ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

Evaluation of the Relationship Between Chronotype, Sleep Quality and Adaptation to Mediterranean Diet in University Students: A Descriptive Study

Üniversite Öğrencilerinde Kronotip, Uyku Kalitesi ve Akdeniz Diyetine Uyum Arasındaki İlişkinin Değerlendirilmesi: Tanımlayıcı Bir Araştırma

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ABSTRACT Objective: This study aimed to examine the relations between chronotype, sleep quality, and adherence to the Mediterranean diet in university students. **Material and Methods:** Sampling included 244 students from Türkiye university and data were collected between May 2021 and June 2021 with the general information form, the "Morningness-Eveningness Questionnaire", "Pittsburgh Sleep Quality Index (PSQI)" and "Mediterranean Diet Adherence Screen (MEDAS)" via online. **Results:** Two hundred forty four students, 69 (28.3%) males and 175 (71.7%) females, with a mean age of 21.8±3.3 years, were joined. The chronotype scale average of the participants was calculated to be 47.1±6.9. Their 11 (4.5%) were of the morningness-type, 172 (70.5%) were of the intermediate-type, and 61 (25.0%) were of eveningness-type. The MEDAS mean score of the students was 5.6±1.9, and 50.4% of them had low adherence to the Mediterranean diet, 47.1% had medium adherence, and 2.5% had high adherence. The total PSQI score of the students was 8.7±3.8, and 77.5% of the participants had poor sleep quality. A significant correlation was found between physical activity status and the number of caffeinated beverages consumed daily according to chronotype (p<0.05). Chronotype score was negatively correlated with PSQI score (r=-0.175, p<0.01). **Conclusion:** It was determined that the chronotypes of the students were intermediate-type, and their sleep quality and adherence to the Mediterranean diet were low.

Keywords: Chronotype; sleep quality; Mediterranean diet; university students; caffeine drinks

ÖZET Amaç: Bu çalışmanın amacı, üniversite öğrencilerinde kronotip, uyku kalitesi ve Akdeniz diyetine uyum arasındaki ilişkilerin değerlendirilmesidir. **Gereç ve Yöntemler:** Örneklem, Türkiye'deki üniversitelerde öğrenim gören 244 öğrenci üzerinde yürütülmüştür. Verilerin toplanmasında genel bilgi formu, "Sabahlık-Akşamlık Anketi", "Pittsburgh Uyku Kalitesi İndeksi (PUKİ)" ve "Akdeniz Diyetine Uyum Ölçeği [Mediterranean Diet Adherence Screen (MEDAS)]" kullanılmıştır. **Bulgular:** Çalışmaya yaş ortalaması 21,8±3,3 yıl olan 69 (%28,3) erkek ve 175 (%71,7) kız olmak üzere 244 öğrenci katılmıştır. Katılımcıların kronotip ölçeği ortalaması 47,1±6,9 olarak hesaplanmıştır. Öğrencilerin 11'i (%4,5) sabahlık, 172'si (%70,5) orta, 61'i (%25,0) akşamlık tip grubunda yer almıştır. Araştırmaya alınan öğrencilerin MEDAS puan ortalaması 5,6±1,9 olup, %50,4'ünün Akdeniz diyetine uyumlarının düşük, %47,1'inin orta, %2,5'inin ise yüksek düzeyde uyduğu tespit edilmiştir. Öğrencilerin toplam PUKİ puanı 8,7±3,8 olup, katılımcıların %77,5'inin uyku kalitesinin kötü olduğu saptanmıştır. Kronotipe göre fiziksel aktivite durumu ile günlük tüketilen kafeinli içecek miktarı arasında anlamlı bir ilişki bulunmuştur (p<0,05). Kronotip skoru, PUKİ skoru ile negatif korelasyon göstermiştir (r=-0,175, p<0,01). **Sonuç:** Bu çalışmada, öğrencilerin kronotiplerinin orta tip olduğu, uyku kalitelerinin ve Akdeniz diyetine uyumlarının düşük olduğu belirlenmiştir.

Anahtar Kelimeler: Kronotip; uyku kalitesi; Akdeniz diyeti; üniversite öğrencileri; kafeinli içecekler

Inclinations based on biology such as going to sleep late and waking up late, insufficient sleep patterns (for example, using the internet at night, daytime naps, consumption of caffeine), severe psychosocial and academic pressure, excessive academic workload, and extracurricular programs are among the multiple factors that contribute to the decrease of sleep in adolescents.[1] A certain part of the

university years of university students coincides with their adolescence period. For this reason, their physical development continues, and their lifestyles and eating habits are changing.[2] University life is a period in which organizational and socio-cultural behaviors can change, which can have an effect that alters the chronotype by influencing different habits such as diet and physical activity.[3] The individual differences in both teenagers and adolescents according to the sleep-wake model called chronotype are among the factors that play a major role in the functioning and behavior of the organism.[4] These differences in chronotypes can be associated with socioeconomic, educational, and environmental disadvantages, as well as contributing to the increase in consumption of unhealthy foods.[5]

Horne and Ostberg considered the individuals who get up early as "morning-types or morningness" and those who get up late as "evening-types or eveningness".[6] A morning-type person has no trouble getting up in the morning and wakes up more often in the morning. On the other hand, an evening type individual has difficulty getting up early and wakes up more frequently at night than a morning type individual.[7] Studies on circadian preferences and eating behaviors show that morning-type people have better control over their food consumption and that evening-type people are more likely to skip breakfast.[8] While this is an advantage for morning-type individuals, it negatively affects evening-types. Evening-type individuals cannot get enough sleep because their longer circadian rhythm shifts sleep-time onset later and morning societal demands curtail their sleeping. As such, they have trouble waking up early in the morning, lose their appetite and often skip breakfast, and go to school with low motivation and attitude.[9] This may adversely affect the school/exam performance of evening-type individuals.[10]

One of the rat studies suggests that misplanned circadian rhythms that arise as a result of behaviors such as eating at different times of the day, skipping breakfast, and eating at night are associated with obesity and metabolic syndrome.[11] In addition, an important point that has been overlooked in the relationship between obesity and sleep is that most current studies have focused mainly on sleep duration and quality and have not paid attention to the effect of endogenous biological rhythms. A slowing of the circadian system can cause obesity by affecting the metabolism of hormones such as leptin, insulin, and cortisol.[12] Most of the students take responsibility for their diet for the first time during the university period. Eating behaviors of students generally include minimizing or skipping certain meals, preferring to eat fast food, eating snacks between meals, and consuming alcohol frequently. In general, their diet is high in fat and low in dietary fiber. An important educational stage for improving students' nutritional habits and future health is the university period.[13] Many university students adopt negative eating habits that may result in body weight gain and do not pay attention to healthy eating recommendations. This may lead to negative consequences such as obesity, cardiovascular diseases, Type 2 diabetes, and increased health costs in the later stages of life.[14] The circadian rhythm is the most important of the rhythms that affect students' cognitive and school performance. Recent studies have demonstrated that Mediterranean-style eating habits have positive effects on cognitive functions and the course of chronic diseases such as diabetes mellitus and hypertension.[15] Scales such as the Mediterranean Diet Adherence Screen are used to assess adherence to the Mediterranean diet. Thus, predictions can be made between the diet compliance index and the risk of contracting the disease.[16] Although the traditional food culture is seen in the regions of the Mediterranean geography varies according to each society and culture, it is based on common principles.[17] For example the Mediterranean diet is a diet rich in whole grains, oil seeds, fruits, and vegetables. Therefore, it involves the consumption of moderate amounts of chicken, fish, and dairy products, red meat once or twice a month, moderate amounts of wine, and high amounts of olive oil. With these features, the Mediterranean diet can offer an adequate and balanced diet.[18] This type of diet is also important in terms of biodiversity and is effective in maintaining a healthy life for present and future generations.[2]

The lack of studies investigating the relationship between chronotype, sleep quality, and adherence to the Mediterranean diet in university students makes this study more significant. The studies also demon-

strate that a nutrition model that follows the principles of the Mediterranean diet is protective against many diseases and supports long life, as well as the importance of raising awareness of individuals about the relationship between nutrition and health. This research was planned to evaluate the relationship between university students' chronotype, sleep quality, and adherence to the Mediterranean diet.

◼ MATERIAL AND METHODS

PARTICIPANTS AND PROCEDURES

This research was a descriptive, cross-sectional and correlational study. The research was carried out between May-June 2021 on university students living in Türkiye, who was reached via electronic means.

ETHICAL CONSIDERATIONS

April 30, 2021 dated 05/25 numbered permission of the Ethics Committee of Erzincan Binali Yıldırım University Human Research Ethics Committee was obtained to carry out the research. The study protocol and free informed consent procedures were issued in accord with the Declaration of Helsinki.

COLLECTION AND EVALUATION OF DATA

General Information

The first part was the general information form. This form, which was applied to the sample group, includes questions evaluating the sociodemographic characteristics of the participants (age, gender, etc.), their dietary habits (number of meals, fluid consumption habits, etc.), and other lifestyle factors such as smoking, physical activity, and sedentary behavior.

Anthropometric evaluations were based on the statements of the participants. In this evaluation, their current body mass (kg), height (cm), and waist circumference (cm) measurements were questioned. Anthropometric data were evaluated according to the classification of the World Health Organization (WHO) by calculating body mass index (BMI) as kg/m² by using the body weight/height (m²) formula.

Morningness-Eveningness Questionnaire (Chronotype)

Horne and Ostberg's Morningness-Eveningness Questionnaire (MEQ) was used in evaluating the chronotype.[19] The validity and reliability of the scale for Türkiye were conducted by Pündük et al. MEQ was the most commonly used scale to determine chronotypes.[20] This 19-item self-report scale was used for screening purposes and gives scores ranging from 16 to 86, and the final score allows determining which chronotype for the participant belongs to. Based on the values obtained with the calculations in the evaluation of the scale, a score between 59 and 86 defines the morning-type, 42 and 58 the intermediate-type and 16 and 41 evening-type groups.

Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index (PSQI) was a self-reporting scale consisting of 9 items, and it allowed the measurement of sleep quality in a reliable, valid, and standard manner.[21] PSQI evaluates sleeping habits one month before to the evaluation. This self-reported questionnaire contains 19 items divided into 7 subscales that assess sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, sedative-hypnotic use, and daytime complaints. The sum of the scores for the 7 components gives an overall score ranging from 0 to 21, with "0" indicating no difficulty and "21" indicating severe difficulty in all areas. Scores above 5 indicate poor sleep quality.

Adherence to the Mediterranean Diet

Adherence to the Mediterranean diet was assessed using the Mediterranean Diet Adherence Screen (MEDAS). The validity and reliability of the Turkish version of the scale were performed by Pehlivanoğlu et al.[15] This scale includes 14 items. One point was given if the condition of an item is met according to adherence to the Mediterranean diet, and 0 point is given if it was not met. The highest score was 14 points, with higher scores indicating better adherence to the Mediterranean diet. Adherence to the Mediterranean diet scores was divided into three groups according to the level of adherence: ≤5 points are low, 6-9 points are moderate, and ≥10 points are high.

STATISTICAL ANALYSIS

IBM SPSS Statistics 22 (IBM SPSS, Türkiye) package software was used for the statistical analysis of the data. For evaluating the data, mean, standard deviation, and percentage were used. Additionally, sta-

TABLE 2: Classification and scores of students' lifestyle habits, anthropometric measurements, adherence to the Mediterranean diet, and sleep quality classification and scores according to chronotype.

Parameters	Morningness-type n=11, 4.5%	Intermediate-type n=172, 70.5%	Eveningness-type n=61, 25.0%	p value
Age (year)	22.0±2.6	21.9±3.1	21.3±2.3	0.665
Gender (n, %)				
Male	3, 27.3%	49, 28.5%	17, 27.9%	0.480
Female	8, 72.7%	123, 71.5%	44, 72.1%	
BMI (kg/m^2)	23.2±2.3	21.4±3.4	22.4±3.9	0.131
BMI classification (n, %)				
Underweight	-	26, 15.1%	5, 8.2%	
Normal	9, 81.8%	120, 69.8%	47, 77.0%	0.488
Pre-obese	2, 18.2%	24, 14.0%	7, 11.5%	
Obese	-	2, 1.1%	2, 3.3%	
Waist circumference (cm)	70.1±13.7	69.5±14.6	73.5±14.3	0.871
Smoking (n, %)				
Yes	1, 9.1%	30, 17.4%	10, 16.4%	0.769
No	10, 90.9%	142, 82.6%	51, 83.6%	
Physical activity (n, %)				
Sedentary	3, 27.3%	78, 45.3%	36, 59.0%	0.046*
Active	8, 72.7%	94, 54.7%	25, 41.0%	
Number of meals	2.6±0.8	2.6±0.8	2.8±0.8	0.521
Daily caffeinated beverages consumed (mL)	419.6±352.1	497.2±405.0	781.1±348.7	0.022*
Mediterranean Diet Adherence Screen	5.6±2.0	5.5±1.9	6.0±1.2	0.985
Mediterranean Diet Adherence Screener classification (n, %)				
Low	6, 54.5%	90, 52.3%	27, 44.3%	
Medium	5, 45.5%	80, 46.5%	30, 49.2%	0.177
High	-	2, 1.2%	4, 6.5%	
PSQI score	9.5±3.9	8.4±3.7	8.0±3.3	0.745
PSQI classification (n, %)				
Good	3, 27.3%	42, 24.4%	10, 16.4%	0.405
Poor	8, 72.7%	130, 75.6%	51, 83.6%	

*Pearson chi-square test, Kruskal-Wallis test; BMI: Body mass index; PSQI: Pittsburgh Sleep Quality Index.

Mediterranean diet, and the classification and scores of sleep quality were given in Table 3. While there was no significant relationship between age, BMI, BMI level, waist circumference, smoking status, physical activity status, number of meals, chronotype scale score and classification, and PSQI score and classification according to adherence of the participants to the Mediterranean diet, a significant correlation was found between gender, physical activity status and the amount of water consumed daily according to the adherence to the Mediterranean diet (p<0.05).

Chronotype score was negatively correlated with PSQI (r=-0.175, p<0.01) (Table 4).

Students with lower values in chronotype (M-type) showed a higher PSQI score (Table 5).

DISCUSSION

The scope of this study covered the relationship between 3 variables of university students: chronotype, sleep quality, and adherence to the Mediterranean diet.

Chronotype

In this study, the percentage of the students with morningness, intermediate, and eveningness-types was found to be 5.1, 69.1 and 25.8 respectively. The most of the participants belonged to the intermediate-type group. The chronotypes of university students

TABLE 3: Classification and scores of students' lifestyle habits, anthropometric measurements, chronotype, and sleep quality according to adherence to the Mediterranean diet.

Parameters	Low n=123, 50.4%	Medium n=115, 47.1%	High n=6, 2.5%	p value
Age (year)	21.9±2.9	21.5±2.9	22.8±4.0	0.562
Gender (n, %)				
Male	45, 36.6%	24, 20.9%	-	0.008*
Female	78, 63.4%	91, 79.1%	6, 100.0%	
BMI (kg/m^2)	21.9±3.6	21.7±3.4	20.4±2.5	0.500
BMI classification (n, %)				
Underweight	15, 12.2%	16, 15.2%	1, 16.7%	
Normal	88, 71.5%	75, 71.4%	5, 83.3%	0.915
Pre-obese	17, 13.8%	12, 11.4%	-	
Obese	3, 2.5%	2, 1.9%	-	
Waist circumference (cm)	70.3±16.3	70.8±12.9	68.8±10.3	0.823
Smoking (n, %)				
Yes	28, 22.8%	13, 11.3%	-	0.033*
No	95, 77.2%	102, 88.7%	6, 100.0%	
Physical activity (n, %)				
Sedentary	63, 51.2%	50, 43.5%	4, 66.7%	0.318
Active	60, 48.8%	65, 56.5%	2, 33.3%	
Number of meals	2.6±0.8	2.7±0.8	2.6±0.8	0.926
Daily water consumption (mL)	1352.3±858.6	1664.2±890.1	1625.0±379.1	0.024*
Chronotype scale	52.0±6.6	51.2±7.1	57.0±5.2	0.551
Chronotype (n, %)				
Morningness-type	6, 4.9%	5, 4.3%	-	
Intermediate-type	90, 73.2%	80, 69.6%	2, 33.3%	0.177
Eveningness-type	27, 22.0%	30, 26.1%	4, 66.7%	
PSQI score	9.5±3.9	8.4±3.7	8.0±3.3	0.277
PSQI classification (n, %)				
Good	25, 20.3%	29, 25.2%	1, 16.7%	0.626
Poor	98, 79.7%	86, 74.8%	5, 83.3%	

*Pearson chi-square test, Kruskal-Wallis test; BMI: Body mass index; PSQI: Pittsburgh Sleep Quality Index.

were determined similar to the results of the studies conducted in different countries such as China, the USA, Libya and our country.[22,23] Additionally, while the results of many studies had revealed that the chronotypes of the students were of the intermediate-type, other studies has been reported that they were of the eveningness-type.[12,24-26]

No significant difference was showed between the age, gender, body weight and smoking scores of the chronotypes (p>0.05), and the groups were similar in terms of these characteristics. When the literatures were reviewed, the results of most the researcher's study by Gümüş and Yardımcı, Bayram and Aktaş, Molu et al., Bodur et al. and Kasap were in line with the results of this study.[2,14,24,26]

TABLE 4: Correlations with age, BMI, Chronotype, PSQI and MEDAS.

Parameters	Age	BMI	Chronotype	PSQI	MEDAS
Age	1				
BMI	0.128*	1			
Chronotype	-0.038	-0.107	1		
PSQI	0.052	-0.129	-0.175**	1	
MEDAS	0.052	0.020	-0.009	-0.065	1

*p<0.05, **p<0.01; BMI: Body mass index; PSQI: Pittsburgh Sleep Quality Index; MEDAS: Mediterranean Diet Adherence Screen.

Maintaining a physically active lifestyle was extremely important for one's own health. Health authorities such as the Centers for Disease Control and Prevention and the WHO recommend moderate or

TABLE 5: Associations between chronotype, PSQI and adherence to the Mediterranean diet.							
	Chronotype				**MEDAS**		
	β	95% CI	pᵃ		β	95% CI	pᵃ
MEDAS	0.957	0.637-1.437	0.833	Chronotype	0.618	0.118-0.887	0.069
BMI	0.831	0.673-1.027	0.087	BMI	1.065	0.818-1.037	0.639
PSQI	0.922	0.769-1.105	0.037	PSQI	0.439	0.085-0.841	0.326

ᵃAdjusted for age, sex, smoking, and physical activity; PSQI: Pittsburgh Sleep Quality Index; CI: Confidence interval; MEDAS: Mediterranean Diet Adherence Screen; BMI: Body mass index.

excessive physical activity in certain frequencies and periods. A significant correlation was associated with the physical activity status of the students according to the chronotype and the amount of caffeinated beverages consumed daily (p<0.05).

Giannotti et al. reported that the negative effect of daytime sleepiness was caused by the need for more stimulants such as caffeine and caffeine-containing beverages in the evening.[27] University students who were extremely inclined towards being an evening-type voluntarily shortened their sleeping hours because of studying for exams, reviewing lessons, entertainment and social communication. For this reason, they consumed high amounts of caffeine to maintain focussing. Zhang et al. stated that those who were in the late chronotype groups, such as the evening-types, tended to consume higher amounts of caffeinated beverages, had more sedentary behaviour, and had less physical activity time.[28] Jalali et al. observed a relationship between medical students' sleep components and their use of tea, coffee, hypnotic drugs, and drugs in their study involving 102 participants from Kermanshah University of Medical Sciences.[29] According to the results of the current study, the amount of consumption of caffeinated beverages according to chronotype was found to be significant (p<0.01). It had the amount of consumption to be 419.6±352.1 mL for morningness-types, 497.2±405.0 mL for intermediate-types, and 781.1±348.7 for eveningness-types. As in previous studies, we determined that evening chronotypes consumed more caffeinated beverages to stay awake in comparison to other chronotypes.

ADHERENCE TO MEDITERRANEAN DIET (MEDAS)

The risk of young individuals being prone to obesity was characterized by lifestyles such as an unhealthy diet and insufficient levels of physical activity.[23] Kabaran and Gezer stated in their study that increasing the levels regarding adherence to the Mediterranean diet helped to reduce the risk of obesity and obesity-related diseases.[30]

According to the study carried out by Sönmez, the rates of men who achieved poor, average, and good results according to the total scores obtained from the PREDIMED (adherence to the Mediterranean diet) test of 739 students studying at Hasan Kalyoncu University were 13.9%, 75% and 11% respectively, while these rates were 10.3%, 72.5% and 17.2% for women.[31] The rate of women who had a good PREDIMED score was higher than men and this result was statistically significant (p<0.01). While the total PREDIMED score for men was 7.4±1.9, this score was 7.8±1.9 for women. Gümüş and Yardımcı conducted their study with 465 university students between the ages of 18-24.[2] When the Mediterranean Diet Quality Index score was evaluated, it was determined that more than half of the male students (51.5%) had very low diet quality, while 49.9% of the female students had average diet quality. In their study with 575 students, Tárraga Marcos et al. reported that 58.3% of the students had high adherence to the Mediterranean diet, while the adherence of 38.6% was moderate, and the adherence of 5.0% was low.[32] The Mediterranean Diet Adherence Screen (MEDAS) score of the students was 5.6±1.9 in this study, and it was determined that 48.8% had low adherence to the Mediterranean diet, 48.4% had medium adherence, and 2.8% had high adherence. There was a significant difference between the MEDAS score and gender, and it was determined that adherence to the Mediterranean diet was low in men and moderate in women. The reason that these results show a difference might be related

to the fact that the number of female students participating in the study was higher than male students.

When Bayram and Aktaş examined the KIDMED classifications of 520 students studying at Selçuk University according to their anthropometric characteristics, they determined that there was no significant relationship according to BMI and waist/hip ratio classifications (p>0.05).[14] Kasap reported that there was no significant difference between the total KIDMED score according to BMI classification.[26] Gümüş and Yardımcı did not find a statistical difference between the distributions of the diet quality levels of the participants by gender and the mean KIDMED scores (p>0.05).[2] In this study, no significant relationship was found between age, BMI, waist circumference, smoking status, physical activity status, the number of meals, chronotype, and sleep quality according to adherence to the Mediterranean diet. In their study involving 457 students, Rodriguez-Muñoz et al. reported that nearly two-thirds (63%) of the students had poor or moderate adherence to the Mediterranean diet, and students with the evening chronotype were less adherent to the Mediterranean diet.[13]

Sleep Quality (PSQI)

In this study, the total PSQI score was determined to be 8.6±3.8, and it was found that 77.4% of the participants had poor sleep quality. In their study conducted with the participation of 197 female medical students, Bodur et al. determined that 77.2% (n=152) had poor sleep quality.[24] The researchers found that the total sleep quality score of the evening-type individuals was 7.56±0.5, and this score was 6.96±0.2 for the intermediate-type and 5.36±0.6 points for the morning-type. In their study, Glavin et al. determined that 54.0% had poor sleep quality according to PSQI (global PSQI score>5).[22] In their study conducted with 103 undergraduate students, Silva et al. reported that the average PSQI score was 6.11±2.44, that 72% of the participants had poor sleep quality, and that there was a negative correlation between MEQ and PSQI scores.[33] A negative correlation was also determined between the MEQ and PSQI scores in this study.

While eveningness chronotype students had shorter sleep duration on weekdays, they sleep for longer periods on weekends. In addition, they experience more daytime sleepiness and had more sleep-related problems than other chronotypes.[4] It had been reported that, in comparison to the morning chronotype students, the students of the evening chronotype were generally sleepy due to sleep deprivation, poor sleep quality, and irregular sleeping schedule, and that they tend to consume agents such as caffeine, alcohol, tobacco and tobacco-like materials more often due to their classes being generally early in the morning, and that they had unhealthy eating habits.[4]

Kabrita et al. emphasized that there was a significant negative correlation between PSQI and MEQ scores of 540 students studying at private and public universities in Lebanon (r=-0.183, p=0.011), and that there was a higher incidence of poor sleep in the eveningness groups.[23] These researchers reported that the prevalence of poor sleep quality among Lebanese university students might be due to decreased sleep duration and shifts in sleep timing between weekdays and weekends, especially among eveningness types. Another study by Núñez found that MEQ scores showed significant correlations with PSQI total scores in undergraduate students (r=-0.282, p<0.01).[34] Kintschev et al. stated that students of the morning chronotype had statistically lower sleepiness scores than those with evening or intermediate-chronotypes.[25] Üzer and Yücens reported that the effect of chronotype on sleep quality was significant (effect= -0.12±0.02, p<0.001, confidence interval: 0.15, -0.09), and evening types exhibited lower sleep quality.[35]

Students should be educated about individual differences in sleep-wake timing preferences so that they can understand own their chronotype and, whenever possible, plan their lessons and other activities in a manner that better fits their internal rhythms. While chronotype and some behavioral choices interact to affect sleep dimensions and quality, raising awareness regarding the effects of getting a sufficient amount of sleep at night on daily performance and avoiding risky behaviors could help college students made better choices in their school and work schedules.

This study had several limitations. First, it was a cross-sectional study, making it difficult to find the causal relationship between the various factors. Second, it included a small sample size (n=244). Third, anthropometric measurements were based only on self-reported data.

CONCLUSION

University was a period of life that affects and changes the living conditions and eating habits of individuals. Similar to other studies, it was observed as a result of this study that the chronotypes of the students were of the intermediate-type, and their sleep quality and adherence to the Mediterranean diet were low. Students should be educated to understand their own chronotype, and this education should be extended, whenever possible, to include their sleeping patterns, physical activity, and dietary habits that had better adapt to their internal rhythms. Compulsory courses on healthy living could be added to the curriculum in all universities for all faculties and departments.

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