

## Sleep quality and associated factors in adults

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### Abstract

**Aim:** The aim of this study was to determine sleep quality and associated factors in adults. **Material and Method:** This cross-sectional study included 462 adults who presented to a family health center in Bandırma, a district of Balıkesir province in the western part of Turkey, from April 2017 to June 2017. The study data were collected using the Personal Information Form, the Pittsburgh Sleep Quality Index (PSQI), the International Physical Activity Questionnaire- Short Form (IPAQ-SF), and the Beck Depression Inventory (BDI). **Results:** The mean score of the participants obtained from the PSQI was  $10.54 \pm 3.49$  (min: 2.00, max: 19.00), and the rate of the participants with poor sleep quality according to the index cut off point was 87.9%. According to the linear regression model, there was a negative association between the global PSQI score and education, physical activity level and a positive association between the global PSQI score and the variables such as age, smoking, alcohol consumption, comorbidities, and depression level ( $p < 0.05$ ). **Discussion:** In this study, it was determined that in nine out of every ten participants, poor sleep quality and smoking, alcohol consumption, increased level of depression and low physical activity level were modifiable risk factors for poor sleep quality. In the present study, the prevalence of poor sleep quality is said to be consistent with the prevalence determined in other studies conducted regionally in Turkey.

### Keywords

Sleep Quality; Adults; Physical Activity; Depression

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## Introduction

Sleep quality is defined as one's satisfaction with the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening [1]. Sleep quality includes quantitative aspects, such as the total sleep time, sleep latency, awakening frequency, and subjective and qualitative aspects [2]. Impairment of sleep quality affects an individual's physical and mental health, working life, social life, economic status and quality of life significantly [3,4]. In studies conducted on the issue, it has been reported that the worldwide prevalence of poor sleep quality is on the rise and that the prevalence varies between 21% and 65% [5-7]. In studies conducted in Turkey, the prevalence of poor sleep quality has been reported to vary from 38% to 95%, which is quite consistent with the prevalence determined in other countries of the world [8-10].

Poor sleep quality may affect body function and give negative mental, emotional, physical effects. Sleep quality is also related to metabolic syndrome, poor management of chronic disease and contributing the higher risk of cardiovascular disease [11]. To reduce personal suffering and the harmful consequences caused by poor sleep quality, it is essential to understand the sociodemographic and behavioral risk factors of sleep disorders. It is regarded that age, gender, marital status, educational level, chronic disease have an impact on the development of sleep disorders in adults [12]. In addition, in the literature, poor sleep quality is reported to be associated with modifiable risk factors such as smoking and alcohol abuse, obesity, depression and physical inactivity [4,5,13,14].

Health workers play a key role in the assessment of sleep quality in adults and in the implementation of intervention programs aiming to improve sleep disorders. Thus, the maintenance of a good sleep quality as a way to promote health and prevent possible disease can be ensured.

The aim of this study was to determine sleep quality and associated factors in adults.

## Material and Method

### *Type of the study*

The study is cross-sectional.

### *The population and sample of the study*

The study population comprised adults aged 18 years and over who presented to a family health center in Bandırma, a district of Balıkesir province in the western part of Turkey, from April 2017 to June 2017. No sampling method was implemented in the present study. Of the patients who presented to the family health center, 462 adults who were 18 years old and over, had cognitive competence to answer the items in the questionnaire, were not pregnant, did not take medication due to a psychiatric or sleep disorders, and agreed to participate in the study were included in the sample.

### *Variables of the study*

The dependent variable of the study is the sleep quality. Age, sex, educational level, employment status, smoking, alcohol consumption, Body Mass Index (BMI), comorbidities, depression level and physical activity level are the independent variables

of the study. Body Mass Index (BMI) was calculated based on the participants' verbal statements, BMI was assessed based on the World Health Organization's (WHO) classification, and those with BMI of 25.00kg/m<sup>2</sup> or above were regarded as overweight/obese.

### *Data collection tools*

The study data were collected with the Personal Information Form developed by the researchers, International Physical Activity Questionnaire Short-Form (IPAQ-SF), Pittsburgh Sleep Quality Index (PSQI) and Beck Depression Inventory (BDI).

### *Pittsburgh Sleep Quality Index (PSQI)*

Pittsburgh Sleep Quality Index (PSQI) which provides information about sleep quality and sleep related-disorders over a month's time, was developed by Buysse et al. in 1989 [15]. It consists of 19 self-rating items that can be categorized into seven components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each component is scored on a 4-point Likert scale [0-3]. A global score of the sleep quality (range 0-21.00) is then determined by the sum of the 7 component scores with the higher scores representing poorer sleep quality. Poor sleep quality is indicated when the index score is 6 and above. The reliability and validity study of the scale in the Turkish population was carried out by Agargun et al. [15-17]. In the present study, the evaluations were based on the global score for the scale, and the Cronbach's alpha value was calculated as 0.81.

### *International Physical Activity Questionnaire- Short Form (IPAQ-SF)*

The scale was developed by Craig et al. [18]. The validity and reliability study of the Turkish version of the scale was conducted by Saglam et al. [19]. In the seven-item questionnaire, physical activities which are performed for at least 10 minutes at a time are taken into account, and the duration of vigorous physical activities, moderate physical activities, time spent walking, and time spent sitting over the last 7 days are questioned. The MET-min/week score is calculated by multiplying the MET (metabolic equivalent) value generated for each activity in the IPAQ-SF by the number of days in which the activity is performed and the time (in minutes) during which the activity is performed. The score lower than 600 MET is classified as physically inactive, between 600 and 3000 MET-min/week is classified as a low level of physical activity and higher than 3000 MET-min/week is classified as an adequate level of physical activity [18,19]. The Cronbach's alpha value in the present study was calculated as 0.76.

### *Beck Depression Inventory (BDI)*

The inventory developed by Beck et al. (1961) aims to determine the level of depressive symptoms and changes in the intensity of depression [20].

The validity and reliability study of the Turkish version of the inventory was conducted by Hisli. The four-point Likert-type inventory consists of 21 items. The highest possible score to be obtained from the inventory is 63.00, and the higher the score,

the higher is the level of depressive symptoms. In the present study, the level of depression symptoms was determined according to the scores obtained from the inventory: no depression (0-10 points), mild to moderate (11-23) and severe depression ( $\geq 24$  points) [21]. The Cronbach's alpha value in the present study was calculated as 0.83.

### Ethical approval

The Research was conducted according to the ethical principles and was approved by The Ethics Committee of the Balikesir University Clinical Research Ethics Committee in 2017, reference number: 2017/26.

### Data analysis

For data analysis, the SPSS 23.0 software (SPSS, Inc., Chicago, IL, USA) was used. In the analysis of descriptive statistics, Shapiro-Wilk test, student t-test, one way ANOVA, and multivariate linear regression analysis were used. Linear regression models were constructed using the enter method to define independent factors associated with the sleep quality. The model included variables determined to be related to dependent variables through the univariate analysis in studies in the literature. Explanation of the model was evaluated with adjusted  $R^2$ .  $P < 0.05$  was considered as statistically significant.

### Results

The mean age of the participants was  $55.43 \pm 12.34$  (min: 18, max: 92). Of them, 50.7% were in the age group of 40-59, 60.8% were female and 59.5% had a five year education s or less, 77.3% did not work in a paid job, 18.8% were smokers, 13.6% consumed alcohol, 16.6% were obese, 43.5% had at least one chronic disease, 12.1% were seriously at risk of depression, and 22.9% had an adequate physical activity level (Table 1).

The mean score of the participants obtained from the PSQI was  $10.54 \pm 3.49$  (min: 2.00, max: 19.00), and the rate of participants with poor sleep quality according to the index cut off point was 87.9%. In Table 2, the distribution of the mean global PSQI scores according to some characteristics of the participants is given. The mean PSQI scores were significantly high in those aged 60 years or over, those who had a five year education of or less, those who employed in a paid job, who were smokers. In addition, the mean PSQI scores were significantly low in those without chronic disease, without depression, and those whose physical activity level was adequate ( $p < 0.05$ , Table 2).

In Table 3, the multivariate analysis of the factors related to sleep quality is given. The explanatory power of the linear regression model (Adjusted R square) determined by using the enter method was 29.2%. According to the linear regression model, there was a negative association between the global PSQI score and education, physical activity level, and a positive association between the global PSQI score and the variables such as age, smoking, alcohol consumption, comorbidities, and depression level ( $p < 0.05$ ).

### Discussion

Sleep disorders have become an important public health issue; they have a significant negative impact on physical and social

Table 1. Distribution of some characteristics of adults (n=462)

Characteristic	n	%
Age (Mean $\pm$ SD: 55.43 $\pm$ 12.34, Range:18-92)		
$\leq 39$	44	9.5
40-59	234	50.7
$\geq 60$	184	39.8
Sex		
Male	181	39.2
Female	281	60.8
Education (years)		
$\leq 5$	275	59.5
$\geq 6$	187	40.5
Employment status		
Not employed	357	77.3
Employed	105	22.7
Smoking		
Non smoker	375	81.2
Current smoker	87	18.8
Alcohol consumption		
No	399	86.4
Yes	63	13.6
BMI		
Underweight/normal ( $\leq 24.99$ kg/m <sup>2</sup> )	177	42.7
Overweight (25.00-29.99kg/m <sup>2</sup> )	169	40.7
Obese ( $\geq 30.00$ kg/m <sup>2</sup> )	69	16.6
Comorbidities		
0	261	56.5
1	127	27.5
$\geq 2$	74	16.0
Depression level		
Normal	269	58.2
Mild/Moderate	137	29.7
Severe	56	12.1
Physical activity level		
Physically inactive (<600MET)	165	35.7
Low (600-3000MET)	191	41.3
Adequate (>3000MET)	106	22.9

performance and quality of life [22]. In the present study, about 88% of the participants had poor sleep quality. In several studies conducted in different countries such as Brazil, Malaysia, China, Korea, the prevalence of poor sleep quality has been reported to vary between 20% and 60% [2,6,11]. These findings may indicate that sleep quality could be affected by various factors, such as ethnicity, population characteristics, geographical location, lifestyle, socioeconomic status, and culture. In studies carried out with adults, the majority of whom were in the older age groups or diagnosed with a specific disease in Turkey in recent years, the prevalence of poor sleep quality is reported to range between 50% and 90% [8-10,23,24]. In the present study, the prevalence of poor sleep quality is said to be consistent with the prevalence determined in other studies conducted regionally in Turkey.

In several studies conducted on the issue, sociodemographic characteristics such as age, gender and educational level have been shown to play an important role in sleep quality [5,6,12,25]. As the age progresses, poor sleep hygiene habits due to circa-

Table 2. Distribution of global Pittsburg Sleep Quality Index score according to some characteristics of adults (n=462)

Characteristics	Global PSQI	
	n	Mean±SD
Age		
≤39	44	9.75±3.13*
40-59	234	10.24±3.47
≥60	184	11.11±3.55
Sex		
Male	181	10.37±3.08
Female	281	10.65±3.73
Education (years)		
≤5	275	11.02±3.48***
≥6	187	9.83±3.40
Employment status		
Not employed	357	10.33±3.56*
Employed	105	11.25±3.19
Smoking		
Non smoker	375	10.17±3.45***
Current smoker	87	12.14±3.23
Alcohol consumption		
No	399	10.33±3.74
Yes	63	10.57±3.46
BMI		
Underweight/normal	177	10.42±3.42
Overweight/obese	238	10.71±3.60
Comorbidities		
0	261	9.48±3.06***
1	127	11.92±3.72
≥2	74	11.91±3.25
Depression level		
Normal	269	9.60±3.26***
Mild/Moderate	137	11.44±3.38
Severe	56	12.87±3.24
Physical activity level		
Physically inactive	165	11.35±3.50***
Low	191	10.90±3.37
Adequate	106	8.63±2.98

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001.

Table 3. Results of the multivariate analysis of the factors associated with sleep quality

	B	95% CI	β	SE	p
Age	0.080	0.049;0.110	0.261	0.015	0.000***
Sex	0.228	-0.531;0.988	0.032	0.386	0.555
Education	-0.145	-0.230;-0.059	-0.186	0.043	0.001**
Employment status	0.707	-0.208;1.621	0.086	0.465	0.130
Smoking	1.843	1.074;2.611	0.206	0.391	0.000***
Alcohol consumption	0.971	0.047;1.896	0.096	0.470	0.040*
BMI	0.036	-0.033;0.105	0.046	0.035	0.302
Comorbidities	0.697	0.395;1.000	0.194	0.154	0.000***
Depression risk level	0.053	0.026;0.081	0.179	0.014	0.000***
Physical activity level	-0.316	-0.486;-0.146	-0.170	0.086	0.000***

R2: 0.309; Adj.R2: 0.292; F change: 18.074. Note: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001. R2: R square; Adj.R2: Adjusted R square; B: Partial regression coefficient; 95% CI: 95% Confidence Interval; β: Standard partial regression coefficient; SE: Standard Error. Reference categories=0. Variables: Sex: 0 male, 1 female; Employment status: 0 no, 1 yes; Smoking: 0 no, 1 yes; Alcohol consumption: 0 no, 1 yes.

dian rhythm changes, medical illnesses, psychiatric illnesses, increase in the use of multiple medications, which causes problems such as increase in time to fall asleep, spending less time asleep, increase in number of awakenings, significant increase in daytime sleepiness and thus affects sleep quality in the elderly [26]. In the present study, as in the literature, sleep quality worsened as age increased [4,13]. Additionally, in this study, it was determined that education level, which is one of the social determinants of health, is related to sleep quality and sleep quality worsened as education level decreased. This result is consistent with those of the studies in the literature [4,5,12]. In the literature, the results of studies investigating the effect of gender on sleep quality are contradictory [5,6,27], that is reported to be due to the fact that the effects of biological and psychosocial factors such as hormones, social role, working life, time use that interfere with sleep quality vary between men and women [6,27]. In the present study, no statistically significant relationship was determined between gender and sleep quality. Therefore, if the relationship between gender and sleep quality is to be explained, gender-specific risk factors should be evaluated separately.

Several studies conducted on the issue have shown that symptoms of nicotine withdrawal not only lead to the shortening of sleep duration and an increase in sleep latency, but also affect sleep quality by causing sleep onset insomnia (difficulty initiating asleep) and sleep awakenings due to respiratory problems [28]. In the present study, the PSQI scores of the smoker participants were significantly higher. This result is consistent with those of the studies in the literature [14,25].

Alcohol abuse and dependence are associated with chronic sleep disturbance, lower slow-wave sleep, and more rapid than normal eyes movement during sleep, that last long into periods of abstinence and may play a role in relapse [29]. In the literature, alcohol consumption is reported to be associated with poor sleep quality [13,25]. In the present study, consistent with literature, alcohol consumption is determined to be positively associated with poor sleep quality.

In the literature, it is reported that sleep disorders are more frequently experienced by adults with chronic illnesses due to the symptoms of the disease and medication used for treatment [3,26,30]. In addition, the comparison of adults with a chronic disease diagnosis with healthy adults demonstrated that the prevalence of poor sleep was higher in the former group and was reported to vary between about 62% and 94% [24,31,32]. In studies conducted in Turkey, it is reported the prevalence of poor sleep quality increases in people with chronic diseases, which is consistent with the results of the present study [10,12,30].

There is a bi-directional relationship between depressive symptoms and sleep disturbances; while depressive mood deteriorates sleep quality, sleep disturbances lead to changes in the mood [33]. Many studies in the literature have reported that depression is a risk factor for short sleep duration and poor sleep quality, which is consistent with the results of the present study [2,11,22].

Despite the known benefits of physical activity, there is a worldwide trend towards less total daily physical activity. Globally, one-third of adults do not achieve the recommended levels of

physical activity [34]. In the Scientific Report of the Physical Activity Guidelines Advisory Committee, it is stated that moderate-to-severe physical activity affects sleep quality by reducing blood pressure levels, increasing insulin sensitivity, and reducing depression and anxiety symptoms. In the report, it is also stated that the increase in physical activity levels is associated with reduced sleep latency, improved sleep efficiency, improved sleep quality, and more deep sleep. In studies conducted in different age groups in Turkey and in other countries of the world, the increase in physical activity levels is reported to improve the subjective and objective sleep quality [4,23,35,37]. The results determined in the literature are consistent with those of the present study.

#### Limitations of the study

This study is cross-sectional and therefore causality cannot be determined. Thus, the results of the present study should be interpreted with caution. Another limitation of the study is that it was conducted in a relatively small group and its results can be generalized to its own population. Additionally, noise, heat, lighting such as environmental factors and caffeinated beverage consumption that may affect the quality of sleep is not questioned is one of the limitations of this research.

#### Conclusions

In the present study, it was determined that in nine out of every ten participants, poor sleep quality and smoking, alcohol consumption, increased level of depression and low physical activity level were modifiable risk factors for poor sleep quality. Within this context, in-service trainings should be planned to increase the awareness of health personnel working in primary health care institutions regarding risk factors for sleep quality, and adults should be monitored in terms of sleep quality and risk factors in health facilities. In addition, education and counseling services for adults on smoking, alcohol consumption, depression, and physical activity, should be improved and attempts to eliminate or reduce these risk factors through inter-sectoral cooperation should be planned. Finally, it is recommended that adults at risk for serious depression should be referred to secondary health care facilities.

#### Scientific Responsibility Statement

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

#### Animal and human rights statement

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

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#### Conflict of interest

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