

Evaluation of Mediterranean Diet Quality and Hedonistic Eating Status in Regularly Exercising Individuals

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ABSTRACT

Purpose: The aim of this study is to evaluate the hedonistic eating behaviors and adherence to the Mediterranean diet of individuals who exercise regularly.

Method: This study was conducted between June and September 2023. 200 individuals who exercised >150 minutes per week and continued this exercise for 3 months participated in the study. After the demographic questions in the first part of the survey, the Mediterranean Diet Adherence Scale (MEDAS) and the Nutrient Power Scale (PFS) were applied to the participants.

Results: As a result of our study, all subgroups of the food power scale were found to be greater than the cut-off value of 2.5. When the level of adherence to the Mediterranean diet increased, a statistically significant decrease was observed in terms of hedonistic eating sub-factors of food availability, food present and total score ($p<0.05$). A positive correlation was observed between the physical activity level and the total score of the MEDAS ($p<0.05$).

Conclusion: When the adherence to the Mediterranean Diet of individuals who exercise regularly was evaluated according to the cut-off point, it was found to be moderately adherent. It was also determined that the participants exhibited hedonistic eating behavior.

Keywords: Regular exercise, Mediterranean diet model, hedonistic eating behavior

ÖZET

Amaç: Bu araştırmanın amacı düzenli egzersiz yapan bireylerin, Akdeniz diyetine bağlılıklarını saptayarak, hedonistik yeme davranışları ile arasındaki ilişkiyi incelemektir.

Yöntem: Bu çalışma Haziran-Eylül 2023 tarihleri aralığında yapılmıştır. Araştırmaya haftada >150 dakika egzersiz yapan ve 3 ay yaptığı bu egzersize devam eden 200 birey katılmıştır. Anketin ilk kısmındaki demografik soruların ardından katılımcılara Akdeniz Diyeti Bağlılık Ölçeği, Besin Gücü Ölçeği uygulanmıştır.

Bulgular: Çalışmamızın sonucunda besin gücü ölçeğinin tüm alt grupları kesme noktası olan 2,5 değerinden daha fazla bulunmuştur. Akdeniz diyetine uyum seviyesi arttığında hedonistik yeme alt faktörleri olan besin bulunabilirliği, besin mevcudiyeti ve toplam puan bakımından istatistiksel olarak anlamlı bir azalma gözlemlenmiştir ($p<0.05$). Fiziksel aktivite düzeyi ile Akdeniz diyetine bağlılık ölçeği toplam puanında istatistiksel olarak pozitif korelasyon gözlemlenmiştir ($p<0.05$).

Sonuç: Düzenli egzersiz yapan bireylerin Akdeniz Diyetine bağlılıkları kesim noktasına göre değerlendirildiğinde orta düzeyde bağlı olarak bulunmuştur. Ayrıca katılımcıların hedonistik yeme davranışı gösterdiği saptanmıştır.

Anahtar Kelimeler: Düzenli egzersiz, Akdeniz diyet modeli, hedonistik yeme davranışı

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Received: 05.07.2024

Accepted: 19.08.2024

Nutrition, physical activity and sleep status of individuals are effective in maintaining health (1). Various studies have shown that regular exercise can reduce the risk of many chronic diseases, including obesity, depression, type II diabetes, cardiovascular diseases, neurological diseases, and various types of cancer (2-4).

The Mediterranean diet model is defined as a nutritional model in which animal foods are consumed at low-moderate levels, plant foods are consumed at high levels, olive oil is the basis of dietary fat, and wine is consumed moderately with meals in the routine diet (5). Studies have shown that compliance with the Mediterranean diet is associated with exercise performance (6,7). Mediterranean diet and regular exercise contribute to reducing the risk of chronic diseases such as heart disease, diabetes, and obesity, while also promoting longevity and a higher quality of life. This combination of healthy eating and physical activity reflects the holistic approach to health that characterizes the Mediterranean lifestyle (8,9).

Individuals' nutrition is maintained by homeostatic and non-homeostatic (hedonistic, emotional eating, etc.) mechanisms. In homeostatic fasting, the individual meets the individual's required energy level by covering a minimum of eight hours of fasting and reversing the individual's acute negative energy balance (10). Today, eating behavior is affected by many triggering factors such as stress, emotional change, rewarding behaviors, and the appeal of the food consumed to the sensory organs. Hedonistic eating behavior is characterized by the behavioral pattern that occurs with hedonic hunger, and the main priority in hedonic hunger is to trigger the urge for pleasure and enjoyment that individuals will get from the food they eat (11,12). Hedonic mechanisms overtake homeostatic mechanisms as individuals prefer delicious foods that appeal to the senses. The risk of diseases such as obesity increases due to the effects of factors such as sugar and fat, which are high in delicious foods (13).

Exercise can play a significant role in modulating hedonic hunger, which is the desire to eat for pleasure rather than to satisfy physiological hunger. Engaging in physical activity can help regulate the brain's reward system, reducing the intensity of cravings and the appeal of high-calorie, palatable foods often associated with hedonic hunger. Additionally, exercise can improve mood and reduce stress, factors that frequently contribute to emotional eating. Thus, regular physical activity may help in managing hedonic hunger by balancing the body's

need for energy with the brain's reward signals, promoting healthier eating habits (14). There are not enough studies in the literature about the use of the Mediterranean diet model in people who exercise regularly and associating these individuals with hedonistic eating situations. In this context, our research was conducted to evaluate the relationship between hedonistic eating behaviors and the adherence to the Mediterranean diet of individuals who exercise regularly.

Material and Methods

Population and Sample

In this cross-sectional planned study; the sample of the study consists of 200 individuals who exercise >150 minutes a week and continue this exercise for 3 months.

Data Collection Tools

Survey form: The survey presented to individuals was filled out via the online platform. The first part of the survey included demographic questions. In the second part of the survey, the Mediterranean Diet Adherence Scale (MEDAS) was used to evaluate individuals' adherence to the Mediterranean diet, and the Food Power Scale (FPS) was used to evaluate hedonistic eating behaviors.

Mediterranean diet adherence scale (MEDAS): The Mediterranean Diet Adherence Scale (MEDAS) consists of 14 questions, and 1 or 0 points are taken for each question depending on the amount of consumption, and these points are summed. The score is categorized as follows: 5 or less indicates low adherence, 6 to 9 indicates medium adherence, and 10 or higher indicates high adherence (15).

Power of Food Scale (PFS): A PFS score of 2.5 points or above indicates that hedonic hunger has increased. High scores psychometrically indicate increased motivation to consume delicious foods in the environment (16).

Results

The study was completed with 200 participants, 145 (72.5%) of whom were women and 55 (27.5%) of whom were men. The education level of 56% of the individuals participating in the study is at undergraduate level. While 33.5% of the participants go to sports 3 times a week; 50% of them do sports between 30-59 minutes daily. Demographic information about the participants is shown in Table 1.

Table 1: Demographic Information of Participants (n=200)		
	N	%
Gender		
Women	145	72.5
Men	55	27.5
Education		
Primary school	7	3.5
High school	49	29.5
University	112	56.0
Postgraduate	32	16.0
Marital status		
Married	80	40.0
Single	120	60.0
Total activity frequency / Weekly		
1	45	22.5
2	71	35.5
3	67	33.5
>4	17	8.5
Total activity time / Daily		
less than 30 minutes	45	22.5
30-59 minutes	100	50.0
60-120 minutes	55	27.5

When the age and anthropometric measurements of the individuals were evaluated, it was observed that their median age was 29.5 (16-71) years, median height was 168.74 (151-190) cm, median body weight was 64 (43-114) kg and median body mass index (BMI) was 22.79 (14.20-35.19) kg/m². Data regarding the participants' age and anthropometric measurements are shown in Table 2.

Table 2: Age and Anthropometric Measurements of Participants			
Variables	Mean± Standard deviation	Median	Min-Max
Age (years)	32.16±11.50	29.50	18-65
Height (cm)	168.74±8.60	168.00	151.-190
Weight (kg)	65.65±12.87	64.00	43-114
Body mass index (kg/m ²)	22.90±3.39	22.79	14.2-35.1

The scores of the participants from the Mediterranean diet adherence and nutritional strength scales are given in Table 3. The median total score of MEDAS was found to be 6 (2-11). 65% of the participants were low; 28% are at medium and 7% at high level of adherence. Additionally, when their scores from the power of food scale are examined, the median score for food availability is 3 (1-5); food present median score 3.5 (1-5); the median score for tasting the food was determined as 3.6 (1-5) and the total median score was 3.30 (1-5).

Table 3: Participants' Scale Scores			
Variables	Mean± Standard deviation	Median	Min-Max
Mediterranean Diet Adherence Scale			
Total score	5.83±1.84	6.00	2-11
Power of Food Scale			
Food available	3.01±1.04	3.00	1-5
Food present	3.31±1.04	3.50	1-5
Food tasted	3.36±1.01	3.60	1-5
Total score	3.23±0.93	3.30	1-5
	N	%	
Mediterranean Diet Adherence Scale Categories			
Low	130	65	
Medium	56	28	
High	14	7	

The relationships between individuals' age, anthropometric measurements, number of main meals and snacks, power of food scale and Mediterranean diet adherence scale are shown in Table 4. It was determined that there was a weak negative ($R = -0.214$) significant relationship between total score of the PFS and MEDAS score ($p < 0.05$). When food availability and the total score of MEDAS were evaluated, a statistically significant negative ($R = -0.219$) relationship was found between them.

Table 4. Relationships Between Age, Anthropometric Measurements, Power of Food Scale and Mediterranean Diet Adherence Scale

	1	2	3	4	5	6	7	8	9	10
1. Age		R= 0,349 p= 0,000	R= 0,439 p= 0,000	R= -0,015 p= 0,835	R= -0,075 p= 0,298	R= -0,122 p= 0,085	R= -0,071 p= 0,319	R= -0,118 p= 0,096	R= -0,120 p= 0,090	R= 0,173 p= 0,014
2. Weight	R= 0,349 p= 0,000		R= 0,840 p= 0,000	R= 0,137 p= 0,055	R= 0,038 p= 0,598	R= 0,064 p= 0,368	R= -0,008 p= 0,907	R= -0,157 p= 0,026	R= -0,037 p= 0,601	R= 0,012 p= 0,868
3. Body mass index	R= 0,439 p= 0,000	R= 0,840 p= 0,000		R= 0,103 p= 0,150	R= -0,064 p= 0,368	R= 0,021 p= 0,772	R= -0,005 p= 0,941	R= -0,171 p= 0,015	R= -0,068 p= 0,342	R= 0,040 p= 0,578
4. Number of main meals	R= -0,015 p= 0,835	R= 0,137 p= 0,055	R= 0,103 p= 0,150		R= 0,045 p= 0,524	R= 0,093 p= 0,189	R= 0,219 p= 0,002	R= 0,125 p= 0,078	R= 0,150 p= 0,034	R= -0,040 p= 0,570
5 Number of snacks	R= -0,075 p= 0,298	R= 0,038 p= 0,598	R= -0,064 p= 0,368	R= 0,045 p= 0,524		R= 0,100 p= 0,159	R= 0,117 p= 0,100	R= 0,153 p= 0,030	R= 0,158 p= 0,025	R= -0,028 p= 0,690
Power of Food Scale										
6. Food available	R= -0,122 p= 0,085	R= 0,064 p= 0,368	R= 0,021 p= 0,772	R= 0,093 p= 0,189	R= 0,100 p= 0,159		R= 0,734 p= 0,000	R= 0,729 p= 0,000	R= 0,909 p= 0,000	R= -0,219 p= 0,002
7. Food present	R= -0,071 p= 0,319	R= -0,008 p= 0,907	R= -0,005 p= 0,941	R= 0,219 p= 0,002	R= 0,117 p= 0,100	R= 0,734 p= 0,000		R= 0,684 p= 0,000	R= 0,881 p= 0,000	R= -0,243 p= 0,001
8. Food tasted	R= -0,118 p= 0,096	R= -0,157 p= 0,026	R= -0,171 p= 0,015	R= 0,117 p= 0,100	R= 0,153 p= 0,030	R= 0,729 p= 0,000	R= 0,684 p= 0,000		R= 0,895 p= 0,000	R= -0,112 p= 0,114
9. Total score	R= -0,120 p= 0,090	R= -0,037 p= 0,601	R= -0,068 p= 0,342	R= 0,150 p= 0,034	R= 0,158 p= 0,025	R= 0,909 p= 0,000	R= 0,881 p= 0,000	R= 0,895 p= 0,000		R= -0,214 p= 0,002
Mediterranean Diet Adherence Scale										
10. Total score	R= 0,173 p= 0,014	R= 0,012 p= 0,868	R= 0,040 p= 0,578	R= -0,040 p= 0,570	R= -0,028 p= 0,690	R= -0,219 p= 0,002	R= -0,243 p= 0,001	R= -0,112 p= 0,114	R= -0,214 p= 0,002	

Discussion

This study aims to assess the adherence of regular exercisers to the Mediterranean diet through the Mediterranean Diet Adherence Scale (MEDAS) and the Power of Food Scale, and to explore the connection between their hedonistic eating behaviors.

In our current study, it was found that 65% of the participants had a low level of adherence to the Mediterranean diet, 28% had a medium level, and 7% had a high level (Table 3). In a study conducted by Manzano-Carrasco et al. consisting of 1676 adolescent participants, adherence with the Mediterranean diet was examined. While 35.7% of the individuals participating in the study had high or optimal compliance with the Mediterranean diet, 64.3% had low compliance with the Mediterranean diet (17). Another study evaluated compliance with the

Mediterranean diet in university students. 65.4% of the participants were found to have low MEDAS score (18). It was observed that the percentage compliance with the Mediterranean diet data obtained in the studies was similar to our current study.

In our study, all subgroups of the nutrient power scale (food availability, food present, food taste, total score) were found to be higher than the cut-off point of 2.5 (Table 3). A study was conducted to evaluate hedonic hunger. In a study evaluating hedonic hunger, all subgroup scores of the nutrient power scale were found to be statistically significantly higher in overweight or obese individuals compared to healthy individuals (19). In our present study, the food tasted score—a sub-factor of the Power of Food Scale—was observed to be higher among overweight and obese individuals compared to those of normal weight (Table 4).

In our study, it was observed that when the MEDAS score increased, the hedonistic eating sub-factors of food availability, food present and total score decreased at a statistically significant level (Table 4). Additionally, PFS score was negatively correlated with the total score MEDAS ($R = -0,214$). This negative correlation supports the hypothesis of our research. In a study investigating hedonic hunger and nutritional patterns among university students, a statistically significant negative correlation was found between the total scores of MEDAS and PFS, consistent with the findings of our research (20). Altinsoy conducted a study investigating the relationship between adherence to the Mediterranean diet and levels of hedonic hunger in adults. This study identified a negative correlation between the total score of the PFS, including the food availability subscale, and the total score of the MEDAS ($p < 0,05$) (21).

In our current study, it was observed that the total score of the MEDAS increased statistically significantly when the level of physical activity increased. A large-scale study measuring adherence to the Mediterranean diet was conducted in Greece among 22,043 participants. A positive relationship was identified between the participants' Mediterranean diet scores and their levels of physical activity (22). In another study, it has been found that individuals who engage in high levels of physical activity have a high score of MEDAS. Furthermore, participants who reported not engaging in physical activity exhibited a moderate level of adherence to the Mediterranean diet (23). It has been observed in the studies that similar results were obtained with our current study.

In our study, no statistically significant relationship was found between the body mass index value and the nutritional power scale sub-factors (except for food tasted) and total score ($p > 0,05$) (Table 4). One study evaluated the nutritional habits of adults with different body mass indexes. It was stated that participants with a body mass index of 30 kg/m² and above had higher scores on the emotional eating scale than individuals with a healthy body mass index (24). In another study, it was found that the average power of food scale score of obese individuals was statistically higher than other individuals (25). It has also been stated that each increase in the scores on the nutritional strength scale doubles the individual's risk of becoming obese (26). Various studies have been conducted examining the power of food scale and body mass index and different results have been found. The variations in the results are believed to stem from factors such as differences in the study population,

the demographic characteristics of the participants, and the environment in which the research was conducted.

A potential limitation of this study is the reliance on self-reported data for both the Mediterranean Diet Adherence Scale (MEDAS) and the Power of Food Scale (PFS). Self-reported data can be subject to bias. Additionally, the study's cross-sectional design limits the ability to establish causality between adherence to the Mediterranean diet and hedonistic eating behaviors.

Conclusion

In our research, which seeks to assess the adherence to the Mediterranean diet and the hedonistic eating behaviors of individuals who exercise regularly, it was found that a significant proportion of participants had a low level of adherence to the Mediterranean diet. In our study, power of food scale scores were found to be higher than the cut-off point of 2.5 in all subgroups. A negative correlation was identified between adherence to the Mediterranean diet and the hedonistic eating sub-factors, including food availability, food presence, and the total score. Additionally, it was found that adherence to the Mediterranean diet improved as physical activity levels increased.

Declarations

Ethical Statement

Ethics committee approval was received for this study from the ethics committee of Bahcesehir University (Ethics number: E-85646034-604.02.02-60527).

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosures of Financial or Other Potential Conflicts of Interest

None.

Acknowledgements

None.

Authors Contribution

AB: Study design, data collection, analysis of data, literature search, writing of the manuscript.

EBK: Study design, literature search, editing of the manuscript.

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