

ORIGINAL ARTICLE

Sleep quality and related factors in individuals aged 20 and over consulting primary health care centers

 Zeynep Ceyda Buran¹,  Beyhan Cengiz Ozyurt²

¹MD., Research Assistant, Manisa Celal Bayar University, Faculty of Medicine, Department of Public Health, Manisa, Türkiye

²Prof. Dr., Manisa Celal Bayar University, Faculty of Medicine, Department of Public Health, Manisa, Türkiye

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Abstract

Objective: This cross-sectional study aimed to evaluate the prevalence of poor sleep quality and to identify related factors among adults.

Methods: This study was among adults aged ≥ 20 years registered at Primary Health Care Center in August-September 2022. Primary outcome was sleep quality, which was assessed by Pittsburgh Sleep Quality Index (PSQI). Secondary outcomes were sociodemographic, lifestyle, health characteristics, sleep-related factors, anxiety-depression. Chi-square test for categorical variables was used in univariate analysis, logistic regression models in multivariate analysis was used. SPSS version 23.0 was used for analysis, type-1 error accepted as 0.05.

Results: Participant's average age was 40.98 ± 13.68 years. 34.6% of participants had poor sleep quality. 12.7% of them had abnormal level anxiety while 8.5% had abnormal level depression. Between total PSQI score and anxiety-depression, there was a moderate positive correlation ($r=.375, p<0.001; r=.468, p<0.001$, respectively). Being older (RR=1.07(95%CI=1.04-1.10)); being female (RR=5.1(95%CI=1.9-13.6)); living in semi-urban area (RR=2.9(95%CI=1.3-6.5)); shift/part-time work (RR=3.9(95%CI=1.1-14.0)); smoking (RR=2.7(95%CI=1.1-6.7)); sleeping in dim light (RR=6.0(95%CI=2.5-14.5)) or sleeping in bright light (RR=9.5(95%CI=3.3-27.5)); being stressed (RR=5.0(95%CI=1.7-14.3)); borderline (RR=3.6(95%CI=1.1-11.3)) or abnormal level (RR=9.5(95%CI=2.6-34.4)) anxiety was found to be related to poor sleep quality.

Conclusion: One out of three people had poor sleep quality. Increasing age, gender, low socioeconomic status, negative lifestyle, poor sleep hygiene and mental health were associated with poor sleep quality. Health-promoting activities should be held to encourage individual's positive health behavior development, in chronic disease follow-ups, sleep quality should be questioned. Since sleep hygiene and mental health were important determinants of sleep quality, people should be informed about how to improve these.

Keywords: Sleep Quality, Sleep Hygiene, Anxiety, Primary Health Care

Correspondence: MD., Research Assistant, Zeynep Ceyda Buran, Manisa Celal Bayar University, Faculty of Medicine, Department of Public Health, Manisa, Türkiye **E-mail:** zeynep.ceyda.buran@gmail.com, **Phone:** +90 506 876 75 91

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INTRODUCTION

Sleep, which constitutes one-third of one's life and is a vital behavior, is one of the requirements of a healthy life and is a temporary state of unconsciousness that can be returned by sensory or other stimuli, but it is an active renewal period that provides rest and prepares person for life again.^{1,2} Sleep quality (SQ) is defined as feeling mentally and physically vigorous, rested, ready for next day after waking up, and includes quantitative (sleep latency, duration, number of awakenings) and subjective (depth, restfulness) components.^{3,4} Many negative cognitive, behavioral, physiological and emotional changes such as fatigue, distraction, irritability, mental disorder, tension in family and social relationships, loss of appetite or increased carbohydrate/fat intake, increased caffeine/alcohol intake and decreased pain threshold occur in the deprivation of sleep, which is required for the regular functioning of brain and energy storage.^{3,5-7} SQ-related problems are important since they are common and can be a symptom of many diseases.⁴ Epidemiological studies have suggested that poor SQ is related with mortality and many adverse health outcomes such as increased risk of high blood pressure, diabetes, corpulence, myocardial infarction, cardiovascular and psychiatric disease.^{8,9} as well as with a wide range of negative health outcomes. However, few studies have examined the association between sleep and self-rated health, particularly through the combination of sleep complaints. The objective of this study was to examine whether self-rated health is associated with sleep complaints, considering the combination of sleep duration, insomnia, and sleep sufficiency. This cross-sectional

study was performed in the 18 largest public hospitals in the city of Rio de Janeiro, Brazil. A total of 2518 female nurses answered a self-filled multidimensional questionnaire. The adjusted odds ratios and 95% confidence intervals (CIs) According to studies, 15-35% of the population suffer from widespread SQ disorders such as difficulty falling asleep and maintaining sleep.⁴

According to population-based 'National Study of Sleep Epidemiology in Adults' (TAPES) conducted by Turkish Sleep Medicine Society in 2010, frequency of poor SQ is 21.8%.¹⁰ Prevalence of poor SQ, which has a wide-interval, is between 15.0-53.0% in Turkey and 32.1-63.7% in other countries.¹¹⁻¹⁸ Conforming to an international multicenter study, 56.0% of those living in the United States (USA), 31.0% of those living in Western Europe, 23.0% of those living in Japan had sleep problems and prevalence of poor SQ ranged from 31.0% to 52.0%.¹⁹

Problems with SQ are especially associated with psychiatry; anxiety, depression, stress-related factors are the major concomitants.⁴ Age, body mass index, familial/social relationships, room temperature, electronic device use are also known to affect SQ.⁷ In literature, older age, low education and socioeconomic level, physical inactivity, obesity, smoking, having poor mental and physical health, shift working, poor sleep hygiene were found to be associated with poor SQ.^{11,20-22} While most studies suggest that SQ is worse in women, a few have found no association between gender and SQ.^{10,11,13-16,20} Also, prolonged use and addiction to electronic devices worsen SQ.^{23,24}

Due to lifestyle or environmental factors that disrupt SQ, which is necessary and important

for health and well-being, sleep problems occur over time and cause significant adverse health consequences. Considering that poor SQ prevalence will increase gradually, it emerges as an important social problem. Therefore, our study aimed to assess sleep quality, its relationship with anxiety-depression and other factors among adults aged ≥ 20 years.

METHODS

Study Design and Sampling

The research is a cross-sectional study. The study was conducted among adults aged ≥ 20 years registered at three Primary Health Care Center (PHC) in urban and semi-urban areas in August-September 2022. By stratifying the urban and semi-urban areas in Manisa according to their population, two PHCs from the urban area and one from the semi-urban area were randomly selected.

The population of this research consists of 349.813 individuals aged >20 years in Manisa city center. Sample size was calculated as 260 using Epi-Info StatCalc software, version 7.2.3.1 with a confidence interval of 95%, with an expected prevalence of 21.8%¹⁰ and the margin of error was 5%. Individuals aged ≥ 20 years who applied to the PHC at the time of the study and agreed to participate were included. In case of refusal to participate, data collection was continued until the determined sample size was reached.

Data Collection

Data were collected by face-to-face interview technique, after obtaining consent of participants by researchers, by using a structured questionnaire consisting of six sections. After filling the questionnaire, participants' height and weight were measured and recorded by researcher. 37

people refused to participate and 260 people were reached. The participation rate was 87.5% ($n=260/297$). The dependent variable of the study is SQ. To assess SQ, Pittsburgh Sleep Quality Index (PSQI) was used.

Study Instruments

Each person completed questionnaire about sociodemographic and lifestyle data (e.g., age, gender, marital status, smoking, physical activity), health (e.g., chronic conditions), sleep-related factors (e.g., caffeine consumption, lighting of the room), anxiety-depression (Hospital Anxiety-Depression Scale, detailed below) and SQ (PSQI, detailed below).

Hospital Anxiety-Depression Scale (HADS): The 14-item self-report scale was developed by Zigmond and Snaith in 1983 to evaluate the level of anxiety-depression, Aydemir et al. conducted Turkish reliability and validity study of the scale in 1997.^{25,26} HADS consist of two subscales; anxiety (1,3,5,7,9,11,13. items) and depression (2,4,6,8,10,12. items). Each item is scored from 0 to 3 points and total scores of subscales ranges from 0 to 21. A score between 0-7 considered normal, between 8-10 considered borderline, and ≥ 11 considered abnormal. The internal consistency coefficients (*Chronbach α*) are measured 0.85 for anxiety subscale and 0.78 for depression subscale.²⁶

Pittsburgh Sleep Quality Index (PSQI): PSQI was developed by Buysse et al. in 1989 to make a short and useful SQ assessment that is reliable, valid, standardized, easy to use and evaluate.⁴ Ağargün et al. conducted Turkish reliability and validity of PSQI in 1996.²⁷ Index consists of seven dimensions (subjective sleep quality, sleep latency, sleep duration,

habitual sleep efficiency, sleep disturbance, use of sleeping pills, daytime dysfunction) and 24-item; while first 19-item is based on self-report, last 5-item is answered by a bed partner/roommate. Last 5-item are not included in scoring and are solely used to obtain clinical info. Dimensions are scored from 0 to 3 points. By summing dimensions' points total PSQI score, ranging from 0 to 21, is obtained. While lower points indicate good SQ, higher ones indicate poor SQ. PSQI's cut-off point is 5; ≤ 5 considered good SQ, >5 considered poor SQ.⁴ The internal consistency coefficients (*Chronbach α*) are measured 0.80.

Statistical Analysis

Data were evaluated using SPSS version 23.0 (IBM SPSS Corp.; Armonk, NY, USA) statistical package program. Descriptive data were presented as frequencies and percentage (n%) for categorical variables, mean \pm standard deviation, median (min-max) for continuous variables. In data analysis, Chi-Square test was used for categorical data, logistic regression analysis was used for multiple analyses. Homer-Lemeshow test was used for model fit. Pearson correlation test was used to compare normally distributed continuous variables, while Spearman correlation test was used for non-normally distributed continuous data. $p < 0.05$ was considered statistically significant.

Ethical Approval

Ethical approval numbered 2023/1643 (January 04,2023) was obtained from the Health Sciences Ethics Committee of our institution. The study was carried out in accordance with the principles of the Declaration of Helsinki. Informed consent from participants was obtained. No financial

support was received, there is no conflict of interest.

RESULTS

Total of 260 participants were enrolled in the study. Average age was 40.98 ± 13.68 years and approximately $\frac{1}{3}$ of them were women. Of the participants, 13.1% were working shifts and 8.0% working part-time, and 21.9%'s income level was less than expenses. More than half of participants were overweight/obese, 24.2% were smokers, 46.2% were physically inactive, 43.8% had a chronic disease (Table-1).

Table 1. Demographic, Lifestyle and Health Characteristics of Participants (n=260)

Variable	n	(%)
Age Mean (SD)	40.98	(13.68)
Place of Residence		
Urban	111	42.7
Semi-Urban	149	57.3
Gender		
Female	166	63.8
Male	94	36.2
Educational Status		
Uneducated	17	6.5
Primary school	59	22.7
Secondary school	27	10.4
High school	65	25.0
University	92	35.4
Marital Status		
Married/Living With a Partner	181	69.6
Single	57	21.9
Divorced	11	4.2
Widowed	11	4.2
Having Children		
Yes	190	73.1
No	70	26.9
Family Structure		
Extended	17	6.5
Nuclear	226	86.9
Single-Parent Family	17	6.5
Employment Status		

Table 1. (continued) Demographic, Lifestyle and Health Characteristics of Participants (n=260)

Unemployed	123	47.3
Full-time	108	78.8
Part-time	11	8.0
Shift-work	18	13.1
Social Class		
Upper	134	51.5
Lower	126	48.5
Income Level		
More than expenses	54	20.8
Equal to expense	149	57.3
Less than expenses	57	21.9
Body Mass Index		
Normal	111	42.7
Overweight	99	38.1
Obese	50	19.2
Smoking		
Never	175	67.3
Former	22	8.5
Current	63	24.2
Alcohol Use		
Yes	101	38.8
No	159	61.2
Physical Activity		
Never	120	46.2
1-3 days/week	101	38.8
>3 days/week	39	15.0
Comorbidity		
Yes	114	43.8
No	146	56.2
Previous Psychiatric Disorder Diagnosed by A Physician		
Yes	32	12.3
No	228	87.7
Prescription Drug Use		
Yes	126	48.5
No	134	51.5
Perceived Health Status		
Very Bad	1	0.4
Bad	8	3.1
Not good, not bad	66	25.4
Good	155	59.6
Very good	30	11.5

SD: Standard Deviation

Of the participants, 94 consumed caffeinated beverages after 6.00 p.m., 112 used electronics before bed. While 15.8% of participants slept in bright room, 26.5% slept in dimly room. One fifth of the participants' perceived stress level in last month was bad/very bad. Table-2 shows other sleep-related factors.

Table 2. Sleep-Related Factors of Participants (n=260)

Variable	n	%
Amount Of Water Consumed Per Day		
≤1.5 L	39	15.0
1.6-2.4 L	89	34.2
≥2.5 L	132	50.8
Consumption Of Caffeinated Beverages After 6.00 pm		
Always	46	17.7
Usually	48	18.5
Sometimes	71	27.3
Rarely	37	14.2
Never	58	22.3
Eating In Last 2 Hours Before Bed		
Yes	101	38.8
No	159	61.2
Bedroom Lighting		
Dark	150	57.7
Dimly	69	26.5
Bright	41	15.8
Perceived Stress Level in The Last Month		
Very good	9	3.5
Good	105	40.4
Not good, not bad	90	34.6
Bad	39	15.0
Very Bad	17	6.5
Workplace Stress (n=137)		
Very good	5	3.6
Good	54	39.4
Not good, not bad	48	35.0
Bad	23	16.8
Very Bad	7	5.1
Using Electronics Before Bed		
Always	43	16.5
Usually	69	26.5
Sometimes	54	20.8
Rarely	42	16.2

Never	52	20.0
Owning a Pet		
Yes	39	15.0
No	221	85.0
Bed Type		
Orthopedic	232	89.2
Floor Bed	11	4.2
Sofa Bed	17	6.5
Assessment of Sleep Patterns		
Very good	15	5.8
Good	156	60.0
Not good, not bad	60	23.1
Bad	21	8.1
Very Bad	8	3.1

Among the participants, 33 had abnormal level anxiety and 22 had abnormal level depression (Table-3).

Variable	n	%
Anxiety Mean (SD)	5.42 (4.29)	
Normal	199	76.5
Borderline	28	10.8
Abnormal	33	12.7
Depression Mean (SD)	4.56 (3.91)	
Normal	202	77.7
Borderline	36	13.8
Abnormal	22	8.5

*SD: Standard Deviation, Hospital Anxiety and Depression Scale

Total PSQI score was 4.22 ± 3.04 , 34.6% had poor SQ. Mean scores obtained from sub-dimensions of PSQI are given in Table-4.

Table-5 shows factors associated with SQ in univariate analysis. SQ was significantly poorer among those aged more than 45 years, compared to younger participants ($p=.006$). Females also had poorer SQ compared to males ($p<.001$). While those secondary school and below education level

had poorer SQ compared to those above it ($p=.026$). Participants who were shift/part-time workers, were living a semi-urban area, had less income than expenses, had comorbidity, were overweight/obese, were smoking had poorer SQ (respectively; $p=.004$, $p<.001$, $p=.017$, $p=.025$, $p=.014$, $p=.002$). It was found that SQ of those who consumed caffeinated beverages after 6.00 p.m., slept in a lighted room, had bad/very bad stress level in the last month and had bad/very bad workplace stress, used electronics before bed, had abnormal level anxiety and depression is poorer (respectively; $p=.002$, $p<.001$, $p<.001$, $p<.001$, $p=.021$, $p<.001$, $p<.001$). Correlation analysis between total PSQI score and anxiety-depression showed a moderate positive correlation between total PSQI score and anxiety and depression (respectively; $r=.375$, $p<0.001$; $r=.468$, $p<0.001$).

PSQI Sub-Dimensions	Mean \pm SD	
Subjective Sleep Quality	1.06 \pm 0.69	
Sleep Latency	0.94 \pm 0.97	
Sleep Duration	0.34 \pm 0.71	
Habitual Sleep Efficiency	0.12 \pm 0.48	
Sleep Disturbance	1.04 \pm 0.51	
Use Of Sleeping Pills	0.09 \pm 0.46	
Daytime Dysfunction	0.63 \pm 0.83	
Total PSQI Score	4.22 \pm 3.04	
Variable	n	%
Sleep Quality		
Good Sleep Quality	170	65.4
Poor Sleep Quality	90	34.6

* SD: Standard Deviation, PSQI: Pittsburg Sleep Quality Index, SD: Standard Deviation

Table 5. Factors Associated with Sleep Quality (n=260)					
Variable	Sleep Quality				p
	Good Sleep Quality		Poor Sleep Quality		
	n	%	n	%	
Age					
<30	53	75.7	17	24.3	0.006**
31-45	65	67.7	31	32.3	
>45	52	55.3	42	44.7	
Gender					
Female	94	56.6	72	43.4	<0.001*
Male	76	80.9	18	19.1	
Place of Residence					
Semi-Urban	55	49.5	56	50.5	<0.001*
Urban	115	77.2	34	22.8	
Educational Status					
Secondary school and below	59	57.3	44	42.7	0.026*
High school and above	111	70.7	46	29.3	
Employment Status					
Unemployed	76	70.4	32	29.6	0.004*
Full-time	83	67.5	40	32.5	
Shift-work/Part-time	11	37.9	18	62.1	
Social Class					
Lower	74	58.7	52	41.3	0.029*
Upper	96	71.6	38	28.4	
Having Children					
Yes	116	61.1	74	38.9	0.016*
No	54	77.1	16	22.9	
Income Level					
More than expenses	39	72.2	15	27.8	0.017**
Equal to expense	102	68.5	47	31.5	
Less than expenses	29	50.9	28	49.1	
Body Mass Index					
Normal	79	71.2	32	28.8	0.014**
Overweight	66	66.7	33	33.3	
Obese	25	50.0	25	50.0	
Smoking					
Yes	31	49.2	32	50.8	0.002*
No	139	70.6	58	29.4	
Physical Activity					
Never	71	59.2	49	40.8	0.030**
1-3 days/week	69	68.3	32	31.7	
>3 days/week	30	76.9	9	23.1	
Comorbidity					
Yes	66	57.9	48	42.1	0.025*
No	104	71.2	42	28.8	

Table 5. (countinued) Factors Associated with Sleep Quality (n=260)					
Previous Psychiatric Disorder Diagnosed by A Physician					
Yes	10	31.3	22	68.8	<0.001*
No	160	70.2	68	29.8	
Perceived Health Status					
Good/Very Good	137	74.1	48	25.9	<0.001**
Not good, not bad	32	48.5	34	51.5	
Bad/Very Bad	1	11.1	8	88.9	
Amount Of Water Consumed Per Day					
≤1.5 L	18	46.2	21	53.8	0.001**
1.6-2.4 L	54	60.7	35	39.3	
≥2.5 L	98	74.2	34	25.8	
Consumption of Caffeinated Beverages After 6.00 pm					
Never/Rarely	71	74.7	24	25.3	0.002**
Sometimes	49	69.0	22	31.0	
Always/Usually	50	53.2	44	46.8	
Bedroom Lighting					
Dark	126	84.0	24	16.0	<0.001**
Dimly	30	43.5	39	56.5	
Bright	14	34.1	27	65.9	
Perceived Stress Level in The Last Month					
Good/Very Good	92	80.7	22	19.3	<0.001**
Not good, not bad	61	67.8	29	32.2	
Bad/Very Bad	17	30.4	39	69.6	
Workplace Stress (n=137)					
Good/Very Good	48	81.4	11	18.6	<0.001**
Not good, not bad	29	60.4	19	39.6	
Bad/Very Bad	10	33.3	20	66.7	
Using Electronics Before Bed					
Never/Rarely	69	73.4	25	26.6	0.021**
Sometimes	36	66.7	18	33.3	
Always/Usually	65	58.0	47	42.0	
Bed Type					
Orthopedic	158	68.1	74	31.9	0.017*
Floor Bed	6	54.5	5	45.5	
Sofa Bed	6	35.3	11	64.7	
Anxiety					
Normal	156	78.4	43	21.6	<0.001**
Borderline	9	32.1	19	67.9	
Abnormal	5	15.2	28	84.8	
Depression					
Normal	147	72.8	55	27.2	<0.001**
Borderline	18	50.0	18	50.0	
Abnormal	147	72.8	55	27.2	

*Chi-Square Test **Chi-Square Test for Trend; Only statistically significant variables given.

Statistically significant variables with SQ in univariate analysis were included to multivariate analysis. Four models were performed in multivariate analysis (Table-6 and Table-7). As shown in Table-7, according to final model (Model-4), being older (RR=1.07(95%CI=1.04-1.10)); being female (RR=5.1(95%CI=1.9-13.6)); living in a semi-urban area (RR=2.9(95%CI=1.3-6.5)); shift/

part-time work (RR=3.9(95%CI=1.1-14.0)); smoking(RR=2.7(95%CI=1.1-6.7));sleepingin dim (RR=6.0(95%CI=2.5-14.5)) or bright light (RR=9.5(95%CI=3.3-27.5)); being stressed (RR=5.0(95%CI=1.7-14.3)); borderline (RR=3.6(95%CI=1.1-11.3)) or abnormal level anxiety (RR=9.5(95%CI=2.6-34.4)) increased the risk of poor SQ [p<.001,p=.003,p=.032,p=.001;respectively.]

Table 6. Factors Associated with Sleep Quality in Multivariate Analysis* (n=260)

Variable	MODEL 1		MODEL 2	
	p**	RR (95% CI)	p**	RR (95% CI)
Sociodemographic Characteristics				
Age	<.001	1.04 (1.02-1.07)	<.001	1.05 (1.02-1.07)
Gender				
Male (Reference)		1 (Ref)		1 (Ref)
Female	<.001	3.5 (1.8-7.0)	<.001	4.4 (2.1-9.0)
Place of Residence				
Urban (Reference)		1 (Ref)		1 (Ref)
Semi-Urban	<.001	3.3 (1.8-6.0)	<.001	3.0 (1.6-5.5)
Employment Status				
Full-time (Reference)		1 (Ref)		1 (Ref)
Unemployed	.204	0.6 (0.3-1.3)	.324	0.7 (0.4-1.4)
Shift-work/Part-time	.008	3.7 (1.4-9.7)	.010	3.6 (1.4-9.4)
Lifestyle and Health Characteristics				
Smoking				
No (Reference)	-	-		1 (Ref)
Yes	-	-	.003	2.9 (1.4-5.5)
R²		0.289		0.341

*Only statistically significant variables given; ****Binary Logistic Regression (Backward-Wald); RR: Risk Ratio; CI: Confidence Interval; R²: Coefficient of Determination.

Variables Included in Models;

Model 1: Age, Place of Residence, Gender, Educational Status, Employment Status, Income Status

Model 2: Model 1 + Smoking, Body Mass Index, Physical Activity, Comorbidity

Table 7. Factors Associated with Sleep Quality in Multivariate Analysis* (n=260)

Variable	MODEL 3		MODEL 4	
	<i>p</i> **	RR (95% CI)	<i>p</i> **	RR (95% CI)
Sociodemographic Characteristics				
Age	<.001	1.07 (1.04-1.10)	<.001	1.07 (1.04-1.10)
Gender				
Male (Reference)		1 (Ref)		1 (Ref)
Female	<.001	5.3 (2.1-13.1)	.001	5.1 (1.9-13.6)
Place of Residence				
Urban (Reference)		1 (Ref)		1 (Ref)
Semi-Urban	.001	3.7 (1.7-7.8)	.008	2.9 (1.3-6.5)
Employment Status				
Full-time (Reference)		1 (Ref)		1 (Ref)
Unemployed	.246	0.6 (0.3-1.4)	.082	0.5 (0.2-1.1)
Shift-work/Part-time	.012	4.8 (1.4-16.5)	.039	3.9 (1.1-14.0)
Lifestyle and Health Characteristics				
Smoking				
No (Reference)		1 (Ref)		1 (Ref)
Yes	.019	2.7 (1.2-6.4)	.025	2.7 (1.1-6.7)
Sleep-Related Factors				
Bedroom Lighting				
Dark (Reference)		1 (Ref)		1 (Ref)
Dimly	<.001	6.2 (2.7-14.4)	<.001	6.0 (2.5-14.5)
Bright	<.001	11.4 (4.1-31.8)	<.001	9.5 (3.3-27.5)
Perceived Stress Level in The Last Month				
Good/Very Good (Reference)		1 (Ref)		1 (Ref)
Not good, not bad	.407	1.4 (0.6-3.3)	.638	1.2 (0.5-2.9)
Bad/Very Bad	<.001	7.1 (2.7-18.4)	.003	5.0 (1.7-14.3)
Anxiety				
Normal	-	-		1 (Ref)
Borderline	-	-	.032	3.6 (1.1-11.3)
Abnormal	-	-	.001	9.5 (2.6-34.4)
R²		0.595		0.643

*Only statistically significant variables given; Hosmer&Lemeshow $\chi^2=12.513$, $df=8$, $p=0.130$; Constant $\beta=-7.162$, $p<0.001$; ****Binary Logistic Regression (Backward-Wald); RR: Risk Ratio; CI: Confidence Interval; R²: Coefficient of Determination; df: Degrees of Freedom.

Variables Included in Models;

Model 3: Age, Place of Residence, Gender, Educational Status, Employment Status, Income Status, Smoking, Body Mass Index, Physical Activity, Comorbidity + Consumption of Caffeinated Beverages After 6.00 pm, Bedroom Lightning, Perceived Stress Level in The Last Month, Using Electronics Before Bed, Bed Type

Model 4: Model 3 + Anxiety, Depression

DISCUSSION

In this study, 34.6% of participants reported poor SQ. According to TAPES, frequency of poor SQ was 21.8%.¹⁰ In two studies conducted with people who applied to PHC in Ankara and İzmir, poor SQ prevalence were found to be 36.1%, 15.0%, respectively.^{11,13} In population-based studies in Austria, Spain, Germany, Iran poor SQ prevalence were 32.1%, 38.2%, 35.2%, 37.0%, respectively, while unlike ours, a study in China among retirees reported as 53.0%.^{14-16,18,28} Considering that SQ tends to worsen with age, difference can be explained by the higher average age of the study conducted in China compared to this study. Our rate was higher from TAPES in 2010 but similar to study in Ankara in 2021; which shows that poor SQ problem has increased over years and started to become a public health problem.

We found that with increasing age SQ gets worse (RR=1.07;95%CI=1.04-1.10). Likewise, studies conducted in İzmir, Nevşehir, Austria, Iran supports our findings.^{11,12,14,28} In line with a population-based study conducted in Spain, age was directly related to poor SQ (RR=1.05;95%CI=1.03-1.06).¹⁵ As getting older; frequent waking up at night, changes in sleep patterns, difficulty in falling asleep, decreased total time spent in sleep, light sleep

or chronic diseases (such as incontinence, chronic pain) occur and cause poor SQ.

In this study, being female was an independent risk factor for poor SQ (RR=5.1;95%CI=1.9-13.6). Our findings are in line with literature.^{11,14,22,28} According to other studies conducted in China, Australia, Spain, Nevşehir, SQ was poorer in women, with an RR of 1.42 (95%CI=1.32-1.53), 1.53 (95%CI=1.23-1.90), 1.88 (95%CI=1.54-2.28), 2.31 (95%CI=1.55-73.46), respectively.^{12,15,16,24} Also in TAPES, RR was 1.8 (95%CI=1.5-2.1) for women.¹⁰ Women have more difficulty falling and staying asleep as well as being more prone to developing sleep disorders (such as insomnia, restless legs syndrome) than men. Moreover, hormonal changes due to pregnancy, menstrual cycle or menopause can cause insomnia in women, which explains the risk of poor SQ.

In our research, SQ was worse in those with low socioeconomic status (LSES) (low education level, income less than expenses, lower social class, living in semi-urban areas); risk was 2.9 times (95%CI=1.3-6.5) higher among those living in semi-urban areas. Similar to our results, according to a population-based study in China, poor SQ frequency was 1.1 times higher (RR:1.12;p=0.002) in those living in semi-urban areas than those living in urban areas.²⁹ As indicated in the report using the National Health Interview Survey 2020 data; in USA, percentage of adults having difficulty falling asleep increased as settlement became more rural, education and income level decreased; and the percentage of adults having difficulty staying asleep increased as income level decreased and settlement became more rural.³⁰ Based on studies conducted in İzmir and Ankara, SQ became more poorer with

lower income and education level.^{11,13} A study with university students in Denizli found that SQ was 1.8 times (95%CI=1.2-2.6) worse in those with less income than their expenses.²³ Socioeconomic factors (such as income, education, employment status, environment) substantially shape people's sleep health; in LSES, individuals' sleep duration is insufficient and quality is poor. Not only do people with higher household incomes feel well-rested, but improved housing quality also leads to noticeable improvements in SQ. Furthermore, SQ may have been found to be lower because people in semi-urban areas were mostly women and shift workers, their anxiety-depression levels were significantly higher, and their socioeconomic levels were lower.

Multiple logistic regression model showed that shift/part-time working was associated with higher odds of poor SQ (RR=3.9;95%CI=1.1-14.0). In parallel with this study, studies conducted in England and Denizli found that shift work increased poor SQ risk by 2.5 (95%CI=1.6-3.7) and 4.9-times (95%CI=1.7-14.3), respectively.^{31,32} Shift workers' sleep is oft interrupted; due to sleep-wake circadian rhythm misalignment, particularly in night shift workers, deep sleep times are shortened, thereby sleepiness occurs during day. Along with working-environment-related factors (such as noise, stress), SQ may have been found to be worse inasmuch as shift workers were mostly live in semi-urban areas and their socioeconomic levels were lower.

As stated in our results, negative lifestyle and health status (smoking, physical inactivity, overweight/obesity, chronic disease, low water consumption) were found to cause poor

SQ; risk was 2.7-fold greater (95%CI=1.1-6.7) in smokers. Likewise, a study conducted in İzmir determined that SQ worsened with increase in BMI, also having chronic disease increased risk by 2.94 times (95%CI=1.04-8.32).¹¹ Conforming to study conducted in Ankara, smoking, having comorbidity, being physically inactive were risky in terms of poor SQ.¹³ According to a study in Konya, university students' SQ deteriorated due to smoking, being physically inactive, having a health problem that prevents sleep.²¹ A study in Denizli found that having chronic diseases worsened SQ, and smoking increased risk 1.5-times (95%CI=1.1-2.1), not doing physical activity 1.7-times (95%CI=1.3-2.2).²³ Based on a research in China, risk is 1.16-times more (95%CI=1.07-1.25%) in those with comorbidity, 1.14-times (95%CI=1.05-1.23) more in those who are physically inactive.¹⁶ Another study in Australia noticed that smoking increased poor SQ risk (RR=1.8;95%CI=1.1-2.9), yet engaging physical activity three or more times a week was protective.²⁴ Physical activity may have had a positive effect on SQ, via making easy to fall asleep, increasing non-REM/REM sleep, and providing rest. Obesity, one of the leading causes of sleep apnea, and chronic disease-related symptoms namely dyspnea, frequent urination, and pain can cause poor sleep quality by often disrupting night sleep. Falling asleep difficulty owing to nicotine's stimulant effect and low total sleep time due to chronic nicotine intake explains poor SQ.

According to our results, SQ of those having negative sleep hygiene (consuming caffeinated beverages in late hours, sleeping with lights on, dealing electronic devices before bed, uncomfortable mattress) was poorer. Dim light at night increased risk by 6.0-fold

(95%CI=2.5-14.5), bright light increased 9.5-fold (95%CI=3.3-27.5); other than these variables wasn't significant in multivariate analysis. Similar to our results, according to a study in Konya, sleeping in an environment that is not dark enough and consuming high amounts of caffeine were associated with poor SQ.²¹ Study conducted in Denizli stated that SQ was worse in those consuming more coffee/caffeinated beverages on weekly basis and using phone/tablet one hour before bed.²³ A research from South Korea reported that light exposure at night causes frequent awakenings, impairs sleep depth and stability.³³ Individuals with poor sleep hygiene oft fall asleep with lights on. Light is one of main synchronizers of sleep-wake cycle; in presence of light (including blue-light originating from phone/tablet/TV screens), secretion of melatonin, which is responsible for depth and quality of sleep, is inhibited, and even if people sleep, complete rest is not achieved owing to melatonin deficiency. Additionally, delaying bedtime because of using phone/tablet/TV can cause poor SQ.

Lastly, poor mental health (previously diagnosed psychiatric disorder, being stressed in last month and at work, abnormal anxiety and depression) was related to poor SQ; borderline anxiety increased risk by 3.6-times (95%CI=1.1-11.3), abnormal level anxiety by 9.5-times (95%CI=2.6-34.4), being stressed by 5-times (95%CI=1.7-14.3). Our findings are in line with other researches. Study conducted in Brazil found that adults with anxiety-depression had poor SQ and anxiety increased risk 1.32-times (95%CI=1.08-1.62).²² In a study, SQ of those with previously diagnosed psychiatric disorders was 3.6 times poorer (95%CI=1.7-7.8).¹² In literature, a significant positive correlation has been shown between

SQ and anxiety-depression.^{21,34} Stress, depressive disorder, anxiety, mood changes such as fear, joy, sadness in daily life prevent falling asleep by causing people excessively think about their worries in bed and by causing tension. Also, dreams become more disturbing, sustainability of sleep is reduced, so sleep is often interrupted. Simultaneously, sleep deprivation and sleep pattern/quality disorder can also trigger anxiety. While sleep disorders and poor SQ can cause anxiety, depression and stress, poor SQ in cases of anxiety, depression and stress may also explain the relationship.

Limitations-Strengths

There are some limitations in our research. Firstly, due to COVID-19 pandemic and problems in obtaining permits for research, our study was not conducted at community level, therefore results should be interpreted cautiously. Second, the fact that participants contain only those who willing to participate in study may have caused subject bias. Using internationally valid scales to determine SQ and anxiety-depression level, carrying out the study in those consulting PHCs, collecting data by face-to-face interview technique, measurement of anthropometric features by researchers are the strengths of our research.

CONCLUSION

Poor SQ was found to be a continues common problem in society, with one out of every three people in our research.

Increasing age, being woman, low income/education level, living in semi-urban area, shift/part-time work, negative lifestyle factors and chronic disease, poor sleep hygiene and anxiety-depression were associated with an increased risk of poor SQ.

In order to improve SQ, health-promoting activities such as preventing obesity, increasing physical activity, preventing smoking, encouraging individuals to quit smoking and directing them to smoking cessation polyclinics should be arranged in primary care and workplace primary care (occupational medicine). Especially sleep patterns of elderly people, women, shift/part-time workers should be monitored more closely, counseling should be given during follow-up of chronic diseases, individuals should be referred to specialists when necessary.

Poor sleep hygiene and mental health were also important determinants; it is recommended to provide information under the leadership of primary care to increase sleep hygiene, to expand mental health services in primary care, and to refer stressed/anxious individuals to psychologists/psychiatrists in case of detection.

Future research may focus on identifying high-risk groups in terms of poor sleep quality, more detailed evaluation of sleep hygiene, and developing interventions to reduce stress and anxiety level and to improve sleep health, along with evaluating the efficiency of those interventions. Moreover, it may be beneficial for future studies to be community-based to identify other causes concerning poor sleep quality.

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