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An investigation of the association of sleep quality and diet quality in adults

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Abstract

This study, which aimed to examine the relationship between sleep quality and diet quality in adults, was conducted on 50 adults residing in Bursa province and known not to use sleeping pills. The researchers via face-to-face interviews completed a questionnaire, querying the personal characteristics, sleep duration and sleep quality of the participants. The daily food consumption data of the participants were recorded using the retrospective recall method. Diet quality and sleep quality were measured using the Healthy Eating Index-2015 (HEI-2015) and Pittsburgh Sleep Quality Index (PSQI), respectively. Most of the participants were female (62%) and aged 25-44 years (68%). The groups with good and poor sleep quality significantly differed for caffeine intake ($p < 0.05$). No statistically significant correlation was observed between sleep quality and other nutrients including vitamin A, calcium and iron ($p > 0.05$). While no statistically significant correlation was determined between sleep quality and the HEI overall diet quality score ($p > 0.05$), the HEI components, the wholegrain score displayed a statistically significant negative correlation with the overall sleep quality score ($p < 0.05$). In this study, no statistically significant correlation was determined between overall diet quality and sleep quality, but caffeine intake and wholegrain consumption were ascertained to significantly affect sleep quality.

Keywords: Caffeine intake, Adult, Sleep quality, Diet quality, Wholegrain consumption

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INTRODUCTION

Sleep is an important biological function that is essential for optimum physical and mental health (Baranwal et al., 2023; Indrasari Utami et al., 2023). It is known that sleep disorders may increase the risk of certain types of cancer and death, as well as the symptoms of some gastrointestinal diseases (Medic et al., 2017).

In addition to homeostasis, which is effective in regulating sleep status, circadian rhythm is controlled by both genetic components and external factors such as nutrition and environment (Zhao et al., 2020; Cheon and Kim, 2022). Internal factors affecting sleep include genetic structure, hormones, and the presence of disease; external factors include the environment and nutrition (Pattnaik et al., 2022).

Although a link between sleep and diet has been reported, it has not been determined whether nutrition affects sleep or sleep affects nutrition (St-Onge et al., 2016). Nutrition affects not only the state of alertness during the day but also the quality of sleep, and it is known that proper nutrition significantly improves the quality of sleep (Sejbuk et al., 2022). The effect of diet on sleep has been associated with a variety of complex and interacting mechanisms (Zhao et al., 2020; St-Onge et al., 2023). Foods affect sleep quality primarily through serotonin and melatonin biosynthesis mechanisms in the body (Zuraikat et al., 2021). Tryptophan is the precursor of the serotonin neurotransmitter and melatonin hormone, which are involved in regulating sleep-wakefulness (St-Onge et al., 2023; Wilson et al., 2022). Many dietary metabolites can become bioactive and affect sleep directly or indirectly (Indrasari Utami et al., 2023). It is known that dietary intake of macronutrients (carbohydrates, fat and protein) can affect the time it takes to fall asleep, total sleep time and sleep quality via tryptophan metabolism (Cheon and Kim, 2022). High-carbohydrate diets may be associated with improved sleep quality and duration (Binks et al., 2020). The glycaemic index may play a role in shortening sleep onset latency and increasing the number of arousals during sleep (Godos et al., 2021). In general, diets low in carbohydrates and high in fiber have been associated with better sleep quality (Wilson et al., 2022). In addition to macronutrients, caffeine can also affect sleep quality through parameters such as total sleep time and time to fall asleep (Gardiner et al., 2023). Caffeine has long been associated with sleep disruption (Alruwaili et al., 2023).

Further research is needed to confirm the hypothesis that nutrition-related variables are associated with sleep quality (Godos et al., 2021). Only very few studies have investigated overall diet quality indicators, instead of a single nutrient or food, for their correlation with sleep quality. In view of the lack of definitive literature data on the correlation of diet and sleep and the underlying mechanism of a possible correlation, the present study was designed to investigate the association of sleep quality with daily energy and macronutrient intake levels together with diet quality, as well as with food groups related to diet quality.

MATERIALS AND METHODS

This study was carried out on 50 adults, who had been referred to a private psychological counseling center, living in the Osmangazi district of Bursa province, between December 2020 and May 2021, were not diagnosed with any psychological disorder, were known not to be using any sleep-inducing or side effect-causing medication and were aged 18 years and older. Data were collected by face-to-face interviews and were analyzed with the SPSS software package. This study was conducted with the informed written consent of the participants, in accordance with the 1989 Declaration of Helsinki of the World Medical Association and was approved by the Ethics Board of the Medical Faculty of Bursa Uludag University.

The participants filled in a personal information sheet, including personal information such as age, sex and educational background.

The Pittsburg Sleep Quality Index (PSQI), which was developed and proven to be reliable and valid by Buysse et al. (1989) and adapted to Turkish by Agargun et al. (1996), was used to determine and assess sleep quality. PSQI is a sleep quality scale used to calculate seven individual component scores and an overall sleep quality score, based on participant responses given to 19 questions. This scale also includes questions addressing the inmate/sleeping partner of the respondent if present. It aims to assess sleep quality over the past month. Sleep quality is inversely proportional to the PSQI score. A PSQI score equal to or below five is consistent with good sleep quality, whilst a score above five is consistent with poor sleep quality.

The 24 hour-food consumption records of the participants were collected and assessed with an aim to determine their daily energy and nutrient intake levels. Recorded data were entered into the Nutrient Data Base (BEBIS) program, and energy and nutrient values were calculated. Diet quality was assessed using the Healthy Eating Index-2015 (Ruel, 2002), which was translated into Turkish. The HEI was developed by the United States Department of Agriculture's (USDA) Center for Nutrition Policy and Promotion (CNPP) and its most recent version was published in 2015 (Ruel, 2002). The HEI-2015 consists of 13 components, nine of which are related to diet adequacy and four of which are related to consumption moderation. Foods recommended to be included in the diet in adequate quantities include total fruits, whole fruits, greens and beans, total vegetables, wholegrains, dairy, seafood and plant proteins, total protein foods and fatty acids. On the other hand, foods recommended to be consumed at limited levels include refined grains, added sugar, sodium and saturated fats. The HEI score is directly proportional to the level of consumption of foods recommended to be included in the diet in adequate quantities and inversely proportional to the level of consumption of foods recommended to be consumed at limited levels. A total score equal to or below 50 points indicates a "poor diet quality", a total score between 51 and 80 points indicates "a diet quality that needs to be improved", and a total score between 81 and 100 points indicates a "good diet quality" (Krebs-Smith et al., 2018).

RESULTS AND DISCUSSION

Out of the 50 participants included in this study, 31 (62%) were female and 19 (38%) were male. While 42% of the participants were between the ages of 25-34, 26% were aged 35-44 years, 16% were aged 18-24 years, 12% were of 45-54 years of age and 4% were aged 55-64 years. Twenty-six (52%) participants had good sleep quality and 24 (48%) suffered from poor sleep quality. Most of the participants were university graduates (66%) and salaried employees (46%). The majority were living with their families (88%). The demographic characteristics of the participants, including sex, age, educational background, occupation, and lifestyle are listed in Table 1.

The daily energy and nutrient intake levels calculated using the 24 h-food consumption records of the participants, which were obtained using the retrospective recall method, are shown in Table 2. The mean dietary energy intake of the participants with good and poor sleep quality were calculated as 1,819.42 ± 779.61 kcal and 1,701.11 ± 732.25 kcal, respectively. The groups with good and poor sleep quality did not show any statistically significant difference for macronutrient and micronutrient levels ($p > 0.05$). The mean caffeine intake level of the participants with good sleep quality (64.14 ± 57.03) was significantly lower than that of the participants with poor sleep quality (112.35 ± 75.38) ($p < 0.05$).

Table 1. Distribution of the participants for their demographic characteristics

Characteristics	Number (n)	Percentage (%)
Sex		
Female	31	62.0
Male	19	38.0
Age (Years)		
18-24	8	16.0
25-34	21	42.0
35-44	13	26.0
45-54	6	12.0
55-64	2	4.0
Educational Background		
Primary school	1	2.0
Junior high school	1	2.0
High school	13	26.0
University	33	66.0
Advanced degree/Doctorate degree	2	4.0
Occupation		
Salaried employee	23	46.0
Student	13	26.0
Proprietor	4	8.0
Artist	1	2.0
Non-worker	9	18.0
Lifestyle		
Solitary	6	12.0
Living with family	44	88.0

The mean overall diet quality scores of the participants with good and poor sleep quality were 51.54 ± 15.07 and 49.11 ± 16.03, respectively. No statistically significant correlation was determined between the overall diet quality score and sleep quality (Table 3). The correlation between the components of the diet quality index and the overall sleep quality score is shown in Table 4. Among the HEI components, the wholegrain score displayed a statistically significant negative correlation with the overall sleep quality score ($p < 0.05$), whilst no such statistically significant correlation was determined for the other HEI components ($p > 0.05$).

Our findings demonstrated a significant difference in caffeine intake between groups with good and poor sleep quality. However, no statistically significant correlation was observed between sleep quality and other nutrients, including vitamin A, calcium, and iron. While no statistically significant correlation was determined between sleep quality and the overall HEI dietary quality score, a negative correlation was found between sleep quality and the HEI whole grains factor score.

An increased number of studies pointing out to a correlation between obesity and sleep has led to the proposition of several theories for an understanding of the causality of this correlation. One of these theories suggests that the dietary amounts and percentages of macronutrients affect sleep. In a previous study, using data of the Korea National Health and Nutrition Examination Survey, the correlation between the sleep duration and macronutrient intake of 14,111 participants aged 20-79 years was analyzed. Daily protein intake was found to be significantly correlated with short sleep duration in both men and women. Sleep duration was determined to be significantly short in men with high fat consumption levels and women with high carbohydrate consumption levels (Doo and Kim, 2016). In a research investigating the effects of a low-carbohydrate diet (30% carbohydrate, 35% protein, 35% fat) on sleep quality, sleep duration, severity of insomnia and risk of obstructive sleep apnea for a period of six months (three months of weight loss and three months of weight maintenance), it was ascertained that the low-carbohydrate diet was not correlated with the PSQI scores and had no effect on sleep quality, sleep duration, severity of insomnia and obstructive sleep apnea in obese adults (Kalam et al., 2021). In a previous study by Lindseth and Murray (Lindseth and Murray, 2016), a group of young adults were given a high-protein diet, high-carbohydrate diet, high-fat diet and control diet at 2-week “washout’’ intervals, during which they consumed a diet of their own preference. The PSQI results demonstrated that, compared to other diets, high levels of fat intake were significantly correlated with better sleep. Furthermore, high levels of carbohydrate intake were found to be significantly correlated with short sleep duration.

Table 2. The mean value, standard deviation and upper-lower limits of the energy and nutrient intake levels of the participants for the two different PSQI categories

Nutritional Element	Sleep Quality				
	Good Sleep Quality (PSQI ≤ 5)		Poor Sleep Quality (PSQI > 5)		
	X̄ ± SD	Lower Limit - Upper Limit	X̄ ± SD	Lower Limit - Upper Limit	p
Energy (kcal)	1,819.42 ± 779.61	879.60 - 4,067.00	1,701.11 ± 732.25	581.50 - 3,597.30	0.66
Carbohydrate (g)	171.55 ± 102.53	37.30 - 500.60	161.77 ± 68.66	37.40 ± 316.00	0.68
Carbohydrate (%)	38.23 ± 11.61	14.00 - 73.00	39.58 ± 10.45	23.00 - 65.00	0.67
Dietary fiber (g)	21.09 ± 9.61	8.60 - 43.80	18.07 ± 9.78	6.10 - 39.70	0.28
Protein (g)	76.83 ± 39.62	37.30 - 210.10	65.96 ± 28.13	15.80 - 140.10	0.27
Protein (%)	17.54 ± 4.82	6.00 - 28.00	16.04 ± 3.30	11.00 - 24.00	0.16
Plant protein (g)	27.85 ± 14.28	11.50 - 60.10	25.65 ± 12.56	11.50 - 60.10	0.57
Fat (g)	91.76 ± 45.12	25.90 - 198.70	85.02 ± 49.31	16.70 - 196.80	0.62
Fat percentage (%)	43.27 ± 10.20	15.00 - 65.00	44.29 ± 11.67	16.00 - 62.00	0.74
Cholesterol (g)	389.52 ± 260.04	13.50 - 1,066.30	278.80 ± 170.30	43.20 - 699.60	0.08
Saturated fatty acid (g)	28.40 ± 13.67	6.30 - 61.80	28.10 ± 15.22	4.70 - 65.40	0.10
Monounsaturated fatty acid (g)	32.51 ± 12.90	9.50 - 69.50	30.56 ± 17.57	5.90 - 64.70	0.65
Polyunsaturated fatty acid (g)	20.87 ± 19.68	4.10 - 93.40	21.15 ± 15.47	2.60 - 56.90	0.68
Vitamin A (µg)	973.84 ± 552.31	277.40 - 2,236.10	2,261.79 ± 5,087.67	147.00 - 22,929.00	0.52
Vitamin E (mg)	18.57 ± 17.29	4.20 - 88.80	17.45 ± 10.50	1.80 - 40.50	0.66
Vitamin B_1 (mg)	0.77 ± 0.28	0.40 - 1.60	0.70 ± 0.27	0.20 - 1.30	0.41
Vitamin B_2 (mg)	1.28 ± 0.49	0.70 - 2.80	1.56 ± 0.89	0.50 - 5.10	0.10
Niacin (mg)	13.31 ± 8.12	3.10 - 37.00	12.77 ± 6.18	1.90 - 23.50	0.79
Pantothenic acid (mg)	4.32 ± 1.91	2.10 - 11.50	4.31 ± 2.19	1.20 - 11.90	0.81
Folic acid (µg)	283.54 ± 124.63	123.90 - 662.30	252.30 ± 105.16	54.00 - 541.50	0.76
Vitamin B_{12} (µg)	4.38 ± 3.15	0.60 - 14.00	9.98 ± 18.97	0.30 - 87.70	0.96
Vitamin C (mg)	62.02 ± 43.74	9.80 - 186.40	62.22 ± 45.32	2.30 - 84.60	0.99
Calcium (mg)	636.13 ± 302.51	175.10 - 1,752.00	666.46 ± 308.25	133.60 - 1,517.20	0.73
Magnesium (mg)	317.33 ± 181.25	146.30 - 819.40	312.20 ± 174.32	90.00 - 791.00	0.92
Iron (mg)	12.97 ± 5.65	6.50 - 25.90	12.71 ± 6.34	3.00 - 30.80	0.96
Zinc (mg)	11.43 ± 5.29	4.70 - 23.60	10.00 ± 5.18	2.50 - 27.90	0.34
Caffeine (mg)	64.14 ± 57.03	0.00 - 200.00	112.35 ± 75.38	0.00 - 264.00	0.02

Table 3. The mean value, standard deviation and upper-lower limits of the HEI total scores of the participants for the two different PSQI categories

Healthy Eating Index Total Score	Sleep Quality				
	Good sleep quality (PSQI ≤ 5)		Poor sleep quality (PSQI > 5)		
	X̄ ± SD	Lower Limit - Upper Limit	X̄ ± SD	Lower Limit - Upper Limit	p
Overall diet quality score	51.54 ± 15.07	30.30 - 86.30	49.11 ± 16.03	18.00 - 78.50	0.58

Table 4. The correlation between the HEI sub-factor scores and PSQI total scores of the participants

Healthy Eating Index Factors	Correlation Coefficient
	PSQI Total Score
Total fruits	-0.127 (p = 0.373)
Whole fruits	-0.109 (p = 0.450)
Total vegetables	-0.028 (p = 0.846)
Greens and beans	0.128 (p = 0.377)
Whole grains	-0.288 (p = 0.043)
Dairy	0.194 (p = 0.176)
Total protein foods	-0.072 (p = 0.617)
Seafood and plant proteins	0.018 (p = 0.903)
Fats acids	-0.010 (p = 0.945)
Refined grains	0.038 (p = 0.793)
Sodium	-0.114 (p = 0.430)
Added sugar	-0.169 (p = 0.241)
Saturated fats	-0.031 (p = 0.833)
Overall diet quality score	-0.060 (p = 0.681)

Another study, which was aimed at assessing sleep quality with the PSQI and making a relatively more objective assessment (AARC-APT, 1995) of sleep parameters with polysomnographic (PSG) monitoring records, demonstrated that higher levels of saturated fat intake and lower levels of fiber intake negatively affected sleep depth (St-Onge et al., 2016). The China National Nutrition and Health Survey, based on 3-day food consumption data of 2,828 adults living in Jiangsu Province, found no correlation between sleep duration and protein intake. In this respect, the findings of this study are similar to the findings of our study. The study determined that there was a statistically significant correlation between sleep duration and fat and carbohydrate intake. In the same study, it was ascertained that, the fat-derived energy percentage of individuals sleeping less than 7 hours a day was significantly higher than that of individuals sleeping 7-9 hours daily (Shi et al., 2008). In an experimental study conducted on eight healthy adult men, provided with an isocaloric normal diet, high-carbohydrate/low-fat diet and low-carbohydrate/high-fat diet, it was observed that, compared to the other diets, the high-carbohydrate/low-fat diet shortened the slow wave sleep (SWS) stage. Furthermore, both the high-carbohydrate/low-fat and low-carbohydrate/high-fat diets, and particularly the former, were significantly associated with REM sleep, compared to the normal isocaloric diet (Phillips et al., 1975). The association of sleep with carbohydrate intake has been explained by the amount and quality of dietary carbohydrates, the percentage of daily energy intake from carbohydrates, and alterations in the glycemic load. Alterations in the glycemic load partly account for differences in sleep quality and the waking frequency after the onset of sleep (Vlahoyiannis et al., 2021). While most of the studies referred to above have shown that sleep quality is not correlated with protein intake, some other studies have suggested that sleep quality is not associated with carbohydrate and fat intake either. In the present study, sleep quality was determined not to be correlated with dietary carbohydrate, protein and fat intake levels. No correlation having been determined between these parameters could be attributed to the study being a short-term investigation or to the quality and type of dietary carbohydrates, protein and fats, rather than their amounts and percentages, inducing different effects on sleep.

The Cross-sectional Bavarian Food Consumption Survey II, which assessed the data of 1,050 inhabitants aged 13-81 years and aimed to analyze the correlation of diet with sleep duration, sleep midpoint and sleep quality in the German Bavarian population, demonstrated results similar to ours, suggesting sleep quality not be correlated with energy, carbohydrate, protein and fat intake (Kleiser et al., 2017).

In a study carried out on 3,304 young women living in Japan, a different sleep assessment method was performed, based on sleeping and waking periods, and the sleep midpoint was determined. The sleep midpoint was found to display a significantly negative correlation with cholesterol, potassium, calcium, magnesium, iron, zinc, vitamin A, vitamin D, thiamin, riboflavin and vitamin B intake levels, and a positive correlation with the energy percentage from fat. It was ascertained that participants with a late sleep midpoint tended to delay main meals and skip meals (Sato-Mito et al., 2011). In the present study, no statistically significant correlation was determined between the levels of macro and micronutrients, including vitamin A, dietary fiber, calcium, magnesium, and sleep quality.

Researchers have shown that morning tiredness leads to the consumption of high levels of caffeine, which disturbs the regular sleep pattern the following night and triggers the occurrence of the vicious caffeine cycle (O'Callaghan et al., 2018). Such a caffeine cycle not occurring, and individuals not being affected by caffeine have been explained by several theories suggesting individuals becoming addicted to caffeine, caffeine intake not taking place at late night hours, and individuals showing genetically low sensitivity to caffeine. These theories maintain their validity today (Hindmarch et al., 2000; Rétey et al., 2007). In an experimental study conducted on three periods, including a placebo, caffeinated coffee consumption and terminated caffeinated coffee consumption period, it was observed that the morning and afternoon coffee consumption of regular drinkers (3 × 150 mg/daily) had no effect on the sleeping pattern of these individuals (Weibel et al., 2021).

In another experimental study aimed at the comparative assessment of the effects of caffeinated beverages and water on cognitive performance and sleep quality, it was ascertained that caffeinated beverages showed a strong dose-dependent negative effect on sleep onset, sleep duration and sleep quality. Furthermore, the highest level of sleep disturbance having been observed in the individuals with the lowest level of caffeine intake demonstrated that the effects of caffeine on sleep are related to the accustomed consumption levels of individuals (Hindmarch et al., 2000). In the present study, although the mean caffeine intake levels of the groups with good and poor sleep quality were not very high, it was observed that individuals suffering from poor sleep quality had significantly higher caffeine intake levels, which suggested that caffeine intake adversely affected sleep quality.

Different studies having reported varying results on the correlation of energy and nutrients with sleep has eventually led researchers to use diet quality scales, which enable the joint evaluation of dietary components. In a previous cross-sectional study investigating the association of food consumption and nutrient intake with sleep quality in 1,548 participants, the researchers made use of the PSQI, China Healthy Diet Index and Food Frequency Questionnaire. While the results showed that the total energy intake was negatively correlated with sleep quality, no statistically significant correlation was detected between other macronutrients, micronutrients and sleep quality. This study is similar to our study findings in that it did not detect a statistically significant correlation between macro and micronutrients and sleep quality. The overall diet quality score was significantly higher in the group of individuals with good sleep quality. Among the dietary quality index components investigated, fruits, fish, shellfish and mollusks were determined to show a significant positive correlation with sleep quality (Wu et al., 2019). In another study, in which the PSQI was used for the assessment of the sleep quality of a total of 3,129 middle-aged female workers with an age ranging from 34 to 65 years, it was observed that poor sleep quality was associated with high confectionary and noodle consumption levels and low vegetable and fish consumption levels (Katagiri et al., 2014). A study that aimed to evaluate the relationship between diet and sleep quality in 868 Spanish university students found that those with an unhealthy diet were more likely to have poor sleep quality. At the same time, an unbalanced intake of vegetables, fruits, dairy products, meat, legumes, sweets and sugary soft drinks was associated with poorer sleep quality (Ramón-Arbués et al., 2022). In another study investigating the effects of fatty fish consumption on the sleep quality of adults, weekly mean fish portion consumption levels and PSQI scores were evaluated. The mean weekly fatty fish consumption level was determined to be 9 ± 6 portions (1 portion = 140 g) and 187 (28%) persons were ascertained to suffer from poor sleep quality. Individuals with good sleep quality were determined to consume a higher level of fatty fish (Del Brutto et al., 2016). Another cross-sectional study, which was based on the use of the data of the United Kingdom (UK) Biobank (UKB) and covered 502,494 middle-aged adults, demonstrated that healthy nutrition, sleep and mental health were positively correlated with each other. It was determined that sleep was positively affected by the consumption of high levels of fruits, vegetables, fish, water and fiber, and negatively affected by the consumption of processed meat and milk (Hepsomali and Groeger, 2021). In all the studies referred to above, fish consumption was found to be positively correlated with good sleep quality. On the other hand, in the present study, sleep quality showed no correlation with the “seafood and plant proteins” score, under which fish consumption was evaluated. This could be due to HEI-2015, the diet quality index used in the present study, not enabling the assessment of fish consumption alone. Furthermore, another possible explanation could be fish consumption having not been noted as part of the daily food consumption records due to the frequency of fish consumption being low. Different from the previous studies referred to above, the present study demonstrated that, among the diet quality components investigated, the wholegrain score had a statistically significant negative correlation with the overall sleep quality score. Thus, it was determined that wholegrain consumption positively affected sleep quality. Literature reports suggest that wholegrain consumption is inversely proportional to the occurrence of noninfectious diseases, including cardiovascular diseases, type II diabetes and some types of cancer. Owing to all these healthful effects, wholegrain consumption may have improved sleep quality in the long term. Furthermore, wholegrains are rich in fiber, and as already highlighted, there are reports indicating the association of high fiber content with good sleep quality. Therefore, due to their rich fiber content, wholegrains could be associated with good sleep quality (St-Onge et al., 2016; Hepsomali and Groeger, 2021).

Recent studies indicate that, in elderly people, children and adolescents, good sleep quality and adequate sleep duration are associated with healthy eating habits and good diet quality (Štefan et al., 2018; Kracht et al., 2019). Likewise, a different study that aimed to determine the relationship between diet and sleep quality in 211 adults, HEI was used to determine diet quality and PSQI was used to determine sleep quality, and it was concluded that sleep quality increased as diet quality increased (Behbahani et al., 2022). Different results have been obtained for adults, such that the Cross-sectional Bavarian Food Consumption Survey revealed no statistically significant correlation between PSQI scores and food groups (Kleiser et al., 2017). Likewise, another study conducted on 1,165 persons aged 19-64 years, using the Recommended Food Score (RFS) and PSQI, revealed no statistically significant correlation between sleep quality and diet quality (Hur et al., 2021). Similarly, in another study aiming to evaluate the relationship between sleep duration and diet quality in 739 Iranian adults, diet quality was assessed using HEI-2015 and estimated sleep duration was not associated with compliance with HEI-2015 (Yazdani et al., 2023). The present study, in which the same sleep quality scales were used and similar results were obtained, also showed that the groups with good and poor sleep quality did not significantly differ for overall sleep quality, such that overall sleep quality and the PSQI total score were not correlated with each other.

CONCLUSION

It is concluded that reducing caffeine and increasing wholegrain consumption could significantly contribute to improving sleep quality. Different studies having shown different diet quality components to be correlated with sleep quality could be attributed to the use of different diet and sleep quality scales, short-term recall-based consumption records falling short in determining the nutritional status, different diet quality indices being based on different consumption amounts, and consumption limits varying in different cultures. Genetic, cultural and age differences may also affect the sleep pattern of individuals. There is a need for high-participant, high-quality cohort and randomized controlled studies to better understand the relationship between sleep and diet quality and determine the underlying mechanism of any possible correlation.

Compliance with Ethical Standards

Peer-review

Externally peer-reviewed.

Declaration of Interests

The authors declare that they have no actual, potential, or perceived conflict of interest for this article.

Author contribution

The contribution of the authors to the present study is equal. All the authors read and approved the final manuscript. All the authors verify that the text, figures, and tables are original and that they have not been published before.

Ethics committee approval

The Bursa Uludag University Ethics Committee approved the study during meeting number 2020-19/11.

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