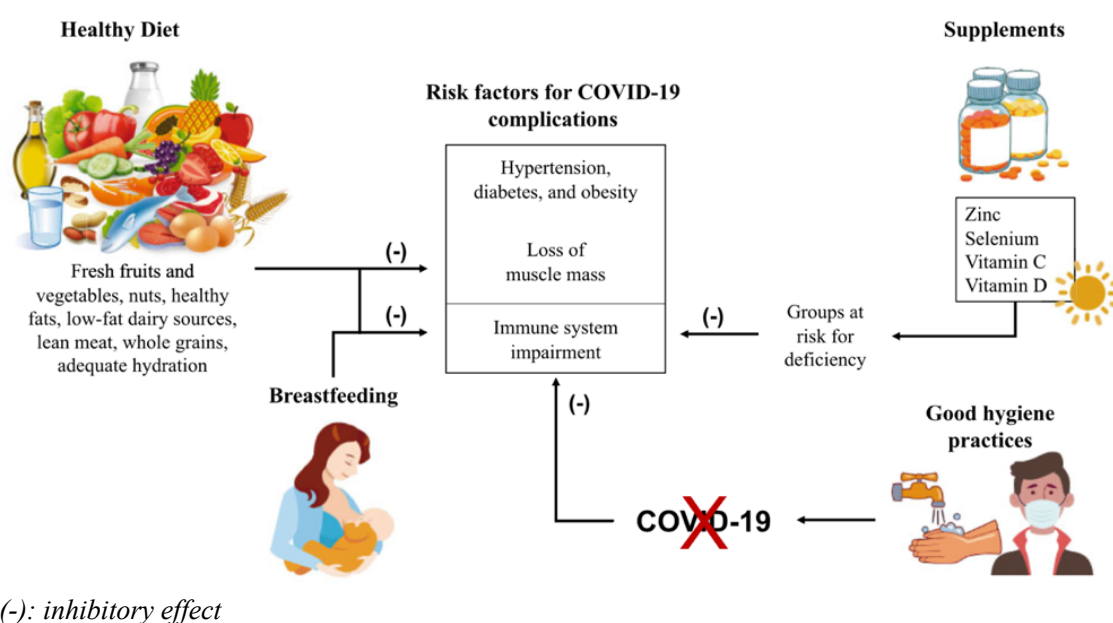


Figure 2.1 Dietary recommendations during the Covid-19 Pandemic

Source: de Faria Coelho-Ravagnani C, Corgosinho FC, Sanches FLFZ, Prado CMM, Laviano A, Mota JF. Dietary recommendations during the COVID-19 pandemic. *Nutrition Reviews*. 2021 Apr 1;79(4):382–93. doi: 10.1093/nutrit/nuaa067

In addition to the vitamins and minerals, also the essential fatty acids have modulating effects on inflammatory processes and immunity (32). However, there is not enough scientific evidence that any micronutrients are routinely used in a larger amount than the daily requirement in the treatment of the disease (33,34). In elders, which is the

group that is at most risk for Covid-19, changes in dietary habits cause significant changes in immunity and inflammation. Some of the nutrients such as probiotics and omega-3 polyunsaturated fatty acids (PUFAs) are linked with anti-inflammatory responses and raising resistance against upper respiratory tract infection (22).

An important issue to be considered in the treatment of Covid-19 is dehydration. Because maintaining hydration is the most important component of all treatment methods. Inadequate hydration, especially in elderly individuals, causes the progression of diseases or important health problems (1). Water is necessary for cellular homeostasis, body temperature control, mood regulation, cognitive- kidney -gastrointestinal - heart function, and headache prevention (35). Drinking water or maintaining sufficient hydration was suggested in documents but there is no guidance about water requirements (cups or milliliters per day) for treatment of Covid-19 (22).

Knowledge about the nutrition of patients suffering from Covid-19 is still insufficient but the available evidence shows that nutritional disorders are linked to increased infection risk and worse clinical outcomes. In a retrospective study, obesity defined as body mass index (BMI) above 30 kg/m², was found as a strong factor increasing the risk of negative outcomes (36).

Malnutrition is defined as a condition that is insufficient to reach an individual's energy or nutritional needs which may be a result of an unbalanced intake of macronutrients or micronutrients and excessive daily energy intake, impaired nutrient absorption, or any of the possibilities mentioned above combined (18). Malnutrition and undernutrition are conditions that potentially worsen the severity and the result of the disease. It is recognized as both a cause or result of immune system dysfunction. However, suffering from Covid-19 also creates a condition that causes body weight loss and malnutrition has shown in Figure 2.2 (33).

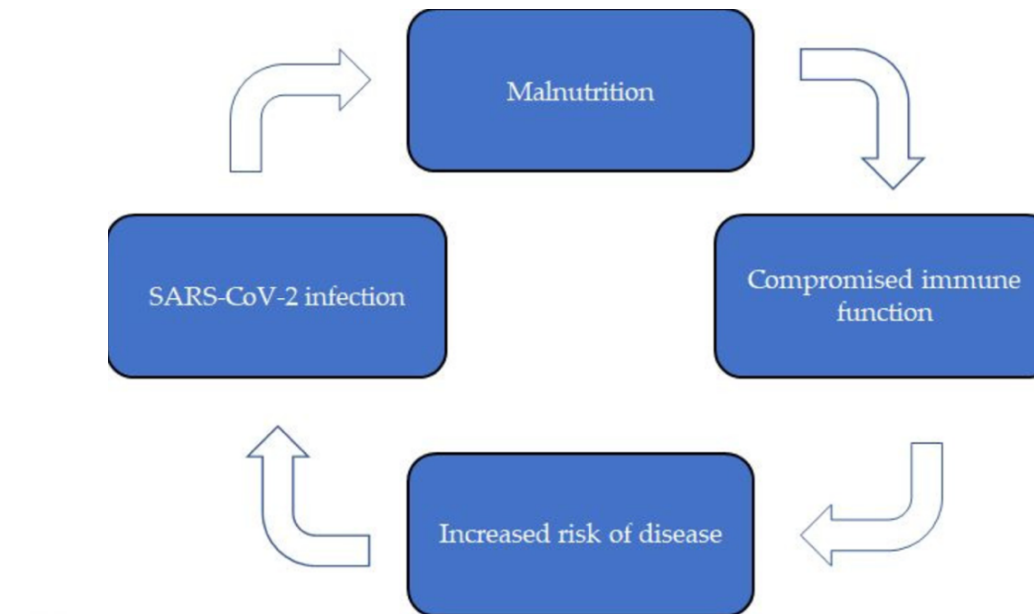


Figure 2.2 Vicious circle connecting malnutrition, immune function and Covid-19

Source: Barazzoni R, Bischoff SC, Breda J, Wickramasinghe K, Krznaric Z, Nitzan D, et al. ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. Clinical Nutrition. 2020;39(6):1631–8. doi: 10.1016/j.clnu.2020.03.022

Reducing the complications associated with adequate and balanced nutritional support ensures the optimization of the situation. When adequate nutrition cannot be provided for various reasons, the immune system weakens and the current disease progresses. Nutritional guidelines prepared by the European Society for Clinical Nutrition and Metabolism (ESPEN) has been published as the nutrition guideline for both infected and patients hospitalized because of Covid-19 given in Table 2.2 (1,34).

Table 2.2 Nutrition Guideline of ESPEN for Infected and Hospitalized Covid-19 Patients

Statement 1:	Check for Malnutrition: Patients at risk for worst outcomes and higher mortality following infection with Covid-19, namely older adults and polymorbid individuals should be checked using the MUST criteria or for hospitalized patients, the NRS-2002 criteria.
Statement 2:	Optimization of Nutritional Status: Patients with malnutrition should undergo diet counselling from an experienced professional.
Statement 3:	Vitamin and Mineral Supplementation: Patients with malnutrition should provide supplementation with vitamins A, D and other micronutrients.
Statement 4:	Regular Physical Activity: Patients in quarantine should continue regular physical activity while taking precautions.
Statement 5:	Oral Nutrition Supplements (ONS): ONS should be used whenever it is possible to meet patient's needs, when dietary counselling and food fortification are not sufficient to increase dietary intake and reach nutritional goals.
Statement 6:	Enteral Nutrition (EN): Patients whose nutritional requirements cannot be met orally, EN should be used. Parenteral nutrition (PN) might be considered when EN is insufficient or not indicated.
Statement 7:	Medical Nutrition in Non-Intubated Intensive Care Unit (ICU) Patients: If energy goal is not reached with oral diet, first ONS should be considered and then EN treatment. If there are limitations for the enteral route it could be advised to prescribe peripheral PN in the population not reaching energy-protein target by oral or enteral nutrition.
Statement 8:	Medical Nutrition in Intubated ICU patients I: EN should be started through a nasogastric tube; post-pyloric feeding should be performed in patients with gastric intolerance after prokinetic treatment or in patients at high risk for aspiration.
Statement 9:	Medical Nutrition in Intubated ICU patients II: In ICU patients who do not tolerate full dose EN during the first week in ICU, PN should be weighted on a case-by-case basis.
Statement 10:	Nutrition in ICU patients with Dysphagia: Texture-adapted food can be considered after extubation. If swallowing is proven unsafe, EN should be administered.

Source: Barazzoni R, Bischoff SC, Breda J, Wickramasinghe K, Krznaric Z, Nitzan D, et al. ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. *Clinical Nutrition*. 2020;39(6):1631–8. doi: 10.1016/j.clnu.2020.03.022

The nutrition in Covid-19 aims to reduce infection and slow down the disease progression while supporting the recovery period. Covid-19 pandemic provides new opportunities to educators and nutrition researchers to give information about the potential benefits of good nutrition and healthy eating habits those especially high-risk groups of the public(37). For this reason, it is important that healthcare professionals and

the medical community to understand the role and the importance of nutrition for maintaining health and reducing disease risk (25).

2.3 Dietary Supplements

Dietary supplements are products that contain one or more components together, aiming to take orally the nutritional elements that cannot be taken at a sufficient level through the dietary intake (38). According to the Turkish Food Codex Communiqué on Supplementary Foods, dietary supplements are made up of nutrients such as vitamins, minerals, carbohydrates, fibers, proteins, amino acids, fatty acids, plants or animal and plant originated bioactive substances that have nutritional or physiological effects to supplement normal nutrition; refers to products for which daily intake is determined and prepared as concentrates, extracts, mixtures of tablets, capsules, lozenges, disposable powder packs, liquid ampoules, dropper bottles and other similar liquid or powder forms (39).

There are many types of dietary supplements such as vitamins, minerals, amino acids, essential fatty acids, fiber, various herbs, and extracts (40).

Individuals with adequate and balanced nutrition do not need dietary support. However, in some special cases, the use of dietary supplements may be required (40):

1. Inability to provide balanced and adequate nutrition due to economic and psychological reasons,
2. Following a low-energy diet,
3. Being vegetarian or vegan,
4. Iron deficiency,
5. Babies and children,
6. Pregnant and lactating women,
7. Women in/after menopause,
8. Elders,
9. Long term drug use,
10. Allergic diseases that restrict food intake,
11. Nutrition, dialysis, etc. receiving treatment.

In developed countries, the market for dietary supplements is growing and product variety is increasing (41), as it is growing day by day in Turkey. Many studies have been conducted on the consumption of dietary supplements in European countries and the

United States of America (USA), however, it is stated that there are few studies in the literature examining consumer behaviors on the Turkish dietary supplements market (41–43). Looking at the results of the US National Health and Nutrition Survey (NHANES) conducted between 1999 and 2012, it was seen that one out of two adults used dietary supplements (29,44).

As stated in the literature, there is no need for dietary support in an adequate and balanced diet, it is seen that supplements containing different compositions and combinations of nutrients and phytochemicals may support the metabolism, immune system, and physiology that are necessary for health (25,40). For these reasons, it is suggested that nutrients and phytochemicals that may provide benefits for Covid-19 symptoms are given in Table 2.3 (25).

Table 2.3 Nutrients and Phytochemicals with Potential Preventative or Therapeutic Effects on Risk Factors Associated with Covid-19

Nutrients, phytochemical	Risk Factor	Associated pathway/select biomarker(s)
n-3 PUFA	Inflammation and immune dysregulation	ECS, Nf-kB, TNF- α , MCP-1
EPA	Cardiovascular disease	P13K/Akt, MAPK/ERK
DHA	Obesity, Diabetes Respiratory inflammation/disease Neurodegeneration/ neuroinflammation	P13K/Akt, MAPK/ERK, AMPK P13K/Akt, MAPK/ERK, GLUT4 TLR-4, GPR120, 7nAChR ECS, COX-2, 15-LOX
Phytochemicals	Inflammation and immune dysregulation	NOX, Nf-kB, Erk, Akt, TNF- α
(-) Epicatechin	Cardiovascular disease	TGF- β 1/smad3, NOX, eNOS
Resveratrol	Diabetes	NOX, TNF- α , JNK1/2
Curcumin	Respiratory inflammation/ disease	P13K/AKT/HIF-1 α , MAPK/ERK/HIF-1 α
EGCG	Neurodegeneration/neuroinflammation	TLR-4/Nf-kB, P13K/Akt
Vitamins	Impaired immune system, inflammation	Cell proliferation&malnutrition, IL-6, TNF- α , Nf-kB, COX-1
Vitamin A	Respiratory inflammation/disease	Improves responses to vaccines, cellular and humoral immune responses
Vitamin D	Respiratory tract infections, compromised antiviral immunity	VDR, hCAP-18/LL-37
Vitamin E	Deficiency impairs immune responses	Antioxidant functions, control free radicals
Vitamin C	Poor immune tissue development	Supportive antioxidant role Potential for antiviral immune protection
B-12 / Folate	Neurodegeneration/ neuroinflammation	TNF- α , IL-6, Hcy

Source: Jagers GK, Watkins BA, Rodriguez RL. COVID-19: repositioning nutrition research for the next pandemic. *Nutrition Research*. 2020;81:1–6. doi: 10.1016/j.nutres.2020.07.005

There are no high-quality scientific studies on specific dietary supplements for Covid-19 treatment (1). In some studies, it has been reported that the administration of some vitamins such as vitamin D, vitamin C, and vitamin B12 in high doses may help decrease inflammation caused by the disease and regress shortness of breath or affect the inhibition of the virus (1,45,46). In a study, dietary supplementation with some of the vitamins (e.g., A, B, C, D), minerals (e.g., selenium, iron, and zinc), and omega-3 fatty acids were suggested as a treatment option for Covid-19 patients as a preventive therapy against lung infection (47). However, there is no exact information about dietary supplements (1,22). Special dietary supplements may be given with the decision of the physician if necessary, according to the patient's condition (1).

2.3.1 Vitamin C

Vitamin C (ascorbic acid) is a water-soluble vitamin and it is an essential nutrient that cannot be synthesized by human metabolism (48–50). Fresh fruit and vegetables (oranges, citrus fruit, cranberries, red pepper, strawberries, spinach, broccoli and others) are major dietary sources of vitamin C. However, boiling or steaming, drying of leafy vegetables, prolonged cooking of food can destroy water-soluble vitamins. With these factors, high dietary fat and sugar consumption are also associated with decreased intake of vitamin C (51,52).

It has lots of functions in optimal health and prevention of disease (51). Vitamin C acts as an effective antioxidant, plays role in the synthesis of collagen, L-carnitine, and some neurotransmitters (30,53). Besides, it protects carbohydrates, proteins, lipids, and nucleic acids against damage of reactive oxygen species (ROS) free radicals formed during normal cell metabolism, and exposure to pollutants and toxins (30,49,53). Also, it activates other antioxidants like vitamin E and glutathione (30). Vitamin C takes part in the functionality and development of different immune cells, production of antibodies, and lymphocyte differentiation and proliferation. The support of vitamin C in immune response has been suggested due to the increase of functions of innate and adaptive immunity (9,29).

Vitamin C supplementation has beneficial effects on recovery have been noted in pneumonia (49). In a meta-analysis with 29 controlled trials showed that regular intake of vitamin C around 1 g/day didn't enough to prevent upper respiratory tract infections (URTI) but, the same trials indicated that the duration of URTI shortened and intensity of

infection decreased during the vitamin C administration (54). Also, another study showed that vitamin C shortened the duration of mechanical ventilation and intensive care unit (ICU) stay by 8% (55). Decreased plasma vitamin C concentrations have been observed in patients with acute respiratory infections. Supplementation returns their plasma vitamin C levels to normal and reduces the severity of respiratory symptoms (49).

Vitamin C is an inexpensive and safe essential nutrient. Its possible benefits on Covid-19 should be investigated with other possible treatments (55). There is no proven benefit associated with Vitamin C supplementation on common cold symptoms however its supplementation has been suggested to prevent or fight against Covid-19(56).

2.3.2 Vitamin D

Vitamin D (cholecalciferol: 25-hydroxyvitamin D: D₃) is taken into the body as D₃ or by converting precursors (7-dehydrocholesterol; animal origin, ergosterol; vegetable origin) into D₃ in the skin through the action of ultraviolet B (UVB) radiation. When the human skin is in contact with UVB (radiation from the sun with short-wavelength) for 15-30 minutes, approximately 15% of 7-dehydrocholesterol is converted to cholecalciferol, transported to the blood circulation and tissues by vitamin D binding protein (DBP) (50).

The formation of vitamin D during sunbathing may vary depending on whether the sunbeams are direct or inclined, the individual's skin color, and age. Since the sunbeams are inclined during winter, vitamin D synthesis is insufficient. Also, it is known that Vitamin D synthesis is less in the elders due to thinning of the skin and the dark-skinned people due to the less effect of light (50). For this reason, it has been stated that low vitamin D levels can cause viral epidemics, especially in winter. Quarantines applied during the pandemic period, less exposure to the sun as a result of less time spent outside and low 7-dehydrocholesterol levels in the skin can be associated with decreased vitamin D synthesis. Only 10% of the vitamin D requirement can be provided by diet (57).

Vitamin D has a role in bone metabolism as well as has important immunoregulatory effects (28,50); increases epithelial integrity and stimulates antimicrobial peptide synthesis in macrophages and epithelial cells and directly enhances host defense (28). It plays a key role in modulating the immune system therefore, the correct functioning of the immune system depends largely on the bioavailability of vitamin D (56). Supplementation can reduce the production of proinflammatory

cytokines, increase the expression of anti-inflammatory cytokines and expression of genes related to the antioxidant system (45).

It is known that adequate vitamin D levels reduce the risk of cytokine storm also called hypercytokinemia causing respiratory tract infections and pneumonia and may play a role in the treatment of depression by showing neuroprotective effect (50). Studies have shown that the state of vitamin D deficiency has decreased respiratory function and immunity; increased inflammation, the risk for respiratory infection, incidence and severity of Covid-19 infection (24,57–59). Vitamin D deficiency is quite common in chronic obstructive respiratory disease (COPD) and patients with pneumonia. If lower respiratory tract infections combine with low vitamin D levels, supplementation will be needed during treatment. The practitioner decides whether the individual will use vitamin D supplements or not after the appropriate tests are done (57,58).

2.3.3 Multivitamins

Multivitamins and minerals which are dietary supplements are generally considered safe and available over-the-counter. They may be beneficial for adults by supporting immunity with the many nutrients they contain (60). It is useful for the elders and women of reproductive age who want to reach the required levels of iron and folic acid (42). In studies on the use of dietary supplements, multivitamins (with or without minerals) are reported as the most widely used dietary supplements (61–64).

Dietary supplements such as vitamin and mineral sources can be produced naturally or synthetically. The most important considerations in their selection should be their safety and bioavailability. Before consuming or purchasing dietary supplements, Food and Agriculture Organization (FAO) and WHO standards, and in cases where these institutions do not have criteria, national regulations should be considered (65).

Vitamins are important for the normal functions of the immune response (9). In the USA, Europe, and Canada, 35% of adults have a deficiency in one or more micronutrients (66). Early detection of micronutrient deficiencies is necessary to find the right therapeutic dose (9).

Considering the rapid spread of Covid-19, there is a race against time to find solutions and treatments. With the low cost of supplements (vitamins C and D, Zn, Fe,

Cu and probiotics, etc.) it might be a suitable approach to be used in the treatment of Covid-19 (67).

2.3.4 Zinc

Zinc is one of the dietary trace elements with immunomodulating functions, important for the maintenance and development of innate and adaptive immune cells (24,48). Optimal levels are essential for a properly functioning immune system (56). Zinc is an anti-inflammatory agent, takes a role in cytokine release (by dampening the development of some pro-inflammatory cytokines), protect against ROS and nitrogen species, it is involved in antibody production (especially IgG), antibody response, wound healing, deoxyribonucleic acid (DNA) synthesis, and cell division (29,53). It helps to reduce the risk of infection by contributing to improving immune responses(56).

Zn deficiency is related to immune system dysfunction and infections (56). Optimal Zn intake or supplementation caused therapeutic effects for immunity and infection reduction in patients (48). Clinical studies have shown that zinc supplementation shortens the duration of the common cold, increases immune activity, reduces incidence and prevalence of pneumonia, and reduces morbidity of common cold, cold sores, and influenza (29,48). It is given as an adjunct to treatment for reducing mortality in severe pneumonia (48).

For the previous scientific findings, adequate intake or supplementation of Zn can be seen as a part of treatment to reduce the effects of Covid-19 (56,68).

2.3.5 Omega-3 - Fish Oil

Unsaturated fatty acids are named according to the number of double bonds in the molecule and the location of the bond. When looking from the end to the beginning of the fatty acid molecule, the first double bond is denoted by ω (omega) or “n”. Omega-3 fatty acids (eicosapentaenoic: C20:5, ω -3, EPA/docosahexaenoic: C22:6, ω -3, DHA/docosapentaenoic acid: C22:5, ω -3, DPA) and omega-6 are long-chain PUFAs containing multiple double bonds. Since they cannot be synthesized in the human body, they are considered “essential “and their consumption of food is very important for metabolic health (50,69,70).

Omega-3 fatty acids are synthesized by various algae. These fatty acids are gradually accumulated through the food chain, passing through the metabolism of

zooplankton, mussels, oysters, shrimp, and fish. For this reason, it is found high amounts in fish than walnuts, hazelnuts, soybeans, and vegetable oils (63,64). They affect immunity and inflammatory responses. Generally, eicosanoids are derived from EPA and DHA, are less inflammatory than those that reproduce from arachidonic acid (ARA) (71).

Inflammation is the first step of immune response and it is often resolved quickly by various mechanisms (72). Omega-3s have lots of biological activities including directly and indirectly modulating cytokine release and inflammatory responses. Enzymatic conversion of omega-3 fatty acids (EPA and DHA) to the inflammation region mediators (IRMs) such as resolvins, protectins, and maresins which actively regulate the solution of acute inflammation is one of these mechanisms (72,73). They may take a role in prevention from cytokine storm at least decreasing the severity of inflammation, mortality risk for patients with Covid-19, and hospitalization with different biochemical mechanisms are shown in Figure 2.3 (74).

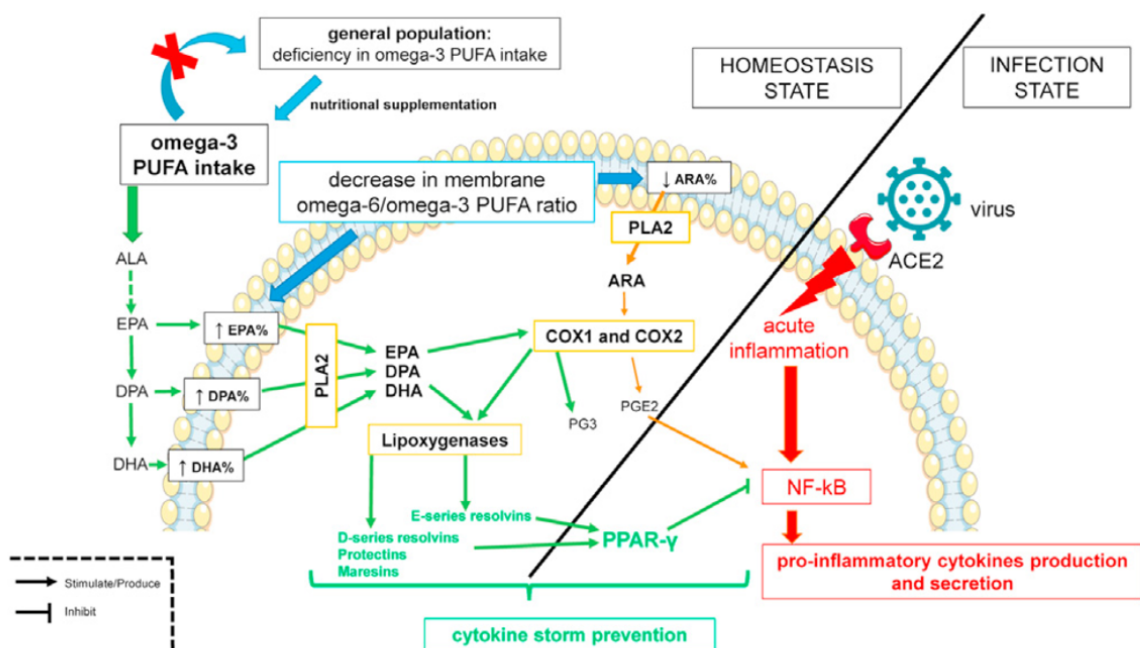


Figure 2.3 Expected mechanisms of anti-inflammatory effects of Omega-3 during Covid-19

Source: *May omega-3 fatty acid dietary supplementation help reduce severe complications in Covid-19 patients?* Pierre Weill, Claire Plissonneau et al. 2020. doi.org/10.1016/j.biochi.2020.09.003.

Most of the population has omega-3 deficiency which increases the ratio of ARA derived from omega-6. It becomes a substrate for cyclooxygenase enzymes (COX1 and

COX2) by phospholipase A2 (PLA2). Then, pro-inflammatory prostaglandin E2 (PGE2) is synthesized from ARA which activates nuclear factor kappa B (NF-kB) and causes systemic chronic low-grade inflammation or a higher response as severe acute inflammation (74).

Anti-inflammatory properties of EPA and DHA are associated with decreasing the amount of ARA in membrane phospholipids, which causes reduced synthesis of lipid mediators derived from ARA and increased less inflammatory EPA-derived lipid mediators' production (71). Nutritional supplementation can increase EPA, DPA, and DHA amounts in phospholipid membranes which limits the step for lipid mediator's synthesis from PUFAs. Because all of EPA, DHA, DPA, and ARA are used by PLA2 (74). ESPEN recommended the use of omega-3 enteral and parenteral nutrition, for its general clinical benefits in medical-surgical and ICU patients (75).

Dietary deficiency of omega-3 fatty acids is known to cause a delay in the healing of inflammation. It has been stated that this situation is also very important in uncontrolled cytokine storms associated with acute respiratory distress syndrome ARDS in Covid-19 (76).

Coagulopathy is generally found in severe cases of Covid-19 as disseminated intravascular coagulation (DIC). A study made by Park and Harris showed that EPA supplementation for healthy people for 4 weeks, reduced platelet activation which is an early step in platelet aggregation. However, DHA did not show the same effect. It has been assumed that because EPA is a cyclooxygenase substrate, it is more active than DHA in altering platelet function (77).

Omega-3 fatty acids show anti-viral effects by inhibiting replication of the influenza virus. The use of omega-3 PUFAs can improve oxygenation in Covid-19 patients according to ESPEN. However definitive evidence is still lacking (59).

The potential benefits of omega-3 to reduce Covid-19 severity is known based on in vitro and in vivo experimental assays, however, the risk of high dose supplementation during or before coronavirus infection must be studied. Potential effects of EPA and DHA supplementation in severe Covid-19 infected patients are shown in Figure 2.4 (71).

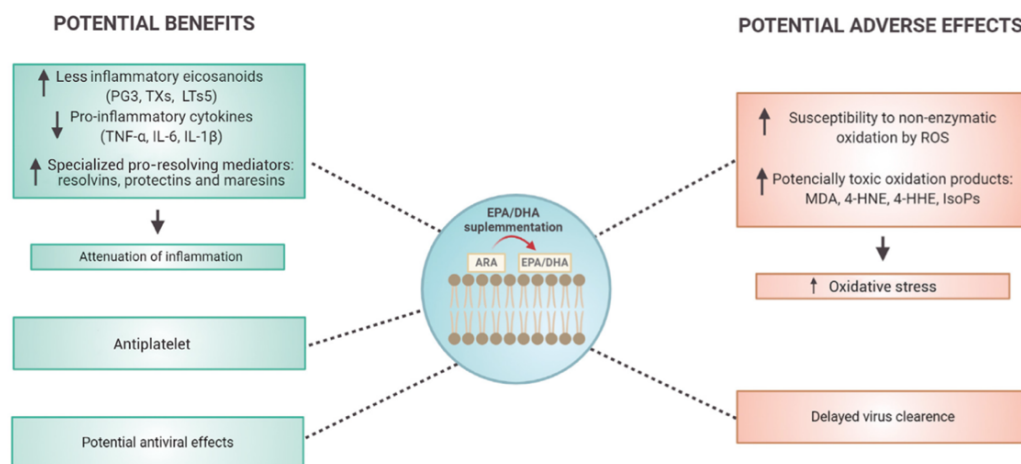


Fig. 3. Potential effects of EPA and DHA supplementation in critical SARS-CoV-2 infected patients. PG3: prostaglandin E3, TXs: thromboxanes; LTs5: 5-series trienes; TNF- α : tumor necrosis factor- α ; IL-6: interleukin 6; IL-1 β : interleukin 1 β ; ROS: reactive oxygen species; MDA: malondialdehyde; 4-HNE: hydroxyl-nonenal; 4-HHE: 4-hydroxy-hexenal; IsoPs: isoprostanes.

Figure 2.4 Potential effects of EPA and DHA supplementation in severe Covid-19 infected patients

Source: Potential benefits and risks of omega-3 fatty acids supplementation to T patients with COVID-19. Marcelo M. Rogeroa, Matheus de C. Leão et. al. Radical Biology and Medicine, 2020. doi.org/10.1016/j.freeradbiomed.2020.07.005.

Answers to some questions and optimal doses for prevention for patients with symptoms or tested positive, are still not certain (74).

2.3.6 Sambucus Nigra

Sambucus Nigra (*S. Nigra*) is a medicinal tree that belongs to the Adoxaceae family (known as the Moschatel family), which is indigenous to Asia, Europe, and North Africa (78,79). The extracts of *S. Nigra* flowers and fruits are being studied for their antiviral properties. Also, they have been used for common cold and flu treatment within herbal preparations (80).

S. Nigra fruits contain different components including triterpenes, flavonoids, mucilage α -linolenic acid, linoleic acid, and hydroxycinnamic acid derivatives. High levels of the anthocyanin flavonoid content of *S. Nigra* are associated with its antioxidant activity. Additionally, it has been shown that elderberry extracts increase the level of cytokines that activates immunomodulation (79,80).

Results from five different clinical studies involving 936 adults indicated that mono-herbal preparations of *S. Nigra* decrease patients' symptoms including headache, fever, cough, mucous discharge, and nasal congestion. If *S. nigra* is taken within 48 hours

of acute respiratory viral infection, it's indicated that may reduce the severity and duration of common cold and influenza in patients (79,81).

Standardized *S. Nigra* liquid extract showed an antiviral and antibacterial effect in vitro studies against influenza A and B virus and respiratory pathogens (15). It has been suggested as a potential supplementary treatment for Covid-19 considering their effects on the common cold and influenza symptoms based on results of different studies but there is not enough evidence that can support the use of *S. Nigra* fruit for the prevention or treatment of Covid-19 (79,80).

It may be accepted that has immune properties against Covid-19 viral entry. However, the effect of *S. Nigra* fruit or flower extracts on S1 surface protein which binds to angiotensin-converting enzyme-2 (ACE 2) has not been studied before (80).

2.3.7 Probiotics – Prebiotics

2.3.7.1 Probiotics

Probiotics are live microorganisms that can live in the human mucosa and regulate the endogenous flora and are defined by the WHO/FAO as "live microorganisms that have beneficial effects on human health when consumed in sufficient quantities" (52,82,83). Nutritional sources; cheese, yogurt, wine, pickles, and kefir fermented using bifidobacteria, lactobacilli, streptococcus, and enterococcus (52). The Dietetic Association of Turkey (TDD) recommends the consumption of products such as probiotic-fortified yogurt and kefir in its Covid-19 general nutritional recommendations (72).

Probiotics have a positive effect on health by strengthening the immune system, fighting against pathogens, protecting and improving the intestinal epithelial barrier. They provide anti-inflammatory, antimicrobial, antioxidant and immunomodulatory effects (9,52,83). The microbe-related molecules they produce (MAMP; peptidoglycan, lipopolysaccharide, etc.) interact with the receptors that recognize these molecules in the immune system and activate the immune system by sending signals to both the innate and the acquired immune system (77). Organic acids produced by probiotics reduce the pH of the environment and suppress the growth of pathogenic bacteria (83).

In the study by Romano et al., it was mentioned that the consumption of probiotics together with antiviral treatments may contribute to the quenching of the cytokine storm

in Covid-19 (72). In another study by Ayoung Lee et al. with non-diabetic individuals over 60 years of age, was observed that daily supplementation of probiotic-fortified yogurt resulted in beneficial immune-stimulating effects in healthy elderly people(85).

Probiotics and microbiota are in direct contact (84). Viruses, bacteria, and microorganisms living in different parts of the human body are called microbiota. This plays a role in maintaining general health and preventing diseases. Therefore, there is an important relationship between the immune system and the microbiota. It is known that the lung and intestinal microbiota are different, but it has been observed that the lung microbiota of patients with trauma, ARDS, and sepsis is affected bidirectionally from the intestinal microbiota through the lymphatic system. It is thought that evaluating the importance of lung and intestinal microbiota to the innate immune system will contribute to the control of Covid-19 (86).

Receptors are gateways for some viruses. Some viruses, such as SARS-CoV2 / coronavirus, use ACE2 receptors, which are also commonly found in the kidney, heart, liver, and intestines, to enter cells. The ACE2 receptor is mainly expressed in the lungs and intestines, and these receptors have become very important due to the entry point of the coronavirus into the body (72,86).

In a study, it was determined that coronavirus RNA was found in the stool of Covid-19 infected patients. Although the coronavirus seems to be mainly involved in the lungs, it has been observed that it also causes symptoms related to the gastrointestinal system (diarrhea, nausea, abdominal pains, etc.). This is due to the impaired systemic immune response caused by the 'Cytokine Storm' (72). Observations from China revealed that some patients with Covid-19 showed intestinal dysbiosis with decreased Bifidobacterium and Lactobacillus numbers (9,28,87). Also, it has been shown that the use of probiotic bacteria in lower and upper respiratory tract infections reduces the infection (87). The evidence shows that bifidobacteria and lactobacilli may improve immune function, decrease the incidence of respiratory infections—including those caused by viruses—improve outcomes in respiratory infections and reduce the severity and the risk of viral respiratory infections (28).

Regular use is recommended for probiotics to show their effect. Probiotics effects may vary depending on the species of the probiotic supplement consumed the formulation of the product, the metabolism of the individual consuming it, and the intestinal flora (83).

However, there are no demonstrable clinical results regarding the therapeutic role of the microbiota and the effect of probiotic use in the treatment of Covid-19 (9,28).

2.3.7.2 Prebiotics

Prebiotics are indigestible, short-chain carbohydrates that increase the activity of colon bacteria and enable the development and proliferation of probiotics. They pass through the small intestine without being digested and fermented in the colon (52,86). Oligosaccharides, fructooligosaccharides, inulin, lactulose, oligofructose, and galactooligosaccharides are the main prebiotic sources (52).

There is no research yet examining the relationship between prebiotics and Covid-19. However, they are thought to be useful in the treatment of Covid-19 due to their effects on microbiota composition. In a review, the milder course of Covid-19 in Japan compared to western countries was attributed to the widespread consumption of seaweeds that are rich in prebiotic polysaccharides (laminarin, fucoidan, porphyrin) in the country (72).

2.3.8 Curcuma Longa (Turmeric) – Curcumin

Curcumin is one of the bioactive substances in turmeric (*Curcuma longa*), such as demethoxycurcumin, bisdemethoxycurcumin, and essential oils (84,88,89). It is one of the star products between natural products that have the potential to have positive effects on human health and the most active main ingredient, making up 3-5% of turmeric, which is called golden spice or Indian gold (90,91).

Curcumin is an antioxidant and anti-inflammatory phytochemical, and it is known to contribute to the inhibition of inflammation in white adipose tissues and the production of anti-inflammatory cytokines (84,88). The radical scavenging and antioxidant properties of yellow curcumin are due to the polyphenols it contains; it is stated to be a better radical scavenger compared to vitamin E (91). In this way, most free radicals are swept away by curcumin, and the levels of antioxidant enzymes increase (92).

Considering the pharmacokinetic properties of curcumin, it is not sufficiently absorbed from the gastrointestinal tract (GIS), a large part of it is excreted in the feces and a small part in the urine. Therefore, it is said that the bioavailability of curcumin is low (92). It is known that proteases are important in virus replication. The main protease (Mpro) of the coronavirus (SARS-CoV-2) appears to be the target for inhibiting

replication (72). Current drugs for the treatment of Covid-19 are primarily effective on Mpro. In a study aimed using medicinal plant derivatives to inhibit Covid-19 infection, curcumin and demethoxycurcumin including quercetin, oleuropein, catechin, resveratrol, epicatechin-gallate have been shown to bind to Mpro, but they have low binding energy and inhibition value (93,94). In other studies, conducted to determine the angiotensin-converting enzyme (ACE) inhibitory effect, it was stated that curcumin has a mild inhibitory effect (90,95).

Studies are far from evidence and more clinical research is needed to determine whether plant-based ACE-2 receptor blockers have risk-reducing effects (93).

2.4 Eating Awareness - Mindful Eating

The concepts of mindfulness and eating awareness have become very popular in recent years (96). Mindfulness should be mentioned before the detailed definition of eating awareness (97).

Kabat-Zinn (2003) expressed the concept of “Conscious Awareness” which is the exact equivalent of the word 'Mindfulness' as “an awareness that involves consciously paying attention to the present moment” (96–98). Last 30 years, mindfulness has become more popular and effective in the treatment of stress and eating problems (97). Eating awareness - Mindful eating has emerged by adapting the concept of mindfulness to define and change eating behaviors and has become very popular in the treatment of stress and eating problems during diet processes in recent years (99). Although mindfulness is associated with many health conditions, it plays an important role in providing portion control, stopping emotional eating, and overeating (97).

Mindful eating has been defined as 'eating by noticing how and why eating behavior occurs rather than what is eaten, internalizing the concept of physical hunger-satiety, being aware of the effect of thoughts and feelings focusing on the food which is consumed at that moment, without being affected by environmental factors, without judging food choices (96,97). The aim is not weight loss or restricting calories but it is believed that if someone is aware of their food consumption, this can lead him/ her to select healthier options (98,100). Healthier food choices can be made by increasing the attention given to eating behavior, internalizing the consumed food, and reducing the sensitivity to thoughts and feelings during food consumption (96,97).

Mindful eating can be simply summarized as eating by focusing on each bite or plate of food or beverage which is consumed (97,100). It starts with the first thoughts about the food and continues until the last bite is swallowed (98). However, our cultural and social environment encourages us to eat even absence of hunger/physiological need for food (100).

Covid-19 pandemic is affecting healthcare systems, lifestyles, and national-global economies. Especially social isolation/quarantine is generally an unpleasant experience that can affect mental health negatively. It has been suggested that self-isolation might cause psychological and emotional mood changes, alter eating or sleeping patterns, worsening of chronic health conditions, weight gain, an increase in the use of alcohol, etc.(22). Despite all the warnings, suggestions, and recommendations of social organizations, peoples' eating habits have changed due to many psychological factors such as the isolation processes that people spent in their homes, difficulties they experienced, fear, and stress (101). Many studies have shown that people's physical activity levels, eating habits and eating behaviors changed the during pandemic (7,102–104).

Emotions such as stress, anxiety, depression, anger, and anger that cause emotional eating often increase food consumption and disrupt eating habits. It is important in determining the need to eat. People who feed on their emotions cannot distinguish whether their hunger is physiological or not (7). Emotional eating refers tendency to eat as a response to emotional triggers, not physiological hunger and it is associated with a thicker waist circumference, greater amounts of body fat, and a high BMI (6). In this case, eating awareness/mindful eating enables the person to recognize the types of hunger and this can be a useful strategy for people who are aware of how eating behaviors and food choices affect them positively influencing food consumption to maximize health and prevent disease (7). A study, it was aimed to change the eating behavior with mindfulness stress training, and a significant decrease was found in emotional eating and uncontrolled eating after mindfulness training (97).

Mindfulness might be associated with Covid-19 preventive health promotive behaviors (e.g., healthy eating, physical activity, etc.). A positive result was obtained in a study that examined the relationship between mindfulness and Covid-19 might be a preventive health behavior during the pandemic period; however, no study has so far

examined the relationship between mindfulness and preventive health behavior in a global pandemic (105).

2.5 Eating Habits of University Students

The basis of a healthy life is laid during the youth period (106). According to the Turkish Statistical Institute (TUIK) 2020 data, 15.4 % of Turkey's population consists of young people aged between 15-24 (Figure 2.5) (107). It is known that inadequate diet and sedentary lifestyle during adolescence, increase the possibility of having chronic diseases such as diabetes, obesity, and cardiovascular diseases in adulthood (106,108).

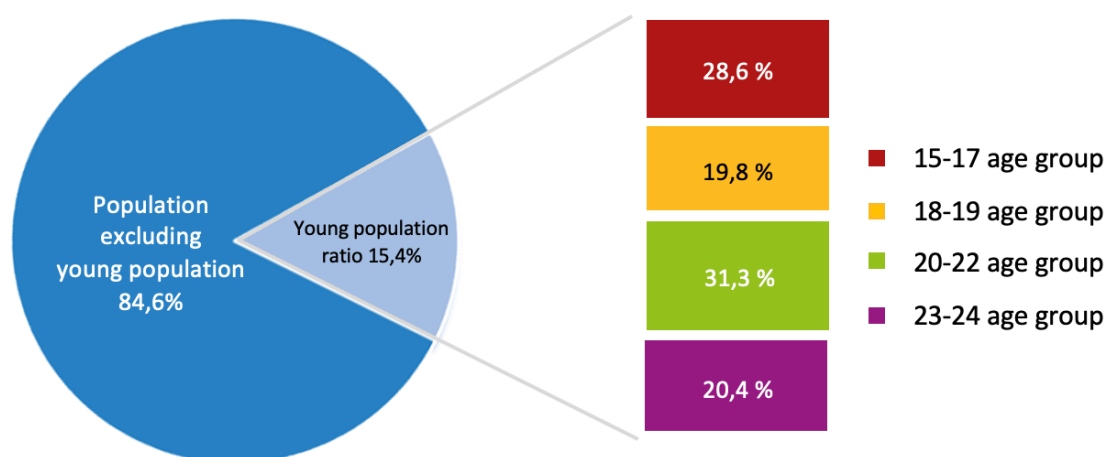


Figure 2.5 Turkey's young population ratio by age groups 2020

Source: Turkish Statistical Institute (TUIK) 2020 Data, TUIK Number: 37242 , Citation Date: July7, 2021, <https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Genclik-2020-37242>

Unbalanced and inadequate nutrition is an important problem in our country. University students are also among the groups in which unbalanced nutrition and malnutrition are the most common (109). The university is a stressful period for many students. It coincides with the end of adolescence and the beginning of adulthood, and this is an important term in which university students' future eating habits are formed (94,97). During this process, students are highly influenced by the environment. Young people who move away from the usual family environment, become more open to external factors; fast-food consumption and unbalanced and inadequate nutrition increase, developing emotional eating behavior, wrong body image, and eating disorder may occur

(110) Also, it is stated that night-eating habits are seen in university students due to high-stress levels, lack of sleep pattern and unbalanced diet might create risk for the development of night eating syndrome (106).

The change in the diet affects not only the physical condition of university students but also their mental state and school performance (109). Studies have shown that university students generally do not pay attention to meals, consume only one meal, prefer hearty foods instead of healthy foods, economic difficulties are effective in inadequate and unbalanced nutrition and students living in dormitories do not have a good diet due to bad conditions (111,112). In Turkey, studies on the dietary habits of university students have shown that students do not pay attention to their meal patterns, prefer fast food, consume insufficient milk and dairy products, are selective in vegetable dishes, consume too much tea, and consume insufficient water (106,113,114). It is reported that young people have insufficient nutritional information (106).

Another study measures the nutritional habits and physical activity levels of first and emergency aid students during the coronavirus period, because the students were at home and they woke up late they had two main meals a day, a late breakfast and an evening meal. According to the Mediterranean Diet Quality Index (KIDMED), 30.9% of the students had low, 56.1% medium and 13% optimal Mediterranean diet quality during the epidemic period (4). In a study which consists of students studying in health-related departments, it was determined that 55.4% of the students had medium, 29.2% had low and 15.4% had optimal diet quality (115).

3. MATERIALS AND METHODS

The research was conducted among Yeditepe University Faculty of Health Sciences students aged 18 and over, who are actively studying. In order to carry out the study, "Ethics Committee Approval" dated 04/03/2021 with a decision no: 1395 37068608-6100-5-109 was received from Yeditepe University Clinical Research Ethics Committee. As a result of the interruption of face-to-face education due to Covid-19, students were reached through the online courses they attended between 01/03/2021-01/06/2021, and data were collected by online survey method after informing about the purpose and importance of the study. Participation in the study was based on volunteerism.

The universe of the study consisted of 1004 students accordingly, the sample size was calculated as a minimum of 279 participants at the 95% confidence level. Between 01/03/2021 and 01/06/2021, the online questionnaire was sent to Yeditepe University Faculty of Health Sciences students and 297 students were reached. However, 10 out of 297 students did not agree to participate in the study; 38 of them left the survey unfinished. Since there are common elective courses, the data of 8 participants from different faculties were not included in the study. The study was completed with the data of 241 participants who accepted to participate in the study and completed the questionnaire.

In the study, a questionnaire consisting of 4 parts was applied to the participants. The sections of the questionnaire consist of questions about demographic-anthropometric information, nutritional habits-food choices during the pandemic, Mindful Eating Questionnaire (MEQ-30) and dietary supplement use. In the first part of the questionnaire, the students were asked about their age, height, weight, gender, department, and which grade they studied in order to learn their demographic and anthropometric information. In the second part of the questionnaire, questions were asked to examine the nutritional habits and food choices of students based on similar studies to analyze the nutritional habits of the students during the pandemic process and to compare how they changed (102). In order to measure the eating awareness levels of the students participating in the study, the MEQ-30 scale was used in the third part. In the last part, questions were asked about the nutritional support usage status of the students, which supplements the users use, for what purpose, and for how long.

While preparing the questions examining the nutritional habits, food selection questions, and the use of dietary supplements, a literature search was conducted and questions were formed based on similar studies (62,102,103,116).

3.1 Mindful Eating Questionnaire (MEQ-30)

The MEQ-30, consisting of 30 questions, was used to evaluate students' awareness levels. It was adapted into Turkish by conducting a validity and reliability study by Köse et al.(96). The original, MEQ was developed by Framson et al. in 2009, with 28 questions and 5 sub-factors evaluated with a 4-point Likert scale(97). The scale was first translated into Turkish as MEQ-28 in line with the guidelines published by Gözümler and Aksayan (117). However, there are differences in meaning stemming from the English-Turkish translation. As a result of the pilot application carried out in 2016, the Cronbach's alpha value of the questionnaire was 0.422, the items that reduced this value were re-examined, and a new 30-question scale was created by adding new items instead of the non-working items in line with expert recommendations. The reliability-Cronbach's alpha value of the MEQ-30 scale was found to be 0.733 (96).

The items were collected in 7 factors: disinhibition, emotional eating, eating control, focus, eating discipline, mindfulness and interference (Appendix 3) (97). The factors in the scale provide more detailed information about the sample in which the study was conducted:

1. Disinhibition (*Questions: 4, 14, 17, 20, 26*): restraint, quantity, and time control
2. Emotional eating (*Questions:21, 22, 23, 28, 30*): emotional hunger, feeling good, and eating for satisfaction.
3. Eating control (*Questions: 3, 6, 27, 29*): adjusting the eating speed, keeping control of the eating function.
4. Focusing (*Questions: 8, 9, 12, 13 15*): focusing on the taste of the food itself, taking a break from other activities and thoughts while eating.
5. Eating discipline (*Questions:1,18,24,25*): planning, preparation, balancing, possession, order, time.
6. Mindfulness (*Questions:2, 7, 11, 16, 19*): physical hunger-satiety awareness, calorie, and nutritional value information, healthy nutrition information, habit awareness.

7. Interference (*Questions:5, 10*): cope with sensory factors such as smell, sight, sound, and distractions such as invitations, food variety, or advertisements.

Straight and reverse scoring are included in the scoring of the scale:

While items 1, 7, 9, 11, 13, 15, 18, 24, 25 and 27 are scored straight,

items 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 17, 19, 20, 21, 22, 23, 26, 28, 29, 30 are reverse scored. (Reverse Scoring: 1=5; 2=4; 3=3; 4=2; 5=1)

The minimum score that can be taken on the scale is 30, and the maximum score is 150, and it is accepted that the higher the score obtained from the scale, the higher the awareness of eating.

3.2 Evaluation of the Data

Statistical evaluation of data; SPSS 23.0 statistical package program will be made in Windows. The suitability of the variables to normal distribution will be examined by using the Kolmogorov-Smirnov test. Descriptive analyzes will be calculated using mean $\pm$ standard deviation for normally distributed variables, and median and quarter-value widths for non-normally distributed variables. Nominal variables will be given using frequency and percentages. The statistical significance of the variation between the groups will be examined using the ANOVA test and pairwise comparisons will be made using Tukey tests for parameters that are normally distributed. The non-parametric test will be used to examine the variation between groups of non-normally distributed parameters. The confidence interval for all analyzes will be 95% and the results will be considered statistically significant for $p < 0.05$.

4. RESULTS

The distribution of students by sex and department is shown in Table 4.1. 241 students aged 18 and over participated in the study, 62.6% (n=151) of students from Nutrition and Dietetics (NUT), 19.1% (n=46) from Nursing (NRS), 18.3% (n=44) from Physiotherapy and Rehabilitation (PTR). 93.8% (n= 226) of the students were women and 6.2% (n=15) were men. 65% of women students are from NUT, 18.6% are NRS, 16.4% are PTR students; on the other hand, 26.7% of men students are NUT , 26.7% NRS and 46.6% PTR students.

Table 4.1 Distribution of students regarding sex and departments

	NUT		NRS		PTR	
	n	%	n	%	n	%
Women	147	65	42	18.6	37	16.4
Men	4	26.7	4	26.7	7	46.6
Total	151	62.6	46	19.1	44	18.3

The distribution of the students participating in the study by sex and class is given in Table 4.2. 29.5% of the participants in the study consisted of 1st grade, 32.4% 2nd grade, 15.3% 3rd grade, and 22.8% 4th grade students. Female students' (n=226), 29.2% were 1st grade, 31.4% 2nd grade, 15.5% 3rd grade, 23.9% 4th grade students. Male students (n=15) consist of 33.3% 1st grade, 46.7% 2nd grade, 13.3% 3rd grade and 6.7% 4th grade students.

Table 4.2 Distribution of the students participating in the study regarding their classes and sex

Sex	Women (n=226)		Men (n=15)		Total (n=241)	
	n	%	n	%	n	%
Class						
- 1 st	66	29.2	5	33.3	71	29.5
- 2 nd	71	31.4	7	46.7	78	32.4
- 3 rd	35	15.5	2	13.3	37	15.3
- 4 th	54	23.9	1	6.7	55	22.8

As shown in Table 4.3 the mean BMI of the students from NUT is 20.7 ± 2.93 kg/m², while it is 22.08 ± 3.8 kg/m² for the NRS students and 22.60 ± 3.51 kg/m² for the PTR department students. A statistically significant difference is found between the mean BMI values regarding the departments ($p=0.001$), indicating that students from departments of NRS and PTR had significantly higher BMI than students from NUT.

Table 4.3 Mean BMI of students according to their departments

	NUT (n=151)		NRS (n=46)		PTR (n=44)		p
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range	
BMI (kg/m ²)	20.7 ± 2.93	16.8-33.66	22.08 ± 3.8	16.98-32	22.6 ± 3.51	15.8-30.8	0.001 ^a *

^a p value calculated via the Kruskal Wallis test.

* $p < 0.05$

The dietary habits and food choices of the participants during the pandemic are shown in Table 4.4. 22.4% of the students stated that the number of meals consumed during the day decreased; 38.2% stated that they did not change, 39.4% stated that the number of meals they consumed increased. While the water consumption of 48.1% of the students increased during the day, 37.8% of them did not change and 14.1% of them decreased their daily water consumption. The consumption of home food increased by 76.8% of the students participating in the study.

Consumption of fresh vegetables and fruits increased in 61.8% of the students, remained unchanged in 32%, and decreased in 6.2%. The amount of carbohydrates in the students' meals increased by 37.3%, remained unchanged by 45.6%, and decreased by 17.1%; the fat content of the meals increased by 25.3%, remained unchanged by 50.2%, and decreased by 24.5%, respectively. Packaged food consumption of 31.9% of the students increased, 41.1% decreased, 27% remained unchanged; the frequency of eating out decreased by 48.1%, remained unchanged by 23.3%, and increased by 28.6%, respectively. 48.9% of the students who participated in the study stated that their desire to consume sugary food increased to relieve themselves.

Tea and coffee consumption increased in 68.1% of the participants during the day, decreased in 6.2% and did not change by 25.7%. The desire to snack constantly increased in 51.9% of the students, decreased in 10.8%, and did not change in the desire to a snack of 37.3%; night snacks increased by 34%, remained unchanged by 46.9% and decreased by 19.1%, respectively. During the pandemic process, the physical activity level of 58.1%

of the students decreased, the physical activity level of 18.3% remained unchanged, and the physical activity level of 23.6% increased; During the pandemic, body weights decreased by 27%, remained unchanged by 34.4% and increased by 38.6%, respectively.

Table 4.4 Nutritional habits and food choices of students during the pandemic

(n=241)	Decreased		Not Changed		Increased	
Eating habits and Food choices	n	%	n	%	n	%
Number of meals consumed in a day	54	22,4	92	38,2	95	39,4
Daily water consumption	34	14,1	91	37,8	116	48,1
Homemade food consumption	14	5,8	42	17,4	185	76,8
Fresh fruit and vegetable consumption	15	6,2	77	32	149	61,8
Carbohydrate content of my meals	41	17,1	110	45,6	90	37,3
Fat content of my meals	59	24,5	121	50,2	61	25,3
Packaged food consumption	99	41,1	65	27	77	31,9
Frequency of ordering ready meals	116	48,1	56	23,3	68	28,6
Desire of consuming sugary foods to relieve myself	38	15,8	85	35,3	118	48,9
Daily tea and coffee consumption	15	6,2	62	25,7	164	68,1
Continuous desire to snack	26	10,8	90	37,3	125	51,9
My night snacks	46	19,1	113	46,9	82	34
My general physical activity level	140	58,1	44	18,3	57	23,6
My weight during pandemic	65	27	83	34,4	93	38,6

The answers are given by the students to the question of "nutrition habits compared to pre-pandemic" are shown in Table 4.5, distributed according to the departments. 48.3% of NUT students, 34.8% of NRS students, 38.6% of PTR students stated that their eating habits were healthier compared to the pre-pandemic period; 25.8% of NUT students, 37% of NRS students, and 25% of PTR students stated that their eating habits are more unhealthy; 25.8% of NUT students, 28.3% of NRS students and 36.4% of PTR students stated that there was no change in their nutrition compared to the pre-pandemic period. When the answers of all participants are evaluated, it is seen that 44% have a healthier, 27.8% more unhealthy diet and 28.2% have no changes in their diet.

Table 4.5 Eating habits status of students before the pandemic by departments

Eating habits status	Nutrition and Dietetics (n=151)		Nursing (n=46)		Physiotherapy and Rehabilitation (n=44)		Total (n=241)	
	n	%	n	%	n	%	n	%
Unhealthier	39	25.8	17	36.9	11	25	67	27.8
Not Changed	39	25.8	13	28.3	16	36.4	68	28.2
Healthier	73	48.4	16	34.8	17	38.6	106	44

The averages of age and MEQ-30 score of the health sciences students according to the departments are shown in Table 4.6. The mean age and mean MEQ-30 score of NUT students are 21.56 ± 2.1 years and 102.71 ± 13.06 respectively. The minimum MEQ-30 score is 68 and the maximum score is 130. The mean age of the NRS department students is 21.52 ± 1.7 years and the mean MEQ-30 score is 96.6 ± 14.8 . The lowest MEQ-30 score obtained is 67 and the highest score is 127. The mean age of PTR students was 21.52 ± 1.5 years and the mean MEQ-30 score was 95.75 ± 12.2 . The lowest score obtained is 65 and the highest score is 117. The difference is found between the mean MEQ-30 scores between departments and this difference is statistically significant ($p=0.01$). A significant difference is found between the mean MEQ-30 scores of the departments of the NUT and the NRS and PTR departments ($p=0.021$, $p=0.007$ respectively); but there is no statistically significant difference found between the NRS and the PTR departments in the comparison of the MEQ-30 score average ($p=1.000$).

Table 4.6 Mean age and MEQ-30 scores of students according to departments

	Nutrition and Dietetics (n=151)		Nursing (n=46)		Physiotherapy and Rehabilitation (n=44)		p
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range	
Age	21.56 ± 2.1	19-35	21.52 ± 1.7	19-30	21.52 ± 1.5	18-24	0.671 ^a
MEQ-30 score	102.71 ± 13.06	68-130	96.6 ± 14.8	67-127	95.75 ± 12.2	65-117	0.01 ^{b*}

^a p value calculated via Kruskal Wallis test.

^b p value calculated via one way-ANOVA test.

* There is a significant difference between the Department of Nutrition and Dietetics and the Department of Nursing (Bonferroni $p < 0.05$).

* There is a significant difference between the Department of Nutrition and Dietetics and the Department of PTR (Bonferroni $p < 0.05$).

The cut-off point for the MEQ-30 score of the health sciences students participating in the study was determined as 100.3 and the students were examined in two groups as below the average (<100.3) and above the average (>100.3). The MEQ-30 score of the students and their distribution by sex are shown in Table 4.7. Of the 121 participants with a MEQ-30 score below 100.3, 91.7% ($n=111$) were women and 8.3% ($n=10$) were men. Of the 120 participants with a MEQ-30 score above 100.3, 95.8% ($n=115$) are women and 4.2% ($n=5$) are men. There is no statistically significant difference between the gender of the students and whether they were in the group below or above the MEQ-30 average ($p=0.188$).

Table 4.7 Distribution of students regarding MEQ-30 mean score classifications and sex

MEQ-30 Cut-Off					
	BELOW THE AVERAGE < 100.3		ABOVE THE AVERAGE > 100.3		p
	n	%	n	%	
Women	111	91.7	115	95.8	0.188
Men	10	8.3	5	4.2	

Students' distribution according to the mean MEQ-30 score the departments they studied are given in Table 4.8. The group whose MEQ-30 score is below 100.3, consists of 53.7% NUT, 22.3% NRS, 24% PTR students. The group with MEQ-30 score above 100.3 consists of 71.7% NUT, 15.8% NRS, 12.5% PTR students. A significant relationship is found between the departments they studied and their classification according to their MEQ-30 scores ($p=0.013$).

Table 4.8 Distribution of students according to MEQ-30 mean score classifications and departments

MEQ-30 Cut-Off					
	BELOW THE AVERAGE < 100.3		ABOVE THE AVERAGE > 100.3		P
	n	%	n	%	
NUT	65	53.7	86	71.7	0.013*
NRS	27	22.3	19	15.8	
PTR	29	24	15	12.5	

* $p<0.05$

The BMI averages of the students according to the mean MEQ-30 score are shown in Table 4.9. The mean BMI of the students whose MEQ-30 score is below the average is $22.2 \pm 3.45 \text{ kg/m}^2$ and the mean BMI of the students whose MEQ-30 score is above the average is $20.5 \pm 2.93 \text{ kg/m}^2$. A highly significant difference is found in the BMI averages of the students according to the MEQ-30 scores, in favor of the students whose MEQ-30 score was below the average ($p=0.000$).

Table 4.9 Mean BMI of groups according to MEQ-30 mean score classification

MEQ-30 Cut-Off						
BMI (kg/m ²)	BELOW THE AVERAGE <100.3 (n=121)		ABOVE THE AVERAGE > 100.3 (n=120)		Significance	
	$\bar{x} \pm \text{SD}$	Range	$\bar{x} \pm \text{SD}$	Range	Z	p
	22.2 ± 3.45	16.81-33.66	20.5 ± 2.9	15.85-32.8	-4.506	0.000*

* $p < 0.05$

The health sciences students were divided into 2 groups according to their MEQ-30 mean score and the comparison of the eating habits of the 2 groups is shown in Table 4.10. Those with MEQ-30 scores below the cut-off (100.3) Group 1 ($n=121$); those above were named Group 2 ($n=120$). 42.6% of the students who stated that the number of meals consumed during the day decreased, were from Group 1, and 57.4% were from Group 2. 64.2% of the students who stated that the number of meals consumed increased was composed of Group 1 students with a lower awareness level. 40.2% of the students who stated that the number of meals did not change were from Group 1 and 59.8% were Group 2 students. 76.5% of the students whose daily water consumption decreased were Group 1 students. 56.9% of the students whose daily water consumption increased were Group 2 students. The number of meals consumed during the day and water consumption of the 2 groups were statistically significant ($p=0.002$, $p=0.003$, respectively).

48.6% of the students who stated that the consumption of homemade food increased were from Group 1, 51.4% of them were from Group 2. Of the students whose homemade food consumption decreased, 78.6% were from Group 1, 21.4% were from Group 2; 47.6% of the students stated that they did not change were from Group 1 and 52.4% of them were from Group 2. 55.8% of the students who stated that their consumption of fresh vegetables and fruits did not change were from Group 1, and 44.2% of them were from Group 2. Of those whose consumption increased, 45.6% were from

Group 1 and 54.5% from Group 2. When the consumption of homemade food and fresh fruit and vegetable consumption of the 2 groups were compared respectively, no statistically significant differences are found ($p=0.091$, $p=0.146$ respectively).

When the students were asked about the carbohydrate content of the meals, 65.6% of the students who stated that it increased were Group 1 students and 34.4% were Group 2 students. 65.9% of the students who stated that their carbohydrate content decreased were from Group 2, 34.1% were from Group 1. A statistically significant difference is found in the comparison of the 2 groups ($p=0.001$). When asked about the fat content in the meals of the participants, 72.1% of those who said that the fat content in my meals increased were Group 1 students; Group 2 students constituted 59.3% of those who stated that the fat content of their meals decreased. When the data of the 2 groups were compared, a statistically highly significant difference is found ($p=0.000$). 72.7% of the participants who said that their packaged food consumption increased were Group 1 students with lower awareness levels and 66.7% of those who said it decreased were Group 2 students who had higher awareness levels. When the packaged food consumption of the 2 groups was compared, a statistically highly significant difference is found ($p=0.000$).

Group 1 students make up 63.8% and Group 2 students make up 36.2% of those who say that the frequency of ordering ready meals has increased during the pandemic process. It was seen that 61.2% of the students who stated that the frequency of ordering ready-meals decreased, were Group 2 students with higher awareness levels, and 38.8% were from Group 1 students with lower awareness levels. When the frequency of ordering food from outside the group was compared, a statistically significant difference is found ($p= 0.002$).

When the students were asked about their desire to consume sugary foods to relieve themselves during the pandemic, 69.5% of the participants who stated that it increased were from Group 1 and 30.5% were from Group 2. While 81.6% of the students who stated that their desires decreased during the pandemic process were Group 2 students and 18.4% were Group 1 students, the difference is found statistically highly significant when the two groups' desire to consume sugary food was compared ($p=0.000$).

When the participants were asked about their daily consumption of tea and coffee, 50.6% of the students who stated that their daily tea-coffee consumption increased were

from Group 1 and 49.4% were from Group 1. The students who stated that their consumption did not change constitute 50% of both groups, 46.7% of the students who stated that their daily tea and coffee consumption decreased were Group 1 students and 53.3% were Group 2 students. There was no statistical difference between the two groups ($p=0.957$).

Group 1 students constitute 65.5% of the students who stated that their continuous desire to snack increased during the pandemic and Group 2 students constitute 69.2% of the students who stated that it decreased. 34.4% of the students who stated that their continuous desire to snack did not change were Group 1 students and 65.6% of them were Group 2 students. Of those who stated that their night snacks increased, 64.6% were Group 1 and 35.4% Group 2 students. Group 1 students made up 26.1% of the students who stated that their night snacks were decreased and Group 2 students made up 73.9%. When the constant desire to snack and night snacks of the 2 groups were compared, a statistically highly significant difference is found ($p=0.000$, $p=0.000$ respectively).

63.2% of the students whose physical activity level increased were Group 2 students. 56.4% of the students who stated that their physical activity level decreased during the pandemic were Group 1 students and 43.6% were Group 2 students. When the physical activity levels of the 2 groups were compared, the difference is found statistically significant ($p=0.042$). When the students were asked about the change in their body weight during the pandemic, 65.6% of the students whose body weight increased were Group 1 students with a lower awareness level, and 34.4% were Group 2 students. Group 2 students with higher awareness levels constitute 63.1% of the students whose body weight decreased, and Group 1 students constitute 36.9%. A statistically significant difference is found between the groups in the comparison of the body weight of the 2 groups during the pandemic process ($p=0.001$).

Table 4.10 Nutritional habits of the participants and the significance of the difference according to the MEQ-30 mean score classification

MEQ-30 Cut-Off								
Eating habits and Food choices	GROUP 1 < 100.3			GROUP 2 > 100.3			χ^2	p
	Decreased %	Not Changed %	Increased %	Decreased %	Not Changed %	Increased %		
Number of meals consumed in a day	42.6	40.2	64.2	57.4	59.8	35.8	12.377	0.002*
Daily water consumption	76.5	49.5	43.1	23.5	50.5	56.9	11.743	0.003*
Homemade food consumption	78.6	47.6	48.6	21.4	52.4	51.4	4.798	0.091
Fresh fruit and vegetable consumption	66.7	55.8	45.6	33.3	44.2	54.4	3.849	0.146
Carbohydrate content of my meals	34.1	43.6	65.6	65.9	56.4	34.4	14.611	0.001*
Fat content of my meals	40.7	43.8	72.1	59.3	56.2	27.9	15.857	0.000*
Packaged food consumption	33.3	49.2	72.7	66.7	50.8	27.3	26.921	0.000*
Frequency of ordering ready meals	38.8	57.1	63.8	61.2	42.9	36.2	12.198	0.002*
Desire of consuming sugary foods to relieve myself	18.4	37.6	69.5	81.6	62.4	30.5	38.275	0.000*
Daily tea and coffee consumption	46.7	50	50.6	53.3	50	49.4	0.087	0.957
Continuous desire to snack	30.8	34.4	65.6	69.2	65.6	34.4	24.722	0.000*
My night snacks	26.1	49.6	64.6	73.9	50.4	35.4	17.551	0.000*
My general physical activity level	56.4	47.7	36.8	43.6	52.3	63.2	6.349	0.042*
My weight during pandemic	36.9	43.4	65.6	63.1	56.6	34.4	14.943	0.001*

* p < 0.05

According to the MEQ-30 scores of the students, their dietary habits compared before to the pandemic period and different significance are given in Table 4.11. For students whose MEQ-30 score is below the average (n=121), 48 of the students stated that they had an unhealthier diet and 41 had a healthier diet. The diet of 32 people did not change. Of the students whose MEQ-30 score is above the average (n=120), 19 of the students stated that they had an unhealthy diet and 65 had a healthier diet. The diet of 36 people did not change. When the food awareness score of the 2 groups was compared with the change in nutritional status compared before the pandemic period, the difference is statistically highly significant (p=0.000).

Table 4.11 The changes of nutritional habits of participants before pandemic according to MEQ-30 mean score classification

MEQ-30 classification						
The change of Nutritional Habits	BELOW THE MEAN < 100.3 (n=121)		ABOVE THE MEAN > 100.3 (n=120)		χ^2	p
	n	%	n	%		
Unhealthier	48	71.6	19	28.4	18.218	0.000*
Not Changed	32	47.1	36	52.9		
Healthier	41	38.7	65	61.3		

* p < 0.05

Answers are given by students to the question “Do you believe that the use of dietary supplements is beneficial?” are given according to the departments shown in Table 4.12. 25.8% of NUT students believe that using dietary supplements is beneficial, 5.3% believe it is not beneficial and 68.9% believe some are beneficial. 26.1% of the NRS students found it beneficial, 17.4% not beneficial, 56.5% some of them are beneficial; 18.2% of PTR students believe that it is beneficial, 13.6% believe it is not beneficial, and 68.2% believe that using some dietary supplements is beneficial. 24.5% of the students participating in the study stated that it is beneficial to use dietary supplements; 9.1% said that it is not beneficial to use dietary supplements and 66.4% believe that some of the dietary supplements are beneficial.

Table 4.12 The answers are given by the students to the question “do you believe that the use of dietary supplements is beneficial?”

Department	NUT		NRS		PTR		Total (n=241)	
Answers	n	%	n	%	n	%	n	%
Yes	39	25.8	12	26.1	8	18.2	59	24.5
No	8	5.3	8	17.4	6	13.6	22	9.1
Some of them are beneficial.	104	68.9	26	56.5	30	68.2	160	66.4

The distribution of dietary supplement usage by the health sciences students participating in the study is given in Table 4.13. 29.8%, 15.2%, and 11.4% of the students of NUT, NRS and PTR departments are using dietary supplements respectively; 23.2%, 15.2%, 27.3% used dietary supplements for a while but not now; 47%, 69.6%, and 61.3% stated that they did not use a dietary supplement. 57 (23.7%) of 241 students are using the dietary supplement, 54 (22.4%) used it for a while but have not used it now, 130 (53.9%) do not use a dietary supplement.

Table 4.13 Dietary supplement use status of health sciences faculty students participating in the study

	NUT (n=151)		NRS (n=46)		PTR (n=44)		Total (n=241)	
Use of dietary supplements	n	%	n	%	n	%	n	%
Yes, I'm using.	45	29.8	7	15.2	5	11.4	57	23.7
I used it for a while, but not now.	35	23.2	7	15.2	12	27.3	54	22.4
No, I don't use.	71	47	32	69.6	27	61.3	130	53.9

The student's dietary supplement usage status according to departments is given in Table 4.14. The students participating in the study were divided into 2 groups as those who are using dietary supplements and those who used but quit + did not use. 23.7% (n=57) of the participants use dietary supplements, 76.3% (n=184) of the students who used dietary supplements but quit + did not use. 29.8% of NUT students, 15.2% of NRS students, 11.4% of PTR students use nutritional support. 70.2% of NUT students, 84.8% of NRS students, 88.6% of PTR students consist of those who used dietary supplements and did not use it. A statistically significant difference is found in the comparison of dietary supplement usage status according to the departments of the students ($p=0.013$).

Table 4.14 Distribution of students by departments according to dietary supplement usage status

Department	Users			Former Users and Non-Users			χ^2	p
	n	% Within department	% Of Total	n	% Within department	% Of Total		
NUT	45	29.8	18.7	106	70.2	43.9	8.654	0.013*
NRS	7	15.2	2.9	39	84.8	16.2		
PTR	5	11.4	2.1	39	88.6	16.2		
Total (n=241)	57	23.7	23.7	184	76.3	76.3		

* p<0,05

Table 4.15 shows the mean BMI and MEQ-30 scores according to the dietary supplement use status of the students. The students participating in the study were divided into 2 groups as those who use dietary supplement and those who used dietary supplement and quit and did not use it. The mean BMI of the two groups is 21.74 ± 3.53 kg/m² and 21.2 ± 3.23 kg/m² respectively and there is no statistically significant difference between the two groups when the BMI averages of the groups were compared (p=0.286). The mean of MEQ-30 scores of the health sciences students using dietary supplement is 101.25 ± 12.2 ; the lowest score is 70 and the highest score is 121. The mean of MEQ-30 scores of the students who did not use and quit using dietary supplements is 99.98 ± 14 ; the lowest score was 65 and the highest score was 131. There is no statistically significant difference between the two groups in the comparison of MEQ-30 score averages divided by dietary supplement usage status (p=0.539).

Table 4.15 Mean BMI and MEQ-30 scores and significance test of students using and not using dietary supplements

	Users (n=57)		Former users and non-users (n=184)		t	p
	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$	Range		
BMI (kg/m²)	21.74 ± 3.53	16.8-32	21.2 ± 3.23	15.8-33.66	1.069	0.286
MEQ-30	101.25 ± 12.2	70-121	99.98 ± 14	65-130	0.615	0.539

The dietary supplement usage status of the students according to the mean MEQ-30 score is shown in Table 4.16. 19.8% of the students below the MEQ-30 mean score use dietary supplement, 80.2% of them have used dietary supplement or not. 27.5% of the students above the mean MEQ-30 score use dietary supplements, 72.5% of them have used dietary supplement or not. When the MEQ scores were compared with the use of dietary supplement, there is no statistically significant difference is found ($p=0.161$).

Table 4.16 Dietary supplement usage status according to MEQ-30 mean score

MEQ-30 Cut-Off								
	BELOW THE AVERAGE < 100.3		ABOVE THE AVERAGE > 100.3		TOPLAM (n=241)		χ^2	p
	n	%	n	%	n	%		
Users	24	19.8	33	27.5	57	23.7	1.960	0.161
Former users and non-users	97	80.2	87	72.5	184	76.3		

The distribution of students using dietary supplements (n=57) by sex is shown in Figure 4.1. 94.7% (n=54) of the students using dietary supplements are women and 5.3% (n=3) are men.

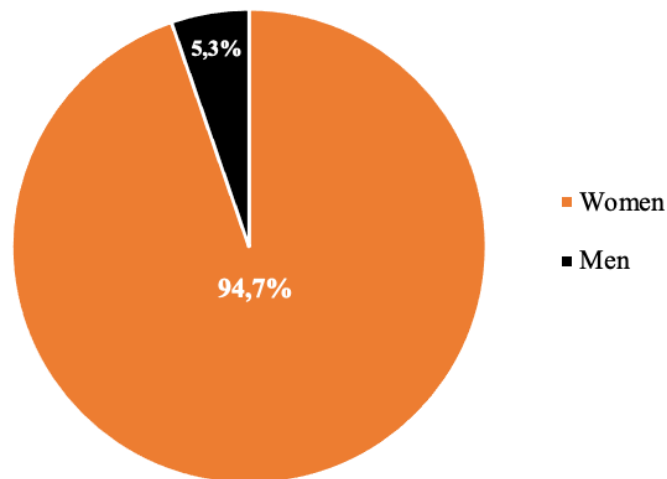


Figure 4.1 Distribution of students using dietary supplements by sex

In Figure 4.2, it is shown when the students using dietary supplements have been using them. 61.4% (n=35) of the students have been using dietary supplements since before the pandemic, and 38.6% (n= 22) of them have been using dietary supplements since the beginning of the pandemic.

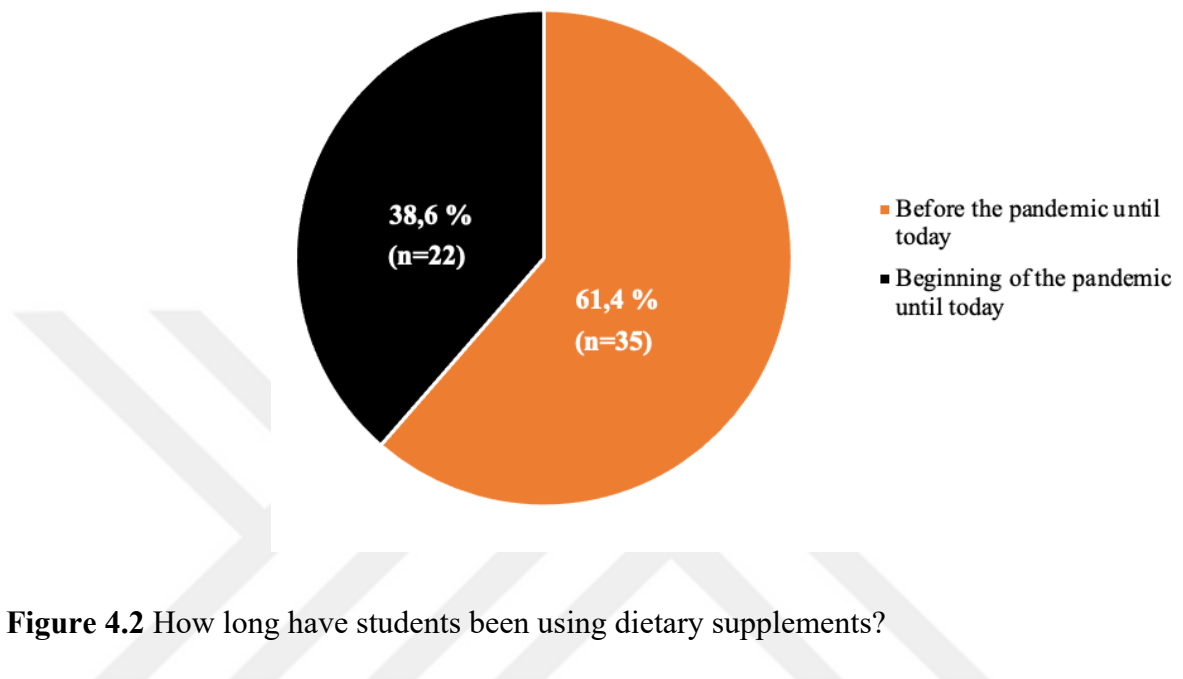


Figure 4.2 How long have students been using dietary supplements?

The supplements used by the students using dietary supplements are shown in Figure 4.3. Participants were given the opportunity to choose multiple options. Among the students using dietary supplement, 45 students use vitamin D, 34 students use vitamin C, 24 students use a multivitamin, 10 students use propolis, 20 students use omega-3, 4 students use black elderberry extract, 20 students use probiotic-prebiotic, 3 students use turmeric-curcumin, 12 students use zinc supplements. Among the students who marked the "other" option, 6 of them state that they use B12, 4 of them use iron, 1 of them use magnesium, 1 of them use biotin and 1 of them use protein powder.

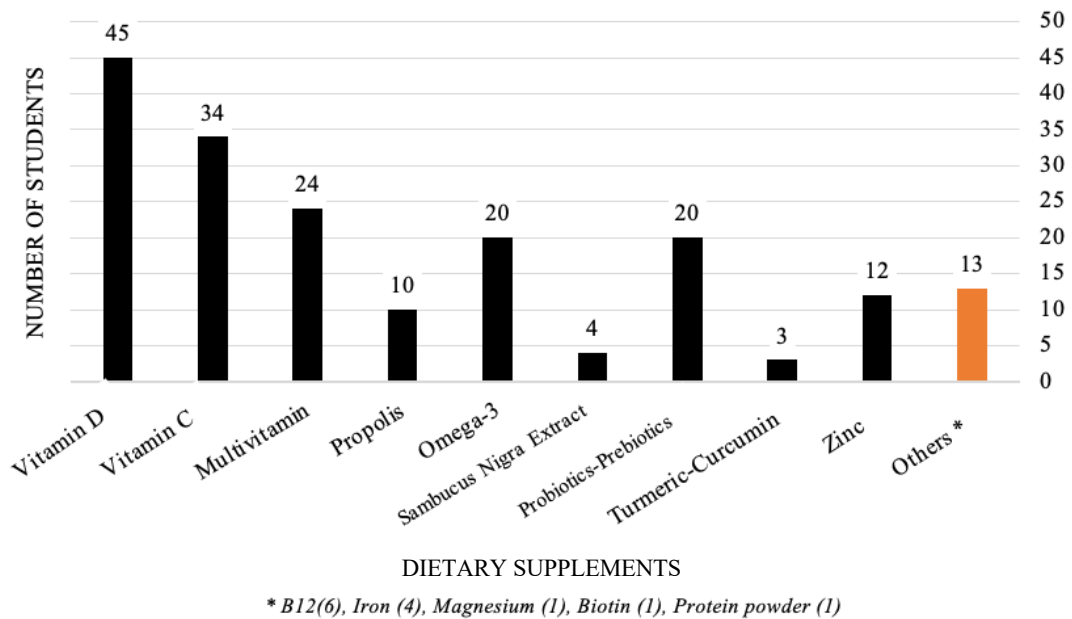


Figure 4.3 Dietary supplements used by students

Figure 4.4 shows for what purpose the students (n=57) who use dietary supplements use them. Students are given the opportunity to choose multiple options. 42 out of 57 students, use supplements for protecting and maintaining their current health, 39 for strengthening their immunity and preventing diseases, 18 for the treatment of disease/deficiency in the blood, 17 because of feeling tired and 2 of them use for losing weight. On the other hand, 2 of the students who marked the “other” option stated that because they are vegan and 1 of them use nutritional support to gain muscle mass.

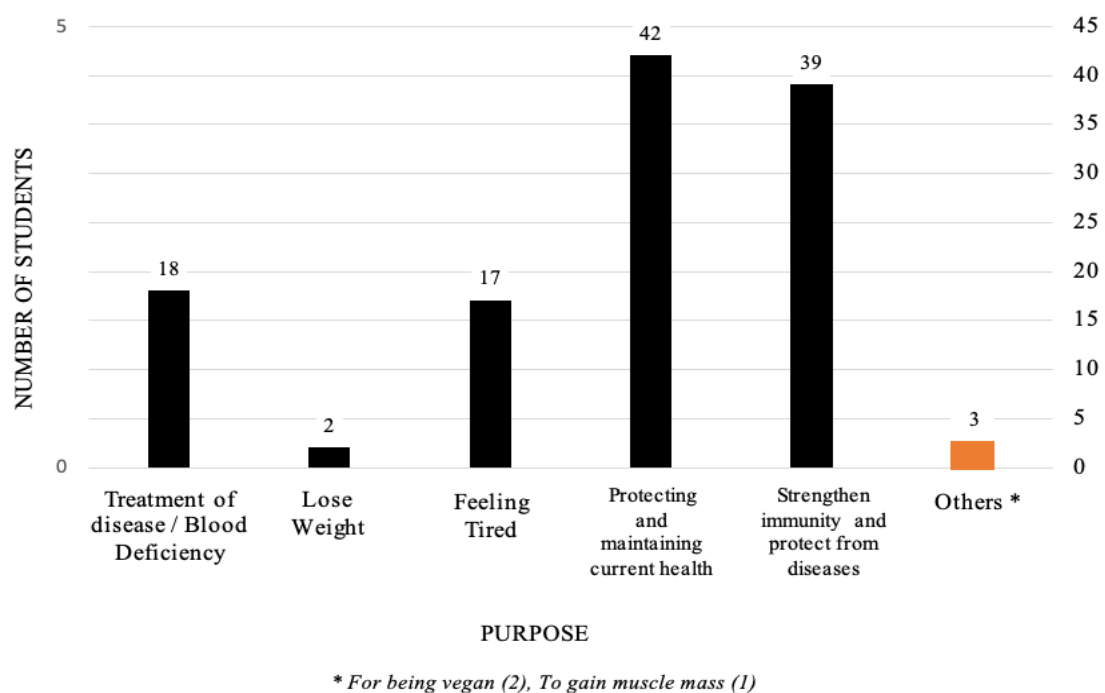


Figure 4.4 The purpose of using dietary supplements by students

The people/channels from which the students who use dietary supplements receive support/advice regarding the use of dietary supplements are shown in Figure 4.5. Students are given the opportunity to choose multiple options. Of the 57 students who use dietary supplements, 34 students stated that they use dietary supplements with the advice of a doctor, 22 students with the advice of a pharmacist, 11 students with the advice of family-friends and 10 of the students stated that they use dietary supplements with the advice of a dietitian. 1 of the students use dietary supplements through the advice of a nurse, 1 student uses it through radio-television programs and 6 students did not receive any support or advice.

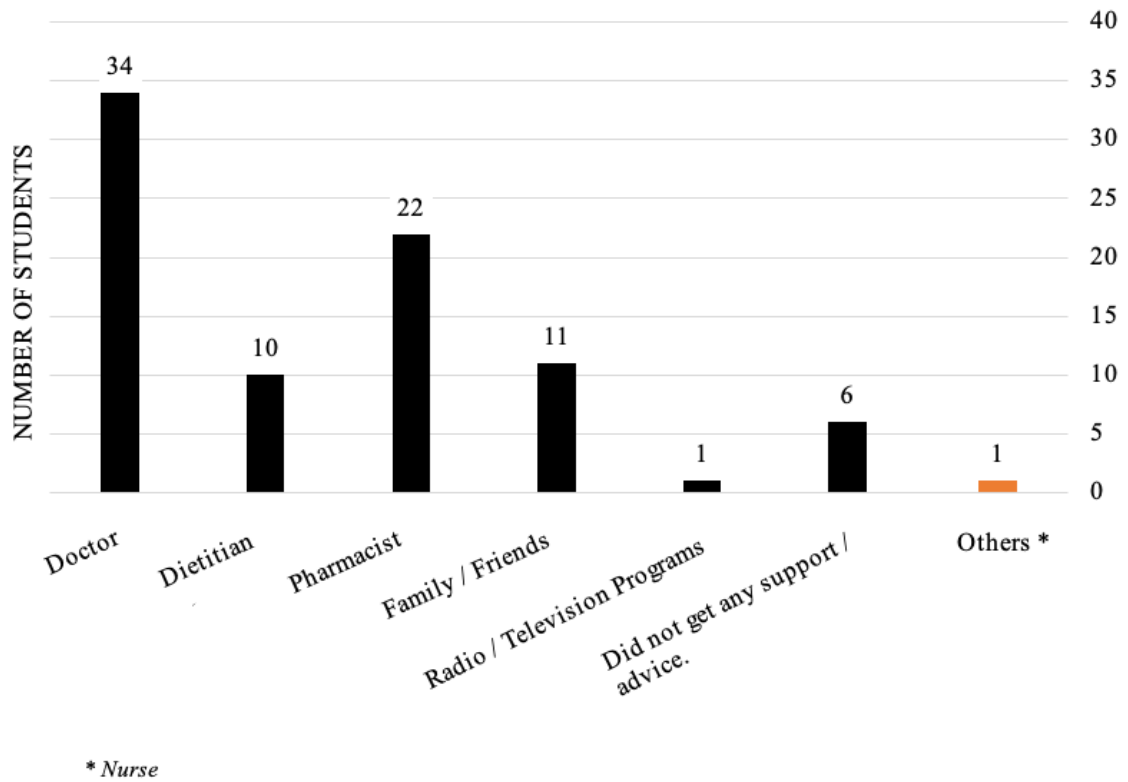


Figure 4.5 Persons or channels from which students using dietary supplements receive support/advice

5. DISCUSSION AND CONCLUSION

5.1 Discussion

A total of 241 students participated in the study. Of the 241 students, 93.8% were female and 6.2% were male. The students participated in the study aged 18 and over who were actively studying at Yeditepe University Faculty of Health Sciences. 62.6% of the students are from Nutrition and Dietetics, 19.1% of them are from Nursing and 18.3% of them are from the PTR department. The rate of women participants and Nutrition and Dietetics participants were found to be higher in the study. The reason for the high number of women participants may be that the high number of women students of the Nutrition and Dietetics department, which had high participation and the participation was on a voluntary basis. The fact that the department of Nutrition and Dietetics had a high level of participation in the study may be because they want to contribute to a study conducted in the same department. When we look at the participation rates by classes, we saw that the 2nd class health sciences students participate more in the study.

In this study, with using the self-reported body weight and height, participants' BMI values were calculated. The mean BMI values of departments were NUT 20.7 ± 2.93 kg/m², NRS 22.08 ± 3.8 kg/m², and PTR 22.60 ± 3.51 kg/m² respectively. The reason why the BMI average of the NUT department was lower than the NRS and PTR departments may be due to the higher nutritional knowledge compared to other departments.

Various questions were asked in order to examine how the eating habits of the students changed during the pandemic (Table 4.4). In this study, the number of meals consumed by the participants during the day, their; daily water, home-made food, fresh vegetable-fruit and, daily tea and coffee consumption, their desire of consuming sugary foods and continuous desire to snack was found to increase. The fat and carbohydrate contents of the participants' meals and their night snacks did not change; their packaged food consumption, the frequency of ordering ready meals and general physical activity level was observed to decrease.

In the study examining the effect of Covid-19 on lifestyle-related behaviors, participants reported that their consumption of fresh vegetables increased during the pandemic (103). Similar study conducted by A. Kumari et al., to assess changes in lifestyle-related behavior during COVID 19 pandemic, it was observed that approximately 75% of the participant's number of meals consumed daily, the number of

snacks between meals, their portions, and consumption of healthy meals containing fresh fruits and vegetables remained the same or increased. Overall intake of fast food, packaged foods, sugar-sweetened foods, and beverages was found to be either similar or decreased. The consumption of unhealthy foods because of boredom or stress was found to be increased around 20% of the participants. For the physical activity, it was found that involvement in aerobic exercise and household chores remained similar or somewhat increased however 75% of the participants reported that, their sitting and screen time during this pandemic period increased (102).

Aleksandra Sidor and Piotr Rzymiski (2020) surveyed 1097 Poles, 43.5% of the participants stated that they ate more food, 51.8% of them stated that they snacked more frequently between meals. About one-third of the participants did not consume fresh vegetables and fruits on a daily basis, while another third stated that they consumed sweets every day (104). In a study conducted in Italy, it was observed that individuals increased their consumption of homemade desserts, pizza, bread, cereals, white meat, and hot beverages, and decreased their consumption of fresh fish, packaged confectionery, and alcohol during the pandemic (118).

Changes in diet during the pandemic process, reduction and restriction of physical activity, changes in food preferences can potentially cause weight change as a result of stress associated with adapting to a new situation encountered for the first time. In this study, it was observed that 38.6% (n=93) of the participant's weight increased during the pandemic, weight of 34.4% (n=83) did not change and 27% (n=65) lost weight. In the study of A. Kumari et al., 47.6% (n=49) of the majority reported that their weight did not change during the pandemic, 15.5% (n=16) lost weight, 32% gained weight, 4.8% (n=5) did not follow their weight (102). Aleksandra Sidor and Piotr Rzymiski stated that 29.9% of participants' weight increased, 18.6% of participants' weight decreased while nearly 40% of participants stated there was no observable change in their weight (104). In an online study of 3533 participants in Italy, 40% of the participants had a slight weight gain and 8% had an excess weight gain (118). In another study, it was observed that 22% of 173 participants over the age of 18 experienced 5-10 kg weight gain during the Covid-19 process (119). In our study, although we worked with a group with higher nutrition and health knowledge because of their education, the percentage of students who experienced weight gain during the pandemic was higher.

When the participants were asked about their dietary habits during the pandemic compared to the pre-pandemic period, 44% said that they ate healthier and 27.8% more unhealthily; 28.2% stated that there was no change in their diet.

Mindful eating can be summarized as eating by focusing on the food or beverage consumed with a simple definition (97). As Mason et al. said, the MEQ was developed to measure the quality of attention given to the eating experience, rather than simply specializing in the context of mindful eating (120). Beshara, Hutchinson, and Wilson named participants who scored high on the MEQ scale as mindful eaters. The highest score that can be obtained on the scale is 150, and it is stated that the higher the score, the higher the level of eating awareness (121). MEQ-30 was used to determine the awareness levels of the participants and their awareness levels were compared according to the departments they studied.

The mean age of the NUT department students was 21.56 ± 2.1 and the mean MEQ-30 score was 102.71 ± 13.06 . The mean age of the NRS department students was 21.52 ± 1.7 , and the mean MEQ-30 score was 96.6 ± 14.8 . The mean age of the PTR department was 21.52 ± 1.5 and the mean of the MEQ-30 score was 95.75 ± 12.2 . While there was no significant relationship between the mean age of the participants according to their departments, a significant difference was found between the MEQ-30 scores. There was no significant difference between the mean MEQ-30 scores of the NRS and PTR departments, however a significant difference was found between the mean MEQ-30 score of the NUT department and the mean MEQ-30 scores of the NRS and PTR departments. In a study conducted with 276 health school students aged 18-35, the mean MEQ score of NUT students was found 100.42 ± 12.00 , mean MEQ score of nursing students was found 95.39 ± 11.82 , and the difference between them was stated to be significant (122). In the present study, the mindful eating levels of the students in the NUT department were found significantly higher than the other departments as well. The reason for the higher MEQ-30 mean score of the Department of NUT compared to other departments of health faculties may be that they are receiving nutrition education. The lowest MEQ-30 score seen in our study was 65, and the highest was 130. In Köse's study with 318 university students, the lowest MEQ-30 score was determined 51 and the highest score was 141 (97).

In the present study, participants were divided into 2 groups according to the MEQ-30 cut-off point (100.3). The MEQ-30 score of 121 participants was below 100.3 and the score of 120 participants was above. When we analyzed the gender distribution of the groups, 111 of the 121 participants who were under 100.3 were women and 10 were men. Out of 120 students with a MEQ-30 score above 100.3, 115 were women and 5 were men. While the MEQ-30 score of 2/3 of men students was below 100.3, the distribution of women students was seen to be quite close. However, no statistically significant difference was found between the gender and the MEQ-30 score distribution. In Köse's study, it was stated that there was no significant difference in MEQ-30 score comparisons according to the gender of the participants as in our study (97).

The distribution of students according to the MEQ-30 cut-off point and their departments are examined in Table 4.8. The group with MEQ-30 score below 100.3 consists of 53.7% NUT, 22.3% NRS, 24% PTR students. Other group with MEQ-30 scores above 100.3 consist of 71.7% NUT, 15.8% NRS, 12.5% PTR students. A significant relationship was found between the departments the students studied and their MEQ-30 scores ($p=0.013$). If we evaluate according to the cut-off point determined in our study, we saw that more than half of the NUT students had a higher mindful eating levels and they formed more than half of the group which was above the cut-off point.

The BMI comparison of the 2 groups we separated according to the MEQ-30 cut-off point was shown in Table 4.9. The mean BMI of 121 students with a MEQ-30 score below 100.3 was found to be $22.2 \pm 3.45 \text{ kg/m}^2$, and the mean BMI of 120 students with a MEQ-30 score above 100.3 was $20.5 \pm 2.9 \text{ kg/m}^2$. When the mean BMI of the 2 groups was compared, a statistically significant difference was found, in favor of those with a MEQ-30 score below 100.3. In the present study, we can say that as the MEQ-30 score decreases, the BMI increases, and the MEQ-30 score increases, the BMI value decreases. Since a low MEQ-30 score indicates a low level of eating awareness, we can expect BMI values to be higher compared to the data obtained from this study. In the studies conducted in our country, it was determined that BMI and MEQ-30 scores were negatively correlated (123,124). Also, some of the studies in the literature show that increasing mindful eating levels may result in a decrease in BMI (125,126). However, in Köse's, Barışkan's and of Karataş et al.'s studies, no statistically significant relationship was found between MEQ-30 score and BMI (97,122,127).

In the present study, students were divided into two groups according to their awareness levels and examined their eating habits during the pandemic. According to the MEQ-30 cut-off score, there was no significant difference found in homemade food, fresh vegetable-fruit, and daily tea and coffee consumption between the two groups with low and high awareness. Since we can consider the awareness level of the students in both groups to be high according to the MEQ-30 scale scoring, it is possible that we observe similar food preferences and nutritional behavior in both groups.

The number of meals consumed during the day and the amount of water, carbohydrate and fat content of meals, packaged food consumption, the frequency of ordering ready meals, the desire to eat sugary foods to relax, the desire to constantly snack, night snacks, physical activity level, and body weight change during the pandemic examined and statistically significant results were obtained between the groups. While the number of meals consumed during the day increased at a higher rate in the group with low awareness levels, it was observed that it decreased more in the group with high awareness levels. Similarly, while the carbohydrate and fat contents of the meals increased at a higher rate in the group with low awareness, it was observed that they decreased at a higher rate in the group with high awareness. It was found that daily water consumption decreased more in the group with low awareness level. While packaged food consumption increased more in the group with low awareness, packaged food consumption mostly decreased in the group with high awareness. In the group with high awareness levels, the frequency of ordering ready meals decreased and in the group with lower awareness levels, the frequency of ordering ready meals increased at a higher rate. In a study conducted with health sciences students, weekly fast-food consumption of students was found to be more frequent than other questioned foods (113).

When the students' consumption of sugary foods to relieve themselves was examined, the increase in the group with low awareness levels and the decrease in the group with high awareness levels were found higher. The desire to snack continuously increased in the group with low mindfulness levels at a high rate. When the night snacking requests of the two groups were examined, there was a greater increase in night snacking in the group with a low mindfulness level compared to the high group. In the study conducted in India, it was observed that the consumption of junk food, fried foods, and fast food increased during the pandemic (103). Similarly, in another study, it was observed that participants' unhealthy food consumption increased, their eating behaviors

changed by eating uncontrollably, snacking more between meals, and generally consuming more main meals (128). In the research conducted during the pandemic period in Italy, it was seen that they cook more at home and as a result, there was an increase in the consumption of homemade desserts, pasta, and bread. However, it was observed that the consumption of sweet-salty snacks, processed meat products, carbonated and sugary drinks decreased because they gave importance to the Mediterranean diet and nutritional values (118).

In our study, the increase in the physical activity level of the group with higher awareness levels and the decrease in the physical activity level of the group with low awareness was found to be higher. Similarly, in a study conducted during the pandemic, it was observed that the physical activity levels of the participants decreased as well (103). In the literature, it has been stated that the level of physical activity has decreased significantly due to the increase in daily sitting and screen time and the restrictions imposed due to the Covid-19 pandemic (102,103,128).

Changes in dietary habits and food consumption during the Covid-19 pandemic, combined with reduced physical activity and the stress associated with adapting to a new situation may cause weight changes (128). In our study, it was found that the bodyweight of health sciences students with low awareness levels increased more than the group with high awareness during the pandemic process, body weight decreased more in the group with higher awareness levels.

In the study, we examined the change in the eating habits of the students who were divided into 2 groups according to the MEQ-30 cut-off score, compared to the pre-pandemic period. While the majority of the participants who said "I eat unhealthier than before the pandemic" were students with low awareness; the majority of the participants who said "I eat healthier than before the pandemic" were students with high level of awareness. The number of students who state that there is no change in their eating habits and food choices is close, and it can be interpreted that the students with a MEQ-30 score below 100.3, with low awareness, eat unhealthier than before the pandemic, and students with a high level of awareness mostly eat healthier. Negative changes in students' eating behaviors may have resulted from the decrease in motivation for healthy eating as a result of the anxiety and stressful mood caused by the pandemic (18,101). Although the awareness level is grouped as low and high, the sample we conducted the study consists

of health sciences students with a high MEQ-30 score. As a result, we would expect them to develop less negative eating behaviors during the pandemic, as we predicted that their awareness levels were higher than the part of the population who did not receive health education (109).

A balanced and adequate diet contains all the essential nutrients needed to maintain health and support immunity (25,40,129). As there are no definite preventive and pharmacological treatments against Covid-19, eating healthy and supplementing it with some dietary supplements (e.g., vitamins, trace elements, nutraceuticals, and probiotics) might be beneficial in this process for vulnerable populations such as the elderly and people with deficiencies (118,129). When we asked the health sciences students participating in our study whether it is beneficial to use dietary supplements or not, the majority stated that they believed some dietary supplements were beneficial. When we analyze the answers of the participants according to the departments they have studied, we reach the same conclusion. The number of students who think that using dietary supplements is not beneficial is less than those who think that it is beneficial. In Kara's study, it was determined that the rates of those who believed (32.5%) of the usefulness of the dietary supplements, did not (35.8%) and believed that some of them were beneficial (31.7%) were very close (62).

We determined that more than half of the health sciences students participating in our study (53.9%) did not use dietary supplements. In general, we can say that students who use dietary supplements are more than those who use them and quit, but the difference is very small. The rate of dietary supplement use in our study was (23.7%), and compared to the studies conducted by Keser et al. (40.8%), Radwan et al. (35.6%), and Zezelj et al. (30.5%) the use of dietary supplement ratio was found to be lower (130–132). However, compared to studies conducted in our country with university students by Tunçer et al. (14.3) and Kara (%10.7), the use of dietary supplement ratio was found to be higher (62,133).

In the present study, participants grouped according to their use of dietary supplements examined the relationship between their use of dietary supplements and the departments they read, and we reached a significant result. The rate of use of dietary supplements by health sciences students was quite low compared to those who used but quit and did not use, and the rate of use of dietary support for all 3 departments was found

to be low compared to those who used but quit and did not use it. In both groups, it is seen that the majority of the students are NUT students. This may be due to the greater participation of NUT students in the study. While the rate of using dietary supplements in the NRS department is higher than the PTR department, the rate of using dietary supplements by the nutrition and dietetics students is the highest between departments.

The students participating in the study were divided into two groups according to their use of dietary support, and when their BMI averages were examined, no significant relationship was found between the BMI averages of students and use of dietary supplements. When the mean MEQ-30 score of the two groups and their use of dietary supplements were compared, there was no statistically significant relationship between their awareness levels and their use of dietary supplements. Similarly, when the dietary supplements usage status of the participants was analyzed by dividing them into two groups according to the MEQ-30 cut-off score, no significant relationship was found between their awareness levels and dietary supplement use. Even if we group the participants according to their use of dietary supplements or the MEQ-30 cut-off score, since we conducted the study with a sample with a high awareness level, it can be expected that there is no significant relationship between the MEQ-30 score averages of the groups and their use of dietary supplements.

In our study, the majority of students using dietary supplements are female students. Similar to our study, in the studies conducted by Koyu et al. with health professionals, Tunçer et al. with health sciences students and Srimiati et al. with university students, the majority of students using dietary supplements were female students as well (12,129,133). In order to examine the effect of the pandemic process on the use of dietary support, when we asked the students who use dietary supplements how long they have been using dietary supplements, most of the students said that they have been using dietary supplements since before the pandemic; other students (38.6%) stated that they started using dietary supplements with the beginning of the pandemic. It can be said that, the Covid-19 pandemic has encouraged health sciences students to use dietary supplements.

In our study, it was observed that health sciences students mostly preferred using vitamin D, followed by vitamin C and multivitamins as dietary support (Figure 4.3). Afterwards, omega-3 and probiotic/prebiotic supplements, zinc, propolis, B12, iron,

sambucus nigra, turmeric-curcumin, magnesium, biotin and protein powder were preferred respectively. In a study conducted in our country, unlike our study, the most frequently used dietary supplements were found to be iron, B-vitamin complex and multivitamin, respectively (130). In another study conducted with university students during the Covid-19 pandemic, similar to our study it was seen that more than half of the students used vitamin C and followed by multivitamins (129). In a study conducted in 2020, it was stated that B12 and D vitamins were used mostly as dietary support, followed by iron supplements (133). Studies in the literature, it was found that the use of vitamin + mineral complexes or multivitamins is common, as determined in Kara's study (62–64). According to the TBSA 2017 data published in Turkey Nutrition and Health Survey (TBSA) 2019, when the samples of people aged 19 and over were examined, the average serum 25-OH vitamin D levels were found to be 18.2 ng/mL. Compared to Turkey's average, 18.3% of individuals aged 19 and over have very low, 44.7% low, 25.9% insufficient vitamin D levels (134). For this reason, the widespread use of vitamin D supplements in our country and the significant effects of vitamin D on the immune system may support the fact that it is the most used dietary supplement in the pandemic and in our study (45,56).

Most of the students in our study who use dietary supplements, use them for protect and maintain their health. This is followed by the purposes of strengthening immunity and protecting against diseases, deficiency-disease treatment, feeling tired, losing weight, vegan nutrition, and gaining muscle mass, respectively. In the study conducted by Keser et al., the reasons for using dietary supplements were stated as being healthy (45.8%), feeling tired (31.3%), and not getting enough nutrition (23.1%) (130). In another study conducted in our country, the reasons for the use of dietary supplements were determined as preventing fatigue, strengthening immunity, deficiency treatment, and support for disease treatment, respectively (133). In a study conducted with healthcare professionals, dietary supplements were divided into two groups as herbals and vitamin-mineral supplements. The aim of the participants who use herbal products was to strengthen the immune system and protect general health; the purpose of using vitamin-mineral supplements was seen as deficiency-insufficiency and to protect general health (12). In our study, results similar to the studies in the literature were found, and it can be thought that the Covid-19 pandemic is effective in the use of dietary supplements by the majority to strengthen immunity and maintain health.

In our study, the majority of students who used dietary supplements stated that they used them with the advice of a doctor. The advice of the doctor is followed by the advice of a pharmacist, family-friend, and dietitian, respectively. While 6 people did not receive any support or advice, one person took the advice of a nurse and one person stated that he did not receive any advice. In the study conducted with university students, while the majority of students using dietary supplements received advice, similar to our study, it was observed that dietary support was used by taking doctor's advice and at least nurse's advice (62). In another study conducted by Keser et al with the students of the faculty of education, unlike our study, it was seen that the families of the students were most effective on the use of nutritional support. This was followed by the advice of friends and their own decisions, respectively. The number of those who use dietary supplements with the recommendation of health personnel is very small (130). In a study conducted in our country, while the most frequently used sources for obtaining information about dietary supplements by university students were television, newspapers/magazines, and websites, the rate of receiving support from health professionals consisting of doctors, dieticians, and nurses were found to be very low (135). In our study, it is seen that health sciences students prefer reliable sources by being more conscious of the use of dietary supplements compared to other studies. It is seen that the fact that they receive health education raises their health awareness compared to the part of the society who do not receive health education, so they act more consciously and selectively.

5.2 Conclusion

One of the important factors affecting a healthy and balanced diet is the level of awareness. It is seen that as higher the awareness level as healthier the diet and the decrease in body weight. For this reason, it is possible to gain healthy eating habits by increasing the awareness levels of individuals. The main purpose of the study was to examine the nutritional habits and dietary supplement usage status of health science students during the pandemic process by associating them with their awareness levels. In this direction, the study was carried out with Yeditepe University faculty of health sciences students. Since the study was conducted with a sample with a high awareness level, it was observed that the higher the awareness level, the healthier the diet during the pandemic and less weight gain. Since there was no significant difference between the lower and higher awareness groups in our study, the effect of the level of awareness on the use of dietary supplements was not determined.

Although there are many studies in the literature examining the use of dietary supplements, a relationship of Covid-19 with nutrition, its effects on nutrition, and the change in nutrition-physical activity habits during the pandemic process, there are no studies that examine the use of dietary supplements by individuals in this process by associating it with the level of awareness. In order to examine the effects of the awareness level on nutrition during the pandemic process, studies can be conducted with health sciences students from different universities; in order to address the impact of the pandemic from a different perspective, studies can be conducted with students of health sciences and other faculty students who do not receive health/nutrition education.

In our study, the rate of use of dietary supplements was found to be low, but the majority of students using dietary supplements are NUT students. Although in the literature it is stated that adequate and balanced nutrition meets the vitamins and minerals required for our health at a sufficient level (if there is no health problem), the factors that lead NUT students to use dietary supplements during the pandemic process can be searched in future studies. In order to investigate the effect of the awareness level on the use of dietary supplements, studies can be conducted using two different samples, those who received and those who received health/nutrition education.

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7. APPENDICES

7.1 Ethical Approval



Sayı : 37068608-6100-15- 2109
Konu: Klinik Araştırmalar
Etik Kurul Başvurusu hk.

04/03/2021

İlgili Makama (Dilek Öztürk)

Yeditepe Üniversitesi Tıp Fakültesi Beslenme ve Diyetetik Bölümü Dr. Öğr. Üyesi İrem Kaya Cebioglu'nun sorumlu araştırmacı olduğu **“Pandemi Döneminde Sağlık Fakültesi Öğrencilerinin Farkındalık Düzeylerine Göre Beslenme Alışkanlığı ve Besin Desteği Kullanımının Değerlendirilmesi”** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (2099) kayıtlı Numaralı KAEK Başvuru Dosyası, Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından 03.03.2021 tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isim belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (KAEK Karar No: 1395)

Prof. Dr. Turgay Çelik

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurul Başkanı

7.2 Permission Slip

22/04/ 2021

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurul Başkanlığı'na

Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik Anabilim Dalı öğrencisi Dyt. Dilek Öztürk'ün "Pandemi Döneminde Sağlık Fakültesi Öğrencilerinin Farkındalık Düzeylerine Göre Beslenme Alışkanlığı ve Besin Desteği Kullanımının Değerlendirilmesi " isimli araştırmayı yüksek lisans tezi olarak yürütmesi uygundur.

Bilgilerinize arz ederim.

Prof. Dr. Serdar Öztezcan
Yeditepe Üniversitesi
Beslenme ve Diyetetik Anabilim Dalı Başkanı

7.3 Questionnaire Form

Pandemi Döneminde Sağlık Fakültesi Öğrencilerinin Farkındalık Düzeylerine Göre Beslenme Alışkanlığı ve Besin Desteği Kullanımının Değerlendirilmesi

Sayfa 1

BİLGİLENDİRİLMİŞ GÖNÜLLÜ OLUR FORMU

Sayın Katılımcı,

Katılımınızı talep ettiğimiz bu çalışma, Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik bölümü yüksek lisans öğrencisi Diyetisyen Dilek Öztürk tarafından yürütülmektedir.

"Pandemi Döneminde Sağlık Fakültesi Öğrencilerinin Farkındalık Düzeylerine Göre Beslenme Alışkanlığı ve Besin Desteği Kullanımının Değerlendirilmesi" başlıklı araştırma çalışmasına katılmanız istenmektedir. Çalışmaya katılıp katılmama kararı tamamen size aittir. Çalışmaya katılma kararı vererseniz, "Çalışmaya katılmayı kabul ediyorum." ibaresini işaretleyiniz. Çalışmada kesinlikle kişisel kimlik bilgileriniz sorulmayacak; katılımınız için sizden herhangi bir ücret istenmeyecek ve katılımınız karşılığında size herhangi bir ücret ödenmeyecektir. Girişimsel hiçbir işlem uygulanmayacaktır.

Bu araştırma ile, Yeditepe Üniversitesi Sağlık Bilimleri Fakültesi öğrencilerinin, farkındalık düzeylerine göre Covid-19 pandemi sürecinde beslenme alışkanlıkları ve besin destek ürünü kullanım durumunun değerlendirilmesi amaçlanmıştır.

Sorumlu Araştırmacı : Dr. Öğretim Üyesi İrem KAYA CEBİOĞLU
Yeditepe Üniversitesi Beslenme ve Diyetetik Bölümü Öğretim Üyesi

Araştırmacı: Dyt. Dilek Öztürk
Yeditepe Üniversitesi Beslenme ve Diyetetik Bölümü Yüksek Lisans Öğrencisi
Telefon Numarası: 05372420830

ÇALIŞMA KATILIM ONAYI *

- ☐ Bilgilendirilmiş Gönüllü Olur formunu okudum, çalışmaya katılmayı KABUL EDİYORUM
- ☐ Bilgilendirilmiş Gönüllü Olur formunu okudum, çalışmaya katılmayı KABUL ETMİYORUM

1-DEMOGRAFİK BİLGİLER

Yaş *

Cinsiyet *

☐ Kadın

☐ Erkek

Boy (cm) *

Kilo (kg) *

Öğrenim Gördüğünüz Bölüm *

Sınıf *

☐ 1

☐ 2

☐ 3

☐ 4

2- BESLENME ALIŞKANLIKLARI VE BESİN SEÇİMİ

Bu anket sizin yeme davranışınız ve besin tercihleriniz ile ilgilidir. Soruları yanıtlarken pandemi öncesi ile pandemi dönemini karşılaştırarak size uygun gelen seçeneği işaretleyiniz. *

	Azaldı	Değişmedi	Arttı
Gün içerisinde tükettiğim öğün sayısı ..	☐	☐	☐
Günlük su tüketimim ..	☐	☐	☐
Ev yemeği tüketimim ..	☐	☐	☐
Taze meyve-sebze tüketimim ..	☐	☐	☐
Öğünlerimin karbonhidrat içeriği ..	☐	☐	☐
Öğünlerimin yağ içeriği ..	☐	☐	☐
Paketli gıda tüketimim ..	☐	☐	☐
Hazır yemek sipariş etme sıklığı ..	☐	☐	☐
Kendimi rahatlatmak için şekerli-tatlı gıdalar tüketme isteğim ..	☐	☐	☐
Gün içerisindeki çay-kahve tüketimim ..	☐	☐	☐
Sürekli atıştırma isteği duyuyorum.	☐	☐	☐
Gece atıştırmalarım ..	☐	☐	☐
Genel fiziksel aktivite düzeyim ..	☐	☐	☐
Pandemi sürecinde kilom (vücut ağırlığım) ..	☐	☐	☐

Uygun gelen ifadeyi seçiniz. *

	Daha Sağlıksız	Değişmedi	Daha Sağlıklı
Pandemi döneminde beslenme alışkanlığım pandemi öncesine kıyasla	☐	☐	☐

3-YEME FARKINDALIĞI ÖLÇEĞİ (YFÖ-30)

Bu anket sizin yeme alışkanlıklarınız ve farkındalığınız ile ilgilidir. Lütfen her bir soruyu dikkatlice okuyunuz ve size uygun gelen seçeneği işaretleyiniz. *

1	2	3	4	5
Hiç	Nadiren	Bazen	Sık sık	Her zaman

1.Besinlerin kalorileri hakkında bilgim vardır.	☐	☐	☐	☐	☐
2.Ana öğünümü ekmeeksiz yiyemem.	☐	☐	☐	☐	☐
3.Lokmalarımı çiğnemedem yutarım.	☐	☐	☐	☐	☐
4.Sevdiğim yiyeceklerden birini yerken, doyduğumu fark edemem.	☐	☐	☐	☐	☐
5.Fast food olmayan bir hayat düşünemiyorum.	☐	☐	☐	☐	☐
6.Çevremdekiler çok hızlı yemek yediğimi söyler.	☐	☐	☐	☐	☐
7.Gaz yapan yiyecekleri yemekten kaçınırlım.	☐	☐	☐	☐	☐
8.Yemeden önce yiyeceklerin görüntüsü ve kokusundan keyif alırım.	☐	☐	☐	☐	☐
9.Dün akşam ne yediğimi hatırlayabilirim.	☐	☐	☐	☐	☐
10.Bir şey ikram edildiğinde düşünmeden yerim.	☐	☐	☐	☐	☐
11.Yüksek kalorili besinlerden uzak dururum.	☐	☐	☐	☐	☐
12.Protein içeriği yüksek besinleri yemekyi tercih ederim.	☐	☐	☐	☐	☐
13.Yediğim besinlerdeki ince tatları fark ederim.	☐	☐	☐	☐	☐
14.Birden bire çok acıktığımı fark edip ne bulsam yiyecek duruma gelirim.	☐	☐	☐	☐	☐
15.Yediğim her lokmanın tadına varırım.	☐	☐	☐	☐	☐
16.Sık sık diyet yaparım.	☐	☐	☐	☐	☐
17.Tok olsam bile yiyeceğin aklıma çeldiği olur.	☐	☐	☐	☐	☐
18.Yemeklerimi saatli yerim.	☐	☐	☐	☐	☐
19.Yemeği kaşıkla yerim.	☐	☐	☐	☐	☐
20.Tıka basa yemek yerim.	☐	☐	☐	☐	☐
21.Evin bir yerlerinde dondurma, kurabiye ya da cips varken yemeden duramam.	☐	☐	☐	☐	☐
22.Moralim bozuk olunca aklıma gelen ilk şey yemek olur.	☐	☐	☐	☐	☐
23.Sıkıntıda yerim.	☐	☐	☐	☐	☐
24.Sağlıklı beslenirim.	☐	☐	☐	☐	☐
25.Yemek çok sıcak ise biraz soğumasını beklerim.	☐	☐	☐	☐	☐
26.Yediğimi fark etmeden atıştırırım.	☐	☐	☐	☐	☐
27.Küçük lokmalarla yerim.	☐	☐	☐	☐	☐
28.Stresli hissettiğimde abur-cubur yerim.	☐	☐	☐	☐	☐
29.Yerken otomatik pilota bağlarım.	☐	☐	☐	☐	☐
30.Mutlu olmak için çikolata yerim.	☐	☐	☐	☐	☐

4- BESİN DESTEĞİ KULLANIM BİLGİSİ

Besin desteği kullanmanın faydalı olduğuna inanıyor musunuz? *

- ☐ a) Evet
- ☐ b) Hayır
- ☐ c) Bazılarının faydalı olduğunu düşünüyorum.

Besin desteği / Besin destek ürünü kullanıyor musunuz? *

- ☐ a) Evet, kullanıyorum
- ☐ b) Kullandım ancak şuan kullanmıyorum.
- ☐ c) Hayır, kullanmıyorum.

BESİN DESTEĞİ KULLANIYORSANIZ / KULLANDIYSANIZ :

Ne zamandan beri besin desteği kullanıyorsunuz? *

- ☐ a) Pandemi öncesinden-bugüne
- ☐ b) Pandemi başlangıcından-bugüne
- ☐ c) Pandeminin ilk aylarında kullandım ancak şuan kullanmıyorum / kullanmayı bıraktım.
- ☐ d) Pandemi öncesi kullandım ve kullanmayı bıraktım.

Hangi besin destek ürününü kullanıyorsunuz/ kullandınız ? (Birden çok seçenek işaretlenebilir) *

- ☐ D vitamini
- ☐ C vitamini
- ☐ Multivitamin
- ☐ Propolis
- ☐ Omega-3
- ☐ Karamürver ekstresi
- ☐ Probiyotik-Prebiyotik
- ☐ Zerdeçal ekstraktı- Kurkumin
- ☐ Çinko
- ☐ Diğer

Besin desteđi kullanmanızın amacı nedir? (Birden çok seenek işaretlenebilir) *

- ☐ a) Hastalığımanın tedavisi / Kanda eksiklik
- ☐ b) Zayıflamak için
- ☐ c) Yorgun hissettiđim için
- ☐ d) Mevcut sađlıđımı korumak ve sürdürmek için
- ☐ e) Bađışıklığı güçlendirmek ve hastalıklardan korunmak için
- ☐ Diđer

Besin desteđi kullanmak için herhangi birinden tavsiye/destek aldınız mı? (Birden çok seenek işaretlenebilir) *

- ☐ Doktor
- ☐ Diyetisyen
- ☐ Eczacı
- ☐ Aile/Arkadaşlar
- ☐ Televizyon/Radyo programları
- ☐ Destek veya tavsiye almadım.
- ☐ Diđer

Anketi başarıyla tamamladınız. Katılımınız için teşekkür ederiz.

Pencereyi kapatabilirsiniz.

7.4 Mindful Eating Questionnaire (MEQ-30) and Scoring

YEME FARKINDALIĞI ÖLÇEĞİ (YFÖ-30)

Değerli katılımcı, bu anket sizin yeme alışkanlıklarınız ve farkındalığınız ile ilgilidir.
Lütfen her bir soruyu dikkatlice okuyunuz ve size uygun gelen kutunun içine X işareti koyunuz.

1	2	3	4	5
Hiç	Nadiren	Bazen	Sık sık	Her zaman

		1	2	3	4	5
1.	Besinlerin kalorileri hakkında bilgim vardır.					
2.	Ana öğünümü ekmeksiz yiyemem.					
3.	Lokmalarımı çiğnemediğim yutarım.					
4.	Sevdiğim yiyeceklerden birini yerken, doyduğumu fark edemem.					
5.	Fast food olmayan bir hayat düşünemiyorum.					
6.	Çevremdekiler çok hızlı yemek yediğimi söyler.					
7.	Gaz yapan yiyecekleri yemekten kaçınırım.					
8.	Yemeden önce yiyeceklerin görüntüsü ve kokusundan keyif alırım.					
9.	Dün akşam ne yediğimi hatırlayabilirim.					
10.	Bir şey ikram edildiğinde düşünmeden yerim.					
11.	Yüksek kalorili besinlerden uzak dururum.					
12.	Protein içeriği yüksek besinleri yemeyi tercih ederim.					
13.	Yediğim besinlerdeki ince tatları fark ederim.					
14.	Birden bire çok acıktığımı fark edip ne bulsam yiyecek duruma gelirim.					
15.	Yediğim her lokmanın tadına varırım.					
16.	Sık sık diyet yaparım.					
17.	Tok olsam bile bir yiyeceğin aklımı çeldiği olur.					
18.	Öğün saatlerim bellidir.					
19.	Yemek yerken çatal yerine kaşık kullanırım.					
20.	Bir öğünde daha fazla yiyemeyecek hale gelene kadar yerim.					
21.	Evin bir yerlerinde dondurma, kurabiye ya da cips varken yemeden duramam.					
22.	Moralim bozulunca ilk aklıma gelen şey yemek olur.					
23.	Canım sıkılınca yerim.					
24.	Sağlıklı beslenirim.					
25.	Yemek çok sıcak ise biraz soğumasını beklerim.					
26.	Yediğimi fark etmeden atıştırırım.					
27.	Küçük lokmalarla yerim.					
28.	Stresli hissettiğimde abur cubur yerim.					
29.	Yerken otomatik pilota bağlarım.					
30.	Mutlu olmak için çikolata yerim.					

Kaynak: Köse G, Tayfur M, Birinciöğlü İ, Dönmez A. Adaptation Study of the Mindful Eating Questionnaire (MEQ) into Turkish, Journal of Cognitive-Behavioral Psychotherapy and Research, 2016; 5(3): 125-134, doi: 10.5455/JCBPR.250644.

PUANLAMA YÖNERGESİ

Alt boyut ve madde sayısı: 7 alt boyut ve 30 madde

1. Düşünmeden Yeme (5 madde): 4, 14, 17, 20, 26
2. Duygusal Yeme (5 madde): 21, 22, 23, 28, 30
3. Yeme Kontrolü (4 madde): 3, 6, 27, 29
4. Farkındalık (5 madde): 8, 9, 12, 13, 15
5. Yeme Disiplini (4 madde): 1, 18, 24, 25
6. Bilinçli Beslenme (5 madde): 2, 7, 11, 16, 19
7. Enterferans (Dış etmenlerden etkilenme) (2 madde): 5, 10

Ölçeğin bulunan ters maddeler: Ölçekte 20 ters madde bulunmaktadır. 1, 7, 9, 11, 13, 15, 18, 24, 25 ve 27. sorular düz puanlandırılmaktadır. Geriye kalan sorular ters* puanlandırılmaktadır. (*Ters Puanlama (1=5, 2=4, 3=3, 4=2, 5=1))

Ölçeğin Değerlendirilmesi: Ölçek puanlanırken alt boyutların ve toplam puanın aritmetik ortalaması alınmaktadır. Ölçeğin her bir alt boyutundan alınan 3 ve üzeri puan bireyin ilgili alt boyutun değerlendirdiği özelliğe sahip olduğunu göstermektedir. Ölçek ayrıca toplam yeme farkındalığı puanı vermektedir.

İzin için iletişim adresi: drgizemkose@gmail.com