T.C.
YEDITEPE UNIVERSITY
INSTITUE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

COMPARISON OF NUTRITIONAL HABITS AND FOOD CONSUMPTION FREQUENCIES OF CHILDHOOD AND ADOLESCENT STUDENTS STUDYING AT A PRIVATE EDUCATION INSTITUTION IN ISTANBUL DURING ONLİNE AND FACE-TO-FACE EDUCATION DURING THE COVID-19 PANDEMIC PERIOD

MASTER THESIS

MERZUKA ECEM ÇANKIRLOĞLU YILMAZ

İSTANBUL – 2023

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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 ....

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Director of Institute of Health Sciences

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.

25.05.2023

Merzuka Ecem ÇANKIRLOĞLU YILMAZ

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LIST OF ABBREVIATIONS

CoV: Coronavirus

ARDS: Acute Respiratory Syndrome

COVID-19: Novel Coronavirus Disease

WHO: World Health Organization

MERS-CoV: Middle East Respiratory Syndrome

RVS: Respiratory Syncytial Virus

rT-PCR: Polymerase Chain Reaction

MHRA: British Medicines and Healthcare Products Regulatory Agency

CDC: Center for Disease Control

FFQ: Food Frequency Questionnaire

ABSTRACT

Çankırloğlu Yılmaz, M. E. (2023). Comparison of Nutritional Habits and Food Consumption Frequencies of Childhood and Adolescent Students Studying at a Private Education Institution in Istanbul during Online and Face-to-face Education during the COVID-19 Pandemic Period. Yeditepe University Institute of Health Sciences, Department of Nutrition and Dietetics, Master Thesis, Istanbul.

Children and adolescents have been greatly affected by the pandemic, both psychologically and physically, due to their limited social life, staying away from school and outdoor activities due to COVID-19. In this study, it was aimed to compare the changes in the eating habits of children and adolescents who received online education during the pandemic. In this context, the research was carried out with 160 students aged 5-18 years studying at Private Ataşehir Bilgi College in Istanbul between 07.02.2022 and 21.02.2022. The questionnaire used in the research consists of sociodemographic, general information and food frequency sections. According to the findings, the consumption of eggs, oil seeds, fruits, cookies-biscuits-cakes, pastries, milk desserts and soft drinks increased during the pandemic compared to the pre-pandemic. In addition, consumption of ayran/yogurt, white meat, dried fruit, white bread and cracked wheat rice decreased. The rate of decrease in the consumption of ayran/yogurt of the students in the childhood period during the pandemic (33.3%) compared to the adolescent students (11.3%); the decrease in the consumption of white meat (22.2%) compared to the adolescent students (2.8%); the rate of decrease in dry fruit consumption (24.1%) compared to the adolescent students (5.7%); the decrease in white bread consumption (27.8%) compared to the adolescent students (5.7%) was determined statistically significantly higher than that of adolescent students compared to the pre-pandemic ($p=0.001$; $p<0.01$). The rate of increase (13%) in the consumption of cookies-biscuits-cakes of the students in the childhood period during the pandemic compared to the pre-pandemic was determined statistically significantly higher than those are in the adolescent period (2.8%) ($p=0.020$; $p<0.05$). During the COVID-19, when the restrictions were intense, the eating habits of children and adolescents who remained in limited physical and social conditions were negatively affected by the change in their eating habits.

Keywords: COVID-19, Food Frequency, Nutritional Habits, Childhood, Adolescent

ÖZET

Çankırloğlu Yılmaz, M. E. (2023). İstanbul'da Özel Bir Eğitim Kurumunda Eğitim Alan Çocukluk ve Adölesan Dönem Öğrencilerinin COVID-19 Pandemi Döneminde Uzaktan ve Yüz Yüze Eğitimleri Sırasında Beslenme Alışkanlıklarının ve Besin Tüketim Sıklıklarının Karşılaştırılması. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik Ana Bilim Dalı, Yüksek Lisans Tezi, İstanbul.

Çocuk ve adölesanlar COVID-19 nedeniyle okul ve açık hava etkinliklerinden uzak kalarak kısıtlı sosyal hayatları sebebiyle hem psikolojik hem de fiziksel olarak pandemiden büyük ölçüde etkilenmişlerdir. Bu çalışmada pandemi döneminde uzaktan eğitim alan çocuk ve adölesanların beslenme alışkanlıklarında oluşan değişikliklerin yüz yüze eğitim aldıkları zamanla karşılaştırılması amaçlanmıştır. Bu bağlamda araştırma 07.02.2022 – 21.02.2022 tarihleri arasında İstanbul'da Özel Ataşehir Bilgi Kolejinde öğrenim görmekte olan 5-18 yaş aralığındaki 160 öğrenci ile gerçekleştirilmiştir. Araştırmada kullanılan anket sosyodemografik, genel bilgi ve besin tüketim sıklığı bölümlerinden oluşmaktadır. Bulgulara göre öğrencilerin pandemi dönemi öncesine göre pandemi döneminde yumurta, yağlı tohum, meyve, kurabiye-bisküvi-kek, hamur tatlıları, sütlü tatlıları ve asitli içecek tüketimleri artmıştır. Bunun yanı sıra ayran/yoğurt, beyaz et, kuru meyve, beyaz ekmek ve bulgur pilavı tüketimleri azalmıştır. Çocukluk dönemindeki öğrencilerin pandemi öncesine göre pandemide ayran/yoğurt tüketimlerindeki azalma oranı (%33,3) adölesan dönemindeki öğrencilerden (%11,3) ; beyaz et tüketimlerindeki azalma oranı (%22,2) adölesan dönemindeki öğrencilerden (%2,8) ; kuru meyve tüketimlerindeki azalma oranı (%24,1) adölesan dönemdeki öğrencilerden (%5,7) ; beyaz ekmek tüketimlerindeki azalma oranı (%27,8) adölesan dönemdeki öğrencilerden (%5,7) istatistiksel olarak anlamlı düzeyde yüksek saptanmıştır ($p=0,001$; $p<0,01$). Çocukluk dönemindeki öğrencilerin pandemi öncesine göre pandemi sonrası kurabiye-bisküvi-kek tüketimlerindeki artma oranı (%13) adölesan dönemindeki öğrencilerden (%2,8) istatistiksel olarak anlamlı düzeyde yüksek saptanmıştır ($p=0,020$; $p<0,05$). Kısıtlamaların yoğun olduğu COVID-19 döneminde kısıtlı fiziksel ve sosyal şartlarda kalan çocuk ve adölesanların yaşam koşullarının değişmesi ile yeme alışkanlıkları olumsuz yönde etkilenmiştir.

Anahtar Kelimeler: COVID-19, Besin Tüketim Sıklığı, Beslenme Alışkanlıkları, Çocukluk Dönem, Adölesan Dönem

1. INTRODUCTION AND PURPOSE

Viruses are the smallest microorganisms that can only infect living cells and thus replicate. Viral infectious diseases threaten human health for centuries and create many different effects on host cells. The most common pathogens of new infectious diseases are viruses; the latest of these is COVID-19. There are many viruses that can cause respiratory tract infections such as measles virus, influenza-related viruses, enterovirus, rhinovirus, respiratory tract syncytial virus, coronavirus, herpes simplex virus and adenovirus (1,2). On the other hand, Coronavirus (CoV) is a large family of viruses which can cause from frequently observed mild infection symptoms, such as common cold, to severe clinical consequences such as pneumonia and severe Acute Respiratory Syndrome (ARDS); the infectious novel coronavirus disease (COVID-19) is caused by the SARS-CoV-2 virus (2,3).

Cov, which first appeared in Wuhan city of Hubei province of China in December 2019, was declared a pandemic by the World Health Organization (WHO) due to the rapid spread of the disease (4-6) on March 11, 2020, when the first case was seen in our country. Although the most common way of transmission of the virus is the respiratory tract; dry cough, high fever and fatigue are among the most typical symptoms (5).

Due to the rapid spread of the virus, many measures were implemented in order to keep the infected individuals away from the society (7). In this process, various practices and sanctions became a current issue in our country, as in many countries, for the prevention of disease and the maintenance of health. These applications include lockdown, social online, mask use, the restriction of activities in crowded environments such as schools, shopping malls etc. where individuals are collectively located (8,9). In the view of such information, while quarantine was applied for infected individuals, social isolation measures were taken to protect healthy individuals from the virus. Lockdowns were implemented sometimes as partial and sometimes as full lockdown in our country, while some restrictions were imposed on travel and places such as restaurants, cafes, etc. were temporarily closed, face-to-face education was stopped. In this context, it was announced that all primary, secondary and high school levels would start online (online) education processes as of March 23 and face-to-face education would be suspended with the circular published on March 12, 2020, (10). During this period of intense restrictions, the changing living conditions of individuals staying at home affected their mental health, sleep patterns and eating habits negatively; in addition, the decrease in the physical activity level of these individuals due to the pandemic accelerated the spread of diseases such as diabetes and obesity (8,9,11,12).

Considering the effects of the pandemic, especially on nutritional habits, it is aimed to compare the changes in the eating habits of children and adolescents who spent this period in limited physical conditions at home instead of school because they received online education, with the time they were receiving face-to-face education. In particular, it will be determined whether they can meet the changing energy and nutritional needs in a healthy way so that they can meet both growth, development and daily energy needs. It is aimed to reveal new nutritional suggestions to be developed for the childhood and adolescence period of the pandemic, where we do not know the process of detecting decreasing and/or increasing healthy behaviors.

In addition to all these, in the face-to-face education process of these age groups, it will be examined whether the habits of rapid ready-to-eat food consumption and its negative effects arising from peer interactions have changed in the limited physical conditions of the same age group in their homes during the pandemic process. In the light of these information, the nutritional habits and food consumption frequencies of childhood and adolescent students will be compared and the increasing and decreasing food types will be determined. These determinations will provide suggestions to eliminate possible excesses or deficiencies.

2. GENERAL INFORMATION

2.1. COVID-19

One of the major pathogens that primarily targets the human respiratory system is CoV. Agents of previous outbreaks of CoV are Severe Acute Respiratory Syndrome (SARS)-CoV and Middle East Respiratory Syndrome (MERS)-CoV, which pose a major public health threat. People epidemiologically linked to the seafood and wet animal wholesale market in Hubei Province, Wuhan city of China; they applied to the hospital with a pre-diagnosis of pneumonia in December 2019 (13). While the majority of the population was asymptomatic carriers, patients with SARS-CoV-2 infection showed many symptoms ranging from mild to severe. Fever, cough and respiratory disorder are among the most common symptoms reported; Chest X-ray in patients with pneumonia has showed multiple mottling and ground glass opacity (14-16). Figure 2.1 has showed the primary respiratory and systemic disorders caused by COVID-19.

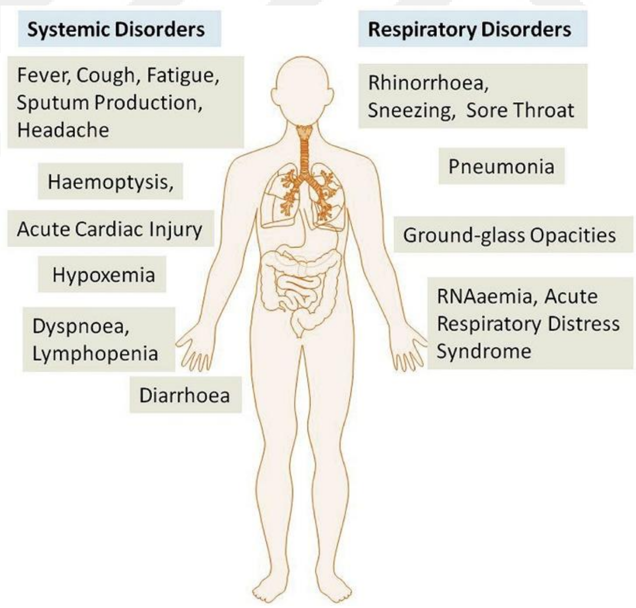


***Figure 2.1.**. The respiratory and systemic disorders caused by CoV infection (13)*

2.1.1 Etiology of COVID-19

Four different types of coronavirus, which are beta, alpha, delta and gamma have different genetic structures (Fig.2.2). The gamma genus is the smallest genus. In Figure 2.3, camels are shown as the original sources of (MERS)-CoV, civet cats as the original sources of (SARS)-CoV, and bats as the original sources of both (SARS)-CoV and (MERS)-CoV. Although the findings show that it originates from the chrysanthemum bat, its intermediate host has not been determined yet, but it is thought to be related to the wild animals such as snakes (1).

Although the new CoV belongs to the beta genus of polymorphic and round/oval enveloped CoV with diameters of 60-140 nm; WHO named this genus SARS-CoV-2. There are 7 CoVs in total. Of these, SARS-CoV first appeared in Guangdong in 2003, MERS-CoV in the Middle East in 2012, and COVID-19 in Wuhan in 2019. These 3 types are contagious and lethal to humans. It has been reported that the other 4 species cause disease in humans, especially the common cold, but the infection rates are not as severe as the other 3 species (1,15,17).

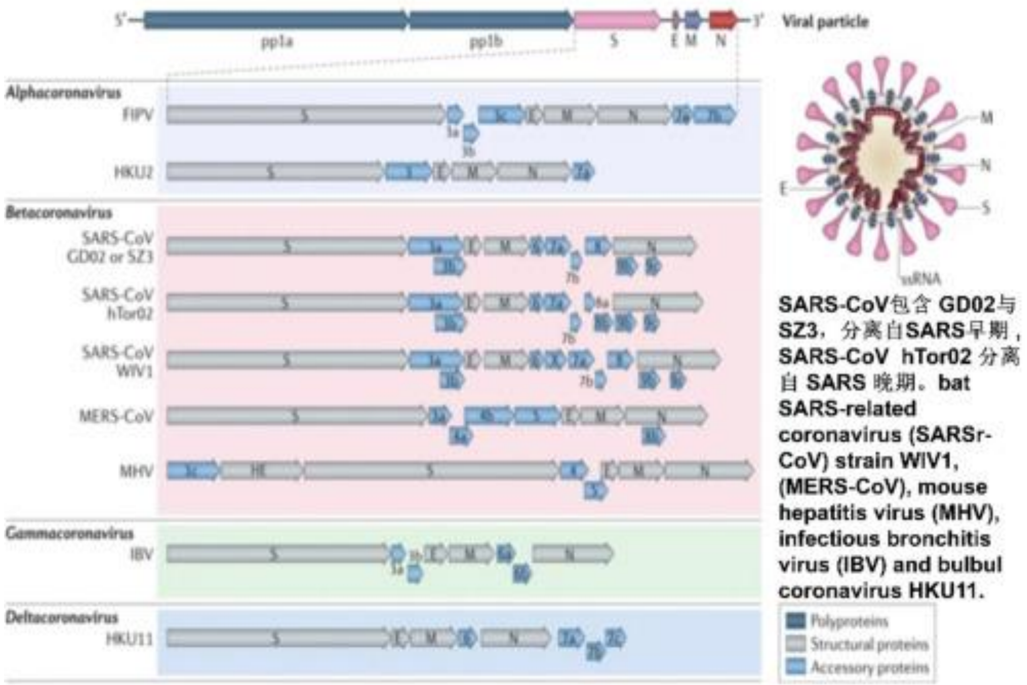
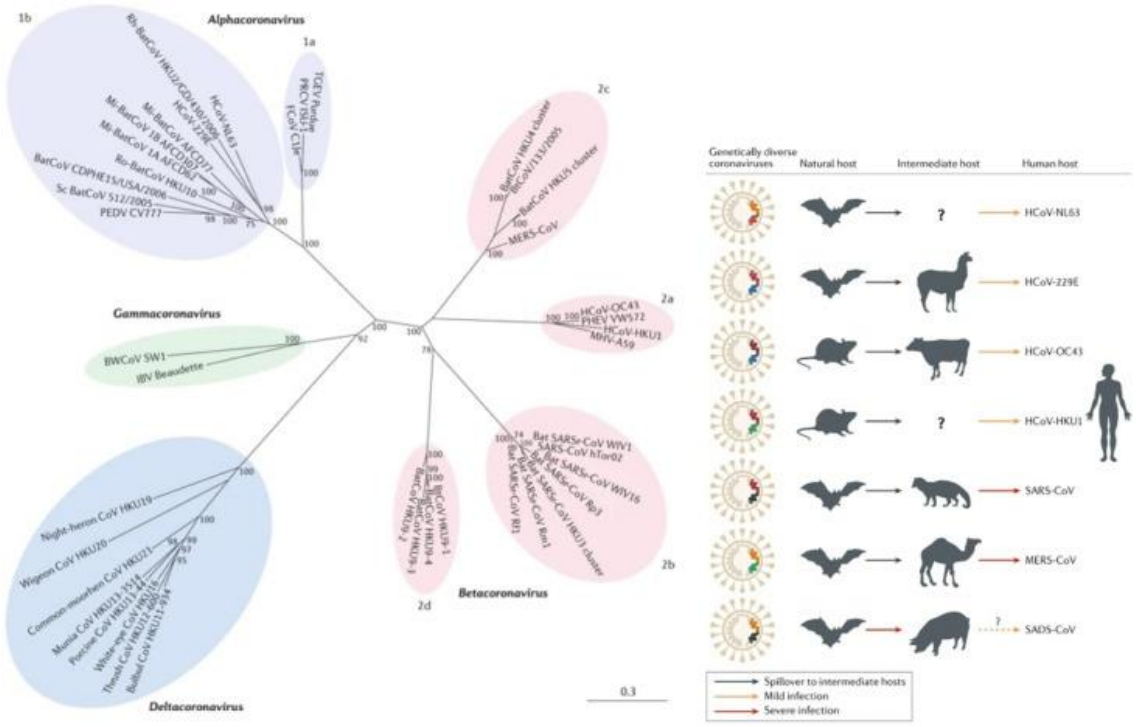


Figure 2.2. *List of coronaviruses: beta, alpha, delta and gamma (1)*



Nat Rev Microbiol 17, 181–192 (2019). https://doi.org/10.1038/s41579-018-0118-9

Figure 2.3. *Coronavirus and intermediate host (1)*

The alpha genus is shown in purple, the beta genus in pink, the gamma genus in green, and the delta genus in blue.

2.1.2. Epidemiology of COVID-19

Acute respiratory infections caused by microorganisms including various viruses and bacteria such as influenza A and B, streptococcus, pneumonia, haemophilus influenzae and coronaviruses affect all humans (18). It has been reported that the most contagious and dangerous ones among these are influenza A and B, RVS (respiratory syncytial virus) and coronaviruses. It has been revealed that these viruses especially affect elderly individuals and cause the longest-lasting pandemics in history (19,20).

On December 26, 2019, a 41-year-old male patient in Wuhan City of China was taken to the hospital 6 days later with symptoms of cough, fever, weakness and pain and chest tightness (21). On December 31, 2019, pneumonia cases of unknown etiology were detected increasingly in Wuhan City, and from this date to January 3, 2020, a total of 44 patients were reported to WHO by the national authorities in China. In all cases, dyspnea, cough, fever and findings radiologically consistent with pneumonic infiltration in the lung were detected. Deaths were generally in elderly individuals with chronic diseases (21-25).

After the new type of CoV spread rapidly to many countries in the world in a short time, WHO classified the COVID-19 outbreak as an "international public health emergency" on January 30 and declared a pandemic immediately after the first positive case was announced in our country on March 11, 2020 (4).

650,879,143 cases of COVID-19, including 6651,415 deaths, were reported to the WHO from December 2019 until 23.12.2022 when this article was written (24) (Fig.2.4-2.6). 17.004.677 of these cases live in our country (Fig.2.7).

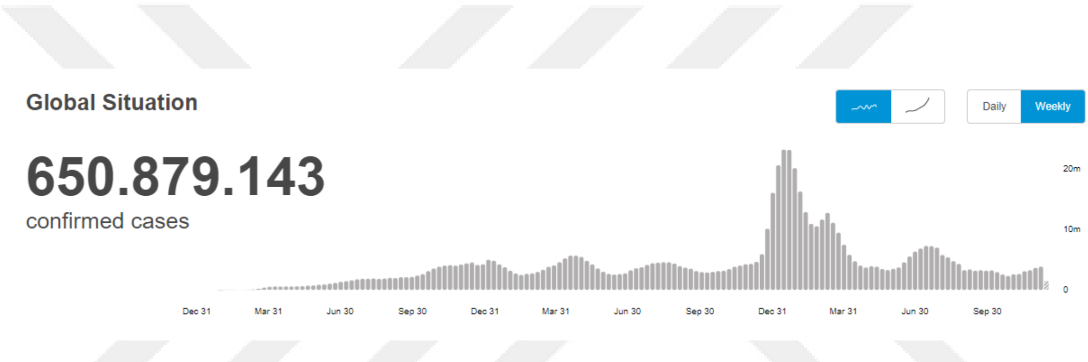


Figure 2.4 *The total number of COVID-19 cases reported to WHO until 23 December 2022 (24)*

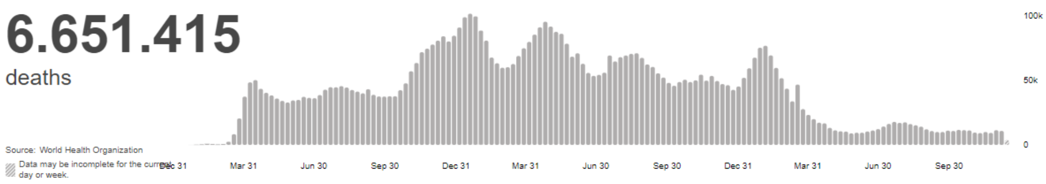


Figure 2.5. *The total number of death from COVID-19 reported to WHO until 23 December 2022 (24)*

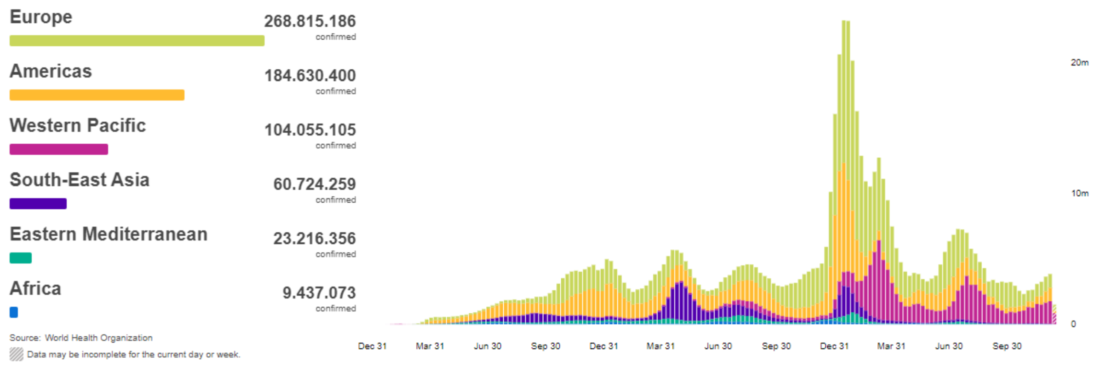


Figure 2.6. *Situation by WHO Region*

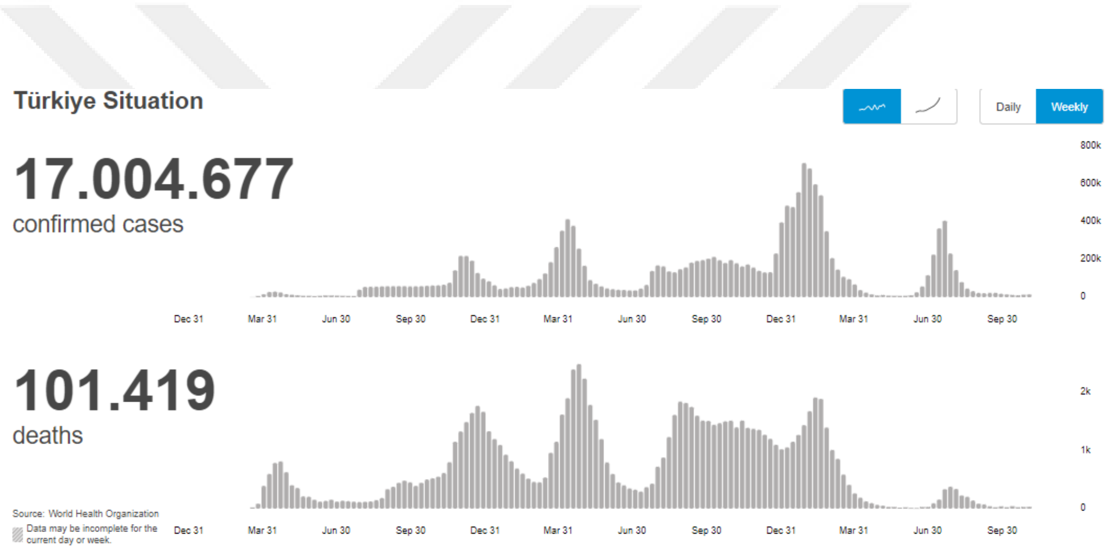


Figure 2.7. *Turkey COVID-19 Reports until 23 December 2022 (24)*

2.1.3. Transmission of COVID-19

SARS-CoV-2 is a bat-borne CoV transmitted to humans, possibly from bats or an intermediate host animal not yet determined (bird, pig, cattle, dog, etc.) or wild animal species. It has been shown in Figure 8 that the transmission hypothesis of the SARS-CoV-2 epidemic, whose intermediate host has not yet been determined. After the first case was seen in a person working in the Huanan Seafood Market in Wuhan province of China, the list of animals sold was removed and many wild animal species were recorded. Hereupon, the Chinese Disease Control and Prevention Center isolated SARS-CoV-2 in 33 samples from 585 environmental samples collected from the Huanan Seafood Market (26).

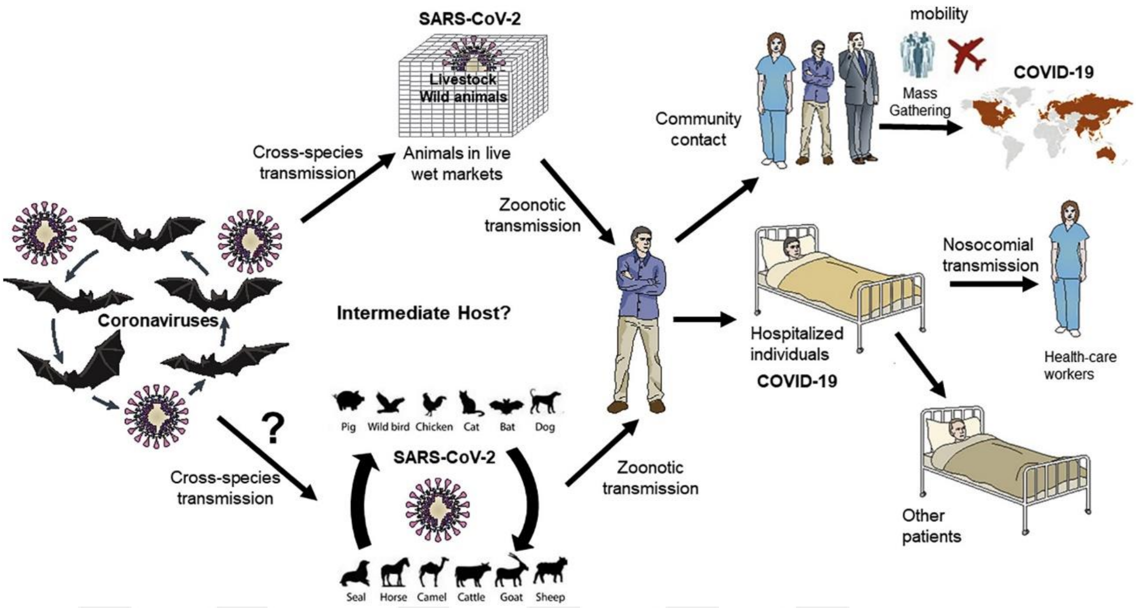


Figure 2.8. *The transmission hypothesis of the SARS-CoV-2 (30)*

Bat-borne CoV was transmitted from person to person by a zoonotic carrier after an intermediate host; and it was confirmed when the virus was isolated in people who did not visit the Huanan Seafood market (27). In further researches, it was determined that the main way people become infected with SARS-CoV-2 was exposure to respiratory fluids carrying infectious viruses (28-30). The exposure occurs in two main ways (Fig.2.8):

a. RESPIRATORY TRANSMISSION: By inhalation of very fine infected respiratory droplets and aerosol particles that appear by speaking, coughing, sneezing and remain suspended by evaporating in the air (28-30);

b. TRANSMISSION THROUGH CLOSE CONTACT: By contact with the mouth, nose, or eyes of hands/objects contaminated with respiratory droplets and particles, objects and surfaces (27,30).

Another point to consider regarding transmission is vulnerable people. Infants and children, immunocompromised, chronically ill people are much more susceptible to this virus and show more severe symptoms than other individuals (1).

The relation between the three stages of infectious diseases (source of infection, mode of transmission and vulnerable people) is crucial. The infectious diseases can only spread when all three steps are present, and infectious diseases can be brought under control if any of these stages is stopped.

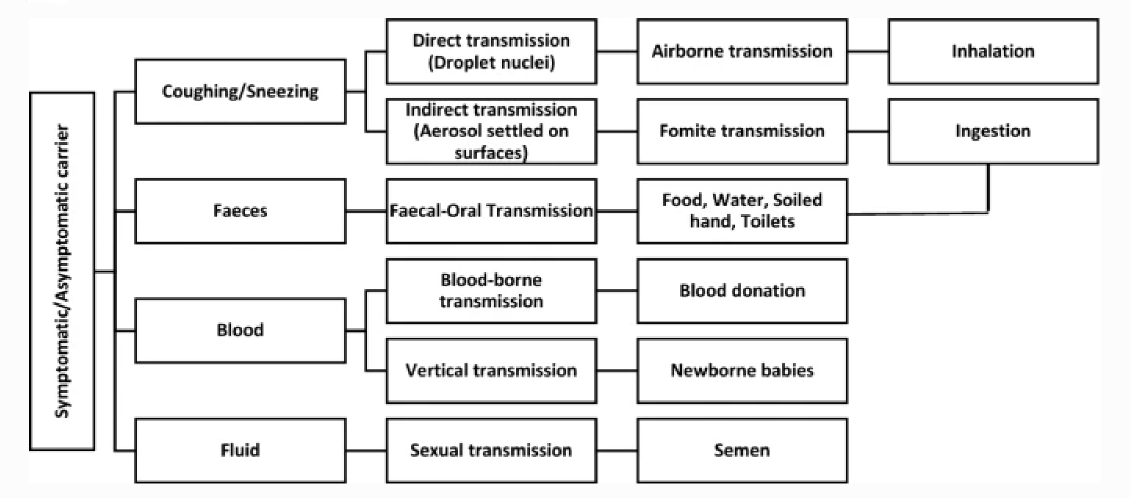


Figure 2.9. *Different transmission routes of SARS-CoV-2*

2.1.4. Diagnostic Methods of COVID-19

Laboratory diagnosis is necessary to distinguish CoV from other respiratory diseases (flu, pneumonia, etc.). While viral culture is a prerequisite for diagnosing viral infections, viral nucleic acids are detected by isolating the virus to identify pathogens. In the diagnosis of COVID-19, the specific sequences of CoV RNA are detected by polymerase chain reaction (rT-PCR) and confirmed by nucleic acid sequence analysis when necessary. rT-PCR sampling is performed and diagnosis is made by collecting samples from the respiratory tract of people with suspected COVID-19 (31,32).

2.1.5. Clinical Features of COVID-19

Viral spread begins 1-2 days before the onset of symptoms, after an average incubation period of 5 days; it can last up to two weeks while it decreases rapidly within the first 7 days with the appearance of the symptoms in the throat area. Finding similar viral loads in asymptomatic and symptomatic patients in some studies indicates that asymptomatic individuals also have a role in transmission. On the other hand, there are also studies reporting that the viral load is higher in severe cases (25).

The most common symptoms of COVID-19 infection are respiratory symptoms, fever, cough, and dyspnea. Symptoms such as headache, sore throat, runny nose, muscle and joint pain, extreme weakness, loss of sense of smell and taste, and diarrhea may also be seen, but they are not among the specific symptoms since these symptoms can also be seen in influenza and other respiratory diseases. While the disease can be asymptomatic, in severe cases, kidney failure, pneumonia, severe acute respiratory tract infection and even death may develop (25, 33).

COVID-19 has several clinical features:

a. Mainly it attacks the lungs but it can also affect other organs and systems
b. Some patients may show mild symptoms without fever and they may recover after 1 week.
c. About half of the patients may develop respiratory disorder 1 week after onset, and some patients may not have fever or significant cough or respiratory disorder initially, but their condition may become severe in a short time as the symptoms on the chest X-ray continue to progress. In some severe cases, septic shock, ARDS and metabolic acidosis, multi-organ failure and coagulopathy may occur.
d. A low to moderate fever during the course of the disease mayo r may not occur in severe or critically ill patients (33).

The incidence of serious cases in patients with symptoms is approximately 20%. Respiratory failure, chest tightness, respiratory disorder and blood oxygen saturation are important clinical signs in the detection of severe cases.

2.1.6. Treatment of COVID-19

Person-to-person transmission of COVID-19 infection requires isolation, especially of individuals with chronic illness. At the beginning of the pandemic, no specific antiviral drug or vaccine against COVID-19 infection was available for the potential treatment of patients. Broad-spectrum antiviral drugs such as Nucleoside analogues were used as the only available option, as well as HIV-protease inhibitors, which could reduce virus infection until specific antiviral was available (34).

While the main goal of the treatment is to prevent respiratory failure and minimize symptoms, Favipiravir, Remdesivir and Lopinavir/Ritonavir, Hydroxychloroquine (chloroquine) antivirals were used in this direction (35). In cases where the drugs were not sufficient and the disease was followed more severely, anti-inflammatory drugs such as corticosteroids and 'Plasma Therapy' were applied, which was performed by taking plasma samples from people who had COVID-19 infection and transferred to the patient (36).

As the infection progresses and it begins to appear in the same people repeatedly, vaccine trials have started for its treatment, many trials have been made, and WHO has announced that vaccination studies will begin, stating that there are 25 vaccines in clinical evaluation. Among these 25 vaccines, the vaccine developed by the American pharmaceutical company Pfizer and the German biotechnology company BioNTech was announced as the "first COVID-19 vaccine registered in the world", with the approval of the British Medicines and Healthcare Products Regulatory Agency (MHRA) for widespread use on 2 December (34,37).

2.1.7. Prevention and Disease Control of COVID-19

Control of infectious diseases is based on prevention rather than treatment. First, the source of the infection should be isolated and suspected patients, mildly affected patients, and diagnosed cases and their close contacts should be kept under medical observation. It is difficult to detect the exact source of the infection unless measures such as individual screening are taken, and the focus of prevention is how to cut off transmission routes. Considering that droplet and contact transmission are the main routes of transmission of COVID-19, the public should avoid going out as much as possible, wear masks in public, and follow hygiene rules, including frequent hand washing and wiping of public areas.

2.1.7.1. Use of Masks and Gloves

The use of masks in the prevention and control of COVID-19 effectively stops the spread of SARS-CoV-2 (38).

It has been proven by various studies that surgical masks and non-ventilated KN95 masks reduce the emission rate of particles which are spread outside during speaking and coughing by an average of 90% and 74%, respectively; and that they have a great role in preventing the transmission of respiratory tract viruses (39).

The correct use of the mask is of great importance here. While surgical masks are disposable, the effective protection period is 4 hours and they should be changed immediately when the mask becomes dirty (40).

The use of surgical gloves reduces the rate of infection from places contaminated with the virus by minimizing close ground contact in public places such as elevator buttons, stair handrails, door handles, etc. It is worth noting that here is to change gloves frequently, not to touch other surfaces, face and mouth with contaminated gloves, and to wash hands in accordance with hygiene rules after removing gloves (40).

2.1.7.2. Hygiene

Hand hygiene has reduced hospital-acquired infections and prevented the transmission of SARS and Ebola in the past. It has once again proven its effectiveness by becoming more important during the COVID 19 epidemic (41). WHO and the Center for Disease Control (CDC) recommend washing hands with soap for at least 20 seconds to stop the transmission of the COVID 19 virus and to mechanically remove pathogens (42,43). When it is not possible to wash hands, the use of alcohol-based disinfectants containing 60% ethanol or 70% isopropyl alcohol inactivates the virus (43).

Before and after meal preparation, before and after using the toilet, after sneezing and coughing, after using the public areas, after touching the frequently used areas (door handles, table, shopping card electronic display screen, elevator buttons and handles, etc.) and before touching the eyes, nose or face, the hygienic condition of hands should be checked.

2.1.7.3. Isolation

Due to the COVID-19 epidemic, words such as social online, isolation, quarantine were often brought to agenda, and it was aimed to isolate the infected people from the society in order to prevent the spread of the virus. Quarantine was implemented to ensure that all symptomatic and non-symptomatic individuals carrying the COVID-19 virus and those who were in contact with these individuals were isolated. Social contact in the society was limited, mask and hygiene rules were paid attention in social environments, and the time spent in these environments was reduced as much as possible (35).

In order to prevent the spread of the virus, many countries in the world closed their country's entrances and exits and took restrictive measures to ensure social isolation by applying certain policies that will bring about some changes in lifestyle and habits within the country. These measures resulted in negative results in individuals (44). As the cases of premature death of COVID-19 outbreak mostly occurred in elderly individuals, who had a weak immune system allowing the viral infection to progress more rapidly; the measures for the elderly were more extensive (38,45).

The rate of spread of the virus decreased with the restrictions imposed within the scope of isolation measures, but the activity and exercise opportunities of individuals were also negatively affected (46). Uncertainties arising from the epidemic process, fear of the risk of contracting the disease, and quarantine practices caused stress and anxiety disorders in individuals (47,48). In addition to all these, it was stated in various studies that radical changes in daily routine such as not being able to spend time outdoors, disturbed sleep, and social online affect mental health (49). All these effects reflected in the food habits of individuals; in general, an increase in energy intake and a decrease in physical activity levels were found (50).

2.1.7.4. Vaccine

While there are still cases of COVID-19 in the world; more than one COVID-19 vaccine is applied in different countries; Biontech (mRNA) and Sinovac (inactive) vaccines are currently applied in our country (51).

When people and all age groups fully vaccinated with any of the three vaccine types (Pfizer-BioNTech, Johnson & Johnson's Janssen, Moderna) compared with unvaccinated people, studies have proved that unvaccinated people have a higher risk of contracting the virus and dying. It has been emphasized that the rate of contracting the disease and death is much higher in people who are not vaccinated when compared with those who are fully vaccinated or have received additional doses (52).

2.1.8 Nutrition in the COVID-19 Period

Although there is no food on its own that can prevent or treat the transmission of the world-threatening SARS-CoV2 virus; a healthy and balanced nutrition and regular physical activity strengthen the immune system. When the concept of healthy nutrition is evaluated in the context of the CoV pandemic, in addition to the long shelf life of the foods, being as nutritious and durable as possible; being rich in protein, fiber, vitamins, minerals and antioxidants means a healthy and balanced nutrition (53, 54).

When it is called fiber, vitamins and minerals, the first food groups coming to mind are vegetables and fruits. Among the fresh vegetables and fruits which are in season, especially long-term resistant ones should be selected and cooked by sticking to cooking techniques, the loss of nutritional value should be minimized, and foods rich in vitamin C such as pepper, lemon, and orange should be consumed every day to support immunity (54). Legumes, rich in fiber and protein, should be added to a healthy nutrition every day thanks to their long shelf life. In addition, eggs and dairy products such as cheese, yogurt and kefir, which are sources of quality animal protein, are also important sources for the functioning of antibodies, which are the body's defense mechanism against viruses and bacteria causing diseases (54, 55). Creating the 'Healthy Nutrition Plate' model recommended in the Turkey-Specific Nutrition Guide, along with other nutritional elements in daily nutrition, guides in creating a healthy and balanced nutrition plan (Fig.2.10) (56).

Figure 2.10.. *Healthy Nutrition Plate (Healthy Nutrition Plate by Food Groups) (56)*

Sugary foods and sugar and beverages that rapidly increase blood sugar, pastries, processed meat products, and prepackaged foods containing excess salt are foods and beverages that should be limited and avoided in this period, as they have no place in a healthy diet (54). At the same time, unbalanced and excessive consumption of these products causes weight gain and obesity with increasing consumption frequency over time. Diseases such as metabolic syndrome, diabetes, cholesterol, which can be caused by obesity, reduce the body's immune response and, like all viral infections, COVID-19 threatens individuals with weak immunity more. In addition, nutritional habit devoid of protein and energy lowers immunity against diseases and increases the risk of infectious diseases (57).

2.2. CHILDHOOD AND ADOLESCENT DEVELOPMENT IN COVID-19

Development, which is a product of heredity and environment interaction, which continues from the prenatal period to death, is very important. Human development covers a process that starts from fertilization and continues until the end of life, and the ages in the developmental periods generally cover the first 2 years of infancy after birth, the age of 3-6 years first childhood (game), the age of 7-11 years second childhood (primary school) and the age of 12-18 years adolescence period.

Development is not in a single area; it consists of social, emotional, physical, psychomotor and cognitive development areas (58, 59). The developmental process, which can have profound effects on human life, is affected by the changes in the family and society in which the child lives (60).

The child opens his eyes to the family environment, and the opportunities provided by the family to the child, the communication style of the parents with the child, and the psychological and physiological conditions are determinative on the development of the child. (61, 62). The communication that family members establish with each other and with their children contributes to the cognitive, social, emotional and language development of children. Children realize their future life experiences by taking their parents as role-models and organize their own lives by interiorizing these behaviors (61, 63). Opportunities and chances provided by parents to their children can positively affect all developmental stages, especially cognitive and psychomotor skills of children.

Besides the family, the society is effective as well in the child development. Especially natural disasters and epidemic diseases that can affect all segments of society have significant effects on development. (64). Natural disasters and epidemic diseases that may occur in society at certain periods do not only affect health, but also cause significant effects on development within the scope of the measures they cause (65). In this context, the COVID 19 pandemic, which started in 2019, is an epidemic disease with social origin and effects on development.

2.2.1. Early Childhood – Play – Preschool (3-6 Years) Period

The early childhood period, which includes the pre-school years, is a very critical period in which the child actively turns to his environment, tries to explore the outside world full of stimuli, and acquires the most basic skills of human life. This period is critical in that it gives the opportunity to control and regulate the later years of life. In this period, the child who starts to socialize goes to pre-school education institutions and socializes with his classmates. He does joint activities with his peers on the street and plays in the park. The skills that a child acquires in this period constitute the basic building block of social relations in the following years (66, 67).

In this period, the confidence formed in infancy evolves towards the child's self reliance and ability to trust the individuals around him, and the child can now walk, run, feed himself, and manage his relationships by getting together with his peers. In this period, the child's need to be an independent individual comes into prominence (68).

Play is a very important nutrient in early childhood. Children spend most of their time by playing, moving and running apart from sleeping hours. Play is a tool for the child to make sense of the things around him that he cannot make sense of, a learning material, and an important power in discovering the environment around him. It is a developmental need for children to play not only at home but also outside. In many scientific studies, it has been proven that the games played by children have positive effects on their cognitive, language, social and emotional development as well as their psychomotor development (69).

As in many other periods, children need love and respect not only from their families but also from their peers, teachers and adults in the first childhood period (70).

Children in the first childhood period, where the development is so fast, had to stay at home, away from their friends and school circles due to COVID 19, and were constantly exposed to concepts such as viruses, germs and diseases (71). In this period, it was very difficult for children who were not mature enough in terms of cognitive development to perceive and accept these concepts, and they created different thoughts (72-74). The decrease and restriction of children's movement environments, being away from school and not being together with their friends caused emotional and behavioral problems in children of this period, as well as negatively affecting the development of physical and motor skills. In addition to all these, they were deprived of clean air and oxygen needed for healthy growth and development; vitamin D, which helps strengthen the immune system (75).

2.2.2. Second Childhood - Primary (7-11 Years) Period

The second childhood period, which covers the primary school years, is a period when children start to online themselves from the family and try to establish their own social environment for the first time, show more interest in what is happening around them, start to socialize in real terms by establishing friendships, and academic success and peer relations are important (67, 76).

In this period, especially when the child starts school, his academic skills come into the forefront and the child wants to learn, be successful, and be appreciated by his teachers and parents. As a result of the success of the child, self-confidence and self-esteem also develop (77, 78). According to research, as children acquire new information in this period, their academic self-esteem develops positively, and this positive academic success increases the child's attendance at school. In other studies, it was emphasized that peer relations of this period were more important than anything else (79).

Just like in infancy and pre-school period, school-age children need to love, be loved and appreciated; they feel the need to seek approval and appreciation for their behavior. The feeling of trust is also strengthened in the child who feels loved and respected (70). At the same time, allowing the child to express his/her feelings and thoughts is important for the child's sense of trust (62).

In this period, unlike the pre-school period, close friendships are established and children spend most of their time with their friends. In this period when peer relations deepen, their friendships become a phenomenon that supports them and includes long-term relationships (79, 80). At the same time, playing games is important for children in this period, like in the pre-school period, as it contributes positively to their development and teaches many new behaviors (81, 82).

Schools that support the development of children in many ways during the school period were closed with the onset of the COVID-19 pandemic, and the children were away from their teachers and peers. Behaviors such as aggression, anger, depression and anxiety have increased in many children during this period, as it is not clear when they will return to school and they feel distant from the environment they are used to (71-74, 83). Since they are at an incomplete age in terms of cognitive development in this period, children cannot think abstractly, and in this case, they cannot fully perceive the damage that diseases, viruses or infections will cause to themselves and their environment (84). They are concerned about thinking that they will fail academically when the schools open (81). Another negative effect of the quarantine process on the children of this period is the restriction of their movements (85).

2.2.3. Adolescence (12-18 years) Period

Adölesan dönemin başlangıcında yaşanan karmaşalar adölesanın yaşadığı deneyimlerle çözümlenmektedir. Adolescence is a very important period in human life, but also a period that is complex and contains imbalances, and at the end of this period, the child/individual resolves his/her own identity. During this period, the adolescent is faced with many problems and questions about what he wants to do in the future and who he is. While searching for answers to these and many similar questions; he generally chooses a role model for himself from people such as his family, teachers, peers, famous people, etc. Since the biggest factor in choosing this person will be the adolescent's commitment to that person, the thoughts that he will hear about that person also affect him (86).

In Hall theory, it is stated that adolescents want their feelings and thoughts to be accepted. When chaos and fluctuations experienced by adolescents in their emotions conflict with the acceptance of feelings and thoughts, problems begin to occur between the parent and the child (86).

Adolescents are in the risk-taking period because they have the idea that "nothing will happen to me" from the point of view of the imaginary audience and personal fairy tale hero that emerged with their egocentrism in this period. The adolescent, with his imaginary audience identity, thinks that everyone is watching him, and therefore, he tries to come to the forefront in the society in order to make himself liked by paying too much attention to his personal care. In this process, which is called a personal tale, the adolescent can easily take risks because he sees his experiences as a fairy tale and considers himself as the protagonist of this tale (79).

In adolescence, peer relationships become valuable enough to be of vital importance. Adolescents want to be with their peers and communicate with them most of the time outside of school. Since being in a peer group is important for adolescent self-actualization, adolescents may have thoughts that are not suitable for them. In this context, the adolescent's desire to act independently and to have a world of his own comes to the fore, and the adolescent wants to have the freedom to act as he wishes within these borders (87, 88).

Considering the developmental characteristics of the adolescent period, the situations and results experienced during the COVID-19 Pandemic process do not match with the developmental process of the adolescent. During this whole process, adolescents have aggressive attitudes by staying at home with their families as they isolate from the environment of friends and these attitudes cause situations such as anger, depression, and anxiety (71, 74, 83).

2.2.4. Nutrition in Preschool Period

At the beginning of the preschool period, which is the transition period from infancy to childhood, children may first consume limited foods dependent on their parents, but at the end of this period, they become independent and able to consume different foods. The nutritional habits of children, who vary in terms of food choices and are influenced by the food preferences of their peers from the beginning, are reflected in the adulthood. For this reason, it is important to provide children with healthy nutritional habits in the preschool period (89). The purpose of healthy nutrition in this period:

a. Ensuring age-appropriate growth and development,
b. Supporting cognitive development
c. To prevent health problems such as anemia, dental caries, malnutrition, obesity that may be associated with this period,
d. To protect children from some chronic diseases related to nutrition such as type-2 diabetes, hypertension, and cardiovascular diseases that may occur in adulthood.

While supply the energy needs of children is an important phenomenon in ensuring proper growth and development, the energy needs of children in this period vary between 1200-1600 kcal/day on average, depending on age, gender and physical activity. In adequate and balanced nutrition, 45-60% of the energy should be met from carbohydrates, 15-20% from proteins and 20-35% from fats. For this, it is necessary to provide food diversity based on food groups consisting of milk, meat, cereals, vegetables and fruits and to consume foods in age-appropriate amounts. As in every period, especially in the preschool period, the consumption of snacks and packaged foods with high fat and sugar content and low vitamin-mineral content should be avoided as much as possible (89, 90).

Although the calcium of which need increases in this period, is necessary for the development and health of bones and teeth, calcium source milk and products should be consumed in 2-3 portions/day (90).

Iron is another important mineral in this period due to iron deficiency anemia, which is common in preschool period, and its contribution to normal development. For this reason, iron-rich foods such as red meat, chicken, fish, egg yolk, green leafy vegetables, legumes and dried frutis should be consumed in sufficient quantities (90, 91).

Zinc, which is a cofactor of hundreds of enzymes in the body, plays important roles in nucleic acid and protein metabolism, energy metabolism, cell division, and it is also necessary for the continuity of the immune system. In addition, its deficiency causes growth retardation, negatively affects the central nervous system and causes deterioration in cognitive functions. Due to all these functions, zinc consists of important minerals in this period and can be obtained from foods such as meat, fish, whole grains and legumes (90, 91).

In this period, consumption of various and sufficient vegetables and fruits is important for meeting the need for vitamin A, which plays an important role in the growth, vision, integrity of epithelial tissue, development and protection of the immune system in children (91).

Vitamin D is a vitamin which has important functions in many parts of the body, especially in the bones and immune system, and its deficiency causes Rachitism in children. In this period, children should be able to benefit from sunlight sufficiently so that they can meet their vitamin D needs (91).

2.2.5. School Age and Adolescent Period Nutrition

While adequate and balanced nutrition is necessary for a healthy life in every moment of life; the importance of nutrition increases even more in the school age and adolescence period, where growth and development accelerate and learning functions gain importance. This period is the period when school children and adolescents with rapid physiological, social and psychological development form behaviors that can continue throughout their lives, and are most suitable for acquiring information and gaining habits. It is also the most risky period for the background of diseases that may occur in adulthood. In this period when physical growth is at its peak, energy and nutrient requirements should be met in a sufficient and balanced way in terms of rapid growth and development. The ratios of nutrients they should take for this; 55-60% for carbohydrates, 12-15% for proteins and 25-30% for fats. In this age, children and adolescents should be given healthy eating habits, as malnutrition will negatively affect growth and development, school success and will pave the way for many chronic diseases such as diabetes, cardiovascular diseases and obesity (92).

Especially peer influence in food selection in school children and adolescents can affect eating behaviors both positively and negatively. As the individualization of the child increases, the time spent in social environments with friends will increase proportionally and will create more independence in food and beverage preferences. In addition, among the nutritional habits that are more common in adolescence compared to other age groups, irregular consumption of meals, excessive consumption of snacks, consumption of fast food, following a certain diet and skipping meals become prominent. Decrease of the family influence, increase of the peer influence, media influence and residence outside the home, more spending capacity, and less time for children to eat with their families contribute to these habits (92, 93).

In studies conducted, adolescents have a higher risk of nutrient deficiency compared to other age groups, since the rate of meeting the recommended nutritional requirements is lower than that of other age groups. While inadequate consumption of whole grains, milk and dairies, fruits and vegetables causes low consumption of phosphorus, magnesium and choline; less consumption of eggs, fish, legumes and red meat causes insufficient protein intake. In addition, insufficient intake of iron, folate, vitamin B6 and B12 in adolescent girls increases nutritional problems with menstruation, hormonal changes and increase in growth rate (94).

2.2.6. Impact of COVID-19 on Preschool, School Age and Adolescent Period Nutrition

Children and adolescents who have been away from school, social life and outdoor activities due to COVID-19 have been greatly affected by the pandemic both psychologically and physically. In fact, some of them were exposed to stress due to increased domestic violence and economic difficulties, and increased anxiety, changes in their diet and school processes directly affected their health (95). Studies have emphasized that pre- and post-COVID-19 children and adolescents' concerns about body weight, eating habits, and the pandemic have many negative effects on the level of anxiety and nutritional habits (96). At the same time, staying at home/isolation and stress and anxiety caused by the pandemic increased the desire to eat in the great majority of adolescents; in addition, the nutritional habits of half of the children and adolescents were adversely affected by the pandemic. It is emphasized that the tendency of children and adolescents to foods such as ready-made foods and salty snacks increases with the perceived high level of stress, while the consumption of fresh foods decreases (97). In addition, an increase has been observed in the number of meals consumed by children and adolescents with the pandemic.

It has been shown that the pandemic process adversely affects the nutritional and exercise behaviors of adolescents, and as the anxiety of catching the disease increases, risky nutritional behaviors increase and they exercise more (98).

The risk of obesity is higher in children who skip breakfast and consume unhealthy foods (99). Studies in children and adolescents have shown that skipping breakfast is associated with abdominal obesity and visceral adiposity (100, 101). In a study conducted to determine the nutritional habits of children and adolescents during the pandemic process, it was determined that the most skipped meal was breakfast (102).

Adequate balanced nutrition and strengthening the immune system are very important in order to provide effective protection against infectious diseases, including COVID-19, and to heal quickly. Stress causes overeating, mostly sugary food consumption, and especially in stressful situations, consuming carbohydrate foods helps to reduce stress by increasing serotonin release (103, 104). In most studies conducted in this process, it was determined that the sweet consumption of participants increased during the pandemic and that most adolescents preferred carbohydrate-rich foods such as cake, biscuit, and chocolate for snacks (102).

3. MATERIALS AND METHOD

In this context, the research was carried out with 160 students aged 5-18 years studying at Private Ataşehir Bilgi College in Istanbul between 07.02.2022 and 21.02.2022. Informed consent form was obtained from the families of the students participating in the study; Questionnaire forms of students aged 5-9 were filled by their families.

Yeditepe University Non-Interventional Ethics Committee Approval was obtained before the study. Ethics committee decision number is 37. After the approval of the ethics committee, a questionnaire consisting of 3 main parts was applied to the students who met the inclusion criteria. The questionnaire consists of the sociodemographic form in which personal information is questioned first, the general information form in which the nutritional habits of the students are evaluated in the second part, and the food frequency questionnaire (FFQ) in which each of the 46 nutrients under 6 main topics is examined both before and during the pandemic period.

Although Istanbul Private Ataşehir Bilgi College is a research location, the population of the study consists of 267 students, including 5-year-old kindergarten, 6-9-year-old primary school, 10-14-year-old middle school and 14-18-year-old high school students. Accordingly, the minimum sample number was calculated as 160 at the 95% confidence interval, according to the sample calculation with a known population. The sample was stratified by weighting according to grade levels.

The FFQ is a common dietary assessment tool used in large epidemiological studies on nutrition and health; it is divided into 2 types as non-quantitative (collecting only frequency information, not portion size) and semi-quantitative (collecting both frequency and portion size information). The non-quantitative FFQ, which will be used in our research, is based on the consumption frequencies of a total of 46 nutrients under 6 main headings: milk and its products, meat-eggs-legumes, fresh fruit-vegetables, bread-cereal, oil-sugar-sweet and beverage consumption and the difference between (online) education and face-to-face education periods will be determined. The Turkish adaptation of the FFQ was made, and its validity and reliability were determined primarily by the Pearson correlation, it has showed that the scale has an acceptable level of reliability and is applicable in Turkey.

While evaluating the findings obtained in the study, SPSS 24.0 program was used for statistical analysis. While evaluating the study data, quantitative variables were shown with mean, standard deviation, median, min and max values, and qualitative variables were shown with descriptive statistical methods such as frequency and percentage. Shapiro Wilks test and Box Plot graphics were used to evaluate the conformity of the data to the normal distribution.

Wilcoxon Signed Rank test was used in those who did not show a normal distribution between two follow-ups.

Fisher's Freeman Halton test was used to compare qualitative data.

The results were evaluated at the 95% confidence interval and the significance level of $p<0.05$.

4. RESULTS

The research was carried out with a total of 160 students, 37.5% (n=60) girls and 62.5% (n=100) boys, studying at Istanbul Private Ataşehir Bilgi College, between 07.02.2022 and 21.02.2022. (Figure 4.1).

The ages of the students participating in the study ranges from 5 to 18, and the mean age is 12.69±3.39 years. 33.75% (n=54) of the students are in the childhood period of 5-11 years, and 66.25% (n=106) of the students are in the adolescent developmental period. While 38.88% (n=21) of the 5-11 year old childhood students are girls and 61.12% (n=33) are boys, 36.79% (n=39) of the students in the adolescent developmental period girls and 63.21% (n=67) boys (Figure 4.2).

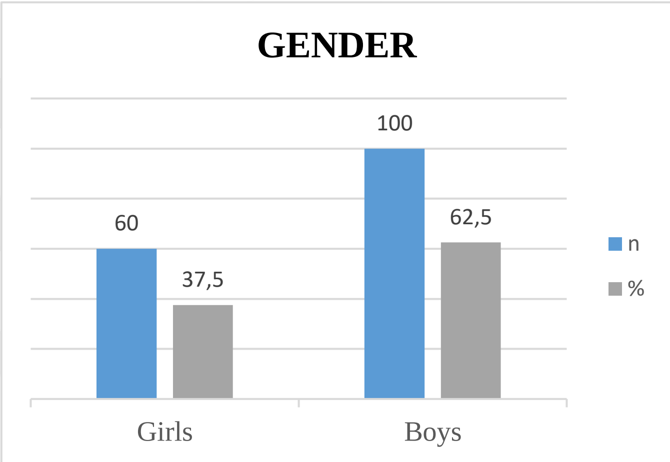


Figure 4.1 *Distribution of Student Gender*

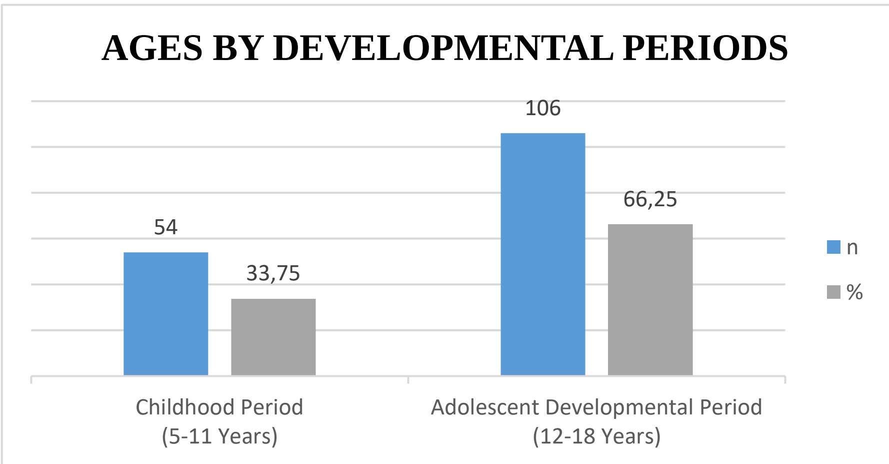


Figure 4.2 *Age Distribution by Developmental Periods*

Table 1: Distributions of Demographic Characteristics

		n (%)
Gender	**Girls**	60 (37,5)
	Boys	100 (62,5)
Age	*Mean±Ss*	12,69±3,39
	Median (Min-Max)	13 (5-18)
Height	*Mean±Ss*	156,70±18,05
	Median (Min-Max)	160,5 (113-197)
Weight	*Mean±Ss*	53,97±18,57
	Median (Min-Max)	53,1 (18-114,1)
BMI	*Mean±Ss*	21,35±4,46
	Median (Min-Max)	20,7 (12,5-37,9)
Class	**Nursery**	6 (3,8)
	1st Grade	11 (6,9)
	3rd Grade	11 (6,9)
	4th Grade	11 (6,9)
	5th Grade	10 (6,3)
	6th Grade	16 (10,0)
	7th Grade	23 (14,4)
	8th Grade	9 (5,6)
	9th Grade	13 (8,1)
	10th Grade	11 (6,9)
	11th Grade	24 (15,0)
	12th Grade	15 (9,4)

The height of the students participating in the study ranges from 113 to 197 cm, the mean height is 156.70±18.05; their weight varies between 18 and 114.1 kg, and the mean weight is 53.97±18.57. The BMI measurement of the students ranges from 12.5 to 37.9, and the mean BMI is 21.35±4.46.

When the class in which the students are educated is examined; 3.8% (n=6) is kindergarten, 6.9% (n=11) 1st Grade, 6.9% (n=11) 3rd Grade, 6.9% (n=11) 4th Grade, 6.3% (n=10) 5th Grade, 10% (n=16) 6th Grade, 14.4% (n=23) 7th Grade, 5.6% (n=9) 8th

Grade, 8.1% (n=13) 9th Grade, 6.9% (n=11) 10th Grade, 15% (n=24) 11th Grade and 9.4% (n=15) 12th Grade.

The demographic characteristics of the students participating in the study are shown in Table 1.

Table 2: Distribution of Nutritional Habits

		n (%)
How many meals	*Mean±Ss*	3,37±1,01
	Median (Min-Max)	3 (1-5)
Reason for skipping meals	**No time**	21 (13,1)
	Difficult to prepare	19 (11,9)
	I don't want	80 (50,0)
	Other	40 (25,0)

1.87% (n=3) of the students who participated in the study have 1 meal a day, 14.37% (n=23) 2 meals a day, 48.13% (n=77) 3 meals a day, 16% .25 (n=26) 4 meals a day and 19.38% (n=31) have 5 meals a day (Figure 4.3).

The number of meals of the students participating in the study varies between 1 and 5 meals a day, and the average number of meals is determined as 3.37±1.01 (Table 2).

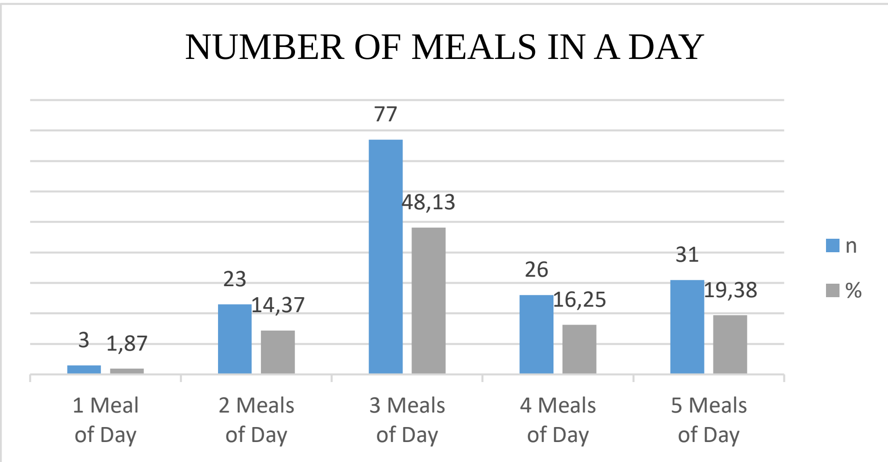


Figure 4.3 *Distribution of the Number of Meals in a Day*

When the reason for skipping meals is examined; 13.1% (n=21) did not have time, 11.9% (n=19) because it was difficult to prepare, 50% (n=80) because they did not want to and 25% (n=19) 40) appears to be due to other reasons (Table 2, Figure 4.4).

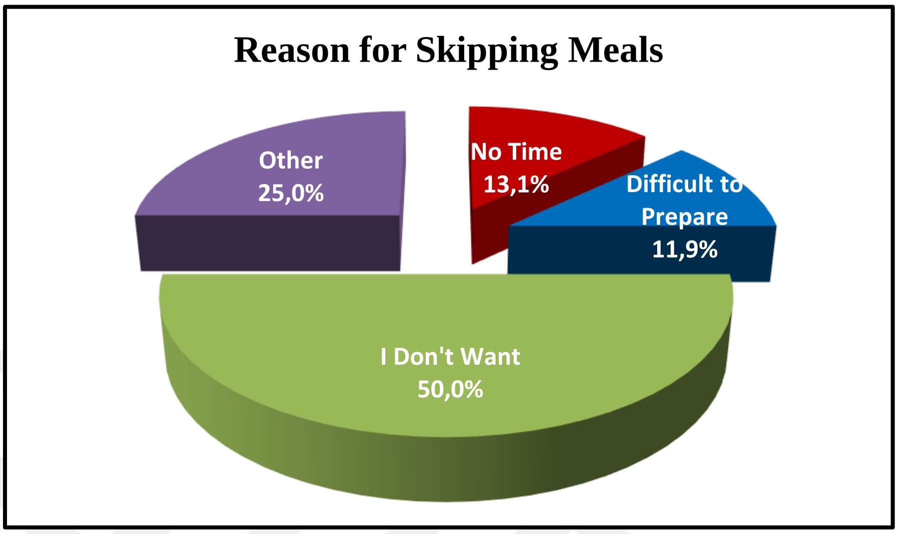


Figure 4.4: *Distribution of the reason for skipping meals*

Table 3: Distribution of Skipping Meals

	I don't skip		I skip occasionally		I skip	
		%	**n**	**%**	**n**	**%**
Skipping breakfast	111	69,4	27	16,9	22	13,8
Skipping mid-morning	24	15,0	35	21,9	101	63,1
Skipping lunch	134	83,8	18	11,3	8	5,0
Skipping afternoon meal	62	38,8	49	30,6	49	30,6
Skipping dinner	138	86,3	13	8,1	9	5,6
Skipping night meal	39	24,4	38	23,8	83	51,9

The distribution of the participants' responses to skipping meals is as in Table 3.

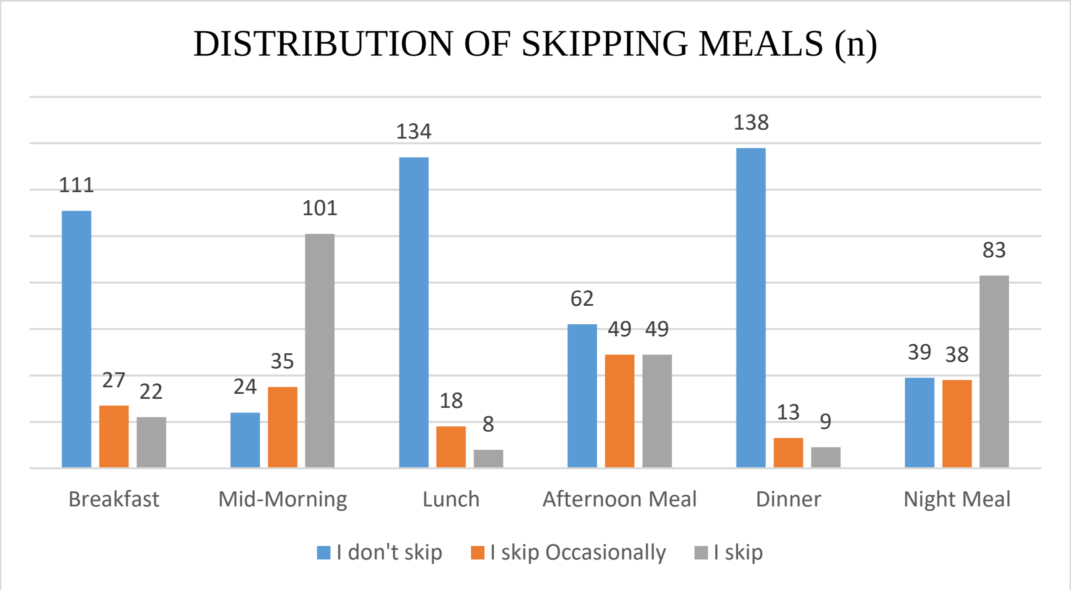


Figure 4.5: *Distribution of skipping meals*

While 69.4% (n=111) of the students participating in the study have breakfast, 13.8% (n=22) do not have breakfast. It was determined that the mid-morning meal was not made at a rate of 63.1% (n=101), while it was made at a rate of 15% (n=24). Lunch is done at a rate of 83.8% (n=134), while it is not done at a rate of 5% (n=8). While the afternoon meal is done at the rate of 38.8% (n=62) and the night meal at the rates of 24.4% (n=39), it is not done at the rates of 30.6% (n=49) and 51.9% (n=83), respectively (Fig. 4.5).

Table 4: Distribution of Breakfast and Lunch in Face-to-face and Online Education

	At home		At school (dining hall)		At school (from home)		Order from outside		Other	
	n	%	n	%	n	%	n	%	n	%
Where do you have breakfast in face-to-face education?	100	62,5	40	25,0	4	2,5	0	0,0	16	10,0
Where do you have breakfast in online education?	155	96,9	1	0,6	1	0,6	0	0,0	3	1,9
Where do you have lunch in face-to-face education?	9	5,6	138	86,3	11	6,9	0	0,0	2	1,3
Where do you have lunch in online education?	146	91,3	4	2,5	0	0,0	3	1,9	7	4,4

The distribution of where the participants have breakfast and lunch in face-to-face and online education is as in Table 4.

Table 5: Distribution of Milk and Products, Meat, Eggs and Legumes Consumption

		Every day		3-4 times a week		1-2 times a week		1 time in 15 days		Once a month		Never			Pandemic Period Change vs. Pre-Pandemic		
		n	%	n	%	n	%	n	%	n	%	n	%	*[a]p*	Increased	Decreased	Not changed
Milk	**PrP**	60	37,5	25	15,6	35	21,9	6	3,8	10	6,3	24	15,0	***0,025****	20 (12,5)	48 (30,0)	92 (57,5)
	PP	73	45,6	31	19,4	19	11,9	5	3,1	11	6,9	21	13,1				
Ayran/yogurt	**PrP**	35	21,9	38	23,8	45	28,1	11	6,9	10	6,3	21	13,1	***0,042****	16 (10,0)	30 (18,8)	114 (71,3)
	PP	45	28,1	39	24,4	40	25,0	5	3,1	14	8,8	17	10,6				
Kephir	**PrP**	9	5,6	14	8,8	11	6,9	15	9,4	27	16,9	84	52,5	***0,806***	9 (5,6)	17 (10,6)	134 (83,8)
	PP	11	6,9	6	3,8	16	10,0	13	8,1	27	16,9	87	54,4				
Cheese	**PrP**	40	25,0	39	24,4	31	19,4	8	5,0	9	5,6	33	20,6	***0,001*****	9 (5,6)	39 (24,4)	112 (70,0)
	PP	59	36,9	39	24,4	21	13,1	9	5,6	7	4,4	25	15,6				
Egg	**PrP**	45	28,1	42	26,3	37	23,1	15	9,4	6	3,8	15	9,4	***0,001*****	16 (10,0)	60 (37,5)	84 (52,5)
	PP	65	40,6	47	29,4	35	21,9	3	1,9	5	3,1	5	3,1				
Red meat	**PrP**	10	6,3	38	23,8	57	35,6	24	15,0	6	3,8	25	15,6	***0,002*****	13 (8,1)	36 (22,5)	111 (69,4)
	PP	11	6,9	44	27,7	64	40,3	13	8,2	12	7,5	15	9,4				
White meat	**PrP**	6	3,8	36	22,5	63	39,4	26	16,3	16	10,0	13	8,1	***0,992***	16 (10,0)	15 (9,4)	129 (80,6)
	PP	5	3,1	36	22,5	62	38,8	30	18,8	14	8,8	13	8,1				
Fish	**PrP**	3	1,9	4	2,5	30	18,8	40	25,0	41	25,6	42	26,3	***0,009*****	10 (6,3)	31 (19,4)	119 (74,4)
	PP	2	1,3	5	3,1	39	24,4	39	24,4	53	33,1	22	13,8				
Legumes	**PrP**	17	10,6	28	17,5	70	43,8	21	13,1	14	8,8	10	6,3	***0,028****	16 (10,0)	36 (22,5)	108 (67,5)
	PP	23	14,4	34	21,3	65	40,6	16	10,0	11	6,9	11	6,9				
Oilseed	**PrP**	28	17,5	43	26,9	25	15,6	22	13,8	15	9,4	27	16,9	***0,001*****	14 (8,8)	41 (25,6)	105 (65,6)
	PP	42	26,3	46	28,7	30	18,8	23	14,4	12	7,5	7	4,4				

PrP:Pre-Pandemic – Face-to-face Education
PP:Pandemic Period – Online Education
[a]*Wilcoxon Signed Rank Test*
***p<0,01* **p<0,05*

The distribution of the responses given by the students participating in the study to the consumption of milk and products, meat, eggs, legumes and oilseed is as in Table 5.

While 37.5% (n=60) of the students consumed milk every day before the pandemic (face-to-face education period), it was determined that 45.6% (n=73) consumed milk every day during the pandemic (online education period). While 15% (n=24) of the students did not consume milk before the pandemic, this rate decreased to 13.1% (n=21) during the pandemic. In general, during the pandemic, it was found that milk consumption increased by 12.5% (n=20), decreased by 30% (n=48) and remained unchanged by 57.5% (n=92). The pandemic period milk consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.025$; $p<0.05$).

While 21.9% (n=35) of the students consumed ayran/yogurt every day before the pandemic, it was determined that 28.1% (n=45) of the students consumed ayran/yogurt every day during the pandemic. While 13.1% (n=21) of the students did not consume ayran/yogurt before the pandemic, this rate was determined as 10.6% (n=17) during the pandemic. It was determined that ayran/yogurt consumption increased by 10% (n=16), decreased by 18.8% (n=30) and remained unchanged by 71.3% (n=114) during the pandemic compared to the pre-pandemic period. The pandemic period ayran/yogurt consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.042$; $p<0.05$).

While the students' kefir consumption was 5.6% (n=9) every day before the pandemic, this rate was 6.9% (n=11) during the pandemic. While the rate of the students who did not consume kefir before the pandemic was 52.5% (n=84), it was determined as 54.4% (n=87) during the pandemic. It was determined that kefir consumption increased by 5.6% (n=9), decreased by 10.6% (n=17) and remained unchanged by 83.8% (n=134) during the pandemic compared to the pre-pandemic period. The pandemic period kefir consumption of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

While 25% (n=40) of the students consumed cheese every day before the pandemic, 20.6% (n=33) did not consume cheese at all. This rate was determined as 36.9% (n=59) who consumed cheese every day during the pandemic and 15.6% (n=25) who did not consume cheese at all. It was determined that cheese consumption increased by 5.6% (n=9), decreased by 24.4% (n=39) and remained unchanged by 70% (n=112) during the pandemic compared to the pre-pandemic period. The cheese consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While 28.1% (n=45) of the students consumed eggs every day before the pandemic, 40.6% (n=65) consumed eggs during the pandemic. The rate of not consuming eggs at the rate of 9.4% (n=15) before the pandemic decreased to 3.1% (n=5) during the pandemic. It was determined that egg consumption increased by 10% (n=16), decreased by 37.5% (n=60) and remained unchanged by 52.5% (n=84) during the pandemic compared to the pre-pandemic period. The pandemic period egg consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.001$; $p<0.01$).

The pandemic period change in students' milk and products and egg consumption is shown in Figure 4.6.

While 6.3% (n=10) of the students consumed red meat every day before the pandemic, 6.9% (n=11) consumed meat every day during the pandemic. This rate was determined as 23.8% (n=38) before the pandemic and 27.7% (n=44) during the pandemic in those who consumed it 3-4 times a week. While red meat was not consumed at a rate of 15.6% (n=25) before the pandemic, this rate was determined as 9.4% (n=15) during the pandemic. It was determined that red meat consumption increased by 8.1% (n=13), decreased by 22.5% (n=36) and remained unchanged by 69.4% (n=111) during the pandemic compared to the pre-pandemic period. The red meat consumption of the students participating in the study was statistically significant during the pandemic compared to the pre-pandemic period ($p=0.002$; $p<0.01$).

While 3.8% (n=6) of the students consumed white meat every day before the pandemic, 3.1% (n=5) of them consumed it every day during the pandemic. This rate does not change before and during the pandemic in those who consume white meat 3-4 times a week. White meat was determined as not consumed at the rate of 8.1% (n=13) before and during the pandemic. It was determined that white meat consumption increased by 10% (n=16), decreased by 9.4% (n=15) and remained unchanged by 80.6% (n=129) during the pandemic compared to the pre-pandemic period. The pandemic period white meat consumption of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

The fish consumption of students 1-2 times a week was determined as 18.8% (n=30) before the pandemic and 24.4% (n= 39) during the pandemic. Fish consumption once a month was determined as 25.6% (n=41) before the pandemic and 33.1% (n=53) during the pandemic. While the rate of those who never consumed fish was 26.3% (n=42) before the pandemic, it was 13.8% (n=22) during the pandemic. It was determined that fish consumption increased by

6.3% (n=10), decreased by 19.4% (n=31) and remained unchanged by 74.4% (n=119) during the pandemic compared to the pre-pandemic period. The fish consumption of the students participating in the study was statistically significant during the pandemic compared to the pre-pandemic period ($p=0.009$; $p<0.01$).

The change in the consumption of red meat, white meat and fish of the students during the pandemic compared to the pre-pandemic period is shown in Figure 4.7.

The legumes consumption of the students 3-4 times a week was determined as 17.5% (n=28) before the pandemic and 21.3% (n=34) during the pandemic. While the rate of those who consumed legumes 1-2 times a week was 43.8% (n=70) before the pandemic, it was determined as 40.6% (n=65) during the pandemic. While legumes were not consumed at a rate of 6.3% (n=10) before the pandemic, it was determined as 6.9% (n=11) during the pandemic. It was determined that legume consumption increased by 10% (n=16), decreased by 22.5% (n=36) and remained unchanged by 67.5% (n=108) during the pandemic compared to the pre-pandemic period. Legumes consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.028$; $p<0.05$).

The daily consumption of oilseeds of students was determined as 17.5% (n=28) before the pandemic and 26.3% (n=42) during the pandemic. While oilseed was not consumed at a rate of 16.9% (n=27) in the pre-pandemic period, it was never consumed at a rate of 4.4% (n=7) during the pandemic. It was determined that oilseed consumption increased by 8.8% (n=14), decreased by 25.6% (n=41) and remained unchanged by 65.6% (n=105) during the pandemic compared to the pre-pandemic period. The oilseed consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

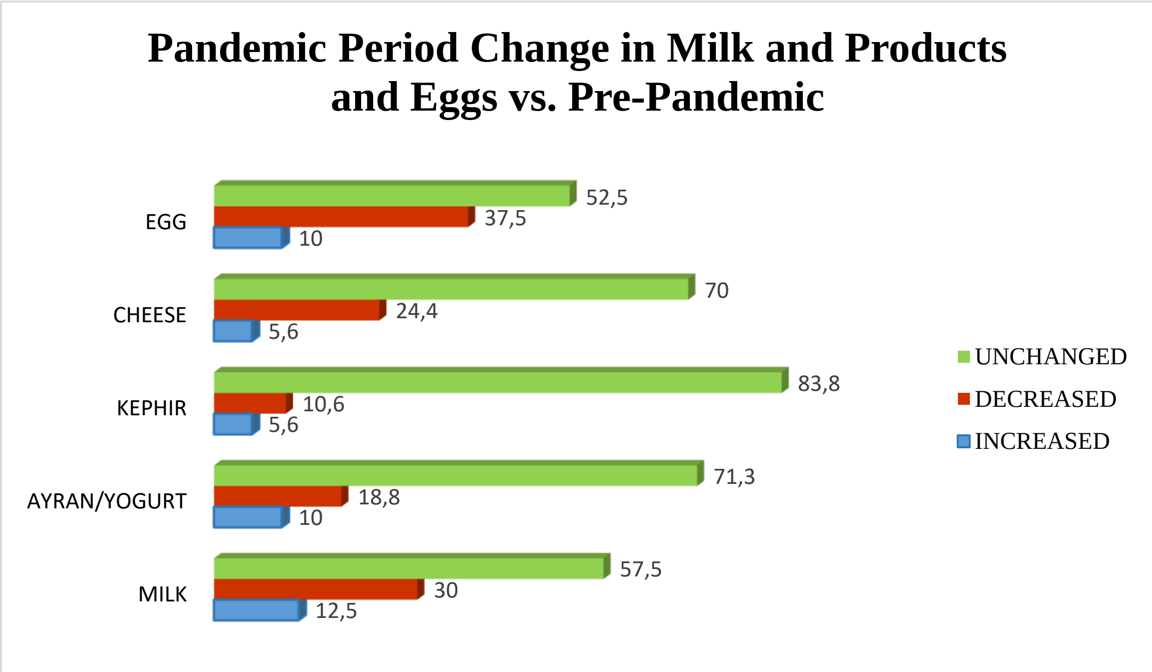


__Figure 4.6:__ Pandemic Period Change of Milk and Products and Eggs vs. Pre-Pandemic

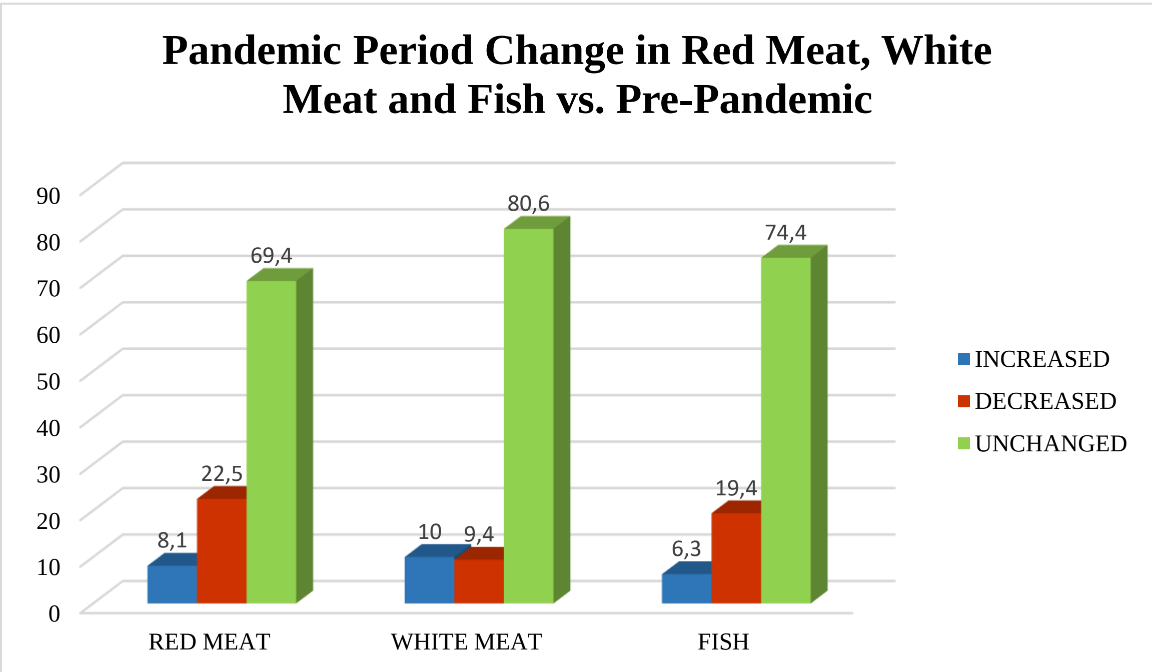


__Figure 4.7:__ Pandemic Period Change in Red Meat, White Meat and Fish vs. Pre-Pandemic

Table 6: Distribution of Fresh Vegetable and Fruit Consumption

		Every day		3-4 times a week		1-2 times a week		1 time in 15 days		Once a month		Never		*^a p*	Pandemic Period Change vs. Pre-Pandemic		
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		**Increased**	**Decreased**	**Not changed**
Green-leafy vegetables	**PrP**	20	12,5	36	22,5	38	23,8	14	8,8	15	9,4	37	23,1	***0,022****	13 (8,1)	30 (18,8)	117 (73,1)
	PP	28	17,5	29	18,1	45	28,1	13	8,1	13	8,1	32	20,0				
Other vegetables	**PrP**	28	17,5	34	21,3	48	30,0	21	13,1	8	5,0	21	13,1	***0,799***	18 (11,3)	21 (13,1)	121 (75,6)
	PP	28	17,5	28	17,5	55	34,4	23	14,4	14	8,8	12	7,5				
Potato	**PrP**	9	5,6	22	13,8	84	52,5	26	16,3	7	4,4	12	7,5	***0,082***	26 (16,3)	38 (23,8)	96 (60,0)
	PP	15	9,4	29	18,1	66	41,3	33	20,6	7	4,4	10	6,3				
Citrus fruits	**PrP**	44	27,5	41	25,6	28	17,5	25	15,6	3	1,9	19	11,9	***0,254***	22 (13,8)	28 (17,5)	110 (68,8)
	PP	42	26,3	52	32,5	25	15,6	18	11,3	6	3,8	17	10,6				
Other fruits	**PrP**	43	26,9	45	28,1	47	29,4	7	4,4	7	4,4	11	6,9	***0,001*****	16 (10,0)	37 (23,1)	107 (66,9)
	PP	66	41,3	36	22,5	40	25,0	9	5,6	8	5,0	1	0,6				
Dried fruits	**PrP**	7	4,4	12	7,5	33	20,6	19	11,9	26	16,3	63	39,4	***0,029****	7 (4,4)	19 (11,9)	134 (83,8)
	PP	6	3,8	16	10,0	35	21,9	19	11,9	31	19,4	53	33,1				

PpP:Pre-Pandemic – Face-to-face Education
PP:Pandemic Period – Online Education
[a]*Wilcoxon Signed Rank Test*
***p<0,01 *p<0,05*

The distribution of the participants' responses to their consumption of fresh vegetables and fruits is as in Table 6.

The consumption of green leafy vegetables by students was determined as 12.5% (n=20) every day before the pandemic and 17.5% (n=28) during the pandemic. While the rate of consumption of green leafy vegetables 1-2 times a week before the pandemic was 23.8% (n=38), this rate increased to 28.1% (n=45) during the pandemic. While the rate of students not consuming green leafy vegetables at all was 23.1% (n=37) before the pandemic, it was determined as 20% (n=32) during the pandemic. In general, it was determined that the consumption of green leafy vegetables increased by 8.1% (n=13), decreased by 18.8% (n=30) and remained unchanged by 73.1% (n=117) during the pandemic compared to the period before the pandemic. Green leafy vegetable consumption by the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.022$; $p<0.05$).

While the consumption rate of other vegetables by the students was 17.5% (n=28) every day before and during the pandemic, their consumption 1-2 times a week was determined as 30% (n=48) before the pandemic and 34.4% (n=55) during the pandemic. While the students did not consume any other vegetables at the rate of 13.1% (n=21) before the pandemic, this rate was determined as 7.5% (n=12) during the pandemic. In general, it was determined that consumption of other vegetables increased by 11.3% (n=18), decreased by 13.1% (n=21) and remained unchanged by 75.6% (n=121) during the pandemic compared to the pre-pandemic period. On the other hand, potato consumption increased by 16.3% (n=26), decreased by 23.8% (n=38) and remained unchanged by 60% (n=96) during the pandemic compared to the pre-pandemic period; in addition, it was determined that citrus fruit consumption increased by 13.8% (n=22), decreased by 17.5% (n=28) and remained unchanged by 68.8% (n=110) during the pandemic compared to the pre-pandemic period. The consumption of other vegetables, potatoes and citrus fruits by the students participating in the study during the pandemic did not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$).

While the consumption rate of other fruits by the students was 26.9% (n=43) every day before the pandemic, this rate was determined as 41.3% (n=66) during the pandemic. While the rate of students who did not consume any fruit was determined as 6.9% (n=11) before the pandemic, it was 0.6% (n=1) during the pandemic. Considering the other fruit consumption rates in general, it was determined that it increased by 10.16% (n=16), decreased by 23.1% (n=37) and remained unchanged by 66.9% (n=107) during the pandemic compared to the period before the pandemic. The consumption of other fruits by the students participating in the study was statistically significant during the pandemic compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While the dried fruits consumption rate of the students was 7.5% (n=12) 3-4 times a week before the pandemic, it was determined as 10% (n=16) during the pandemic. The rate of those who consumed dried fruits once a month increased from 16.3% (n=26) in the pre-pandemic period to 19.4% (n=31) during the pandemic. While the rate of those who never consumed dried fruits was 39.4% (n=63) before the pandemic, this rate was determined as 33.1% (n=53) during the pandemic. Considering the consumption of dried fruits in general, it was determined that it increased by 4.4% (n=7), decreased by 11.9% (n=19) and remained unchanged by 83.8% (n=134) during the pandemic compared to the period before the pandemic. The pandemic period dried fruits consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.029$; $p<0.05$).

Table 7: Distribution of Bread and Cereal Consumption

		Every day		3-4 times a week		1-2 times a week		1 time in 15 days		Once a month		Never			Pandemic Period Change vs. Pre-Pandemic		
		n	%	n	%	n	%	n	%	n	%	n	%	^{a}p	Increased	Decreased	Not changed
White bread	**PrP**	81	50,6	30	18,8	18	11,3	5	3,1	7	4,4	19	11,9	***0,726***	21 (13,1)	21 (13,1)	118 (73,8)
	PP	81	50,6	24	15,0	24	15,0	3	1,9	9	5,6	19	11,9				
Wholemeal-Whole-grain-Rye bread	**PrP**	31	19,4	18	11,3	27	16,9	5	3,1	19	11,9	60	37,5	***0,596***	15 (9,4)	19 (11,9)	126 (78,8)
	PP	28	17,5	26	16,3	15	9,4	9	5,6	18	11,3	64	40,0				
Cracked wheat rice	**PrP**	14	8,8	25	15,6	66	41,3	19	11,9	21	13,1	15	9,4	***0,001****	45 (28,1)	13 (8,1)	102 (63,8)
	PP	8	5,0	10	6,3	69	43,1	28	17,5	27	16,9	18	11,3				
Pasta-noodles-rice	**PrP**	30	18,8	56	35,0	49	30,6	17	10,6	5	3,1	3	1,9	***0,554***	20 (12,5)	29 (18,1)	111 (69,4)
	PP	33	20,6	54	33,8	49	30,6	16	10,0	5	3,1	3	1,9				
Pie-pastry	**PrP**	3	1,9	12	7,5	49	30,6	44	27,5	25	15,6	27	16,9	***0,047****	18 (11,3)	35 (21,9)	107 (66,9)
	PP	4	2,5	21	13,1	43	26,9	44	27,5	32	20,0	16	10,0				
Cookie-biscuit-cake	**PrP**	10	6,3	23	14,4	45	28,1	27	16,9	32	20,0	23	14,4	***0,001****	10 (6,3)	38 (23,8)	112 (70,0)
	PP	20	12,5	31	19,4	44	27,5	23	14,4	34	21,3	8	5,0				

PrP:Pre-Pandemic – Face-to-face Education
PP:Pandemic Period – Online Education
[a]*Wilcoxon Signed Rank Test* ***p<0,01* **p<0,05*

The distribution of the participants' responses to bread and cereal consumption is as in Table 7.

While the rate of white bread consumption of the students was 50.6% (n=81) every day before and during the pandemic, those who did not consume any bread were 11.9% (n=19). Considering the consumption of white bread in general, it was determined that it increased by 13.1% (n=21), decreased by 13.1% (n=21) and remained unchanged by 73.8% (n=18) during the pandemic compared to the pre-pandemic period. While the consumption of wholemeal-whole-grain-rye bread was 19.4% (n=31) every day before the pandemic, it was determined as 17.5% (n=28) during the pandemic. While the rate of those who never consumed Wholemeal-Whole-Grain-Rye bread was 37.5% (n=60) before the pandemic, it was 40% (n=64) during the pandemic. Considering the consumption of Wholemeal-Whole-Grain-Rye bread in general, it was determined that it increased by 9.4% (n=15), decreased by 11.9% (n=19), and remained unchanged by 78.8% (n=126) during the pandemic compared to the pre-pandemic period. The pandemic period white bread, wholemeal-whole grain, rye bread consumption of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

In the pre-pandemic period, while the students consumed cracked wheat rice at the rate of 11.9% (n=19) every 15 days, this rate was determined as 17.5% (n=28) during the pandemic. While the rate of those who never consumed cracked wheat rice was 9.4% (n=15) before the pandemic, it was 11.3% (n=18) during the pandemic. Considering the consumption of cracked wheat rice in general, it was determined that it increased by 28.1% (n=45), decreased by 8.1% (n=13) and remained unchanged by 63.8% (n=102) during the pandemic compared to the period before the pandemic. The pandemic period cracked wheat rice consumption of the students participating in the study was determined statistically significant compared to the pre-pandemic ($p=0.001$; $p<0.01$).

While the rate of consumption of pasta-noodles-rice was 18.8% (n=30) every day in the pre-pandemic period, it was determined as 20.6% (n=33) during the pandemic. The rate of those who never consumed pasta-noodles-rice was determined as 1.9% (n=3) before and during the pandemic. Considering the consumption of pasta-noodles-rice in general, it was determined that it increased by 12.5% (n=20), decreased by 18.1% (n=29) and remained unchanged by 69.4% (n=111) during the pandemic compared to the pre-pandemic period. found to be unchanged. The pandemic period pasta-noodle-rice consumption of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

While the rate of consumption of pie-pastry 3-4 times a week was 7.5% (n=12) in the pre-pandemic period, it was determined as 13.1% (n=21) during the pandemic. While the rate of those who never consumed pie-pastry was 16.9% (n=27) before the pandemic, it was determined as 10% (n=16) during the pandemic. Considering the consumption of pie-pastry in general, it was determined that it increased by 11.3% (n=18), decreased by 21.9% (n=35) and remained unchanged by 66.9% (n=107) during the pandemic compared to the period before the pandemic. The pandemic period pie-pastry consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.047$; $p<0.05$).

While the students consumed cookies-cakes-biscuits at the rate of 6.3% (n=10) every day in the pre-pandemic period, this rate was determined as 12.5% (n=20) during the pandemic. While the rate of consumption of cookies-cakes-biscuits 3-4 times a week was 14.4% (n=23), it was determined as 19.4% (n=31) during the pandemic. While the rate of those who did not consume cookies-cakes-biscuits at all was 14.4% (n=23) before the pandemic, it was determined as 5% (n=8) during the pandemic. Considering the consumption of cookies-cakes-biscuits in general, it was determined that it increased by 6.3% (n=10), decreased by 23.8% (n=38) and remained unchanged by 70% (n=112) during the pandemic compared to the pre-pandemic period. The pandemic period cookie-biscuit-cake consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.001$; $p<0.01$).

Table 8: Distribution of Oil, Sugar and Sweet Consumption

		Every day		3-4 times a week		1-2 times a week		1 time in 15 days		Once a month		Never			Pandemic Period Change vs. Pre-Pandemic		
		n	%	n	%	n	%	n	%	n	%	n	%	^{a}p	Increased	Decreased	Not changed
Olive	**PrP**	33	20,6	16	10,0	42	26,3	12	7,5	11	6,9	46	28,7	***0,013****	13 (8,1)	31 (19,4)	116 (72,5)
	PP	43	26,9	23	14,4	25	15,6	16	10,0	11	6,9	42	26,3				
Oliveoil	**PrP**	21	13,1	30	18,8	35	21,9	15	9,4	12	7,5	47	29,4	***0,021****	7 (4,4)	17 (10,6)	136 (85,0)
	PP	33	20,6	24	15,0	36	22,5	14	8,8	11	6,9	42	26,3				
Sunflower – corn oil	**PrP**	23	14,4	16	10,0	23	14,4	19	11,9	19	11,9	60	37,5	***0,872***	15 (9,4)	20 (12,5)	125 (78,1)
	PP	23	14,4	15	9,4	21	13,1	20	12,5	26	16,3	55	34,4				
Butter	**PrP**	21	13,1	27	16,9	43	26,9	18	11,3	14	8,8	37	23,1	***0,014****	15 (9,4)	27 (16,9)	118 (73,8)
	PP	24	15,0	34	21,3	40	25,0	21	13,1	17	10,6	24	15,0				
Margarine	**PrP**	2	1,3	3	1,9	19	11,9	12	7,5	24	15,0	100	62,5	***0,001*****	4 (2,5)	23 (14,4)	133 (83,1)
	PP	4	2,5	9	5,6	21	13,1	13	8,1	22	13,8	91	56,9				
Sugar	**PrP**	18	11,3	31	19,4	39	24,4	18	11,3	19	11,9	35	21,9	***0,001*****	9 (5,6)	36 (22,5)	115 (71,9)
	PP	26	16,3	27	16,9	52	32,5	11	6,9	24	15,0	20	12,5				
Chocolate	**PrP**	29	18,1	39	24,4	44	27,5	19	11,9	9	5,6	20	12,5	***0,001*****	9 (5,6)	53 (33,1)	98 (61,3)
	PP	50	31,3	33	20,6	50	31,3	15	9,4	7	4,4	5	3,1				
Pastry	**PrP**	6	3,8	4	2,5	27	16,9	32	20,0	32	20,0	59	36,9	***0,001*****	9 (5,6)	43 (26,9)	108 (67,5)
	PP	6	3,8	15	9,4	33	20,6	28	17,5	43	26,9	35	21,9				
Milky desserts	**PrP**	7	4,4	16	10,0	17	10,6	22	13,8	47	29,4	51	31,9	***0,006*****	12 (7,5)	30 (18,8)	118 (73,8)
	PP	7	4,4	23	14,4	19	11,9	27	16,9	44	27,5	40	25,0				

PrP:Pre-Pandemic – Face-to-face Education PP:Pandemic Period – Online Education

[a]*Wilcoxon Signed Rank Test* *$^{**}p<0{,}01$* *$^{*}p<0{,}05$*

The distribution of the participants' responses to their consumption of fat, sugar and sweets is as in Table 8.

While the rate of students consuming olives every day before the pandemic was 20.6% (n=33), this rate was determined as 26.9% (n=43) during the pandemic. While the rate of those who did not consume olives before the pandemic was 28.7% (n=46), this rate was determined as 26.3% (n=42) during the pandemic. In general, it was determined that olive consumption increased by 8.1% (n=13), decreased by 19.4% (n=31) and remained unchanged by 72.5% (n=116) during the pandemic compared to the pre-pandemic period. The olive consumption of the students participating in the study was statistically significant during the pandemic compared to the pre-pandemic period ($p=0.013$; $p<0.05$).

While the rate of students consuming olive oil every day before the pandemic was 13.1% (n=21), this rate was determined as 20.6% (n=33) during the pandemic. While the rate of those who did not consume olive oil before the pandemic was 29.4% (n=47), this rate was determined as 26.3% (n=42) during the pandemic. In general, it was determined that olive oil consumption increased by 4.4% (n=7), decreased by 10.6% (n=17) and remained unchanged by 85% (n=136) during the pandemic compared to the pre-pandemic period. The olive oil consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.021$; $p<0.05$).

The rate of consumption of sunflower-corn oil every day before and during the pandemic was determined as 14.4% (n=23). While the rate of those who did not consume sunflower-corn oil before the pandemic was 37.5% (n=60), this rate was determined as 34.4% (n=55) during the pandemic. In general, it was determined that sunflower-corn oil consumption increased by 9.4% (n=15), decreased by 12.5% (n=20) and remained unchanged by 78.1% (n=125) during the pandemic compared to the pre-pandemic period. The pandemic period sunflower - corn oil consumption of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

While the rate of students consuming butter every day before the pandemic was 13.1% (n=21), this rate was determined as 15% (n=24) during the pandemic. While the rate of those who consumed butter 3-4 times a week before the pandemic was 16.9% (n=27), this rate was determined as 21.3% (n=34) during the pandemic. While 23.1% (n=37) did not consume butter before the pandemic, this rate was determined as 15% (n=24) during the pandemic. In general, it was determined that butter consumption increased by 9.4% (n=15), decreased by 16.9% (n=27) and remained unchanged by 73.8% (n=18) during the pandemic compared to the pre-pandemic period. The butter consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.014$; $p<0.05$).

While the rate of students consuming margarine every day before the pandemic was 1.3% (n=2), this rate was determined as 2.5% (n=4) during the pandemic. While the rate of those who consumed margarine 1-2 times a week before the pandemic was 11.9% (n=19), this rate was determined as 13.1% (n=21) during the pandemic. While the rate of those who did not consume margarine before the pandemic was 62.5% (n=100), this rate was determined as 56.9% (n=91) during the pandemic. In general, it was determined that margarine consumption increased by 2.5% (n=4), decreased by 14.4% (n=23) and remained unchanged by 83.1% (n=133) during the pandemic compared to the period before the pandemic. The pandemic period margarine consumption of the students participating in the study was statistically significant compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While the rate of students consuming sugar every day before the pandemic was 11.3% (n=18), this rate was determined as 16.3% (n=26) during the pandemic. While the rate of those who did not consume sugar before the pandemic was 21.9% (n=35), this rate was determined as 12.5% (n=20) during the pandemic. In general, it was determined that sugar consumption increased by 5.6% (n=9), decreased by 22.5% (n=36) and remained unchanged by 71.9% (n=115) during the pandemic compared to the pre-pandemic period. The sugar consumption of the students participating in the study was statistically significant during the pandemic compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While the rate of students consuming chocolate every day before the pandemic was 18.1% (n=29), this rate was determined as 31.3% (n=50) during the pandemic. While the rate of those who did not consume chocolate before the pandemic was 12.5% (n=20), this rate was determined as 3.1% (n=5) during the pandemic. In general, it was determined that chocolate consumption increased by 5.6% (n=9), decreased by 33.1% (n=53) and remained unchanged by 61.3% (n=98) during the pandemic compared to the pre-pandemic period. The chocolate consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While the rate of students who consumed pastries 3-4 times a week before the pandemic was 2.5% (n=4), this rate was determined as 9.4% (n=15) during the pandemic. While the rate of those who did not consume pastries before the pandemic was 36.9% (n=59), this rate was determined as 21.9% (n=35) during the pandemic. In general, it was determined that the consumption of dumplings increased by 5.6% (n=9), decreased by 26.9% (n=43) and remained unchanged by 67.5% (n=108) during the pandemic compared to the pre-pandemic period. The pandemic period pastry consumption of the students participating in the study was statistically significant compared to the pre-pandemic ($p=0.001$; $p<0.01$).

While the rate of students who consumed milky desserts 3-4 times a week before the pandemic was 10% (n=16), this rate was determined as 14.4% (n=23) during the pandemic. While the rate of those who did not consume milky desserts before the pandemic was 31.9% (n=51), this rate was determined as 25% (n=40) during the pandemic. In general, it was determined that milky dessert consumption increased by 7.5% (n=12), decreased by 18.8% (n=30) and remained unchanged by 73.8% (n=18) during the pandemic compared to the pre-pandemic period. The consumption of milky desserts by the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.006$; $p<0.01$).

Table 9: Distribution of Beverage Consumption

		Every day		3-4 time a week		1-2 times a week		1 time in 15 days		Once a month		Never			Pandemic Period Change vs. Pre-Pandemic		
		n	%	n	%	n	%	n	%	n	%	n	%	[a]p	Increased	Decreased	Not changed
Water	**PrP**	153	95,6	1	0,6	5	3,1	1	0,6	0	0,0	0	0,0	***0,317***	0 (0,0)	1 (0,6)	159 (99,4)
	PP	153	95,6	1	0,6	6	3,8	0	0,0	0	0,0	0	0,0				
Instant fruit juices	**PrP**	7	4,4	21	13,1	39	24,4	17	10,6	22	13,8	54	33,8	***0,285***	21 (13,1)	22 (13,8)	117 (73,1)
	PP	7	4,4	23	14,4	38	23,8	24	15,0	20	12,5	48	30,0				
Asidic beverages	**PrP**	18	11,3	14	8,8	29	18,1	16	10,0	15	9,4	68	42,5	***0,001*****	12 (7,5)	39 (24,4)	109 (68,1)
	PP	21	13,1	22	13,8	33	20,6	9	5,6	20	12,5	55	34,4				
Tea	**PrP**	43	26,9	31	19,4	28	17,5	9	5,6	12	7,5	37	23,1	***0,849***	19 (11,9)	20 (12,5)	121 (75,6)
	PP	45	28,1	32	20,0	23	14,4	9	5,6	9	5,6	42	26,3				
Coffee	**PrP**	36	22,5	8	5,0	19	11,9	14	8,8	16	10,0	67	41,9	***0,390***	23 (14,4)	27 (16,9)	110 (68,8)
	PP	30	18,8	13	8,1	26	16,3	19	11,9	11	6,9	61	38,1				
Mineral water	**PrP**	23	14,4	17	10,6	8	5,0	9	5,6	32	20,0	71	44,4	***0,045****	19 (11,9)	32 (20,0)	109 (68,1)
	PP	26	16,3	17	10,6	14	8,8	22	13,8	18	11,3	63	39,4				

PrP:Pre-Pandemic – Face-to-face Education
PP:Pandemic Period – Online Education
[a]*Wilcoxon Signed Rank Test*
***p<0,01* **p<0,05*

The distribution of the participants' responses to their beverage consumption is as in Table 9.

The rate of students drinking water every day before and during the pandemic was determined as 95.6% (n=153). It was determined that water consumption increased by 0% (n=0), decreased by 0.6% (n=1) and remained unchanged by 99.4% (n=159) during the pandemic compared to the period before the pandemic. While the rate of students who consumed instant fruit juices 3-4 times a week before the pandemic was 14.4% (n=23), this rate was determined as 13.1% (n=21) during the pandemic. While the rate of those who did not consume instant fruit juices before the pandemic was 33.8% (n=54), this rate was determined as 30% (n=48) during the pandemic. In general, it was determined that the consumption of instant fruit juices increased by 13.1% (n=21), decreased by 13.8% (n=22) and remained unchanged by 73.1% (n=117) during the pandemic compared to the period before the pandemic. The pandemic period water and instant fruit juice consumptions of the students participating in the study did not show a statistically significant difference compared to the pre-pandemic ($p>0.05$).

While the rate of the students who consumed soda drinks 3-4 times a week before the pandemic was 8.8% (n=14), this rate was determined as 13.8% (n=22) during the pandemic. While the rate of those who did not consume soda before the pandemic was 42.5% (n=68), this rate was determined as 34.4% (n=55) during the pandemic. In general, it was determined that the consumption of soft drinks increased by 7.5% (n=12), decreased by 24.4% (n=39) and remained unchanged by 68.1% (n=109) during the pandemic compared to the period before the pandemic. The consumption of soft drinks by the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.001$; $p<0.01$).

While the rate of students consuming tea every day before the pandemic was 26.9% (n=43), this rate was determined as 28.1% (n=45) during the pandemic. While the rate of those who did not consume tea before the pandemic was 23.1% (n=37), this rate was determined as 26.3% (n=42) during the pandemic. In general, it was determined that tea consumption increased by 11.9% (n=19), decreased by 12.5% (n=20) and remained unchanged by 75.6% (n=121) during the pandemic compared to the pre-pandemic period. While the rate of students who consumed coffee every day before the pandemic was 22.5% (n=36), this rate was determined as 18.8% (n=30) during the pandemic. While the rate of those who did not consume coffee before the pandemic was 41.9% (n=67), this rate was determined as 38.1%

(n=61) during the pandemic. In general, it was determined that coffee consumption increased by 14.4% (n=23), decreased by 16.9% (n=27) and remained unchanged by 68.8% (n=110) during the pandemic compared to the pre-pandemic period. The tea and coffee consumption of the students participating in the study during the pandemic does not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$).

While the rate of students consuming mineral water every day before the pandemic was 14.4% (n=23), this rate was determined as 16.3% (n=26) during the pandemic. While the rate of those who did not consume mineral water before the pandemic was 44.4% (n=71), this rate was determined as 39.4% (n=63) during the pandemic. In general, it was determined that mineral water consumption increased by 11.9% (n=19), decreased by 20% (n=32) and remained unchanged by 68.1% (n=109) during the pandemic compared to the period before the pandemic. The mineral water consumption of the students participating in the study during the pandemic was statistically significant compared to the pre-pandemic period ($p=0.045$; $p<0.05$).

Table 10: Comparison of Pandemic Period Milk and Dairy Products, Meat, Eggs and Legumes Consumption in the Developmental Period Compared to Before the Pandemic

		Developmental Period		${}^{b}p$
		Childhood period (n=54)	**Adolescent period (n=106)**	
Milk	**Increased**	9 (16,7)	11 (10,4)	***0,445***
	Decreased	17 (31,5)	31 (29,2)	
	Not changed	28 (51,9)	64 (60,4)	
Ayran /yogurt	**Increased**	7 (13,0)	9 (8,5)	***0,001****
	Decreased	18 (33,3)	12 (11,3)	
	Not changed	29 (53,7)	85 (80,2)	
Kefir	**Increased**	5 (9,3)	4 (3,8)	***0,008****
	Decreased	1 (1,9)	16 (15,1)	
	Not changed	48 (88,9)	86 (81,1)	
Cheese	**Increased**	3 (5,6)	6 (5,7)	***1,000***
	Decreased	13 (24,1)	26 (24,5)	
	Not changed	38 (70,4)	74 (69,8)	
Egg	**Increased**	3 (5,6)	13 (12,3)	***0,377***
	Decreased	23 (42,6)	37 (34,9)	
	Not changed	28 (51,9)	56 (52,8)	
Read meat	**Increased**	5 (9,3)	8 (7,5)	***0,658***
	Decreased	14 (25,9)	22 (20,8)	
	Not changed	35 (64,8)	76 (71,7)	
White meat	**Increased**	7 (13,0)	9 (8,5)	***0,001****
	Decreased	12 (22,2)	3 (2,8)	
	Not changed	35 (64,8)	94 (88,7)	
Fish	**Increased**	2 (3,7)	8 (7,5)	***0,019****
	Decreased	17 (31,5)	14 (13,2)	
	Not changed	35 (64,8)	84 (79,2)	
Legumes	**Increased**	6 (11,1)	10 (9,4)	***0,661***
	Decreased	14 (25,9)	22 (20,8)	
	Not changed	34 (63)	74 (69,8)	

Oilseed	**Increased**	4 (7,4)	10 (9,4)	***0,060***
	Decreased	20 (37,0)	21 (19,8)	
	Not changed	30 (55,6)	75 (70,8)	

[b]Fisher Freeman Halton Test ***p<0,01* **p<0,05*

During the developmental periods, the milk consumption of the students during the pandemic does not show a statistically significant difference compared to the pre-pandemic period (p>0.05) (Table 10).

The rate of decrease in the consumption of ayran/yogurt of the students in childhood period during the pandemic compared to the pre-pandemic was statistically significantly higher than those of adolescence period. The rate of not changing the consumption of ayran/yogurt of the students in childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than the cases in the adolescence period (p=0.001; p<0.01) (Fig. 4.8).

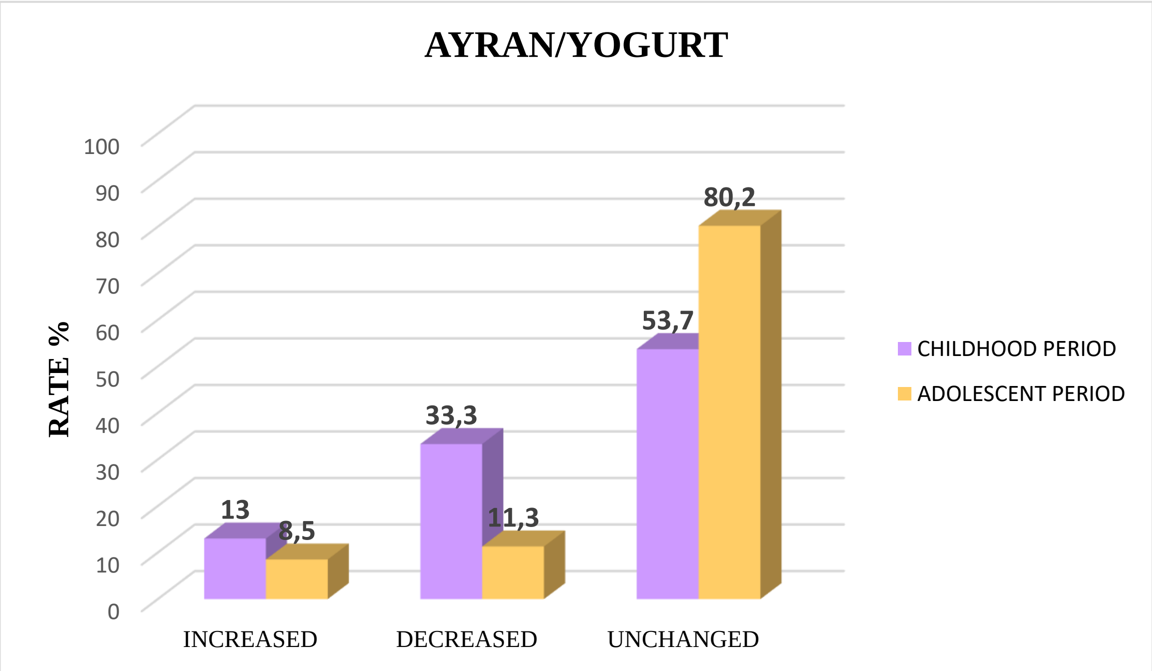


Figure 4.8: *Distribution of ayran/yogurt consumption during the pandemic compared to the pre-pandemic periods*

The rate of decrease in the kefir consumption of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescent period ($p=0.008$; $p<0.01$).

The consumption of cheese, eggs and red meat during the pandemic did not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$).

The rate of decrease in the consumption of white meat of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly higher than that of the adolescent students. The rate of change white meat consumption of the students in the childhood period in during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than the cases in the adolescence period ($p=0.001$; $p<0.01$).

The rate of decrease in fish consumption of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly higher than those are in the adolescent period. The rate of change in fish consumption of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescent period ($p=0.019$; $p<0.05$) (Fig 4.9)

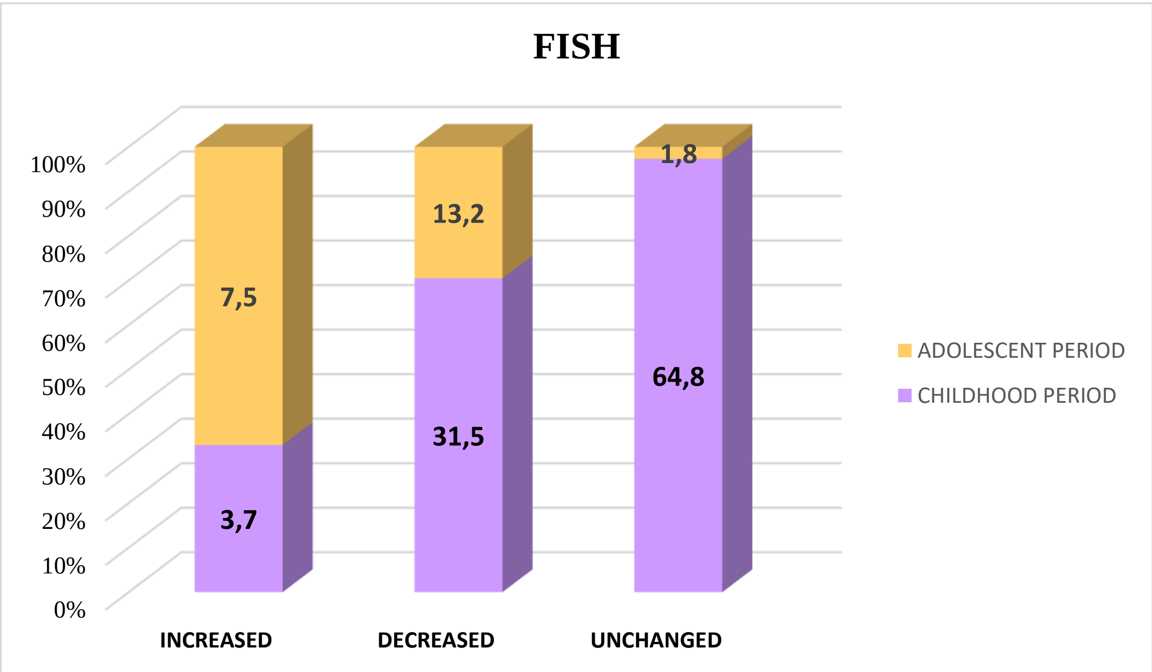


Figure 4.9: *Distribution of pandemic period fish consumption compared to pre-pandemic in the developmental periods*

Legumes and oilseed consumption of the students in the developmental period during the pandemic compared to the pre-pandemic period does not show a statistically significant difference (p>0.05).

Table 11: Comparison of Fresh Vegetables and Fruit Consumption during the Pandemic Compared to Before the Pandemic in the Developmental Period

		Developmental Period		[b]p
		Childhood period (n=54)	**Adolescence period (n=106)**	
Green leafy vegeteables	**Increased**	3 (5,6)	10 (9,4)	***0,724***
	Decreased	11 (20,4)	19 (17,9)	
	Not changed	40 (74,1)	77 (72,6)	
Other vegetables	**Increased**	8 (14,8)	10 (9,4)	***0,170***
	Decreased	10 (18,5)	11 (10,4)	
	Not changed	36 (66,7)	85 (80,2)	
Potato	**Increased**	9 (16,7)	17 (16,0)	***0,414***
	Decreased	16 (29,6)	22 (20,8)	
	Not changed	29 (53,7)	67 (63,2)	
Citrus fruits	**Increased**	7 (13,0)	15 (14,2)	***0,560***
	Decreased	12 (22,2)	16 (15,1)	
	Not changed	35 (64,8)	75 (70,8)	
Other fruits	**Increased**	4 (7,4)	12 (11,3)	***0,352***
	Decreased	16 (29,6)	21 (19,8)	
	Not changed	34 (63,0)	73 (68,9)	
Dried fruits	**Increased**	3 (5,6)	4 (3,8)	***0,001*****
	Decreased	13 (24,1)	6 (5,7)	
	Not changed	38 (70,4)	96 (90,6)	

[b]Fisher Freeman Halton Test ***p<0,01*

In the developmental periods, the consumption of green leafy vegetables, other vegetables, potatoes, citrus fruits and other fruits during the pandemic compared to the pre-pandemic period did not show a statistically significant difference (p>0.05).

The rate of decrease in the consumption of dried fruit of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly higher than that of the adolescent students. The rate of unchanged dry fruit consumption of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescent period ($p=0.001$; $p<0.01$) (Table 11).

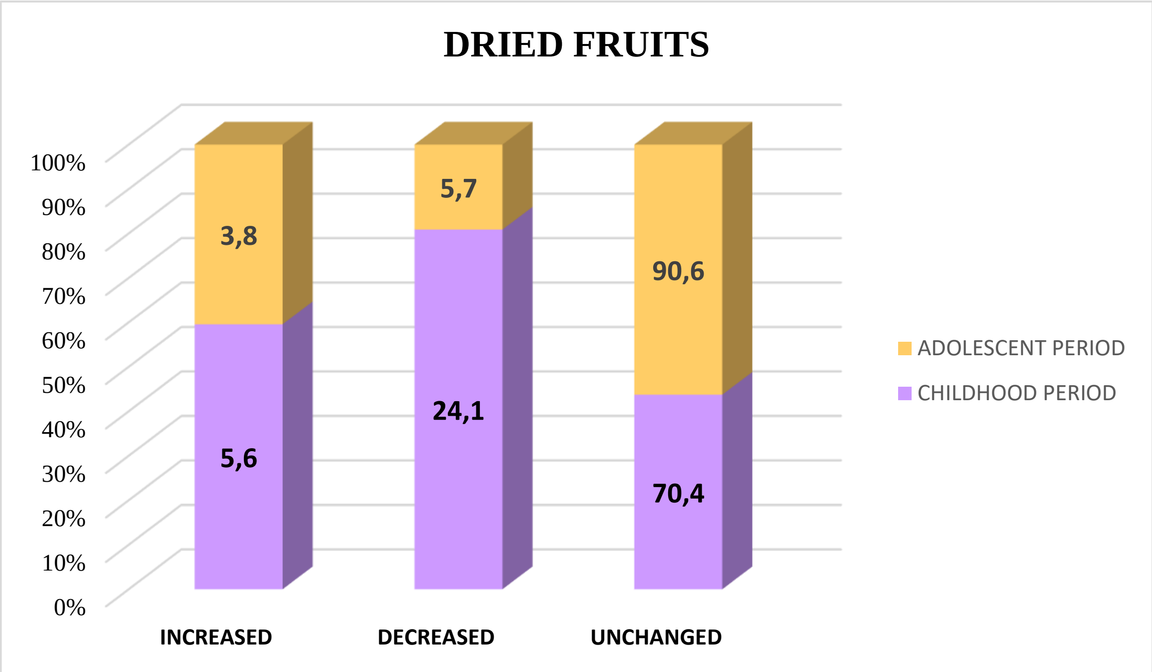


Figure 4.10: *Distribution of pandemic period dried fruit consumption compared to pre-pandemic in the developmental periods*

Table 12: Comparison of Bread and Cereal Consumption during the Pandemic Compared to Before the Pandemic in the Developmental Period

		Developmental Period		$^b p$
		Childhood period (n=54)	**Adolescence period (n=106)**	
White bread	**Increased**	8 (14,8)	13 (12,3)	***0,001****
	Decreased	15 (27,8)	6 (5,7)	
	Not changed	31 (57,4)	87 (82,1)	
Wholemeal-Whole-grain-Rye bread	**Increased**	8 (14,8)	7 (6,6)	***0,142***
	Decreased	4 (7,4)	15 (14,2)	
	Not changed	42 (77,8)	84 (79,2)	
Cracked wheat rice	**Increased**	14 (25,9)	31 (29,2)	***0,001****
	Decreased	12 (22,2)	1 (0,9)	
	Not changed	28 (51,9)	74 (69,8)	
Pasta-noodles-rice	**Increased**	10 (18,5)	10 (9,4)	***0,277***
	Decreased	9 (16,7)	20 (18,9)	
	Not changed	35 (64,8)	76 (71,7)	
Pie-pastry	**Increased**	4 (7,4)	14 (13,2)	***0,341***
	Decreased	15 (27,8)	20 (18,9)	
	Not changed	35 (64,8)	72 (67,9)	
Cookie-biscuit-cake	**Increased**	7 (13,0)	3 (2,8)	***0,020****
	Decreased	15 (27,8)	23 (21,7)	
	Not changed	32 (59,3)	80 (75,5)	

[b]*Fisher Freeman Halton Test* *$**p<0,01$* *$*p<0,05$*

The rate of decrease in the consumption of white bread of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly higher than that of the adolescent students. The rate of unchanged white bread consumption of the students in the childhood during the pandemic compared to the pre-pandemic period was found to be statistically significantly lower than that of students in the adolescent period ($p=0.001$; $p<0.01$).

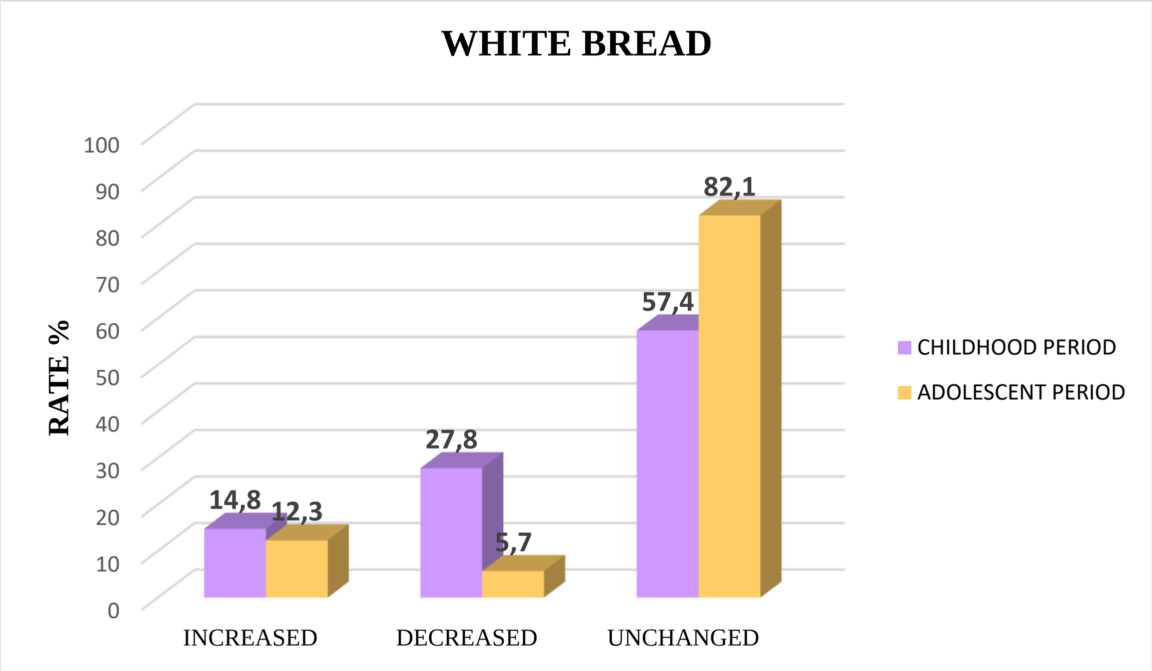


Figure 4.11: *Distribution of pandemic period white bread consumption compared to pre-pandemic in the developmental periods*

The consumption of wholemeal-wholegrain-rye bread during the pandemic compared to the pre-pandemic period did not show a statistically significant difference ($p>0.05$) (Table 12).

The rate of decrease in the consumption of cracked wheat rice of the students in the childhood period during the pandemic compared to the pre-pandemic was determined statistically significantly higher than those are in the adolescence. The rate of unchanged consumption of cracked wheat rice during the pandemic compared to the pre-pandemic students was statistically significantly lower than that of the adolescent students ($p=0.001$; $p<0.01$).

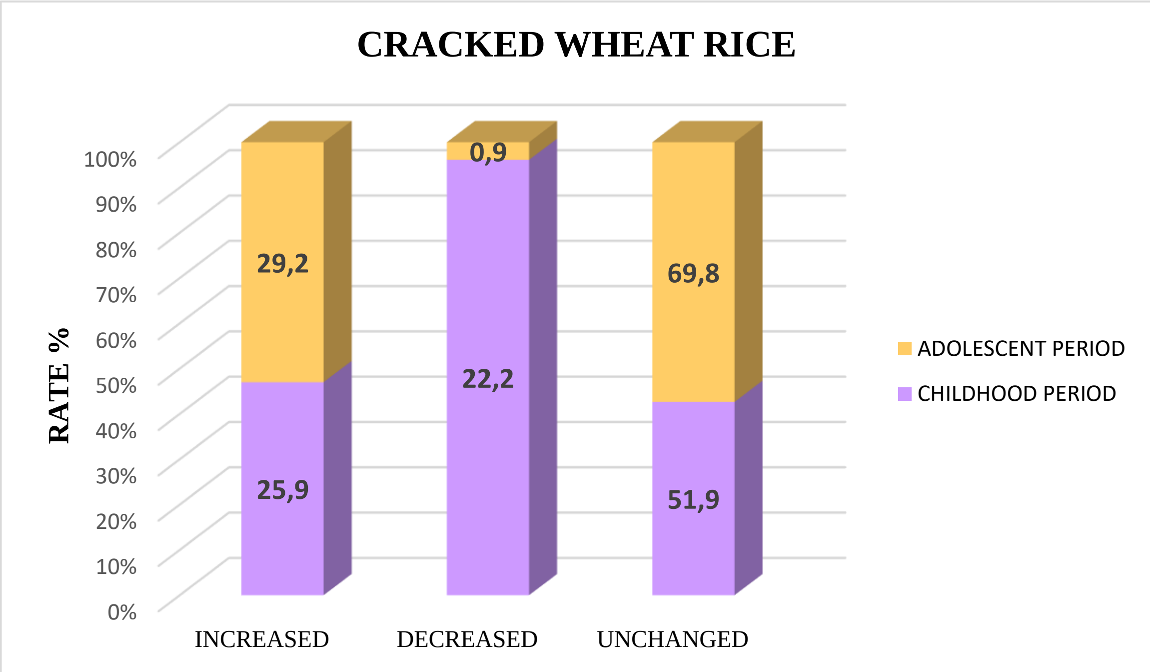


Figure 4.12: *Distribution of cracked wheat rice consumption during pandemic compared to pre-pandemic in the developmental periods*

In the developmental periods, the consumption of pasta-noodle-rice and pie-pastry during the pandemic did not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$) (Table 12).

The rate of increase in the consumption of cookies-biscuits-cakes of the students in the childhood during the pandemic compared to the pre-pandemic was statistically significantly higher than those are in the adolescence. The rate of decrease in the consumption of cookies-biscuits-cakes of the students in the childhood during the pandemic compared to the pre-pandemic was statistically significantly higher than those are in the adolescence. The rate of unchanged cookie-biscuit-cake consumption of the students in the childhood during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in adolescence ($p=0.020$; $p<0.05$) (Fig 4.13).

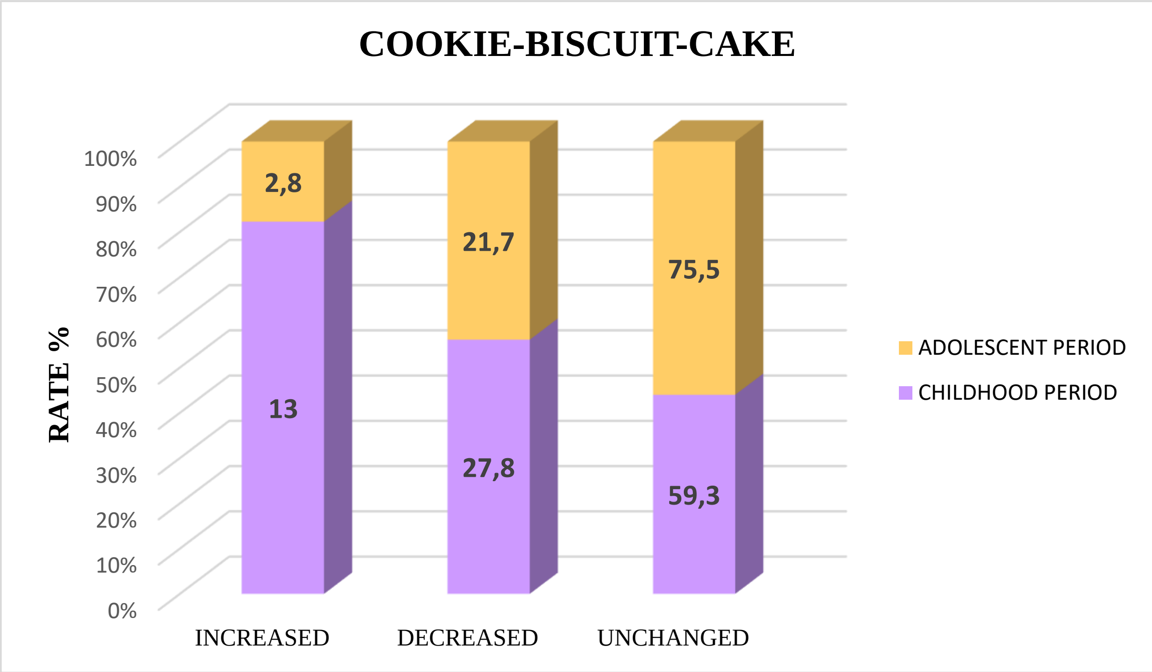


Figure 4.13: *Distribution of pandemic period cookie-biscuit-cake consumption compared to pre-pandemic in the developmental periods*

Table 13: Comparison of Fat, Sugar and Sweet Consumption during the Pandemic Compared to Before the Pandemic in the Developmental Period

		Developmental period		^{b}p
		Childhood period (n=54)	Adolescence period (n=106)	
Olive	**Increased**	6 (11,1)	7 (6,6)	***0,061***
	Decreased	15 (27,8)	16 (15,1)	
	Not changed	33 (61,1)	83 (78,3)	
Oliveoil	**Increased**	3 (5,6)	4 (3,8)	***0,357***
	Decreased	8 (14,8)	9 (8,5)	
	Not changed	43 (79,6)	93 (87,7)	
Sunflower-corn oil	**Increased**	5 (9,3)	10 (9,4)	***0,534***
	Decreased	9 (16,7)	11 (10,4)	
	Not changed	40 (74,1)	85 (80,2)	
Butter	**Increased**	6 (11,1)	9 (8,5)	***0,060***
	Decreased	14 (25,9)	13 (12,3)	
	Not changed	34 (63,0)	84 (79,2)	
Margarine	**Increased**	3 (5,6)	1 (0,9)	***0,183***
	Decreased	6 (11,1)	17 (16,0)	
	Not changed	45 (83,3)	88 (83)	
Sugar	**Increased**	3 (5,6)	6 (5,7)	***0,461***
	Decreased	9 (16,7)	27 (25,5)	
	Not changed	42 (77,8)	73 (68,9)	
Chocolate	**Increased**	3 (5,6)	6 (5,7)	***0,849***
	Decreased	16 (29,6)	37 (34,9)	
	Not changed	35 (64,8)	63 (59,4)	
Pastry	**Increased**	2 (3,7)	7 (6,6)	***0,545***
	Decreased	17 (31,5)	26 (24,5)	
	Not changed	35 (64,8)	73 (68,9)	
Milky desserts	**Increased**	7 (13,0)	5 (4,7)	***0,160***
	Decreased	8 (14,8)	22 (20,8)	
	Not changed	39 (72,2)	79 (74,5)	

[b]Fisher Freeman Halton Test

In the developmental periods, the consumption of olive, olive oil, sunflower-corn oil, butter, margarine, sugar, chocolate, pastry and milky desserts of the students during the pandemic compared to the pre-pandemic period did not show a statistically significant difference (p>0.05) (Table 13).

Table 14: Comparison of Pandemic Period Beverage Consumption Compared to Pre-Pandemic in the Developmental Period

		Developmental period		***[b]p***
		Childhood period (n=54)	**Adolescence period (n=106)**	
Water	**Increased**	0 (0,0)	0 (0,0)	***0,337***
	Decreased	1 (1,9)	0 (0,0)	
	Not changed	53 (98,1)	106 (100,0)	
Instant fruit juices	**Increased**	6 (11,1)	15 (14,2)	***0,092***
	Decreased	12 (22,2)	10 (9,4)	
	Not changed	36 (66,7)	81 (76,4)	
Soft drinks	**Increased**	6 (11,1)	6 (5,7)	***0,444***
	Decreased	12 (22,2)	27 (25,5)	
	Not changed	36 (66,7)	73 (68,9)	
Tea	**Increased**	1 (1,9)	18 (17,0)	***0,010****
	Decreased	8 (14,8)	12 (11,3)	
	Not changed	45 (83,3)	76 (71,7)	
Coffee	**Increased**	3 (5,6)	20 (18,9)	***0,002*****
	Decreased	4 (7,4)	23 (21,7)	
	Not changed	47 (87,0)	63 (59,4)	
Mineral water	**Increased**	5 (9,3)	14 (13,2)	***0,716***
	Decreased	10 (18,5)	22 (20,8)	
	Not changed	39 (72,2)	70 (66,0)	

[b]Fisher Freeman Halton Test *$**p<0,01$* *$*p<0,05$*

In the developmental periods, the consumption of water, instant fruit juices and soft drinks during the pandemic did not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$) (Table 14).

The rate of increase in tea consumption of students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescence ($p=0.010$; $p<0.05$).

The rate of increase in coffee consumption of the students in the childhood during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescence. The rate of decrease in coffee consumption of the students in the childhood during the pandemic compared to the pre-pandemic period was determined statistically significantly lower than those are in the adolescence. The rate of unchanged coffee consumption of the students in the childhood period during the pandemic compared to the pre-pandemic period was determined statistically significantly higher than those are in the adolescence ($p=0.002$; $p<0.01$) (Fig 4.14).

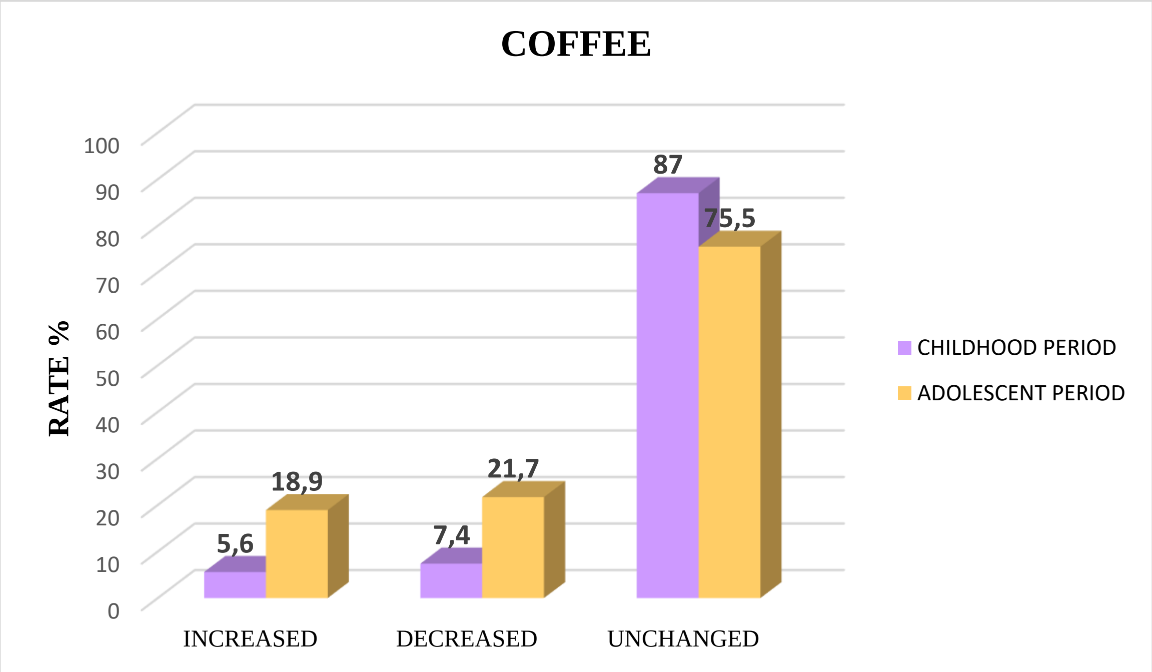


Figure 4.14: *Distribution of pandemic period coffee consumption compared to pre-pandemic in the developmental periods*

In the developmental periods, the mineral water consumption of the students during the pandemic does not show a statistically significant difference compared to the pre-pandemic period ($p>0.05$).

Table 15: Comparison of Where They Have Breakfast in Face-to-Face and Online Education

		Where do you have breakfast in online education?					p
		At home	At school (dining hall)	At school (from home)	Order from outside	Other	
Where do you have breakfast in face-to-face education?	At home	97 (62,6)	0 (0,0)	1 (100,0)	0 (0,0)	2 (66,7)	***b*0,490**
	At school (dining hall)	39 (25,2)	1 (100,0)	0 (0,0)	0 (0,0)	0 (0,0)	
	At school (from home)	4 (2,6)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	
	Order from outside	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	
	Other	15 (9,7)	0 (0,0)	0 (0,0)	0 (0,0)	1 (33,3)	

bFisher Freeman Halton Test

It does not show a statistically significant difference where the students participating in the study had breakfast in face-to-face and online education (p>0.05).

Table 16: Comparison of Where They Have Lunch in Face-to-Face and Online Education

		Where do you have lunch in online education?					p
		At home	At school (dining hall)	At school (from home)	Order from outside	Other	
Where do you have lunch in online education?	At home	8 (5,5)	0 (0,0)	0 (0,0)	1 (33,3)	0 (0,0)	***b*0,076**
	At school (dining hall)	127 (87,0)	4 (100)	0 (0,0)	1 (33,3)	6 (85,7)	
	At school (from home)	10 (6,8)	0 (0,0)	0 (0,0)	0 (0,0)	1 (14,3)	
	Order from outside	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0)	
	Other	1 (0,7)	0 (0,0)	0 (0,0)	1 (33,3)	0 (0,0)	

bFisher Freeman Halton Test

It does not show a statistically significant difference where the students participating in the study had lunch in face-to-face and online education (p>0,05).

5. DISCUSSION

This research was conducted to evaluate the nutritional habits and food consumption frequencies of childhood and adolescent students studying at Istanbul Private Ataşehir Bilgi College during their face-to-face and online education during the COVID-19 pandemic period. In the research, a questionnaire consisting of 3 main parts was applied to the students. The questionnaire consists of the sociodemographic form in which personal information in the first part, the general information form in which the nutritional habits of the students are evaluated in the second part, and the FFQ in which each of the 46 nutrients under 6 main topics is examined both before and during the pandemic period. The responses to the questionnaires used in our study were also supported by reminding the students of the menus prepared by me in the dining hall, where the students received collective nutrition service in the aforementioned educational institution before the pandemic.

The ages of the students participating in the study ranges from 5 to 18 years. 33.75% (n=54) of the students are in the childhood period of 5-11 years, and 66.25% (n=106) of them are in the adolescent developmental period. While 38.88% (n=21) of the 5-11 years old childhood students are girls and 61.12% (n=33) are boys, 36.79% (n=39) of the students in the adolescent developmental period are girls and 63.21% (n=67) are boys. The height of the students varies between 113 and 197 cm; their weight is between 18 and 114.1 kg. It has been determined that the BMI measurement of the students is between 12.5 and 37.9.

The number of meals that students make during the day varies between 1 and 5, and they have 3 meals a day with an average of 48.13%. The reasons for skipping meals by the students did not make were determined that ‘they don’t want’. While the meal that childhood and adolescence students skip the least is dinner (86.3%), the meal they skip the most is mid-morning (63.1%). Lunch at the rate of 83.8% and breakfast at 69.4% are not skipped; night meal is frequently skipped at the rate of 51.9%. In the study that Dilek Ersü et al. conducted parallel to our study, it was concluded that half of the adolescents (50.4%) consumed 3 meals a day, while 86.3% consumed snacks 1-2 times a day during the pandemic period. Again, in the same study, it was emphasized that 55% of the participants had breakfast every morning, 8.4% did not have breakfast at all, and the breakfast (45%) was the most skipped meal (105). In the studies conducted by Cansev Yavuz and Başar Özer with 933 adolescents and by Mehmet Akman et al. on 357 adolescents, it was seen that most of the participants consumed main and snack meals similar to the results of this study, the contents of the foods consumed in the snacks and the consumption of fast food were similar. In addition, it was emphasized in these studies that adolescents had risky nutritional behaviors and that they did not have sufficient knowledge about nutrition (105,106).

It was determined that 62.5% (n=100) of the students had their breakfast at home in face-to-face education, and 25% (n=40) of them had it in the dining hall at school. The rate of having breakfast at home increased to 96.9% (n=155) during the pandemic period. The rate of students consuming their lunch at home during the pandemic is 91,3% (n=146) while the rate of students consuming it at the dining hall at school is 86,3% (n=138) during the pre-pandemic period. The rate of consumption of dinner at home has increased during the pandemic period. An increase in the rate of eating at home was observed when the literature reviews investigating pre-pandemic and pandemic period nutritional behaviors were compared. In a study conducted by Cemre İnan in a private education institution, it was determined that even if the income status of individuals is better during the pandemic period, food consumption at home is more preferred and the income status does not affect this situation (107). In another study similar to the study, it was observed that the eating out habits of individuals decreased with the pandemic due to hygienic conditions (108). In a study conducted with 330 parents with children aged 4-7 years in 3 different cities from 3 different countries, it was found that during the pandemic, parents generally paid attention to providing healthy meals to their children at home, they cooked home cooked meals every day, and 63% of their children did not gain weight (109).

Considering the frequency of food consumption in our study, it is observed that the consumption of milk, ayran/yogurt and cheese increased in general during the pandemic compared to the pre-pandemic period (Table 5). In a study conducted by Allabadi et al. on 127 adolescent students, it was observed that the milk consumption of the participants increased (110). However, as seen in Figure 4.8, when the difference in developmental stages is considered, the decrease in the consumption of yogurt/ayran in childhood students (33.3%) is much higher than the decrease in the consumption of adolescents (11.3%). There is no significant change in yoghurt/ayran consumption of adolescent students compared to childhood students (80.2%; 57.3%).

In our study, it was determined that the consumption rates of white meat and fish decreased in childhood students during the pandemic period compared to the adolescent students (Table 10). However, as seen in Figure 4.9, when the difference in two different developmental periods is examined, no significant change was found in fish consumption of adolescent students compared to childhood students (79.2%; 64.8%). The consumption of other red meat, legumes and oilseeds, which we included in the protein group, generally increased during the pandemic period (Table 5). In parallel with our findings, it was emphasized that fish consumption decreased by 36.5% in a study examining the nutritional habits of children in social isolation during the COVID-19 period (111).

Considering the consumption of green leafy vegetables, other vegetables, potatoes, citrus fruits and other fruits in general increased during the pandemic period, but this increase did not show a statistically significant difference (Table 6, Table 11). However, the rate of decrease in dry fruit consumption in childhood students during the pandemic period (24.1%) compared to the pre-pandemic period was determined significantly higher than the decrease rate in adolescence (5.7%) (Table 11). While the rate of no change in dry fruit consumption is 70.4% in childhood, this rate reaches 90.6% in adolescents (Figure 4.10). In a study, it was stated that the consumption of vegetables and fruits increased during home quarantine of adolescents (110). In a study conducted in a private education institution in Istanbul, it was emphasized that the consumption of some healthy food groups such as vegetables increased (107). In an international study conducted with 820 adolescents between the ages of 10-19, covering 5 countries, it was determined that the consumption of vegetables and fruits increased during the pandemic (112).

When the bread and grain consumption frequencies are observed, the consumption of white bread, wholemeal-whole grain-rye bread, pasta-noodle-rice does not show significantly difference (Table 7). However, when the consumption of cracked wheat rice is observed, the rate of decrease in the consumption of it in childhood students (22.2%) is much higher than the rate in adolescence (0.9%), even though there is a general increase in the consumption frequency of once in 15 days and once a month (Figure 4.12). Likewise, the rate of decrease in white bread consumption in childhood students was 27.8%, while this rate was 5.7% in adolescents (Figure 4.11). Again, the consumption of pie-pastry and cookies-biscuit-cakes, which we evaluated in this category, increases during the pandemic period compared to the period before the pandemic (Table 7). The rate of increase in cookie-biscuit-cake consumption during the pandemic period was determined much higher in childhood (13%) than in adolescence (2.8%) (Figure 4.13). As can be seen in Figure 4.13, when the difference in two different developmental periods is examined, no significant change was found in the consumption of cookies-biscuits-cakes in the adolescent period compared to the students in the childhood period (75.5%; 59.3%). In a study conducted by Cemre İnan with 105 adolescents between the ages of 14-19, it was stated that there was an increase in the consumption of fast food, pastries, sweets and junk food during the pandemic process (107). In support of our findings, it was emphasized in the review by Gonzalez-Monroy et al. that the pandemic gave individuals unhealthy eating habits and that the quarantine process caused an increase in the consumption of processed food and pastries in children and adolescents. (113).

In the section where we review the frequency of consumption of oil, sugar and desserts, an increase is observed in the consumption of olive, olive oil, margarine and butter in general (Table 8). The increase in these foods can be associated with the increase in the rate of having breakfast at home. In addition, the consumption of sugar, chocolate, pastries and milky desserts in this group increases significantly during the pandemic period compared to the pre-pandemic period (Table 8). In a study conducted with 131 adolescents between the ages of 10-19 in Istanbul, one third of the participants increased their sweet consumption and preference of carbohydrate-rich foods such as cake-biscuit and chocolate for snacks (102). In another study on children, which looked at the effects of social isolation on eating habits, it was shown that children consumed more various salty and sweet snacks, sweet and pastry products compared to the pre-pandemic period (111). Adequate nutrition and strengthening the immune system are very important in order to provide effective protection against infectious diseases such as COVID-19 and to heal quickly. In addition, it was emphasized in the studies that social isolation and quarantine could change the relationship with food (114). Stress is likely to increase overeating, mostly sugary food consumption. Consuming carbohydrate foods, especially in stressful situations, helps to reduce stress by increasing serotonin release (103, 104). In support of these information, in a study evaluating the eating habits of individuals before and after Covid-19, it was shown that there was a significant difference between the participants in terms of the negative effects of the pandemic on the level of anxiety and eating habits; as a result of the study, it was found that staying at home/isolation in 58% of the adolescents and stress and anxiety caused by the pandemic increased their desire to eat in 48.1% (115).

Considering the frequency of beverage consumption of children and adolescents, there was no significant change in water and instant fruit juice consumption during the pandemic period compared to the pre-pandemic period. On the contrary, the students' consumption of soft drinks during the pandemic period increased compared to the pre-pandemic period (Table 9). Tea and coffee consumption rates of adolescent students during the pandemic period (17%; 18.9%) were determined higher than those of pediatric students (Table 14). The consumption of foods and beverages prepared with non-energy sweeteners and sugar-sweetened beverages is high in children and adolescents, and this is associated with increased body weight (106,116,117). Caffeine is a widely used psychoactive substance in beverages, and although it may cause anxiety in children, the frequency of consumption of beverages containing caffeine increases in children and adolescents (118,119). In a study conducted by Dilek Ersü et al. with a total of 131 children and adolescents, it was emphasized that the consumption of tea, coffee, carbonated and sugary drinks increased in 18.3% of the participants during the pandemic (102). Again, in the same study, it was stated that some of the adolescents met their fluid needs with soft drinks, tea and coffee instead of water, and the increase in the consumption of these beverages may be related to the increase in the time spent at home due to the pandemic.

Although it was observed that there were changes in nutritional habits during COVID-19 as a result of our study and other studies mentioned above, studies evaluating the nutritional habits of children and adolescents during and before the pandemic period are very limited both in Turkey and in the world. In order to understand the effects of the COVID-19 pandemic on the nutritional preferences of children and adolescents, studies with a larger sample number are needed.

6. CONCLUSION

Children and adolescents have been greatly affected by the pandemic, both psychologically and physically, due to their limited social life, staying away from school and outdoor activities due to COVID-19. In fact, some of them were exposed to stress due to increased anxiety disorder caused by pandemic restrictions, family negativities and economic difficulties, and increased anxiety, changes in their diet and school life directly affected their health.

The increase in the time spent in front of the screen and the time spent using technology, together with the social isolation and education taking place in the online environment, not only reduces the physical activity levels in children, but also affects the sleep quality and dietary habits negatively.

According to our results, the consumption of unhealthy and high-calorie foods such as fast-food, fat, dessert, pastry, cake-biscuit-cookies, chocolate and soft drinks by children and adolescents has increased during the pandemic period. Although the consumption of vegetables and fruits and the rate of eating home-cooked food have increased, there has not been a positive change in nutrition and health patterns as the above-mentioned unhealthy food consumption of children and adolescents has increased.

Starting from the pre-school period until the adolescence period, nutritional habits are established and these habits gain even more importance in the adolescence period, when the growth peaks, it brings adequate and balanced nutrition into the forefront. In addition, since the immune system is associated with infection and nutrition, adequate and balanced nutrition to support immunity is also required to prevent or reduce the effects of Sars-Cov-2, which causes infectious disease and has no definite treatment. In this study, it was observed that the COVID-19 pandemic negatively affected the nutritional habits and preferences of childhood and adolescent students, which are especially important stages of the developmental period. However, the studies with a larger sample size are needed.

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