



# Sleep disorders, sleep quality, and health-related quality of life in patients with cancer in Turkey: a multi-center cross-sectional survey

Vesile Şenol<sup>1</sup>, Zekeriya Temircan<sup>2</sup>

<sup>1</sup>Department of Nutrition and Dietetics, School of Health Science, Kapadokya University, Nevşehir, Turkey

<sup>2</sup>Department of Psychology, Faculty of Humanities, Kapadokya University, Nevşehir, Turkey

**Received** Sep 19, 2023  
**Revised** Jan 16, 2024  
**Accepted** Jan 18, 2024

#### Corresponding author

Zekeriya Temircan  
Department of Psychology, Faculty of Humanities, Kapadokya University, Kapadokya Yerleşkesi, Yeni, Nevşehir 50420, Turkey  
Tel: 90-555-071-7938  
Fax: 90-384-353-5125  
E-mail: zekeriya.temircan@kapadokya.edu.tr

#### Keywords

Disorders of excessive somnolence; Neoplasms; Quality of life; Restless legs syndrome; Sleep initiation and maintenance disorders

**Objectives:** The present study aims to examine the frequency of sleep disorders and the level of sleep quality, as well as their relationship with health-related quality of life in cancer patients.

**Methods:** This multi-center cross-sectional survey included 333 cancer patients ranging in age from 16 to 72 years, between June 15, 2017, and August 30, 2018 at the Ankara Oncology Hospital and Erciyes University Kemal Dedeman Oncology Hospital Polyclinic. Data were collected via various surveys conducted through face-to-face interviews, including following measurement tools: Short Form 36 Health Questionnaire, the Pittsburgh Sleep Quality Index, the Epworth Sleepiness, and the Berlin Sleep Questionnaire for obstructive sleep apnea. Face-to-face interviews were carried out with patients who presented for an initial examination or follow-up and were awaiting their appointments.

**Results:** The most commonly reported sleep disorders were daytime sleepiness (36.9%), sleep respiratory disorders (34.8%), insomnia (29.4%), and parasomnias (28.8%). Good sleepers were found to have significantly higher physical ( $40.20 \pm 10.08$  vs.  $33.21 \pm 8.06$ ;  $P < 0.001$ ) and mental component scores ( $43.54 \pm 8.25$  vs.  $38.20 \pm 7.52$ ;  $P < 0.001$ ) than poor sleepers. Conversely, individuals with insomnia ( $P < 0.01$ ), daytime sleepiness ( $P < 0.001$ ), sleep-respiratory disorders ( $P < 0.05$ ), and bruxism ( $P < 0.001$ ) showed significantly lower scores in both physical and mental components. Additionally, those with restless legs syndrome had a significantly lower physical component score ( $P < 0.001$ ), and those with parasomnias had significantly lower mental component scores.

**Conclusion:** Cancer patients exhibited moderate average sleep quality scores, with over half of them demonstrating low quality sleep patterns. Sleep disorders significantly impacted their health-related quality of life.

## Introduction

### Background

Cancer's rising incidence, partly due to an aging population, is noteworthy. By 2030, the number of older adults with cancer is expected to increase by 67% from 2010 in the United States [1]. Advances in early detection and treatment have extended cancer patients' life expectancy. Consequently, effective treatment, minimizing treatment side effects, and improving patients' quality of life (QoL) are vital goals. Identifying factors that hinder cancer patients' daily activities, functional capacity, and QoL is crucial. Factors like pain, depression, fatigue, and sleep disorders

still significantly affect their QoL [2,3].

Sleep disorders, affecting 9%–33% across ages [4], are particularly concerning for cancer patients, impairing their daily life and health-related QoL (HRQoL) [5,6]. These disorders are more severe in cancer patients due to the disease's direct impact, treatment side effects, and comorbid conditions [7]. Insomnia, a common sleep disorder, affects daily activities and is more prevalent in cancer patients (30%–69%) compared to the general adult population (30%) and elderly (23%–50%) [8]. In some cancer cases, insomnia prevalence can be as high as 30%–93% [9].

Sleep disorders and symptom burden greatly diminish older cancer patients' health, functionality, and QoL, potentially worsening disease progression and side effects [10]. Older patients with sleep disturbances face physical and psychosocial challenges, including musculoskeletal, gastrointestinal issues, anxiety, and depression [11]. Insomnia correlates with reduced daily activity, increased fall risk, and cognitive issues [12]. Factors like hospitalization, pain, treatment side effects, immune alterations, and physiological changes contribute to sleep disorders. Insomnia, combined with depression and anxiety, can adversely affect long-term QoL. It impairs immune functions by altering cytokine expression, impacting disease trajectory and mortality [13]. Insomnia is also associated with decreased natural killer cell numbers and activity due to abnormal cortisol synthesis [13,14]. Recognizing, diagnosing, and treating sleep disorders in cancer patients are essential. This helps manage disease prognosis, prevent recurrence, and enhance patient QoL. Despite their importance, sleep disorders are often overlooked in patient care.

### **Objectives**

This study aimed to evaluate sleep disorders and sleep quality, along with their impact on the overall QoL, by using universally recognized measurement tools that are highly sensitive and specific. These tools were based on self-reported data and diagnostic questions administered to cancer patients.

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## **Methods**

### **Ethics statement**

The Ethics Committee in Clinical Research on Human Subjects at Erciyes University, Faculty of Medicine, approved this study (Decision date and no.: 2013/232). All participants provided both verbal and written consent before data collection commenced.

### **Study design**

This was a multi-center cross-sectional survey study. It was described according to the STROBE statement (<https://www.strobe-statement.org/>).

### **Setting**

This study was conducted with 333 volunteer cancer patients ranging in age from 16 to 72 years, between June 15, 2017, and August 30, 2018. Face-to-face interviews were carried out with patients who presented at the Ankara Oncology Hospital and Erciyes University Kemal Dedeman Oncology Hospital Polyclinic for an initial examination or follow-up and were awaiting their appointments. As tools for data collection, we utilized self-administered questionnaires, scales, indexes, and a selection of diagnostic and support questions.

**Participants**

Participants who were unable to complete the interview and questionnaires due to medical reasons (e.g., cognitive impairment), were excluded from the study. The response rate was 90%.

**Variables**

Demographic data and topics of questionnaires were outcome variables.

**Measurement**

The research data were collected using questionnaires that addressed sociodemographic variables (8 questions), the Short Form 36 Health Questionnaire (SF-36; 11 questions) [15], the Pittsburgh Sleep Quality Index (PSQI; 19 questions), the Epworth Sleepiness Scale (ESS; 8 questions) [16,17], and the Berlin Sleep Questionnaire for obstructive sleep apnea (10 questions) [18]. Additional information was obtained through questions derived from the original scales' global diagnostic criteria for insomnia (3 questions) [19], parasomnias (6 questions), restless legs syndrome (RLS; 5 questions) [20], and bruxism (3 questions). A more specific description on the measurement tools are presented in Supplement 1. Socio-demographic data was obtained from the participants that are presented in Supplement 2.

**Bias**

Since the subject population participated in this survey study voluntarily, there may be sampling bias. The persons who did not participated in the study, may be in worse health or a state of lack of strength.

**Study size**

Sample size estimations were not made since only voluntary participants were included during the limited period.

**Statistical methods**

The data were analyzed using the IBM SPSS Statistics Standard Concurrent User V 25 (IBM, Armonk, NY, USA) software. To assess the normality of quantitative variables, the Shapiro-Wilk test was employed. Descriptive statistics for continuous numerical variables that followed a normal distribution are presented as the mean±SD. For variables that conformed to parametric assumptions, Student's t-test was utilized, while the Mann-Whitney U test was applied to those that did not. The chi-square test and Fisher exact test were used for categorical variables. Sleep disorders were converted into dichotomous (yes/no) data by employing global scale/index scores, cut-off points, and diagnostic criteria questions. Linear regression analysis was conducted to determine the impact of sleep disorders and sleep quality on physical and mental health QoL. In this analysis, the physical health QoL summary score (PCS) and mental health QoL summary score (MCS) were treated as dependent variables. Independent variables included the PSQI, RLS, sleep-disordered breathing, parasomnias, daytime sleepiness, and total insomnia scores. The significance level for statistical evaluation was set at  $P < 0.05$ .

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**Results****Participants**

Socio-demographic characteristics were presented in Table 1. A significant proportion

**Table 1.** Socio-demographic characteristics of oncology patients (n=333)

Variables	No.	%
Gender		
Female	188	56.5
Male	145	43.5
Age group (years), mean±SD: 50.81±11.31 (min-max:16–72)		
16–35	32	9.6
36–45	59	17.7
46–55	109	32.7
56–72	133	39.9
Marital status		
Married	291	87.4
Single/separated/widowed	42	12.6
Educational status		
Primary school	148	44.4
Secondary and high school	103	30.9
University	26	7.8
Monthly income (TL), mean±SD: 1,409.10±818.45 (min-max: 200–5,900)		
Low (200–1,400)	194	58.3
Middle (1,401–5,900)	139	41.7
Active working status		
Working	54	16.2
Not working	279	83.8
Smoking		
Yes	40	12
No	293	88.8
Alcohol consumption		
Yes	24	7.2
No	309	92.8
PSQI, mean±SD: 6.17±3.83		
Good sleepers (≤5 points)	136	40.8
Poor sleepers (>5 points)	181	59.2
Stage of cancer		
Receiving treatment	261	78.3
Completed treatment	72	21.7
Types of treatment		
Chemotherapy	86	25.8
Radiotherapy	5	1.5
Chemotherapy+radiotherapy	47	14.1
Treatment for medical support	9	2.7
Chemotherapy and medical support	80	24
Chemotherapy, radiotherapy, and medical support (e.g., pain control, intake drugs and screening)	70	21
Surgery	48	14.4
Unknown	36	10.8

TL, Turkish lira; PSQI , Pittsburgh Sleep Quality Index.

of cancer patients (83.8%) reported being unemployed, non-smokers (88.8%), and non-alcohol drinkers (92.8%)<sup>1</sup>. Regarding treatment, 25.8% of cancer patients underwent isolated chemotherapy, 1.5% received only radiotherapy, and 14.1% underwent a combination of chemotherapy and radiotherapy.

## Main results

### *Number of cancer patients according to the organs or systems, and sex*

When assessing the prevalence of cancer by sex, cancers of the respiratory system were the most common in men, accounting for 33.8% of cases. Cancers of the gastrointestinal system followed at 25.5%, and hematological cancers ranked third at 20.0%. In women, cancers of the breast and endocrine organs were the most prevalent, making up 41.5% of cases. Gynecological cancers, including those of the ovary, fallopian tubes, uterus, cervix, vagina, and vulva, were the second most common (18.1%), and hematological cancers were the third most common, representing 13.3% of cases.

Number of cancer patient according to organs or systems are presented in Table 2.

### *Ages of cancer patients*

Approximately 40% of the participants were elderly. The treatments for these patients typically include chemotherapy and radiotherapy. The most common types of cancer among the elderly were breast and endocrine system cancers (including breast and thyroid) at 48.5%, respiratory system cancers (such as lung, bronchus, and oto-rhino-laryngeal) at 33.2%, and gastrointestinal system cancers (including colorectal, hepatobiliary, and pancreatic) at 18.3%. Compared to other age groups, elderly participants tended to have the same types of cancers. The prevalence of sleep disorders among elderly cancer patients was as follows: daytime sleepiness in 41.3% (55 individuals), sleep-related respiratory disorders in 27% (36 individuals), insomnia in 20.3% (27 individuals), and parasomnias in 11.4% (15 individuals). It is noteworthy that RLS and bruxism were not observed as sleep disorders in this group, although they were common among other participants.

### *Sleep disorders*

The prevalence of sleep disorders among cancer patients was presented in Table 3. While sleep disorders did not show statistically significant relationships with sex, with the exception of

**Table 2.** Distribution of cancer according to organs or systems by gender

Types of cancer	No. (%)			Statistical assessment $\chi^2/P$
	Male	Female	Total	
Gastrointestinal system (esophagus, stomach, duodenal, colorectal, hepatobiliary, pancreatic) cancers	37 (69.8)	16 (30.2)	53 (15.9)	17.692/<0.001
Hematological (lymphoma, leucemia, multiple myeloma, etc.) cancers	29 (53.7)	25 (46.3)	54 (16.2)	1.663/0.231
Breast-endocrine (breast, thyroid, etc.) system cancers	0 (0.0)	78 (100)	78 (23.4)	78.61/<0.001
Gynecological (ovarian, tubal, uterine, cervical, vaginal, vulvar) cancers	0 (0.0)	35 (100)	35 (10.2)	29.205/<0.001
Respiratory system (lung-bronchial, oto-rhino-laryngeal) cancers	49 (84.5)	9 (15.5)	58 (17.4)	33.434/<0.001
Other (skin and its appendages; malignant melanoma, squamous cell, orthopedic, primary bone, etc.) cancers	30 (53.6)	26 (46.4)	56 (16.8)	2.754/0.198

**Table 3.** Distribution of cancer patients with sleep disorders according to gender

Sleep disorders	No. (%)			$\chi^2/P$
	Male	Female	Total	
Restless legs syndrome	29 (20.0)	48 (25.5)	77 (23.1)	1.409/0.242
Insomnia	48 (33.1)	50 (26.6)	98 (29.4)	1.669/0.196
Parasomnias	50 (34.5)	46 (24.5)	96 (28.8)	4.002/0.045
Excessive daytime sleepiness	56 (38.6)	67 (35.6)	123 (36.9)	0.313/0.576
Sleep respiratory disorders	50 (34.5)	66 (35.1)	116 (34.8)	0.014/0.906
Bruxism	28 (19.3)	26 (13.8)	54 (16.2)	1.810/0.180

parasomnias, they tended to be more severe in men. Excessive daytime sleepiness (38.6% vs. 35.6%), sleep respiratory disorders (38.6% vs. 34.9%), insomnia (33.1% vs. 26.6%), parasomnias (34.5% vs. 24.5%,  $P=0.045$ ), and bruxism (19.3% vs. 13.8%) were more prevalent in men than in women. Conversely, RLS, which was generally reported in 23.1% of patients, was more common in women than in men (25.5% vs. 20.0%; Table 3).

### *Sleep quality*

The mean PSQI score among cancer patients was  $6.17 \pm 3.83$  (95% CI, 5.75–6.58;  $P < 0.001$ ). Of these patients, 136 (40.8%) had normal (good) sleep quality, with PSQI scores of 5 or less, while 181 (59.2%) experienced poor sleep quality, with PSQI scores ranging from 6 to 16. The mean PSQI score for men was slightly higher at  $6.30 \pm 3.82$ , compared to  $6.06 \pm 3.85$  for women, although this difference was not statistically significant ( $P > 0.05$ ; Table 1). All sleep disorders, except for parasomnias, showed significant associations with sleep quality (Table 4).

Upon investigating the relationship between mean PSQI scores, sleep quality level, and sleep disorders, it was revealed that individuals experiencing excessive daytime sleepiness (36.9%) had a mean PSQI score of  $7.47 \pm 3.99$  ( $P < 0.001$ ), with 61.8% of them exhibiting poor sleep quality ( $\chi^2=12.079$ ,  $P=0.001$ ). Additionally, a significant positive association was noted between daytime sleepiness and sleep quality ( $\chi^2=20.486$ ;  $P < 0.001$ ). Those with sleep-disordered breathing (34.8%) had a mean PSQI score of  $8.67 \pm 3.83$  ( $P < 0.001$ ), and 58.6% were found to have poor sleep quality ( $\chi^2=12.079$ ,  $P=0.001$ ). Participants with insomnia (29.4%) had a mean PSQI score of  $8.67 \pm 3.83$  ( $P < 0.001$ ), with 73.5% reporting poor sleep quality ( $\chi^2=43.331$ ;  $P < 0.001$ ). The mean PSQI score for patients with RLS (23.1%) was  $7.57 \pm 3.91$  ( $P < 0.001$ ), and 58.4% had poor sleep quality ( $\chi^2=6.590$ ,  $P=0.010$ ). Lastly, participants with bruxism (16.2%) had a mean PSQI score of  $7.59 \pm 4.28$  ( $P=0.003$ ), with 66.7% experiencing poor sleep quality ( $\chi^2=11.479$ ,  $P=0.001$ ). Patients with insomnia, bruxism, and RLS exhibited higher mean PSQI scores than their counterparts, indicating that these groups had lower sleep quality levels.

### *Associations between sleep disorders and health-related quality of life*

When assessing the relationship between sleep disorders and HRQoL using summary scores for physical and mental health components, it was observed that the average mental health QoL scores across all sleep disorders were significantly higher than those for physical health QoL. However, when evaluating physical health QoL on its own, patients with all types of sleep disorders—except for parasomnia—exhibited significantly lower scores. Conversely, patients with all sleep disorders, with the exception of RLS, had significantly lower mental health QoL

**Table 4.** Association between sleep disorders and level of sleep quality in cancer patients (n=333)

Sleep disorders	PSQI score		Level of sleep quality			$\chi^2/P$
	Mean±SD	P-value	Good (PSQI: ≤5 points)	Poor (PSQI: 6–16 points)	Total	
			No. (%)	No. (%)	No. (%)	
Restless legs syndrome						
Yes	7.57±3.91	<0.001	32 (41.6)	45 (58.4)	77 (23.1)	6.590/0.010
No	5.75±3.71		149 (58.2)	107 (41.8)	256 (76.9)	
Insomnia						
Yes	8.67±3.83	<0.001	26 (26.5)	72 (73.5)	98 (29.4)	43.331/<0.001
No	5.12±3.32		155 (66.0)	80 (34.0)	235 (70.6)	
Parasomnias						
Yes	7.09±3.96	0.005	45 (46.9)	51 (53.1)	96 (28.8)	3.032/0.090
No	5.79±3.72		101 (42.6)	136 (57.4)	237 (71.2)	
Epworth Sleepiness Scale						
Yes	7.47±3.99	<0.001	47 (38.2)	76 (61.8)	123 (36.9)	20.486/<0.001
No	5.40±3.53		134 (63.8)	76 (36.2)	210 (63.1)	
Sleep respiratory disorder						
Yes	7.07±3.87	0.002	48 (41.4)	68 (58.6)	116 (34.8)	12.079/0.001
No	5.68±3.73		133 (61.3)	84 (38.7)	217 (65.2)	
Bruxism						
Yes	7.59±4.28	0.003	18 (33.3)	36 (66.7)	54 (16.2)	11.479/0.001
No	5.89±3.68		163 (58.4)	152 (45.6)	279 (83.8)	

PSQI, Pittsburgh Sleep Quality Index.

scores. Additionally, individuals with RLS had the lowest PCS scores, while those with bruxism had the lowest MCS scores (Table 5).

### ***Sleep quality and health-related quality of life***

All sub-dimensions of the SF-36 and the summary scores for the physical and mental health components were found to be significantly lower in poor sleepers. The scores for the physical and emotional role difficulty sub-dimensions were particularly impacted, markedly reducing the QoL in these patients. Poor sleep quality was found to affect the physical health component of QoL more significantly than the mental health component, as shown in Table 6. Conversely, patients classified as good sleepers had significantly higher scores in the sub-dimensions of bodily pain, social functioning, and mental health than those classified as poor sleepers. These patients also had relatively higher scores in the sub-dimensions of vitality, general health, and physical functioning.

### ***Predictive factors of health-related quality of life***

In the linear regression analysis, the PCS and MCS dimension scores are treated as dependent variables, while sleep quality, parasomnias, sleep-disordered breathing, excessive daytime sleepiness, bruxism, RLS, and insomnia are considered independent variables. Poor sleep quality and sleep disorders accounted for 50.95% (95% CI, 37.10%–64.80%;  $R^2=0.293$ ;  $P<0.001$ ) of the

**Table 5.** Association between sleep disorders and health-related QoL in cancer patients (n=333)

Sleep disorders	No.	SF-36 summary scores			
		PCS score	P-value	MCS score	P-value
		Mean±SD		Mean±SD	
Restless legs syndrome					
Yes	77	31.30±8.38	<0.001	39.10±7.63	0.120
No	256	37.50±9.44		40.77±8.39	
Insomnia					
Yes	98	33.51±9.13	0.002	38.46±7.67	0.006
No	235	37.13±9.56		41.19±8.36	
Parasomnia					
Yes	95	36.23±9.82	0.842	38.20±8.82	0.002
No	238	36.00±9.48		41.27±7.85	
Epworth Sleepiness Scale					
Yes	123	32.05±7.19	<0.001	38.22±7.47	<0.001
No	210	38.42±10.00		41.65±8.42	
Sleep respiratory disorders					
Yes	116	34.30±8.36	0.009	38.67±7.58	0.004
No	217	37.01±10.04		41.30±8.45	
Bruxism					
Yes	54	31.68±7.92	<0.001	36.79±7.31	<0.001
No	279	36.92±9.63		41.08±8.24	
Sleep quality					
Good sleepers (≤5 points)	136	40.20±10.08	<0.001	43.54±8.25	<0.001
Poor sleepers (>5 points)	197	33.21±8.06		38.20±7.52	

QoL, quality of life; SF-36, Short Form-36; PCS, physical component summary; MCS, mental component summary.

**Table 6.** Association between sleep quality and health-related QoL in cancer patients (n=333)

SF-36 domains	Level of sleep quality			P-value
	Good sleepers (PSQI: 0–5 points)	Poor sleepers (PSQI: 6–16 points)	Overall SF-36 (n=333)	
	(n=181)	(n=152)	(n=333)	
PF	52.48±34.21	34.47±26.95	44.26±32.34	<0.001
RP	40.33±44.83	8.55±23.91	25.82±40.01	<0.001
BP	61.51±24.10	42.90±22.35	53.02±25.07	<0.001
GH	53.76±18.05	41.82±17.11	48.31±18.58	<0.001
VT	54.58±19.23	40.88±17.18	48.33±19.53	<0.001
SF	62.63±25.65	46.62±23.59	55.33±25.95	<0.001
RE	47.14±45.94	15.57±33.42	32.73±43.59	<0.001
MH	62.29±15.81	51.84±14.75	57.52±16.17	<0.001
PCS	40.20±10.08	33.21±8.06	36.07±9.56	<0.001
MCS	43.54±8.25	38.20±7.52	40.38±8.24	<0.001

Values are presented as mean±SD .

QoL, quality of life; SF-36, Short Form-36; PSQI, Pittsburgh Sleep Quality Index; PF, physical function; RP, role difficulty (physical); BP, bodily pain; GH, general health; VT, vitality; SF, social function; RE, role difficulty (emotional); MH, mental health; PCS, physical component summary; MCS, mental component summary.



deterioration in physical health QoL and 28.25% (95% CI, 15.60%–40.89%;  $R^2=0.207$ ;  $P<0.001$ ) of the impairment in mental health QoL. Additionally, 51.65% (95% CI, 33.46%–69.84%,  $R^2=0.291$ ;  $P<0.001$ ) of the physical health QoL deterioration and 35.26% (95% CI, 19.28%–51.23%;  $R^2=0.283$ ;  $P<0.001$ ) of the mental health QoL impairment can be attributed to these factors.

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## Discussion

### Key results

It has shown that people who sleep well typically have considerably higher scores in physical (average score of 40.20 compared to 33.21; with a significance level  $P<0.001$ ) and mental health components (average score of 43.54 compared to 38.20; with a significance level  $P<0.001$ ) than those who sleep poorly. On the other hand, individuals suffering from insomnia, daytime sleepiness, sleep-respiratory disorders, and bruxism were found to have significantly lower scores in both physical and mental health aspects. Moreover, people with RLS had notably lower physical health scores, and those with parasomnias had significantly lower mental health scores.

### Interpretation/comparison with previous studies

#### *Prevalence of sleep disorders*

Our analysis of patients with various cancers showed that the most common sleep disorders were excessive daytime sleepiness (36.9%), sleep-disordered breathing (34.8%), and insomnia (29.4%). These findings align with Davidson et al. [21], who reported leg restlessness, insomnia, and excessive daytime sleepiness as most prevalent, though the order varied. Our prevalence of excessive daytime sleepiness was higher than Davidson et al. [21] but lower than Jaumally et al. [14]. We found a 35.8% prevalence of sleep-related breathing disorders, notably high in patients with respiratory system cancers (43.1%). Dreher et al. [22] reported a 49% prevalence in lung cancer patients, and Huppertz et al. [23] found a 90% prevalence in head and neck cancer patients. Insomnia prevalence was 29.5%, with the highest rate (46.6%) in respiratory system cancer patients [24].

#### *Types of cancer and sleep quality*

The average PSQI score among our cancer patients was 6.17, indicating moderate sleep quality disorder. Over half (59.2%) were poor sleepers. While no significant relationship was found between cancer type and sleep quality, higher prevalence of poor sleep quality was observed in patients with respiratory system, hematological, and breast cancers. Other studies reported varying rates of poor sleep quality in lung [25] and breast [26] cancer patients, and in those with advanced cancers [27].

#### *Relationship among sleep disorders, sleep quality, and health-related quality of life*

Patients with sleep disorders had higher PSQI scores, reflecting worse sleep quality. The prevalence ranged from 16% to 37%, with bruxism and insomnia patients showing the highest PSQI scores. Cheng and Lee [28] identified insomnia as a major troubling symptom for cancer patients. Sleep disorders were linked to reduced physical health QoL, except for parasomnias. RLS and bruxism patients experienced significant declines in physical and mental health QoL, respectively [10]. Chronic insomnia can lead to neuropsychological disorders and weaken immune defenses [9].

Our study found a strong association between poor sleep quality and lower physical health QoL. Poor sleepers showed notable reductions in physical and emotional-role functioning. Linear regression analysis identified poor sleep quality as a primary factor for the decline in physical and mental health QoL. A recent study [29] found a significant negative correlation between sleep disturbances and all QoL domains, with psychological aspects more affected than physical health. Prior studies have linked sleep disorders with reduced QoL, depression [30], concentration difficulties [31], fatigue, and lower survival rates [12]. The connection between sleep problems and physical or mental health concerns remains varied, with some studies [32] finding a stronger link to physical health issues, while others [33] noted a stronger association with mental health factors.

### Limitations

As mentioned in the methods section, the sampling is conventional. Only voluntary participants were included.

### Suggestion for further studies

Future research should investigate patients' sleep patterns prior to medical care or the onset of illness. Furthermore, present study is a descriptive. Therefore, cohort study or randomized-controlled study is required to compare the QoL of cancer patients with sleep disorders.

### Conclusion

Improving the sleep quality of cancer patients through early detection and social support is comparably important to disease treatment. Addressing factors that impact the QoL of cancer patients, such as pain, sleep disorders, fatigue, and anxiety, can lead to improvements in their QoL. Neglecting these issues; however, can have a detrimental effect on patient well-being, as these symptoms can exacerbate each other and lead to further decline. By understanding the importance of social support and motivation, healthcare professionals and family members of patients can actively contribute to alleviating sleep problems and enhancing the QoL of those affected by cancer.

### ORCID

Vesile Şenol: <https://orcid.org/0000-0002-2001-0527>

Zekeriya Temircan: <https://orcid.org/0000-0001-6017-3403>

### Authors' contributions

Conceptualization: Temircan Z

Formal analysis: Şenol V

Investigation: Temircan Z

Methodology: Şenol V

Project administration: Temircan Z

Writing – original draft: Şenol V, Temircan Z

Writing – review & editing: Şenol V, Temircan Z

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

### Funding

Not applicable.

### Data availability

Data files are available from Harvard Dataverse: <https://doi.org/10.7910/DVN/CMG88I>

Dataset 1. Raw response data from participants

#### Acknowledgments

We would like to thank Dr. Pelin Nar for her support, help, and guidance to make this research possible.

#### Supplementary materials

Supplementary materials are available from: <https://doi.org/10.12771/emj.2024.e5>.

Supplement 1. Explanation of survey tools, including validity test

Supplement 2. Survey questionnaire

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