

Evaluation of the Effects of Adherence to the Mediterranean Diet in Adults on the Mental Well-Being During the COVID-19 Pandemic: A Pilot Study

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ABSTRACT

Aim: A healthy diet supports the body's energy and physiological needs with adequate nutrients. The Mediterranean diet (MD) exemplifies balanced nutrition and can have protective effects on health. This research aims to evaluate the impact of adhering to the MD on the mental health of adults during the COVID-19 pandemic.

Material and Methods: Data were collected through an online questionnaire including socio-demographic characteristics, the Mediterranean Diet Adequacy Scale (MEDAS), and the Warwick Edinburgh Mental Well-Being Scale (SWEMWBS). The questionnaire was shared via social media or email using a link. The study included 129 individuals (52 men, 77 women) who responded approximately one week after the questionnaire was shared.

Results: The mean age of individuals was 26.5 ± 7.37 . Most men (59.61%) had a normal weight, while most women (50.65%) were overweight or obese. The majority of individuals (58.14%) showed low adherence to the MD, with a mean MEDAS score of 7.0 ± 1.92 . The proportion of underweight or normal-weight individuals who consumed red meat (in men) and nuts (in women) was significantly higher compared to overweight or obese individuals. However, there was no statistically significant relationship between the MEDAS scores and mental well-being scores of individuals.

Conclusion: Adequate and balanced nutrition is crucial for physical and psychological health, particularly during the pandemic. This study revealed low adherence to the MD among individuals. Further research with a larger sample size is needed to investigate the relationship between the MD and mental health during the pandemic period.

Keywords: Mediterranean diet; mental health; COVID-19.

Yetişkinlerde Akdeniz Diyetine Uyumun COVID-19 Pandemisi Sürecinde Mental Sağlık Üzerindeki Etkilerinin Değerlendirilmesi: Bir Pilot Çalışma

ÖZ

Amaç: Sağlıklı bir diyet, genellikle vücudun enerji ve fizyolojik ihtiyaçlarını destekleyen, yeterli miktarda mikro ve makro besin ögesi içeren bir diyet olarak tanımlanır. Akdeniz Diyeti (AD), yeterli ve dengeli beslenmeyi teşvik eden bir beslenme modelidir ve sağlık üzerinde koruyucu etkileri olabilir. Bu araştırma, COVID-19 pandemisi sürecinde yetişkin bireylerin AD'ye uyumunun mental sağlık üzerindeki etkilerini değerlendirmek amacıyla yapılmıştır.

Gereç ve Yöntemler: Veriler, bireylerin sosyo-demografik özelliklerini sorgulayan ve Akdeniz Diyetine Uyum Ölçeği'ni (MEDAS) ve Kısa Warwick Edinburgh Mental İyi Oluş Ölçeği'ni (WEMİÖÖ-KF) içeren çevrimiçi bir anket formuyla toplanmıştır. Anket formu, bir link oluşturularak sosyal medya veya e-posta yoluyla paylaşılmıştır. Formun paylaşılmasından yaklaşık bir hafta sonra ulaşılan ilk 129 birey (52 erkek, 77 kadın), bu çalışmaya dahil edilmiştir.

Bulgular: Bireylerin ortalama yaşı $26,5 \pm 7,37$ 'dir. Erkeklerin çoğu (%59,61) zayıf veya normal ağırlıktayken kadınların çoğu (%50,65) fazla kilolu veya obezdir. Bireylerin çoğunun (%58,14) Akdeniz diyetine uyumu düşüktür ve ortalama MEDAS puanı $7,0 \pm 1,92$ 'dir. Erkeklerde kırmızı et tüketimi, kadınlarda kuruyemiş tüketimi ile ilgili sorulara olumlu cevap verenlerin sayısı, zayıf veya normal kilolu bireylerde fazla kilolu veya obez bireylere göre anlamlı olarak daha yüksek bulunmuştur. Bireylerin MEDAS puanları ile mental iyi oluş puanları arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır.

Sonuç: Yeterli ve dengeli beslenme, özellikle pandemi sürecinde hem fiziksel hem de psikolojik sağlık için çok önemlidir.

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Bu çalışmada bireylerin sağlıklı beslenme modeli olan AD'ye bağlılıklarının düşük olduğu belirlenmiştir. Pandemi döneminde Akdeniz diyeti ile ruh sağlığı arasındaki ilişkinin incelendiği daha geniş popülasyonlu çalışmaların yapılması faydalı olabilir.

Anahtar Kelimeler: Akdeniz diyeti; mental sağlık; COVID-19.

INTRODUCTION

A healthy diet usually refers to a diet that meets the physiological requirements of the body and contains sufficient amounts of energy and nutrients (1,2). Mediterranean Diet (MD) is a nutrition pattern in which fruits and vegetables, legumes, whole grains, and oilseeds are frequently consumed, seafood and poultry are consumed several times a week, and red meat is less consumed, the main fat component is olive oil and a small amount of wine is accompanied by meals (1,3). For this reason, it is thought that the MD can be a dietary model that reflects adequate and balanced nutrition. It is emphasized that consumption of all these foods together and in recommended amounts may have protective effects on health (4).

Mental health is recognized as an important component of general well-being and health. The factors that affect mental health are diverse and largely interrelated. These factors include hereditary and other biological factors, and social factors, including nutrition. Adequate and balanced nutrition is considered essential for good mental health and has been proposed as a very important component in the treatment and prevention of various cognitive and mental illnesses, such as depression, dementia, Alzheimer's disease and other cognitive disorders (4).

The Mediterranean diet is known to increase the quality of life of the individual. Thanks to the nutritional elements it contains and the physical and emotional well-being it provides, the Mediterranean diet has become a recommended diet for nutrition in mental illnesses (2). In one study, participants with high adherence to the MD were less likely to experience depression, anxiety, and psychological distress than participants with low adherence. Adherence to Mediterranean dietary patterns is inversely associated with depression, anxiety and psychological distress (5).

In addition to these, it is known that a healthy and balanced diet is a part of individual risk management during a pandemic (6). Many bioactive nutrient components, along with most macro and micronutrients, play a role as immunomodulators against viral infections (7). In particular, the MD can have a protective effect in these processes with its food and nutrient components. Studies on the ongoing COVID-19 pandemic report that there are changes in individuals' nutritional attitudes and a trend toward healthy diet (8,9). Especially with the pandemic, it is estimated that individuals eat healthier in order to strengthen their immune systems and protect against disease (7).

Based on this information and due to the limited number of studies in the literature on the relationship between mental well-being and adherence to the MD during the COVID-19 pandemic in our country and MD can have positive contributions to mental health, this study aims to

Statistical Analysis

contribute to this issue by examining the relationship between the Mediterranean Diet compliance status and mental status of adults.

MATERIAL AND METHODS

This pilot study had been via an online questionnaire between 10-17 November 2020 in Turkey. Before the study was started, ethical approval was obtained from Aydın Adnan Menderes University Faculty of Health Sciences Non-Invasive Ethics Committee (Approval no: 92340882-050.04.04).

The population of the research was adults in Turkey. Any sampling method was not used and those between the ages of 19-64 years voluntarily individuals in the research were included. Totally, 129 individuals (52 men, 40.31% and 77 women, 59.69%) participated in the research.

Data Collection

Data for the research was collected through a questionnaire created from Google Forms. Individuals were informed about the study and an online consent form was obtained. The questionnaire consists of 32 questions including socio-demographic characteristics and anthropometric measurements (bodyweight, height) of individuals, the Mediterranean Diet Adherence Scale (MEDAS), and Short Warwick Edinburgh Mental Well-Being Scale (SWEMWBS). In the research., based on the World Health Organization (WHO) BMI classification, those with a BMI of <25.00 kg/m² were considered underweight and normal bodyweight, and those with a BMI of ≥25.00 kg/m² and above were considered overweight and obese (10). Individuals were evaluated with this classification in terms of their socio-demographic characteristics and adherence to the MD.

The MEDAS consisting of 14 questions was developed by Schröder H et al. (10) for the quick estimation of adherence to the MD. The scale was adapted to Turkish by Pehlivanoglu Ozkan et al. (9) its validity and reliability were ensured by finding the Cronbach alpha coefficient of 0.829. The scale includes questions about the consumption of MD components (etc. olive oil, fruit and vegetable). Each question takes 0 or 1 point according to the amount of consumption and the total score is calculated. A total score ≥7 indicates an acceptable or medium level of adherence to the MD, while a total score ≥9 indicates high adherence to the MD (11,12). In this research, the MEDAS score of the individuals, below 7 points, was evaluated as low adherence to the MD, 7-8 points as moderate adherence to the MD, and 9 points and above as high adherence to the MD.

The SWEMWBS is a 5-point Likert type (1=Never 5=Always), 7-item scale consisting of positive expressions, whose validity and reliability in Turkish was made by Demirtas et al. The scale was tested in two different study groups and Cronbach's alpha coefficients were calculated as 0.84 and 0.86 (11). It has been developed to estimate the mental well-being of individuals. Seven items on the scale are associated with functionality rather than emotions. The scoring of the scale is between 7 and 35. Higher scores on the scale indicate higher positive mental well-being. In practice, participants are asked to consider their experiences in the last two weeks (13,14).

The research data were analyzed using IBM SPSS-26 statistical package program. Whether the data were normally distributed was determined with the Kolmogorov-Smirnov test. In the analysis of the data, numbers, percentages, arithmetic mean, and standard deviation were used. Pearson chi-square test and Fisher's exact test were used to find out whether there was a difference between the socio-demographic characteristics in terms of sex. The Mann-Whitney U test was used for the difference between the mean of the two groups. In the adherence to the Mediterranean Diet, differences between the groups were monitored by the chi-square test and Fisher's exact test. Spearman correlation was used for the relationship between MEDAS and SWEMWBS scores.

The significance level of the statistical tests was accepted as $p < 0.050$.

RESULTS

Table 1 reports the key demographics of the sampled population. A total of 129 individuals, including 52 men (40.31%) and 77 women (59.69%) were in the study. The mean age of individuals is 26.5 ± 7.37 years, and the mean BMI for women and men is 26.3 ± 3.49 kg/m² and 25.5 ± 4.73 kg/m², respectively. While the majority of men (59.61%) are underweight or normal body weight, the majority of women (50.65%) are overweight or obese. Educational status, marital status, and BMI classification of individuals did not differ significantly according to sex ($p > 0.050$).

Table 1. Socio-demographic characteristics of individuals by sex

Variables	Men (n=52)	Women (n=77)	Total (n=129)	p*
Age (year), Mean±SD	26.8±7.93	26.3±7.02	26.5±7.37	0.971
Bodyweight (kg), Mean±SD	79.4±15.68	70.8±11.21	74.3±13.80	<0.001*
Height (cm), Mean±SD	176.4±6.81	163.9±6.26	169.0±8.93	<0.001*
BMI (kg/m ²), Mean±SD	25.5±4.73	26.3±3.49	26.0±4.04	0.162
<u>Education Status</u>				0.936
Primary school	1 (1.92%)	1 (1.30%)	2 (1.55%)	
High school	3 (5.77%)	4 (5.20%)	7 (5.43%)	
Graduate	40 (76.93%)	59 (76.62%)	99 (76.74%)	
Postgraduate	8 (15.38%)	13 (16.88%)	21 (16.28%)	
<u>Marital status</u>				0.447
Married	13 (25.00%)	24 (31.17%)	37 (28.7%)	
Single	39 (75.00%)	53 (68.83%)	92 (71.3%)	
<u>Working status</u>				0.006*
Not working	-	9 (11.69%)	9 (6.97%)	
Student	29 (55.77%)	44 (57.14%)	11 (8.53%)	
Worker/Employee	6 (11.54%)	5 (6.49%)	73 (56.59%)	
Self-employment	8 (15.38%)	2 (2.60%)	10 (7.75%)	
Public officer	9 (17.31%)	16 (20.78%)	25 (19.38%)	
Retired	-	1 (1.30%)	1 (0.78%)	
<u>BMI classification</u>				0.173
Underweight and normal bodyweight	31 (59.61%)	38 (49.35%)	69 (53.49%)	
Overweight and obese	21 (40.39%)	39 (50.65%)	60 (46.51%)	

BMI: Body Mass Index, cm: centimeter, kg: kilogram, m: meter, SD: standard deviation.

*Pearson chi-square test, Fisher's exact test, and Mann-Whitney U test were performed to evaluate differences by sex.

The evaluation of individuals' adherence to the MD according to their BMIs is given in Table 2. While the mean MEDAS score of individuals with underweight or normal bodyweight was 7.1 ± 2.07 , the mean MEDAS score of individuals who were overweight or obese was 6.9 ± 1.74 ($p > 0.05$). It has been determined that the majority of individuals (58.14%) have low adherence to the MD and the mean MEDAS score was 7.0 ± 1.92 . In terms of BMI values, no difference was found between the scores of individuals' adherence to MD ($p > 0.050$). Positive answers to the question about red meat consumption were higher in underweight or normal bodyweight (87.10%) men than in overweight or obese (57.14%) men ($p = 0.012$). On the other hand, positive answers to the question about nuts consumption were

higher in underweight or normal weight (52.63%) women than in overweight or obese (17.95%) women ($p = 0.047$).

In addition, while there was no significant difference between the mean MEDAS scores of underweight/normal weight and overweight/obese women ($p = 0.358$), a significant difference was found in terms of adherence to the MD ($p = 0.021$).

The relationship between MEDAS and SWEMWBS scores was also examined with the Spearman correlation coefficient (Table 3). An identical relationship of 0.051% was found between MEDAS and SWEMWBS scores. It was determined that there was no statistical relationship between the two-scale scores ($p = 0.910$).

Table 2. Evaluation of individuals for adherence to the Mediterranean Diet according to their BMI

	BMI < 25 kg/m ²		BMI ≥ 25 kg/m ²		Total (n=129)	p ¹	p ²	p ³
	Men (n=31)	Women (n=38)	Men (n=21)	Women (n=39)				
Olive oil, ≥2 times/week	21 (67.74%)	34 (89.47%)	15 (71.43%)	28 (71.79%)	98 (75.97%)	0.777	0.050	0.286
Olive oil, ≥48 g/day	10 (32.26%)	16 (42.11%)	9 (42.86%)	16 (41.03%)	51 (39.53%)	0.436	0.923	0.644
Vegetables, ≥2 p/day	7 (22.58%)	13 (34.21%)	4 (19.05%)	19 (48.72%)	43 (33.33%)	0.760	0.197	0.261
Fruits, ≥3 p/day	6 (19.35%)	8 (21.05%)	7 (33.33%)	13 (33.33%)	34 (26.36%)	0.253	0.226	0.094
Red meat, <100 g/day	27 (87.10%)	32 (84.21%)	12 (57.14%)	28 (71.79%)	99 (76.74%)	0.014*	0.189	0.012*
Butter, <1 p/day	23 (74.19%)	33 (86.84%)	17 (80.95%)	27 (69.23%)	100 (77.52%)	0.570	0.062	0.288
Sweet beverage, <1 p/day	24 (77.42%)	33 (86.84%)	15 (71.43%)	32 (82.05%)	104 (80.62%)	0.624	0.562	0.540
Wine, ≥7 p/week	-	-	-	1 (2.56%)	1 (0.77%)	-	0.320	0.282
Legumes, ≥3 p/week	15 (48.39%)	13 (34.21%)	11 (52.38%)	20 (51.28%)	59 (45.74%)	0.777	0.130	0.207
Fish and seafood, ≥3 p/week	3 (9.68%)	4 (10.53%)	2 (9.52%)	2 (5.13%)	11 (8.53%)	0.985	0.377	0.480
Sweets or pastries <3 p/week	20 (64.52%)	28 (73.68%)	13 (61.90%)	27 (69.23%)	88 (68.22%)	0.848	0.665	0.724
Nuts, ≥3 p/week	10 (32.26%)	20 (52.63%)	9 (42.86%)	7 (17.95%)	46 (35.66%)	0.436	0.001*	0.047*
White meat over red	21 (67.74%)	20 (52.63%)	14 (66.67%)	25 (64.10%)	80 (62.02%)	0.935	0.307	0.515
Sofrito, ≥2 p/week	19 (61.29%)	28 (73.68%)	12 (57.14%)	26 (66.67%)	85 (65.89%)	0.765	0.501	0.568
MEDAS score, Mean±SD	6.6±2.03	7.4±2.07	6.7±2.11	6.9±1.52	7.0±1.92	0.977	0.358	0.568
	7.1±2.07		6.9±1.74					
Adherence to the MD						0.118	0.021*	0.466
Low	18 (58.06%)	20 (52.63%)	14 (66.67%)	23 (58.97%)	75 (58.14%)			
Medium	8 (25.81%)	4 (10.53%)	1 (4.76%)	11 (28.21%)	24 (18.60%)			
High	5 (16.13%)	14 (36.84%)	6 (28.57%)	5 (12.82%)	30 (23.26%)			

Positive answers to MEDAS questionnaire.

BMI: Body Mass Index, cm: centimeter, g: gram, kg: kilogram, m: meter, MD: Mediterranean Diet, MEDAS: Mediterranean Diet Adherence Scale, p: portion, sofrito: traditional sauce of tomatoes, garlic, onion, and olive oil.

p¹significance according to BMI value in men, p² significance according to BMI in women, p³ significance between BMI<25 kg/m² and BMI≥25kg/m².

*Mann-Whitney U test, Pearson chi-square test, and Fisher's exact test were performed to evaluate differences by BMI.

Table 3. Relationship between MEDAS and SWEMWBS scores

MEDAS score	SWEMWBS score	
	r	p
	0.051	0.910

MEDAS: Mediterranean Diet Adherence Scale, p: significance between MEDAS score and SWEMWBS score, r: correlation coefficient
SWEMWBS: Short Warwick Edinburgh Mental Well-Being Scale

DISCUSSION

A recently published review highlights the need for a healthy diet that can help boost immunity for protection from viral infections (15). It is also known that an adequate and balanced diet affects mental well-being and this increases resistance to diseases. It is estimated that individuals are consumed more healthy foods, especially to strengthen the immune system after quarantine, prevent diseases, and support mental health (16). This pilot study examined the relationship between adults' adherence to the MD and mental well-being during the pandemic.

Obesity is known as chronic low-grade inflammation (17). Therefore, obese individuals can be considered as the risk group for COVID-19. In this study, approximately half of the participants (46.51%) had overweight or obese, while 53.49% had underweight or normal bodyweight. No significant difference was found between the MD adherence scores of the individuals with underweight/normal bodyweight and those who were overweight/obese. When the adherence to the MD was examined, although most of the individuals showed a low level of adherence, the number of overweight or obese women with a high level of adherence was found lower than the women with underweight or normal bodyweight. However, no significant difference was found between the mean MEDAS score of these two groups. This may be because overweight or obese women do not pay attention to a healthy diet, although this is not reflected in the mean MEDAS score. As it is known, today, especially during the COVID-19 pandemic, since obesity is considered a risk factor in viral diseases, individuals should adopt a healthy diet model in order to reach and maintain a healthy bodyweight.

In a study examining the changes in nutritional attitudes of individuals during the COVID-19 pandemic, it was determined that those with high healthy eating attitudes had better nutrition and lifestyle habits during the pandemic (18). In a study in Italy, it was found that during the COVID-19 pandemic, individuals between the ages of 18-30 years had more adherence to the MD ($p < 0.001$) compared to the younger and older population (9). In this study, it was measured that adherence to the Mediterranean diet was low. Also, it was observed that adherence to the MD in men is lower (MEDAS score is 6.7 ± 2.11). The fact that men consume more red meat and fewer vegetables, fruits, fish, and seafood can be effective in this. Although the small number of samples examined is effective in these results, another important factor is that the populations examined in the studies are different.

Extra virgin olive oil is one of the most resistant oils against oxidation due to its high oleic acid (76-89%), total phenol (20-150mg/100g), tocopherol (10-30mg/100g), and carotenoid content. Nuts are particularly rich in monounsaturated fatty acids (MUFA) and n-3, n-6 polyunsaturated fatty acids (PUFA), vitamins, selenium, various phenolic compounds, and phytosterols (19). It has been noted that the MD with high fat and antioxidant intake resulting from frequent consumption of olive oil and nuts exerts an anti-inflammatory effect on the cardiovascular system as it down-regulates cellular and circulating inflammatory biomarkers related to atherogenesis in individuals at high cardiovascular risk

(20). Estruch et al. (19) applied the MD with extra virgin olive oil or nuts added to the individuals in their study on individuals at high cardiovascular risk, and a low-fat diet to the control group. As a result of the study, the risk of cardiovascular disease was found to be lower in the MD with extra virgin olive oil or nuts added compared to those who consumed a low-fat diet (21). Also, olive oil consumption and nut consumption significantly was higher in individuals with underweight and normal body weight compared to overweight and obese individuals in this study.

The results of two prospective cohort studies reported that consuming more than 1 serving of red meat and processed red meat per day increased cardiovascular disease and cancer mortality and that the substitution of white meat instead of 1 serving of red meat per day decreased the risk of mortality (20). In this study, the consumption of red meat was higher in overweight and obese men than in underweight and normal bodyweight men. Excessive consumption of red meat is a bad indicator of adherence to the MD. The side effects of red meat and processed meat products can be a consequence of their content, which supports pro-inflammatory and pro-oxidative metabolic processes such as nitrosamines, iron, saturated fats, and cholesterol (4).

According to data from Turkey Nutrition and Health Survey-2019 (TBSA-2019), it was found that 0.20% of individuals consumed fish every day, 8.20% consumed fish 2-3 times a week, and 8.80% did not consume any fish (22). Turkey Specific Food and Nutrition guide recommended consuming fish (one portion 150 g) at least two to three times a week due to the content of high omega-3 fatty acids (23). It is seen that this amount is much lower than the amount of fish consumed in developing and developed countries. Fish protein is an important nutrient due to its long-chain polyunsaturated n-3 fatty acids, vitamin D, and iodine content. It has been reported that fish consumption in adulthood positively affects cardiovascular diseases, metabolic syndrome, cancer, depression, and sleep quality (24). The result of this study is reflected in fish consumption in Turkey; only 8.53% of the individuals reported that they consume fish 3 times a week or more. Fish consumption is very important and should be increased in order to lead a healthy life and prevent diseases.

In recent years, relationships between nutrition and mental well-being have received great attention. Epidemiological studies have observed that adhering to a healthy or MD is associated with a reduced risk of depression (25). In a study examining mental well-being and adherence to the MD, high adherence to MD was significantly associated with a positive emotional state ($\beta = 0.018$, $p = 0.009$), and it is recommended that adopting a dietary pattern such as MD is linked to an improvement in emotional well-being (26). In contrast, our study was not found a significant relationship between adherence to the MD and mental well-being ($r = 0.051$, $p > 0.05$). This may be due to the small sample size.

The limitation of this study is the representation of data by a self-reported questionnaire due to its online conduct. This may have resulted in data being misreported. Also, data were collected in just a week in an online

questionnaire, so the findings cannot be generalized for all age groups and the population of Turkey.

CONCLUSION

In this pilot study, during the COVID-19 pandemic adherence to the MD, and mental well-being status of the adult population in Turkey were evaluated. There was no significant difference between the MD adherence scores of the individuals with underweight/normal bodyweight and those who were overweight/obese. Also, it was determined that there was no statistical relationship between the MEDAS and SWEMWBS scores. This study determined that individuals' adherence to the MD, which is a healthy diet model, was found to be low. There are many studies in the literature examining the effects of adherence to the MD on the mental status of individuals, but studies conducted in our country during the COVID-19 pandemic are insufficient in this regard. The data obtained from this study will shed light on other studies on this subject. These results can be clarified better with larger population studies.

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REFERENCES

- Gönder M, Akbulut G. Güncel akdeniz diyeti ve potansiyel sağlık etkileri. *Türkiye Klinikleri Sağlık Bilimleri Derg.* 2017; 2(2): 110-20.
- Metin D, Bakir BO. The association between mediterranean diet and emotional status among university students. *ESTÜDAM Halk Sağlığı Derg.* 2021; 6(2): 159-68.
- Eker ME, Karakaya S. Akdeniz diyeti, melatonin ve sağlık. *Türk Tarım-Gıda Bilim ve Teknoloji derg.* 2018; 6(9): 1258-66.
- Barbaros B, Kabaran S. Akdeniz diyeti ve sağlığı koruyucu etkileri. *Beslenme ve Diyet Derg.* 2014; 42(2): 140-7.
- Sadeghi O, Keshteli AH, Afshar H, Esmailzadeh A, Adibi P. Adherence to Mediterranean dietary pattern is inversely associated with depression, anxiety and psychological distress. *Nutritional neuroscience.* 2021; 24(4): 248-59.
- Gasmi AN S, Tippairote T, Dadar M, Menzel A, Björklund G. Individual risk management strategy and potential therapeutic options for the COVID-19 pandemic. *Clin Immunol.* 2020: 215, 108409.
- Chandra RK. Nutrition, immunity and infection: From basic knowledge of dietary manipulation of immune responses to practical application of ameliorating suffering and improving survival. *Proc Natl Acad Sci USA.* 1996; 93: 14304-7.
- Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attinà A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translational Medicine.* 2020; 18(1): 229.
- Özenoğlu A, Çevik E, Çolak H, Altıntaş T. Effects of covid 19 pandemic on nutritional attitude and behavior and life style habits. *Mediterranean Journal of Nutrition and Metabolism.* 2021; 14(3), 325-341.
- World Health Organization. Obesity: preventing and managing the global epidemic. 2000.
- Pehlivanoglu EFÖ, Balcioğlu H, Ünlüoğlu İ. Akdeniz diyeti bağlılık ölçeğinin Türkçe'ye uyarlanması geçerlilik ve güvenilirliği. *Osmangazi Tıp Derg.* 2020; 42(2): 160-4.
- Schröder H, Fito M, Estruch R, Martinez-Gonzalez MA, Corella D, Salas-Salvado J, et al. A short screener is valid for assessing Mediterranean diet adherence among older Spanish men and women. *J Nutr.* 2011; 141(6): 1140-5.
- Demirtaş AS, Baytemir K. Warwick-Edinburgh mental iyi oluş ölçeği kısa formunun Türkçe'ye uyarlanması: Geçerlik ve güvenilirlik çalışması. *Electronic Journal of Social Sciences.* 2019; 18(70): 664-6.
- Stewart-Brown S, Tennant A, Tennant R, Platt S, Parkinson J, Weich S. Internal construct validity of the Warwick-Edinburgh mental well-being scale (WEMWBS): a Rasch analysis using data from the Scottish health education population survey. *Health and quality of life outcomes.* 2009; 7(1): 15.
- Jayawardena R, Sooriyaarachchi P, Chourdakis M, Jeewandara C, Ranasinghe P. Enhancing immunity in viral infections, with special emphasis on COVID-19: A review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews.* 2020; 14(4): 367-82
- Ingram J, Maciejewski G, Hand CJ. Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in psychology.* 2020; 11: 2328.
- De Lorenzo A, Gratteri S, Gualtieri P, Cammarano A, Bertucci P, Di Renzo L. Why primary obesity is a disease? *Journal of translational medicine.* 2019; 17(1): 169.
- Özenoğlu A, Çevik E, Çolak H, Altıntaş T, Alakuş K. Changes in nutrition and lifestyle habits during the COVID-19 pandemic in Turkey and the effects of healthy eating attitudes. *Mediterranean Journal of Nutrition and Metabolism.* 2021; 14(3): 325-41.
- Bullo M, Lamuela-Raventos R, Salas-Salvado J. Mediterranean diet and oxidation: nuts and olive oil as important sources of fat and antioxidants. *Current topics in medicinal chemistry.* 2011; 11(14): 1797-810.
- Urpi-Sarda M, Casas R, Chiva-Blanch G, Romero-Mamani ES, Valderas-Martínez P, Arranz S, et al. Virgin olive oil and nuts as key foods of the Mediterranean diet effects on inflammatory biomarkers related to atherosclerosis. *Pharmacological research.* 2012; 65(6): 577-83.
- Estruch R, Ros E, Salas-Salvado J, Covas M-I, Corella D, Aros F, et al. Primary prevention of cardiovascular disease with a Mediterranean diet supplemented with extra-virgin olive oil or nuts. *New England journal of medicine.* 2018; 378(25): e34.
- T.C. Sağlık Bakanlığı, Hacettepe Üniversitesi Beslenme ve Diyetetik Bölümü. Türkiye Beslenme ve Sağlık Araştırması 2010 (TBSA): Beslenme durumu ve alışkanlıklarının değerlendirilmesi sonuç raporu; 2014 (931). [Cited: 2021 March 7]. Available from: <https://www.tegel.org.tr/turkiye-beslenme-ve-saglik-arastirmasi-tbsa-2010/>

23. T.C. Sağlık Bakanlığı, Hacettepe Üniversitesi Beslenme ve Diyetetik Bölümü. Türkiye'ye Özgü Besin ve Beslenme Rehberi (TÜBER); 2015. [Cited: 2021 March 10]. Available from: <https://dosyasb.saglik.gov.tr/Eklenti/10915,turkiye-beslenme-rehberipdf.pdf>
24. Alkan ŞB, Taşkin H, Ayrancı M, Öksüz A. Yaşam boyu sağlıklı ve dengeli beslenme için balık tüketiminin önemi. *Food and Health*. 2018; 4(1): 43-62.
25. Lassale C, Batty GD, Baghdadli A, Jacka F, Sánchez-Villegas A, Kivimäki M, et al. Healthy dietary indices and risk of depressive outcomes: a systematic review and meta-analysis of observational studies. *Molecular psychiatry*. 2019; 24(7): 965-86.
26. Lopez-Olivares M, Mohatar-Barba M, Fernandez-Gomez E, Enrique-Miron C. Mediterranean diet and the emotional well-being of students of the campus of Melilla (University of Granada). *Nutrients*. 2020; 12(6): 1826.