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ORIGINAL ARTICLE

The Relationship Between Dyspnea and Sleep Quality in Lung Cancer Patients

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ÖZET

Amaç: Bu araştırmanın amacı, akciğer kanserli bireylerde dispne ile uyku kalitesi arasındaki ilişkiyi belirlemektir. **Yöntem:** Tanımlayıcı ilişkisel olarak yapılan bu araştırma, Ekim 2020- Mayıs 2021 tarihleri arasında yapılmıştır. Araştırmanın evrenini; İnönü Üniversitesi Turgut Özal Tıp Merkezi Medikal Onkoloji servisinde yatarak tedavi gören ve Kemoterapi Ünitesinde ayaktan tedavi gören tüm akciğer kanseri tanısı almış hastalar, örneklemini ise; bu hastalar arasından araştırmaya katılmayı kabul eden, araştırmaya alınma kriterlerine uyan hastalar oluşturmuştur. Çalışma 115 hasta ile tamamlanmıştır. Veriler Tanıtıcı Özellikler Veri Formu, Kanser Dispne Ölçeği ve Pittsburgh Uyku Kalite İndeksi ölçekleri kullanılarak toplanmıştır. Verilerin değerlendirilmesinde ANOVA, bağımsız örneklerde t-testi, Mann-Whitney U testi, Kruskal-Wallis Testi, Spearman ve Pearson korelasyon katsayıları ve lineer regresyon analizi kullanılmıştır. **Bulgular**: Akciğer kanserli hastaların yaş ortalaması 60.94±10.62, Kanser dispne ölçeği toplam puanı 27.43±11.71, Pittsburgh Uyku Kalitesi İndeksi ölçek toplam puanı 14.60±3.06 olarak saptanmıştır. Akciğer kanserli hastaların dispne ile uyku kalitesi arasında pozitif korelasyon olduğu (p<0.05), regresyon analizinde ise Kanser dispne ölçeği toplam puanının Pittsburgh Uyku Kalitesi İndeksi puanı üzerine pozitif yönde istatistiksel anlamlı etkisi olduğu saptanmıştır (p<0.05). **Sonuç:** Dispne ile uyku kalitesi arasında negatif yönde bir ilişki vardır. Hastaların dispne düzeyleri arttıkça, uyku bozukluğu düzeyleri de artmaktadır. Uyku bozukluğu yaşayan hastalarda dispnenin değerlendirilip, azaltılmasına yönelik girişimler planlanması önerilmektedir.
Anahtar kelimeler: Akciğer Kanseri, Dispne, Uyku Kalitesi

ABSTRACT

Aim: The purpose of this study was to investigate the relationship between dyspnea and sleep quality in lung cancer patients. **Methods:** This descriptive correlational study was carried out between October 2020 and May 2021. The population of the study consisted of all patients who were diagnosed with lung cancer and receiving treatment as inpatients in the Medical Oncology inpatient clinics and outpatient Chemotherapy Unit at İnönü University Turgut Özal Medical Center. The sample included patients who met the inclusion criteria and agreed to participate in the study. The study was completed with 115 patients. The data were collected using a Personal Information Form, the Cancer Dyspnea Scale, and the Pittsburgh Sleep Quality Index. ANOVA, independent samples t-test, Mann-Whitney U test, Kruskal-Wallis Test, Spearman and Pearson correlation coefficients, and linear regression analysis were used to evaluate the data. **Results:** The mean age of the patients was 60.94±10.62, the mean Cancer Dyspnea Scale score was 27.43±11.71, and the mean total Pittsburgh Sleep Quality Index score was 14.60±3.06. There was a positive correlation between dyspnea scores and sleep quality (p<0.05), while the regression analysis results showed that the total Cancer Dyspnea Scale scores had a statistically significant positive effect on Pittsburgh Sleep Quality Index scores (p<0.05). **Conclusion:** There is a negative relationship between dyspnea and sleep quality. As the dyspnea level of patients increases, their sleep quality decreases. It is recommended to plan interventions to reduce dyspnea in patients with sleep disorders.
Keywords: Lung Cancer, Dyspnea, Sleep Quality

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INTRODUCTION

Lung cancer is one of the most frequently diagnosed cancers worldwide and is responsible for the majority of cancer-related deaths (1). Lung cancer is the most frequent cancer in males, with 41.7 cases per 100 000 males. In females, it ranks fourth out of the 10 most frequent cancers, with 8.7 cases per 100 000 females (2).

Cancer-related symptoms are more common in lung cancer patients. More than 80% of lung cancer patients experience multiple symptoms compared to other types of cancer (1). The most common symptoms of patients diagnosed with lung cancer include dyspnea, insomnia, cough, phlegm, hemoptysis, fatigue, pain, loss of appetite, and weight loss (3).

In the literature, the terms "shortness of breath" and "dyspnea" have been used to define the same symptom, and they refer to the feeling of difficulty breathing (4). Dyspnea is one of the most prevalent symptoms in advanced-stage cancers and lung cancer is one of the top causes of dyspnea, which is seen in 60% of cancer patients (5). The prevalence of dyspnea in patients with advanced-stage cancers was reported as 44.37% (6). Dyspnea weakens the patient and can lead to serious interruptions in daily life activities (5, 6).

Lung cancer patients have sleep disorders and particularly need to be assessed in terms of sleep problems (7). While the rate of sleep problems among cancer patients varies in the range of 19%-40%, it is in the range of 50%-80% in lung cancer patients (7, 8). Lung cancer patients have excessive daytime dysfunction and they have high rates of sleep medication use (8).

Lung cancer is one of the most common cancers in Turkey, and it causes dyspnea and insomnia. It is thought that dyspnea causes insomnia in lung cancer patients by affecting their sleep quality (8). Chen, Yu, and Yang (2008) reported that there is a negative relationship between dyspnea and sleep quality among patients undergoing chemotherapy (9). Similarly, Gelişken Akyüz, Uğur, and Elçigil (2013) reported that lung cancer patients who have respiratory problems have lower sleep quality compared to others (10). Delgado-Guay et al. (2011) reported that there is a negative relationship between sleep quality and dyspnea among patients with advanced cancer (11).

Dyspnea and sleep problems psychosocially affect lung cancer patients and their daily life activities (12). It is considered that in lung cancer, diagnosis at advanced stages, the presence of metastasis-associated symptoms, and treatment side effects cause dyspnea and sleep disorders (13). One of the main responsibilities of a nurse is to plan the care of the patient by aiming at the prevention and solution of dyspnea and sleep disorders (14). The objective of this study was to investigate the relationship between dyspnea and sleep quality in lung cancer patients.

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MATERIAL AND METHODS

Design

This is a descriptive correlational study.

Population and Sample

The population of the study consisted of all patients diagnosed with lung cancer who were receiving treatment as inpatients in the Medical Oncology inpatient clinic and outpatient Chemotherapy Unit at İnönü University Turgut Özal Medical Center.

The sample included patients who met the inclusion criteria and agreed to participate in the study. A convenience sample were used in the study. A total of 167 lung cancer patients visited the inpatient clinic (97 patients) and outpatient Chemotherapy Unit (70 patients) at İnönü University Turgut Özal Medical Center between October 2020 and May 2021. According to the ICD-10 diagnosis classification, the patients who were diagnosed with R06.0 (Dyspnea) and the codes of J00-J99 in in the previous 3 months were excluded from the study. For these diseases/symptoms, the history of the patients was investigated in patient data software. Diagnoses were made by medical doctors from different clinics of the hospital. However, the patients did not have any disease that may lead to dyspnea. Forty-seven patients refused to participate in the study, three patients were diagnosed with COVID-19, and two patients had communication problems. The study was completed with 115 patients.

Inclusion Criteria

The sample of the study included patients who had been diagnosed with lung cancer at least 6 months ago, were over the age of 18, did not have cognitive dysfunction, did not have a condition that would prevent communication, and agreed to participate in the study.

Data Collection

The data were collected between October 2020 and May 2021 by the researcher via face-to-face interviews in patient rooms. The questions on the data collection forms were read by the researcher and answered by the patient. Each interview took approximately 15-20 minutes.

Data Collection Instruments

The data were collected using a Personal Information Form, the Cancer Dyspnea Scale (CDS), and the Pittsburgh Sleep Quality Index (PSQI). The data were collected from the patients, roommates, and companions via face-to-face interviews.

Personal Information Form

The form was developed by the researchers in line with the literature (1, 15, 16) and included 10 questions on the sociodemographic and disease-related characteristics of the patients.

Cancer Dyspnea Scale (CDS)

CDS was developed by Tanaka et al. (2000). The scale consists of 3 dimensions and 12 items (8). The scale was reported as a valid and reliable tool for Turkish society with its high Cronbach's alpha coefficient (0.72). Five items (items 4, 6, 8, 10, 12) assess the sense of effort, 3 items (1, 2, and 3) assess the sense of discomfort, and 4 items (5, 7, 9, and 11) assess

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the sense of anxiety. The possible maximum total score of the scale is 48 (the maximum scores for the dimensions are 16 for the sense of anxiety, 20 for the sense of effort, and 12 for the sense of discomfort). Higher total scale scores indicate higher severity of dyspnea (17). The Cronbach's alpha value of CDS in this study was found as 0.82.

Pittsburgh Sleep Quality Index (PSQI)

PSQI, which was developed by Buysse et al. in 1989, is a self-report scale that is used to evaluate sleep disorders and sleep quality of patients in the previous month (18). The validity and reliability of the scale for Turkish society were assessed in 1996 by Ağargün et al. and Cronbach's alpha coefficient of the Turkish version was 0.80. PSQI consists of a total of 24 items, and the last 5 items are not included in the scoring. In the scale which consists of 7 dimensions (sleep duration, sleep latency, habitual sleep efficiency, subjective sleep quality, sleep disturbances, daytime dysfunction, and use of sleep medications), each item is scored in the range of 0-3, and the sum of the scores of all 7 dimensions provides the total score of the scale. The minimum and maximum scores of the scale are 0 and 21. Scores higher than >5 indicate the presence of poor sleep quality (18, 19). The Cronbach's alpha coefficient of the PSQI in this study was determined as 0.78.

Data Analysis

The descriptive statistics of the data are presented with frequency (n), percentage (%), mean, and standard deviation values. First of all, the normality of the distribution of the data was tested. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test normality. In the cases of normal distribution, an independent-samples t-test was used to compare two independent groups, whereas a one-way analysis of variance (ANOVA) was used to compare three or more groups. In the cases of non-normal distribution, the Mann-Whitney U test was used to compare two independent groups, whereas the Kruskal-Wallis test was used to compare three or more groups. When significant differences were identified among multiple groups, pairwise comparisons were made using post hoc Dunn-Bonferroni tests. In the analyses of the relationships between the continuous variables, Pearson's correlation analysis was used for the normally distributed variables, while Spearman's correlation analysis was used for the non-normally distributed variables. The level of statistical significance was accepted as $p < 0.05$, and the analyses were carried out using the IBM SPSS 25.0 package program.

Ethical Aspects of the Study

All stages of the study adhered to the principles of the Declaration of Helsinki. To conduct the study, ethical approval from the Non-Interventional Studies Ethics Committee at İnönü University (2020/1031) and institutional permission from İnönü University Turgut Özal Medical Center were obtained. The patients to be included in the study were informed that their data would not be shared with third parties, participation in the study was voluntary, and they could leave the study any time they wanted. The patients who agreed to participate in the study provided verbal consent. These steps were followed to ensure

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compliance with the principles of "the protection of patient rights", "privacy", and "informed consent".

RESULTS

We found that 72.2% of the participants were male, 58.3% were retired, and the mean age was 60.94±10.62 years. Fifty-three percent of the participants stated that they did not have any chronic disease, 34.8% were stage IV patients, 75.7% were undergoing chemotherapy, and 61.7% had a history of metastasis. While 55.7% of the patients reported that they had experienced sleep disorders before, 57.4% reported that they had previously experienced dyspnea (Table 1).

Table 1. Sociodemographic, disease-, dyspnea-, and sleep-related characteristics of the patients

	n	%
Gender		
Female	32	27.8
Male	83	72.2
Job		
Employee	6	5.2
Officer	5	4.3
Self-employment	14	12.2
Retired	67	58.3
Housewife	23	20.0
Chronic Disease		
No	61	53.0
Yes	54	47.0
Type of Chronic Disease		
None	61	53.0
Diabetes	19	16.5
COPD	13	11.3
Hypertension	14	12.2
Heart Failure	8	7.0
Disease Stage		
Stage I	25	21.7
Stage II	24	20.9
Stage III	26	22.6
Stage IV	40	34.8
Treatment Protocol		

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Surgical	10	8.7
Chemotherapy	87	75.7
Radiotherapy	13	11.3
Hormone Therapy	5	4.3
History of Metastasis		
Yes	71	61.7
No	44	38.3
Have you ever had a sleep disorder?		
Yes	64	55.7
No	51	44.3
Have you had dyspnea before?		
Yes	66	57.4
No	49	42.6
	Mean ± Standard Deviation	
Age	60.94±10.62	

Mean scores for the CDS total, sense of effort subscale, sense of anxiety subscale, and sense of discomfort subscale were 27.43±11.71, 11.92±5.73, 9.07±4.86, and 6.43±3.77, respectively. Mean scores for the PSQI total, subjective sleep quality subscale, sleep latency subscale, sleep duration subscale, habitual sleep efficiency subscale, sleep disturbances subscale, use of sleep medications subscale, and the daytime dysfunction subscale were 14.60±3.06, 1.95±0.77, 2.75±0.44, 2.63±0.79, 2.62±0.82, 1.74±0.69, 0.69, 0.72±1.04, 2.19±0.88, respectively.

The mean Sense of Discomfort subscale and total CDS scores of the patients differed significantly based on their working status (Table 2). The mean scores of the patients in all subscales of the CDS and their mean total CDS scores differed significantly based on their chronic diseases and history of metastasis (Table 2).

Table 2. Comparison of mean cancer dyspnea scale total and subscale scores based on the sociodemographic, disease-related, dyspnea-related, and sleep-related characteristics of the patients

	Sense of Effort	Sense of Anxiety	Sense of Discomfort	Total Scores
Job				
Working (n=25)	9.80±5.79	7.24±5.19	4.52±3.07[a]	21.56±11.18[a]
Retired (n=67)	12.75±5.29	9.92±4.53	6.98±3.78[b]	29.66±10.76[b]
Housewife (n=23)	11.83±6.61	8.57±5.00	6.91±3.89[ab]	27.30±13.12[ab]
Test Value/p	F=2.475/p=0.089	F=3.040/p=0.052	**F=4.373/p=0.015**	**F=4.632/0.012**

Chronic Disease				
No (n=61)	9.00 (5.00-20.00)	7.00 (2.00-16.00)	8.00 (0.00-12.00)	31.98±10.29
Yes (n=54)	14.00 (1.00-20.00)	11.0 (0.00-16.00)	6.00 (0.00-12.00)	23.39±11.47
Test Value/p	**z=-0.492/p<0.001**	**z=-0.558/p<0.001**	**z=-.647/p=0.008**	**t=4.203/p<0.001**
History of metastasis				
Yes (n=71)	14.00 (2.00-0.00)	10.06±5.21	6.56±3.95	30.07±12.00
No (n=44)	8.50 (1.00-20.00)	7.48±3.76	6.23±3.48	23.16±9.94
Test Value/p	**z=-0.574/p<0.001**	**t=3.850/p<0.001**	**t=2.852/p=0.005**	**t=3.199/p=0.002**
Have you ever had a sleep disorder?				
Yes (n=64)	13.80±5.90	10.30±5.17	6.62±4.08	30.72±12.29
No (n=51)	9.57±4.56	7.53±3.97	6.20±3.35	23.29±9.54
Test Value/p	**t=4.211/p<0.001**	**t=3.151/p=0.002**	t=0.605/p=0.547	**t=3.546/p=0.001**
Have you had dyspnea before?				
Yes (n=66)	15.00 (2.00-10.00)	10.35±5.05	6.88±3.99	31.12±12.09
No (n=49)	8.00 (1.00-20.00)	7.35±4.03	5.84±3.39	22.45±9.14
Test Value/p	**z=-.124/p<0.001**	**t=3.427/p=0.001**	t=1.474/p=0.143	**t=4.205/p<0.001**

F= ANOVA Test Value , t= T-test Test Value, z= Mann-Whitney U Test Value, [abc] Post hoc tests-Multiple Comparisons

In the analyses of the relationships between the disease-, dyspnea-, and sleep-related characteristics of the patients and their PSQI total and subscale scores, we found that the mean Sleep Disturbances subscale scores and mean total PSQI scores of the patients differed significantly based on their chronic disease statuses. Presence of metastasis, history of previous sleep disorders, and history of previous dyspnea experiences were significantly associated with the mean Sleep Disturbances, Use of Sleep Medications, Daytime Dysfunction, and Subjective Sleep Quality subscale scores and the mean total PSQI scores (Table 3).

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Table 3. Comparison of Mean Pittsburgh Sleep Quality Index total and subscale scores based on the sociodemographic, disease-related, dyspnea-related, and sleep-related characteristics of the patients

	Subjective Sleep Quality	Sleep Latency	Sleep Duration	Habitual Sleep Efficiency	Sleep Disturbances	Use of Sleep Medications	Daytime Dysfunction	Total Scores
Chronic Disease								
No (n=61)	2.00 (1.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	2.50 (0.00-3.00)	0.00 (0.00-3.00)	3.00 (0.00-3.00)	15.28±3.00
Yes (n=54)	2.00 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	2.00 (0.00-3.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00)	14.00±3.01
Test Value/p	z=-1.160/p=0.246	z=-1.550/p=0.121	z=-0.198/p=0.843	z=-0.525/p=0.599	z=-2.517/p=0.012	z=-1.313/p=0.189	z=-1.739/p=0.082	t=2.277/p=0.025
Disease Stage								
Stage I (n=25)	2.00 (1.00-3.00) [a]	3.00 (2.00-3.00)	2.00 (0.00-3.00) [a]	3.00 (0.00-3.00)	2.00 (0.00-3.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00) [a]	14.04±2.65
Stage II (n=24)	2.00 (0.00-3.00) [a]	3.00 (2.00-3.00)	2.00 (0.00-3.00) [a]	3.00 (2.00-3.00)	1.00 (1.00-3.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00) [a]	13.67±3.29
Stage III	2.00 (0.00-3.00) [a]	3.00 (2.00-3.00) [a]	2.00 (2.00-3.00) [a]	3.00 (1.00-3.00)	2.00 (0.00-3.00)	1.00 (0.00-3.00)	2.00 (0.00-3.00) [a]	14.92±2.94
Stage IV	2.50 (1.00-3.00) [b]	3.00 (2.00-3.00) [b]	3.00 (0.00-3.00) [b]	3.00 (0.00-3.00)	2.00 (1.00-3.00)	0.00 (0.00-3.00)	3.00 (1.00-3.00) [b]	15.30±3.12
Test Value/p	KW=11.260/p=0.010	KW=0.727/p=0.867	KW=8.560/p=0.036	KW=5.201/p=0.158	KW=7.772/p=0.051	KW=7.517/p=0.057	KW=15.408/p=0.001	F=1.862/p=0.140
History of metastasis								
Yes (n=71)	2.50 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	2.00 (0.00-3.00)	0.00 (0.00-3.00)	3.00 (0.00-3.00)	15.20±3.04
No (n=44)	2.00 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	1.00 (0.00-2.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00)	13.64±2.85
Test Value/p	z=-2.299/p=0.022	z=-0.398/p=0.691	z=-0.978/p=0.328	z=-0.219/p=0.827	z=-3.451/p<0.001	z=-2.100/p=0.036	z=-2.442/p=0.015	t=2.735/p=0.007
Have you ever had a sleep disorder?								
Yes (n=64)	2.50 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	2.00 (0.00-3.00)	0.50 (0.00-3.00)	3.00 (0.00-3.00)	15.37±2.96
No (n=51)	2.00 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	1.00 (1.00-3.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00)	13.63±2.92
Test Value/p	z=-2.790/p=0.005	z=-0.490/p=0.624	z=-0.274/p=0.784	z=-1.127/p=0.260	z=-4.336/p<0.001	z=-2.141/p=0.032	z=-3.0.58/p=0.002	t=3.163/p=0.002
Have you had dyspnea before?								
Yes (n=66)	2.50 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	2.00 (0.00-3.00)	0.50 (0.00-3.00)	3.00 (0.00-3.00)	15.48±3.08
No (n=49)	2.00 (0.00-3.00)	3.00 (2.00-3.00)	3.00 (0.00-3.00)	3.00 (0.00-3.00)	1.00 (1.00-3.00)	0.00 (0.00-3.00)	2.00 (0.00-3.00)	13.41±2.60
Test Value/p	z=-3.078/p=0.002	z=-1.143/p=0.253	z=-0.474/p=0.635	z=-0.678/p=0.498	z=-4.840/p<0.001	z=-2.570/p=0.010	z=-3.812/p<0.001	t=3.810/p<0.001

t= T-test Value, z = Mann-Whitney U Test Value, KW= Kruskal Wallis Test Value, [a,b] Post hoc tests-Multiple Comparisons

There was a positive statistically significant correlation (r=0.544, p<0.001) between the PSQI and CDS scales total scores (Figure 1). According to the results of the linear regression analysis that was conducted to analyze the predictors of the total PSQI scores of the patients, the total CDS scores of the patients had a positive and statistically significant effect on their total PSQI scores. As the total CDS scores of the patients increased, their total PSQI scores also increased (Table 4).
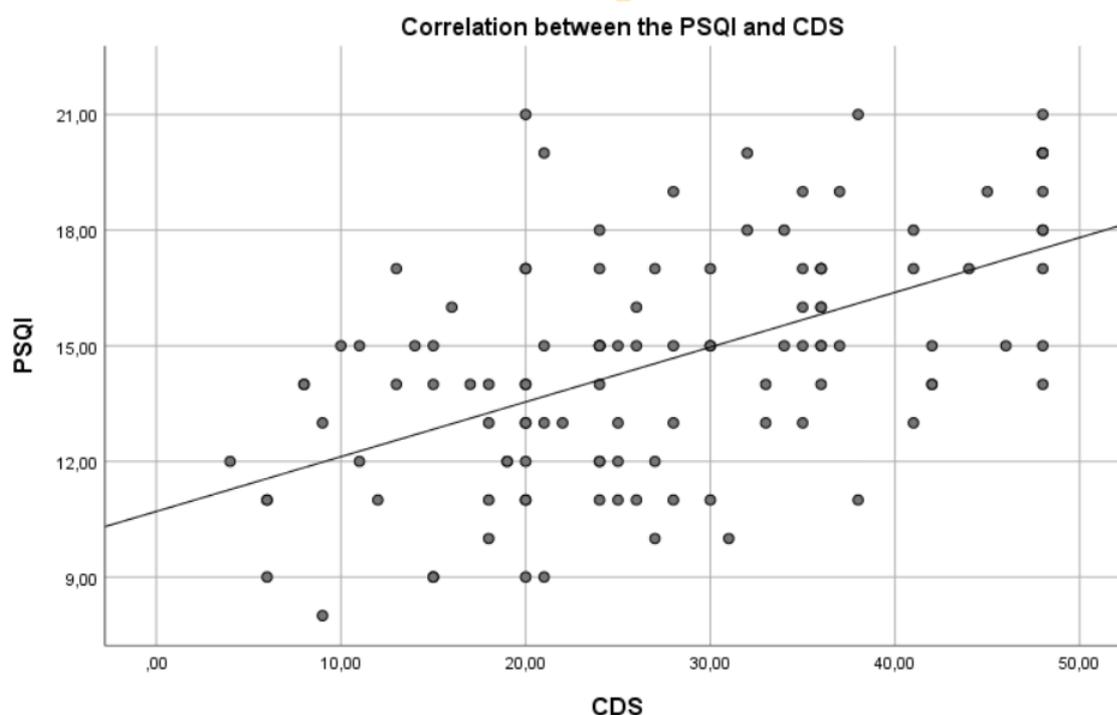

Figure 1. Correlation between the PSQI and CDS

Table 4. Predictors of Pittsburgh Sleep Quality Index total score

	B	β	t	p
Fixed	10.776	-	4.705	<0.001
CDS Total Scores	0.118	0.453	4.957	**<0.001**
Age	0.035	0.122	1.404	0.163

Chronic Disease	0.357	0.059	0.643	0.521
History of Metastasis?	-0.541	-0.086	-1.013	0.314
Have You Ever Had A Sleep Disorder?	-0.357	-0.058	-0.509	0.612
Have you had dyspnea before?	-0.591	-0.096	-0.813	0.418

Model Summary: R=0.579 , R^2=0.335 , Adjusted R^2=0.298 , F=9.085 , p<0.001

The correlation between the two scales was determined as 0.544 and thus, the coefficient of determination p2 was 0.296. Dyspnea had a moderate effect on sleep quality.

DISCUSSION

Lung cancer is a common form cancer worldwide. Sleep disturbances and decreased sleep quality have been reported in lung cancer patients. To improve the sleep quality of lung cancer patients, it is important to investigate the determinants of sleep quality in these patients (14). If nurses are aware of the factors affecting sleep quality in lung cancer, they can manage sleep problems in these patients more effectively. In this study, the relationship between dyspnea and sleep quality was investigated.

In this study, the mean Sense of Discomfort subscale and total CDS scores of the patients were significantly related to their working status (Table 2). The patients who were working had a higher level of functional capacity. Hukire and Poovishnu Devi (2020)

reported that dyspnea negatively affects the functional capacity of cancer patients (20). We believe that the lower level of dyspnea in the working population in our study is related to their functional capacity and the patients who suffer from severe dyspnea may not be able to work.

In this study, the patients who had metastases had higher mean scores in all subscales and total scores of CDS (Table 2). The metastasis of lung cancer to other organs leads to dyspnea and increases the severity of existing dyspnea symptoms (16). Pezzuto et al. (2013) reported that metastasis to the colon from the lung is associated with severe dyspnea (21). Similarly, Hui et al. (2013) reported that dyspnea is associated with metastasis among hospitalized advanced cancer patients (22). Our findings reflect the literature on the relationship between dyspnea and metastasis.

The presence of chronic diseases in the patients in our study was significantly related to their mean Sleep Disturbances subscale and total PSQI scores (Table 3). Mayda et al. also reported a statistically significant relationship

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between the presence of chronic diseases and poor sleep quality in a study conducted in Turkey (23). Shuman et al. (2010) reported that comorbidities in cancer patients negatively affect sleep quality (24). Hayashino et al. (2010) reported that the number of comorbidities has a negative effect on sleep quality among advanced cancer patients (25). For this reason, nurses need to inquire about patients' comorbidities during admission. Nurses should also consider cancer patients' comorbidities while planning investigations to improve sleep quality.

In our study, the disease stages of the patients were significantly associated with their mean PSQI Subjective Sleep Quality, Sleep Duration, and Daytime Dysfunction subscale scores, while the stage IV patients had higher scores (Table 3). In the literature, the prevalence of sleep disorders in the general population has been reported in the range of 5%-35%, while this rate in cancer patients has been reported in the range of 30%-50%. In cancer patients, compared to the general population, sleep disorders are seen more frequently in every stage of the disease, especially in advanced stages (26). Arslan and Fadıloğlu (2009) stated that in cancer patients, the stage of the disease, the duration of the disease, time of hospitalization, and treatment methods lowered sleep quality by causing sleep disorders (27).

There exists no study in the literature regarding the relationship between the CDS and the PSQI. Lung cancer patients experience more difficulty in falling asleep with increasing dyspnea severity, and their habits of sleeping during the daytime increase due to their high frequency of waking up at night. This situation may cause an increase anxiety and disturbance in the patient, resulting in poorer sleep quality (28).

The linear regression analysis to examine the predictors of the total PSQI scores of the patients showed that the total CDS scores of the patients had a positive and statistically significant effect on their total PSQI scores. As the total CDS scores of the patients increased, their total PSQI scores also increased. This result indicated that as the dyspnea severity of the patients increased, their sleep quality decreased. In the literature, there is no other study examining the effect of total CDS scores on total PSQI scores. Sleep disorders are frequently experienced by lung cancer patients. Throughout the course of the disease, cancer patients develop conditions such as dyspnea and sleep disorders. Dyspnea affects sleep and leads to sleep problems in lung cancer patients (28). Nurses need to be aware of the relationship between the CDS and the PSQI when they are planning interventions to improve the sleep quality of lung cancer patients.

Limitations

The limitations of the study included the fact that the sample consisted only of patients receiving treatment as inpatients in the Medical Oncology inpatient clinic and as outpatients in the Chemotherapy Unit at İnönü University Turgut Özal Medical Center, they were selected using the method of random sampling, and their results could be

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generalized only to the group in which the study was conducted.

CONCLUSION

Consequently, there was a negative relationship between dyspnea levels and sleep quality, and the total CDS scores of the patients had a positive and statistically significant effect on their PSQI scores. As the total CDS scores of the patients increased, total PSQI scores also increased, that is, as their dyspnea levels increased, their sleep disorder levels also increased.

According to the results of this study, it may be recommended to regularly assess the presence of dyspnea and sleep problems in lung patients starting with their diagnosis and organizing seminars, workshops, and in-service training programs for nurses about reducing the prevalence of dyspnea and sleep problems.

Conflicts of interest: The authors have no conflicts of interest to declare.

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