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The influence of individual lifestyle parameters on subjective sleep quality assessment in Polish adults

Wpływ poszczególnych parametrów stylu życia na subiektywną ocenę jakości snu u polskich dorosłych

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Abstract

Introduction and Objective. Sleep disorders are now considered to be one of the most common ailments among adults worldwide. There are many factors that can affect sleep disorders, including poor sleep hygiene, chronic stress, the use of stimulants or improper diet. The aim of the study is to investigate the relationship between eating habits and subjective sleep quality assessment in adults.

Materials and Method. The study involved 520 randomly selected Polish adults – 388 women and 132 men. A diagnostic survey method was used in the data collection using a questionnaire consisting of 3 parts: metric, Sleep Quality Assessment Questionnaire and Dietary Quality Assessment Questionnaire.

Results. Only 29 (8%) of respondents were satisfied with their sleep. The vast majority declared normal sleep quality – 81 (2%). Statistically significant correlations with the sleep quality index occurred only for frequency of consumption of energy drinks (p=0.0051) and sweetened drinks (p=0.0429). As the frequency of consumption of these products increased, the sleep quality index increased, and thus the sleep quality of the subjects deteriorated.

Conclusions. Nutritional factors, such as irregular meals, low intake of fruit and vegetables, sugary and caffeine-containing beverages, as well as other lifestyle factors, such as low physical activity and smoking, may also affect sleep quality. Most important is a holistic approach to the problem of insomnia, taking into account a broadly understood lifestyle and sleep hygiene.

Key words

sleep disorders, sleep quality, eating habits, food frequency questionnaire

Streszczenie

Wprowadzenie i cel pracy. Zaburzenia snu są obecnie uważane za jedne z najczęstszych dolegliwości wśród dorosłych na całym świecie. Istnieje wiele czynników mogących mieć wpływ na zaburzenia snu, są to m.in. nieprawidłowa higiena snu, przewlekły stres, stosowanie używek czy nieprawidłowa dieta. Celem badania było poznanie związku między nawykami żywieniowymi a subiektywną oceną jakości snu u osób dorosłych.

Materiał i metody. W badaniu wzięło udział 520 losowo wybranych dorosłych Polaków: 388 kobiet i 132 mężczyzn. Do gromadzenia danych wykorzystano metodę badania diagnostycznego z użyciem kwestionariusza składającego się z 3 części: metryczki, kwestionariusza oceny jakości snu i kwestionariusza oceny jakości żywienia.

Wyniki. Tylko 29,8% respondentów było zadowolonych ze snu. Zdecydowana większość badanych deklarowała przeciętną jakość snu – 81,2%. Statystycznie istotne korelacje ze wskaźnikiem jakości snu występowały tylko dla częstotliwości spożywania napojów energetycznych ($p = 0{,}0051$) i napojów słodzonych ($p = 0{,}0429$). Wraz ze wzrostem częstotliwości spożywania tych produktów wzrastał wskaźnik jakości snu, a tym samym jakość snu badanych ulegała pogorszeniu.

Wnioski. Na jakość snu mogą wpływać negatywnie zarówno czynniki żywieniowe, takie jak: nieregularne posiłki, niskie spożycie warzyw i owoców, picie napojów słodzonych i napojów zawierających kofeinę, jak i pozostałe czynniki stylu życia, tj. niska aktywność fizyczna czy palenie papierosów. Kluczowe dla zbadania związku między nawykami żywieniowymi a subiektywną oceną jakości snu okazuje się holistyczne podejście do problemu bezsenności, uwzględniające szeroko pojęty styl życia i higienę snu.

Słowa kluczowe

nawyki żywieniowe, zaburzenia snu, jakość snu, kwestionariusz częstotliwości spożycia żywności

INTRODUCTION

Sleep as a natural physiological process deserves a special place in the hierarchy of determinants of health and disease. Sleep is a state of spontaneous loss of consciousness in which body temperature, blood pressure, hormone secretion,

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brain activity, heart rhythm and breathing rate change [1]. Physiologically, sleep restores energy resources, influences the recovery and repair of body tissue, and regulates the body's thermal processes and metabolism. In addition, sleep enhances immune defences, helps to maintain one's mood and cognitive acuity and also promotes physiological homeostasis and resilience [2].

Sleep deprivation leads to difficulty getting up, excessive daytime sleepiness and tiredness. Studies show that after a sleepless night, in the afternoon, subjects experience memory disturbances, low mood, disturbances in attention and increased aggressiveness. Poor quality sleep leads to disturbances in the secretion of certain hormones produced by adipose tissue, including leptin and ghrelin, which can result in hunger and satiety disorders [1]. Insufficient sleep may worsen glucose metabolism, which may increase the risk of insulin resistance or diabetes [3]. In addition sleep deprivation increases the risk of infections, cancer, heart disease or neurodegenerative diseases [4, 5].

The quality of nutrition can influence the occurrence of sleep disorders, and *vice versa* – sleep disorders can be caused by certain choices of foods and their consequences. There are many studies that determine the correlation between sleep quality and nutrition, where sleep disorders can be both a cause and a consequence of overweight and obesity. In the Chia-Lun Yang study, conducted with adult women aged 18–55 who usually slept 7–9 hours, their sleep time was reduced by 33%. It was shown that women after a shorter night showed increased hunger, increased appetite and selection of larger portions [6]. This correlation was confirmed by a study which showed that in adolescents who have sufficient sleep, the diet was healthy and the quality of the food they consumed improved. Adolescents who slept less than 7 hours, more often consumed fast food meals and consumed fewer fruits and vegetables [7]. Many relationships between sleep quality and nutritional quality, frequency and quantity of food consumed can be found in a 2015 review article []. The epidemiological studies review confirmed that sleep deprivation leads to an increase in daily calorie intake. The correlation between short sleep and reduced consumption of healthy food is also shown. Those who suffered from sleep deprivation also turned away from the conventional eating rhythm in favour of nocturnal snacking and irregular eating during the day [8].

The aim of the study was to assess the influence of diet quality on subjective assessment of sleep quality in adults.

MATERIALS AND METHOD

A diagnostic interview method was used in the study. The study instrument was a questionnaire consisting of a self-survey and a sleep quality scale. Between 2 December 2020–6 December 2020, 520 randomly selected adults participated – 388 women and 132 men. Participation in the study was voluntary and anonymous.

The diagnostic survey method was used in the data collection using a questionnaire consisting of 3 parts. Part I included a metric with basic questions such as gender, age, occupation and place of residence. Part II of the questionnaire, which consisted of 2 parts, the questions concerned the quality of sleep. The first part of Part II included questions on sleep quality and duration, while the second part assessed sleep parameters (used with the author's consent) to determine sleep quality (SQ) [9]. The questionnaire included 14 questions on sleep and insomnia. The answers to each question had 4 choices by which respondents identified themselves and were assigned points, i.e. never – 1 point, rarely – 2 points, often – 3 points, and always – 4 points. The minimum number of points that could be scored in the JS questionnaire is 14 points – such a result testified to perfect sleep quality. The maximum score of 56 points was a sign of a very poor quality of sleep. For the interpretation of the results, a point threshold of 35 used by the author of the questionnaire for sleep quality was used as a reference. Below this value, respondents' sleep was interpreted as 'good' sleep, and above this value as 'bad' sleep.

Part III of the questionnaire included questions on dietary quality, regularity of meals, snacking and a food frequency questionnaire, which consisted of a 6 points scale: 1 – never or almost never, 2 – once a month or less frequently, 3 – several times a month, 4 – several times a week, 5 – daily / once a day, 6 – several times a day.

Detailed information on the study group is provided in Table 1.

Table 1. Characteristics of the study group

STUDY GROUP METRICS					
Gender	n	%	Type of work	n	%
Female	388	74,6	Student	169	32.5
Male	132	25,4	Physical	46	8.8
Age	n	%	Intellectual	279	53.7
18–26	298	57,3	Unemployed	14	2.7
27–35	157	30,2	Pensioner	12	2.3
36–45	44	8,5	Work system	n	%
46–55	6	1,2	One shift system (usually from 06:00–14:00 p.m.)	254	78.2
56–65	6	1,2	Shift system (2–3 shifts)	60	18.5
More than 65	9	1,7	No response	11	3.4
Education	n	%	Place of residence	n	%
Primary	4	0,8	Rural	169	32.5
Vocational	3	0,6			
Secondary	160	30,8	Urban	351	67.5
Higher	353	67,9			

BODY MASS INDEX		
BMI	n	%
Underweight	24	4.6
Normal	320	61.5
Overweight	117	22.5
Obese	59	11.3

Parameter		n	Average	Std. Dev.	Median	Min.	Max.
Body mass [kg]	Female	388	65.8	13.8	62.0	43.0	130.0
	Male	132	80.8	15.8	80.0	48.0	167.0
	Total	520	69.6	15.8	66.0	43.0	167.0
Height [cm]	Female	388	166.4	5.8	166.5	150.0	184.0
	Male	132	179.4	6.5	180.0	165.0	196.0
	Total	520	169.7	8.3	169.0	150.0	196.0
BMI [kg/m^2]	Female	388	23.71	4.60	22.46	16.73	44.98
	Male	132	25.02	4.27	24.64	15.85	44.83
	Total	520	24.04	4.55	23.09	15.85	44.98

RESULTS

Satisfaction with sleep. Most respondents were dissatisfied with their sleep – 58.8%, and only 29.8% were satisfied with their sleep. The remainder had no opinion – 11.3% of the respondents. In order to be satisfied with their sleep, statistically significant interactions occurred: age (p=0.0043) – among the subjects who were dissatisfied with sleep, the proportion of subjects over 45 years of age (71.4%), the lowest was the proportion of subjects aged 18–26 years (51,3%), education (p=0.0118) – among the respondents who were not satisfied with sleep; a higher percentage consisted of those with higher education (60.9%) compared to persons with a lower education (54.5%), type of work (p=0.0010) – among the respondents who were not satisfied with their sleep, the percentage of old age and disability pensioners was the highest (83,3%), and the lowest was the percentage of the unemployed (28.6%), place of residence (p=0.0018) – among those who were dissatisfied with sleep, the proportion of urban dwellers was higher (64.1%) compared to rural dwellers (47.9%

Bedtime and sleep duration. Slightly more than half of the respondents went to bed between 22:00 – midnight (53.7%). Between midnight and 02:00, 30.2% of respondents went to bed, between 22 to 11.2% of respondents. The remainder went to bed after 02:00 – 5.0% of the respondents. The majority of respondents slept 6–7 hours a night – 60.6% of respondents; 28,1% slept 8–9 hours and 10.6% slept for 5 hours. The remainder slept for at least 10 hours – 5 respondents (1.0%).

Sleep quality. On the sleep quality scale, the respondents scored between 14–45 points, with an average sleep quality factor of 29.2±5.8 points. Half of the respondents scored a maximum of 29 points and half at least 29 points. The percentage of the individual responses to the questionnaire on sleep quality is shown in Figure 1.

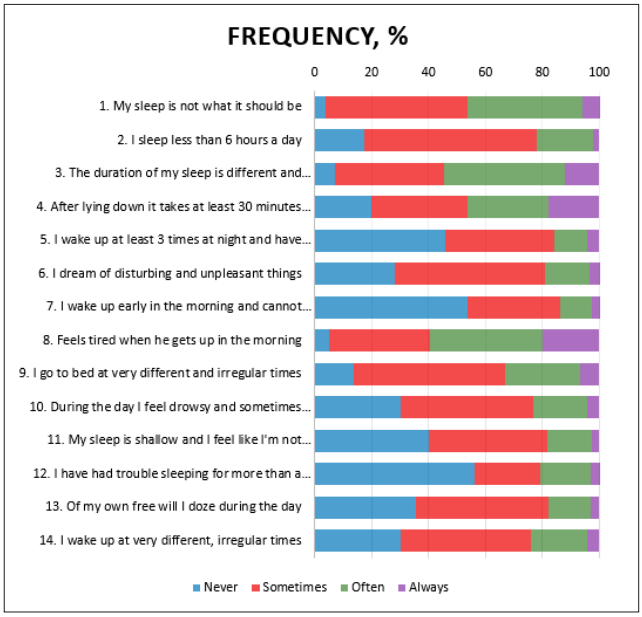

Figure 1. Respondents' responses to Sleep Quality Scale

The vast majority of respondents had a normal sleep quality (sleep quality factor less than 35 points) – 81.2% of respondents, whereas 18.8% had a low quality of sleep.

Nutrition quality. The number of meals, frequency of snacking and snacks are shown in Table 2, and the frequency of consumption of each product is shown in Figure 2.

Table 2. Eating habits of the study group

How many meals do you eat during the day?	n	%	What do you eat most between meals?	n	%
1	2	0.4	I do not eat	36	6.9
2	51	9.8	Fruits	90	17.3
3	170	32.7	Vegetables	8	1.5
4	217	41.7	Unsweetened milk products, e.g. yoghurts, cottage cheese	42	8.1
5 and more	80	15.4	Sweetened milk products, e.g. flavoured cheeses, flavoured milk	30	5.8
Are your meals regular?			Sweet snacks, e.g. candy, biscuits, cakes, chocolate bars	181	3.8
Yes	122	23.5	Salty snacks, e.g. crackers, salt sticks, chips, fries	88	16.9
Yes, but only some	233	44.8	Nuts, almonds, seeds, seeds	45	8.7
No	165	31.7	How long before you go to bed do you eat your last meal?		
How often do you eat between meals?			30 minutes and less	37	7,1
Never	34	6.5	1 h	103	19.8
Several times a month	156	30.0	2 h	173	33.3
Several times a week	184	35.4	3 h	137	26.3
Every day	121	23.3	4 h and more	70	13.5
Several times a day	25	4.8	How many glasses of water do you usually drink during the day?		
Do you ever skip breakfast?			I do not drink water	34	6.5
Never	193	37.1	1–2 glasses	124	23,8
Rarely	125	24.0	3–4 glasses	146	28.1
Sometimes	77	14.8	5–6 glasses	107	20.6
Often	69	13.3	7–8 glasses	73	14.0
Very often	56	10.8	9 or more glasses	36	6.9

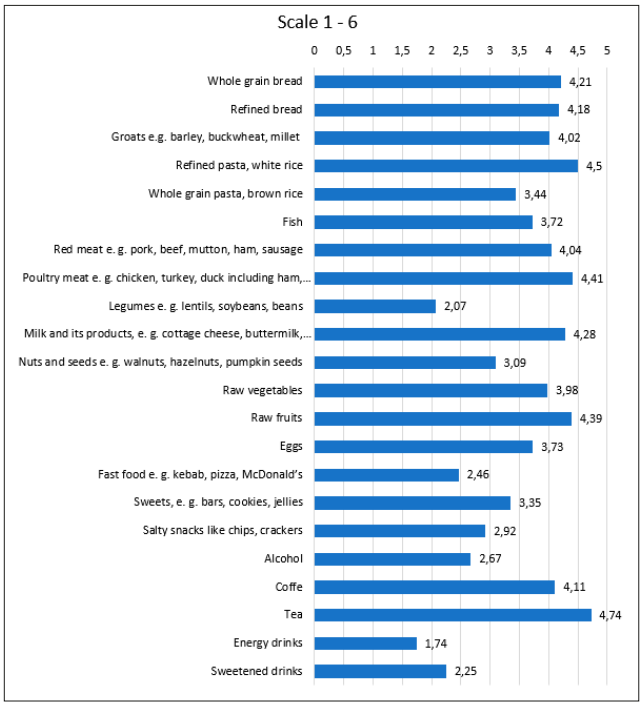

Figure 2. Frequency of consumption of selected foods by the study group

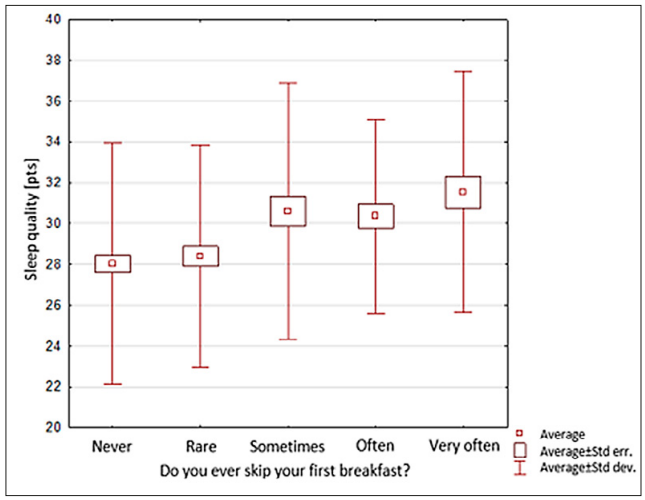

Figure 3. Box-plot of sleep quality index in subjects with varying rates of skipping the fitst breakfast

Correlations between dietary habits and sleep quality. Statistically significant differences in sleep quality occurred between the number of meals: 1–2 and 4 (p=0.0002); 1–2 a 5 and above (p=0.0129); 3 a (p=0.0013). Worse sleep quality was experienced by those who consumed fewer meals during the day. For meal regularity, worse sleep quality was experienced by those who did not have regular meals, or had them occasionally. Regarding the frequency of snacking between meals, worse sleep quality was experienced by those who snacked more often.

Regarding the duration of the last meal, there was no significant difference in the sleep quality factor between those with a different duration of the last meal before bedtime (p> 0,05). When skipping breakfast, correlations with the sleep quality index were found. Statistically significant differences in sleep quality occurred between: never and time (p= 0.0235), never and often (p=0.0142); rare and very common (p=0.0186). Those who skipped the first breakfast had a poorer quality of sleep (Fig. 3).

In the case of correlations between sleep quality and frequency of consumption of selected food products, statistically significant correlations with the sleep quality index occurred only for frequency of consumption of: energy drinks (p=0.0051) and sweetened drinks (p=0.0429) – a positive correlation of very weak strength: Rs=0.123 and Rs=0.089, as the frequency of consumption of energy drinks and sweetened drinks increased, the sleep quality index increased, and thus the sleep quality of the respondents deteriorated.

Analyzing the level of sleep satisfaction and the frequency of raw fruit consumption, a statistically significant difference occurred only between 'yes' and 'don't know' responses (p=0.0227). The frequency of raw fruit consumption was higher in those satisfied with their sleep. For the frequency of coffee consumption, statistically significant differences occurred between 'yes' vs. 'no' (p=0.0013) and 'no' vs. 'don't know' (p=0.0031) reponses – the frequency of coffee consumption was higher in those dissatisfied with their sleep.

Regarding the correlation between bedtime and the frequency of consumption of given food products, significant differences were shown for: whole-grain bread, raw vegetables and fruits. For whole-grain bread statistically significant differences occurred between 22:00 – midnight, and after 02:00 (p=0.0047) and between the hours of midnight – 02:00 and after 02:00 (p=0.0159). For raw fruit and vegetables, a statistically significant difference occurred only between 22:00 – midnight and after 02:00 – for vegetables p=0.0287 and for fruit p=0.0251. The frequency of whole-grain bread, raw vegetables and consumption of fruit was higher in those who went to bed earlier.

For the frequency of consumption of fast foods, the multiple comparisons test showed no statistically significant differences for any pair of responses (p>0.05). For the frequency of tea consumption, a statistically significant difference occurred only between the hours of 22:00 – midnight and after 02:00 (p=0.0248). The frequency of tea consumption was higher in those who went to bed between 22:00 – midnight.

For the frequency of consumption of energy drinks, statistically significant differences occurred between before 22:00 and after 02:00 (p<0.0001); 10:00 p.m-12:00 a.m. and after 02:00 a.m. (p<0. 0001); 00:00–02:00 a.m. vs. 02:00 a.m. (p=0,0001). In case of sweet drinks, statistically significant differences occurred between the hours before 10:00 p.m. and after 02:00 a.m. (p=0.0345); 22:00 – midnight vs. after 02:00 (p=0.0106). In all cases, the frequency of consumption was higher in those who went to bed after 02:00.

Analysing the number of hours slept at night, a difference was shown for the frequency of raw fruit consumption. Statistically significant difference occurred only between 5 hours a night and under, and 6–7 hours (p=0.0489). The frequency of raw fruit consumption was higher in those who slept 6–7 hours at night.

Other factors and sleep quality. In the case of correlations related to physical activity, statistically significant differences in the level of sleep quality occurred between physical activity: low and moderate (p=0.0420), low and high (p=0.0008) – poorer sleep quality was experienced by respondents with low physical activity.

Regarding the number of hours spent at the computer/ TV, there occurred a statistically significant difference in

sleep quality only between 4–6 hours and 10 hours and more (p=0.0231). Respondents who spent at least 10 hours a day in front of the computer/TV had poorer sleep quality.

For cigarette smoking, there were statistically significant differences in sleep quality between the responses: 'I do not smoke' and 'occasionally' (p=0.0267, 'I do not smoke' and 'I smoke' (p=0.0294) – worse quality of sleep was experienced by people who smoked cigarettes habitually and occasionally.

DISCUSSION

The most important factors influencing sleep quality were gender, age, education and work patterns. The self-study showed that the age of the respondents correlated with their satisfaction, which was not the case when assessing sleep quality. The proportion of those who were dissatisfied with their sleep was higher among those over 45 years of age. In the study of J. Taillard et al. the authors present the mechanism of change in the daily and homeostatic sleep regulation of humans, which deteriorates with increasing age. Impairment of sleep quality in the elderly is mainly associated with difficulty in maintaining sleep, increased involuntary awakenings during nighttime sleep, decreased consolidation of the NREM phase of sleep, and decreased endogenous melatonin secretion with age [10].

The gender of the respondents in the self-study was not statistically significant in terms of correlation with sleep quality or sleep satisfaction. J. Kasperczyk et al. showed a lower quality of sleep in wome, which is in line with the literature [9]. According to epidemiological data, sleep disorders are 1.5 times more common in women, and may also be associated with the menopausal period and hormonal disorders [11, 12].

As far as eating habits are concerned, the observed correlations in the number of meals and their regularity, snacking and skipping breakfast, are consistent with the findings of other researchers. K. Peuhkuri et al. showed that people who sleep less often consume more energy and consume fewer fruits and vegetables. Shorter sleep was associated with more eating irregularities, more frequent snacking and less breakfast. The authors also point out that an unhealthy diet is associated with shorter sleep and irregular sleep patterns. The study also shows a snacking mechanism that may indicate a nutrient-poor diet. Snacking is also characteristic for short sleepers, who usually lead a night life [13].

The frequency of consumption of selected foods did not show a significant correlation with sleep quality. The correlations found concerned 2 cases, namely the consumption of energy drinks and sugary drinks. As the consumption of these products increased, the quality factor of sleep increased, leading to a deterioration in the quality of sleep of the respondents. In the study by M. St-Onge et al., epidemiological evidence suggests that high consumption of sweets, energy drinks, sweetened beverages and a general high consumption of carbohydrates has been associated with a deterioration in sleep quality, as confirmed by the results of an own study [14]. The increased consumption of vegetables and fish also led to a better subjective assessment of sleep quality. The consumption of kiwi and tart cherries also led to an improved quality of sleep. This effect may be associated with the high content of health-promoting ingredients, such as folic acid, vitamins C and E, as well as the content of antioxidants. In the self-study, the consumption of raw fruit was slightly higher in people who were satisfied with their sleep.

In terms of coffee consumption, those who consumed less coffee reported a higher level of sleep satisfaction. This may indicate the negative impact of inadequate quantity and time of coffee consumption. Too much caffeine can cause insomnia, increased excitement and stomach problems [15, 16]. If taken shortly before bedtime, the quality of sleep may deteriorate even further. The paradoxical effect of caffeine is also cited in a study by R. Doherty et al. [17], the paradox being that people who do not feel asleep consume caffeine to stimulate and eliminate the feeling of drowsiness. However, caffeine consumption often results in a deterioration of sleep quality, leading to repeated problems with the deterioration of sleep quality. Sleep quality and sleep satisfaction have proven to be irrelevant to the consumption of salty snacks. O. Krajewska et al. shows a mechanism by which too little sleep and too little sleep can contribute to the development of high blood pressure by increasing stress due to insufficient recovery. Stress, on the other hand, increases the appetite for salty foods and reduces kidney function [18].

When examining the influence of the frequency of consumption of selected products on the subjective assessment of sleep quality, consideration should be given to the variables that may influence the assessment of sleep in the subjects, i.e. the time and duration of sleep. The sleep time of the respondents correlated significantly with the consumption of foods such as wholemeal bread, raw vegetables, raw fruits, tea and energy drinks, as well as sweet drinks. Subjects who ate more raw vegetables and fruit and whole grain bread went to bed earlier. For tea consumption, a self-study showed that the incidence of tea consumption after 02:00 was significantly lower.

Tea as a caffeinated beverage, but in smaller quantities than coffee, did not affect the later time of sleep, but rather the earlier time of sleep. In the D. Yilmaz study, there was no association between tea consumption by the student respondents and the quality of their sleep. However, significant differences were found between quality of the students' sleep and smoking habits, total hours of sleep, morning rest, and average daily coffee consumption [19]. Presumably, the subjects replaced beverages such as coffee or sweet drinks with tea, and thus showed an earlier sleep time. The consumption of tea *per se,* not as a substitute for stimulating drinks, also has a therapeutic and health-promoting effect, including the intake of antioxidants and other health-promoting ingredients.

From the above results it can be concluded that earlier sleep is correlated with increased consumption of vegetables, fruit, tea and wholemeal bread, i.e. a healthier diet. Unfortunately, there is insufficient research cited in the literature on the hours of sleep. One can conclude that an earlier hour of sleep can promote better sleep, which is correlated with a healthy diet. On the other hand, a number of studies have focused on the issue of the amount of sleep, which is crucial. In the study by Ch. Min et al., the authors describe the relationship between sleep duration and quality and food intake in adolescents. The authors show that increased consumption of instant noodles, vegetables, fruits and milk was associated with longer sleep time. Higher consumption of carbonated beverages, soft drinks, fast food and confectionery was associated with less sleep [20]. Self-studies confirm these correlations only with the consumption of raw fruit. The

frequency of fruit consumption was higher in those who slept 6–7 hours compared to those who slept for only 5 hours.

In a study by J. Yasuda et al., a correlation was shown between the intake of milk and milk products for a subjective assessment of sleep quality in athletes. The study showed that the athletes who consumed milk more often had a lower risk of a decrease in subjective sleep quality, compared to those who consumed less milk [21].

Dashti et al. presenedt the health consequences of shorter sleep, and the relationship between shorter sleep and diet. Shorter sleep was associated with increased total energy intake and increased fat intake [8]. Studies also indicate a link between shorter sleep time and lower intake of health-promoting foods. Short sleepers also tend to move away from traditional diets in favour of irregular meals. Shorter sleep was also correlated with lower dietary fibre intake during the day.

Confirmation of the above data is demonstrated in own study which shows that an increased frequency of consumption of raw fruits by people who sleep longer, and more frequent consumption of vegetables, fruits and whole grain bread during earlier sleep periods, may affect the improvement of the quality and duration of sleep.

In own study there was no correlation between the frequency of fast food consumption and the quality of sleep, or the resulting satisfaction. A study by K. Tambalis et al. carried out among children and adolescents showed that those who consumed fast food more often reported poorer eating habits, spent more time in front of TVs and computers, and had shorter sleep times than those who did not eat fast food [22]. The S. Hong et al. study also showed a correlation between fast food consumption and poor sleep quality, and a correlation between fast food consumption and depressed mood in the subjects studied [23].

In own study, there was no significant relationship between the consumption of individual foods and their groups on sleep quality and sleep satisfaction. Frequent consumption of foods such as raw fruit and vegetables, wholemeal bread and tea can be assumed to have a positive effect on sleep quality and sleep satisfaction. Frequent consumption of energy drinks, coffee and sugary drinks may impair this quality. When it comes to eating habits, the regularity of meals and the right number of meals can also have an impact on the quality of sleep.

For other factors, a self-study showed that increased exposure to TV or computer screens worsened the subjective assessment of sleep quality. A study of children showed that those who had access to a phone or TV at bedtime had shorter sleep times and poorer quality of sleep. In addition, compared to normal-weight children, a higher percentage of obese children had access to entertainment and communication facilities in the bedroom, and used them one hour before bedtime [24].

For physical activity, the results of own studies showed that more physical activity influenced a better subjective assessment of sleep quality. A review by F. Wang et al. showed that moderate physical activity improved sleep quality compared to high physical activity. Moderate physical activity has a beneficial effect on sleep quality in both young and older populations [25]. In own study, smokers showed poorer sleep quality. In the Y. Liao et al. study comparing the sleep quality of smokers and non-smokers, smokers showed poorer sleep quality [26].

CONCLUSIONS

The low subjective assessment of sleep quality shown in the self-study may be due, among other things, to abnormal dietary patterns such as irregular eating and snacking, a diet low in fruit and vegetables, and the use of stimulants. Consuming more whole grains and fresh fruit and vegetables may improve sleep quality. In addition to improper diet, the use of stimulants and energy drinks, a holistic approach to sleep disorders is very important. Low physical activity, smoking and long screen time may also impair sleep quality. It is very important to pay attention to lifestyle, and hence physical activity, sleep hygiene, use of stimulants and methods of coping with stress.

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