GÜSBD 2023; 12(4): 1553 - 1561 **Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi** **Araştırma Makalesi**
GUJHS 2023; 12(4): 1553 - 1561 Gümüşhane University Journal of Health Sciences Original Article

Identifying Changes in Nutrition and Physical Activity in Adults During the COVID-19 Pandemic

COVID-19 Salgını Sırasında Yetişkinlerde Beslenme ve Fiziksel Aktivitedeki Değişikliklerin Belirlenmesi

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ABSTRACT

This study aimed to determine changes in nutrition and physical activity in adults during the COVID-19 pandemic. The population of this descriptive-cross-sectional study consists of adults between the ages of 18-64. The data was collected online using the "Personal Information Form" and "Nutrition and Physical Activity Change Survey" between February and April 2021, after receiving the approval of the Ministry of Health and the ethics committee. Data were evaluated by number, percentage and chi-square test. According to the results, 78.1% of the participants were women, 24% were married and 10.7% had a chronic disease. During the COVID-19 epidemic, 50.2% had a decrease in physical activity time, 70.5% had a decrease in sedentary time, 44.1% had an increase in body weight, and 43.7% had a decrease in junk food, snack and appetizer consumption. There was an increase. Participants stated that they did not engage in physical activity for various reasons such as lack of a suitable environment for sports, lack of time, and curfew. Obesity represents a critical global public health problem that continues to increase. The COVID-19 pandemic has significantly affected individuals' daily lifestyles, leading to reduced physical activity opportunities and weight changes for many. To minimize the long-term impact of the COVID-19 pandemic on non-communicable chronic diseases, it is crucial to prioritize efforts to inform and counsel adults on adopting healthy nutrition and physical activity practices.

Keywords: Adult, COVID-19, Nutrition, Obesity, Physical Activity

ÖZ

Bu çalışma, COVID-19 salgını sırasında yetişkinlerde beslenme ve fiziksel aktivitede meydana gelen değişiklikleri belirlemeyi amaçlamıştır. Tanımlayıcı-kesitsel nitelikteki bu çalışmanın evrenini 18-64 yaş arası yetişkinler oluşturmuştur. Veriler, Sağlık Bakanlığı ve etik kurul onayı alındıktan sonra Şubat-Nisan 2021 tarihleri arasında "Kişisel Bilgi Formu" ve "Beslenme ve Fiziksel Aktivite Değişikliği Anketi" kullanılarak çevrimiçi olarak toplanmıştır. Veriler sayı, yüzde ve ki-kare testi ile değerlendirilmiştir. Sonuçlara göre katılımcıların %78,1'i kadın, %24'ü evli ve %10,7'sinin kronik hastalığı vardı. COVID-19 salgını sırasında %50,2'sinin fiziksel aktivite süresinde azalma, %70,5'inde hareketsiz kalma süresinde azalma, %44,1'inde vücut ağırlığı artışı ve %43,7'sinde abur cubur, atıştırmalık ve meze tüketiminde artış görülmüştür. Katılımcılar, spor yapmak için uygun ortamın olmaması, yeterli zamanın olmaması, sokağa çıkma yasağı gibi çeşitli nedenlerden dolayı fiziksel aktivite yapmadıklarını ifade etmişlerdir. Obezite, artmaya devam eden kritik bir küresel halk sağlığı sorununu temsil etmektedir. COVID-19 salgını, bireylerin günlük yaşam tarzını önemli ölçüde etkileyerek, birçok kişinin fiziksel aktivite fırsatlarının azalmasına ve kilo değişimlerine yol açtı. COVID-19 salgınının bulaşıcı olmayan kronik hastalıklar üzerindeki uzun vadeli etkisini en aza indirmek için yetişkinleri sağlıklı beslenme ve fiziksel aktivite uygulamalarını benimseme konusunda bilgilendirme ve danışmanlık çabalarına öncelik vermek çok önemlidir.

Anahtar Kelimeler: Beslenme, COVID-19, Fiziksel Aktivite, Obezite, Yetişkin

Araştırmanın yapılabilmesi için Artvin Çoruh Üniversitesi Etik Kurulu'ndan onay (28.01.2021/ E-18457941-050. 01. 04-2433) alınmıştır. 3rd Internatıonal Congress of Multıdıscıplınary Studıes In Medıcal 17 Ağustos 2021 tarihinde özet sözlü bildiri şeklinde sunulmuştur.

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Geliş Tarihi / Received: 26.09.2023
Kabul Tarihi/Accepted: 24.12.2023

INTRODUCTION

The outbreak of the novel coronavirus in December 2019, originating from China, was officially recognized as a 'pandemic' by the World Health Organization (WHO) after its rapid spread across multiple continents and countries.[1] In response to the pandemic, governments implemented various measures, including closures, distance education, flexible working hours, curfews, travel restrictions, and the closure of fitness centers, aimed at controlling the spread of the virus and protecting public health.[2] While the focus of measures and planning during this process was primarily on infectious diseases, non-communicable chronic conditions such as obesity, diabetes, and hypertension received less attention.[3] The implementation of restrictive measures resulted in various factors contributing to weight gain and the development of obesity, including increased sedentary behaviors, reduced physical activity, changes in sports habits, increased screen time, alterations in dietary patterns, pandemic-related stress, feelings of loneliness, and fear.[4,5]

Obesity is a significant public health issue that is increasing globally and varies in prevalence across different regions.[6] Worldwide, 13% of individuals aged 18 and above (2.7 billion people) and 32% of individuals aged 20 and above in Turkey are obese.[2] Obesity is strongly associated with morbidity and mortality, particularly cardiovascular diseases, diabetes, hypertension, and chronic lung diseases.[4] Risk factors for obesity include increased energy intake, reduced energy expenditure, physical inactivity, a sedentary lifestyle, unhealthy food consumption (processed and frozen foods, etc.) sugary drinks, alcohol, irregular and poor-quality sleep, and mental health issues.[3] Obesity can be effectively controlled and prevented through balanced and regular nutrition, portion control, avoidance of sugary and alcoholic beverages, regular physical activity, sufficient sleep, and lifestyle changes.[7]

Globally, measures implemented to control the COVID-19 pandemic and reduce transmission resulted in significant changes in daily life, such as reduced physical activity, increased sedentary behaviors, and alterations in eating habits. The European Association for the Study of Obesity (EASO) indicated that the pandemic poses a risk factor for obesity and is expected to exacerbate the current situation for individuals with obesity.[8] Elmacıoğlu et al. (2020) found that uncontrolled eating and emotional eating increased during the pandemic, leading to a 35% increase in body weight among individuals.[2] In Lithuania, Kriaucioniene et al. (2020) reported that 49.4% of individuals consumed more food, physical activity decreased by 60.6%, and 31.5% of participants experienced weight gain compared to before the pandemic.[7] Reyes-Olavarría et al. (2020) observed that 38.1% of women and 25.6% of men experienced weight gain, while 58.7% of women and 51.2% of men reported a decrease in physical activity during the COVID-19 pandemic in Chile.[9] Similarly, Cheval et al. (2020) found a reduction in physical activity and an increase in sedentary behaviors in France and Switzerland during the pandemic.[10] Pellegni et al. (2020) reported weight gain and changes in eating habits among individuals during the lockdown period in Italy, with boredom/loneliness, reduced exercise, increased snack consumption, and altered eating behaviors associated with weight gain.[5]

Obesity has detrimental effects on individuals and society, contributing to increased morbidity and mortality rates and representing a significant global public health concern.[2,4,6,8] With the understanding that the pandemic had a profound impact on individuals worldwide, resulting in substantial alterations in daily routines, physical activity levels, and eating habits, this research aims to investigate the changes in nutrition and physical activity among

adults during the COVID-19 pandemic and contribute to the existing literature with valuable insights.

MATERIALS AND METHODS

Type of Research

The research is descriptive and cross-sectional.

Population and Sample of the Study

The population of the study consists of adults aged 18-64 residing in Turkey. Based on the literature, the recommended sample size calculation suggests selecting 1% of the population by maintaining the ratio n/N=1%, and using a fixed sampling rate.[11] Based on this calculation, with a predetermined sampling error of 0.05, the sample size was determined to be 1067 individuals out of a population of 100 million.[11] Furthermore, relevant literature suggests that having a minimum of 10 participants per predictor variable is considered appropriate. Higher sample representativeness is achieved with 30 participants per variable if feasible.[12] Thus, considering 34 predictor variables and accounting for the possibility of data loss, the sample size calculation was determined to be [30x34 (number of variables) + 50 (possibility of data loss)] 1190.[13] During the research, three incomplete responses were excluded, resulting in a final sample size of 1210 individuals. Participants were reached by snowball sampling method.

Data Collection Tools

The research data was collected using the "Personal Information Form" and the "Nutrition and Physical Activity Change Questionnaire," developed by the researchers based on a review of relevant literature.[4,5,7]

The Personal Information Form

It consists of 22 questions about demographic information like age, gender, marital status, regular exercise habits, weight changes during the pandemic period, and other relevant details.

The Nutrition and Physical Activity Change Questionnaire

It includes 16 questions that assess changes in food consumption, portion sizes, consumption of sugary foods, snack intake, and other related factors.

Data Collection

To ensure safety and compliance with pandemic-related measures, data were collected online between February 1 and April 1, 2021, after receiving approval from the Ministry of Health and the ethics committee. The questionnaires were shared through Facebook, Instagram, etc. as *Google Forms*, and participation was voluntary. It took approximately 5-10 minutes to fill out the questionnaires.

Inclusion and Exclusion Criteria

The inclusion criteria were living in Turkey, proficiency in Turkish, voluntary participation, access to the Internet, and being between the ages of 18 and 64. Those not meeting these criteria were excluded from participation.

Dependent and Independent Variables and Research Questions

The independent variables of the study are the socio-demographic characteristics of the participants. The dependent variables of the study are nutrition, physical activity, and the weight changes of the participants.

Data Evaluation

The study data were analyzed using the Statistical Package for Social Sciences (SPSS) 24.0 package program. Numbers, percentages, and chi-square ($\chi 2$) analysis were used in the interpretation of the research data. Body Mass Index (BMI) was calculated using the criteria set by WHO (2007) [BMI=Weight (kg)/Height (m^2)] [Underweight (BKI<18,5), Normal weight (18,5<BKI<24,9), Overweight (25,0<BKI<29,9), Obese (30,0<BKI)].[30]

All analysis results were evaluated at a 95% confidence level, and significance levels were considered $p<0.05$.

Ethical Aspect

Before data collection, research permission was obtained from the Ministry of Health, and ethics committee permission (E-18457941-050.01.04-2433) was obtained from Artvin Çoruh University. During the research, participants were informed about the study and its content, and those who volunteered were recruited for the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Limitations

Despite its valuable contributions to the existing literature, the study has certain limitations that should be acknowledged. Firstly, it is important to note that the research was conducted online, relying solely on self-reported data provided by individuals. Secondly, it exclusively focused on adult participants, without including children or elderly individuals. Therefore, the generalizability of the results is restricted to the adult population within the age range of 18 to 64 who took part in the study.

RESULTS AND DISCUSSION

Table 1 presents the socio-demographic and descriptive characteristics of the participants. 78.1% of the participants were female, 24% were married, 54% lived in the city center, 61.9% had a normal BMI, and 10.7% had chronic diseases (Table 1).

Table 1. Socio-Demographic and Descriptive Characteristics of the Participants (n: 1210)

Characteristics	n	%
Gender		
Female	945	78.1
Male	265	21.9
Marital status		
Single	920	76.0
Married	290	24.0
BMI		
Normal (18.5≤BMI≤24.9)	749	61.9
Slightly overweight(25.0≤BMI≤29.9)	246	20.3
Obese (BMI≥30.0)	127	10.5
Place of residence		
City	653	54.0
Province	375	31.0
Village	182	15.0
Type of house		
Detached house	416	34.4
Flat	794	65.6
Region of residence		
Aegean	32	2.6
Mediterranean	145	12.0
Marmara	133	11.0
Black Sea	264	21.8
Central Anatolia	257	21.2
Eastern Anatolia	152	12.6
Southeastern Anatolia	227	18.8
Presence of chronic disease		
Yes	129	10.7
No	1081	89.3
Presence of barriers to sports		
Yes	36	3.0
No	1174	97.0
Doing regular exercise		
Yes	268	22.1
No	942	77.9

n: Number, %: Percentage, BMI: Body Mass Index

The change in participants' physical activity and nutritional habits during the COVID-19 outbreak is presented in Table 2. Results show that 50.2% of participants experienced a decrease in physical activity time, while 70.5% reported an increase in sedentary behavior. A remarkable 5.3% of respondents sought professional sports support. 35.3% say they do physical activity to be healthy, 28.9% avoid physical activity because there is no suitable environment, 27.5% say they do not have the desire or energy to do physical activity, and 23.1% say they will do sports. He said he didn't have time. In the change in eating habits during the pandemic period, consumption of food, snacks and appetizers increased by 44.1% of body weight, 32% of the number of meals, 35.6% of portion size and 43.7% of junk food consumption (Table 2) .

Table 2. Participants' Eating Habits, Physical Activity Status and Changes They Experienced During the Pandemic Period (n: 1210)

Features	n	%
Duration of physical activity		
Increased	144	11.9
Unchanged	458	37.9
Decreased	608	50.2
Table 2 (Continued)		
Duration of sedentary behavior		
Increased	853	70.5
Unchanged	221	18.3
Decreased	136	11.2
Receiving Professional sports support		
Yes	64	5.3
No	1146	94.7

Table 2 (Continued)

Reasons for not doing physical activity		
Being healthy	427	35.3
Losing weight/maintaining current weight	372	30.7
Feeling good	351	29.0
Reducing tension	208	17.2
Improving concentration	71	5.9
Meeting new people	28	2.3
Reasons for not doing physical activity		
Lack of suitable environment	350	28.9
No desire or energy	333	27.5
No time	279	23.1
Curfew	239	19.8
Preference for reading books and watching TV	164	13.6
Work overload	159	13.1
Not wanting to do sports indoors	121	10.0
Financial constraints	120	9.9
Intention to do regular sports when the pandemic is over		
Yes	828	68.4
No	382	31.6
Receiving Professional nutrition support		
Yes	68	5.6
No	1142	94.4
Body weight		
Increased	534	44.1
Decreased	256	21.2
Unchanged	375	31.0
Doesn't now	45	3.7
Number of meals		
Increased	387	32.0
Unchanged	628	51.9
Decreased	195	16.1
Portion size		
Increased	431	35.6
Unchanged	588	48.6
Decreased	191	15.8
Unhealthy food consumption		
Increased	411	34.0
Unchanged	505	41.7
Decreased	294	24.3
Consumption of junk food, snacks and appetizers		
Increased	529	43.7
Unchanged	433	35.8
Decreased	248	20.5
Consumption of homemade bread, cakes, cookies etc.		
Increased	675	55.8
Unchanged	444	36.7
Decreased	91	7.5

n: Number, %: Percentage

The body weight changes of the participants according to BMI are given in Figure 1. During the pandemic, the increase in body weight in slightly overweight and obese individuals was higher than in underweight and normal-weight individuals; the decrease in body weight in underweight and normal-weight individuals was higher than in slightly overweight and obese individuals (Figure 1).

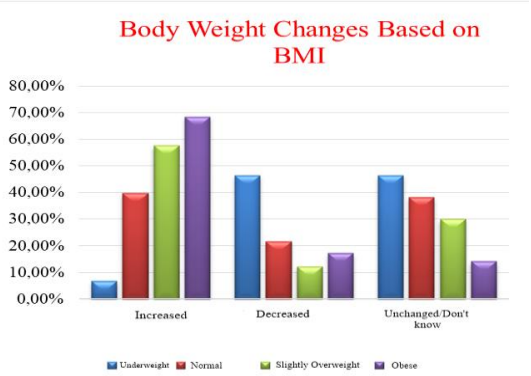

Figure 1. Body Weight Change of Participants Based on BMI

The weight change during the pandemic according to various characteristics of the participants is given in Table 3 as follows: weight gain is higher in adults whose physical activity time decreased ($p<0.001$), sedentary time increased ($p<0.001$), unhealthy food consumption increased ($p<0.001$), portion size increased ($p<0.001$), the number of meals increased ($p<0.001$) and junk food consumption increased ($p<0.001$) and the difference is statistically significant ($p<0.05$) (Table 3).

Table 3. Weight Change of Participants According to Some Characteristics During the Pandemic (n: 1210)

	Weight Change						
	Increased		Decreased		Unchanged/Don't know		
Characteristic	**n**	**%**	**n**	**%**	**n**	**%**	**Test value and p value**
Physical activity							
Increased	52	4.3	41	3.4	51	4.2	χ2: 112.476
Unchanged	137	11.3	87	7.2	234	19.3	p<0.001
Decreased	345	28.5	128	10.6	135	11.2	
Sedentary time							
Increased	441	36.4	180	14.9	232	19.2	χ2: 100.293
Unchanged	53	4.4	36	3.0	132	10.9	p<0.001
Decreased	40	3.3	40	3.3	56	4.6	
Unhealthy food consumptin							
Increased	226	18.7	76	6.3	109	9.0	χ2: 37.057
Unchanged	208	17.2	101	8.3	196	16.2	p<0.001
Decreased	100	8.3	79	6.5	115	9.5	
Portion size							
Increased	300	24.8	50	4.1	81	6.7	χ2: 376.421
Unchanged	197	33.5	88	7.3	303	25.0	p<0.001
Decreased	37	3.1	118	9.8	36	3.0	
Number of meals							
Increased	246	20.3	59	4.9	82	6.8	χ2: 181.850
Unchanged	224	18.5	106	8.8	298	24.6	p<0.001
Decreased	64	5.3	91	7.5	40	3.3	
Junk food consumption							
Increased	286	23.6	106	8.8	137	11.3	χ2: 46.478
Unchanged	167	13.8	86	7.1	180	14.9	p<0.001
Decreased	81	6.7	64	5.3	103	8.5	

n: Number, %: Percentage, χ2: chi-square test value

The COVID-19 pandemic caused profound transformations in various domains of life, encompassing daily life, education, and employment. In Turkey, several measures, such as curfew restrictions, the shift to online education, remote working arrangements, and the closure of fitness centers, were implemented to curb the pandemic and safeguard public health. Despite their significance in pandemic management, these measures gave rise to sedentary behavior and a reduction in physical activity, posing a risk of obesity.[2]

The analysis revealed a notable discrepancy between the decrease in physical activity and the sedentary time during the pandemic period, with individuals experiencing greater weight gain attributed to reduced physical activity (Table 3). Engaging in regular physical activity plays a pivotal role in preventing various diseases and promoting overall physical health and longevity. To this end, WHO recommends a minimum of 30 minutes of daily physical activity to mitigate the risks of certain health conditions.[14] Similar findings were reported by Malta et al. (2020) who observed a significant decline in physical activity and a simultaneous increase in sedentary behavior among Brazilian adults during the COVID-19 pandemic.[15] Moreover, Olawarria et al. (2020) noted that the reduction in physical activity time among Chilean adults aged 18 to 62 years during the pandemic correlated with weight gain. In a comprehensive meta-analysis study with 3 million individuals, Wahid et al. (2016) revealed that adhering to regular physical activity within the guidelines prescribed by the WHO resulted in lower incidences of cardiovascular diseases, mortality linked to these conditions, and type 2 diabetes.[9,16] Extensive research investigating the beneficial impact of physical activity on health underscores its capacity to boost the immune system, alleviate stress, depression, and anxiety, and

mitigate the risk of non-communicable chronic diseases.[17] The literature further reports a significant association between physical inactivity and a heightened risk of various health conditions. For instance, physical inactivity contributed to a 24% increase in coronary heart disease, a 16% increase in stroke, and a 42% increase in type 2 diabetes, based on a longitudinal study with 484.840 individuals.[18] Notably, an etiology of the factors underlying COVID-19-related fatalities revealed that diseases associated with physical inactivity ranked as the foremost cause.[19] This observation is believed to stem from the reduction in physical activity and an increase in sedentary behavior due to pandemic-related restrictions, the closure of fitness centers, the adoption of online education methods, and the transition to remote work.[20] Given this context, governments should develop tailored strategies that address the needs of vulnerable populations, thereby averting the potential long-term adverse effects of COVID-19.[15]

The analysis conducted in this study showed a significant correlation between "increased consumption of unhealthy food, junk food, and appetizers in general" and weight gain, with individuals who exhibited higher weight gain being associated with increased consumption of these unhealthy food items (Table 3). This trend can be attributed to the initial panic and uncertainty experienced by people during the onset of the pandemic, leading to a notable surge in the purchase of foods with extended shelf life.[7] Moreover, extended periods of staying at home and limited access to fresh fruits and vegetables further contributed to an upward trajectory in the consumption of foods rich in salt, sugar, and fat.[21] Recognizing the adverse impact of the COVID-19 pandemic on obesity, the European Association for the study of Obesity (EASO) underscored that the effects are particularly detrimental for individuals who are already obese.[8] Notably, increased consumption of unhealthy and junk food represents a significant risk factor for obesity as it is closely associated with an increase in body fat mass.[1] In light of this, it is of utmost importance to provide individuals with guidance and counseling on maintaining balanced and regular nutrition. Encouraging the consumption of fresh vegetables and fruits, while discouraging the intake of processed and prepared foods, and fostering awareness about the controlled consumption of foods high in sugar, fat, salt, and spices are all essential measures in combating obesity and promoting overall health. To address these concerns effectively, governments should play an active role in disseminating information on the significance of healthy nutrition through mass media platforms. Additionally, collaborative efforts with local authorities and non-governmental organizations may be required to implement targeted initiatives aimed at mitigating the adverse effects of the COVID-19 pandemic on nutrition and public health.[15,22,23]

In our study, a significant association was found between the "increase in the number of meals and portion amount" and weight gain, with individuals who experienced an increased number of meals and larger portion sizes showing greater weight gain (Table 3). Notably, the continuous coverage of COVID-19 news in both social media and mass media during the pandemic was linked to increased stress levels in individuals, which, in turn, was associated with an increase in food consumption.[24] A separate study conducted by Akyol and Çelik (2021) reported that the nutritional habits of paramedic students were adversely affected during the COVID-19 period, leading to an increase in the number of meals they consumed.[25] Another study by Kriaucion et al. (2020) demonstrated that 49.4% of individuals consumed more food during the pandemic and 62.1% prepared more food at home, indicating significant changes in individuals' eating habits during this period. It is postulated that the increased number of meals and portion sizes among individuals during this period may be related to emotional and uncontrolled eating behaviors arising from a desire for comfort and protection against COVID-19 or simply due to spending more time at home.[7,24,25] Considering these findings, providing

information and counseling to adults on balanced and regular nutrition, healthy food preparation, and the development of self-management skills is important. [6,26]

In this present study, it was observed that weight gain was notably higher in individuals classified as slightly overweight or obese than those categorized as underweight or normal (Figure 1). These findings are consistent with other studies conducted during the COVID-19 pandemic period in Italy and the United Kingdom, where Pellegni et al. (2020) and Flagana et al. (2020) respectively reported higher weight gain among obese individuals. The changes in lifestyles during the COVID-19 pandemic, brought about by measures and restrictions to prevent transmission and safeguard public health, are believed to have contributed to weight gain by reducing physical activity.[5,27] Consequently, it becomes imperative to implement measures that enable society to cope healthily during public health crises, particularly in the context of the COVID-19 pandemic, to mitigate the risk of secondary diseases. In this regard, promoting and supporting healthy nutrition and physical activity behaviors during the pandemic period plays a crucial role.[3,21,28]

Based on the research findings and existing literature[26,27,29], the study establishes "Health, Nutrition, and Physical Activity Recommendations" to protect and maintain public health and prevent obesity and obesity-related secondary diseases during the COVID-19 pandemic period, as well as in any future crises (Figure 2).

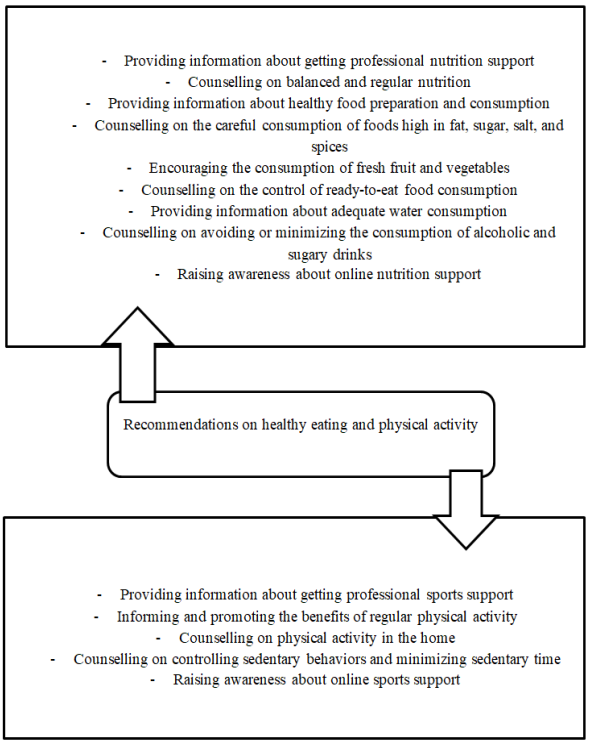

Figure 2. Healthy Nutrition and Physical Activity Recommendations for the Prevention of Obesity During the COVID-19 Pandemic

CONCLUSION AND RECOMMENDATIONS

The study investigating changes in the nutrition and physical activity habits of adults during the COVID-19 pandemic period showed that half of the adults experienced a decrease in physical activity time, the majority increased sedentary time, and approximately half of the adults gained weight. Furthermore, very few adults received professional sports and nutrition support during the pandemic period. The primary reasons cited by adults for not engaging in physical activity included the lack of a suitable environment for exercising, low motivation and energy to exercise, and adherence to curfew restrictions.

The data obtained from this study contribute significantly to the existing literature. To protect the health of adults and maintain weight control, it is recommended that the Ministry of Health General Directorate of Public Health take several proactive steps, including providing essential information and awareness campaigns to draw attention to the importance of the issue, utilizing public spots, organizing online physical activity programs, conducting screenings for obesity risk in primary health care institutions adhering to pandemic measures, and directing individuals at risk to receive support from dietitians and/or physical activity professionals. For future studies, it

is recommended to explore the impact of nutrition and physical activity education provided to adults on their adoption of healthy habits, changes in body weight, and overall well-being. Ultimately, the results of this study can serve as a guiding resource for researchers working on nutrition and physical activity-related studies in adults amid the ongoing pandemic period.

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